

Article

Socio-Economic Impact of the Interest-Free Community Investment Fund: A Case Study of Rural Sindh, Pakistan

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Abstract: This study aims to measure the impact of an intervention, the Community Investment Fund (CIF), on the socio-economic life of rural women. CIF is a community-managed fund aimed at improving the living standards of women by empowering them to undertake income-generating projects to become financially more stable and self-governed in the Khairpur, Shikarpur, Kandhkot-Kashmore and Jacobabad districts of Sindh, Pakistan. This study used a quasi-experimental design approach that involved two groups, i.e., the treatment group (beneficiaries) and control group (non-beneficiaries). The sample size of this study was 708 respondents including the treatment and control group. The results of comparison of mean indicate that there is a significant difference between treatment and control group in terms of socio-demographic variables (including monthly income and consumption, saving amount, total asset value, an asset purchased value and household diet) and women empowerment's indicators, thereby suggesting that CIF has resulted in women empowerment. Concerning the results of the poverty scorecard, the higher graduation of beneficiaries (treatment group) asserts that the intervention of CIF has also a positive impact on targeted beneficiaries. In particular, the findings indicate that 72% of beneficiaries (treatment group) have graduated from one poverty band to another higher band compared to 59.4% of non-beneficiaries (control group) in poverty score. In addition, the findings of the logistic regression analysis confirmed that participation in the CIF program empowers women beneficiaries. This study will support policymakers to further improve CIF so that it can become more effective and sustainable.

Keywords: interest-free community investment fund; rural women empowerment; case study; logit model



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1. Introduction

There are many social issues that people are dealing with around the world, but the most key issue regarding women is the issue of women's empowerment. Despite being the largest proportion of the population, women still have very low status and involvement in decision-making. In countries where a male-dominated society is predominant, females have been restrained through socio-cultural boundaries. In many ways, women have been deprived of access to material resources such as credit, property and money, and access to social resources such as education (Cheston and Kuhn 2002). Microfinance institutions have come up to formulate different ways to make a change in the lives and status of women. However, it is not possible to address all the challenges of women's empowerment through access to microfinance, but Cheston and Kuhn (2002) argue that suitable and flexible designed microfinance programs can contribute to women's empowerment. Through these programs, women would easily access capital and earn independent earnings. In this manner, women would contribute financially to the betterment of their families and

communities to a larger extent. Financial institutions have been the major aspect of the economic development of any country.

Microfinance institutions appear to be contributing more and more to this purpose. Through productive loans, women will earn extra income and control their household resources. However, microcredit programs can at best facilitate such types of problems. These microcredit programs help women to increase their autonomy and reduce their socio-economic dependence on men (Parmar 2003). Ruhul Amin et al. (1998) stated that microfinance may increase women's prestige and their importance in the eyes of their husbands.

The microfinance strategy of the Government of Pakistan has been framed to achieve three main objectives to deal with and ease the large development deficit that is in the country, in particular to reduce the high existence of poverty that is projected about one-third of the population of Pakistan; to endorse the empowerment of women by encouraging them to undertake income-generating projects in order to become self-sufficient and financially more independent; and to support and encourage the small and medium enterprise sector (Zaidi et al. 2007). Since starting, the microfinance sector has undertaken rural development projects funded by donors with the aim of reducing poverty in rural areas of Pakistan, in general. Akhuwat is also one of the organizations that work to eliminate poverty by providing interest-free loans to poor families to make them self-reliant. It focuses on women's empowerment as the study conducted by Khandker (2005) suggests that microfinance helps to reduce poverty, especially when the loan is given to the woman. Agha Khan Rural Support Program (AKRSP) was initially initiated to reduce poverty and improve the quality of life for poor people of Gilgit Baltistan. Seeing the success of these community-based financing opportunities for rural women poverty alleviation, the same model was adopted at the national and provincial level through Rural Support Program (RSP), National Rural Support Program (NRSP) in 1992, Punjab Rural Support Program (PRSP) in 1997, and Sindh Rural Support Program (SRSO) in 2003. However, along with poverty alleviation, micro-finance has been considered a tool for women's empowerment in Pakistan. Government and some rural support programs believe that by providing loans to women, which they use for income generation and consumption purposes, their social and economic status at the household level and in the community can be improved (Zaidi et al. 2007). SRSO has undertaken many initiatives, i.e., social mobilization, natural resource management, micro-finance and others to reduce poverty, enhance the living standard, and improve the socio-economic status of rural households in 12 districts of northern Sindh. The Union Council Based Poverty Reduction Program (UCBPRP) is one of those initiatives funded by the Sindh Government and it was started in 2009. Under UCBPRP, an interest-free Community Investment Fund (CIF) program has been initiated and it is a rural community-managed and revolving fund aimed at enhancing the living standard and empowering the poorest women. CIF has disbursed PKR 996 million, which has covered 4122 villages in four districts of Sindh province of Pakistan. It is widely believed that micro-finance is beneficial and therefore everybody needs and demands it (Hussein and Hussain 2003). However, there is not much questioning about the benefits of microfinance or micro-grants. There has not been attention in trying to measure the impacts of such interventions, especially in the Sindh province of Pakistan.

To our knowledge, this is the first study of its type that conducted an impact assessment of Community Investment Fund under union council-based poverty reduction Program (UCBPRP) in the Sukkur, Shikarpur, Kandhkot-Kashmore and Jacobabad districts of Sindh. This impact assessment of the CIF program helps donors, the provincial government and other stakeholders to know the impact in terms of poverty alleviation and women's empowerment in the above-mentioned four districts of Sindh and provide some corrective measures for its future effectiveness.

2. Structure of the SRSO Program

In Pakistan, dependence on microfinance as an instrument for poverty reduction and female empowerment has been increasing (Hussein and Hussain 2003). Similarly, the poverty discount method of the Government stresses the provision of micro deposit as a primary function of its poverty reduction strategy. Microfinance has remained a key component of the poverty discount method of NGO quarters for decades in Pakistan. For instance, Agha Khan Rural Support Program (AKRSP) was the first to decrease poverty and improve the quality of life for poor people of Gilgit Baltistan. Then, the same model was once adopted at the national and provincial level through the Rural Support Program (RSP) and the Sindh Rural Support Program (SRSO) was established in 2003.

As SRSO is a rural support organization, its key role is supposed to mobilize, organize and motivate the community to take part in development activities. Further, it believes that social mobilization is pivotal to all activities and the success and sustainability of the program related to rural development depend on it. This involves creating a proactive community informed of their problems and capable of resolving them. To achieve the objectives of the CIF program, SRSO has adopted a three-tier social mobilization network model to form community organizations (COs) at the neighborhood level, village organizations (VOs) at the village level and local support organizations (LSOs) at the union council level. CO is a group of 15–25 members and is an important forum for capitalizing on the people's potential to take an active role in the management of development activities. COs ordinarily carry out activities such as household-level development planning, training, savings, microcredit and micro-investment. CO members meet on a fortnightly or monthly basis to discuss their plans and problems, thereby enhancing existing social capital and becoming more development oriented. VO has been introduced in the social mobilization approach and strategy. This is an umbrella organization having more than one CO in its fold. The objectives of VO are to: ensure capacity building of activists of COs members and participation of villagers in the decision making about the use of local resources, boost membership of at least 80% village households in the COs and strengthen coordination with NGOs and Government organization. Lastly, Village Organization (VO) is further federated at the union council level to form a Local Support Organization (LSO). Federating COs into VOs and LSOs provides rural communities with the opportunity to mobilize their villages as well as the entire union council. The LSOs, in particular, with their union council level structure, not only aggregate the collective requirements of its member villages but also form linkages with those external organizations and government line departments that best serve the developmental requirements of its communities. The power of social mobilization, therefore, provides poor communities with a unified vision and voice for availing resources and services which were previously inaccessible to them.

