Chapter IV

Analysis of Research Results

4.1. Introduction

This chapter discusses the main findings of the effect of microfinance on outcome indicators of the present study. The outcome indicators selected for this study are income and employment of the participants, financial inclusion indicators and a set of poverty and inequality indicators. Three standard measures of poverty are employed, namely, Head Count Index (P_0), Poverty Gap Index (P_1) and Squared Poverty Gap Index (P_2). We measured poverty by using three Foster-Greer-Thorbecke poverty indices and income inequality by using three common measures of inequality, namely, Lorenz curve, Gini Coefficient and Atkinson Index. The impact of a microfinance programme on targeted households is subject to two main sources of bias, the observed and unobserved bias. The Propensity Score Matching (PSM) method is applied to assess the impact of microfinance programme by correcting biases based on observables using the primary data. The field survey was conducted in between May, 2013 to October, 2013 using a well-structured questionnaire. Data were collected from the respondents through face-to-face interview method. The SHG-Bank Linkage programme of Swarnajayanti Gram Swarozgar Yojana (SGSY) is a comprehensive microfinance scheme in which the rural poor are provided with joint liability loans for financial inclusion and poverty alleviation in the study area. The impact of this programme is examined in this study. This would provide useful justification for policy makers and microfinance providers in designing, implementing and monitoring microfinance programmes.

The rest of the chapter is organised as follows:

Section 4.2 presents the socio-economic profile of the sample households. Section 4.3 discusses the profile of the sampled SHGs and their functioning aspects. Section 4.4 and 4.5 discuss the estimated results of the impact of the microfinance on selected indicators of outcomes of the sampled households.

4.2. Profile of the Sampled Respondents

This section discusses the socio-economic characteristics of the sampled respondents. The discussions are based on the primary data collected from the field, including results and findings from a descriptive analysis such as, compare means, frequency tables, etc. The t-test was used to test if the mean values of respondents characteristics between the particiants and control groups are statistically different or not. This indicates how good a quantitative variable can be used to control for the similarities and differences between the two groups. The null hypothesis (H_0) formulated is that both the samples come from the same normal population ($H_0:\mu_1=\mu_2$) and there is no significant difference in their mean values. The alternate hypothesis (H_1) is that there is significant difference in the mean incomes of two samples ($H_1:\mu_1 \neq \mu_2$). To carry out the test, t-value was calculated using the following formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S} \cdot \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

$$S = \sqrt{\frac{\Sigma(X_1 - \bar{X}_1) + \Sigma(X_2 - \bar{X}_2)}{n_1 + n_2 - 2}} \qquad (4.1)$$

Where,

$\bar{X}_1$= Mean value of the first sample

$\bar{X}_2$= Mean value of the second sample

n_1 = Size of first sample

n_2 = Size of second sample

S = Combined standard deviation of two samples

The degree of freedom is equal to n_1+n_2-2.

The estimated value of 't' is compared with the Table value for degrees of freedom at a certain level of significance for acceptance and rejection of null hypothesis. If the estimated value of 't' is greater than the table value for n_1+n_2-2 degrees of freedom H_0 is rejected and H_1 is accepted. Conversely, if calculated t-value is

smaller than the table value for n_1+n_2-2, H_0 is accepted and H_1 is rejected. The hypotheses are used throughout the analysis for testing the mean values between the groups.

Secondly, the Chi-square test as a non-parametric test was used to test the relationship (independent or not) between the categorical variables and treatment assignment. This test shows how likely a categorical variable is independent of the distribution of the two groups, participants and control groups. In order to test whether or not categorical variables are associated, the null hypothesis (H_0) formulated that there is no association between the attributes and treatment assignment. The value of Chi-square is calculated as follows:

$$\chi^2 = \sum \frac{(0 - E^2)}{E} \qquad (4.2)$$

Where,

O = Observed frequencies

E = Expected frequencies.

The expected frequency for any cell can be calculated as follows:

$$E = \frac{RT \times CT}{n}$$

Where,

RT = The row total for the row containing the cell.

CT = The column total for the column containing the cell.

n = Total number of observations.

The estimated value of χ^2 is compared with the Table value for degrees of freedom: (Number of columns-1) $\times$ (Number of rows-1) at certain specified level of significance. If the calculated value is greater than the Table value at a certain level of significant, the null hypothesis is rejected and the association between the attributes is considered significant. On the other hand, if the estimated value of χ^2 is less than the table value at a certain level of significance, the null hypothesis that attributes are independent is accepted. This hypothesis of χ^2 test is used to test the association between categorical variables and treatment assignment throughout the

discussions. The statistical package SPSS version 22 was used to compute these statistical tests.

Let us now discuss the profile of the respondents selected for the present study. We begin with the age distribution of the respondents.

4.2.1. Age of the Respondents

Age is a critical input and reflects the rigour and vigour of a person for doing the work. As per the NABARD guidelines, an individual with 18 years or above can become a member of an SHG. Table 4.1 indicates the age distribution of respondents. The age ranged from 22 to 65 years old. The mean age of the respondents was 40.61. When grouped into age categories, the most popular age belonged to the age group of 36-45 years (43.9 percent), followed by age group of 26-35 years (23.3 percent) and 46-55 years (23.9 percent). It was seen that a higher portion of non-participant respondents belong to higher age category of 46-55 years (26.7 percent) than that of participant group which is 20.7 percent. the mean age was 40.61 years. The t-test was applied to see the mean age difference between the participants and non-participants. The mean age of the participants and non-participants were 40.21 and 41.38 years respectively. The t-test of equation (4.1) was applied with the stated hypotheses above to determine the mean age differences between the two groups. The calculated t-value is compared with the table value. The test shows that the estimated t-value of -1.300 was lower than the table value. Thereofre, the null hypothesis was accepted and hence there is no significnat differences in mean age between the participants and control groups.

Table-4.1: Age of the Respondents

Age Category	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
22-25	7	3.9	4	2.2	11	3.4	
26-35	40	22.2	39	26.0	79	23.9	
36-45	74	41.1	71	47.3	145	43.9	
46-55	48	26.7	31	20.7	79	23.9	
56 & Above	11	6.1	5	3.3	16	4.8	
Total	180	100	150	100	330	100	
Mean	41.38		40.21		40.61		t= -1.30

Source: Researcher's own calculation based on primary data

4.2.2. Educational Status of the Respondents

Education level is an important factor that tends to determine where one works and income level. The SHG programme targets to those poor individuals or households with low income and socially disadvantaged like illiterate or low educated who are not favoured by the formal financial institutions in order to provide access to formal financial services at affordable cost. The respondents were divided into four groups with respect to educational attainment: those having no formal education, primary school, secondary school, HSLC and HSC completed. Table 4.2 shows that the majority, i.e., over sixty percent of the respondents has obtained some form of education and about forty percent were reported to be having no formal education. The result of the distribution of education levels was found different between the two groups. The proportion of the respondents with no formal education at 45.6 percent of the non-participant group was larger than the participant group which is 32.7 percent. This shows that the treatment group (participant) attained more primary, secondary education and matric level than control groups. The percentage of formal educations from primary to matric level for the treatment clients was about 64 percent which was much higher than that of the control group (non-participants) with 50 percent within this level of education. However, though the proportion of respondents with higher secondary level was low in both the groups, the percentage with HSC level for the treatment group (3.3 percent) was slightly smaller than the non-treated group (4.4 percent). The t-test was used to test the significant difference of education level between the two groups using equation (4.1) with the same hypotheses. The t-test of mean educational level of respondents has revealed statistically significant differences between the two groups. There are more respondents with formal education in participant groups. This implies that education has statistically significant influence on participation in microfinance services at 10 percent level.

Table-4.2: Educational Attainment of the Respondents

Education Level	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
Illiterate	82	45.6	49	32.7	131	39.7	
Primary (1-5)	49	27.2	50	33.3	99	30.0	
Secondary (6-9)	23	12.8	25	16.7	48	14.5	
HSLC (10)	18	10.0	21	14.0	39	11.8	
HSC (12)	8	4.4	5	3.3	13	3.9	
Total	180	100	150	100	330	100	
Mean	3.87		4.67		4.23		t= 1.841***

Source: Researcher's own calculation based on primary data

*** *Significant at 10 % level*

4.2.3. Marital Status of the Respondents

We now consider the marital status of the respondents. Marital status was used to see whether it influence participation or not. Table 4.3 reveals the marital status of the respondents. The result indicates that the most of the surveyed women respondents are found married and the proportion of widow or divorce women and unmarried girls is very low. The table 4.3 shows that the proportion of married women in the participant group is 87.3 percent which is nearly 90.5 percent of the control groups. The proportion of widows is 2.8 percent for control group and 11.3 percent is treatment group. Only 1.3 percent of the treatment group and 6.7 percent of the control group are unmarried. This suggests that individuals with household responsibilities (married women) were most likely to participate in microfinance programmes. In other words, married women are most likely to be involved in micro-enterprise activities, in part, because they can get initial capital and support from family. They are interested to support their family by providing subsidiary income and transform themselves into an asset of the family instead of housewife activity. The Chi-square test was applied to test the whether marital status is significantly associated with the participation status or not. The test shows that marital status was statistically significant at 1 percent level. This implies that marital status explicitly influenced participation in micro-credit because most microfinance programmes target married women.

Table-4.3: Marital Status of the Respondents

Marital Status	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
Married	163	90.5	*131*	*87.3*	*294*	*89.1*	
Unmarried	1	6.7	2	1.3	14	4.2	
Widow	5	2.8	*17*	*11.3*	22	6.7	
Total	180	100	150	100	330	100	χ^2=14.564*

Source: Researcher's own calculation based on primary data

*Significant at 1 % level

4.2.4. Gender of Household Head

Out of the 330 respondent households, about 92 percent were male headed and only about 8 percent were female-headed households. Among the male-headed households, 91.7 percent and 92.7 percent were non-participants and participants respectively. Similarly, out of 7.9 percent of the female headed households, 7.3 percent were participants and 8.3 percent we nonparticipants. In order to see the significance of association of the gender of the household head with the participation status, the chi-square test was conducted. The χ^2 test analysis showed that there was no significant difference existed in the sex of the household head between treatment and control groups household heads (Table 4.4).

Table-4.4: Sex of Household Head

Gender	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
Male	165	91.7	139	92.7	304	92.1	
Female	15	8.3	11	7.3	26	7.9	
Total	180	100	150	100	330	100	χ^2=0.113

Source: Researcher's own calculation based on primary data

4.2.5. Household Size

The household size (members) of the respondents ranges from a minimum 2 members to a maximum of 18 members. The average household size was about five members. The mean household size of treatment group was 4.57 and that of

control group was 5.05. The table 4.5 below shows the household size of the sampled respondents.

Table-4.5 Household Size of the Respondents

Household Size	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
2-4	93	51.7	104	69.3	197	59.7	
5-7	69	38.3	36	24.0	105	31.8	
8-10	11	6.1	8	5.3	19	5.8	
11 & Above	7	3.9	2	1.3	9	2.7	
Total	180	100	150	100	330	100	
Mean	5.05		4.57		4.83		t= -2.149**

Source: Researcher's own calculation based on primary data

**Significant at 5% level

It reveals that majority (59.7%) of the households had members 2-4 in the family, followed by 5-7 members (31.8 percent) and 5.8 percent 8-10 members. The households having 11 and above members in the family is only 2.7 percent. In between the two groups, 69.3 percent of the households in the treatment group had 2-4 members in the family compared to 51.7 percent in the control group. Conversely, a greater proportion (38.3 percent) of the household in the control groups had 5-7 members in the family as compared to 24 percent in the treatment group. The t-test was conducted to see the significant difference of household size using (4.1). The test result estimated the t-value at -2.149 which is greater than the table value. It shows that the variation in the average household size between the two groups is statistically significant at 5 percent level (Table 4.5).

