

Determinants of Female-Headed Household Participation in Microfinance Program and its Impact on their Livelihood: in Case of Oromia Credit and Saving Share Company (OCSSCO) in Guto Gida district, Ethiopia

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Abstract

Participation in microfinance contributes toward improving women's livelihood. This study attempts to investigate the factors affecting the participation decision of women in microfinance programs and its impact on their livelihood in the Guto Gida district using cross-sectional survey data gathered in 2019/20. The survey was conducted on 169 sample women-headed households. Descriptive statistics and econometric methods such as binary logit regression and propensity score matching were employed for the data analysis. The results of the binary logit regression revealed that participation in the program was significantly affected by age, size of family, livestock holding, cultivated land size, distance from microfinance center, initial wealth, and perception of risk. The results of the propensity score matching presented that the mean income and saving of participants was much higher than their counterparts on average by 5339.82 ETB and 404.38 ETB respectively. The findings suggest that participation was associated with a significantly higher income and savings. Microfinance institutions and other concerned bodies should give important attention to participation decisions based on enhancing income. The summary of this study by policymakers and plan designers could bring better improvement in the participation of programs.

Keywords: *Participation, Economic development, Econometric methods, saving, Income*

1. INTRODUCTION

Microfinance institutions (MFIs) involve the provision of small-sized financial services to rural poor households who lack access to the formal bank (Duong & Thanh, 2015). Moreover, participation in microfinance programs is a key approach to improving the economic development of poor and low-income people (Shete, 2017). It provides credit, savings, payment, and insurance services (Ayen, 2016). However, credit enhances rural poor-headed households' ability to meet their financial need such as purchase and use of improved agricultural inputs (Bekele & Dereje, 2014). Particularly, it enhances income and smooth consumption of rural poor (Alemu et al., 2018). Furthermore, the major task of microfinance is improving poor people's living standards (Shete, 2017). Hence, it allows rural poor people to diversify their source of income and it is an essential pathway to depart from poverty and hunger (Abdul et al., 2014). Participating in a microfinance program is crucial to smooth consumption, build assets, and improve income and savings (Duong & Thanh, 2015). This study, therefore, aims to gain a deeper understanding of how participation in microfinance programs can improve rural women's headed household livelihood. The study was planned to assess factors affecting participation decisions and the impact of microfinance on rural women's headed household livelihood.

Microfinance has been and continues to be center stage in the financial service of many less developed and developing countries (Abdul et al., 2014). Consequently, it provides different financial services to low-income and poor people (Herath *et al.*, 2015). Therefore, credit and saving services are provided by the Microfinance Institutions (Alemayehu, 2020). Microfinance institutions are by far the largest institution in Ethiopia's economy serving financial services to the poor (Ayen, 2016). It is taken as a strategy to overcome the constraints of the conventional bank in reaching the poor and instruments for livelihood improvement and diversification in fighting against poverty in poor countries (Chirkos, 2014). Access to credit through microfinance is crucial for rural poor economies and it is key to alleviating rural poverty (Shete, 2017).

The prevailing operations of conventional financial institutions in Ethiopia are inefficient in creating sustainable credit facilities (Antonides, 2015). The formal financial institution such as banks and insurance that could provide credit services for low-income people are very limited due to associated high risks and costs (Bekele & Dereje, 2014). The major reason to conduct this study is weak formal financial banks and insurance in providing credit services to rural poor women-headed households. There is a controversial argument among the studies concerning the effect of the program on the livelihood of people. Microfinance significantly improves household livelihood through an increase in household income, saving, asset building, consumption expenditure, education, health care, and employment generations (Alemayehu, 2020; Awunyo-vitor et al., 2012; Ayen, 2016; Bekele & Dereje, 2014; Duong & Thanh, 2015; Eularie, 2017; Herath et al., 2015; Shete, 2017; Tisdell & Steen, 2020). On the contrary, despite its popularity, other studies on microfinance showed that microfinance program has a limited to improving the lives of poor people (Awaworyi, 2014; Stewart, 2012). Systematic and adequate information on the process of adoption of the program was not developed in the Guto Gida district. Therefore, this study attempts to investigate the factors affecting the participation of microfinance program decisions and its impact on the livelihood of women-headed households in the Guto Gida district.

