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# WOMEN ACCESS TO CREDIT: AN EMPIRICAL EVIDENCE FROM ERITREA

By

**Bahta ,Y.T.**

**(Doctor)**

University of the Free State  
Department of agricultural economics  
P.O. Box 339  
Internal box 58  
Bloemfontein 9300  
South Africa  
Fax: +2751 401 3473  
Phone: +2751 401 9050  
Cell: +27 735591859

**Corresponding author:** E-mail: [Bahtay@ufs.ac.za](mailto:Bahtay@ufs.ac.za) and [Yonas204@yahoo.com](mailto:Yonas204@yahoo.com)

**Strydom, D.B.**

**(Doctor)**

University of the Free State  
Department of agricultural economics  
P.O. Box 339  
Internal box 58  
Bloemfontein 9300  
South Africa  
Fax: +2751 401 3473  
Phone: +2751 401 7036  
E-mail: [DStrategy@ufs.ac.za](mailto:DStrategy@ufs.ac.za)

Donkor Emmanuel

**(Postgraduate student)**

University of the Free State  
Department of agricultural economics  
P.O. Box 339  
Internal box 58  
Bloemfontein 9300  
South Africa  
Fax: +2751 401 3473  
Phone: +2781 071 4854  
E-mail: [edonkor.knust@gmail.com](mailto:edonkor.knust@gmail.com)

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## WOMEN ACCESS TO CREDIT: AN EMPIRICAL EVIDENCE FROM ERITREA

Bahta, Y.T.<sup>1</sup>, Strydom, D.B.<sup>1</sup> and Donkor Emmanuel<sup>1</sup>

### ABSTRACT

This paper assesses the availability of credit for women in Eritrea using a probit regression model. A woman as a variable is fitted into the probit model with other variables. The parameters in the model are estimated using the maximum likelihood approach over the ordinary least square because the dependent variable is a binary. For policy implications, the marginal effects of the explanatory variables are also derived. The result shows that gender and adoption of rain water collection technology had the greatest impacts on women access to credit followed by access to extension officer visit and number of children in the household. Women households had less to access credit facility due to collateral and social constraints, especially in the male-dominated agricultural businesses. Without serve as collateral, women are also cut off from access to credit, and without credit, they often cannot buy essential inputs to boost production. The study recommends that, Saving and Micro-credit program (SMCP) in Eritrea doing valuable work in improving women's access to credit, the government should mobilize resources to coordinate among different stakeholders involved in development programs and the financial institutions to sustained and ensure women's access to credit.

**Key Words:** Women, access to credit, probit model, marginal effect, maximum likelihood approach

### 1 INTRODUCTION

Women play an important role in the economic development of Eritrean. During the struggle for independence they helped transform Eritrean society. Today rural women contribute substantially to the agriculture sector and provide income for their households (IFAD, 2014). Women's contributions to food production and food security would be far greater if they enjoyed equal access to essential resources and services. Without land to serve as collateral, women are also cut off from access to credit, and without credit, they often cannot buy

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<sup>1</sup> Department of Agricultural Economics, University of the Free State. E-mail: Bahtay@ufs.ac.za ; Dstrydom@ufs.ac.za and edonkor.knust@gmail.com.

essential inputs – such as seeds, tools and fertilizer or invest in irrigation and land related improvement measure (FAO, 2014).

The African Gender Development Index (AGDI) and other contemporary research measures clearly show that women's access to economic resources, financial services and other natural resources such as land, in particular, has not improved to a satisfactory extent and has not followed the overall economic growth curve in Africa. Instead, especially in rural areas, women are about to drop from the formal economic sector development. The demand for land that is suitable for cultivation is beyond the available resources of most women in Africa (UNECA, 2007).

One of the most serious obstacles to increasing agricultural productivity in Africa is women's insecure access to land tenure and credit. The consequences of their inadequate land rights are various, including food insecurity, inability to invest in land and denial of access to additional financial resources. Without clear ownership rights, women are not eligible for loans and credits, nor for memberships in agricultural organizations. However, there is a clear consensus that only by inclusion of women in economic life will sustainable grounds for development be created (UNECA, 2007).

Women's access to credit has shown faster improvement than access to other economic resources, due to the intensive work done by various organizations and governments in establishing special credit schemes and programmes targeted to women. However, women's access to formal credit sources such as bank loans remains extremely low compared to men's due to lack of regular income, inability to guarantee the loans and limited access to information. While community-based organizations (CBOs) and non-government organizations (NGOs) are doing valuable work in improving women's access to credit, the economic development is not sustained unless governments take actions to ensure women's access to credit in the formal sector (UNECA, 2007).

