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DEPARTMENT OF STATSTICIS

A SENIOR RESEARCH PAPER ON THE DETERMINANTS OF WOMEN'S PARTICIPATION IN MICROFINANCE SERVICES IN WOLKITE TOWN

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Abstract

In a subsistence agriculture and low income countries like Ethiopia, where smallholder farming dominates the overall national economy, who are facing with shortage of financial resources not only to purchase productive agricultural inputs but they also need to participate in income generating activities. Since 1996 Micro-finance institutions have made significant assistance to the livelihoods of many people through the provision of financial and supporting services to the poor, especially women in rural environments.

This study examined the determinants of women's participation in micro-finance institutions in Wolkite town. For this study data was collected from a total of 256 women of which 120 are participants and 136 of them are non-participants in micro finance service by using simple random sampling method. The analysis of this study was conducted using both descriptive statistics and inferential statistics. The descriptive statistics indicates that participant women's are less than non- participants. Whereas the estimation results of the logit model indicates out of 18 explanatory variables used 7of them are significant.

Key words: Micro finance, women Participation and logit model

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ACRONYMS

CSA	Central Statistics Authority
MDG	Millennium Development Goal
MFIs	Microfinance institutions
MFIS	Microfinance institutions Sector
NBE	National Bank of Ethiopia
REST	Relief Society of Tigray
RUSACCOs	Rural Saving and Credit Cooperatives
SACCOs	Saving and Credit Cooperative
UNDP	United Nations Development Program
UNMDG	United Nation Millennium Development Goal
VSLA	Village Savings and Loan Association

CHAPTER ONE

INTRODUTION

1.1 Background

Microfinance is supposed to be anew field of financial sector with the aim of providing financial services to low income clients who traditionally lack access to banking microfinance when extending to people. Some argued that the cause of poverty in developing economies among other things is that the poor does not have access to credit for the purpose of working capital as well as investment for its small business (Dereje. K et al, 2013).

The beginning of formal micro finance programs can be traced back to the 1950s after World War II. They proliferated in the 1960s and 1970s and in the process, lending methodologies suitable for low income clients in both rural and urban areas were developed (UNDP, 1998). By the 1970s some commercial banks particularly in some parts of Asia, had gained decades of experience in mobilizing large amounts of saving from rural people.

According to the World Bank, Africa as a continent had been left behind in the development of microfinance programs. This is because Africa's microfinance institutions tend to be smaller and less advanced as compared to those in Asia and Latin America. However, there is a common factor in the objective of the microfinance programs globally. The microfinance programs are often designed for the poor of whom women are the majority (Benedicta T. et al, 2016).

MFIs are a 1990s phenomenon in Ethiopia. The Microfinance proclamation in 1996 marked the start of deposit taking MFIs in Ethiopia (Ayele, 2015, p.119). However, the first microfinance service in Ethiopia was introduced as an experiment in 1994, when the Relief Society of Tigray (REST) attempted to rehabilitate drought and war-affected people through the rural credit scheme. It was inspired by other countries' experiences and adapted to the conditions of the Tigray region (the northern part of Ethiopia). In the second half of the 1990s, as a result of its success, the microfinance service was gradually replicated in other regions (Gebrea K.,2013).

However, Ethiopian microfinance sector is one of the fastest growing in the world, it has recently progressed from humanitarian orientation to combining outreach and viability missions (Ayele, 2015, p.119).The Microfinance institutions in the country reached to 38 MFIs by end of 2019, according to the NBE (NBE-Annual Report, 2019).

1.2 Statements of the problem

Women constitute about 50 percent of the Ethiopian population. Women are also engaged in different sectors of the economy. Even though rural women are major laborers in the agriculture sector, they hardly obtain proportionate earnings. Especially, in the rural parts of the country,

women engage in a highly time consuming workloads like in crop production and animal husbandry almost equally with their male partners. On the other hand, they are engaged with activities supporting the agricultural production such as food preparation, fetching wood and water, child rearing etc. Even if this is the reality, due to cultural problems, UN participatory policies and lack of awareness, women continue to be burdened with heavy workloads (Tesfay A.D; 2003).

Women who constitute half of the population that also constitute the majority of disguisedly unemployed segment of the population are the most affected by poverty, and they have not been exposed to the economic opportunities that would enable them practice in alternative income generating activities. Lack of access to be engaged in off-farm activities i.e. income generating activities makes women to be affected by the low level and harsh conditions of the rural life (Gebra K.2013)

According to the World Banks Gender Statistics Database, women have a higher unemployment rate than men in virtually every country. In general, women also make up the majority of the lower paid, unorganized informal sector of most economies. These statistics are used to justify giving priority and increasing women's access to financial services because women are relatively more disadvantaged than men (www.genderstats.worldbank.org).

Now days many scholars, policy makers and development planners have started advocating the important role of the emerging new phenomenon, micro-finance program, for the advantage of poor Ethiopian women. The UN MDG a study published in September 2020 found that poverty increased by 7% in just a few months due to day covid-19 pandemic, even though it had been steadily decreasing for the last 20 years BMGF (2020).

The MDG document recognizes micro finance as a powerful instrument to alleviate poverty and empower women. The government of Ethiopia has been providing attention to reduce poverty in the country through different mechanisms. However, Ethiopian microfinance sector is one of the fastest growing in the world; it has recently progressed from humanitarian orientation to combining outreach and viability missions (Ayele, 2015, p.119).

Women's in Wolkite took enormous responsibility that made it difficult for women to be able to support themselves in the absence of their spouse this explain how women's are venerable to poverty especially those women's are heading the family.

Microfinance has been developed to fill these gaps with increasing assistance from the various financial institution and other donors microfinance services is emerging as a power full tool to reduce poverty and improve access to financial services for the poor women's of Wolkite town. Therefore, in order to assess the problem the study will answer the following research question.

- ✓ What are the factors that determine women's participation in microfinance services in Wolkite town?
- ✓ What is the most influential factor for the participation of women is in microfinance?

1.3 Objective of study

1.3.1 General objective

- ➢ The main objective of the study is to identify the major socio-economic determinants of women's participation in micro-finance service in Wolkite town.

1.3.2. Specific objectives

- ☞ To identify the major determinants of women's participation in micro finance
- ☞ To compare participants and non –participants overall improvement based on some selected variables

1.4. Significance of the study

The finding of the study is believed to show the major factors that contribute women have to participate in MFIS. From this study interested researcher's in the area are expected to get a good knowledge on enhancing finance intermediate for women and their improvement in decision making. Moreover, the result of the study will provide additional information about the program participants in MFIS and will produce inputs for policy makers and executive bodies.

1.5 Scope of the Study

The research will be doing based on the data collects from Wolkite town. The study specifically focuses on analyzing factors that determine participation of women's in micro finance services in the study area. The finding of the study to other areas may not be feasible besides the research design employed.

1.6 Limitation of the study

The basic things that limit this study not to be as it was expected are

- ❖ The study is on the information from primary data
- ❖ The study is based on limited factors i.e. the data of all factors are not available
- ❖ Shortage of time also significantly limits this study.
- ❖ There is also shortage of budget to get the overall information and internet access.
- ❖ Lack of the detailed information about the location of governmental offices.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical literature

2.1.1 Concept and definition of Microfinance

Microfinance is referring to the provision of financial services such (credit, insurance, payments) affordably, targeting mainly the poor. Microfinance emerged at the end of the last century as a financial instrument to serve low-income households who are unable to access the formal financial services provided usually through commercial banks. However, Microfinance initially emerged in a form of microcredits programs provided to the poorest people to help them establish their small businesses and play out their way to get out of poverty (Abay Yimer, 2011,p.151).