In prospects of the three-tier social mobilization network model, SRSO has initiated CIF to provide the fund to marginalized and socially excluded groups whose poverty score ranges from 0–23. It complements the social mobilization process by ensuring the financial viability of the network of COs/VOs/LSOs since CIF is utilized and not consumed and managed at the VO level. Objectives of CIF are to contribute to improve the livelihoods and lives of CO members and to empower poor women. Currently, under UCBPRP, SRSO is implementing CIF in three districts of Shikarpur, Kandhkot-Kashmore and Jacobabad. The members of these organizations are rural women. CIF fund is given by VOs to beneficiaries on the recommendation of COs based on PSC score (0–23). The CIF fund is for income generation activities, and it is meant to be invested and not spent. Under this initiative, 85,000 members of COs of Shikarpur, Kandhkot-Kashmore and Jacobabad have accessed PKR 996 million under CIF, out of which PKR 617 million have been revolved among 50,000 members in three districts.

3. Literature Review

Microfinance has helped the poor not only to strengthen financial conditions such as increased savings and assets but also helped them to strengthen their non-financial

conditions, which include their health, security of food, good nutrition, education, housing, job creation and women's empowerment (Van Rooyen et al. 2012; Hermes and Hudon 2018). The focus of this study is on the effects of micro credit on women's empowerment. The term "empowerment" refers to the ability to make choices; thus, "woman empowerment" is the process through which the ability to make choices is retained by a woman who has been denied this ability earlier (Kabeer 1999). The other way to think of empowerment is through "power" which also means autonomy, where autonomy refers to the ability to take one's own decisions, without the permission and consultation of others (Acharya et al. 2010; O'Hara and Clement 2018). Likewise, her control over materials, her knowledge and information access, her control over her own life, her say in the home affairs, her freedom of mobility and her ability to make independent decisions all are the aspects of empowerment.

Furthermore, there are many aspects of empowerment which can be categorized as the economic, socio-cultural, interpersonal, legal, political and psychological (Rehman et al. 2015). Whereas, Al-Shami et al. (2017b) concluded that AIM microcredit has a positive impact on the monthly income of women and empowers women in household decision making (mobility, daily expenditure, loan order decision, children's schooling and health expenditure) in Malaysia. However, another study has reported women's empowerment with four aspects which are self-esteem, role in decision making, mobility and control over resources and identified its impacts on rural development (Baig et al. 2017).

The "social empowerment" entails to increase woman's status in her family, community and society in a way that she has chance to participate in decision-making specifically to take decision regarding marriage, family planning and schooling of her children, to obtain better health and to protect herself from domestic violence (Ahmad and Ahmad 2016). Therefore, microcredit programs are increasing women's decision making in the household and strengthening her social position (Al-Shami et al. 2017a). Microfinance organizations are providing social empowerment to socially excluded poor women, give them the opportunity to belong to a particular group, lead them to the achievement of their experience and social change, letting them work in a group, interact with the group and share knowledge with a group (Kabeer 2005).

Existing literature clearly supports the idea of economic empowerment of women by microcredit. The "economic empowerment" refers to the access over the resource, control over resources, asset's ownership, greater purchasing power, more opportunities, training and skills of a woman (Ahmad and Ahmad 2016). Moreover, economic empowerment is also denoted as the economic security which involves her own income, her property rights over her husband's property, her contribution in household expenses, her savings and her ability to borrow money in case of emergency (Al-Mamun et al. 2014). Thus, microcredit programs help a woman to increase her economic empowerment in a way that it strengthens her economic condition because better conditions lead to better quality of her life by the generation of more income (Mazumder 2015; Tasos et al. 2020). However, a woman should be given equal importance in the economic community along with a man because she is the key stakeholder of the industry, and micro finance institutes should guarantee that women can have a life which can be matched with basic human dignity (Naser and Crowther 2016).

Very limited studies exist for the empowerment of women politically, particularly in the case of Pakistan. That is the reason we have included this aspect of empowerment in our studies for the valuable contribution in this field of research because it's also impacting women empowerment. The "political empowerment" includes the ability to make and to have freedom on political choices which can impact on her life, community or society as a whole (Bayulgen 2008). Moreover, along with other aspects of empowerment, it is also essential to measure the political aspect because women face inequality in political life along with other aspects of life (Rehman et al. 2015; Al-Qahtani et al. 2020). However, political empowerment can be further divided into two aspects i.e., political awareness and political participation, where political awareness refers to the level and access to information regarding politics and their rights as a citizen, whereas political participation refers to the

involvement in public decision making such as participation in COs, campaigns, petitions, protests and unionizations (Bayulgen 2008).

4. Research Methodology

This study is designed to assess the impact of an interest-free Community Investment Fund (CIF) under the union council-based poverty reduction Program (UCBPRP) in the Khairpur, Shikarpur, Kandhkot-Kashmore and Jacobabad districts. As per the nature and requirement of the study, a quantitative research approach is used to measure various objectives mentioned above. A quantitative methodology makes use of statistical representations rather than textual pictures of the phenomenon (Kabungaidze et al. 2013). However, this study does not only report descriptive statistics but also examines the impact of CIF on socio-economic changes of Community Organization (CO) members in four districts (Khairpur, Shikarpur, Kandhkot-Kashmore and Jacobabad).

4.1. Research Design

This study aims to measure the impact of CIF on women CO members in villages of four selected districts by using a poverty scorecard as well as a quasi-experimental design in which the sample includes women (CO members) who have received CIF fund and non-member women who have not received a loan under union council-based poverty reduction Program from the villages under study. In a quasi-experimental design, there are two groups, i.e., (1) the treatment group which consists of beneficiaries of intervention and (2) the control group which contains non-beneficiaries. The quasi-experimental design has been used for similar studies by many researchers including (Bhuiya et al. 2016; Khan 2004; Khandker 2005). Furthermore, we used cross-section data on various socio-economic variables that were identified from objectives to capture the impact of the community investment fund on the living standards and livelihood of women members of the program in four targeted districts.