4.2.6. Number of Children in the Family

The numbers of children in the family are distributed in proportion to the household size. The average size of the number of children was 1.4 for both the groups of households. About 67 percent of the households have one or two children in the family. There was little difference in the number of children between the two groups of households. The number of households with 3-4

number of children was more in non-participant group (11.1 percent) than that of the treatment group (8 percent only). The family having 5 and above number of children was 2.2 percent of the control group compared to 2 percent of the treatment group. The conduct of t-test as above for significant of differences of mean number of children reveals that the t-value of -0.437 is smaller than the table value. Therefore, the null hypothesis is accepted and hence difference of the number of children between the two groups was not statistically significant (Table 4.6).

Table-4.6: Number of Children in the Family

Children	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
NIL	41	22.8	29	19.3	70	21.2	
1-2	115	63.9	106	70.7	221	67.0	
3-4	20	11.1	12	8.0	32	9.7	
5 & Above	4	2.2	3	2.0	7	2.1	
Total	180	100	150	100	330	100	
Mean	1.46		1.41		1.44		t=- -0.437

Source: Researcher's own calculation based on primary data

4.2.7. Number of Earning Members

A households with large number of earner means low dependency ratio and hence less financially vulnerable than that of less number of earner households. Table 4.7 summarises the number of income earners in the family. About 97.3 percent of the participant groups of households have income earners one to two number was greater than that of control households (89.4 percent). But the households with three and more income earners were greater in the control group compared to the participant households. On an average, there was 1.60 number of income earners in the family in both the treatment and control group. The t-test value for significant of difference of mean number of income earners between the two groups using the equation (4.1) reveals that the t-value is greater than the table value at 10% level. Therefore, the difference in the number of income earners is statistically significant at the 10% level. The negative sign implies that households

with less number of income earners are more associated with participating in the microfinance programme to multiply earning members in the family (Table 4.7). The number of children and earner in the family give the indication of dependency ratio in the family. The dependent ratio is calculated as the ratio of the household members without income to the number of income earners. It reflects the economic activities and financial position of a household. Households with less number of income earners tend to have more dependents, such as children and the elderly, and are more financially stressed than those with lower ratios. As dependency ratio increases, the need for enough basic needs and financial resource also increase. This shows economically active person has to support oneself as well as additional persons for their livelihood. As a result, households with more dependents which in turn have less number of earners are more likely participate in the microfinance programme (Table 4.7).

Table-4.7: Number of Earning Members

Number of Income Earners	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
1-2	161	89.4	461	97.3	307	93.0	
3-4	13	7.2	3	2.0	16	4.8	
5 & Above	6	3.3	1	0.7	7	2.1	
Total	180	100	150	100	330	100	
Mean	1.68		1.50		1.60		t= - 1.854***

Source: Researcher's own calculation based on primary data

*** *Significant at 10 % level*

4.2.8. Agricultural Lands (bigha[15])

The agricultural landholdings is considered as status symbol in rural areas. Household's agricultural landholding is measured as a total size of land occupied by the household for cultivation. The landholding status is shown in Table 4.8 below.

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[15] The unit of measurement of agricultural land is bigha (1 bigha = 0.4 acre)

Table-4.8: Agricultural Landholdings (bigha)

Agriculture Land	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
Nil	25	13.9	25	16.7	50	15.2	
1-3.0	45	25.0	45	30.0	90	27.3	
3.1-5.0	47	26.1	43	28.7	90	27.3	
5.1-10.0	46	25.6	32	21.3	78	23.6	
10.1 & Above	17	9.4	5	3.3	22	6.7	
Total	180	100	150	100	330	100	
Mean		5.11		4.27		4.73	t= - 1.635***

Source: Researcher's own calculation based on primary data

*** Significant at 10% level

Table 4.8 shows that participant households owned, on average, about 4.27 bigha and the control group households owned 4.21bigha. The proportion of households over both groups holding no agricultural land is about 15 percent. A greater number of households (32.8 percent) in the treatment group have land between 1-3 bigha than that of households (25 percent) in the control group. However, households with more than five bighas of land are higher in control group compared to treatment group households. The t-test was applied to test the significant difference of agricultural landholdings between the two groups. The value of t-test rejects the null hypothesis at 10 percent level. This means that agricultural land area held by households was significantly different at 10 percent level between treatments and non-treatment groups. It is negatively associated with the participation in microfinance programme. Since microfinance programmes do not require collateral for a loan, the households owning less amounts or no land households land are associated with the microfinance programme. However, households owning land seem to have an advantage over landless households in borrowing (Table 4.8).

4.2.9. Distance to Financial Institutions from Residence

Distance to banks is an important determinant of participation and accessibility of formal credit. Table-4.9 summarises the location of households from the formal financial institutions. It reveals that about 40 percent of the participant households

are located in between 2-5 kilometres away from the banks. This figure for the control group is 43.3 percent. The proportion of households (49.3 percent) of the participant group is slightly higher than that of control group (46.7 percent) in the distance bracket of 6-10 kilometres. The proportion of households residing in the bracket of 11 and above kilometres are same for both the participants. The conduct of t-test accepts the null hypothesis that there is no significant difference of mean distance between the two groups because the calculated t-value is less than the table value.

Table-4.9: Distance to Financial Institutions from Residence

Distance to Bank (Kms.)	Non-Participants		Participants		All Respondents		Statistical Test
	Count	Percentage	Count	Percentage	Count	Percentage	
2-5	78	43.3	61	40.3	139	42.1	
6-10	84	46.7	74	49.3	158	47.9	
11& Above	18	10.0	15	10.0	33	10.0	
	180	100	150	100	330	100	
Mean	6.35		6.40		6.38		t= -0.149

Source: Researcher's own calculation based on primary data

4.1.10. Summary of t-tests for Quantitative variables

The t-test was applied to find out the significant difference of mean values of quantitative variables between the participants and control group (non-participants). Table 4.10 summarises the t-test results. The test was conducted to see whether participants are significantly different from non-participants in terms of age, education, family size, number of Children, number of earners, operational landholdings (bigha) and distance from residence to bank. The test results have revealed that participant group is significantly different from non-participants in terms of mean education level, household size, number of earners and agricultural lands. The households size is significantly different at 5 percent level and education level, number of earners and agricultural lands are significant at 10 percent level. Thus participants are different from non-participants in terms of these selected variables.

Table 4.10: Summary Results of t-test Conducted in Quantitative Variables

Variables	Respondents	N	Mean	Std. Deviation	Std. Error Mean	t=test
age	Participants	150	40.21	7.873	.643	**1.300**
	Non-Participants	180	41.38	8.372	.624	
Education Level	Participants	150	4.67	3.786	.309	**1.841***
	Non-Participants	180	3.87	3.997	.298	
Household size	Participants	150	4.57	1.844	.151	**- 2.149****
	Non-Participants	180	5.05	2.180	.162	
Number of Children	Participants	150	1.41	1.094	.089	**-0.437**
	Non-Participants	180	1.46	1.155	.086	
Number of earners	Participants	150	1.50	.792	.065	**- 1.854***
	Non-Participants	180	1.68	.972	.072	
Agricultural Land	Participants	150	4.273	4.7525	.3880	**- 1.635***
	Non-Participants	180	5.108	4.5064	.3359	
Distance to Bank	Participants	150	6.35	2.826	.231	**-0.149**
	Non-Participants	180	6.40	2.832	.211	

Source: Researcher's Own Calculation Based on Primary Data
**Significant at 5 % level; ***Significant at 10% level.

Similarly, Chi-square test was conducted to find out assocation (independent or not) of categorical variables and treatment assignment. The test result showed that marital status of respondents is significantly associated with the treatment assignment. As the participants in the sample are appeared to be different than that of control group (non-participants), if we run a naïve regression and estimate impact of borrowing from the microfinance programme on different indicators, we are very likely to over-estimate the impact of microfinance. Therefore, there is need for correcting biases in terms of observed variables which is done by using PSM method.

4.3. Profile of the Sample SHGs in the study area

The field survey covered 60 SHGs out of which 30 SHGs are from Baksa district and 30 SHGs are survey from Udalguri district of Assam. The status of the SHGs

surveyed in this study is presented in Table 4.11. From each SHG, three SHG members were interviewed from each of the selected SHGs. Following this, a total of 150 participants were surveyed. The results of the findings that the range of group membership varies from 10 to 20 members but on average there are about 11 members per SHG.

Table-4.11: General Characteristics of SHGs in the Study Area

Particulars	Baksa	Udalguri	Combined
Total Number of SHGs Surveyed	30	30	60
Number of Participants Surveyed	79	71	150
Membership Size of SHGs	10-15	10-20	10-20
Average Number of Members in a Group	11.4	11.6	11.5

Source: Field Survey

4.3.1. Functioning of SHGs under Bank Linkage Programme

The SHG-Bank Linkage Model (SBLP) is developed in India to provide microfinance to those who are otherwise likely to be excluded by the formal banking system. In this model, the informal SHGs are deposit linked first and then credit linked with vast network of the formal lending institutions. The main idea of SHGs is to begin with encourage thrift, learn participative fund management, and learn to interact with a bank branch with a saving deposit account. The members of SHG are encouraged to make a voluntary thrift on regular basis at fixed interval, particularly every month to show their financial performance. Once the groups show this mature financial behaviour, banks are encouraged to provide loan in the group name in multiples of their accumulated savings. Therefore, effective functioning of SHGs is necessary for the sustainability of the programme. In this section, an attempt has been to study the functioning of the SHGs under SHG-Bank Linkage model in the study area.

The functioning of the SHGs under SBLP are studied by including age of the group, selection of group leaders, conduct of meeting, frequency of meeting, attendance in meeting, collection of savings and record keeping and account maintenance. The results are summarised with the help of following tables.

4.3.1.1. Age of SHG

The age is an important indicator to measure the sustainability of the groups. It is implied that higher age of SHGs means these groups have performed their group activities successfully over a long period of time. In this study it is found that 56 percent of the groups have been performing their microfinance activities for more than six years. More than 38 percent of the groups are performing their activities for four to six years. The reasons for long sustenance might be awareness about the concept of self-help and care taken by NGOs and other facilitating agencies (Table 4.12).

Table-4.12: Age-Wise Distribution of Sample SHGs

District	Up to 3 years	4-6 years	Above 6 years	Total
Baksa	1	13	16	30
Udalguri	2	10	18	30
Total	3	23	34	60

Source: Field Survey

4.3.1.2. Selection of Leader

The sustainability of a group functioning largely depends on the selection of a group leader. The group leader should have the ability to manage the groups in all respects. Hence, the way in which group leader is selected assumes significance. SHGs are mostly formed by the poor and illiterate or just literate women. Therefore, the members of the group mostly wanted and preferred the highest educated among them to be the leader of the group. The group leader have to be selected on a democratic basis in whom all the members can trust. Table 4.13 reveals that 100 percent of the SHGs leaders were nominated and elections were not held. The concern of smoothness in day-to-day operations could be an important reason for the leaders chosen on nomination basis. Apparently, there is no evidence of election for leader in any SHG in our study area.