Microfinance emerged institutionally on a popular large scale in the 70s decade of the last century, with Grameen Bank, which established in 1976 by Muhammad Yunus in Bangladesh. However, historically, it exists as an informal financial service with small operations such as savings and small credits since the 18th century. Kagan argued that the "first occurrence of micro lending is attributed to the Irish Loan Fund system, introduced by Jonathan Swift, which sought to improve conditions for impoverished Irish citizens" (2019).

Microfinance institutions differ from formal commercial institutions in many ways: First, from the mission, the aim of microfinance institutions is not the profitability as much as the social-based mission to support low income and unemployed populations, and also, in particular, most vulnerable groups such as the women (Merra& Abafita& Ayalew,2019, Second, the source of funds for microfinance institutions which usually come from international development banks and Donors and NGOs (Abay & Koru& Abate& Berhane, 2019) Finally, they differ also in the form of financial work methodologies and approaches for the financial operations either credits/landings, insurance, or payments (Löscher, 2019).

2.1.2 Microfinance Development in Ethiopia

The definitions of microfinance given by different scholars contain some similar pointes. They describe microfinance as provision of a small amount of loan for the poor, specifically the rural poor living in developing country.

Ethiopia is one of the poorest countries in the world. Micro financing in Ethiopia was started in 1994/95 to reduce poverty, and since then developing microfinance in Ethiopia has encouraged the further spread of modern financial services in the country. The program believes to reduce the poverty by giving loans for the poor. Although the development of deposit-taking MFIs started only in 1996, the industry has shown outstanding growth Microfinance started in Ethiopia after the issuance of the proclamation of licensing and supervision of microfinance institutions

(proclamation number 40/1996) E.C or 40/2004 G.C. After the issuance of this proclamation 30 microfinance institutions (MFIs) such as have been licensed by National Bank of Ethiopia. Currently, there are 35 Micro Finance Institutions operating in different regional states of Ethiopia (Association of Ethiopia Micro Finance Institution, 2020).

Some microfinance institutions provide non-financial services for their clients. But in our case, most of the micro finances are known by the provision of a small amount of credit and saving services (Muluken and Mesfin, 2014).

2.1.3 Factor influencing determinants of women participation in microfinance service

There are several factors that influence women's participation in microfinance services and this includes are:- age, saving, level of education, social participation, credit, religion, marital status, family size, main occupation, income, educational status and land ownership.

2.1.4 Women's Economic Empowerment through Microfinance

The microfinance sector supports the community in its transition towards the country's development and peace and building. According to Rahman et al. (2017), the microfinance industry supports local economic development by providing the needed financial and non-financial services for small enterprise development. Some researchers consider microfinance as a survival strategy in a time of disaster and sustainable peace development (Yousuf & Dawit, 2014; Khanday, Shah, Mir, & Rasool, 2015; Sell & Minot, 2018).

In Ethiopia context, supervision and Licensing Microfinance Proclamation No. 626/2009 define microfinance as "financial services providers including credit, savings, drawing, transferring money, and related services." This microfinance business definition does not confine the microfinance institution to only credit. The microfinance sector supports women financially by providing seed money and supports women to get constant income to their families (Tandon, 2016; Rashid, John, Consolatta, & Stephen, 2015). Women's economic development generated self-esteem and respect for women microfinance beneficiaries (Khanday et al., 2015).

2.1.5 Revolution of formal micro finance in Ethiopia

Formal microfinance services as stated above, only 22% of the adult population has access to formal financial institutions. In Ethiopia, all the formal financial institutions are domestic and there are currently no international financial institutions operating. In the country, there are 19 commercial banks, 17 insurers, and 34 MFIs registered by the NBE across the nine regions and two city administrations of Addis Ababa and Dire Dawa. Apart from the Commercial Bank of Ethiopia and the Development Bank of Ethiopia, all other banks were established within the last two decades.

The widely available financial products of banks are saving; enterprise and personal loans, letters of credit for export transactions, and recently some have started mobile and digital banking. MFIs offer saving and micro loans for small and medium-sized enterprises (SMEs) and farmers. Limited access to finance means young people have to obtain finance to start or expand a

business from the informal sources such as RUSACCOs, SACCOs, VSLA, family, or friends. Generally, the lack of diversified financial products and limited geographic coverage of formal financial institutions coupled with challenges to access skills training, agricultural inputs, and markets exacerbate youth unemployment in rural and urban areas(Esayas .M and Jane .W, 2020).

2.2. Empirical literature review

Participation in micro-finance has been increasing from time to time in several developing countries. Various studies conducted in different countries on the performance of micro-finance institutions attest to this fact (Paolo, 2010). According to paper conducted by Borchgrevink (2011), on marginalized groups, credit and empowerment for the case of Dedebit Credit and Saving Institution (DECSI) of Tigray and he indicated as female headed households , young households , rural land less and urban dwellers who live through renting houses are some of marginalized group of peoples.

Through two –phase assessment, the study found that DECSI's programmer has had positive impact on the livelihood of and as well enhanced the social and political position of many clients. Concerning the constraints for economic development, the study noted poor rainfall, small farm size, and shortage of labor during peak agricultural seasons as the main constraints (Alemayehu, 2008)**.**

As cited in sisay (2008) variables like gender, educational status, house hold labor and farm size are factors that affect the probability of choosing formal credit sectors((like choosing micro finance institutions) positively. Furthermore, factors like education, credit information and extension visits were the variables that increase decision making ability of women at house hold level and enhance the information access and base for better and maximized decision making purpose. In addition, this helps to compare advantage and disadvantage of choosing appropriate credit lending organization.

2.2.1 Overview of Wolkite credit and saving institution

Wolkite saving and credit institution was established in the southern region and aims to fill the gap of formal institutions by meeting the need of small-scale borrowers in income generating schemes. Wolkite credit and saving institutions also had significant impact on asset creation improving employment as well as back ward linkage at macro level. Wolkite town has been selected for the present study. Therefore, it is important to conduct research on use microfinance services. Furthermore, the statistical model that is applied in this study will be binary logistic regression model to identify the factor that determines women participation in microfinance service.

2.2.2 Some reviews related to the Methodology of the study

According to the study conducted by (Dereje Kifle et al., 2013) revealed that saving, income and landownership were the significant determinants of the women's participation decisions on

microfinance services therefore, the study conclude that creating an enabling land access institutions and capital asset accumulation were priority strategy for microfinance development.

The result of the study, the mean age of the respondent laid on productive age category which was 30 years average age difference among micro finance users and non-microfinance users was also statically significant at 5% level even if the average economic difference was very invisible (0.21 years). The difference between microfinance users and non –microfinance users in relation to level of education statistically significant 5% level (Dereje Kifle et al., 2013).

CHAPTER THREE

METHODOLOGY

3.1 Description the Study area

This study would be conducted in Wolkite town, which is located about 158km southwest of Addis Ababa. Wolkite Town is found between Addis Ababa and Jimma in Gurage zone in the Southern Nations, Nationalities, and Peoples regional State (SNNPRS) in Ethiopia. Wolkite Town has a total population of 83,954 of whom 43,293 are males and 40,661 females from this 21496 is women (CSA, 2020). The climatic condition of the town is Wayne Degas. Thus, town has attitude and longitude of 8%17 AND 37'47'percentage E and elevation point between 1910 and 1935 meter above sea level.