2. LITERATURE REVIEW

Microfinance is a broader term than microcredit and encompasses financial services that provide a greater scope of access for the poor, while microcredit is the provision of one kind of service: credit distribution and collection, and the financial and organizational activities associated with such operations (Abdul et al., 2014; Kabeer, 2005). Understanding the different factors underlying participation in microfinance programs is crucial in terms of achieving household social welfare (Eularie, 2017). The microfinance program is one of the documented determinants of the country's economy which induces access to living standards. There are several studies on determinants and impacts of participation in microfinance programs that have been done in the Least Developed Countries (LDC) in general and in Ethiopia in particular (Duong & Thanh, 2015; Herath et al., 2015). Hence, there are no decisive results. The study conducted by (Aregawi et al., 2019), the impact of microfinance on the household livelihood using a propensity score matching model in the Tigray region, Ethiopia. Findings revealed that sales, profit, income, capital assets, savings, expenditure on clothes and children's schooling, and food were positively significant in client's households than in non-clients. In some studies, the impacts of a microfinance program on clients' livelihood were minimal (Siyoum et al., 2012).

Quite a several studies have been done regarding the effect of participation in program intervention on the living standards of the women-headed household. Some empirical findings indicated that microfinance program has a statistically significant positive impact on household livelihood (Alemu et al., 2018; Antonides, 2015; Aregawi et al., 2019; Ayen, 2016; Bekele & Dereje, 2014; Challa & Mansingh, 2015; Herath et al., 2015; Tisdell & Steen, 2020). Conflict empirical literature review on microfinance program (Awaworyi, 2014). In general, there are no similar findings among different empirical reviews of the literature on the effect of microfinance on the livelihood of borrowers, and their findings are yet inconclusive (Alemu et al., 2018; Aregawi et al., 2019; Ayen, 2016; Bekele & Dereje, 2014; Challa & Mansingh, 2015). The study estimation strategy was guided by the conceptual framework. This conceptual framework was developed and modified based on the empirical literature (Alemayehu, 2020). Accordingly, women-headed households' decision to participate in microfinance programs is affected by demographic characteristics and socio-economic variables. Participation in microfinance programs improves women-headed households' income and saving presented in Figure 1.

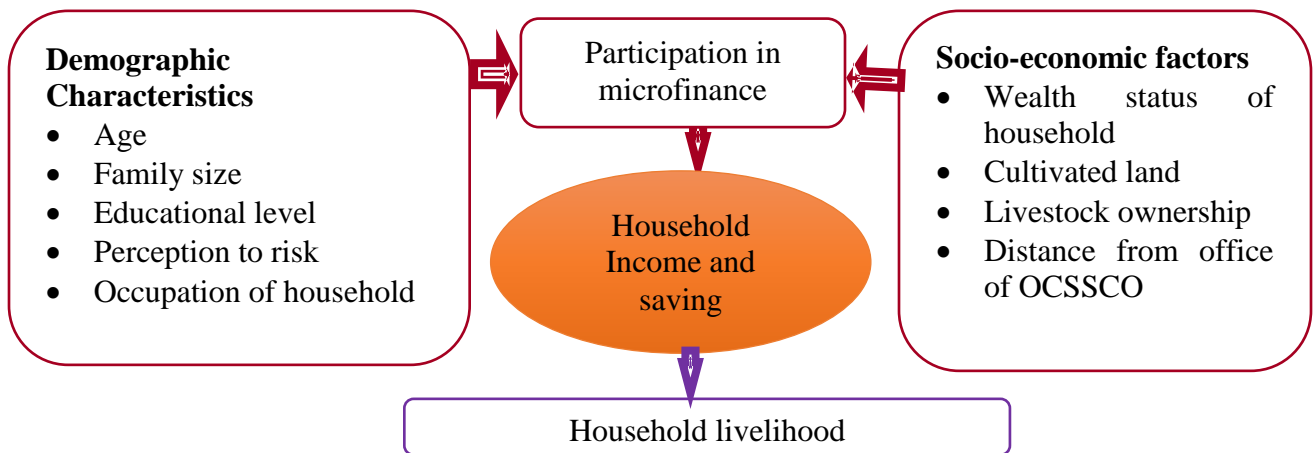


Figure 1: Conceptual framework

3. MATERIALS AND METHODS

3.1 Study area

This study was employed in the Guto Gida district, located in the Oromia regional state of Ethiopia. It is located about 331 kilometers from Addis Ababa of Ethiopia in the western direction of the country. The Guto Gida district has agriculturally suitable land in terms of topography. The mean annual rainfall ranges from 1600 mm to 2000 mm. The average annual temperature of Guto Gida is slightly greater than 15°C.