Informal businesses in Eritrea have become an important generator of employment and income. Women are the majority of the entrepreneurs in this sector, but they are not able to reach their full potential due to lack of access to suitable facilities, markets, finances, technology, information, training and business skills. Women make up 30% of the workforce and are heavily represented in the informal sector and run 40% of all small and medium enterprises. Eritrea has several micro-finance schemes run by the government and NGOs

(AFDB, 2009). The Savings and Micro-credit Program (SMCP) was established as a component of the Eritrea Community Development Fund (ECDF) in 1996 and has been independently operating since 2002. SMCP is the largest microfinance program in Eritrea; and in 2006, there were 33,167 clients (13,267 women clients) from all zobas (provinces). From 1996 to December 2006, the village bank savings captured Nakfa 72.34 million (USD 4.8 million) (SMCP, 2006). The main objective of the SMCP is the creation of new income and employment in poor communities through the promotion of micro-scale activities.

The Tier-I loan targets clients deemed to be poor or very poor. This includes women and women led households. Under this Tier -I loan, voluntarily organized solidarity groups of 3 – 7 persons of at least 35 clients set up a community bank but the maximum number of clients does not exceed 105 in the village bank. In any case, if the client's number exceeds 105, they split into two or more village banks and thus develop the customers and banks. It is to be noted that the Group members (solidarity groups) guarantee each other's loans. Clients under this particular program can access loans ranging from Nakfa 3,000 (USD 200) to 40,000 (USD 2,667) disbursed in ten progressive loan cycles. Like all micro finance institute loans, SMCP loans are short term. For the first four cycles, the loan term ranges from 3 – 12 months, while loans in the next six cycles can be paid within 3 – 24 months. Indeed, the clients are required to pay the loan in monthly instalments. It is observed that an off-shoot of this particular loan program (Tier- IB) SMCP introduced as an incentive to encourage clients to pay on time allows clients to borrow individually after demonstrating perfect loan repayment records in four consecutive loan cycles (Rena, 2008).

Tier-I loans range from US\$100 to US\$1,000. The second tier loan is an individual loan program. Clients eligible under this loan program can access loans ranging from Nakfa 40,000 (USD 2,667) to 150,000 (USD10, 000) disbursed in six different loan cycles. Each loan is granted based on best performance and full repayment of previous loans. Loan term under this program ranges from 3 – 36 months. Most loans under this program are given to people owning small enterprises and persons with some exploitable skills for working capital and investment capital needs. Unlike in the group loan (Tier-I), for anyone to be eligible under this loan program, collateral/co-signers are a requirement. The second tier loan program has a unique advantage of creating job opportunities (Rena, 2006b). The 2007 report of SMCP revealed that credit is helping women to break cultural barriers and improved the

livelihood of 87% of its clients. Repayment rates increased from 74% in 2006 to 80% in 2007. As of 2007 the main share of loans provided were agriculture (33%), services (59%), and manufacturing (2%). From 1997 to 2007 some 22,600 clients accessed the SMCP, of which 47% were women beneficiaries, 74% of whom were urban residents. As women do not usually qualify for formal sector, i.e. bank loans, they depend on private credit institutions, or even less organized private moneylenders. The high interest rates charged by private moneylenders are a real reflection of the opportunity costs of the loan.

The main objective of the study is to assess the availability of credit for women in Eritrea of Zoba Maekel (central) region using a probit regression model. Women as a variable is fitted into the probit model with other variables. The parameters in the model are estimated using the maximum likelihood approach. For policy implications, the marginal effects of the explanatory variables are also derived. The remainder of the paper is structured as follows. Section 2 provides a literature review of related studies. Section three describes the study areas, followed by a methodology and model adequacy test presented in section four. Section five illustrates results. A summary, conclusion and recommendation of the study are reported in section six.

## **2 REVIEW OF SELECTED STUDIES**

This section provides an overview research reports on access to credit. Similar studies on access of women credit in Eritrea are rare as far as the author's aware. A study conducted by Ondergo and Ochand (2005) in Nairobi mapped the operations of 30 microfinance institutions (MFIs), and concluded that there was conspicuous inadequacy in both policies and control mechanisms to ensure systematic, secure and sustainable functioning of the institutions. A number of problems were identified, including inadequate registration systems and therefore lack of responsibility in providing the services to the customers, lack of professionalism and lack of business security, as institutions are relying excessively on external support from donors. While microcredit programmes have been recognized as a potential powerful tool for poverty reduction, and have had good results and high payback rates especially among the programmes targeted to women, they are still mostly in the hands of donor agencies, having received relatively little focus at the government level.