4.2. Data Collection and Sampling Method

Primarily, the survey method was used to collect data. The survey was conducted in the Khairpur, Shikarpur, Kandhkot-Kashmore and Jacobabad districts where community investment funds were distributed under a union council-based poverty reduction Program. The target population of intervention is 85,000 beneficiaries. Referring to the sample size table of Krejcie and Morgan (1970), the sample size of this study was selected as 383 out of 85,000 beneficiaries of intervention at 95% confidence level and 5% of margin of error. Similarly, 383 of the control group (non-beneficiaries) respondents were selected using the same approach. Due to the unavailability of respondents, we were able to collect the data of 356 beneficiaries (treatment group) and 352 non-beneficiaries (control group). The sampled population is divided into strata by using a stratified random sampling method. Each stratum is formed on Union Council (UC) level in every district. There is a total of 113 UCs in five districts, such as Khairpur 3, Shikarpur 33, Kandhkot-Kashmore 37 and Jacobabad 40. Further, three villages were randomly selected from each union council and at least four beneficiaries from each village were selected by using a systematic random sampling approach. In particular, the randomly selected sample of respondents from the study areas was based on following formula:

$$nth = \frac{N}{n}.$$

nth = every n th respondent from the list of beneficiaries (non-beneficiaries in case of control group) in a village.

N = Total number of beneficiaries (non-beneficiaries in case of control group) in a village.

n = targeted respondents from the total number of beneficiaries (non-beneficiaries in case of control group) in a village.

4.3. An Instrument for Data Collection

A survey questionnaire was used to collect data for this research from the respondents. According to [Babbie \(2013\)](#), a questionnaire contains questions and other types of items designed to seek appropriate information for data analysis. There are two data collection tools, i.e., (1) to measure the graduation level of women (CIF beneficiaries) in terms of poverty using the poverty scorecard tool to assess the impact of interest-free microfinance on empowering women politically, socially, economically and on the health and education of their families. The latter questionnaire, used by [Hashemi et al. \(1996\)](#) ([Garikipati 2008](#); [Al-Shami et al. 2017a, 2017b](#)), has been adopted and refined according to the objectives of this research. After the development and adoption of assessment tools, five data collection teams were formed. Each team consisted of two female enumerators and one supervisor. The enumerators and supervisors were hired using an in-house trained database of the institute. Two days were dedicated to the training of teams and questionnaire pilot testing. Further, for the actual survey, the one-day classroom training was arranged for data collection teams to understand modified questionnaires and educate them about scope of the study. Another day was used for pre-testing the questionnaires in the field before conducting the actual survey. The actual survey took three weeks to complete. Quantitative collected data was entered and analyzed in the latest SPSS (Statistical Package for Social Scientists) software.

4.4. Logistic Regression Model

The logistic regression model was used to apply to the binary dependent variable (dichotomous). This study adopted the logit model to analyze the impact of microfinance on women empowerment from the perspective of socio-economic and political. In this study, we determined the factors of women's empowerment and predicted its likelihood. Women's empowerment, which is the dependent variable, is measured by the dichotomous response (1—a woman is empowered, 0—a woman is not empowered). In logistic regression, the probability of women's empowerment is reflected to be a function of independent variables in the model. The logistic regression function can be written in the following form:

$$P = E(y) \frac{e^{C_0 + C_1 X_1 + C_2 X_2 + \dots + C_k X_k}}{1 + e^{C_0 + C_1 X_1 + C_2 X_2 + \dots + C_k X_k}} \quad (1)$$

where P is the likelihood of women's empowerment, $E(y)$ is the anticipated value of the dependent variable, C_0 is a constant to be estimated. C_i is a coefficient to be estimated for each independent variable X_i . Equation (1) is a logistic regression function that can be transformed into Equations (2) and (3) which is known as logit transformation:

$$\text{Logit}(p) = \text{Log}_e \left(\frac{P}{1 - P} \right) \quad (2)$$

$$\text{Logit}(p) = C_0 + C_1 X_1 + C_2 X_2 + \dots + C_k X_k \quad (3)$$

5. Empirical Results and Analysis

5.1. Descriptive Statistics

Table 1 shows the number of districts, tehsils and villages that were included in the sample. The study was conducted in four districts of rural Sindh, i.e., Jacobabad, Shikarpur, Khairpur and Kandhkot-Kashmor. Four tehsils of Jacobabad, four tehsils of Shikarpur, one tehsil of Khairpur and one tehsil of Khandhkot-Kashmor could be reached. Furthermore, 11 villages from Jacobabad, 18 from Shikarpur, 4 from Khairpur, 1 from Kandhkot-Kashmor, for a total of 34 villages, were reached for the survey.

Table 1. No. of districts, tehsils & villages in the sample.

Districts	No. of Tehsils	No. of Villages
Jacobabad	4	11
Shikarpur	4	18
Khairpur	1	4
Khandhkot-Kashmor	1	1
Total	10	34

5.2. Household Size

Table 2 shows the household size frequencies and percentages in each group. It shows that 111 (31.5%) respondents in the control group and 62 (17.4%) respondents in the treatment group, respectively, had 1 to 5 members in the family who cook and eat together, whereas 180 (51.1%) and 190 (53.4%) respondents in the control and treatment group respectively had a household size of 6 to 10 members. Furthermore, 48 (13.6%) and 88 (24.7%) respondents had 11 to 15 members, 11 (3.1%) and 11 (3.1%) respondents had 16 to 20 members and 2 (0.6%) and 5 (1.4%) respondents had 21 and above members in the family in the control and treatment group, respectively. Overall data indicates that the majority of the respondents have a household size of 6 to 11 members which mostly consists of their spouse, children and parents.

Table 2. Household size status in each group.

Household Size	Control		Treatment		Total	
	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency
1 to 5	31.5%	111	17.4%	62	24.4%	173
6 to 10	51.1%	180	53.4%	190	52.3%	370
11 to 15	13.6%	48	24.7%	88	19.2%	136
16 to 20	3.1%	11	3.1%	11	3.1%	22
21 & above	0.6%	2	1.4%	5	1.0%	7
Total	100.0%	352	100.0%	356	100.0%	708

5.3. Poverty Scorecard Analysis

The analysis of the poverty scorecard was performed on the cut-off band score and the category of poor, as shown in Table 3. Based on those bands, the graduation level of respondents for each band was measured. The cut-off band and categories of poor were adopted from the assessment of measuring the impact of PPAF (Pakistan poverty alleviation fund) interventions using the Pakistan poverty scorecard (PPAF 2012), where the categories are (1) extremely poor, who are the poor who are at less than or equals to 50% of the poverty line, (2) chronically poor, who are the poor who will remain poor due to their basic characteristics, has structural poverty and are at 50–75% of the poverty line, (3) transitory poor, who are the poor whose level of poverty transition changes due to income or expenditure shocks and are at 75–100% of the poverty line, (4) transitory vulnerable, who are the poor whose level of poverty is susceptible due to income or expenditure shocks and are at 100–125% of the poverty line, (5) transitory non-poor, who are the poor who are at 125–200% of the poverty line and (6) non-poor, who are the people who have a low chance of being poor and thus enjoy a high level of consumption and are at above 200% of the poverty line (Finance Division 2008; Haq et al. 2008; Sean O’Leary et al. 2011; World Bank 2007).

Table 3. Poverty score bands matrix and cut-off.