3.2 Study population

The target population consists of all women who live in Wolkite town.

3.3 Sampling techniques

Sampling technique is a system of taking a small ratio of observation from large population with the aim of getting information of those large populations from the sampled observation by using some statistical techniques. For this study, simple random sampling technique will be employed. Simple random sampling is the most widely used probability sampling method because it is easily to implement and easily to analysis. In simple random sampling all women's are equal likely to be selected as a sample; therefore, to consider all women including in the sample we used simple random sampling technique.

3.4 Sample size determination

To conduct a research, we always required a sample a population and we have to use appropriate sample size. Appropriate sample size is very important, because taken too large sample implies waste time, resource and money while small sample size was lead as to wrong conclusion. Therefore, the sample size should carefully determine. The sample size determination formula is adopted for this study was described as follows (Cochran 1977)

$n_o = (z\frac{\alpha}{2})^2 \frac{pq}{d^2}$ q= 1-p ..... (3.1)

Where; z= standard normal distribution at α/2

n_o = the desired sample size

p = proportion of women microfinance services users

q= proportion of women microfinance services non-users

d^2= degree of accuracy

According to the study conducted by Dereje Kifle et al.(2013) at Dire Dawa, the proportion of women microfinance users is around 60 percent. Mathematically,

$n_{0=}$ $(1.96)^2 0.6*0.4)/0.06^2$=256.1 approximately =256, where $Z\frac{\alpha}{2}$ =1.9; P= 0.6; q= 0.4; d= 0.06 Therefore, the ratio of n_0 and N=21496 is less than 5 percent. Thus the sample size (n) of the study is equals n_0 (i.e $n_{0=}$ n= 256).

3.5 Variables of the study

In this study, two types of variables are incorporated. These dependent variable and independent variables are supposes to predictors of the dependent variable.

3.5.1 Dependent variable

Microfinance services: categorized as microfinance service user women (1) and non-user (0)

3.5.2 Independent variable

Variable	Category of variable
Age of the women	1. <25
	2. 26-36
	3.37-48
	4. 48-58
	5. >58
Religion	1. Orthodox
	2. Catholic
	3. Protestant
	4. Muslim
	5. Other
Marital status	1. Married
	2. Single
	3. Divorced
	4. Windowed
Level of education	1 Primary
	2. Secondary
	3. higher education
Income	1. < 1000 2. 1000-2000
	3. 2001-3001
	4. >3001
Family size	1. 1-4
	2. 5-8

	3. >9
Main occupation	1. Government employers
	2. farmer
	3. Shopkeeper
	4. Other
Saving account	1. Yes
	2. No
Social participation	1. Poor
	2. Good
	3. Very good
	4. Excellent
Credit	1. yes
	2. no
Mortgage	1. Yes
	2. No
Family budget	1. yes
	2. no
Farmland	1. yes
	2. no
Residence	1. rural
	2. urban
Different supports	1. yes
	2. no
Money responsibility	1. husband
	2. you
	3. otherwise
Change after use	1. yes
	2. no
Own house	1. yes
	2. no

3.6 Method of Data Collection

There are two types of method of data collections namely; primary and secondary method of data collection. In this study, primary data collection method would be used.

3.7 Method of Data Analysis

To analyze the collected data, the study would be used both

- Descriptive and
- Inferential statistics.

3.7.1 Descriptive Statistics

Descriptive statistical analysis summary measure such as number and proportion would be used to describe the sample information. It is utilized numerical and graphical methods to look for patterns in the data set to summarize and to present that information in convenient form. It describes the data collected through charts, frequency table, Statistical graphs and so on. In this study, frequency tables and pie chart would be used.

3.7.2 Inferential statistics

It deals with making inference or conclusion about population based on data obtains from a limited number of observations from population. In this study, we would be used both chi-square test of independency and binary logistic regression model to analyze data.

3.7.3 Chi-square test of Independence

The chi square test of independence is used to test the association between two variables. It is used to analysis categorical data. The chi- square independent test is use to whether there is association between dependent and independent variable (Bluman, 8th Edition)

Here,

$$\chi^2 = \sum\sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \sim \chi^2_{\alpha}((R-1)(C-1)) \quad \text{..... (3.2)}$$

χ^2 cal=chi square calculated

O_{ij}= observed frequency.

E_{ij}= expected frequency.

The test statistics is distributed approximately as chi-square with (r-1) (c-1) degree of freedom. Note that: c is number of the columns on the data sand r is number of rows on the data.
Test procedures for independence of chi-square

Step 1: stated the null hypothesis and alternative hypothesis

H_o: the two factors are independent.

H_1: the two factors are dependent.

Step2: Determine α-level of significance

Step3: Test Statistic

$$X^2 = \frac{\sum_j^r \sum_i^c \left(o_{ij} - E_{ij}\right)^2}{E_{ij}^2}$$

The degree of freedom associated with contingency table degree of freedom= (number of rows-1) (number of columns-1) =(r-1) (c-1); finding the critical value, $X^2\alpha(r-1)(c-1)$

Step4: concluded based on the decision. Reject H_O if $X^2cal > X^2\alpha$ (r-1) (c-1), otherwise accept H_o. or Reject H_o if p-value is less than the level of significance (p-value <α).

Step5: Conclusion.

Assumptions of chi- square test of independence

- The populations must be normally distributed for the variable under the study.
- The observations must be independent each other.
- The sample must be randomly selected from the population.
- The sample size is large.
- Each data cell should contain at least five observations
- The expected frequency for each category must be 5 or greater than 5

3.8 Logistic Regression Model

Logistic regression is a special case of generalized linear model in which the mean of the response variable is related to explanatory variables through a regression equation. It is a type of regression analysis used for predicting the outcome of categorical dependent variable (a dependent variable that can take on a limited number of values whose magnitude are not meaning full but whose ordering of magnitude may or may not be meaningful) based on one or more predictor variable. It is also used in estimating empirical values of the parameters in a qualitative response model. The relation between the predictor response variables is a linear function in logistic regression, instead the logistic regression function is used which is the legit transformation of Θ

$$\theta = \frac{e^{(\alpha+\beta 1x1+\beta 2x2+\cdots+\beta pxp)}}{1+e^{(\alpha+\beta 1x1+\beta 2x2+\cdots+\beta pxp)}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(3.4)}$$

Where α=the constant of the equation

β=the coefficient of the predictor variable

3.8.1 Binary logistic regression

The dependent variable in binary logistic regression is usually dichotomous, that is, the dependent variable can take the value "0" with probability of success (participants) and the value 1 with probability of failure (non-participants). The model for logistic regression analysis assumes that the outcome variable Y is categorical, for example, binary or dichotomous.

In this study the binary logistic model is used to analyze whether the dependent variable on the participants or not. The dependent variable in this case is dummy variable, which take the value of (0) for participants and (1) otherwise. This model allowed one to predict out comes, from set of variables may be continuous, discrete and dichotomous or mix of any of these.

Where, are the model parameters and for this study the dependent and explanatory variables are defined as

$$Yi=\begin{Bmatrix} 0\ if\ ,participants \\ 1, otherwise \end{Bmatrix}$$

Moreover, other explanatory variables may be include in our study based on the data would be collected from the respondents.