Study by African Gender Development Index (AGDI) (2004) in 12 African countries (Benin, Burkina Faso, Cameroon, Egypt, Ethiopia, Ghana, Madagascar, Mozambique, South Africa,

Tanzania, Tunisia and Uganda) findings report on poor performance in securing women's access to and control over economic resources, women's access to land on average being less than half of men's respectively. Similar conclusions can be made in the case of credit. Women's access to credit remains lower than men's in Ghana, with an indicator of 0.50. The credits are channelled through the Credit Unit Association (CUA), which has 11 regional branches in the country. Despite the relatively low indicator rate, as many as four out of five women, especially those unmarried decide on the spending of their own savings.

Similarly, in South Africa, based on a survey of employers and self-employed (SESE) in 2001 (conducted by Statistics South Africa), women have received more loans and credits than men. However, as in Mozambique, women tend to take more credits from other moneylenders than banks. Women have also received loans from NGOs and CBOs while men have not used that source at all according to the AGDI report. South Africa's indicator for access to credit is 1.50. It seems that the need for loans and credits has been recognized as an essential tool for improving gender equality in Uganda. Women clients represent over half of the number of the loans and credits taken, the indicator being 0.54, women's access to credit has improved rapidly. In 2000, only 35% of the women had access to some form of credit. In 2002/2003, women represented 55% of all the loan and credit clientele. However, as in most African countries, distribution of loans remains a geographical challenge, as most of the MFIs are located in urban areas, while most of the women occupy rural areas. Despite the positive developments, women are less able to control their earnings in Uganda. The AGDI report indicates that only 45% of the women are able to decide on their expenditure.

Women's access to credit compared to men's remains very low in Madagascar (indicator 0.21) and Ethiopia, indicator being only 0.14. The Demographic and Health Survey (DHS) in 2000 in Ethiopia showed that, despite the limited access to external resources, over 70% of the women are in control of spending their own savings. The survey findings are similar in Benin where women's access to credit is reported to be low (indicator 0.23), but where women are able to control their own earnings and savings satisfactorily (indicator 0.80).

Several studies show that women have proven to be reliable customers with very high repayment rates. For example, a study done in Kenya reveals satisfactory results on women's access to credits provided by microfinance institutions. Women represent 40 - 60 % of all the



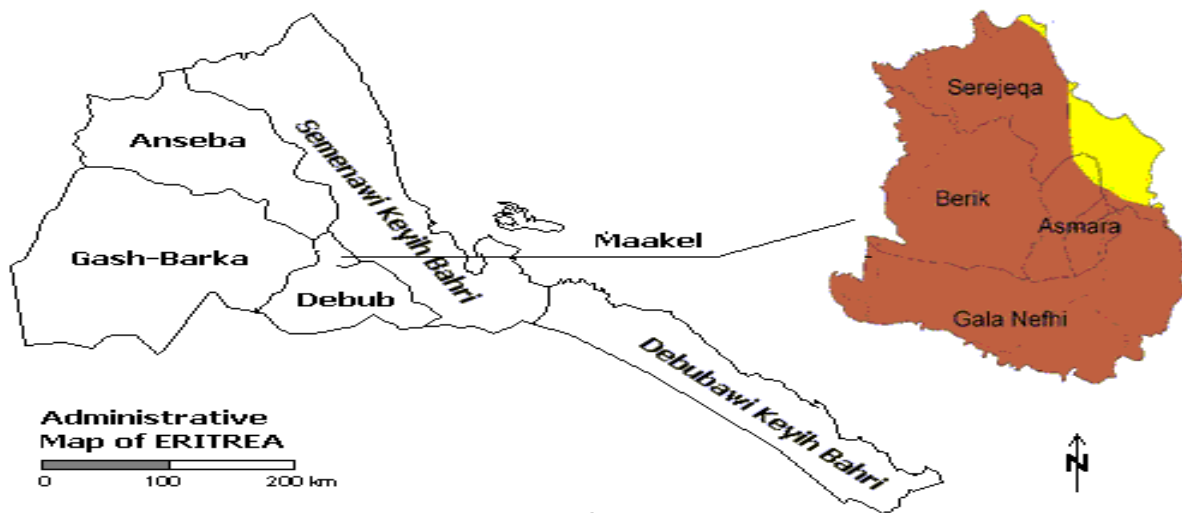
loan takers with repayment rates from 80 to 100 % (Ondergo and Ochanda, 2005). Similarly in Zambia, credit management services Limited was established with the support of several donors in 1992. It offers microcredit schemes for hundreds of women in different provinces. The company reports positive results in expanding existing businesses as well as establishing new ones. Additionally, credit programmes have taught women to save parts of their income to increase the financial security of the family (World Bank, 1999).