Band	Cut-Off Band Score	Category
1	0–11	Extremely poor
2	12–18	Chronically poor
3	19–23	Transitory poor
4	24–34	Transitory vulnerable
5	35–50	Transitory non-poor
6	51–100	non-poor

The categories of poverty starting from extremely poor to non-poor were identified by PRSP-II (Finance Division 2008) for further analysis of the severity of poverty (Sean O’Leary et al. 2011). Haq et al. (2008) and Sean Sean O’Leary et al. (2011) have also used these six categories of poverty for the analysis and classifications of poor people. Although initially these categories were developed based on expenditure per adult, PPAF (2012) has modified and developed these categories based on poverty score with the help of the world bank’s guidelines.

Furthermore, interventions such as microcredit or social mobilizations in Pakistan use a poverty scorecard as a tool to assess the beneficiaries. That is why many reports on poverty or impacts of such types of interventions have performed their analysis with poverty scorecards, including BISP and SRSO. Likewise, in this study, the poverty scorecard has been used for the achievement of the second objective of the study, which was to measure the graduation of respondents on poverty score. As such, these bands and categories of poverty shown in Table 3 adopted from (PPAF 2012) were the perfect tools for the analysis and measurement of the poverty score and severity of the poverty. In this study, a total of 708 respondents were surveyed, among those 356 (50.3%) were beneficiaries (treatment group) of CIF and 352 (49.7%) respondents were non-beneficiaries (control group).

Figure 1 represents the comparison of the old and new poverty scorecard of the control group. It shows that in the old poverty scorecard only 16 households (respondents) were in the first category of the poverty band (0–11) named as extremely poor, whereas in the new poverty scorecard there are only 10 households (respondents) in this band. Likewise, it is also shown that 53 households (respondents) were in the second band (12–18) and were chronically poor in the old poverty scorecard, whereas only 27 households (respondents) are in this band in the new poverty scorecard. Furthermore, 8 households (respondents) in the third band (19–23), 15 households (respondents) in the fourth band (24–34) and 7 households (respondents) in the fifth band (35–50) and 2 households (respondents) in the sixth band (51–100) entitled as transitory poor, transitory vulnerable, transitory non-poor and non-poor respectively are available in the new poverty scorecard.

Table 4 presents the detailed figures for the graduation of the control group in each band. The results show that 69 new respondents’ poverty scorecard could be matched with the old poverty scorecard of the control group. Of those 69 respondents, only 41 (59%) respondents graduated on the poverty scorecard. Furthermore, as shown in the table, initially there were 16 households in the first band (0–11), but as per the new poverty scorecard only 2 (12.5%) households remained extremely poor, and 14 (87.5%) households graduated. Among those 14 graduated households, 9 (56.3%) moved to the second band (12–18), 2 (12.5%) moved to the fourth band (24–34), 3 (18.8%) moved to the fifth band (35–50) and were entitled as chronically poor, transitory vulnerable and transitory non-poor, respectively. Likewise, in the second band (12–18) initially, 53 households were there. Among them, 27 (50.9%) households have graduated to the next levels. From those 27 graduated households, 8 (15.1%) moved to the third band (19–23), 13 (24.5%) moved to the fourth band (24–34), 4 (7.5%) moved to the fifth band (35–50) and 2 (3.8%) moved to the sixth band and became transitory poor, transitory vulnerable, transitory non-poor and non-poor, respectively. The overall results show that out of 69 only 2 households have completely come out of poverty and moved to the non-poor category in the control group.

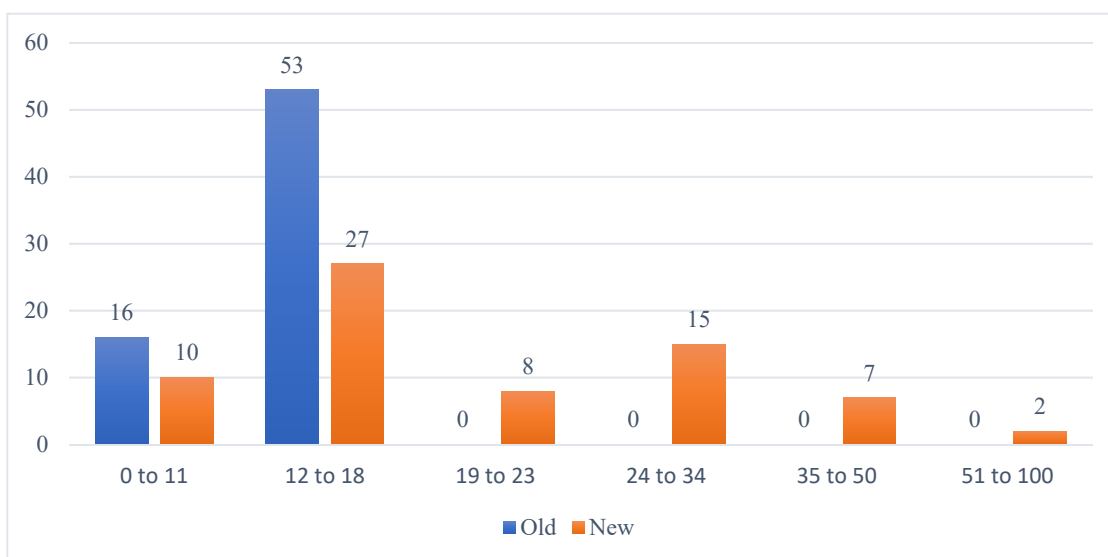


Figure 1. Comparison of old and new poverty score (control group).

Table 4. The graduation of the control group in each band.

PSC Band (Old)	PSC Band (New)						Graduation	
	0 to 11	12 to 18	19 to 23	24 to 34	35 to 50	51 to 100		
Total	69	10	27	8	15	7	2	41
0 to 11	16	2	9	0	2	3	0	14
12 to 18	53	8	18	8	13	4	2	27
Total	100%	10	27	8	15	7	2	59%
0 to 11	23.2%	12.5%	56.3%	0.0%	12.5%	18.8%	0.0%	87.5%
12 to 18	76.8%	15.1%	34.0%	15.1%	24.5%	7.5%	3.8%	50.9%

Note: PSC bands (old) are shown vertically whereas PSC bands (new) are shown horizontally in the table.

Figure 2 shows the comparison of the old and new poverty scorecard of the treatment group. As per the old poverty scorecards, 93 households (respondents) were there in the first band (0–11), currently, 21 households are found in the first band (0–11). However, in the second band (12–18) only 63 households were there in the old poverty scorecard and, currently, 51 households are there in the poverty scorecard. Furthermore, in the third band (19–23) only 10 households were found, and 31 households are found in the old and current poverty scorecard respectively. Whereas 44 households in the fourth band (24–34), 18 households in the fifth band (35–50) and 1 household in the sixth band (51–100) are found in the current poverty scorecard.

The further break-up of the figures for the graduation of the treatment group in each category is given in Table 5. In the treatment group, 166 households’ old poverty scorecard was found and matched with the new one, among them 120 (72%) households (respondents) have graduated to the next levels and the remaining 46 households have either not changed their position or gone down.

