The Contribution of Self-Help Group Approach to Improve the Livelihood Outcomes of Poor Women in Debre Markos Town, Amhara Region, Ethiopia

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Abstract

Self-Help Group is one of the most important approaches that play a significant role in improving the livelihood of women across the world. Despite the fact that multitude of research prove the positive role of the approach in improving the livelihoods of women across the world, its contribution in Ethiopia is still not well understood. In addition, it is not yet included in the policy agenda of the government. This might be because of lack of concrete evidence about the issues. Therefore, this study was designed to examine the impact of Self-Help Group approach on the livelihood improvement of poor women in Ethiopia through the application of comparative analysis based on 100 women members and 196 non-members. Propensity Score Matching (PSM), a non-experimental research design approach with mixed data analysis techniques, was used to examine the effect of the approach on the livelihood of the beneficiaries. It was found that beneficiaries had a higher score in income, consumption, saving, food insecurity and access prevalence reduction, and, assets. It can be concluded that the approach had a significant impact on women's livelihood improvement in Debre Markos town, Ethiopia. Based on the result, it is recommended that greater emphasis should be given for Self-Help Group approach on the livelihood improvement of marginalized community in general and poor women in particular.

Keywords: Self-Help Group, Women, Livelihood, Propensity score matching, Debre Markos

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1. Introduction

All over the world, gender inequality can be connected to poverty. This is particularly so in developing countries where more than 24% of the population lives under miserable poverty. From this, the majority are women (Rathinam and Akudugu, 2014) representing about 70% of the poor. And they are particularly vulnerable to economic problems due to persistent gender inequalities (UN, 2009).

Ethiopia is one of the world's oldest civilizations. However, still it is one of the poorest countries in the world (World Bank, 2014). Even though poverty headcount declined slowly from 44.2% in 2000 to 26% in 2013, still one-fourth of its population is below the international poverty line of $1.25 per day, of which the majority are women (UNDP, 2013). The low development status of the country manifests itself in many respects. For instance, its per capita income was $470 in 2014. In terms of the Human Development Index (HDI), Ethiopia's HDI value for 2017 was 0.463 which put the country in the low human development index category, positioning it at 173 out of 189 countries. This is below average among countries in the low human development group (UNDP, 2018).

According to the World Bank's national poverty assessment report of 2018, Ethiopia has been registering impressive achievements with an average annual economic growth rate of 10% for the last decade including reduction in poverty gap and poverty severity which declined from 10.1% and 3.9% in 2000 to 3.7% and 1.4% in 2016, respectively. Nonetheless poverty is still a challenge in Ethiopia as over 22 million people are living below the national poverty line. Even people just above the poverty line are vulnerable to shocks and food insecurity. Moreover, there is higher gender inequality which further exacerbates the problem (World Bank, 2016).

The Global Gender Gap report (2010) ranks Ethiopia at 121 out of 134 countries in terms of the magnitude and scope of gender disparities. Women and girls in Ethiopia are strongly disadvantaged compared to boys and men in several areas, including literacy, health, livelihoods and basic human rights.

Ethiopia has experienced remarkable economic success in recent years. In the past decade, its average annual growth rate far exceeded the regional average, at slightly over 10 percent relative to a regional 5 percent. Agriculture grew at 7 percent, services at 12 percent, and industry at 21 percent (World Bank, 2016).

Despite significant economic growth, however, women continue to face significant barriers in the workforce. Women experience high rates of unemployment (50 percent), seasonal employment (37 percent), and temporary employment (13 percent). Women are also less likely than men to be paid for their work: over half of all women engaged in the agricultural sector, for example, receive no payment. Similar trends exist in other industries like small-scale manufacturing, where 58 percent of female workers are unpaid family workers, relative to 40 percent of male workers.

Furthermore, according to this report, for women active in the workforce, their productivity lags behind than that of men. Female farmers have lower rates of agricultural productivity than their male counterparts, and in entrepreneurship, female owned firms underperform those owned by men in an array of critical dimensions including profitability, survival rate, average size, and growth trajectory. In a study of small- and medium-sized enterprises in Ethiopia, researchers found that while female-owned firms account for only 44 percent of firms, they make up nearly 70 percent of failed businesses.

The unmet potential of women in the workforce is intrinsically linked to a lack of opportunities for women in education, health, and human rights. Women are less literate, suffer from poorer health outcomes, and have fewer basic rights than men. These wide and pervasive gender gaps hinder not only female livelihoods, but also the potential for poverty alleviation and growth at a national level (World Bank, 2016).

To fight against these discriminatory practices and problems faced by Ethiopian women, and further for the achievement of sustainable development goals, alongside government policies and women empowerment strategies, voluntary and independent women's

empowerment based non-governmental organizations are believed to play an essential role in women empowerment and poverty reduction efforts.