### 3 STUDY AREA

Eritrea is located in the Horn of Africa shares borders with Sudan, Ethiopia, Djibouti, and the Red Sea. It has an estimated population of 4.5 million and a total land area of 12.2 million hectares. Its annual population growth is estimated at 2.9%. There are nine ethnic groups and six administrative zobas (provinces/regions). The economy is primarily based on agriculture, fishing, light industry, and services, including tourism (Rena, 2008).

Zoba-Maekel is one of the six administrative Zobas of Eritrea. It is located in the central part of the country with longitude of 38° 41' 36" - 39° 3' 00" East and Latitude 15° 34' 36" North. It shares boarders with Zoba-Anseba in the North, Zoba-Debub in the South, Zoba- Northern Red Sea in the East and Gash Barka in the West. This Zoba is divided into 4 Sub-Zobas namely Asmara, Gala-Nefhi, Berik and Serejeka; with 59 administrative regions and 89 villages. The study was carried out in sub Zoba Gala-Nefhi, Berik, and Serejeka of Zoba-Maekel.

Zoba-Maekel (central) is densely populated and according to the statistical figures of 2008, the number of population is 591,368 consisting of 139,921 households; out of which 27% of the region's population is engaged in agriculture, 23.5 % in trade and services, 18% in manufacturing and handicrafts, 7.5% in civil service, and 24% in casual labour (Zoba Maekel Administration [ZMA], 2009).



**Figure 1:** Map of Eritrea: Maakel region indicted as a Central  
**Source:** Bahta and Haile, 2013.

## 4 METHODOLOGY

### 4.1 Sample Design and Data Collection

Primary data were used in this study. Semi-Structured questionnaires were used in the collection of primary data with the household being the unit of analysis. A questionnaire was administered according to Sub-Zoba to collect quantitative data on households. A total of 120 households were randomly selected from each Sub-Zoba for the household interview (120 households x 3 Sub-Zoba= 360). Hence, a total of 360 households were taken for the interview. Each sub-Zobas were represented by 120 samples to give equal chance of representation in the study as accurate population census is not available in the region. The number of samples from each “Kebabi” was weighed based on the number of household in the village. Out of the planned 360 households, a total of 307 households have responded to the interview while 53 samples were not present during the interview due to various personal reasons. The number of respondents from Galanefhi were 27% (77% of them were men households and 23% female households), 35% from Berik (77% of them were men households and 23% female households), and the rest of 38% were from Serejeka (70% of them were men households and 30% female households). The number of respondents from Serejeka, Berik, and Galanefhi are 117, 106, and 84 respectively. The numbers of households selected for interview are shown in Table 1.

Two - stage sampling technique was adopted, such as the probability proportional size sampling technique was used in the first stage in the selection of the “Kebabi” followed by the second stage where the selection of households was done using simple random sampling in each selected “Kebabi”. Thus, rural “Kebabi”’s was taken as the primary sampling units (PSU’s). Household heads within the sampled PSU’s were taken as secondary sampling units (SSU’s). The sample of “Kebabi”’s were allocated among sub-Zobas proportional to the number of households within each “Kebabi” which implies that the “Kebabi” with higher household number had higher chance to be included in the sample than those with lesser number of households. It should be noted that all sub-Zobas were represented in the sample by at least one “Kebabi” and within the “Kebabi”, the households were selected using systematic simple random sampling technique. Information was collected from November 2010 to December 2011.

**Table1:** Villages selected for the survey in Zoba- Maekel

Sub-Zoba	“Kebabi”	Village	No. of households	Randomly selected	Male households	Female households	Total number respondent
Gala-Nefhi	Merhano	Merhano	900	120	65	19	84
	Adiarada	Adiarada	246				
	Himbirti	Himbirti	1550				
		Adomzemat	230				
	Selaedaero	Selaedaero	300				
Berki	Tsezega	Tsezega	1471	120	82	24	106
	Hazega	Hazega	600				
	Adi ghebru	Adi ghebru + Adi-Tekaly	640				
	Ametsi	Ametsi	360				
Serejeka	Shemanugus Tahtay	Shemanugus Tahtay	600	120	75	42	117
	Weki-Zager	Weki-Zager	587				
	Kwazen	Kwazen	960				
	Shemaneguse Laealy	Shemaneguse Laealy + Mekerka	520				
Total			8764	360	222	85	307