A model with one or more predictors is fit using an iterative reweighted least squares algorithm to obtain maximum likelihood estimates of the parameters. Binary logistic regression has also been used to classify observations in to one of two categories and it may give fewer classification errors than discriminates analysis for some cases. The model for the binary logistic regression is given as:

$$\{\frac{p}{1-p}\} = exp^{\beta 0+\beta 1x1+\beta 2x2+\cdots+\beta kxk}$$

$$ln\ \left\{\frac{p}{1-p}\right\} = \beta 1 + \beta 1x1 + \beta 2x2 + \cdots + \beta kx \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

Where,

- ✓ P= the probability women participants
- ✓ 1-p= the probably woman non-participants
- ✓ βo= is constant term.
- ✓ β_is are coefficient of the predictor variable
- ✓ X_i, i=1, 2, 3…, k is independent variables.

So by using SPSS we are going to obtain values for each coefficients because the model have been Programmed in to available logistic regression packages like SPSS. We used in this study SPSS version 16.

3.8.2 Odds Ratio

Logistic regressions work with odds so it is necessary to define both odds and odds ratio. The odds are simply the ratio of the probabilities for the two possible outcomes. If p is the probability that the event will occur, then 1 –p is the probability that the event will not occur:

Odds=$\frac{p}{1-p}$

In the 2 × 2 tables, within row 1 the odds of success are odds1=$\frac{p_1}{1-p_1}$and within row 2 the odds of success equal odds2=$\frac{p_2}{1-p_2}$.The ratio of the odds from the two rows

$$pi = \frac{odds1}{odds2} = \frac{p1(1-p2}{p2(1-p1})$$

Where p= is probability of success, 1-p= is probability of failure

Pi is called odds ratio. Whereas the relative risk is a ratio of two probabilities, the odds ratio p_i is a ratio of two odds. The model for p-explanatory variables (i.e. x_1, x_2… x_p) is given by:

Logit (Π(x)) =log ($\frac{\pi(x)}{1-\pi(x)}$) =α+β_1x_1+β_2x_2+…+β_px_p …… (3.6)

i=1, 2… p

Where π(x) is the conditional probability of success and is given by:

\ $\pi(x) = \frac{\exp(\alpha+\beta 1X1+\beta 2X2+\cdots+\beta pXp)}{1+\exp(\alpha+\beta 1X1+\beta 2X2+\cdots+\beta pXP)}$

Where, π the probability of success and 1-π is the probability of failure.

Interpretation of odds ratio are this $e^{\beta j}$ is the factor by which the odds changes when the jth independent variable increase by one unit.

Properties of odds ratio

- Each odd≥ 0, and $\theta \geq 0$.
- θ= 1 when$\pi_1 = \pi_2$: the two variables are independent each other.
- If rows interchanged, or if columns interchanged $\theta \rightarrow \frac{1}{\theta}$.

Note: if β_j is positive then the odds increase and if β_j is negative, the odds decrease.

3.8.3 Parameter Estimation for Logistic Regression Model

To estimate the parameters of logistic regression model, the two estimation methods mostly uses are maximum likelihood and non-iterative weighted least squares method. When the assumption of normality of the predictors does not hold, the non- iterative weighted least squares method is less efficient. In contrast, the maximum likelihood estimation method is appropriate for estimating the logistic model parameters due to this less restrictive nature of the underlying assumptions. Thus in this study the maximum likelihood estimation technique would be applied to estimate parameters of the model.

3.9 Goodness of Fit of the model

The goodness of fit of a model measures how well the model describes the response variable. Assessing goodness of fit involves investigating how close values predicted by the model are to the observed values. The appropriateness of the fitted logistic regression model needs to be

examined before it is accepted for use as in the case of all regression models. In practice, several different measures exist for determining the significance or goodness of fit of a logistic regression model. These are Pearson, Hosmer-Lemeshow, likelihood ratio test and the classification table. In theoretical sense, all measures are equivalent.

To be more precise, as the number of observation goes to infinity, all measures converge to the same estimate of the model significances. The test can detect major departures from a logistic response function (Alan, 1990).

3.10 Assessment of Model Adequacy

After the model is fitted, the next important step is checking the model adequacy. There are several steps involved in assessing the appropriateness, adequacy and usefulness of the model. First, the overall goodness of fit of the model is tested. Second, the importance of each of the explanatory variables is assessed by carrying out statistical tests of the significance of the coefficients.

3.10.1 Test of overall model fit

3.10.1.1 Likelihood-Ratio Test

The likelihood ratio test statistic (G^2) is the test statistic commonly used for assessing the overall fit of the logistic regression model argues that the likelihood ratio test is better, particularly if the sample size is small or the parameters are large. The likelihood-ratio test uses the ratio of the maximized value of the likelihood function for the full model (L1) over the maximized value of the likelihood function for the simpler model (L0).The likelihood-ratio test statistic is given by:

$$G2 = -2log\,(lo/l1) = -2[log\,(lo) - log\,(l1)] = -2log\,(lo - l1) \quad \ldots\ldots\ldots\ldots\ldots (3.7)$$

Where: - L_1 is the likelihood of the full model and

L_0 is the likelihood of the null model.

The likelihood ratio test statistic has an approximate distribution with k degrees of freedom. (Where, k is the number of predictors in the full model). If significant, it suggests that, taken together, the predictors contribute significantly to the prediction of the outcome. It tests the null hypothesis that all population in logistic regression coefficients is zero except the constant one. In addition, a small p-value, for example, $p < 0.05$ leads to rejection of the null hypotheses that all of the predictor effects are zero. Thus when likelihood test is significant, at least one of the predictors is significantly related to the response variable.

3.10.1.2 Hosmer-Lemeshow Test

The final measure of model fit is the Hosmer-Lemeshow goodness of fit statistics, which measure the correspondence between the actual and the predicted value of the dependent variables. The Homer-Lemeshow test is commonly used test for assessing the goodness of fit

model and allows for any number of explanatory variables, which may be continuous or categorical. In this case better model fit is indicated by smaller difference in observed and predicted statistic. The Hosmer–Lemeshow test uses a test statistic that asymptotically follows a x^2distribution to assess whether or not the observed event rates match expected event rates in subgroups of the model population.

The test statistic is:

$$G^2_{HL}=\Sigma \{\frac{(Oj-Ej)2}{Ej(1-Ej/nj)}\} \quad \text{(3.9)}$$

Where, nj= Number of observations in the j^{th} group, o_j = Observed number of cases in the j^{th} group, E_j = Expected number of cases in the j^{th} group.

According to Hosmer and Lemeshow, G^2_{HL} is used after partitioning the observations into 10 equal sized groups based on their predicted probabilities (Alan A. Second edition).

3.10.2 Test of individual predictor

Ho: The model is good to fit the data.

H1: The model is not good to fit the data.

If the Hosmer-Lemeshow goodness-of-fit test statistic is greater than 0.05,we will not reject the null hypothesis that there is no difference between observed and model predicted values; implying that the model estimates are adequate to fit at acceptable level.

3.10.2.1 The Wald Statistic

The Wald statistic is an alternative test, which is commonly used to test the significance of individual logistic regression coefficients for each independent variable (that is to test the null hypothesis in logistic regression model that a particular logit coefficient is zero). If the Wald test is not significant, then these explanatory variables can be omitted from the model. Wald χ2statistic is used to test the significance of individual coefficients in the model and is calculated as:

$$W = \left(\frac{\hat{\beta}_j}{se(\hat{\beta}_j)}\right)^2 \quad \text{(3.10)}$$

Where: $\grave{\beta}i$ is the estimated parameter for $\beta i$and SE ($\grave{\beta}i$) is standard error of $\grave{\beta}\imath$

Each Wald statistic is compared with a χ2distribution with 1 degree of freedom. Wald statistic is easy to calculate but their reliability is questionable, particularly for small samples. For data that produce large estimates of the coefficient, the standard error is often inflated, resulting in a lower value of the Wald statistic, and therefore the explanatory variable may be incorrectly assumed unimportant in the model. Likelihood ratio tests are generally considered superior.