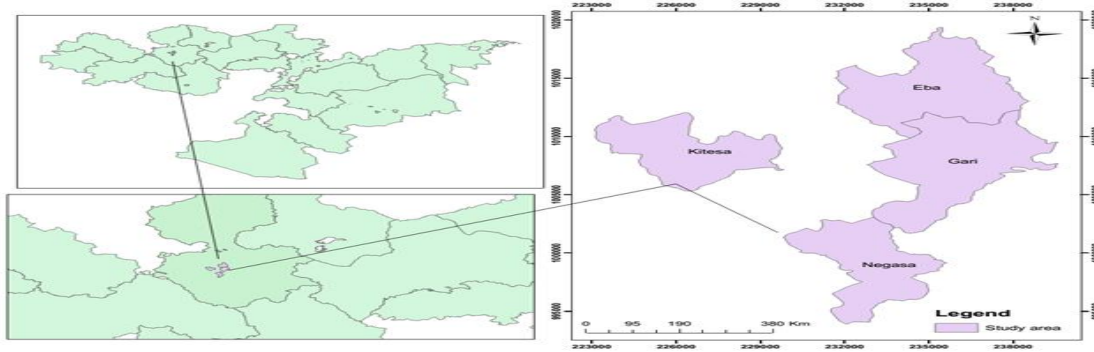


Figure 2: Map of the study area

3.2 Sampling Technique

A multi-stage probability sampling method was employed to select the sample of women-headed households' from the given OCSSCO. In the first stage: four program user kebeles (Kitesa, Eba, Gari, and Kajela) were randomly selected from 22 OCSSCO credit users Kebeles in the district. In the second stage: a total number of program users (294) was selected from a list of each selected OCSSCO credit users' kebeles stratified by participation status. The sample respondents from four kebeles were selected randomly by employing the random selecting method. The sample size was determined based on the formula $n = N/1+N(e^2) = 294/1+294(0.05^2) = 169$ given by (Yamane, 1967). Accordingly, a total of 169 microfinance program participant women-headed households (73 clients and 96 non-clients) were selected for the survey during the 2019/20 microfinance program participation season. In the third stage: A total sample size of 169 rural women-headed households was selected from each kebeles using proportionate selecting procedures.

Table 1: Sample OCSSCO credit users-based adoption status

Kebeles	Total women-headed households (N_{wi})	Probability Proportional Sample (PPS) Size				Total Sample (n_i)
		Participants		Non-participants		
		N_p	n_p	N_{np}	n_{np}	
Kitesa	59	24	14	35	20	34
Eba	60	27	15	33	19	34
Gari	86	37	22	49	27	49
Kajela	91	40	23	51	29	52
Total	296	128	74	168	95	169

Note: n_i = total sample from kebele i ($i = 1, 2, 3, 4$); N_{wi} = total women headed households in kebele i ; N_p = Total number of participants; N_{np} =Total number of non-participants; n_p = participating women headed households selected; n_{np} = non-participating women headed households selected

3.3 Types and Sources of Data

In this study, both primary and secondary data were used. Qualitative and quantitative primary data were employed. The primary data collection included rural women's demographic and socio-economic characteristics. To get the required primary data methodological approach like

questionnaires was employed. The questionnaires were administered in 73 rural women client households and 96 rural women non-client households in Guto Gida district, Ethiopia. Classically, the questionnaires were distributed and collected at a later date after completion. The study was supplemented by secondary data obtained from published and unpublished documents, the OCSSCO office, Guto Gida district administrative office, relevant literature, websites, and other relevant organizations. Information obtained from secondary sources includes a list of rural women clients and non-clients.