Studies show that women's livelihood improvement is a prerequisite for sustainable development and pro-poor growth towards the achievement of the entire Growth and Transformation Plan (GTP) of Ethiopia. Because of this fact, the government and different domestic and international non-governmental organizations have been exerting greater effort to empower women through designing and implementing various projects in the country. In the last two decades, various women-based organizations have been formed in Ethiopia to address women issues in different respects. It includes the mainstreaming of gender issues, addressing violence against women, the fight against harmful traditional practices and empowering their economic status like; micro-finance, women-only micro-enterprises, savings and credit schemes, women's cooperatives, asset transfer schemes, and, child benefit and support initiatives (Aragaw, Bamlaku and Kidist, 2012). These organizations have created an enabling environment for poor women in the country by providing access to credit, training for self-empowerment, and creating various productive and beneficiary activities.

Self-Help Group approach is based on voluntary involvement of women who form homogenous groups; who agree on their own by-laws; and who receive number of practical trainings. Women meet in Self-Help Groups usually on weekly basis with the aim to have discussions and to save small amount of money. Money is saved in a joint account and any member can take a loan from the group in order to establish or expand her business. Essential part of the group's saving is allocated as a social protection fund, i.e. used in case child is sick, school payments, weddings or funerals etc. Women as members of Self-Help Groups are becoming empowered and share decision making responsibilities with their husbands. The approach promotes the holistic development of poor households to improve their economic and social wellbeing. Researches indicated that it has a long history, one of the means that play a vital role for the socio-economic empowerment and poverty reduction of poor households especially that of women across the world.

Sources show that Self-Help Group is a small economically similar and kinship group of the poor which is voluntarily ready to contribute to a common regular saving to be lent to its members as per group decision, which works for group harmony, self-group, consciousness, social and economic empowerment in the way of democratic functioning. It has been documented that nearly 53 developing countries including Ethiopia, have taken up this on a large scale.

A study that was conducted by Rathinam and Akudugu (2014) stated that Self-Help Group program is critical for gender equality and empowerment of women as well as for economic growth and development. It is concluded that throughout the last two decades, Self-Help Groups across India and Ghana in particular, and the developing world as a whole have played critical roles in improving the livelihoods of the poor and vulnerable, especially women. Similarly, studies conducted by (RathinamandAkudugu, 2014) and Similarly, Sarania and Das (2015) concluded that Self-Help Group program increases savings habits and income level of women. In addition, Deininger and Liu (2009), conducted a study on 'Economic and Social impacts of Self-Help Group on Women' and suggested that the program did in fact contribute to greater empowerment, improved nutritional diversity and higher levels of consumption, but it did not improve income.

In fact, findings of empirical works do not offer similar results; the findings are inconclusive. For example, Rani, Dhimanand Kalirajan (2012) conducted their studies on the contribution of the Self-Help Group program to poverty alleviation. They concluded that Self-Help Group approach is not effective for income increments and socio-economic improvements of households due to conservative family culture and poor educational background of the masses. From this, we can understand that the issue of the approach and its role is inconclusive suggesting that it requires further investigation. In this regard, comparative methodology between the beneficiaries and non-beneficiaries will have a significant contribution to the existing debates in the literature.

In the case of Ethiopia and the study area, even if the approach is not supported by any scientific evidence, the review by Kindernothilfe (2010) annual report indicates that the Self-Help Group project succeeded in bringing about sustainable economic growth among the lives of the poor community by increasing their monthly income more than 2 percent in most of the beneficiaries. Except the report of Kindernothilfe which indicate that Self-Help Group approach has a positive outcome on the livelihood of the community, there has been no study in Debre Markos town where the approach has been practiced for more than a decade and there exist considerable number of Self-Help Groups still practicing. Empirical works are also scantly at the national level. Besides, the Ethiopian government has not yet given emphasis to Self-Help Group and does not yet include it as a policy agenda. This might be due to lack of concrete evidence about the effectiveness and efficiency of the approach. Hence the aim of this article is to investigate the contribution of Self-Help Group approach in improving the livelihood of women in Debre Markos Town by deeply looking into its contribution to the income change, saving status, consumptions expenditure, asset holding and food security status of poor women participating in Self-Help Groups. To address these objectives this article hypothesizes the following basic questions:

- what is the contribution of Self-Help Group approach to the income and consumption improvement of the poor women in the study area?
- is there any significant difference in savings amount of Self-Help Group members and non-members in DebreMarkos Town?
- does being a member of Self-Help Group have a positive contribution to food insecurity status reduction?
- how much does Self-Help Group contribute to asset holding of poor women in DebreMarkos town?

According to the literature reviews, the author hypothesise that women's participation in Self-Help Groups would enable them to gain access to resources in the form of credit, training, loans or capital. It also develops their knowledge and skills about income generating activities (IGA's) and their life in general. Consequently, these women experienced an increase in income, savings, and accumulation of assets and/or loan repayments as well

as possibily enabling them to minimise their vulnerability (reduced food insecurity).