**Note:** “Kebabi” represent village’s administration

**Source:** Author’s observation

## 4.2 Conceptual framework

### 4.2.1 Probit model

The conceptual framework of the study is founded on the theory of utility. Women farmer's decision to access credit is a binary choice and therefore, the study employs the probit model to examine the probability of women getting access to credit. For a woman to decide on the probability of women getting access to credit or not, she first considers the utility obtained from accessing the credit. If the utility derived from accessing the credit ( $U_c$ ) is greater than not accessing ( $U_{nc}$ ) it, then the woman is more likely to access the credit, thus,  $U_c > U_{nc}$ . The woman's decision to access credit is also dependent on a vector of socioeconomic variables. Following Maddala (2001), the Probit model is theoretically written as:

$$Y_i = \begin{cases} 1, & y_i^* \geq 1 \\ 0, & y_i^* \leq 0 \end{cases} \quad (1)$$

$$y_i^* = \mathbf{x}'\beta_i + u_i \quad (2)$$

The probability of access of women accessing credit is expressed by equation (3):

$$P(Y_i = 1) = \phi\left(\frac{-\mathbf{x}'_i\beta}{\sigma}\right) \quad (3)$$

Where  $Y_i$  denotes the observable variable,  $y_i^*$  denotes a latent dependent variable,  $\mathbf{x}'_i$  denotes a ( $M \times 1$ ) vector of explanatory variables,  $\beta$  is a ( $1 \times M$ ) unknown parameter, and  $u_i$  denotes the error term.  $P$  denotes the probability, and  $\phi$  is the cumulative probability distribution.

Taking the partial derivatives of (1) with respect to  $x_i$  gives the respective marginal effects. The marginal effect indicates the effect of unit change in each independent variable on the dependent variable in this study. The marginal effect of a variable is the effect of a unit change of this variable on the probability  $P(Y = 1|X = x)$ , given that all other variables are constant. The marginal effect is expressed as indicated in (4):

$$\frac{\partial P(Y_i = 1 | x_i)}{\partial x_i} = \frac{\partial E(Y_i | x_i)}{\partial x_i} = \phi(\mathbf{x}'_i\beta)\beta \quad (4)$$

#### 4.2.2 Empirical Specification of the Probit Model

Empirically, the probit regression model to examine woman's access to credit is expressed as stated in (5).

$$Ca_i = \delta_0 + \delta_1 Ge_i + \delta_2 Ex_i + \delta_3 Sm_i + \delta_4 Rwc_i + \delta_5 Rm_i + \delta_6 Hl_i + \delta_7 Rd_i + \delta_8 Cp_i + \delta_9 Ms_i + \delta_{10} Age_i + \delta_{11} Edu_i + \delta_{12} Nc_i + e_i \quad (5)$$

where  $Ca_i$  denotes probability of women getting access to credit ( $Ca$  equals 1 if farmer accessed credit and 0 otherwise),  $Ge_i$  denotes gender ( $Ge$  equals 1 if farmer was a female and 0 otherwise),  $Ex_i$  denotes access to extension contact ( $Ex$  equals 1 if farmer accessed extension and 0 otherwise),  $Sm_i$  denotes seed multiplication ( $Sm$  equals 1 if farmer participated in seed multiplication programme and 0 otherwise),  $Rwc_i$  denotes adoption of rain water collection technology ( $Rwc$  equals to 1 if farmer used rain water collection technology and 0 otherwise),  $Rm_i$  denotes remittances ( $Rm$  equals 1 if farmer received remittances and 0 otherwise),  $Hl_i$  denotes hired labour ( $Hl$  equals 1 if farmer had access to hired labour and 0 otherwise),  $Rd_i$  denotes radio ( $Rd$  equals 1 if farmer owned a radio set and 0 otherwise),  $Cp$  denotes cell phone ( $Cp$  equals 1 if farmer owned a cell phone and 0 otherwise),  $Ms_i$  denotes marital status ( $Ms$  equals 1 if farmer was married and 0 otherwise),  $Age_i$  denotes age (years),  $Edu_i$  denotes educational level (number of years of formal schooling),  $Nc_i$  denotes (number of children in the household), and  $e_i$  denotes the error term which captures the unspecified variable. The parameters in equation (5) are estimated using the maximum likelihood procedure. The study chooses this estimation approach over the ordinary least square (OLS) because the dependent variable is a binary and therefore, the maximum likelihood procedure gives efficient and consistent estimates.