Table-4.13: Governance and Management Practices of SHGs

Particulars	Frequency	Percentage
1. System of Selecting Group Leader		
Election	0	0
Nomination	60	100
2. Frequency of Meeting		
Weekly	4	6.7
Fortnightly	4	6.7
Monthly	52	86.7
3. Members Attending Meeting		
100 %	19	31.7
90-99%	39	65.0
Less than 90%	2	3.3

Source: Field Survey

4.3.1.3. Conduct of Meeting

The conduct of meeting at regular intervals after formation in a common place is one of the most essential activities of SHGs. Meetings are common platform in which all members participate for group sustainability. Here, members undertake not only financial transactions in terms of collection of savings, disbursement of loans, recoveries of loans and but also decides on economic activities to be undertaken for income generating purposes. Meetings also provide scope for discussion of their common problems and other social issues that need to be sort out through the intervention of the groups or its members. Therefore, the frequency of the meetings and the level of attendance are considered as a parameter for measuring sustainability of the groups. Table 4.13 shows that majority (86.7 percent) of SHGs were held regular meeting at monthly interval and the percentage of attending meetings is good and only 2 SHGs have shown less than 90 % attendance. This reason of high attendance might be due to the proximity of stay of members and homogeneity in formation of the groups (Table 4.13).

4.3.1.4. Collection of Savings

Monthly savings in a common fund (bank pass book account) is compulsory in the process of SHG activities after formation. This inculcates the habits of savings and

provides incentives of getting bank loans at lower interest rate, mostly among the rural poor who are likely to be excluded by the formal financial institutions. Members have to jointly decide the savings per month per member on the basis of their capacity to save. The amount of savings varies across the sample groups. The rate of savings varied from ₹20 to ₹200 per month. It was found that members saved ₹50-100 per month in 55 percent of the total surveyed SHGs (Table 4.14).

Table-4.14: Monthly Savings of the SHGs

Savings (H./Month)	Number of SHGs	Percentage
20-30	22	36.7
50-100	33	55.0
101-150	3	5.0
151-200	2	3.3
Total	60	100.0

Source: Field Survey

4.3.1.5. Maintenance of the Records and Accounts

Maintenance of records and accounts such as saving ledger, loan ledger, pass book, minute's book, group activities record, attendance register, membership register and visitor's register is an integral part of the successful functioning of a SHG. In all the groups, in 90 per cent of cases, the minutes of the meetings and accounts were maintained by the literate member of the group. In 43.3 per cent of cases, it was found that literate villagers or other family members had been involved in this exercise and only in 3.3 cases promoting agencies are involved in the activity. Sometimes, the groups also take help of NGOs (Table 4.15).

Table-4.15: Qualities of Record Keeping and Account Maintenance (%)

Particulars	Frequency	Percentage
Literate Members	32	53.3
Promoting Agencies	2	3.3
Village Literate persons	26	43.3

Source: Field Survey

4.3.2. Group Age-Wise Average Financial Status of Surveyed SHGs

Self Help Groups under the SGSY programme are linked with a bank branch for initially savings deposit for a period of six month and gradually credit on the basis

of maturity of financial performance. As the group matures the group corpus savings fund also increases. And, when the SHG shows financial maturity, the group is entitled to receive cash credit, revolving fund/subsidy and project loan depending on the status of the group at least after six months. The average amount of SHG loan, RF/Subsidy, and internal loans is calculated by dividing it by the duration of membership in years. Table 4.16 summarises the average amount of loans, RF/subsidy and internal loans. It was found that average size of the SHG bank loan, internal group loan and RF/subsidy amount increase with the age of the SHGs in our study areas. The correlation between total loan, RF/subsidy, internal loan and age of the groups turned to be positive and statistically significant at 1 percent level.

Table-4.16: Average Amount of Group Loans, RF/Subsidy, Savings and Internal Loans Per Group *(Amount in ₹.)*

Age of Group (in Years)	Group Loan Amount	Internal Loan Amount	RF/Subsidy	Total Savings
Upto 3	21666.67	16666.67	10000.00	10966.6667
4-6	76304.35	31782.61	48260.87	14398.0870
More than 6	115735.29	46794.12	72794.12	23828.1765
Total	95916.67	39533.33	60250.00	19570.2333
Correlation with Age of SHG	.437[*]	.577*	.424[*]	.566[*]

Source: Researcher's own calculation based on primary data
* Significant at 1% level.

4.3.3. Utilisation of SHG Loans

The SGSY's SHG-Bank linkage programme was designed to help the rural women by providing financial resources to start new or expand their micro-enterprise activities through bank loans and government subsidy. The excluded rural poor by the formal financial institutions receive joint liability loans from banking institutions via SHGs to acquire income generating asset (Banerjee, 2009). The group members required to invest their micro-loans in her own enterprise or in a joint venture in order to generate income for sustainability of the group and pull themselves above poverty line. However, SHG loans are not given strictly for the

purpose of investing in productive or income generating activities. The members can also utilise obtained loans for some other priority needs such as consumption and other emergency purposes. During the field survey, the group members were asked about the different purposes for which they use of group loans. It was found that SHG members usually utilize their loans for multiple purposes such as working capital needs, daily consumption needs and emergencies in combination. For example, a member who invested their loans for productive purpose also utilise a part of it for other purposes such as health treatment or repaying old debt. Table 4.17 shows utilization pattern of their microfinance by the participants in various activities or purposes.

A perusal of the Table 4.17 indicates that over 73 percent of the participants invested their loan money in productive activities either in their own business or in joint ventures. Forty percent and over 24 percent of the members used their loan money for daily consumption needs and for medical treatment respectively. Whereas more than 30 percent of the members used loans for purchasing durable assets (like mobile, TV, bicycle, etc.), twenty percent of the members also used for expenses on social ceremonies (e.g., marriage of daughter, death ceremony, etc.). In addition, over 20 percent of the members used the loan for the purpose of house repairing and about 11 percent used the loan money for other purposes (such as repayment of old debt).

Table-4.17: Types of Utilisation of SHG Loans

Purpose	Number of Members	Percentage
1. Productive	109	72.67
2. Consumption	60	40.0
3. Medical Treatment	37	24.67
4. Social Ceremony	33	22.0
5. Consumer Durable	46	30.67
6. House Repairing	31	20.67
7. Others	17	11.33

Source: Field Survey

4.2.4. Difficulties faced by SHGs in their functioning

During the field survey, it was found that the SHGs have been facing many problems in their functioning under the programme. Members have pointed out that delay in sanctioning of loan, lack of knowledge about banking procedure, low amount of loan for generating economic activity as a group are the major problems faced by them in the functioning of the SHGs. Out of the total members, 30 percent and over 23 percent have pointed out that delay in sanctioning of loan and ignorance of banking procedure as the main problems faced by them. Similarly, more than 21 percent of the members complained that they have to do a lot of paper works while getting bank loan, and 18 percent of the members said that they have to visit the bank branches many times either because of their incomplete documents or absence of bank officials. About 15 percent and 12 percent of the members have pointed out that inadequate size of loan for setting up microenterprises, lack of adequate technical and marketing support, lack of skills among the members of the group are the other problems faced by them during the time of production process and marketing of the products (Table 4.18).

Table-4.18: Difficulties faced by SHGs in their functioning

Constraints	Number of SHG Members	Percentage
Delay in sanctioning of loan	45	30.0
Lack of knowledge of banking procedure	35	23.33
Large formalities	32	21.33
Unnecessary visits to banks	27	18.0
Low amount of bank loans	23	15.33
lack of training and marketing support	18	12.0

Source: Field Survey

Thus, it was observed that SHGs were functioning well in terms of various indicators of group quality such as conduct of meeting, regular attendance in the meetings, maintenance of records and accounts, etc. However, SHGs are facing

various problems in their functioning under the programme such as financial, train0ing and marketing problems.

4.4. Impact of microfinance Programme

The main aim of this study is to assess the impact of microfinance on income, employment and financial inclusion of the SHG members and their households. The impact of microfinance is measured on outcome indicators like income of the respondents, employment, financial inclusion representing access to and usage of formal credit, savings, transaction services and insurance. As the ultimate target of microfinance programme is reduction of poverty and inequality, we also measured the impact of microfinance using a set of standard poverty and inequality indicators. We examined the impact of microfinance programme on income poverty using three Foster, Greer and Thorbecke (FGT) poverty indices representing incidence of poverty, depth of poverty and severity of poverty. To measure income inequality, we used Lorenz Curve, Gini Coefficient and Atkinson index. Lorenz curve measures income inequality graphically while Gini coefficient and Atkinson index are quantitative measures of income inequality.

The impact is measured by comparing the means of the participant households with control group (non-participants). The treatment effect of the microfinance programme is focused by estimating two parameters of interests- the **average treatment effect on the treated (ATT)** and the **average treatment effect (ATE)** in section 4.5. The t-test statistic and chi-square (χ^2) test as indicated by equations 4.1 and 4.2 were used to test for significance.

4.4.1. Income Level of the Respondents

Income is considered as one of the most important determinants of poverty. The improved financial position of an individual and household automatically leads to increased consumption and other expenditures and thereby helps to pull above the poverty line. The services provided under the microfinance programme economically empowers the beneficiaries of the programme by helping them to own productive assets that lead to generation of additional income and employment. Increased level of income helps the beneficiaries to come out of poverty and raise their standard of living by accessing the basic necessities of life for meaningful life. In this section, an attempt has been made here to discuss the

change in individual and household income of the participants and the income inequalities among the respondent households.

The participants of the microfinance programme are supposed to utilise microloans to start any productive activities, which raise their level of income and employment. The impact of microfinance services is determined by comparing the changes in income of the participants and control respondents. Table-4.19 summarises the result of the level of income of both participants and non-participant respondents.

Table-4.19: Income of the Participants and Non-Participants per month(In ₹.)

Income Category	Non-Participants		Participants		t=test
	Count	Percentage	Count	Percentage	
Nil	109	60.6	24	16.0	
1-200	0	0.0	11	7.3	
201-500	50	27.8	46	30.7	
501-800	13	7.2	45	30.0	
801-1000	8	4.4	8	5.3	
Above 1000	0	0.0	16	10.7	
Total	180	100	150	100	
Mean	**198.56**		**502.11**		**8.580***

Source: Researcher's own calculation based on primary data
* Significant at 1% level.

Group Statistics

	Respondents	N	Mean	Std. Deviation	Std. Error Mean	t=test
Income of Respondents	Participants	150	5.0211E2	370.64203	30.26279	
	Non-participants	180	1.9856E2	270.74289	20.17998	8.580*

A perusal of the table-4.19 shows that majority of the respondents of the participant group, that is, 30.7 percent of the participants belong to the income bracket of ₹201-500 per month, whereas majority of the non-participants, that is, 60.6 per cent are having no income earning at all. The proportion of respondents

(30.0 percent) of treatment group in the income bracket of ₹501-800 per month was higher than that of respondents (7.2 percent) in the control group. About 11 percent of the participants have income in the category of Above ₹1000 per month, whereas none was found in this category from the control group. Thus, the monthly income level of the participants is higher than that of the non-participant respondents.