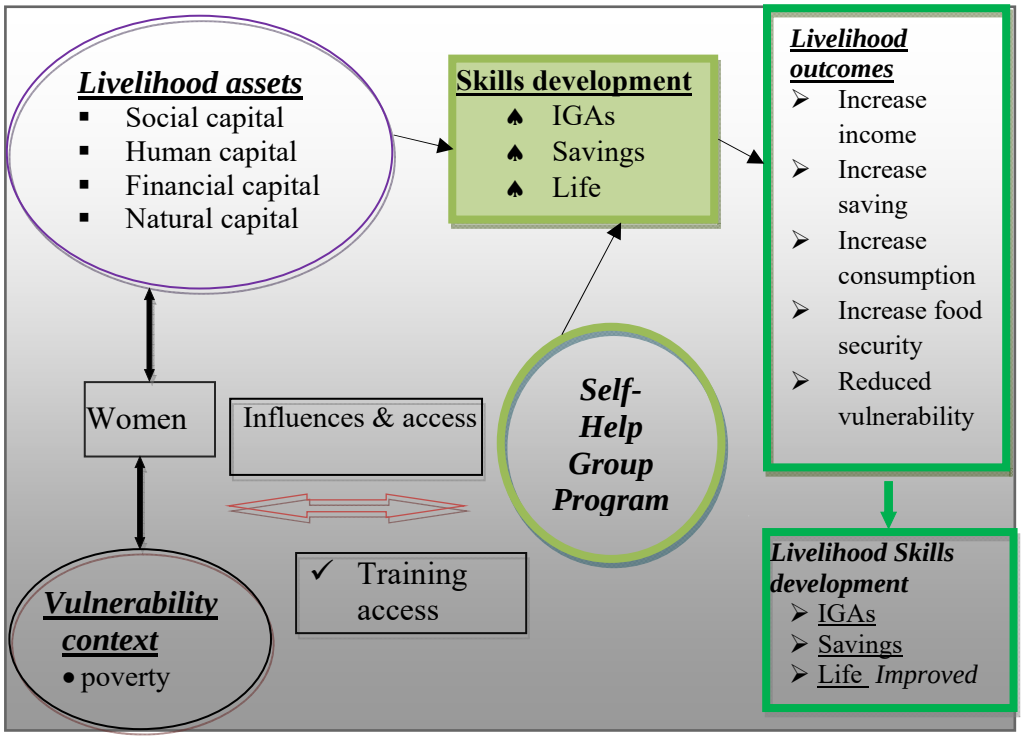

Figure 1. Represents the Conceptual Frame-work that shows the Relationship between the Independent Variables and Dependent Variable

Source: Adapted from DFID (1999)

Poor women live in vulnerable environments. However, in this hazardous context, latent synergies emanate that could enable them to escape from this vulnerable context. As the conceptual framework illustrates, women could be exposed to poverty before they join SHGs. At the same time, they could use their untapped potentials (i.e human capital, natural capital, social capital and financial capitals) which could be available in their environment. The only support that they need is showing the direction and the ways how to exploit and utilize these untapped potentials to improve their livelihoods. However, after they become a member of SHGs program, they could get an exposure to various opportunities (training and financial support). This would enable them to develop their knowledge and skills to maximize their

potentials such as their saving skills, income diversification and maximization, consumption expenditure optimization; asset holding and, improvement of their food security. At the end, the overall livelihood of poor women is expected to improve.

2. Methods

The study was based on a cross-sectional survey of households in Debre Markos Town of Amhara National Regional State in Ethiopia. The researcher used non-experimental research design. Propensity score matching (which is non-experimental design) is used to measure the impacts of the intervention through comparison groups (treatment and control groups). The representative samples comprised of 296 women determined by using probability sample size determination formula suggested by Kothari (2004). From the total number of samples, 100 were taken from the Self-Help Group project beneficiaries as a treatment and the remaining 196 were taken from non-beneficiary women as a control group. In order to select sample from the study, both probability and non-probability sampling techniques were employed. In this case, the authors had two groups.

Accordingly, the treatment group participants were selected first by randomly identifying two clusters out of the total eleven Self-Help Group clusters which had a total of twenty-four Self-Help Groups members. Further, to draw a manageable sample for the study, eight Self-Help Groups were randomly selected. Finally, all members of the eight Self-Help Groups were considered as a sample.

Similarly, to select samples for a comparison non beneficiaries group from 7 *kebeles,* which are the smallest administrative units in Ethiopia, in Debre Markos town, 2 districts *"kebeles"* were selected as a sample by using simple random sampling techniques. Then, from the selected *"kebeles"* 196 households were selected as participants by using systematic sampling methods.

Finally, non-probability (purposive) sampling technique was employed to select participants from Self-Help Groups members for the purpose of key informant interviews and focus group discussions. The study used both

primary and secondary data. The primary data was collected from a cross-sectional survey of households through questionnaires. In addition, key informant interviews were held with the project beneficiary women.