3.11 Variable Selection

Choosing an appropriate variable is the major issue in statistical investigations. The rational for minimizing the number of predicator variable in the model is that resultant model likely more to be numerically stable. A variable may seem to have little effect because it over laps considerably with other predicator in the model. Deleting the redundant predicator can be help full to reduce standard error of the other estimate effect. Omitting relevant variables that are correlated with repressors causes least squares to be biased and inconsistent. Including irrelevant variables reduces the precision of least squares. There are a great deal of algorithms, and methods to select appropriate variables that should be included in the model; we would be used one or some of these algorithms and methods to do this research.

Step-wise variable selection

It is the method in which variable are selected either for inclusion or exclusion from the model based on statistical significance criteria.

The method of forward selection proceeds as follows.

1. Begin with no terms in the model.

2. Find the term that, when added to the model, achieves the largest value of the log likelihood. Enter this term into the model.

3. Continue adding terms until a target value for the log-likelihood is achieved or until a preset limit on the maximum number of terms in the model is reached.

Note that these terms can be limited to those keeping the model hierarchical. This method is comparatively fast, but it does not guarantee that the best model is found except for the first step when it finds the best single term. You might use it when you have a large number of observations and terms so that other, more time consuming, methods are not feasible. Backward elimination begins with a complex model and sequentially removes terms. At each stage, it selects the term for which its removal has the least damaging effect on the model e.g., largest P-value. The process stops when any further deletion leads to a significantly poorer fit.

Many statisticians prefer backward elimination over forward selection, feeling it safer to delete terms from an overly complex model than to add terms to an overly simple one. Forward selection can stop prematurely because a particular test in the sequence has low power. Neither strategy necessarily yields a meaningful model. Use variable selection procedures with caution! (Alan A. Second edition).

3.11.2 AIC, Model Selection

Other criteria besides significance tests can help select a good model in terms of estimating quantities of interest. The best known is the Akaike information criterion AIC. It judges a model by how close its fitted values tend to be to the true values, in terms of a certain expected value. Even though a simple model is farther from the true model than is a more complex model, it may be preferred because it tends to provide better estimates of certain characteristics of the true model, such as cell probabilities.

Thus, the optimal model is the one that tends to have fit closest to reality. Given a sample, Akaike's showed that this criterion selects the model that minimizes

$$AIC = 2(maximized\ log\ likelihood\ -\ number\ of\ parameters\ in\ model) \quad \text{..... (3.11)}$$

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Descriptive Statistics Analyses

The main aim of this chapter is to analyze microfinance service and its associated factors among women in wolkite town. The data used in this study for analysis were obtained from all women in wolkite town by using simple random sampling techniques. The response variables considered in this study is microfinance service participants (user=0) and non-participants (non-user=1)

The analysis has two sections, the first section which is the result of descriptive statistics are presented and the second section which is inferential part ,that is binary logistic regression methods were used to measure the determinants of women's participation in microfinance service in wolkite town. The descriptive part provides percentages of women's participation in microfinance service. The binary logistic regression analysis was used to identify factors that have effect microfinance service and the data are analyzed using SPSS.

Table 4.1 Frequency distribution for categorical variables

Variables	Categories	Microfinance service		
		Yes (%)	No (%)	Total (%)
Age	<25	14(46.7)	16(53.3)	30(11.7)
	26-36	22(38.6)	35(61.4)	57(22.3)
	37-47	40(50.6)	39(49.4)	79(30.9)
	48-58	42(57.5)	31(42.5)	73(28.5)
	>59	2(11.8)	15(88.2)	17(6.6)
Religion	Orthodox	37(38.1)	60(61.9)	97(37.9)
	Muslim	39(51.3)	37(48.7)	76(29.7)
	Protestant	33(66.0)	17(34.0)	50(19.5)
	Catholic	1(25.0)	3(75.0)	4(1.6)

	Others	10(34.5)	19(65.5)	29(11.3)
Marital Status	Married	55(43.7)	71(56.3)	126(49.2)
	Single	1(7.1)	13(92.9)	14(5.5)
	Divorced	34(50.0)	34(50.0)	68(26.6)
	Widowed	30(62.5)	18(37.5)	48(18.8)
Education level	Primary	49(59.8)	33(40.2)	82(32.0)
	Secondary	22(37.3)	37(62.7)	59(23.0)
	Higher education	49(42.6)	66(57.4)	115(44.9)
Monthly Income	<1000	18(34.6)	34(65.4)	52(20.3)
	1000-2000	37(43.5)	48(56.5)	85(33.2)
	2001-3001	38(44.2)	48(55.8)	86(33.6)
	>3001	27(81.8)	6(18.2)	33(12.9)
Family Size	1-4	58(63.0)	34(37.0)	92(35.9)
	5-8	46(46.9)	52(53.1)	98(38.3)
	≥9	16(24.2)	50(75.8)	66(25.8)
Occupation	Gov't employer	40(59.7)	27(40.3)	67(26.2)
	Farmer	28(25.9)	80(74.1)	108(42.2)
	Merchant	19(51.4)	18(48.6)	37(14.5)
	Other	33(75.0)	11(25.0)	44(17.2)
Social participation	Poor	24(35.8)	43(64.2)	67(26.2)

‘	Good	36(43.4)	47(56.6)	83(32.4)
	Very good	32(53.3)	28(46.7)	60(23.4)
	Excellent	28(60.9)	18(39.1)	46(18.0)
Different Supports	Yes	33(28.0)	85(72.0)	118(46.1)
	No	87(63.0)	51(37.0)	138(53.9)
Residence	Rural	37(33.9)	72(66.1)	109(42.6)
	Urban	83(56.5)	64(43.5)	148(57.4)
Farmland	Yes	70(49.6)	71(50.4)	141(55.1)
	No	50(43.5)	65(56.5)	115(44.9)
Mortgage	Yes	49(62.0)	30(38.0)	79(30.9)
	No	71(40.1)	106(59.9)	177(69.1)
Credit	Yes	61(48.0)	66(52.0)	127(49.6)
	No	59(45.7)	70(54.3)	129(50.4)
Bank Account	Yes	71(39.7)	108(60.3)	179(69.9)
	No	49(63.6)	28(36.4)	77(30.1)
Own house	Yes	89(64.8)	101(53.2)	190(74.2)
	No	31(47.0)	35(53.0)	66(25.8)
Money Responsibility	Husband	89(58.9)	62(41.1)	151(59.0)
	You	30(33.7)	59(66.3)	89(34.8)
	Otherwise	1(6.2)	15(93.8)	16(6.2)
Head of family	You	74(43.8)	95(56.2)	169(66.0)
	Otherwise	46(52.9)	41(47.1)	97(34.0)

Change after use microfinance	Yes	36(27.9)	93(72.1)	129(50.4)
	No	84(66.1)	43(33.9)	127(49.6)

On the above table 4.1, the age in year distribution of the respondents (women) the result indicated that 46.5, 38.6, 50.6, 57.5 and 11.8 percent of women's age were found in <25, 26-36, 37-47, 48-58, and ≥59, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user. On the above table 4.1, the religion of the respondents indicated that 38.1, 51.3, 66.0, 25.0, and 34.5 percent of women's religion were Orthodox, Muslim, protestant, catholic, and other, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