3.4 Method of Data Analysis

Data analysis was carried out using descriptive statistics and econometric methods. Descriptive analysis was examining demographic characteristics and socio-economic profiles of the program user and is performed using indicators such as frequency, averages, percentages, tables, standard deviation, maximum and minimum values, χ^2 and t-test. Next, we applied econometric methods to provide a more appropriate and in-depth analysis. More specifically, we employ the logit model to explore factors affecting the adoption of microfinance programs among program user women households. Besides, the propensity score matching technique was employed to measure the effect of participation in the livelihood.

$$ADOOCSSCO_i = \alpha + \beta X_i + u_i \quad (1)$$

Where $ADOOCSSCO_i$ is the adoption status of women's household i , which takes a score of 1 for households who have adopted microfinance program and 0 otherwise.; X_i is a vector of covariates including socioeconomic, and demographic factors that are presumed to affect the adoption status of women's household i (Table 2); u_i is the error term of the model such that $u_i \sim N(0, \sigma^2)$; and α, β are model parameters to be determined. Impact analysis refers to the analysis of the distributional change of microfinance programs on the women-headed household's income and savings of the beneficiary. The dependent variable for the binary logistic model is the participation microfinance program. The dependent variable is a dummy variable, taking the values of 1 if the women-headed households are participants and 0 otherwise. The socio-economic and demographic variables are explanatory variables that affect the practice of participating in microfinance programs. The outcome variables for the propensity score matching model are women-headed households' income and saving; variables are continuous variables and measured by birr (ETB).

Table 2: Definition of explanatory variables and hypothesis

Definition of Variable	Nature of Variable	Variable Definition and Measurement	Expected Sign
Age of HH headed	Continuous	In year	-
Family size of women-headed	Continuous	In number	+
Distance from microfinance	Continuous	In hour	-
Educational status	Categorical	If 1 literate, 0 otherwise	+
Wealth level of women-headed	Continuous	In Birr	+
Household perception of risk	Dummy	1 if positive and 0 otherwise	-
Cultivated land size	Continuous	In hectare	+
Livestock owned	Continuous	TLU	-

Occupation of household	Categorical	1 for the farmer, 2 for the small trader, 3 for firewood and charcoal seller, 4 for local drink seller	+
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Source: Authors' hypothesis 2019/20

To assess whether adoption status is associated with differences in female household level livelihood outcomes, the following regression specification may be employed.

$$L_i = \alpha + \gamma ADOOCSSCO_i + \beta X_i + \xi_i \quad (2)$$

Where L is a measure of women's household livelihood; γ is the parameter of interest for estimating the effect of adoption; ξ is the model error term and the rest of the definitions are as in (1). A major methodological challenge associated with the estimation of the model (2) through the usual least-square procedure is that the parameter γ would typically be biased – a situation commonly referred to as ‘self-selection’ bias. This is mainly because households’ decision to adopt microfinance is likely not random and such decisions could be systematically related to other factors that affect women's household livelihood outcomes. Besides, there are also unobservable differences between the two groups of women households. The implication is that the two groups are not comparable and that any difference between the two in terms of livelihood cannot be attributed to differences in adoption status alone. Consequently, measurement of impact based on γ fails to separate the effect of adoption (i.e., treatment effect) from that attributable to systematic differences (i.e., selection bias). To address this challenge, we employ propensity score matching combined with a sensitivity analysis that tests the assumption of selection on observables (Rosenbaum & Rubin, 1983). The idea of propensity score matching is to show a comparison group that is based on a model of the probability of adopting the treatment – also known as propensity score matching – using observed characteristics and then matching participants to non-participants based on this probability of participating. The average treatment effect is then determined as the average difference in outcomes across these treated and control groups. The validity of propensity score matching depends on two important conditions: (i) conditional independence and (ii) a sizable common support or overlap region in propensity scores matching across the treatment and control groups.

Accordingly, we estimate the ATE of adoption of a microfinance program on livelihood outcome measures mentioned earlier. For this, we first estimated the propensity scores, using a logit model specified in equation 1 (Gujarati, 2003). Only variables that are not possibly influenced by adoption status were included for the estimation. We then matched households using four of the matching algorithms: the nearest neighbor matching (NN), radius matching (RM), caliper matching (CM), and kernel matching (KM). We then estimated the ATE as the average weighted difference in findings between adopters and matched non-adopters using bootstrapped standard errors. To ensure the validity of the common support, we used observations in the common support region only and deleted all other observations whose propensity score was lower than that of the minimum for treated and higher than that of the maximum for the control. To determine the best matching algorithm, we employed performance criteria such as a balancing test of covariate means on the matched samples using t-tests. Furthermore, we also tested the balancing properties by estimating the propensity score matching on the matched sample and performing a likelihood ratio test on the together significant effect of all regressors. Accordingly, lower Pseudo R^2 from the re-estimation of the PS and significance of the LR test indicated

fulfillment of the balancing properties. Finally, to ensure the validity of the conditional independence assumption, we conducted a sensitivity analysis as a means of checking for the robustness of our results. The idea is to check whether unobserved factors affect both the treatment and the measured outcomes thereby resulting in a ‘hidden/selection bias’. This was accomplished by checking the degree to which the estimated adopters’ effect is sensitive to lower changes in the formulation of the propensity score matching.