The collected data was analysed using descriptive and inferential statistics as well as qualitative narration. Moreover, T-test, rank sum test and two-way ANOVA were used to test the statistical significance of the differences. In order to estimate the economic impacts of the project on the target population, Propensity Score Matching (PSM) estimation impact analysis model was used.

Specifically, PSM estimates the average impact of program participation on participants by constructing statistical comparison groups on the basis of the probability of participating in the treatment D, conditional on observed characteristics X.

$$P(\chi i) = Pr(Di = 1 \perp X) \quad (1)$$

By considering Rosenbaum and Rubin (1983), the approach worked with two strong assumptions: the model specification is described in "Annex-1".

3. Results and Discussion

3.1. Impacts of Self-Help Group Approach on the Livelihood Outcomes of Women

The average treatment effect of Self-Help Group approach participation on the beneficiary income is shown in Table 1 below.

Table 1. The Impact of Self-Help Group on Income of Women

Matching method	No. of beneficiaries	No. of non-beneficiaries	ATT	Std. Err.	T-test
Nearest neighbor	80	38	221.406	51.867	4.269
Radius matching	80	58	177.586	57.029	3.114
Kernel matching	80	58	173.168	40.266	4.301
Stratification matching	73	65	173.782	33.761	5.147

Source: Field Survey, 2015

As it is clearly depicted in the analysis, Self-Help Group approach brought a significant mean difference in income between the beneficiaries and non-beneficiaries groups in all matching methods. The program, thus, improved the income of the beneficiaries, on the average, by about ETB 221.41 (nearest neighbor), ETB 177.586 (radius), ETB173.168 (kernel) and ETB 173.782 Birr (stratification matching) with 1 percent significance level. This is a clear manifestation that Self-Help Group approach has a great contribution to income improvements of poor women. This corroborates with findings of the study conducted by Rathinam and Akudugu (2014).

Besides, the result from the key informant interview also supplements the findings in this respect. Most of the interviewees reported that Self-Help Group is a typical tool to improve their lives. According to the interviewees' response, their lives have been improved after they were being the member of the group. Because of getting access to training, interest free loan, experience sharing and income generating activity trainings; they expanded their business and run a new business without any doubt. These opportunities could help them to maximize their income. For instance, a young woman explained the contribution of Self-Help Group in her life as follows:

Case Box-A: The Contribution of Self-Help Group on Income of Women

A 38-year old widow and a mother of one live in a kebele house. She remembers the difficult times she elapsed saying *"My impoverished life started when my husband died."* She and her child had been living under a bad condition for ten years before she joined SHG program. She did not have job and any income sources. As a result, she used to live in an empty house with no enough food to feed her child and herself. *"One bright day in April 1998"* she says, she was approached by someone to join SHG. After she joined SHG, she immediately took a loan from groups saving and started to sell 'Derek Enjera'. At the same time, she expanded the business by selling tea and bread. By doing this, she could pay for her debt after three months. Currently, she runs her business by her own; she has a total of Birr 80,000 in her individual savings bank account and she earns Birr 4,000 on monthly basis. Now, she is employed three workers to support her work. "*I am now seeing unbelievable positive change in my life.*

Moreover, the interview and focus group discussion analysis showed that Self-Help Group program can empower women through training, creating credit access, new income generating activities skill development and enlarging their previous business opportunity.

Impacts of Self-Help Group on Women's Consumption Expenditure

In order to assess the impact of Self-Help Group program on livelihood of the participating women, the study considered women's monthly consumption expenditure as one of the indicator variables. The resulting average treatment effect of the Self-Help Group approach on the beneficiary group's consumption expenditure is presented in Table 2.

Table 2. The Contribution of Self-Help Group on its Member's Consumption

Matching method	# of beneficiaries	# of non-beneficiaries	ATT	Std. Err.	T-test
Nearest neighbor	80	38	160.813	37.318	4.309
Radius matching	80	58	120.265	35.864	3.353
Kernel matching	80	58	122.051	28.953	4.216
Stratification matching	73	65	125.794	25.231	4.986

Source: Field survey, 2015

Women's consumption expenditure, as measured in Ethiopian Birr (ETB), increased due to positive change in the income level of the Self-Help Group members, where difference in mean consumption between the beneficiaries and non-beneficiaries was significant in all matching methods (Table 2).

Impacts of Self-Help Group Program on Women Saving

Another important point to be considered to evaluate the economic empowerment aspects of Self-Help Group was to measure the saving capacities of the members. The basic premises of Self-Help Group program is *"save from us for us"* which means that the poor who are similar status come together and save weekly based on the agreement which they sign and provide loan for the members based on their interest. In order to measure whether this premise brings a difference on its members, evaluating the average monthly saving amount between the two groups was one basic

focus of this study. The average treatment effects of the program on the beneficiaries (ATT) are described in Table 3.