Moreover, it indicates that in the first band (0–11), 93 households are there, and among them, 14 (15.1%) remained extremely poor, 27 (29%) moved to the second band (12–18), 18 (19.4%) moved to the third band (19–23), 25 (26.9%) moved to the fourth band (24–34) and 8 (8.6%) to the fifth band (35–50), and only 1 (1.1%) moved to the sixth band (51–100) and became chronically poor, transitory poor, transitory vulnerable, transitory non-poor and non-poor, respectively. Furthermore, in the band (12–18) only 5 (7.9%) households have moved downward and became extremely poor, 20 (31.7%) households remained in the same band as chronically poor, 12 (19%) households moved to the third band (19–23), 16 (25.4%) households moved to the fourth band (24–34) and 10 (15.9%) households moved

to the fifth band (35–50). However, in the band (19–23), 2 (20%) households have moved down to the first band (0–11), 4 (40%) households have moved down to the second band (19–23), 1 (10%) household remained in the same band and only 3 (30%) households have been graduated to the fourth band (24–34). The overall results show that although 120 (72%) households have graduated in the treatment group, only 1 household has come out of poverty and moved to the non-poor category.

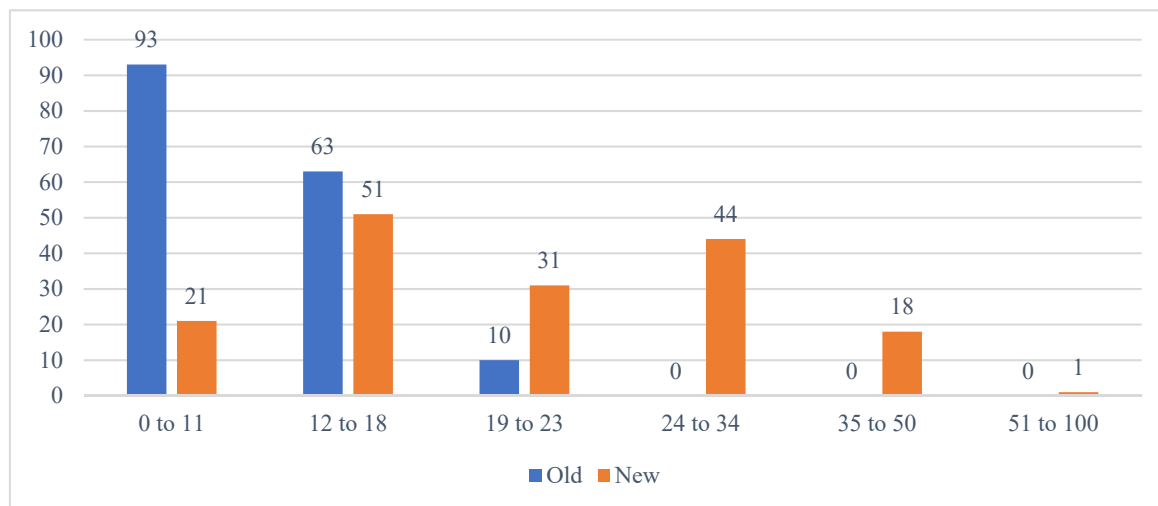


Figure 2. Comparison of old and new PSC (treatment group).

Table 5. The graduation of treatment group on each band.

PSC Band (Old)		PSC Band (New)						Graduation
		0 to 11	12 to 18	19 to 23	24 to 34	35 to 50	51 to 100	
Total	166	21	51	31	44	18	1	120
0 to 11	93	14	27	18	25	8	1	79
12 to 18	63	5	20	12	16	10	0	38
19 to 23	10	2	4	1	3	0	0	3
Total	100%	21	51	31	44	18	1	72%
0 to 11	56.0%	15.1%	29.0%	19.4%	26.9%	8.6%	1.1%	84.9%
12 to 18	38.0%	7.9%	31.7%	19.0%	25.4%	15.9%	0.0%	60.3%
19 to 23	6.0%	20.0%	40.0%	10.0%	30.0%	0.0%	0.0%	30.0%

Note: PSC bands (old) are shown vertically whereas PSC bands (new) are shown horizontally in the table.

Figure 3 represents the comparison of the graduation of both groups. It shows that only 59.4% of households in the control group graduated as per the new poverty scorecard, whereas 72.3% of households from the treatment group graduated as per the new poverty scorecard.

The finding of the study confirms with the study of Imai and Azam (2012); Shirazi (2012); Rashid and Makuwira (2014); Agbola et al. (2017) that the microcredit intervention has a positive impact on the reduction of the poverty. Therefore, it can be inferred that respondents in the treatment group who have graduated to the next band have done so due to the CIF microcredit program intervention. Graduation in the control group has also been witnessed and this can be attributed to natural growth rates, other poverty alleviation tools such as BISP, and other microcredit programs, and families striving for income and food, education of their children, more income earners, and more opportunities for earning. Even so, it is indicated that microcredit has also played a vital role in the reduction of poverty and improving the poverty score of the beneficiaries to move from one category of poor to another upper category. Microcredit has a positive impact on income and consumption (Imai and Azam 2012), along with income microcredit increases the savings

and living standards of the beneficiaries (Agbola et al. 2017). Microcredit programs have a significant impact on per capita income and per capita consumption expenditure (Cuong 2008), enhanced livelihood in rural areas (Rashid and Makuwira 2014) and increased assets, i.e., fans, bicycles and sewing machines (Shirazi 2012). However, 17.7% of respondents have either not graduated or their status has worsened. The possible reason is that poor people borrow to fulfill their consumption (Shirazi 2012). They may be tied up with the wrong type of farming activities and units (Bateman 2012). However, from overall results, it can be suggested that after getting microcredit from CIF, a woman and her family's poverty reduces, and her wellbeing increases.

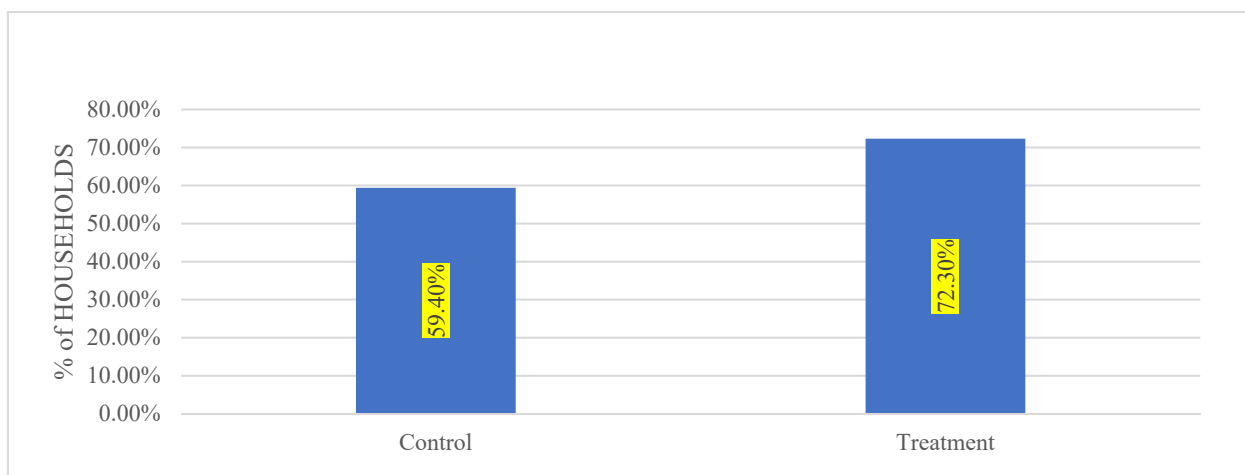


Figure 3. Comparison of the graduation of both groups.