The average income of the participants was also compared with the income of the non-participant group. The microfinance programme has improved the level of income of the participants. The average income was significantly higher than that of non-participants. It is evident from Table-4.19 that the average income of non-participants is just ₹198.56 per month as compared to ₹502.11 per month for the participants. It shows that the income of the participants has increased substantially due to microfinance programme. The mean income of the participants is 2.5 times higher than the average income of non-participants. The t-test was used to see the significance of difference between the mean incomes of the participant and non-participant groups as was conducted above to test the mean differences. The estimated result of t-test shows that the difference was significant at 1 per cent level. Thus, it can be said that the microfinance programme has helped its participants to increase their contribution to the household income. This finding is consistent with the study given by Hossain, (1988), Todd (2001), Chen and Donald, (2001), and Bansal, (2010), who have concluded that the incomes of programme participants are significantly higher than that of the incomes of non-participants.

4.4.2. Household Monthly Income

Household income is the sum total of money income received in the previous calendar year by household members from all possible sources. The SHG-bank linkage programme increases the individual income, which subsequently enhance the total money income of the household. This increase in income of the participants enables to support their families in a better way and hence enhance their status in the family. Table-4.20 shows the category of household monthly income of participants and non-participants households.

Table-4.20: Level of Household Income

Income Class	Non-Participants		Participants	
	Count	Percentage	Count	Percentage
Less than 2500	92	51.1	73	48.7
2500-4000	37	20.6	27	28
4000-6000	25	13.9	13	8.7
6000-8000	4	2.2	5	3.3
8000-10000	9	5.0	12	8.0
Above 10000	13	7.2	20	13.3
Total	180	100	150	100

Source: Researcher's own calculation based on primary data

A perusal of the table-4.20 reveals that majority of the participant households, that is, 48.7 per cent belong to the income group of less than ₹2500 per month, whereas 51.1 percent of the non-participants have income in this category. Twenty eight percent of the participants appear in the income group of ₹2500-4000 per month as compared to 20.6 percent of the control group. About thirteen percent of the participant households have income in the bracket of Above ₹10000 per month as against only 7.2 of the control households. The proportion of households of the treatment group was higher in the income bracket of ₹6000-10000 per month whereas the proportion of households of the control was greater in lower income bracket of ₹4000-6000. Thus, the household income level of the participants of the programme is higher than that of the non-participant households.

4.4.3. Employment Status of the Participants

Employment is an important determinant of generating income, alleviating poverty, and access of formal financial services and use of labour force both as wage labour and self-employment. The impact of the SHG-bank linkage microfinance programme is measured by comparing the employment status of the participants and non-participants respondents. Table 4.21 summarises the result of the employment status of both the participants and non-participants.

Table-4.21: Employment Status of the Participants and Non-Participants

Employment Status	Non-Participants		Participants		χ^2
Unemployed	109	60.6	24	16.0	
Employed	71	39.4	126	84.0	
Total	180	100.0	150	100.0	**67.509***

Source: Researcher's own calculation based on primary data
*Significant at 1% level

A perusal of the table 4.21 reveals that the microfinance programme has helped participants to increase their level of employment as compared to non-participants. It indicates that about 84 percent of the participants were employed and 16 percent were unemployed. These figures for the non-participants in the control group were only 39 percent and about 61 percent respectively. Thus the proportion of participants who were engaged in income earing activities was 84 percent as against 39.4 percent of the members in the control group (non-participants). This implies that nearly 44.6 percent of the participants who were unemployed also have gained employment with the help of microfinance programme. Chi-square test was used to test the significant difference of employment status among the participant and non-participant respondents. The calculated value of Chi-square is greater than the table value at 1 percent level. This shows the significant difference among the participants and non-participants concerning their level of employment. The motivation of the women members of SHGs to become economically empowered and contribute income for family welfare are main reasons which resulted investment of micro-loans in income generating activities rather than for non-productive purposes.

4.4.4. Level of Employment of the Respondents (Yearly)

The microfinance programmes not only give employment opportunity to unemployed but also provides with more number of employment days to the poor women per pear. Table 4.22 shows the employment of the respondents measured in person days per year. The table shows the comparison of participants with the non-participants in terms of their employment status. It is found that the non-participants are employed for just 33 days per year as compared to 161 days for the participants. The average employment days of the participants are 4.9 times higher than that of the non-participants of the programme. The t-test was applied to see

the significance of difference of mean employment days per year. The t-test value of 12.712 confirms that the increase in employment days is significantly higher as compared to the control group. Thus, it can be concluded the microfinance programme not only increases the number of persons employed but also provides the employment for more number of days. Various empirical studies such as Borbora and Mahanta, (1995); Gaonkar, (2001); Dunn and Arbuckle, (2001); Mishra and Hossain, (2001); Hossain, (2012); Bansal, (2010); Surender, et al, (2011); Bera, (2011), etc. have shown that the microfinance programme is helpful for increasing employment, alleviation of poverty through empowerment of rural poor.

Table-4.22: Number of Employment days of the participants and non-participants

Employment Days (Yearly)	Non-Participants		Participants		t-test
	Count	Percentage	Count	Percentage	
Nil	109	60.6	24	16.0	
1-50	44	24.4	26	17.3	
51-100	8	4.4	1	0.7	
101-150	5	2.8	7	4.7	
151-200	10	5.6	46	30.7	
Above 200	4	2.2	46	30.7	
Total	180	100	150	100	
Mean	**32.86**		**161.72**		**12.712***

Source: Researcher's own calculation based on primary data
*Significant at 1% level.

Group Statistics

	Respondents	N	Mean	Std. Deviation	Std. Error Mean	t=test
Yearly Employment days	Participants	150	161.72	118.697	9.692	12.712*
	Non-Participants	180	32.86	60.545	4.513	

However, though the number of employment days of the participants of the programme are higher when compared to non-participants, they are mostly

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engaged in agriculture and allied activities, mainly home based activities as can be understood from the following point 4.4.3.

4.4.5. Economic Activities of the Participants

Generally, participants undertake income generating activities based on the availability of local resources and demands in the local markets. Table 4.23 summarises the type of economic activities undertaken by the participants of the programme. The SHG-Bank linkage programme was designed to help the rural women by providing financial resources to generate self-employment opportunities in rural areas. The participants of the programme invested the group loans in various economic activities. The participants have invested their microloans in their own enterprises or jointly with other group members. This leads to generation of employment which increases the income of the participants. However, the generation of employment and income largely depends on the types of activities they are involved in along with other factors such as training and marketing. Table 4.23 shows that the participants have started self-employment activities such as weaving, livestock rearing, agriculture, sericulture, handicrafts, etc. with help of micro-loans. However, the participants of SHGs were using a combination of few activities from amongst the list in table 4.23.

It has been observed that rearing of livestock is the most popular activity among the respondents. About 34 percent of the members in the treatment group and over eight percent of the members in the control group were engaged in rearing of livestock activities. They generate income by selling livestock in the local market. The livestock activities include piggery, goatery, poultry and duckery. But the most popular livestock is rearing of piglets. The fact was that pork was very much demand in the study area and most of the women were from a community which rears pig traditionally preferred piggery as their economic activity. Respondents also admitted piggery to be the most profitable business in the study area.

This second popular and preferred activity is handloom and weaving and this is followed by agriculture and food processing activity (such as achar/juice making, pitha making, etc.). Traditionally, rural women of North-East Region, particularly in Assam are skilled and expert in handloom and weaving activity. The participants who were engaged in handloom make *phali, langa, dokhana, aronai, Gamsha,*

(bodo community's dresses and ornaments), gamosha, mekhela, and sador, etc. (Assamese cloths) in their weaving which are marketed in the local markets. In handloom and weaving activities, as many as 17.9 percent of the participants were engaged as compared to 6.7 percent of the non-participants in the study area. About 11percent of the participants were engaged in agricultural activity (such as paddy crop and rabi crops). Another activity known as 'food processing' (e.g. achar making, pitha making, etc.) were performed by six percent among the respondents of the treatment group. Sericulture (eri/muga reeling) and handicraft (cane and bamboo work) industry were the least preferred activities among the sample respondents. This is due to the low profitability of hand-made goods which are facing stiff competition from the similar machine made goods. Eri-culture and sericulture are less preferred because of lack of raw materials and emission of odours for which this activity is traditionally avoided.

Table-4.23: Activity-Wise Classification of Non-Participants and Participants

Type of Activity or Occupation	Non-Participants		Participants	
	Count	Percentage	Count	Percentage
Not Taken Yet	109	60.6	24	16.0
Handloom & Weaving	12	6.7	26	17.9
Agricultural farming	6	3.3	16	10.7
Livestock Rearing	15	8.3	51	34.0
Food Processing	0	-	9	6.0
Sericulture	0	-	4	2.7
Cane and Bamboo Work	1	.6	3	2.0
Labour	37	20.6	17	11.3
Total	180	100.0	150	100.0

Source: Field Survey

The findings revealed that members who made investment of credit in income generating activities have invested their credit in home-based activities which are low-risk and low return economic activity. These are mainly due to absence of any high-return economic activity in the area, lack of market for raw materials and final products and lack of proper and effective training. The interactions with these

members expressed that they are not provided any type of training and marketing facilities so they have limited their production to meet the local demands only.

The impact of microfinance programme on the type of employment generated can be observed from the comparison of occupational difference of participants and the non-participants. Thirty four percent of the participants were engaged in livestock activity as against eight percent of the control group. As against 17.9 percent of the participants engaged in handloom and weaving, only 6.7 percent of the control groups were engaged in this activity. Similarly, 10.7 percent of the participants in the treatment group were engaged in agricultural farming whereas only 3.3 percent of the control groups were engaged in this activity. Moreover, six percent and 2.7 percent of the participants were engaged in food processing industry whereas none of the respondents in the control group were involved in these activities. Two members in the participants group were also involved in cane and bamboo works activity as against one member in the control group. There was also difference in the number of respondents (20 percent) of the non-participant group and the respondents (11.3 percent) of the treatment group engaged as casual labours (agricultural and non-agricultural activities). The most important concern is that around 61 percent of the respondent in non-participant group and 16 per cent of the participants were not involved in any sort of economic activity. This means that they are still engaged in unemployed and housewife sort of activities.

4.4.6. Level of Financial Inclusion of the Sampled Households

The impact of SHG-bank linkage programme on financial inclusion was assessed by preparing an index of financial inclusion (IFI). Financial inclusion is a multidimensional concept and is defined by various authors in different ways (Mor and Ananth, 2007; World Bank 2005; Kamath, 2007; Sharma, 2008; GOI, 2008; European Commission, 2008; Prathap, 2011). Based on the definitions provided by them on financial inclusion, the following definition is derived:

"Financial inclusion may be interpreted as poor and low income households' access and usage of basic financial services which include savings, credit and insurance available from formal institutions in a manner that is reasonably convenient and flexible in terms of access and design and reliable in the sense that savings are safe and those insurance claims are paid with certainty." This definition is a modified one given by above authors. The definition of financial inclusion has stressed that Financial Inclusion does not essentially focus on

providing credit and offering facilities for savings alone, but also includes the whole gamut of financial services including savings, insurance and money transmission mechanisms mode suited to the income pattern of the poor (Committee on Financial Inclusion, 2008). Thus financial inclusion includes broadly households' permanent access to formal financial services- credit, savings, insurance, money transfers which are also the products and services of microfinance. Therefore, financial inclusion index (IFI) has been constructed by quantifying households' access to formal financial services comprising usage dimension variables representing formal credit, savings, access to insurance and transaction banking services (usages of ATM/Cheque giving appropriate weights to the selected variables. The variables were selected based on extensive literature available on the subject and based on preferences of the services appropriate weights were assigned to each variable (Rangappa, et al., 2008; Prathap, 2011). The construction of the Financial Inclusion Index (IFI) and assignment of weights to selected variables are given in Table 3 in chapter-III. The value of index varies from 0 to 100. The value '0' implies total financial exclusion and value '100' implies complete financial inclusion. The level of financial inclusion is categories into three; category '1-29' implies low financial inclusion, '30-60' implies medium financial inclusion and '61-99' implies high level of financial inclusion.