Table 3. The contribution of Self-Help Group approach for saving growth

Matching method	# of beneficiaries	# of non-beneficiaries	ATT	Std. Err.	T-test
Nearest neighbor	80	38	46.706	16.229	2.878
Radius matching	80	58	30.025	22.969	1.307
Kernel matching	80	58	28.641	15.428	1.856
Stratification matching	73	65	28.056	11.101	2.527

Source: Field survey, 2015

Self-Help Group definitely contributed to women saving in a positive way and this has been uniform result over all the matching methods. As it is described in the analysis result, Self-Help Groups have significant impact on women saving with the nearest-neighborhood matching method (t = 2.878), stratification matching method (t=2.527) and kernel matching t = 1.856) with average treatment effect on the beneficiaries (ATT) of ETB 46.706, ETB 28.056, and ETB 28.64 respectively in the above-mentioned three methods. This result directly supports the findings of Arania and Das (2015) concluded on their study and they conclude that Self-Help Group program increases savings habits and income level of women.

Moreover, findings from qualitative data analysis revel that the saving practice and saving amount of women really differ before and after they joined the Self-Help Group. Most of the discussants argued that before being member of the Self-Help Group they did not have awareness about saving and never saved anything in any financial institution. However, based on the discussants, after they joined Self-Help Group, they developed saving habits and their saving capacity has increased from time to time in both group account and individual account 'pass book'. According to the majority of the discussants, it was learnt that when they started their savings in the group one individual saved 50 cents in a week but now the minimum average amount of regular saving that an individual member saves per week is Birr 15, and the average amount of group saving per week is Birr 150. Besides, their Self-Help Group's by-laws allow interested members to save

beyond their regular savings. These are called 'special savings' which are intended to boost their group saving capital, and motivated each individual member to increase their monthly saving amount.

Similarly, the evidence that was found from key informant interviews supports the evidence that was obtained from questionnaire and focus group discussions described in the preceding analysis. According to responses from key informant interviewees, Self-Help Group program plays a key role in changing the lives of the poor women. They reported that when they joined the Self-Help Group they could get free training about the importance of saving, after they saved money in group they could get free credit access and they could be engaged in IGAs based on their interest and group member advice. The quote from Self-Help Group leader illustrates this situation.

The loans advanced to members by Self Help Group (SHG) have been instrumental in micro enterprise enlargement such as income generating activities. Some members have used the loan to start business; some use it to scale up the existing business, others use it to start a new business. (Interview with SHG leader).

By doing so, they could increase the amount of individual as well as group savings. This further helps them to enlarge their capital, and finally to live a better life. The narration in Box 2 further elaborates the importance of Self-Help Group in changing the life of clients in the study area.

From this discussion, we can understand that SELF-HELP GROUP approach helped the poor women to maximize their saving skills and increased their saving capacity ultimately changing their lives for the better.

Case Box-2: The role of Self-Help Group for women saving amount growth

A young woman, 47, is a mother of two children. She lives in Debre Markos town. Before ten years, she and her children could live on the very small income she found from roasting maize locally known as 'Derkot Mekulat' for others. She and her children were in constant shortage of food and clothes. So, she had to look for other ways of generating income for her family. She went to microfinance institution. But her effort ended up in vain. Therefore, she had to find another way of getting funds. One day she heard about Self-help group in her locality. She was so motivated that she decided to join the group. She immediately started saving money with the group. Then, she had got a free loan. "*When I received the loan I told myself that this was the beginning of a better life*," she says. Shortly after receiving the loan, she was engaged in retailing sugar cane business. Her business grew and her saving amount increased from time to time so that she was able to repay the loan within a short time. After she repaid the debut her monthly saving amount has increased. Today, she has enlarged her capital by saving more and more and she is engaged in cereals trading.

Impacts of Self-Help Group Program on Asset Buildings of Women

The economic empowerment aspects of Self-Help Group program may not be limited to income change and savings growth alone. Rather, it has multi-dimensional impacts. Another indicator of successful women's economic empowerment interventions is an increase in assets. Respondents were required to put the current estimated values of each asset they own in Ethiopian Birr for the purpose of quantitative analysis. Finally, mean comparison of asset values owned by members and non-members were

compared using different matching algorithms and the results are presented in Table 4.

Table 4. The Role of Self-Help Group Program on Physical Asset Empowerment of Women

Matching method	# of beneficiaries	# of non-beneficiaries	ATT	Std. Err.	T-stat
Nearest neighbor	80	38	5073.200	908.780	5.582
Radius matching	80	58	4603.737	871.008	5.286
Kernel matching	80	58	4437.478	642.745	6.904
Stratification matching	73	65	4346.394	704.497	6.170

Source: Field Survey, 2015

As is clearly portrayed in Table 4, Self-Help Group approach plays a significant role for the increment of asset values owned by the Self-Help Group program beneficiary women. Women who are member of the program have significant mean difference of estimated asset values compared with non-beneficiary households in all matching methods. As evident in Table 5, Self-Help Group members were able to have ETB 5073.780, on average, asset values higher than that of non-members in nearest neighbor matching (t=5.582), ETB 4603.737 in radius matching (t=5.286), ETB 4437.478 in kernel matching (t=6.904) and ETB 4346.394 in stratification matching (t=6.170). Based on these findings, we can generalize that Self-Help Group program has a positive contribution for women's physical assets accumulation within the household. These findings replicate a study that was conducted by Rathinam and Akudugu (2014) which has stated that self-help group program is critical for gender equality and empowerment of women as well as for economic growth and development.