The overall comparison of the graduation of both groups on all the levels is not sufficient to see the impact of microcredit on the graduation of women's poverty score, because graduation to the next level does not confirm the wellbeing of respondents and they are still living under the poverty line. Therefore, the study conducted a detailed analysis and measured graduation on the last three bands of the poverty scorecard. The last three bands were selected for further analysis of graduation because respondents on these bands live above the poverty line and Mark Schreiner 2016 () also identified that the poverty score of respondents that ranges from 25 to 34 has a 47.1% to 39.5% likelihood of being below the poverty line on the national poverty line of Pakistan. Respondents having poverty score ranges of 35 to 49 have 29.8% to 16.9% likelihood and the poverty score range of 50 to 100 have a 10.7% to 0% likelihood of being below the poverty line on the national poverty line of Pakistan (Mark Schreiner 2016).

Table 6 shows the comparison of the graduation of both groups on the last three bands. It indicates that only 15 (62.5%) respondents in the control group and 44 (69.8%) respondents in the treatment group have graduated in the third band (24–34), whereas 7 (29.2%) respondents in the control group and 18 (28.6%) respondents in the treatment group have graduated in the fifth band (35–50). However, only 2 (8.3%) respondents and 1 (1.6%) respondent have graduated in the sixth band (51–100) in the control and treatment group, respectively. The overall results indicate that there is not a big difference in the graduation of the treatment and control group.

As shown in Table 7, only 34.8% of respondents in the control group and 38% of respondents in the treatment group graduated to the last three bands of the poverty scorecard. The overall results suggest that the difference between graduation of treatment and control is 3.2% only, which is insignificant. Our findings confirm the study of Sayvaya and Kyophilavong (2015), which concluded that microcredit has a positive impact on poverty, but that impact is not significant. Therefore, we can infer that although microcredit is impacting woman poverty but not significantly and there are other factors as well, such

as BISP and other social mobilizing support to rural women, which are reducing their poverty and increasing the graduation level.

Table 6. Comparison of the graduation of both groups on the last three bands.

Bands	Control		Treatment	
	Percentage	Frequency	Percentage	Frequency
24 to 34	62.5%	15	69.8%	44
35 to 50	29.2%	7	28.6%	18
51 to 100	8.3%	2	1.6%	1
Total Graduated	100.0%	24	100.0%	63

Table 7. Overall graduation in last three bands in each group.

Groups	Control	Treatment
Total Respondents	69	166
Total Graduated in the last three bands	24	63
Total Graduated in the last three bands %	34.8%	38.0%

5.4. Socio-Demographic Characteristics

Table 8 presents the socio-demographic characteristics of the treatment group who received microfinance loans and the control group who have not taken loans, and it further indicates that both groups based on their characteristics were divided into unmatched and matched samples by using the propensity score matching technique. It shows the t-statistics of comparing the mean of treatment and control groups, which differs significantly. According to unmatched samples, women in the treatment group are likely to be older and have significantly larger household size. In particular, with an average monthly income per family of approximately PKR 17,723.68, women's family monthly income in the treatment group is significantly higher than the control group, which is having an average of approximately PKR 6692.92 per family, whereas, in matched samples, the average monthly income per family of women in the treatment group is approximately PKR 13,207.28, and is significantly higher than the control group, having an average of approximately PKR 11,722.61 per family. This indicates that the treatment group on average earns more income than the control group. Therefore, it suggests that microfinance has helped women to advance the level of their income. This finding is consistent with the study of [Al-Shami et al. \(2017a, 2017b\)](#) which states that microfinance has a positive impact on the monthly income of women. Similarly, with an average monthly consumption per family of approximately PKR 14,603.68, the treatment group in the matched sample is significantly higher than the control group, having an average of approximately PKR 12,571.57 per family. Similarly, with an average monthly consumption per family of approximately PKR 23,447.37, the treatment group in the unmatched sample is significantly higher than the control group, having an average of approximately PKR 8152.05 per family. In the unmatched sample, women who have a savings account are significantly more likely to join microfinance programs. In the matched sample, women who have a savings account have a significantly higher possibility to join microfinance programs earlier. This indicates that women in the treatment group have more savings accounts than the control group, as there is a requirement to open at least one bank account before applying for a microfinance loan from SRSO. Moreover, women also need a savings account to save their money earned from the business which was started from the loan amount. Similarly, [Agbola et al. \(2017\)](#) argue that microfinance has a moderately positive effect on poverty alleviation by the increased saving of its clients than non-clients. Women in the treatment group are less educated than the control group but there is no significant difference between them. According to the unmatched sample, women in the treatment group have significantly more total assets'

value and asset purchased value than non-borrowers, whereas, in the matched sample, total asset value and asset sold value of women in the treatment group are higher than the control group. Women participation in microfinance increases the value of their assets as they invest in different businesses and earn reasonable profit, which is also supported by the findings of Hashemi et al. (1996) that participation in microcredit increases women ownership of assets.

Table 8. Socio-demographic characteristics of the control and treatment group.