4 RESULTS AND DISCUSSIONS

4.1 Socio-demographic characteristics of respondents

(Table, 3) shows summary statistics of the data collected from a randomly selected sample of women-headed households by type of participating microfinance program. Out of total observations 169 (100%), about 74 (43.78%) of the total women-headed households participated in the microfinance program, which was relatively smaller than those who didn’t participate 95 (56.22%) during the 2019/20 participating season.

Table 3: Sample women-headed households by participation status

Microfinance program	Frequency	Percent
Non-participants	95	56.22
Participants	74	43.78
Total	169	100

Source: Own survey data (2019/20)

Based on responses open-ended questions put to respondents’ lack of personal interest were the main reasons cited for not practicing microfinance programs. Some of the respondents went to the extent of suggesting the need for government to consider distributing microfinance credit as a means to improve their livelihood. As the survey data in (Table 4) below revealed that in terms of average age participant sample women-headed households smaller average age than those who didn’t participate in microfinance programs. The mean age difference between participants and non-participants in OCSSCO is 2.912376 years. The age of a sample women-headed household is statistically significant. There is a large family size on the side of microfinance program participants than controlled. The variable is statistically significant with an average difference between treated and controlled of -0. 5392603. The average difference in wealth between participants and non – participants is 2269. 488. Therefore, the result of these statistical analyses indicated that participant households are less wealthy than non-participant households and their mean difference is statistically significant. The summary statistics reveal that there is significant variation between treated and controlled OCSSCO in the use of cultivated land. The mean difference is -0.6331437 hectares. This implies that participant households have more cultivated land size than non-participant households. Analyzing the significance of the average variation of cultivated land size between participants and non - participants showed a significant probability level. The result of these statistical analyses indicates that participant households have more livestock population than non-participant households on average and the mean difference is statistically significant.

Table 4: Household characteristics by adoption status (continuous variables)

Variables	Total Sample	Treated	Control group
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	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean diff.	t-value(P>t)
AGE	40.36686 (6.459238)	38.72973 (5.630877)	41.64211 (6.7963)	2.912376	2.9752(0.0034) ***
FSIZE	4.088757 (1.639666)	4.391892 (1.63705)	3.852632 (1.610923)	-0.5392603	-2.1438(0.0335) **
DHMF1	65.38462 (23.50279)	59.45946 (21.62203)	70.00 (23.97916)	10.54054	2.9585(0.0035) ***
WEALTH	14885.21 (5713.358)	13609.46 (3315.227)	15878.95 (6893.844)	2269.488	2.6057(0.0100) **
CULSI	2.60355 (.9175468)	2.959459 (0.7927616)	2.326316 (.9160752)	-0.6331437	-4.7245(0.0000) ***
LSTOK	4.701533 (1.366561)	5.211892 (1.296073)	4.303989 (1.291642)	-0.9079024	-4.5267(0.0000) ***

Source: Own survey data (2019/20), ***, and ** implies significant at 1%, and 5% probability level respectively

According to the data in (Table 5), the result shows that majorities (65.6%) of the respondents were fear the risk of defaulting to take loans. When we see the comparison of women-headed households between participants and non-participants, out of 100%, 55.41% of participant households, and 75.79% non – participant households were fear of the risk default to take a loan. The result of statistical analysis showed that household perception of risk affects participation in microfinance programs significantly at a 1% probability level. In (Table 6), education is a categorical dummy variable. Variable can be categorized into four categories: 0 for illiterates, 1 for grade 1-4, 2 for grades 5-8, and 3 for above grade 8. According to the result of the sample data, the majority of the female household head on average attained grades 1-4 (38.95%). About 64.02% of the sample women household heads are literate while 35.98% of the sample women-headed households are illiterate. The statistical result showed that there was no significant variation between treated and controlled households in the status of education and the level of education of women-headed households was found statistically insignificant. As the (Table 7), occupation is also a categorical dummy variable. It can be categorized into four categories: 1 for the farmer, 2 for the small trader, 3 for firewood and charcoal sellers, and 4 for local drink sellers. According to the data, from the total sample of women-headed households (59.8%) of the sample respondents were farmers, (24.195%) of the sample respondents were small traders, (11.72%) of the sample respondents were firewood and charcoal sellers, and (4.28%) of the sample respondents were local drink seller. This result presented that the majority of the household head on average are farmers. When we see treated with controlled, the mass of both treated and controlled households head on average is a farmer and this is 64.86% and 54.74% respectively. The statistical result showed that there was no significant variation between treated and controlled household heads in terms of occupation and the occupation of household head was found statistically insignificant.