4.4.6.1. Uses of ATM/Cheque

The usage of transaction banking services such as ATM/Cheque is an important indicator of financial inclusion. This indicator also indicates financial literacy of the person concerned. The following table 4.24 shows the usage of ATM/cheque by the respondent households.

Table-4.24: Usage of ATM/Cheque by respondent households with Institutional sources

Indicator	Status	Non-Participants		Participants	
		Count	Percentage	Count	Percentage
Usage of ATM/Cheque	Not Used	155	86.1	121	80.7
	Used	25	13.9	29	19.3
Total		180	100	150	100

Source: Field Survey

A perusal of the Table 4.24 reveals the uses of ATM or cheque by the participants and non-participants households. It indicates that about 16.4 per cent of the

households of both treated and control group (non-participants) were using ATM or Cheque and the use of these facilities is more in respective of participant households when compared with control group households. Over 19 percent of the households in participant group were using this facility of banks as against 14 percent of the control households. These services were availed by the households having earning members mostly in government sector. The lack of awareness and financial education of the rural households underscores ignorance of banking procedures. Financial transactions through banks are less preferred due to lesser distribution of service outlets in rural areas. For example, one may have to travel to the bank branch upto 20 kms. or even further to operate an ATM (Table 4.24).

4.4.6.2. Access to Formal Credit

Access to credit as the prime indicator of financial inclusion determines the level of well-being of a family achieved. The reason is that access to credit is widely regarded as a financial service (Schilling, 2003; Prathap, 2011). The state of poverty is characterized by low income distribution among the underprivileged caused by lack of employment opportunities due to lack of easy credit services. These people hardly earn income to accomplish their basic needs due to less employment avenues apprehended by credit inaccessibility in rural areas. Rural people are often devoid of a regular income and these fluctuating earnings among the poor give rise to mis-match between income and expenditure of the households. In the absence of accessibility to formal sources, the households are forced to borrow from informal sources of moneylenders. They have to borrow money to meet their economic exigencies occurs at times of emergencies due to hospitalization of household members and/or occurrence of unforeseen incidents like the death of earners and various household needs such as marriage ceremony. The formal credit off take of the participant's based on primary data as compared to the non-participant households during the last three years from 2010 to 2012 prior to the primary field survey conducted in 2013 is demonstrated in Table-4.25.

Table-4.25: Credit usage by respondent households from Institutional sources of finance

Indicators	Status	Non-Participants		Participants	
		Count	Percentage	Count	Percentage
Credit from Formal Sources/ through SBLP linkage in 2010	Not Used	165	92.2	21	14
	Used	14	7.8	129	86.0
Credit from Formal Sources/ through SBLP linkage in 2011	Not Used	162	90.0	52	34.7
	Used	18	10.0	98	65.3
Credit from Formal Sources/ through SBLP linkage in 2012	Not Used	158	88.3	55	36.7
	Used	21	11.7	95	63.3
Total		180	100	150	100

Source: Field Survey

A perusal of the Table 4.25 reveals that the credit accessibility was higher among the participant households due to penetration of microfinance and participation in the SHG-bank linkage programme in the study area. Not being strictly formal, microfinance has been treated as a semi-formal source (Basu, 2006) and since the SHGs are linked with the banks in the study districts is regarded as formal credit. Table 4.25 reveals that 86 percent, 65.3 percent and 63.3 percent of the participant households borrowed credit from formal sources (bank and SHG-bank linkage) in 2010, 2011 and 2012 respectively. The access to formal credit by the participant households are compared with control group households. The number of households borrowed from formal sources in the treatment group (86 percent) is significantly higher than that of the households (only 7.8 percent) in the control group in 2010. The similar trend was observed in 2011 also where 65.3 percent of the treated households borrowed from formal sources as compared to only 10 percent households in the control group. In 2012, these figures were 63.3 and 11.7 percent for the participants and control households respectively. Thus, SHG-bank linkage programme has significant impact on the credit inclusion of the poor

households who were otherwise bypassed by the formal financial service providers.

4.4.6.3. Access to Deposit Services

Savings or thrift is usually dependent on people's attitude rather than accessibility to formal fold of financial institutions in the study districts of Assam. There remains an element of involuntary attitude to savings among households that consumerism in villages has peaked in addition to alcohol consumption that one can hardly find any habit of thrift in the tribal households. Hence, deposit exclusion can be more or less treated as voluntary, emerging out of lack of savings habit among the tribal and poor households. However, the SHG-bank linkage programme has changed this scenario and is very much successful in this regard. Under the SHG-bank linkage programme, bank loans are provided to those SHG participants who show the matured financial behaviour at least for six month since their opening of passbook account in a bank branch. Therefore, a joint account in the name of the group is opened by participants where all members have to contribute compulsorily a certain amount at certain interval. Thus, the deposit inclusion by the SHG participants was around 92 percent in SHGs, whereas it was only 4.4 percent of the households in non-participant group. Usually, deposit access occurs complementarily with access to credit from formal financial institutions, but deposits in a corpus fund (savings bank account) is prerequisite in SHG-bank linkage programme. But the household having operational Savings Bank Account was low and even lower in Recurring /Fixed Deposits accounts access irrespective of membership of the households with SBLP. However, there is difference in access to these services for participants and non-participant households, although little. About thirty three percent of the households in the participant groups have bank accounts as compared to twenty-five percent of the households in the control group. Similarly, Recurring /Fixed Deposits (RD/FD) access with formal bank was over 5 percent of the participants as compared to 5.6 percent of the non-participant household (Table 4.26). Thus, it can be said that the SHG programme has some positive impact on deposit inclusion.

Table-4.26: Access to Deposit services

Indicators	Status	Non-Participants		Participants	
		Count	Percentage	Count	Percentage
Saving A/C	Not Used	135	75.0	101	67.3
	Used	45	25.0	49	32.7
Recurring/Fixed Deposit	Not Used	170	94.4	142	94.7
	Used	10	5.6	8	5.3
SHG Savings	Not Used	172	95.6	12	8.0
	Used	8	4.4	138	92
Total		180	100	150	100

Source: Field Survey

4.4.6.4. Access to Insurance

Insurance inclusion is an important service identified by the studies in broader financial inclusion ambit of the households with formal source. But in our study area, insurance policy is less popular as revealed by the analysis of primary data. Table 4. 27 summarises the insurance access by the households of the participants and non-participant households.

Table-4.27: Access to Insurance by participant and non-participant households

Indicator	Status	Non-Participants		Participants	
		Count	Percentage	Count	Percentage
Insurance	Not Used	151	83.9	120	80.0
	Used	29	16.1	30	20.0
Total		180	100	150	100

Source: Field Survey

It is found that the access to this service is low irrespective of membership of the households. There is little difference between the participants and control group households in access to this service. Most of the households in the study area are hand to mouth. There is also lack of campaign regarding financial literacy. The table 4.27 reveals that about twenty percent of the households in the treatment group as compared to sixteen percent control households.

4.4.6.5. Financial Inclusion Index

The percentages of households included in selected financial services (Table 4.24 to Table 4.27) are consolidated to compute the financial inclusion index (IFI) and the degree of financial inclusion of each household is given in table 4.28 below.

Table-4.28: Level of Financial Inclusion of the Participant and Non-Participant Households

Households	Degree of Financial Inclusion				Chi-square Test (χ^2)
	Financially Excluded	Low (1-29)	Medium (30-60)	High (61-99)	
Non-Participants	113 (62.8)	31 (17.2)	29 (16.1)	7 (3.9)	**1.505E2[*]**
Participants	0	47 (31.3)	63 (42.0)	40(26.7)	

Source: Researcher's own calculation based on primary data

Note: The figures given in parentheses indicate percentages of participants and non-participants.

Chi-square ($\chi 2$) =1.505E2 with 3 df. *Significant at 1 % level.

A perusal of the Table 4.28 reveals that nearly 63 percent have been totally excluded from formal sources in case of non-participants whereas none was financially excluded in case of member participants of the programme. The percentage of households reaching the medium and high of financial inclusion increases with membership in SHG. The percentage of households (31.3 percent) in treatment group that achieved low financial inclusion (1-29) is higher than that of control group households (17.2 percent). About 42 percent of the participant households are in the bracket of 30-60, i.e., medium level of financial inclusion and only 16 percent have achieved this level of financial inclusion of the non-participant households. The high level of financial inclusion was obtained by 26.7 percent of the households as compared to about four percent of the control group. However, 100 percent financial inclusion is rarely found among rural households due to inaccessibility of transaction services such as ATM or cheques. The Chi-square test ($\chi 2$) was used to verify the significance of the association between the degree of financial inclusion and membership in SHGs. The calculated Chi-square

value of 1.505E2 was found to be significant at 1 percent level. This implies that the degree of financial inclusion can be increased with implementation of SHG-bank linkage programme. Therefore, it could be concluded that SHG-bank linkage programme increased the degree of financial inclusion among the participant households when compared to control households.

The mean financial inclusion index of households of both participants and nonparticipant households are estimated in Table-4.29.

Table 4.29: Mean Financial Inclusion

Households	Mean	N	Std. Deviation	Std. Error Mean	t=value
Participants	47.43	150	26.576	2.170	
Non-Participants	12.14	180	20.808	1.551	13.525*
Total	28.18	330			

Source: Researcher's own calculation based on primary data
      *Significant at 1% level.

A perusal of the Table-4.29 revealed that the mean index of financial inclusion of the participant households at 48.58 was greater than that of the non-participant households which is about 12.14. The t-test was conducted to find the significance of difference between the mean financial inclusion of the participants and control households with the hypothesis that means are not significantly different. The t-value of 13.525 shows higher than the table value. It means highly significant difference between the means of the two groups at 1 percent level. Thus, it can be concluded that the SHG-bank linkage programme has significant positive impact on the level of financial inclusion of the participants as compared to non-participants. The findings are consistent with the earlier studies attempted by Rangappa, et al, (2008), Anjugam, (2011), and Prathap, (2011), who concluded that microfinance programme, i.e., the SHG-Bank linkage programme increased the degree of financial inclusion among SHG participants when compared to non-participant households.

4.5. Econometric Results

This section describes the whole process of deriving the impact of microfinance on the sampled households. It discusses the estimation of propensity scores, matching methods, common support region and balancing test analysis for the purpose of the study. It also explains the treatment effect of the intervention across the participating households. In this section, two parameters of interests are focused when estimating treatment effects- the **average treatment effect on the treated (ATT)** and **the average treatment effect (ATE).** First one estimates the impact of microfinance on respondents' outcomes who actually treated and second determines what effect microfinance would have on an individual drawn randomly from the population. When responses to treatment among households is homogeneous, these two effects will be identical. The ATT and ATE will differ, should the responses be allowed to differ across the surveyed households. The first of policy makers concern is of course to determine whether microfinance had any impact on per-capita income and employment days per year to cross the poverty line. Another important concern is whether the expansion of microfinance programmes is worth considering or not. ATT provides answers to the question of the impact for policy purpose, while ATE is required to go further and assess the opportunity of expanding microfinance. For instance, the value of ATE will be smaller than ATT if only individuals with the largest expected gains participate in microfinance programme. Thus, a generalization of the programme may generate a lower effect than the one indicated by average treatment effect on the treated (ATT).