#### 4.2.3 Model adequacy tests (testing for multi-collinearity)

The basic assumption of our study is that explanatory variables should not be correlated with each other and if this assumption is violated then it means there is a problem of multi-collinearity. Multi-collinearity may cause lack of significance of individual explanatory variables while the overall model may be strongly significant. It may also result in incorrect signs and magnitudes of regression coefficient estimates, and consequently in inaccurate conclusions about the relationship between explanatory variables. Multi-collinearity problem can be detected by performing the correlation matrix test (Gujarati, 2003).

The correlation matrix between explanatory variables shows that there is no linear relationship among all the explanatory variables because none of the value is greater than 0.90 which suggests that the basic assumption of multi-collinearity has not been violated so multi-collinearity problem does not exist in the model.

A simple measure of multi-collinearity is inspection of the off-diagonal elements  $r_{ij}$  in  $X'X$ . If regressors'  $x_i$  and  $x_j$  are nearly linearly dependent, then  $r_{ij}$  will be near unity. Thus, a correlation coefficient exceeding 0.90 shows a sign of multi-collinearity (Bonate, 2011).

**Table 2:** Result of correlation Matrix

	Sm	Exi	Rm	Hl	Rwc	Rd	Cp	Ge	MS	Age	Edu	Nc
Sm	1.000											
Exi	0.127	1.000										
Rm	0.058	0.121	1.000									
Hl	0.072	0.146	0.018	1.000								
Rwc	0.134	0.162	0.066	0.050	1.000							
Rd	-0.005	-0.047	0.001	-0.054	-0.037	1.000						
Cp	0.028	-0.066	0.004	-0.042	-0.002	-0.087	1.000					
Ge	-0.188	-0.333	0.049	-0.115	-0.103	-0.021	0.124	1.000				
MS	0.195	0.183	-0.037	0.037	0.077	-0.012	-0.120	-0.448	1.000			
Age	0.110	0.099	0.071	0.119	-0.164	-0.000	-0.175	-0.296	0.144	1.000		
Edu	0.061	0.083	0.021	0.026	0.028	-0.097	0.019	0.088	-0.016	-0.342	1.000	
Nc	0.111	0.026	-0.065	-0.033	0.122	-0.023	-0.172	-0.216	0.322	0.013	0.049	1.000

Source: Author's calculation

## 5 RESULTS AND DISCUSSION

### 5.1 Socioeconomic characteristics of the farmers

The socioeconomic characteristics of the respondents are provided in Table 3. Farmers' adequate access to credit is essential to improve and increase the size of their farm business. However, the study reveals that farmers have limited access to credit particularly women. The results indicate that 71 per cent forming the majority did not have access to credit while only 29 per cent accessed credit. Out of those who accessed credit, 86 per cent were men while the remaining 14 per cent were women. The survey data show that 47 per cent of the farmers had access to extension services and among these farmers, 88 per cent were men and few (12 per cent) were women. This result implies that women have limited access to extension services as well as agricultural information. Extension services provide farmers with agricultural information regarding production technologies, input application among others is needed for productive agricultural enterprise. The results also find that 23 per cent of the farmers participated in seed multiplication program. The seed multiplication program seeks to help farmers to produce their own farm seeds without necessarily relying on external

support. Eighty eight percent (88 per cent) of the participants in the seed multiplication program were men while 12 per cent were women.

Agricultural production requires adequate supply of water in order to get higher output. Therefore, farmers were introduced to rain water harvesting technology in which farmers will collect rain water and use it for agricultural production. This is to make the agricultural enterprise more sustainable. Only twenty percent (20 per cent) of the farmers had adopted the rain water harvesting technology while 80 per cent did not use this technology. Among 60 adopters of the rain water technology, the majority (82 per cent) were men while 18 per cent were women. It can be inferred that women have limited access to credit, extension services and agricultural technology (rain water harvesting). Women participation in agricultural program is not encouraging. Very few farmers (9 per cent) received remittances with men (66 per cent) been the majority. Agricultural enterprise is labour intensive and additional labour (hired) is resourceful to carry out various activities on the farm ranging from land preparation to the marketing of the proceeds. The study reveals that most of the farmers (92 per cent) rely on the family labour while 8 per cent hired extra labour to work on the farm. Men were found to hire labour to work on the farm since they have adequate access to credit unlike the women. In contemporary times, radio and cell phones are valuable sources of information on production practices and market for farmers. Radio set and cell phones are quite expensive for the poorly resourced farmers. This connotes that access to credit will be needed to purchase these gadgets. Nevertheless, due to farmers' limited access to credit, only 16 per cent and 3 per cent owned radio set and cell phones respectively.