Findings from FGDs also tally with findings from the quantitative analysis. For instance, 20 members from different Self-Help Groups who took part in focus group discussions indicated that most of them were engaged in small businesses. All participants said that they had bought different household physical assets after they joined Self-Help Groups. They could also fulfill all the necessary materials in their house. According to the discussants,

before they joined Self-Help Group program, they could not buy kitchenware for the family. However, after joining Self-Help Groups, most of them agreed that they were able to buy television, radio, non-beneficiaries beefy, sofa, refrigerator, and other luxurious materials for their house.

Besides, evidence from key informant interviews suggests that Self-Help Group can change the life of women in different perspectives. One key informant says Self-Help Group *"not only increased my income, saving and consumptions but also help me accumulate different physical assets in my house and able to buy livestock"*.

The Role Self-Help Group Approach to Reduce Household Food Insecurity Access Prevalence

Household Food Insecurity Access Scale (HFIAS) is used as tool to assess household food insecurity. The tool, as developed by Food and Nutrition Technical Assistance (FANTA), is composed of nine questions that ask households' diet or food consumption patterns and measure the severity of food insecurity in the preceding 30 days (UN 2008). Household Food Insecurity Access Prevalence (HFIAP) categorizes households in to four levels of household food insecurity or access: food secures, mild, moderately and severely food insecure. This indicator measures the percentage of households that falls in each food insecurity (access) category. However, for the purpose of this study, the researcher intention was not computing HFIAP by category and leveling households in each category based on their results. Rather HFIAP used as a criterion for computing the average mean value all item measures between the treatment and compression groups and estimate by how match Self-Help Group program could contribute to reduce the HFIAP, on average, for the beneficiaries (see Table 5 for the results).

The results described in Table 5, Self-Help Group program has significantly reduced the food insecurity access prevalence of member women in all matching algorithms.

Table 5. The Role Self-Help Group Approach to Reduce Household Food Insecurity Access Prevalence

Matching method	# of beneficiaries	# of non-beneficiaries	ATT	Std. Err.	T-stat
nearest neighbor	80	38	-1.417	0.210	-8.244
radius matching	80	58	-1.338	0.180	-7.449
kernel matching	80	58	-1.318	0.160	-8.244
Stratification matching	73	65	-1.279	0.161	-7.922

Source: Field survey, 2015

This negative sign indicates that Self-Help Group program beneficiaries have lower food insecurity and access prevalence than non-beneficiaries. In order to estimate the magnitude of its effect, impact of the program was changed into percentage prevalence (which is 9* 30= 270 (100 percent)) in this study the maximum number of food insecurity access prevalence which was observed in the data was 36 (13.3 percent). Hence, this number is used as a benchmark for the analysis. Findings show that member women (beneficiaries) have gotten an advantage to reduce the number of monthly occurrences in food insecurity access, on average, by about 3.93 percent in nearest neighbor matching (t=8.244), 4.98 percent in radius matching (t=7.449), 0.488 percent in kernel matching method (t=8.244) and 3.66 percent in stratification matching (t=7.922) compared with non-members (non-beneficiaries).

Sensitivity of Average Treatment Effect on the Outcome of Interest

In propensity score matching estimation, the unobserved factors may have influence on the outcome of interest. Thus, the sensitivity of the PSM estimation results in this study to unobserved factors was computed and the result is described in Annex-3. As evident from the table, the sensitivity analysis results indicate that the log odds of differential assignment due to unobserved factors are very minimal. This suggests that the estimation of this study is free from hidden bias.

4. Conclusion and Recommendations

The study concluded that by participating in Self-Help Group, women secured an enhanced livelihood in terms of income, consumption expenditures, savings, asset accumulation and food insecurity reduction. Self-Help Group program also improved the saving culture of beneficiaries through compulsory saving and encouraged members to increase their savings and reinvest them in entrepreneurial activities. Women in Self-Help Group program could develop IGAs entrepreneurial skills to expand their business and diversify their income. Overall, Self-Help Group did not only empower women to improve their income, consumption and saving but it also played a significant role to balance food security. Generally, the Self-Help Group program created an enabling environment for women by helping them to minimize their hazards and constraints in different respects.

The results revealed that the Self-Help Group approach had significant role in livelihood improvement of poor women in particular and poverty reduction in general. Thus, the zonal government and the city administration office, in particular, should give due attention to self-help group program as a central point in the promotion and implementation of women enhancement agenda in the study area. The NGOs implementing the program should share their best practices with other women empowerment projects, poverty reduction actors and underserved communities.