Table 5: Household perception of taking a loan if the risk happens

Category	Participants	%	Non-participants	%	Total sample size	%	Pearson chi2 (P-value)
Yes	41	55.41	72	75.79	133	65.6	

No	33	44.59	23	24.21	56	34.4	7,8011
Total	74	100	95	100	169	100	(0.0050)

Source: Own survey data (2019/20)

Table 6: The educational level of sample household head

Category	Participants	%	Non- participants	%	Total sample size	%	Pearson chi2 (P-value)
0	27	36.49	34	35.79	61	35.79	0.979 (0.9628)
1	27	36.49	37	38.95	64	38.95	
2	18m	24.32	21	22.11	39	22.11	
3	2	2.70	3	3.16	5	2.96	
Total	74	100	95	100	169	100	

Source: Own survey data (2019/20)

Table 7: Occupation of sample household head

Category	Participants	%	Non- participants	%	Total sample size	%	Pearson chi2 (P-value)
1	48	64.86	52	54.74	100	59.17	3.2096 (0.360)
2	14	18.92	28	29.47	42	24.85	
3	8	10.81	12	12.63	20	11.83	
4	4	5.41	3	3.16	7	4.14	
Total	74	100	95	100	169	100	

Source: Own survey data (2019/20)

4.2 Econometric results

Model estimates for the determinants of women-headed household decisions to participate in the microfinance program are presented in Table 8. The goodness fit concerning the predictive efficiency was high with 141 (83.43%) of the 169 microfinance program participant respondents included in the model perfectly predicted.

Seven of the nine variables including head's age, family size, distance from microfinance center, head's wealth, perception of risk, cultivated land size, and livestock ownership were found to have a significant association with participation decisions in microfinance programs. Specifically, age was found to have a strong negative association with adoption decisions. Keeping other factors fixed, each extra year of the head's age is expected to result in a 2.33% reduction in the probability of adoption, a statistically significant association ($P < 0.01$). From all seven significant variables head's age, family size, perception of risk, cultivated land size, and livestock ownership were statistically significant at a 1% probability level, whereas distance from the microfinance center and the head's wealth were at a 5% significant level. This result is consistent with the findings of (Abraham, 2019; Alemayehu, 2020; Ayen, 2016; Tesfaye et al., 2019).

On the other hand, factors such as head's age, distance from microfinance center, head's wealth, and perception of risk had all significant negative associations with households' adoption decisions, whereas family size, cultivated land size, and livestock ownership had all significant

positive associations with households' adoption decisions, with marginal effects ranging between 0.0017% to 21% on average (citrus paribus). More specifically, an extra unit of head's perception of risk, cultivated land size, livestock ownership, and the family size were respectively associated with a 21%, 12.45%, 10.25%, and 8.4% higher probability of adoption on average, all else remaining the same.

Table 8: Estimates of the determinants of female-headed households' participation decisions

Variable	Coef.	SE	Z	P > Z	dy/dx
AGE	-0.1679528	0.0456204	-3.68	0.000	-0.0233115
FSIZE	0.6052681	0.1681431	3.60	0.000	0.0840101
DHMF1	-0.0224028	0.0100786	-2.22	0.026	-0.0031095
EDUC	0.1024833	0.2680984	0.38	0.702	0.0142245
WEALTH	-0.0001224	0.0000503	-2.43	0.015	-0.000017
HPR	-1.518804	0.4756425	-3.19	0.001	-0.2108072
CULSI	0.898382	0.2435992	3.69	0.000	0.1246938
LSTOK	0.738928	0.190198	3.89	0.000	0.1025618
HOCU	-0.2240883	0.2555827	-0.88	0.381	0.1025618
Cons.	2.540425	2.314438	1.10	0.272	-0.031103
LR chi2 (9)	87.55	Pseudo R2	0.3779		
Prob > chi2	0.0000	Log likelihood	-72.058534		

Source: Own survey data (2019/20); ***, and ** shows significance at 1%, and 5% probability level respectively

Accordingly, the common support region is estimated in (Table 9), below the estimated propensity scores matching varies between 0.0451007 and 0.9982129 for participants and 0.0000439 and 0.9392631 for non-participants. Accordingly, the common support of propensity score matching region was found in the range of 0.0451007 to 0.9392631 by discarding 5 microfinance program users from those participants (Caliendo & Kopeining, 2008).