**Table 3:** Socioeconomic characteristics of the farmers

Variable	Category	Men (N = 222)	Women (N= 85)	Pooled(N = 307)
Credit	Yes	77 (86%)	13 (14%)	90 (29%)
	No	145 (67%)	72 (33%)	217(71%)
Extension	Yes	127 (88%)	17 (12%)	144(47%)
	No	95 (58%)	68 (42%)	163 (53%)
Seed multiplication program	Yes	63 (88%)	9 (12%)	72 (23%)
	No	159 (68%)	76 (32%)	235 (77%)
Rain water harvesting technology	Yes	49 (82%)	11 (18%)	60 (20%)
	No	173 (70%)	74 (30%)	247(80%)
Remittance	Yes	19 (66%)	10 (34%)	29 (9%)
	No	203 (73%)	75 (26%)	278 (91%)
Hired labour	Yes	24 (89%)	3 (11%)	27 (8%)
	No	198 (71%)	82 (29%)	280 (92%)
Radio	Yes	24 (50%)	24 (50%)	(16%)
	No	184 (71%)	38 (29%)	259 (84%)
Cell phone	Yes	7 (78%)	2 (22%)	9 (3%)
	No	215 (72%)	83 (28%)	298 (97%)

Source: Author's calculation

## 5.2 Empirical Results

This section presents the estimated Probit model. This Model discussed in the previous section was estimated using availability of credit access (Ca) as a dependent variables and gender (Ge), assets (radio)(Rd), assets (cellophane)(Cp), hired labour (Hl), remittance (Rm), marital status (Ms), age (Age), education level (Edu), number of children (Nc), seed multiplication (Sm), visited by extension officer (Exi), and rain water collection (Rwc) as independent variables. The estimate of the result of the Probit model analysis is presented in Table 3. For policy implications, the respective marginal effects of the explanatory variables are reported in Table 3 also. The marginal effect indicates the effect of a unit change of a variable on the probability of accessing credit.



**Table 3:** Estimated coefficient for the Probit regression and marginal effect

Variables	Parameter	Coefficients	Average marginal effects	Std.Error	z-Statistics	Prob.
Constant	$\delta_0$	-1.328	-	0.553	-2.4	0.016
Sm	$\delta_1$	0.040	0.012	0.189	0.21	0.834
Exi	$\delta_2$	0.299	0.090	0.174	1.72	0.085***
Rm	$\delta_3$	0.203	0.061	0.291	0.7	0.485
Hl	$\delta_4$	0.350	0.105	0.262	1.33	0.182
Rwc	$\delta_5$	0.467	0.140	0.200	2.33	0.020**
Rd	$\delta_6$	-0.233	-0.070	0.489	-0.48	0.633
Cp	$\delta_7$	-0.177	-0.053	0.214	-0.83	0.408
Ge	$\delta_8$	-0.418	-0.125	0.222	-1.88	0.060***
MS	$\delta_9$	0.035	0.010	0.257	0.13	0.895
Age	$\delta_{10}$	-0.035	-0.010	0.078	-0.44	0.657
Edu	$\delta_{11}$	0.076	0.023	0.064	1.18	0.24
Nc	$\delta_{12}$	0.108	0.032	0.032	3.34	0.001*
Wald chi-square	$\delta_1 = \dots = \delta_{12} = 0$	42.79 (0.000)*				
Log pseudo likelihood	-163.52995					
Pseudo R <sup>2</sup>	0.1195					

\*Significant at 1%, \*\* significant at 5% and \*\*\* significant at 10%

**Source:** Probit regression estimation using the STATA-11 software

The likelihood ratio chi-square of 42.79 with a p-value of 0.0000 tells us that the model as a whole is statistically significant, that is, it fits significantly better than a model with no predictors. An increasing Pseudo R<sup>2</sup> may indicate a better fit of the model. The results in Table 3 show that Gender (Ge), visited by extension officer (Ex), water collection technology (Rwc) and number of children (Nc) are statistically significant. Gender and water collection technology had the greatest impacts on access to credit.

The coefficient of gender was highly significant at 1% and had negative effect on probability of accessing credit. The marginal effect of -0.125 indicates that women are more likely to reduce their probability of accessing credit by 12.5%. Without collateral, women are cut off from access to credit and without credit, and they often cannot buy essential inputs to improve productivity. Without improving women's direct access to and control over resources including credit it is difficult to achieve investments in human capital and have a

stronger impact on children's health, nutrition and education with important long-term implications for families and societies.