The Propensity score matching (PSM) method was employed to find out ATE and ATT by correcting biases on observable characteristics of respondents based on propensity score P(X). PSM uses propensity score which is defined as conditional probability that an individual is assigned to the treatment group.

4.5.1. Estimation of propensity scores

The Probit regression model was used to estimate propensity score matching for treatment and control client households. The propensity score is a conditional probability that an individual is assigned to the treatment group (Rosenbaum and Rubin, 1983). In this model, the dependent variable is binary that indicate

respondents' participation decision in the microfinance services. The model provides predictions on the likelihood that individuals participate in the microfinance programme conditional on observed characteristics. Probit model is specified as:

$$P(D=1|X)= \Phi(\beta_1 X_1 + \ldots\ldots\ldots\ldots ..+\beta_i X_i)= \Phi(X\beta) \qquad (4.3)$$

Where $0< \Phi(X\beta)<1$ for all values of X and Φ is the cumulative distribution function of the standard normal distribution.

Explanation of Variables in Probit Model

Dependent Variable

The dependent variable in the probit model is of dichotomous nature indicating respondents' participation decision in the microfinance programme. Specifically, the dependent variable takes a value of '1' for households who have borrowed micro-loans from the SHG-bank linkage programme under SGSY scheme and '0' for households who have never obtained microcredit from the SGSY's microfinance scheme.

Independent Variables

The independent variables used in the probit model include the following variables:

X_1 = Age of the respondent (in years);

X_2 = educational attainment of the respondent (in years);

X_3 = Marital Status dummy; (1=married; 0= otherwise);

X_4 = Household size total number of people living in household;

X_5 = Agricultural landholdings (in bigha);

X_6 = gender of head of the household dummy (1=female; 0=male);

X_7 = Economic dependency ratio

X_8 = Occupation of the respondent dummy (1=housewife; 0= otherwise);

X_9 = Household Monthly income (in Rs.);

X_{10} = Distance to residence from bank (in kms.);

X_{11} = Age-squared

X_{12} = Education-squared

The independent variables selected above are hypothesised to influence simultaneously the individual's probability of participation and borrowing

microloans either positive or negative way from the microfinance programme. For example, age of the respondent is considered to be negatively related to the participation and borrowing of microcredit from the microfinance programme. Generally, older people tend to be risk averse and they may also find it difficult to understand the operations and loan conditions which reduces their propensity to borrowing of microcredit of the microfinance programmes. This has been confirmed by the literature available that the probability of borrowing from formal and semi-formal credit sources decreases as people become older (Zeller, 1994; Mohamed, 2003; Li, 2010).

We hypothesised education variable to influence the probability of participation and borowing from mcirofinance positively. By education, we mean here the formal education that an individual gathers through attending educational institutions like school, college, university, and other formal educational institutions. Educational attainment of the individuals reflects human capital and therefore it is hypothesised to facilitate their households' accessibility to microcredit services from microfinance programme through participation in any SHG by avoiding informal sources of borrowing. For example, a higher educated persons are likely to have more exposure to the external environment including risks and possess more skills, and therefore they might require more credit for production and/or consumption when compared to uneducated persons. In addition, educated members can better understand the terms and conditions, profit and loss, and can independently establishes contacts with office staff and expresses her requirement of credit for a suitable project compared to uneducated members. Educated persons might be more ready to comply with the formalities required by microfinance service providers (Yehuala, 2008; Vaessen, 2001; Anjugam and Ramasamy, 2007).

Marital status and gender of the household head are hypothesised to influence the probability of participation and accessibility to microcredit of women in microfinance programme. Generally, married women are resource poor in rural areas and need to approach informal source for credit who charge exorbitant rate of

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interest and they are usually dependent on their husbands' income for livelihood. They are skilled in various micro-enterprise activities such as weaving, rearing animals, and food processing (e.g., achar making, pitha-laroo making), etc. and therefore through participation in SHG microfinance programme, they are likely to access microcredit from microfinance programme for income generating activities which yields employment and income and hence improved status in the family. In addition, female headed households are more likely to participate in SHG programme for microcredit which indicates that microfinance programmes targets women since they are assumed to be more disadvantaged in getting microloans from formal sources and often need to dependent on usurious informal moneylenders than a male-headed household.

Occupation dummy of the respondents is hypothesised to positively affect the likelihood of participation in SHG and borrowing from microfinance programme. Unemployed, in particular housewives are more likely to participate in SHG microfinance programme to access microcredit for starting self-employed income generating activities and become economically empowered for upliftment of their family status with combined effort of husband.

Economic dependency ratio is hypothesised to negatively affects the probability of borrowing from microfinance programme. Economic dependency ratio measures the ratio of economically inactive population to economically active population expressed in percentage terms. In our study, it is expressed as the ratio of household members without income to household income earners. It negatively influences the likelihood of participation and borrowing in that a higher ratio indicates a lower ability to repay loans and thus lower probability of accessing microcredit of the household (Li, 2010).

The result of the estimation of probability of participation (propensity score) using probit model is given in table 4.30. It is to be noted that probit regression uses maximum likelihood estimation which is a iterative procedure. This procedure may include stepwise selection models with repeating steps until the treatment and control groups are achieved.

Table 4.30: Probit Regression Model for the Estimation of the Propensity Score

Iteration 0: log likelihood= -227.37305			
Iteration 1: log likelihood= -219.47178			
Iteration 2: log likelihood= -219.43456			
Iteration 3: log likelihood= -219.43454			

Probit regression	Number of Obs. = 330
Log Likelihood= -219.43454	LR chi2(14) = 52.91
Dependent Variable: SHG participation Dummy (1=participant; 0=non-participant)	Prob > chi2 = 0.0000
	Pseudo R2 = 0.4072

	Coefficient	Standard Error	Z-Statistics
Age	-0.8053783	0.462329679	-1.742***
Education	0.1730674	0.098895657	1.75***
Agricultural Landholding (in bigha)	-0.0640544	0.030072488	-2.13**
Household size	0.1614138	0.084509843	1.91***
Marital Status	0.7332614	0.37033404	1.98*
Gender	0.3308195	0.186903672	1.77**
Dependency Ratio	-0.2529666	0.248006471	-1.02
Occupation Dummy (1=Housewife; 0=otherwise)	0.6347577	0.375596272	1.69***
Monthly Household Income (in Rs.)	0.0002186	9.62996E-05	2.27**
Distance from banks (kms.)	0.1631174	0.049280181	3.31*
Age-Squared	0.0283537	0.052506852	0.54
Education-squared	-0.0118065	0.01044823	-1.13
Constant	5.087036	23.12289091	0.22

Source: Researcher's own calculation based on primary data
***Significant at 10 % level. **Significant at 5 % level. *Significant at 1 % level.

A perusal of the table Table 4.30 shows the list of the log likelihoods at each iteration for the probit model. The first iteration (called Iteration 0) is the log likelihood of the 'empty' model, that is, a model with no predictors. At the next

stage, (Iteration 1), the specified predictors are included in the model. The predictors included in our model are age, education, marital status, gender of household head, number of earners, occupation dummy, monthly income, household size, agricultural landholding, dependency ratio,distance from bank, age-square, education square, age cube. At each iteration, the log likelihood increases because the goal is to maximise the log likelihood. Thus, when the difference between successive iterations is very small, the model is said to have converged and the iteration stops. This is obtained in our model in three iteration (Iteration 3) where treatment and control group are achieved. The log likelihood of the fitted model is 219.43454 and the model is well specified with high Likelihood Ratio Chi-squared of 52.91 and Pseudo R-squared coefficients of 0.4072. The Chi square test for the model shows statistical significance at the 1% level, indicating that the variables included in the model statistically explain the propensity scores used in the matching steps.

The estimated coefficients by the probit model cannot be interpreted directly for two main reasons. Firstly, probit regression was estimated on a binary choice based sample and thus does not represent the real proportions of treated (participant) and non-treated (control) of the population. Secondly, these are not the marginal effects of the explaining variables on the dependent variable. Therefore, while interpreting the probit coefficient, we should be cautious enough. However, to check whether any differences in the estimated propensity to participate in the programme existed between who really makes part and who does not, below are displayed the mean estimation of Probit for the participants and non-participants in Table 4.31 below.

Among the covariates, age of the respondents, education level, marital status, gender of the household, agricultural landhldings, occupation dummy, monthly household income and distance from financial institutions emerged as the significant variables that influenced participation in SHG-led microfinance programme. Out of the covariates that are found signifcant, the coeffiicients for age and agricultural landholdings show that these variables negatively influenced the participation in microfinance programme. Whereas, the sign of coefficients of the variables like education, marital status, gender, monthly income, occupation dummy, distance from bank are positive and therefore positively affect the

participation in SHG programme. The negative sign of age implies that as the age of the respondent increases the likelihood of participation in SHG microfinance programme diminishes, indicating that as the age of women increased, they could not participate in the programme effectively. Similar result was found by Anjugam and Ramasamy, (2007), and Emerole, et al., (2014) regarding age of women in predicting probability of participation in SHG programme.

Education of the respondents positively affects the probability of participation and borrowing in microfinance programme. This means that the likelihood of participation in SHG increases with increase in levels of education of the respondents. This is beacause an educated member is more efficient and skilled can independently establishes contacts with office staff and expresses her requirement of credit for a suitable project compared to uneducated members and therefore more likely to be included in SHG by non-educated members. This result is consistent with the one given by Awunyo-Vitor, et al., (2012), who concluded that women operating small businesses with microcredit had statistically significant higher income compared with their non-microcredit participant counterparts.

The size of agricultural landholding has a significant negative impact on the probability of participation of the respondents in SHG programme. The agricultural land is a status symbol of richness in rural areas and they are required to be busy with their agricultural activities and therefore are not interested to participate in the programme. Mostly those women who are not having agricultural land are likely to be the member of SHGs as they want to be self-employed through investment of credit obtained from the microfinance programme in their own-skilled household activities such as weaving, livestock rearing, etc. Kifle, et al., (2013), in Ethiopia revealed landholdings as one of the significant determinants of women's participation decision in microfinance programme.

Household size of the respondent is a significant determinant of the participation of women in SHGs. This factor is positively associated with the probability of participation in SHG programme at 10 percent level of significant. The positive association implies that women from the large household size are likely to be the member of SHGs as they have enough time for SHG activities. This result is in track with the one given by various studies. Emerole, et al., (2014), in their study

of determinants in participation of women farmers in SHG microfinance programme in Nigeria found statistically significant. Zewde and Tollens, (2008), in their microfinance impact study in Tigray found family size as a significant factor in determining the probability of participation in microcredit programme. Similarly, Kifle, et al., (2013), in Ethiopia revealed household size as significant determinant of women's participation decision in microfinance programme.

Marital status of the respondent positively associated and is significant at 1 percent level. This implies that women who are married mostly interested to participate in SHG and likely to borrow from the microfinance programme. The similar result has been given by Bhattacharjya and Banarjee, (2013), in West Bengal, India regarding the participation in SHG programme. Phan, (2012), also found that marital status as one of the significant determinants of borrowing of microcredit from microcredit programme in Vietnam.