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Annexes

Annex-1: Model Specifications

The first one is conditional independence/ unconfoundedness assumption: this presumes that given a set of observable covariates X which are not affected by treatment, the potential outcomes are independent of treatment assignment: unconfoundedness, is that after non beneficiariesling for covariates (X), mean outcomes of non-beneficiaries will be identical to outcomes of the beneficiaries if they had not received the program (Rosenbaum and Rubin, 1983).

$$Yi^1, Yi^0 \perp Ti, Xi \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (Two)$$

This implies that selection is only based on observable characteristics and that all variables that influence treatment assignment and potential outcomes simultaneously are observed by the researcher. Caliendo and Kopeinig (2005) suggested that if the balancing hypothesis of unconfoundedness is satisfied, observations with the same propensity score must have the same distribution of observable (and unobservable) characteristics independently of treatment status. In other words, for a given propensity score, exposure to treatment is random and therefore beneficiaries and non beneficiary units should be on average observationally identical. In this case, the treatment effects were estimated by:

$$E(Yi^0 / Xi, Ti = 0) = E(Yi^1 \quad Yi^0 / Xi, Ti = 1) \mid E(Yi^0 / Xi, Ti = 1) \quad E(Yi^0 / Xi, Ti = 0) = Yi^1 - Yi^0 / Xi, Ti = 1) \quad = E(Yi^1 - Yi^0 / Xi) \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Thus, because of conditional independence the selection effect=0, since

$$E(Yi^0 / Xi, Ti) = E(Yi^0 / Xi)$$

$$ATE = ATET \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

The second assumption is the common support assumption additional criterion besides independence is the satisfaction of overlap condition. It works with the trend of perfect predictability of D given X:

$$(overlap) Zero < P(D = 1, X) < 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

It makes sure that individuals with the same X values have a positive probability of being both participants and non-participants (Heckman, LaLondeand Smith. 1999). Treatment units will therefore have to be similar to non-treatment units in terms of observed characteristics unaffected by the treatment; thus, persons that fall outside the region of common support area would be dropped.

Finally, if conditional independence assumption is satisfied and there is sufficient overlap between the two groups which is called 'strong ignorability assumption' by Rosenbaum and Rubin (1983), the PSM estimator for ATT can be estimated in general as:

$$ATT = Ep(x)/D = 1\{E[Y(1)/D = 1, P(X)] - \{E[Y(0)/D = 0, P(X)]\} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Annex-2: Descriptions of Matching Algorisms

Nearest Neighbor /NN/matching: In this matching method, individual from the non beneficiariesled group is selected as a matching partner for a beneficiary individual that is neighboring in terms of propensity score. The study was employed NN matching with replacement. Because in this case the non-beneficiary individual can be used more than once as a match and if we allow replacement, in this case the mean quality of matching will maximize and bias will minimize (Smith and Todd 2005). Hence, following them the beneficiary unit i is matched with that of the non-beneficiary unit j

$$c(pi) = \min_j \|pi - pj\|, j \in D = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (Seven)$$

Where the c(pi)=NN, D=1 denotes the set of program participants and D=0 the set of non-participants, that is, the non-participant with the value of pj that is closest to pi is selected as the match and matching was performed without replacement.

Caliper and Radius Matching: if the closest partner is fall in far distance, NN matching faces the threat of bad matches. Hence, it can be avoided by imposing a tolerance level on the maximum propensity score distance (caliper). Bad matches are avoided and hence the matching quality rises (Caliendo andKopeinig, 2005). Applying caliper matching means that those individual from the non beneficiaries group is selected as a matching partner for individual beneficiaries that falls within the caliper and closest in terms of propensity score. That is, a match for unit i is selected only

if $\|pi - pj\| < \delta, j \in D = 0,$ where δ is a pre-specified tolerance. Beneficiaries units for whom no matches can be laid within the caliper are avoided from the analysis (smith and Todd 2005). The basic idea of this variant is to use not only the nearest neighbor within each caliper but all of the non beneficiary units within the caliper. A benefit of this approach is that it uses only as many comparison units as are available within the caliper and therefore allows for usage of extra fewer units when good matches are not available. Hence, it shares the attractive feature of oversampling stated above, but avoids the threat of bad matches. Therefore, the estimation was performing by the following formula:

$$E(TY) = \frac{1}{n}\sum_{i=1}^{N}[Y1i - Y0\,j(i)] \quad (8)$$

Where Y 0 j(i) is the average outcome for all non-beneficiary individuals who are matched with unit, Y1iis the outcome for unit i, and nis the number of beneficiary units. This approach does not limit the number of units that are matched with a given participant, as long as those units are "close" enough.