Table 9: Predicted common support of propensity score matching region

Observations	Mean	Std. Dev.	Min.	Max.
Non-participants	0.247819	0.2455066	0.0000439	0.9392631
Participants	0.6802257	0.2441672	0.0451007	0.9982129
Total	0.4371568	0.325462	0.0000439	0.9982129

Source: Own survey data (2019/20)

Propensity score matching algorithm can be selected based on balancing test, low Pseudo R-square, large matched sample size, and insignificant LR chi-square. From four used matching algorithms: nearest-neighbor matching (NNM), radius matching (RM), caliper matching CM, and kernel matching (KM); a kernel matching method width of 0.1 was the best estimator of the data. This estimator resulted in the least Pseudo R-square (0.017), a large number of matched sample size (158), balancing test (9) after reaching the percent of bias below 5%, and LR – chi-square is insignificant. In (Table 10) the standardized bias difference in covariates before matching lay between 0.7% and 73.9% in absolute value and after matching was lie between 1.6% and 19.3% in absolute value, which is less than the critical level of 20%.

Table 10: Propensity score and covariate balance test

Variable	Unmatched Matched	Mean		Standard bias %	Reduction bias %	t-test	p> t
		Treated	Control				
AGE	Unmatched	38.73	41.642	-46.7		-2.98	0.003***
	Matched	39.079	39.481	-6.4	86.2	-0.37	0.710
FSIZE	Unmatched	4.3919	3.8526	33.2		2.14	0.033**
	Matched	4.2222	4.3266	-6.4	80.6	-0.40	0.691
DHMFI	Unmatched	59.459	70	-46.2		-2.96	0.004***
	Matched	56.825	58.838	-8.8	80.9	-0.60	0.550
EDUC	Unmatched	.93243	.92632	0.7		0.05	0.963
	Matched	1.0317	1.112	-9.5	-1211.7	-0.54	0.589
WEALTH	Unmatched	13609	15879	-42.0		-2.61	0.010**
	Matched	13875	13790	1.6	96.3	0.12	0.901
HPR	Unmatched	.55405	.75789	-43.7		-2.84	0.005***
	Matched	.5873	.55305	7.3	83.2	0.39	0.701
CULSI	Unmatched	2.9595	2.3263	73.9		4.72	0.000***
	Matched	2.9048	2.9873	-9.6	87.0	-0.54	0.593
LSTOK	Unmatched	5.2119	4.304	70.2		4.53	0.000***
	Matched	4.9161	4.8014	8.9	87.4	0.59	0.557
HOCU	Unmatched	1.5676	1.6421	-8.7		0.-56	0.575
	Matched	1.5714	1.7373	-19.3	-122.6	-1.02	0.309

Source: Own survey data (2019/20); ***, and ** show significance at 1% and 5% probability levels respectively

The impact of participants of the microfinance program on the women-headed households' income and savings was based on a sample of matched treated and controlled. The estimated average treatment effect on the treated (ATT) significant effect on the income and savings of women headed with significant t – statistics 1.90 and 3.24 respectively at (P < 0.0001). More specifically, the mean income of adopting women-headed households was much higher than those who didn't adopt on average by 5339.81848 ETB. Similarly, the saving of adopters was also found to be significantly higher than those of their non-adopter counterparts by 404.379167 ETB on the average. Thus, the program intervention has found a significant mean difference between the participant and non-participant women's head household in terms of increase in income and saving. These findings indicate that participation in a microfinance program had indeed a significant positive impact on female households' income and savings (Table 11).

Table 11: The average treatment effects

Outcome variable	Sample	Participants	Non – participants	Difference	S. E	t-stat
Income	ATT	11495.2381	6155.41962	5339.81848	2808.59994	1.90
Saving	ATT	793.650794	389.271627	404.379167	124.66795	3.24

Source: Own survey data (2019/20)

4.3 Sensitivity analysis

Sensitivity analysis is the final diagnostic that must be done to analyze the sensitivity of the estimated treated group effect to small variations in the specification of the model. Sensitivity

cheek is a highly strong evaluating assumption and must be justified. The Q_mh+ and Q_mh- are statistical balances for positive and negative unobserved selection on the impact of the microfinance program. Both Q_mh+ and Q_mh- give similar findings on the impact of women-headed households in terms of income and saving. We conclude based on this concept of sensitivity analysis that the findings are not affected by the external effect. This shows that the treatment effect on the treated is not sensitive to any external variation. In general, the results revealed that there is no hidden bias.