Extension visit positively correlated with probability of accessing credit and was highly significant at 1% level. The results show that as farmers' access to extension services increase by 1%, their probability of accessing credit increases correspondingly by 9%. The possible reason for this result could be that farmers who receive extension services are more likely to adopt improved farm technologies which also come at a cost. Women benefit from extension and training services that would teach them about new crop varieties and technologies. Improving women's ability to invest in machinery and other technology and to secure their rights to property would undeniably improve the families' general financial security in the long run. Equally important, but receiving relatively little attention to date, training women to process agricultural products, such as conserving fruits and vegetables would have a positive impact on household food security. Boosting women's access to credit combined with adequate business training has also proven to be an important factor in developing self-esteem and the sense of independence.

Water collection technology had positive influence on farmers' access to credit and was significant at 5% level. As farmers' adopts water collection technology, their probability of accessing credit increases by 14%. Credit is needed to purchase containers required to store the water collected. Access to credit could empower women households to finance their own rain water collection systems for domestic as well as productive use. Rain water collection has proven to be a viable alternative water source in challenging environments where other means of water supply have very little or no potential. Through the promotion of rain water collection; there is also the possibility to enhance the income of women if it is combined with income generating activities and programmes.

As number of children in the household increases, the probability of accessing credit increase correspondingly by 3.2%. The possible reason this results is that large households have higher food requirements and consumption. Therefore, they need to produce enough to meet this requirement. They can achieve this aim by procuring productive farm inputs and adopting improved farm techniques which come at a cost.

The rest of the variable were not significant but seed multiplication (Sm), remittance (Rm), hired labour (Hl), marital status (Ms), and education level (Edu) are more likely to increase the probability of accessing credit while assets (radio)(Rd), assets (celphonne)(Cp), age (Age), would reduce access to credit. For example Farmers who participated in the seed multiplication program are more likely increase their probability of accessing credit by 1.2%.

## 6 SUMMARY, CONCLUSION AND RECOMMENDATION

The main objective of the study is to access the availability of credit for women in Eritrea using a probit regression model. A woman as a variable is fitted into the probit model with other variables. The parameters in the model are estimated using the maximum likelihood approach over the ordinary least square because the dependent variable is a binary. For policy implications, the marginal effects of the explanatory variables are also derived. The result shows that gender and adoption of rain water collection technology had the greatest impacts on women access to credit followed by access to extension officer visit and number of children in the household.

The farmers who participated in rain water collection technology are more likely to increase their probability of access credit by 13%. Farmers who had contact with extension agents are more likely to increase their probability of access credit by 9%, this could be women benefit from extension and training services that would teach them about new crop varieties and technologies. Boosting women's access to credit combined with adequate business training has also proven to be an important factor in developing self-esteem and the sense of independence. As number of children in the household increases, the probability of accessing credit increase correspondingly by 3%, the possible reason could be large households have higher food requirements and consumption. Therefore, they need to produce enough to meet this requirement. They can achieve this aim by procuring productive farm inputs and adopting improved farm techniques which come at a cost. Women households had less to access credit facility from formal sector due to collateral and social constraints, especially in the male-dominated agricultural businesses. Without serve as collateral, women are also cut off from access to credit, and without credit, they often cannot buy essential inputs to improve productivity.

The following variables were not significant but seed multiplication (Sm), remittance (Rm), hired labour (Hl), marital status (Ms), and education level (Edu) are more likely to increase

the probability of accessing credit while assets (radio)(Rd), assets (celphonne)(Cp), age (Age), would reduce access to credit. For example Farmers who participated in the seed multiplication program are more likely increase their probability of accessing credit by 1.2%.

Based on the results of this study, the following recommendations are proposed. While microcredit programmes have been recognized as a potential powerful tool for poverty reduction, and have had good results and high payback rates especially among the programmes targeted to women, SMCP is a good example in Eritrea case, however, still mostly in the hands of donor agencies, having received relatively little focus at the government level. Hence governments should work to sustain the sustainability of the programs and take decisive actions to ensure women's access to credit in the formal sector also. Moreover, micro finance does not address the needs of women trying to expand beyond the microenterprise to medium scale businesses with larger capital needs. Financial products catering for medium-scale enterprises need to be expanded.

The study concludes that, while microcredit schemes for women, provided by SMCP are necessary and much needed, they only provide bandages for more profound structural problems. There are challenges in both the patterns of provision of credits and the uses of the credits. Despite the good results of the microcredit programmes in improving and sustaining household income and well-being, the credits provided by the programmes are small and short-term by nature. Then, the government and other partners should work together to eradicate the obstacles.

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