Kernel matching is non-parametric matching estimator that compares the outcome of each beneficiary person to a weighted average mean of the outcomes of all the unbeneficiaries individuals, with the maximum weight being located on those with scores nearby to the beneficiaries individual. A weakness of this matching method is it may use poor match in some observations. Hence, the major importance of this matching method is the proper imposition of the common-support condition. When applying kernel matching; one also expected toselect the kernel function and the bandwidth parameter. In this case, following, the kernel weighting function is given by:

$$\hat{}_{\alpha KM} = \frac{1}{n1}\sum_{i\in D1}\frac{G(\frac{pi-pj}{a_n})}{\sum_{k\in D=0}G(\frac{pk-pi}{a_n})} \quad (9)$$

Where $G(\cdot)$a kernel is function and an is a bandwidth parameter. In terms of equation the weight average function $W(i,j)$ is equal to: $\frac{G(\frac{pj-pi}{a_n})}{\sum_{k\in D=0}G(\frac{pk-pi}{a_n})}$

for kernel function bounded between -1 and 1, the neighborhood is $c(pi) = \{\frac{pi-pj}{a_n} \leq 1\}, j\ D0$ under standard conditions on bandwidth and

kernel $\frac{\sum_{j\in D=0} Y0_j G\left(\frac{pj-pi}{a_n}\right)}{\sum_{k\in D=0} G\left(\frac{pk-pi}{a_n}\right)}$ is consistent estimator of $E(Y0|D = 1, Pi)$ (Smith and Todd, 2005).

Stratification and Interval Matching: The idea of stratification matching is to partition the common support of the propensity score into a set of intervals (strata) and to calculate the impact within each interval by taking the mean difference in outcomes between beneficiaries and non beneficiaries observations (caliendoandKopeinig, 2005). In this alternative of matching, the common support of P is divided into a set of intervals. Within each interval, a separate impact is calculated by taking the mean difference in outcomes between the D = 1 and D = 0 observations within the interval Then, weighted average of the interval impact estimates, using the fraction of the D = 1 population in each interval for the weights, provides an overall impact estimate.

Clearly, one question to be answered is how many strata should be used in empirical analysis. One way to justify the choice of the number of strata is to check the balance of the propensity score (or the covariates) within each stratum (Aakvik, 2001).

Annex-3. Model Fit Analysis of Covariates Mean Difference after Matching

	Mean			t-test	
Variable	Beneficiaries	Non-beneficiaries	Percent bias	t-value	p- value
Age	42.139	41.876	5.9	0.39	0.695
Family size	1.6528	1.6771	-2.7	-0.17	0.864
nochu18	.54167	.57995	-5.1	-0.32	0.749
Education	2.3056	1.9719	12.9	0.87	0.387
Marital status	.875	.87978	-1.4	-0.09	0.931
Rented dummy	.34722	.33123	3.3	0.20	0.841
Kebele dummy	.59722	.62512	-5.6	-0.34	0.734
Own dummy	.05556	.04365	5.4	0.33	0.744
House head status	.83333	.80368	7	0.46	0.647
Remittance	.23611	.15767	17.9	1.18	0.240
House wife dummy	.31944	.30397	3.4	0.20	0.843
Other dummy	.09722	.08251	5.4	0.31	0.760
Trading dummy	.31944	.33576	-3.4	-0.21	0.836
Daily labor dummy	.26389	.27776	-3.1	-0.19	0.853

Source: Field survey, 2015

Annex-4. Test Result of Sensitivity of Average Treatment Effect on Outcome Interests

Rosenbaum bounds for rho						
Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	2.00E-10	2.00E-10	160.47	160.470	120.2500	204.904
1.05	6.20E-10	6.10E-11	157.202	164.345	117.3680	209.431
1.1	1.70E-09	1.90E-11	154.309	168.438	115.3330	213.095
1.15	4.50E-09	5.70E-12	151.091	170.619	111.9520	217.602
1.2	1.10E-08	1.70E-12	148.343	174.101	109.0730	221.869
1.25	2.30E-08	5.30E-13	143.698	177.821	106.8530	224.023
1.3	4.90E-08	1.60E-13	139.431	181.119	102.9290	229.228
1.35	9.70E-08	5.00E-14	136.88	184.725	99.0972	232.368
1.4	1.80E-07	1.50E-14	133.81	187.917	96.2675	235.987
1.45	3.30E-07	4.70E-15	131.184	190.6	92.8571	239.219
1.5	5.70E-07	1.40E-15	128.99	193.036	89.2823	242.320
1.55	9.50E-07	4.40E-16	127.32	195.653	86.8892	244.452
1.6	1.50E-06	1.10E-16	125.154	198.119	84.2199	248.546
1.65	2.40E-06	0	123.083	200.743	81.5226	250.583
1.7	3.70E-06	0	120.952	203.036	78.8509	253.202
1.75	5.50E-06	0	118.976	207.119	77.0742	255.310
1.8	8.10E-06	0	117.463	208.831	75.7785	258.043
1.85	0.000012	0	116.629	210.987	74.2277	260.417
1.9	0.000016	0	115.387	212.927	72.4777	262.595
1.95	0.000023	0	114.018	215.167	70.7430	264.452
2	0.000031	0	111.952	217.602	68.5464	266.184

*gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Source: Field Survey, 2015