Similarly, female headed household is sgnificant at 5 percent level. This also implies that microfinance progrmammes mostly target women. A study undertaken by Imai, et al., (2010), found that a household with a female head is more likely to participate in microfinance programme. Dependency ratio does not significantly explain the probability of participation in microfinance programme. However, the occupation dummy of the respondent is statistically significant and the coeffient is found to be positive indicating that women who are housewives or unemployed or worked as labourers are more likely to participate and access microcredit from the microfinance programme as they are more likely to contribute to family income for economic independence. This implies that the target of SGSY programme to reach and empower the unemployed/housewives by forming SHGs among them with the initiatives of government sponsored microfinance scheme is successful to some extent.

Monthly income of the household significantly determines the participation in microfinance programme. The effect of income is positive meaning that higher income increases the probability of borrowing from microfinance programme. The significant positive sign on the income variable indicates that households with higher income have higher probability of accessing SGSY microcredit. One possible reason for this result is that high income households tend to have more

investment opportunities, leading to stronger potential need for credit support. High-income households may also be more confident in repaying of loans if they borrow. Therefore, they are more inclined to access microcredit. This result is consistent with the result given by Li, (2010), regarding accessibility of microcredit from Rural Credit Co-operative in China by rural households.

Moreover, distance from bank significantly affect the probability of participation in SHG. This implies that a person from a far off place are more likely to be a participant of microfinance programme. The positive association between likelihood of SHG membership with distance to bank is understandable as larger is the distance to bank, the higher is the transaction costs incurred by individual respondents in regard to visiting bank branch for both savings and credit purpose. Participation in terms of membership in SHGs in such cases probably provide them better bargaining power and economies of scale out of collective action.

This also implies that romote villages have the greater probability of joining SHGs with the penetration of SGSY programme indicating that SGSY programme is doing well in reaching the remote areas. This result is consistent with the result given by Swain and Floro, (2010), in India who concluded that vulnerability between the participants and non-participants were not different, indicating that distance from bank was positively affecting the participation in microfinance programme.

On the other hand, other variables such as dependency and higher ordered terms are not singificant, indicating that these variables could not explain the probability of participation significantly.

Since we are not sure about the best specification of the covariates which determines both outcome and the decision to participate in SGSY's microfinance programme, we provide parsimonious specification of all observations in Table 4.31. It shows the conditional probability to participate into the programme on the basis of the observed characteristics of participant and non-participant groups.

As it can be observed from the table 4.31, it appears that probit regression estimate is good predictors of participation in microfinance programme. The estimated propensity score ranges from a minimum of .083304 to a maximum of 0.693102 including for both participant and non-participants. This means that the region of

common support in our study area is [0.08-0.693]. The average propensity score for both the groups is estimated at 0.455. It is to be noted that the propensity score is a probability which takes values within the interval of [0 - 1]. This makes possible to interpret the estimations as percentage of the total. Thus, the probability of participation in the treatment group is about 45 percent for all respondents. In other words, in 45 percent of cases, probit regression model has predicted correctly the participation of all observations.

Table-4.31: Estimation of Probit for the whole sample: P-Score

Variable	Observation	Mean	Std. Dev.	Min	Max
P-Score	330	.4550131	.1063979	.083304	.693102

Source: Researcher's own calculation based on primary data

4.5.2. Checking for Common Support between the treated and the comparison group

Here, we checked the common support region whether there is enough overlap between the treatment and control group to make reasonable comparison. It was examined by plotting a histogram of the propensity score. The common support is the region where the propensity score has a positive density for both participants (treated) and non-participants (non-treated) units. Figure-4.1 gives the frequency distribution of the propensity scores calculated above by using probit model for the participants and non-participants of microfinance programme.

The upper halves of the histogram shows the propensity scores distribution for the participant group while the bottom halves refer to that of the non-participant group respectively. The propensity score ranges from 0.083 to .0.693 for both the groups. It can be seen that the common support condition is satisfied. There is substantial overlap in the distribution of the propensity scores of both treated and contol group and a severe common support problem does not exist between them. Since the main purpose is not on the probability estimations of probit model but to match individuls, it is encouraging to see that a large fraction of households from both groups (treated and untreated) gets an estimated probability in the range of 0.08 to 0.69 (Figure-4.1).
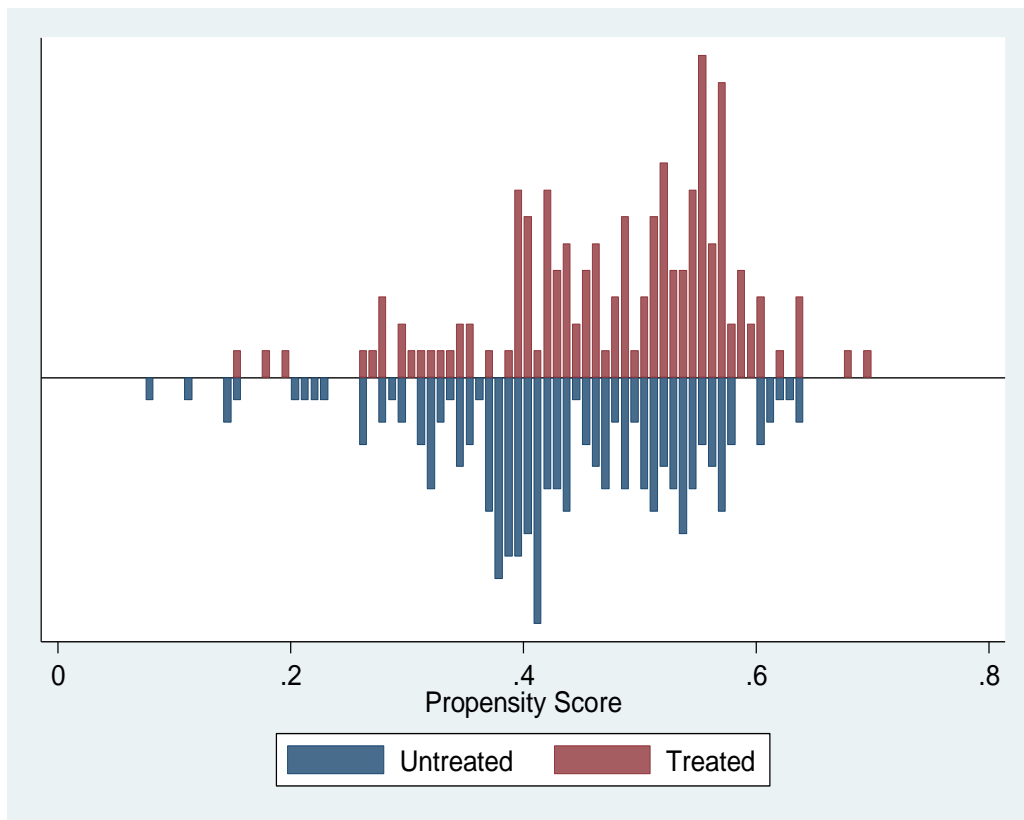
**Figure 4.1: Frequency of control cases against treated
group for propensity score**

Thus, the figure-4.1 clearly suggests that the overlapping condition of common support exists which allows us to make comparision between the two groups within the value of probability of participation that ranges between 0.08 and 0.69 (propensity score). Given that substantial overlap assumption in the distributions are satisfied, the average treatment effect is restricted to the overlapping area whereby the non-participants are comparable with the participants based on their observed characteristics. Some respondents of the non-treatment group who are not similar to treatment groups in terms of the observed characteristics were not used in the comparison. Since we are doing matching without replacement by using Nearest-neighbour Matching, thereofre, thirty observations of the control case were discarded for making comparison. Hence, 150 control observations were used to compare with the 150 treatment observations based on their nearest propensity score.

Let us now check whether the balancing propery of covariates are satified or not in the next point.

4.5.3. Checking for Balance between the Two Groups

This test for balancing covariates need to be conducted to ensure that the mean propensity score is not different for the treated and control groups. Because only when the balancing property is satisfied, common support is defined and can be used for matching purposes. Table 4.32 below summarises the test result on covariate balancing with mean and pseudo-R^2. It is apparent that matching removes most of the existing bias for almost all covariates as no covariates are found to be significant different between the two groups. The results of t-test of equality of means in the two samples of participants and non-participants for each covariate indicate that there is no systematic patterns of significant differences between the covariates in the treatment and non-treated groups after conditioning on the propensity score. Furthermore, the pseudo-R^2 is found fairly low after matching implying that the matching procedure is able to balance the characteristics of the treated and control groups.

Table-4.32: Identifying the balance between two groups

Variables	Mean			t-test	
	Treated	Control	% Bias	t	p>|t|
Age	40.207	40.68	-5.8	-0.52	0.604
Education	4.6667	4.4533	5.5	0.52	0.605
Marital Status	.88667	.92667	-12.5	-1.19	0.235
Gender	.07333	.06667	2.5	0.23	0.822
Agricultural land	4.2733	4.75	-10.3	-0.98	0.326
Household Size	4.5667	4.6133	-2.3	-0.23	0.819
Dependency Ratio	2.4155	2.3311	5.9	0.51	0.607
Occupation Dummy (1=Housewife; 0=otherwise)	.66667	.69333	-5.6	-0.49	0.622
Monthly Income (in Rs.)	1057.7	995.58	5.6	0.46	0.646
Distance from banks (kms.)	6.3533	6.3867	-1.2	-0.10	0.917
Pseudo- R^2= 0.012					

Source: Researcher's own calculation based on primary data

Since all the onditions are satisfied, we now turn to find out the treatment effect of the microifnce programme on the treated- **ATE** and **ATT** in the next point.

4.5.4. Estimation of Treatment Effect

The following impact indicators of the treatment effect have been performed using the already mentioned PSM model. The analysis focuses on two parameters of interest when estimating treatment effects- the **average treatment effect on the treated (ATT)** and the **average treatment effect (ATE)**. First one estimates the impactof microfinance respondents outcomes who actually treated and second determines what effect microfinance would have on an individual drawn randomly from the population. When the treatment among households are assumed to have homogeneous response these two effects will be identical. Both the two effects, that is, ATT and ATE will differ, should the responses be allowed to vary across households. The first of policy makers concern is to of course to determine whether microfinance had any impact on per-capita income, employment and financial inclusion. Another important concern is whether the expansion of microfinance programs is worth considering. While the ATT provides answers to the question of the impact, ATE is required to go further and assess the opportunity of expanding microfinance. For instance, if only individuals with the largest expected gains participate in microfinance, then ATE will be smaller than ATT. Thus, a generalization of the program may generate a lower effect than the one indicated by ATT.

The ATT and ATE are estimated by using Nearest-Neighbour and Kernel matching. The use of these two matching algorithms circumvents any shortcoming that may result by relying on just one method, and also helps to check the robustness of the estimated impact on the outcomes. The estimates of the average treatment effect on the treated (ATT) and the average treatment effect (ATE) obtained via propensity score matching, using these two matching algorithms are presented in Table 4.33 and Table 4.34. The estmation of ATE and ATU including ATT are shown in Table 4.33 using Nearest-Neighbour matching. The table revealed that ATE was ₹390.75 per month as compared to ATU of ₹348.27 per month of the respondents. Similarly, the estimated ATE and ATU for the employment days per annum of the respondents were about 110 and 102 respectively. The average treatment effect on the untreated (ATU) was 32.41 as against the ATE value of 34.02 for financial inclusion. These results showed that

the estimated ATE for the impact indicators were higher than that of the ATU value. Thus, average treatment effect was greater than that of the average treatment on the untreated with implication that microfinance programme has positive impact on the outcome indicators of the participants. However, ATE and ATU cannot be used to find the actual impact of the microfinance programme with confidence, so we concentrated on the average treatment effect on the treated (ATT).