Variables	Unmatched Samples			Matched Samples		
	Control Group	Treatment Group	t-Test	Control Group	Treatment Group	t-Test
Age	35.52	48.21	−6.802 ***	42.78	43.38	−0.543
Household's size	5.14	10.99	−9.55 ***	8.01	8.4	−1.275
Income earners	1.05	3.25	−6.79 ***	1.93	2.07	−1.287
Monthly Income	6692.9178	17,723.6842	−5.921 ***	11,722.606	13,207.279	−1.651 *
Monthly Consumption	8152.0548	23,447.3684	−3.6 ***	12,571.566	14,603.676	−2.02 **
Loan amount other than CIF	1000	328.9474	0.857	691.1765	632.3529	0.158
Saving Account	0.03	0.13	−2.364 **	0.07	0.08	−0.486
Saving Amount	3315.0685	539.5263	1.014	185.6654	451.8493	−2.027 **
Education	1.6	1.29	1.512	1.25	1.24	0.2
House type	1.92	3.08	−1.967 *	2.2	2.18	0.399
Total Assets Value	132,657.53	256,053.947	−2.901 ***	165,644.485	214,036.029	−2.543 **
Asset Purchased Value	410.9589	6894.7368	−2.228 **	3752.2059	4937.8676	−0.744
Asset Sold Value	452.0548	2881.5789	−1.715 *	1091.9118	2644.489	−1.657 *
Political Empowerment	0.0137	0	1.02	0.011	0.0294	−1.523
Social Empowerment	0.0822	0.3289	−3.867 ***	0.1471	0.1949	−1.481
Economic Empowerment	0.0274	0.2105	−3.549 ***	0.1471	0.1838	−1.153
Political Awareness	0.0137	0.0132	0.028	0.0184	0.0478	−1.921 *
Political Participation	0.0137	0.1184	−2.594 **	0.0882	0.114	−0.995
Say In Decision	0.1507	0.4211	−3.789 ***	0.2059	0.3051	−2.667 ***
Mobility	0.4521	0.8026	−4.726 ***	0.6324	0.7316	−2.495 **
Household Asset and Income	0.1918	0.3684	−2.427 **	0.2978	0.3676	−1.73 *
Control Over Minor	0.0274	0.2632	−4.271 ***	0.1324	0.2096	−2.4 **
Control Over Major	0.0548	0.25	−3.401 ***	0.1728	0.1728	0
Composite Empowerment	0.0137	0.1316	−2.804 ***	0.0882	0.1507	−2.253 **
Children of school-aged (5–16 years)	1.7	3.68	−6.143 ***	2.69	3.1	−2.255 **
Children currently attend school, full or part-time	1.03	2.13	−4.4 ***	1.58	1.66	−0.572
Children that never attended school	0.58	1.49	−3.343 ***	1.01	1.37	−2.559 **
Highest grade level of your children	2.19	4.84	−4.218 ***	3.49	4.21	−2.057 **
Monthly medical expenditure	3701.3836	3369.7368	0.434	3604.9632	2891.5074	0.846
Family needed medical attention during last one month	0.73	0.7	0.361	0.75	0.72	0.721
Money to pay medical cost	3.33	3.13	0.566	3.39	3.03	2.042 **
Lack the money for medical treatment in the last year	0.59	0.55	0.387	0.45	0.54	−1.822 *
Household's diet	1.84	2.16	−3.302 ***	1.88	1.99	−1.908 *
Health Condition Worsened	3.47	4.09	−0.594	3.87	4.2	−0.673
Health Condition Improved	2.5	2.91	−0.365	4.18	3.85	0.643
Health8	0.59	0.59	−0.031	0.61	0.58	0.493
Health10	3.39	3.52	−0.174	2.9	2.63	0.804
Poverty Scorecard	23.71	21.61	1.233	21.34	21.44	−0.116
Poverty Scorecard (Loan cycle 3 and above)	23.71	23.33	0.147	21.34	21.78	−0.331

Note: ***, ** and * show statistical significance at 1%, 5% and 10% level, respectively.

In the unmatched sample, women in the treatment group have significantly higher social empowerment with an average score of 32.89%, higher economic empowerment with an average score of 21.05% and relatively high political participation with an average score of 11.84%, than women in the control group with an average score of 8.22%, 2.74% and 1.37%. While social and economic empowerment and political participation are not significant in the matched sample. Table 8 also shows a significant difference of the unmatched sample in

women say in decision making with an average score of 42.11%, mobility with an average score of 80.26%, control over resources minor with an average score of 26.32% and control over major resources with an average score of 25% in the treatment group while 15.07%, 45.21%, 2.74% and 5.48% in the control group, whereas women in the treatment group have significantly more political awareness with more control over minor resources in the matched sample. These findings are consistent with a study of [Rehman et al. \(2015\)](#) which states that access to microcredit makes women more empowered in terms of health and education (the health and education of their children), social empowerment (social aspects of life), economic empowerment (decisions regarding purchases of household items), and political empowerment (aware of their rights). The composite empowerment in both unmatched and matched groups is significant but high in women of the treatment group in the unmatched sample. Moreover, children of age between 5 and 16 years of women in the treatment group have a significantly high enrollment rate in school with more children in the highest grade level. This finding is consistent with the study of [Mahmood \(2011\)](#) who finds that after getting microfinance, women are more empowered in household decisions such as the education of their children.

There is no significant difference between the two groups of women concerning both overall poverty scorecard including all loan cycles and poverty scorecard with loan cycle 3 and above in both matched and unmatched samples as their resultant t-statistics is not significant with an approximately same value of both treatment and control group. This indicates that the bias of treatment and control group was reduced and both groups are now comparable based on the selected pretreatment characteristics.

5.5. Logistic Regression Analysis

The analysis begins with the sample survey data. Logistic regression was performed to assess the impact of interest-free microfinance on the likelihood of women empowerment. The models contain eleven independent variables: four controlled variables (beneficiary, age, education, and occupation) and seven main independent variables (monthly income, monthly consumption, loan amount, BISP, saving amount, total assets values and asset purchased value). The independent variables are identified along the vertical axis of the logit model tables. The B values provided in the second column of logit model tables are coefficients for the constant that is used to identify the direction of the relationship between the independent variable and dependent variable. The *p*-value is used to predict whether an independent variable would be significant in the model. *p*-values are shown in the third column of logit model tables. The test that is used here is known as the Wald test. Wald is basically t^2 which is Chi-Square distributed with “df (degree of freedom)” equal to 1. This tests the null hypothesis that the constant equals 0. This hypothesis is rejected if the *p*-value is smaller than the critical *p*-value. Wald test is labelled in column fourth of logit model tables. The “ e^B ” values are represented in the fifth column of logit model tables. “ e^B ” is the exponentiation of the B coefficient and represents odds ratios for each independent variable. The odds ratio is defined as the change in odds of being in one of the categories of the outcome when the value of a predictor increases by one unit ([Barbara et al. 2007](#)). The Cox & Snell R Square and the Nagelkerke R Square values suggest the amount of variation in the dependent variable explained by the model, and it ranges between 0 and 1. The Cox & Snell R square is based on the log-likelihood for the model compared to the log-likelihood for a baseline model, whereas Nagelkerke R Square is an adjusted version of the Cox & Snell R-square. The models also adjust for the socio-demographic characteristics discussed above, but as we are not concerned here with the magnitude of their effects on women empowerment, their estimates are not shown.

Table 9 provides the last logistic regression model results of composite empowerment which is a combination of the previous ten models. At the 10% significance level, the likelihood of composite empowerment of women increases when total asset value increases. In this model, other variables reliably associated with composite empowerment of women are age, occupation type, i.e., farming, labour and SME owner and asset purchased value.

The likelihood that composite empowerment of women declines as women's age increases at a 10% significance level, shows that young women have more composite empowerment. The strongest predictor of reporting women composite empowerment is occupation type labour, recording an odd ratio of 4.896. This indicates that women working in labour are over 4.896 times more likely to report composite empowerment than other occupations, controlling all other factors in the model. The odds ratio of 2.404 and 3.987 for occupation type farming and SME owner is more than 1, indicating that for every additional increase in the number of women working in farming and SME owner are 2.404 and 3.987 times more likely to report having women composite empowerment, controlling for other factors in the model. The odds ratio of 0.979 for age is less than 1, indicating that for every additional year is 0.979 times less likely to report having women composite empowerment, controlling for other factors in the model. In other words, young women are 1.021 (1/0.979) times more likely to have composite empowerment, controlling for other factors in the model.

Table 9. Logistic model 11.