On the above table 4.1, the marital status of the respondents (women) the result indicated that 43.7, 7.1, 50.0 and 62.5 percent of women's marital status were married, single, divorced and widowed, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user. On the above table 4.1, the education level of the respondents (women) the result indicated that 59.8, 37.3 and 42.6 percent of women's were primary education, secondary, and higher education, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

On the above table 4.1, the monthly income of the respondents (women) the result indicated that 34.6, 43.5, 44.2 and 81.8 percent of women's monthly income were <1000, 1000-2000, 2001-3001 and >3001, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user. On the above table 4.1, the family size of the respondents the result indicated that 63.0 46.9 and 24.2 percent of women's family size were 1 to 4 families, 5 to 8 families, and ≥9 respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

On the above table 4.1, the main occupation of the respondents the result indicated that 59.7, 25.9, 51.4 and 75.0 percent of women's main occupation were, government employer, farmer merchant and other, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user. On the above table 4.1, the social participation of the respondents the result indicated that 35.8, 43.4, 53.3 and 60.9 percent of women's social

participation were poor, good, very good and excellent, respectively are the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

Based on the above table 4.1, the different supports of the respondents the result indicated that 28.0 and 63.0 percent of women's different supports were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user. Based on the above table 4.1, the residence of the respondents the result indicated that 33.9 and 56.5 percent of women's residence were rural and urban respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user. Based on the above table 4.1, the farmland of the respondents the result indicated that 49.6 and 43.5 percent of women's farmland were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

Based on the above table 4.1, the mortgage of the respondents the result indicated that 62.0 and 40.1 percent of women's mortgage were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user. Based on the above table 4.1, the credit of the respondents the result indicated that 48.0 and 45.7 percent of women's credit were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user. Based on the above table 4.1, the bank account of the respondents the result indicated that 39.7 and 63.6 percent of women's bank account were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

Based on the above table 4.1, the own house of the respondents the result indicated that 64.8 and 47.0 percent of women's own house were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user. Based on the above table 4.1, the day-to-day money responsibility of the respondents the result indicated that 58.9, 33.7 and 6.2 percent of women's money responsibility were husband, you and otherwise respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

Based on the above table 4.1, the head of family of the respondents the result indicated that 43.8 and 52.9 percent of women's head of family were you and otherwise respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user. Based on the above table 4.1, the change after use microfinance service of the respondents the result indicated that 27.9 and 66.1 percent of women's changes after used microfinance service were yes and no respectively from the women who participate in microfinance service. But, the rest women's weren't microfinance service user.

Pie Chart

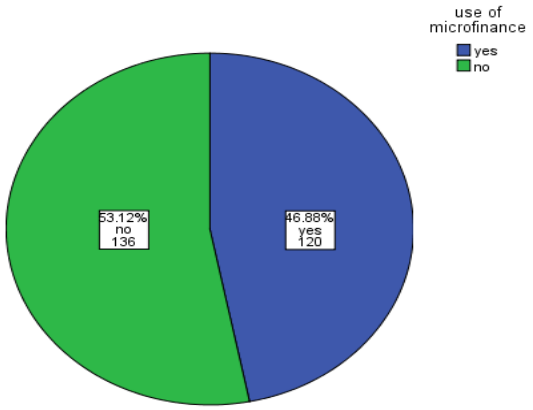


Figure 4.1: number of women in microfinance service

From the above pie chart, out of 256, 120(46.88) women are microfinance service participants whereas, 136 (53.12) of women are non-participant in microfinance service.

4.2 Inferential Statistics Analysis

4.2.1 Chi-Square Test for Independency

Chi-square test of association between microfinance services with different independent variables.

Table 4.2 chi square test for dependent variable and independent variable

Association variables		Pearson chi-square		
		Value (X^2)	Df	Sig
Microfinance service	Age	13.763[a]	4	0.008
	Religion	13.472 [a]	4	0.009
	Marital status	14.374 [a]	3	0.002
	Level of education	8.482 [a]	2	0.014
	Monthly income	19.951 [a]	3	0.000
	Family size	23.234 [a]	2	0.000
	Main occupation	37.734 [a]	3	0.000
	Saving account	12.424 [a]	1	0.000
	Social participation	8.087 [a]	3	0.044
	Credit	0.135[a]	1	0.713
	Own house	0.000 [a]	1	0.986
	Mortgage	10.532 [a]	1	0.001
	Head of family	1.904 [a]	1	0.168
	Change	37.569 [a]	1	0.000
	Farmland	0.967 [a]	1	0.235
	Supports	31.429 [a]	1	0.000
	Residence	12.744 [a]	1	0.000
	Money responsibility	25.627	2	0.000

Hypothesis test

H_o*:* the two factors are independent (there is no association between microfinance and its covariates).

H_1**:** the two factors are dependent (there is association between microfinance and its covariate).

From this table age, religion, marital status, level of education, monthly income, family size, main occupation saving account, social participation, mortgage, change, supports, residence and money responsibility have an association with microfinance service because, it's p-value is < 0.05(level of significance) but the rests have no association because of their p-value >0.05(level of significance).

4.2.2 Binary Logistic Regression Analysis

a. Hosmer and Lemeshow Goodness of fit Test

The Hosmer and Lemeshow goodness of fit test statistic measures the correspondence between the actual and predicted values of response variable. Hosmer-Lemeshow test is used to test overall model goodness of fit. The hypothesis test:

- H_0: There is no difference between observed and predicted model Vs
- H_1: There is difference between observed and predicted model.

Table 4.3 Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	12.896	8	.115

The Hosmer and Lemeshow Goodness-of-Fit Test divides subjects into deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. The p-value=0.115 here is computed from the chi-square distribution with 8 degrees of freedom and indicates that the logistic model is a good fit. That is, if the Hosmer and Lemeshow Goodness-of-Fit test statistic is 0.05 or less, we reject the null hypothesis that there is no difference between the observed and predicted values of the dependent; if it is greater, as we want, we fail to reject the null hypothesis that there is no difference, implying that the model's estimates fitted the data and observed one is equal. Therefore, our fitted logistic regression model is good fit. Therefore, since the p-value is greater than 0.05 then the observed value and fitted value are equal (the model is well fitted).

b. Omnibus test of Model coefficients

It is another method of assessing the overall fit of binary logistic regression model. The presence of a relationship between microfinance service and combination of predictor variables is based on the statistical significance of the model chi-square after explanatory variables have been added to the model. Hypothesis for Omnibus Tests of Model Coefficients:

- H_0: There is no difference between model with only constant(null) and model with predictors Vs
- H_1: Not $H0$.

Table 4.4 Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	174.084	35	.000
	Block	174.084	35	.000
	Model	174.084	35	.000

Consider the model which includes all predictors. Omnibus Tests of Model Coefficients gives us a Chi-Square of 174.084 with 35 degree of freedom which is significant at 0.000. This is indicating the rejection of the null hypothesis that adding the predictors to the model has not significantly affected. Since, omnibus test is significant we can conclude that adding the predictors to the model has significant effect. Test of individual parameter (variable) which Omnibus Tests of Model Coefficients indicate that if we add one independent variable to the model, they are statistically significant.

c. **Pseudo R-square Test and likelihood test**

Another measure of goodness-of-fit is R-square indices defined by (Cox and Snell, 1989 and Nagelkerke, 1991). The Cox and Snell cannot reach the maximum value of 1. But the NagelkerkeR-square reaches the maximum value of 1.