Table 12: Sensitivity test of external effect on ATT

Gamma	Q_mh+	Q_mh-	P_mh+	P_mh+
1	-	-	-	-
1.05	-.081139	-	.532334	-
1.1	-.081139	-.081139	.532334	.532334
1.15	-	-.081139	-	.532334
1.2	-.081139	-.081139	.532334	.532334
1.25	-	-.081139	-	.532334
1.3	-	-.081139	-	.532334
1.35	-	-	-	-
1.4	-.081139	-	.532334	-
1.45	-.081139	-.081139	.532334	.532334
1.5	-	-.081139	-	.532334
1.55	-.081139	-.081139	.532334	.532334
1.6	-	-.081139	-	.532334
1.65	-.081139	-.081139	.532334	.532334
1.7	-.081139	-.081139	.532334	.532334
1.75	-.081139	-.081139	.532334	.532334
1.8	-.081139	-	.532334	-
1.85	-.081139	-.081139	.532334	.532334
1.9	-.081139	-.081139	.532334	.532334
1.95	-	-.081139	-	.532334
2	-.081139	-.081139	.532334	.532334

Source: Own survey data (2019/20)

5. CONCLUSIONS AND RECOMMENDATIONS

This study was focused on investigating the determinants of microfinance program adoption and the impact of program adoption decisions on women-headed household livelihood among program users in the Guto Gida district, Ethiopia. The study used both primary and secondary sources of data. Primary data were collected from interview questionnaires. Descriptive and econometric techniques were applied as the methods of data analysis. Particularly, the propensity score matching model was applied to evaluate treated groups with controlled groups in terms of income and saving. Among four matching algorithms, a kernel matching method width of 0.1 was the best estimator of the data. The findings revealed that the adoption decision of the microfinance program was associated with significant improvements in women-headed household livelihood as reflected in significantly increased women-headed household income and savings. The sensitivity check also revealed that predictions are almost free from unobserved

covariates or bias. Consequently, it can be determined that the overall findings are remarkably robust supporting the robustness of the matching techniques. Moreover, key women-headed household characteristics such as the age, size of family, livestock holding, cultivated land size, distance from microfinance center, initial wealth, and household perception of risk were found to be important factors underlying women-headed households' participation decisions. The propensity score matching techniques of treated groups were higher by 5339.81848 ETB mean annual income and 404.379167 ETB mean annual saving than that of controlled groups in the 2019/20 season. Therefore, it is developed to improve the best microfinance program, and the services of the participants to other non - participants can be considered as one option to increase women-headed households' income and saving in the study area.

Given these findings, several implications could emerge from our analysis upon which important suggestions could be made as key recommendations. First, even though the participation in the microfinance program is relatively low in the Guto Gida district, women-headed households who participated could generally enhance their income and saving. Consequently, participation in microfinance programs could be considered one important way to improve the livelihoods of women-headed households. Secondly, the positive impact associated with participation necessitates the need for strategies for expanding participation among microfinance programs in the study area. In this regard, a better understanding of the factors influencing women-headed households' choice of participation in microfinance programs is quite imperative. More importantly, our findings on the key factors underlying rural women-headed household decisions of participating in microfinance programs could serve as an important input for designing policies and strategies aimed at enhancing participation. For instance, wealth has a strong correlation with participation in microfinance programs as it scales up women-headed households' income and saving. Therefore, due emphasis has to be given to strengthening the wealth of women-headed households at different levels, especially for rural women. Distance of the women headed households' home from microfinance institutions is a crucial activity in microfinance program, through which induce women households' income and saving. The result of this study indicated that treating women's households in microfinance programs has had a significant effect on women-headed household income and savings. Hence, the microfinance institutions and other concerned bodies should give attention to women-headed households to enhance women-headed households' participation in microfinance programs. Therefore, expansion in the level of participation of microfinance programs should consequently find in substantial women-headed households' mean annual income and saving on a sustainable basis.

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