Predictors	Composite Empowerment			
	B	P	Wald's X2	Exp(B)
Beneficiary (1)	−0.446	0.251	1.320	0.640
Age	−0.021	0.080	3.055	0.979
Monthly Income	0.000	0.881	0.022	1.000
Monthly Consumption	0.000	0.810	0.058	1.000
Loan Amount	0.000	0.275	1.193	1.000
BISP (1)	−0.426	0.130	2.288	0.653
Saving Amount	0.000	0.250	1.325	1.000
Education	0.005	0.979	0.001	1.005
Occupation		0.000	29.057	
Occupation (1)	0.877	0.037	4.362	2.404
Occupation (2)	1.588	0.001	12.034	4.896
Occupation (3)	1.383	0.044	4.046	3.987
Occupation (4)	−0.460	0.317	1.000	0.631
Total Assets Value	0.000	0.067	3.363	1.000
Asset Purchased Value	0.000	0.006	7.424	1.000
Constant	−1.711	0.035	4.434	0.181
Test				
−2 Log likelihood	419.178			
Model Chi Square	12.125	0.146		
R ²		0.082/0.164		
% Correctly Predicted	89.1			

Note: Significance level is " $< \text{or} = 0.10$ " and bold values are significant. Predictors are the independent variables while Political Empowerment is the dependent variable.

Furthermore, the odds ratio of 1 for total asset value and asset purchased value indicate that for every additional asset purchased value and asset sold value is 1 time less likely to report having women composite empowerment, controlling for other factors in the model. The two values 0.082 and 0.164 of R Square suggest that the variability in composite empowerment of women is between 8.2% and 16.4%. Overall, the model correctly predicted 89.1% of the cases.

The process of women's empowerment is complex. This is confirmed by the results of the present analysis. The complexity of empowerment is apparent when comparing the relationships between independent and dependent variables. From the logistic regression results, we find that the various dimensions of empowerment (political empowerment, political awareness, political participation and ownership of household assets and income) are not necessarily related to the determinants (predictors) consistently. For example, the women having education have a negative relationship with ownership of household assets and income even though they are more likely to have ownership of household assets and

income. Moreover, the composite score is lower for older women and higher for young women.

Concerning the exposure to the CIF microcredit program, the results suggest that occupation types have a positive impact on women empowerment as the number of women working as labour increases, the probability of social and economic empowerment in women increases. Women who work as labour are more likely to have greater freedom of mobility and are more likely to have control over minor and major resources. Women working as SME owners increases the probability of economic empowerment in women with more control over minor resources and ultimately leads to the probability of women overall empowerment as indicated by the composite score. Women as housewives show a negative relationship with the social empowerment of women due to several cultural norms and stereotypes, as in rural areas the mostly male-dominated society does not involve women to participate in different decision making. Women remain at home and perform household tasks. Further, results indicate that housewives do not have ownership of household assets and incomes because women are not allowed to work outside the house and earn some money to own any asset. Education is a very important indicator of women empowerment. There is considerable evidence for the claim that access to education can bring about changes in the cognitive ability of humans, especially women. The results of this study suggest that the increase in the education level of women increases the probability of political empowerment and political awareness in women whereas the probability of ownership of household assets and income decreases as the education level of women improves because while getting an education, women are unable to work and earn. This makes women more dependent on other family members for earnings.

Mostly, the CIF program helps women to increase their total asset value, and the results propose that if the total asset value increases the probability of economic and social empowerment in women increases. An increase in the total asset value also increases the women's ownership of household assets and incomes as well as control over minor resources. Microcredit helps women to become independent in society by giving more control over resources. This results in increasing the probability of women overall empowerment as indicated by the composite score. For exposure to the CIF program, the results suggest that as the asset purchased value of family increases, the probability of political, social and economic empowerment of women, political participation and control over resources increases. For the control variables, the results suggest that if women's age increases, the probability of women's say in decision-making decreases while the mobility of women increases. In the other words, young women have more ease of mobility from outside the home. This study suggests that not only CIF programs empower women by strengthening their political, social and economic roles but also other indicators such as education level and occupation type have a strong impact on women empowerment.

6. Conclusions

Microcredit has been seen as the most powerful tool to empower women and reduce poverty because it provides lending, which helps a poor woman to increase her earnings and status in society and home. This study aims to measure the graduation level of women in terms of poverty using the poverty scorecard tool and to assess the impact of interest-free microfinance on empowering women socially, economically, politically, and on the health and education of their families. The findings show that women in the treatment group are likely to be older and have significantly larger household size and more income earners than the control group in the unmatched sample. Moreover, respondents in the treatment group have a higher income and consumption range than the control group and the difference is statistically significant in both unmatched and matched samples. Furthermore, respondents in the treatment group have higher total assets value in an unmatched and matched sample, whereas respondents in the treatment group have also purchased assets more in the unmatched sample as compared to the control group thus participation in microfinance increases the value of their total assets. Similarly, the number

of children of respondents attending school is significantly greater in the unmatched sample and has attained a higher grade level in the treatment group than in the control group in both samples. However, the percentage of social empowerment, economic empowerment, political participation, and control over major resources in the unmatched sample and political awareness in the matched sample is significantly higher in the treatment group as compared to the control group. Percentage of say in decision making, mobility, ownership of household assets, control over minor resources and an overall composite of empowerment is significantly higher in the treatment group as compared to the control group in both samples.

Secondly, the results of the study suggest that microcredit has positively impacted women beneficiaries in terms of reduced poverty and improved their family wellbeing. The family rosters in poverty scorecard indicate that beneficiaries are purchasing productive assets or income-generating assets such as sewing machines, cattle and so on and sending their children to schools. Although 72% of beneficiaries (treatment group) have graduated from one poverty band to another higher band than 59.4% non-beneficiaries (control group) in poverty score, their graduation does not confirm their wellbeing and lower poverty because initial three bands (see Table 5) of poverty score still implicate the score of respondents below the poverty line. Thus, the real graduation was considered if the respondents have graduated in the last three bands (see Table 5) of the poverty scorecard, which is 38% in the treatment group and 34.8% in the control group. Furthermore, results of the logistic regression analysis illustrate that the involvement of the CIF program does empower rural women of Sindh, Pakistan but the empowerment process does not necessarily occur simultaneously across all dimensions. Women's participation in the CIF program increases women's ownership of household assets and income, say in decision making, mobility outside the home, socio-economic empowerment and composite empowerment. Despite the CIF program, occupation types, i.e., labour and SME owners have also a strong impact on women empowerment in the perspective of socio-economic and composite empowerment as a whole whereas housewives have low social empowerment. Similarly, literate women are more politically empowered as they have more access to information regarding politics and their rights as a citizen than illiterate women. Based on the findings of the study, policymakers, donors, government and other stakeholders will be able to make decisions on the investment for interest-free microfinance intervention. Furthermore, they should focus on other aspects such as education, employment opportunities for women and other social mobilization activities along with microfinance interventions for poverty reduction and empowerment.

Author Contributions: P.A.M. developed the idea and drafted the introduction of the study. M.R.K. designed research methodology, developed research tools for data collection and partially writing. K.T. contributed to the data collection and data analysis. P.S. contributed to the data collection and interpreted the results. S.S. contributed to the data collection and reviewed the paper. All authors have read and agreed to the published version of the manuscript.

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