Table 4.5 Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	179.806[a]	.493	.659

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Table above gives result of "Model Summary," which are summary statistics for the model at "Step 1" which is the model with 18 predictors. Under Model Summary we see that the - 2 Log Likelihood statistics is 179.806[a]. The smaller the statistic, the better the model, so since the value of this statistics is smaller, then our model is better model. The value of Cox & Snell R2 and Nagelkerke R square are good enough. The "Cox& Snell R Square" value is .493. This statistic is referred to as a "pseudo-R" statistic.

Table 4.6: Binary logistic regression analysis results for microfinance service and covariates

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Age			14.311	4	.006			
	age(1)	-1.761	.868	4.120	1	.042	.172	.031	.941
	age(2)	-2.267	.776	8.532	1	.003	.104	.023	.474
	age(3)	-2.153	.892	5.834	1	.016	.116	.020	.666
	age(4)	.785	1.126	.486	1	.486	2.192	.241	19.907
	Religion			1.452	4	.835			
	religion(1)	-.338	.557	.368	1	.544	.713	.239	2.126

	religion(2)	-.841	.823	1.045	1	.307	.431	.086	2.163
	religion(3)	.203	1.471	.019	1	.890	1.225	.069	21.884
	religion(4)	.099	.853	.014	1	.907	1.104	.208	5.871
	Marital status			9.864	3	.020			
	Marital status(1)	2.963	1.374	4.646	1	.031	19.347	1.308	286.099
	Marital status(2)	1.214	.589	4.254	1	.039	3.367	1.062	10.669
	Marital status(3)	-.521	.586	.792	1	.374	.594	.188	1.871
	Education level			.610	2	.737			
	Education level(1)	.160	.573	.078	1	.780	1.173	.382	3.608
	Education level(2)	.498	.637	.609	1	.435	1.645	.472	5.736
	Income			14.008	3	.003			
	income(1)	-.866	.581	2.216	1	.137	.421	.135	1.315
	income(2)	-1.749	.710	6.073	1	.014	.174	.043	.699
	income(3)	-2.845	.832	11.703	1	.001	.058	.011	.297
	Family size			5.844	2	.054			
	Family size(1)	1.144	.568	4.048	1	.044	3.139	1.030	9.564
	Family (2)	1.408	.658	4.587	1	.032	4.089	1.127	14.835
	Occupation			8.518	3	.036			

	occupation(1)	-.042	.682	.004	1	.951	.959	.252	3.650
	occupation(2)	-.484	.659	.538	1	.463	.617	.169	2.245
	occupation(3)	-1.943	.766	6.434	1	.011	.143	.032	.643
	account(1)	-.477	.561	.723	1	.395	.621	.207	1.864
	Participation			6.461	3	.091			
	participation(1)	.047	.566	.007	1	.934	1.048	.346	3.177
	participation(2)	-1.059	.588	3.238	1	.072	.347	.110	1.099
	participation(3)	-1.216	.756	2.586	1	.108	.296	.067	1.305
	credit(1)	.269	.504	.284	1	.594	1.308	.487	3.515
	house(1)	.038	.496	.006	1	.940	1.038	.392	2.748
	Response			3.505	2	.173			
	responsibility(1)	.738	.518	2.027	1	.155	2.092	.757	5.776
	responsibility(2)	1.899	1.306	2.115	1	.146	6.680	.517	86.347
	mortgage(1)	1.187	.497	5.699	1	.017	3.277	1.237	8.686
	head(1)	-.393	.553	.505	1	.477	.675	.228	1.996
	change(1)	-.890	.489	3.321	1	.068	.410	.158	1.070
	farmland(1)	.413	.494	.697	1	.404	1.511	.573	3.981
	residence(1)	-1.482	.454	10.657	1	.001	.227	.093	.553

	supports(1)	-1.509	.530	8.090	1	.004	.221	.078	.626
	Constant	3.608	1.253	8.287	1	.004	36.878		

a. Variable(s) entered on step 1: age, religion, marital status, edu, income, family size, occupation, account, participation, credit, house, responsibility, mortgage, head, change, farmland, residence, supports.

As shown in the table above, No need of saying anything about insignificant variable because they are not important to predict the model and we fit the Logistic model only for a significant variable.
Now the model becomes:

$$\frac{\pi(x)}{1-\pi(x)} = e^{(3.608-1.761X1(1)-2.267X1(2)-2.153X1(3)+2.963X2(1)+1.214X2(2)-1749X3(1)-2.845X3(2)-1.943X4+1.187X5-1.482X6-1.509X7)}$$

$$\text{Log}((\pi(x))/(1-\pi(x))) = 3.608 - 1.761X1(1) - 2.267X1(2) - 2.153X1(3) + 2.963X2(1) + 1.214X2(2) - 1749X3(1) - 2.845X3(2) - 1.943X4 + 1.187X5 - 1.482X6 - 1.509X7$$

Where X1=age, X2=marital status, X3=monthly income, X4=main occupation, X5=mortgage, X6=residence, X7=supports

In this study the inferential statistics going to used logistic regression model. By inverting the definition of the logistic function, we are interpreting odd ratio of age, marital status, monthly income, main occupation, mortgage, residence and supports.

4.3 Interpretation for odds ratio

To interpret the regression coefficient in logistic model we used odds ratio. The odds ratio indicates the effect of each explanatory variable directly on the odds of use microfinance service than on log (odds). Estimates of odds ratio greater than 1.0 indicate that women‘s who use microfinance service greater than that for the reference category. Estimates less than 1.0 indicate that women‘s who use microfinance service is less than that for the reference category of each

variable. Therefore, the final model presented in Table is interpreted in terms of odds ratio as follows:-

The coefficient of Age in year 26-36 (β=-1.761, OR=0.172, P=0.042), 37-47(β=-2.267, OR=0.104, P=0.003), and 48-58(β=-2.153, OR=0.116, P=0.016) were indicates that 0.172, 0.104 and 0.116 times less likely microfinance service participants (users) respectively as compared to age in reference category (i.e. age groups <25). The coefficient of marital status in single (β=2.963, OR=19.347, P=0.031), and divorced (β=1.214, OR=3.367, P=0.039) were indicates that 19.347 and 3.367 times more likely microfinance service participants (users) respectively as compared to in reference social participate category (i.e. married).

The coefficient of monthly income in 2001-3001 (β=-1.749, OR=0.174, P=0.014) and >3001((β=-2.845, OR=0.058, P=0.001) were indicate that 0.174 and 0.058 times less likely microfinance service participants (users)as compared to reference of monthly income (i.e. <1000). The coefficient of mortgage in No (β=1.187, OR=3.277, P=0.017) was indicate that 3.277 times more likely microfinance service participants (users)as compared to reference of family mortgage (i.e. yes). The coefficient of residence in urban (β=-1.482, OR=0.227, P=0.001) was indicate that 0.227 times less likely microfinance service participants (users)as compared to reference of residence (i.e. rural). The coefficient of different supports in No (β=-1.509, OR=0.221, P=0.004) was indicate that 0.221 times more likely microfinance service participants (users)as compared to reference of different supports (i.e. yes).

Interpretation for coefficients of significant variables

Wald test

Since Wald test is used to test the statistical significance of individual coefficient (β) in the model and the test statistic is a chi-square statistic.

The hypothesis to be tested is:

H0: To conclude that the given coefficient is significant to model based on the following:-

i) The chi-square (Wald) statistics must be greater than tabulated statistic ($\chi^2_{0.05,1}$)

ii) P- Values of coefficients are less than the level of significance, α=0.05.

For β11:-From the parameter estimation above; the chi-square statistics (Wald) =4.120 is greater than $x^2_{0.05,1}$= 3.84, and the p-values for the β1 =0.042 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of age 26-36 significant to the model. For β12:-From the parameter estimation above; the chi-square statistics (Wald) = 8.532 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β12 =0.003 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of age 37-47 significant to the model. For β13: From the parameter estimation above; the chi-square statistics (Wald) =5.834 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β13 =0.016 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of age 48-58 is significant to the model.

For β21: From the parameter estimation above; the chi-square statistics (Wald) =4.646 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β21 =0.031 is less than 0.05 level of significance. Thus, based on this result we see that the coefficient of marital status (single) is significant to the model. For β22: From the parameter estimation above; the chi-square statistics (Wald) =4.254 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β22 =0.039 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of marital status (divorced) is significant to the model.

For β31: From the parameter estimation above; the chi-square statistics (Wald) =8.532 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β31 =0.003 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of monthly income (2001-3001) is significant to the model. For β32: From the parameter estimation above; the chi-square statistics (Wald) =5.834 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β32=0.016 is less than 0.05 level of significance. Thus, based on this result we see that the coefficient of monthly income (>3001) is significant to the model.

For β4: From the parameter estimation above; the chi-square statistics (Wald) =6.434 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β4=0.011 is less than 0.05 level of significance. Thus, based on this result we see that the coefficient of main occupation (other) is significant to the model. For β5: From the parameter estimation above; the chi-square statistics (Wald) =5.699 is

greater than $x^2_{0.05,1}$= 3.84 the p-values for the β5=0.017 is less than 0.05 level of significance. Thus, based on this result we see that the coefficient of mortgage is significant to the model.

For β6: From the parameter estimation above; the chi-square statistics (Wald) =10.657 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β5=0.001 is less than 0.05 level of significance. Thus, based on this result we see that the coefficient of residence is significant to the model. For β6: From the parameter estimation above; the chi-square statistics (Wald) =8.090 is greater than $x^2_{0.05,1}$= 3.84 the p-values for the β5=0.004 is less than 0.05 level of significance. Thus, based on this result we see that the coefficient of different supports is significant to the model.

Discussion

This study focuses on the analysis of microfinance service and covariates. The results of the study showed that out of a sample of 256, 120(46.88) percent of women who participate in microfinance service and 136(53.12) percent of women who non-participate in microfinance service. The chi-square test was carried out to determine the association between microfinance service and individual independent variables. Furthermore, the findings indicate that microfinance service has associated with age, marital status, monthly income, main occupation, mortgage, residence and supports at 5% level of significance. But the left variable is not significant at 5% level of significance.

Based on table 4.1 above the age in 48-58 is 42(57.5) percent were the highest microfinance service participants and in age 37-47 is 39(49.4) percent are highest non-participants from another age group based on our study. Based on table 4.1 above religion, Muslim 39(5.3) percent was the highest microfinance users and orthodox 60(61.9) was women the highest non-participants.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 conclusion

The main objective of this study was to investigate the factors that determine the participation of women in microfinance service in Wolkite town. We conclude this study was an attempt to examine the impacts of some factors that determine the women's participation in microfinance service in Wolkite town. In this analysis we have looked at logistic regression models that can be applied when our outcome is represented by a binary variable. We see in the above interpretation the Proportional odds assumption is justified binary regression models can be a powerful means of summarizing relationships that utilizes all the information present in the binary outcome. Furthermore, the findings indicate that microfinance service have associated with age, marital status, monthly income, main occupation, mortgage, residence and supports. Therefore, they have statistically significant association with microfinance service.

On the other hand from the result of binary logistic regression it can be concluded that the left factors had not significant effect on microfinance service.

5.2 Recommendation

The findings show that the determinants women participation of microfinance service was affected by age, sex, marital status, monthly income, main occupation, mortgage, residence and different supports. Therefore, based on the findings of the study, we recommend the following:

- The government, non-government organization and microfinance service development agencies should motivate, help, and advise the owner or manager and the participants of the enterprises on their overall business activities.
- Giving training on business issues, arrange forum and exhibition for experience sharing and solve the credit infrastructure, supply, and market access problem in collaboration.
- Suggested strategies to increase women participation in microfinance by increasing women's awareness and understanding of SACCOs, design new products, policies, and procedures and train women in business skills.
- Suggested strategies to increase the female board members by awareness rising and leadership skills development.

- As women access is still insufficient women's access to participant has to be supported.
- Beyond the financial support, the contribution of micro-finance services to women's participation should be enhanced through a combination of more effective support services(technical, material capacity building, business development service and the like) or linkages should be made with services provider organizations like TVET, micro and small scale organization, women children, youth affaires that work directly to enhance gender main streaming, challenge women's marginalization and subordination by helping to improve the socio-economic status of women.
- Finally, further research should be conducted to examine factors associated with the performance of micro and small-scale enterprises from time to time.

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APPENDEX: QUESTIONNAIRES

WOLKITE UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

DEPARTMENT OF STATISTICS

Dear respondents, first of all we would like to thank you for time you devote to give the answer for the following questions The main objective of this questionnaire is to investigate the determinants of women's participation in micro finance services in Wolkite town. Thus, your heart full response for the questions will have a great impact for the validity and reliability of the research.

INSTRUCTION;- In-circle number for your answer . Your faith full response has great role in the accomplishment of this study.

Client's Signature (If agree to be involved) _____

Identification number: _____

Data collectors: 1 Yunsef Megersa 2. Tolesa Tesfaye 3. Mamush Teferi

1 Do you use micro finance service?

1 Yes 2.No

2. Age of women in years

1 <25 2 .26-36 3. 37-47 4.48-58 5. >58

3. What is your Religion?

1 Orthodox 2.Muslim 3.Protestant 4.Catholic 5.Others

4. Marital status

1 Married 2. Single 3. Divorced 4. Windowed

5. What is your level of education?

1 Primary 2. Secondary 3. Higher education

6. What is your monthly income?

1 < 1000 2. 1000-2000 3. 2001-3001 4. >3001

7. How many is your family size ?

1 1-4 2. 5-8 3. >9

8. What is your main occupation?

1 Farmer 2. Government employer 3. merchant 4. Other

9. Do you have a saving account in bank? 4.1 Yes 2. No

10. What is your social participation?

1 Poor 2. Good 3.Very good 4. Excellent

11. Do you have previous access and experience in credit use? 1. Yes 2. No

12. Do you have house? 1 Yes 2. No

13. If Q "12" yes, do you have sleeping home? 1 Yes 2. No

14. Who is responsible for day-to-day decisions about money in your home?

1 You 2. Husband 3. Otherwise

15. Do you have mortgage? 1 Yes 2. No

16. Does your household have a budget? 1 Yes 2. No

17. Who is the head of the household? 1 Your-self 2. Otherwise

18. Is there any change or improvement in your house after participating in microfinance service? 1 Yes 2. No

19. Do you have farmland? 4.1 Yes 2. No

20. Is there access of different supports (technical, material, financial, capacity, building and the like) ? 1 Yes 2 No

22. Residence 4.1 Rural 2. Urban

THANK YOU FOR YOUR COOPERATION!!!