Table-4.33: Estimation of ATE and ATT on Income, Employment and Financial Inclusion (IFI) using Nearest Neighbour Matching

Impact Indicators	ATE	ATU	ATT
Monthly Income	390.75	348.27	441.71* (7.51)
Employment days per year	110.24	102.87	119.09* (10.31)
Financial Inclusion (IFI)	34.02	32.41	35.93* (10.31)

Source: Researcher's own calculated based on primary data
Note: t-statistics are in parenthesis; *Significant at 1 % level.

Table 4.34 shows the ATT estimated by using both the Nearest-Neighbour and Kernel matching algorithms. The first column in Table 4.34 specifies the outcome variables, second column indicates the matching method used. The result of the average treatment effects on the microfinance participants, that is, ATT on income, employment and financial inclusion (IFI) of the participants are estimated in third column. Standard error and t-statistics are given in the last two columns.

Table-4.34: Estimation of ATT on Income, Employment and Financial Inclusion (IFI) using Nearest Neighbour and Kernel Matching

Impact Indicators	Matching Method	ATT	Std. Err.	t-statistics
Monthly Income	Nearest Neighbour	441.71*	50.75	7.51
	Kernel	390.16*	54.916	7.10
Employment days	Nearest Neighbour	119.09*	11.549	10.31
	Kernel	108.04*	11.390	9.49
Financial Inclusion	Nearest Neighbour	35.93*	3.485	10.31
	Kernel	33.44*	2.664	12.55

Source: Researcher's own calculated based on primary data
*Significant at 1 % level.

A perusal of the Table 4.34 revealed a supportive evidence of statistically significant effect of the programme on individual income, employment and financial inclusion index of the households. The estimated ATT of microcredit on

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income level of the women recorded an increment of income on average ₹441.71 to ₹390.16 per month more than their similar non-participant women. These matching results are statistically significant at 1 percent level. This implies that women who participated in microfinance programme have significantly increased their earnings by ₹441.71 to ₹390.16 per month compared to non-participant women. There are various reasons that can be interpreted to the incremental income of SHG members. One reason is that mostly members of the SHGs were either housewife or unemployed or casual workers and therefore they were hardly earning income. But after becoming a member in a SHG and getting microcredit, majority of them started income generating activities like weaving and handloom, livestock rearing, achar-making, etc. (see, Table-4.23) either in joint venture with other group members or with family members or individual micro-businesses. Another reason is that those members who have already been engaged in their micro-enterprises expanded their economic activities and other micro-businesses by investing of the amount of microcredit obtained from the SHGs through linkage of banks which helped them to supplement their income. Moreover, they could combine their savings with credit for expanding their income generating activities. This finding is consistent with many previous studies that employed a similar PSM analysis. For example, Ghalib, et al., (2011), provided evidence of the microcredit impact on income of the poor in Pakistan. The microfinance significantly increased the monthly income of the borrowers due to investment of microcredit in income generating activities such as livestock, setting up shops, etc. Awunyo-Vitor, et al., (2012), revealed a significant positive impact of microcredit on income of women in Ghana. Compared to non-credit women, participants who operated small businesses with microcredit significantly increase their income as a result of microcredit participation. Similarly, Liheta, (2014), revealed positive impact of microfinance on income in Tanzania. In an empirical study of microcredit programme impact by Li, (2010), in China had observed a positive impact of the programme on the income of the rural household. The findings suggested that microcredit programme participants realised about 5.3 percent increase in their household income as a direct result of programme participation. Furthermore, Nguyen, et al., (2007), revealed that participation in Vietnam's anti-poverty policy

significantly increased income of the poor household and decreased poverty. Hossain, (1988), showed that Grameen Bank members realised incomes that were 28 percent higher than non-participants in all the 30 project villages under survey. An impact assessment study conducted by Sarangi, (2007), in the state of Madhya Pradesh, India showed a significant positive effect of programme participation by an increase in the income of poor households as the participants in the programme obtained formal microcredit easily from a group savings fund. Bansal, (2010), reported the impact of microfinance programme (SHG-bank linkage programme) on the poor in Punjab, India. The microfinance programme significantly increased the income of the participants when compared with non-participants. The average income of the participants was 2.7 times higher than the income of the non-participants which was about 234 percent increase over nonparticipants. Sarmah, (2014), in Lakhimpur district of Assam found that microfinance had created additional employment opportunity and increased the annual income of the SHG members.

However, our findings contrast with a number of studies that showed insignificant impact of microcredit programme on income. For example, Coleman's (1999) in Thailand found no evidence of microcredit programme impacts on poor households. Phan, (2012), in Vietnam found no significant impact of credit on the income of the poor.

Table 4.34 reports the estimated mean impact of microfinance on number of employment days per annum generated. The results for the mean impact indicated that programme participation significantly increases employment level (number of days employed per annum). The ATT results revealed that the microfinance programme resulted with an increase of 119 days of employment per annum which is statistically significant at 1 percent level. This implies that the women participated in SGSY have got an extra employment of 119 days annually when compared to non-participants. In case of Kernel matching, we used a smoothening parameter of 0.06. The result showed 108 days significant increase of employment per annum over the non-participants. Thus, it can be inferred that microfinance has resulted employment generation of 108 days to 119 days extra per annum engagement in various income generating activities.

These findings are consistent with earlier studies conducted by Borbora and Mahanta, (1995), Gaonkar, (2001), Dunn and Arbuckle, (2001), Mishra and Hossain, (2001), etc. that showed the microfinance programme had helped to increase employment and mitigate poverty by empowering rural poor. Bansal, (2010), found that the SHG-bank linkage programme not only significantly increased the number of employment days but also provided employment opportunities to the unemployed women. Pand and Atibudhi, (2011), revealed that microfinance programme positively affected on increasing income and employment days in Orissa and the microfinance programme had higher impact on households with micro-enterprise and trading activity than that of agriculture and allied activities. A study by Sharma, (2008), in Himachal Pradesh, India provided clear evidence of the impact of microfinance programme that income and employment days of the group members were significantly higher than that of their similar counterparts. Abdullah-Al-Mamun, et al., (2011), by examining the effect of microcredit on employment in peninsular Malaysia concluded that participation in Amanah Ikhtiar Malaysia's microcredit programme increases employment rate among client's households.

The mean financial inclusion of the participant households are also estimated in Table 4.33 and Table 4.34. A financial inclusion index was constructed by taking into account various formal financial services representing usage dimensions such as formal credit, savings, insurance and usage of ATM/cheque giving weights to the variables. Most of the weights were taken from the literature available with certain modifications on some weights. The index varies from 0 to 100. The value '0' implies financially excluded and '100' value means total financial inclusion. Accordingly, we classified financial inclusion into three levels; 1-29 indicates low inclusion, 30-60 represents medium financial inclusion and 60-99 high financial inclusion. Table 4.33 and Table 4.34 reported that the mean impact of microfinance on financial inclusion index was between 35.93 and 33.44 which comes within the range of medium level of financial inclusion. This result is found highly significant at 1 percent level. This implies that the SHG-bank linkage programme under SGSY scheme has shifted the participant household to medium level of financial inclusion as compared to non-participant households. This

finding is consistent with various earlier empirical studies. A study was carried out Rangappa, et al., (2008), in Davangere district of Karnataka State of India assessed the impact of SHG-bank linkage programme on financial inclusion of rural household. The results of this study clearly indicated that the SHG-Bank linkage programme increased the flow of institutional credit to landless and marginal farm households and discouraged non-institutional borrowing through thrift creation. The percentage of households reaching the higher degree of financial inclusion was more among SHG member households compared to non-member households. Similarly, Anjugam, (2011), in Tamil Nadu found that the higher percentage of SHG member households reaching the medium degree of financial inclusion compared to non-member households. The SHG-Bank linkage programme increased the degree of financial inclusion among landless households who are the major participants of this programme. Further, a financial inclusion study of fisher households in the state of Kerala by Prathap, (2011), provided the evidence that microfinance programme promoted the level of financial inclusion of the SHG members. The impact of microfinance programme showed that the SHG members with or without the SHG-MFP linkage had higher financial inclusion index than non-members. This mean IFI of non-members was the lowest and it was higher for members (participants) and even higher for members with SHG-MFP linkage and this difference in levels of financial inclusion was found significant at 1 per cent level.

In the following point we estimated the treatment effect of microfinance services on income poverty and inequality among the participant households.

4.5.5. Impact of Microfinance Programme on poverty and Income Inequality

The ultimate target of the microfinance programme is to reduce the poverty and inequality in rural areas. Therefore, an attempt has been made to assess the impact of the programme on a set of poverty and inequality indicators. The poverty impact of the programme was assessed on incidence of poverty, depth of poverty and severity of poverty. We used state specific official poverty line (Z) for the state of Assam estimated by The Planning Commission (GOI) for the year 2011-12 at ₹828 for rural areas. Based on this poverty threshold, three Foster, Greer and Thorbecke (FGT) poverty indices (P_α) for the quantitative assessment (Foster el al., 1984) was

used because of its decomposability into subgroups which allows comparison. The Index is calculated as follows:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{q} \left[\frac{Z - Y_i}{Z} \right]^\alpha$$

(4.4)

When $\alpha=0$, we have the headcount index and P_0 measures the incidence of poverty; $\alpha=1$ denotes the poverty gap index where P_1 measures depth of poverty and $\alpha=2$ is the squared poverty gap index measuring P_2 the severity of poverty. To measure the inequality, we used three common measures of inequality: Lorenz curve, Gini Coefficient and Akinson Index. The Lorenz curve measures inequality of income distribution graphically and the Gini coefficient is a quantitative measure of income inequality from the Lorenz curve. In the Lorenz curve graph, a straight line shows the perfect equality of income distribution whereas a curved line denotes the Lorenz curve showing actual income distribution of the households. A Lorenz curve closer to the perfect equality curve indicates lower inequality and farther away from it means higher inequality.

The Gini coefficient can be measured using the following formula given in (4.5):

$$G = 1 - \frac{1}{2n(n-1)\mu} \sum_{i=1}^{n} \sum_{j=1}^{n} |Y_i - Y_j|$$

(4.5)

The value of the Gini coefficient varies from 0 indicating to perfect equality to 1 corresponding to perfect inequality. A value closer to 0 indicates more equal distribution, while the closer value to 1 is more unequal is the distribution.

The Atkinson Index of inequality is calculated using (4.6) as follows:

$$A_\varepsilon = 1 - \frac{1}{\mu} \left[\sum_{i=1}^{n} y_i^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}$$

(4.6)

The value of the Atkinson Index can vary between 0 and 1. A lower Atkinson value represents more equal income distribution and 1 denotes perfect inequality. In addition, the sensitivity parameter (ε) ranges from 0 to infinity. As the sensitivity index approaches 0, the Atkinson Index becomes more sensitive to

changes in the income position of the higher income groups. As the sensitivity index approaches higher values, the Atkinson Index becomes more sensitive to changes at the lowest income groups.

4.5.5.1. Impact of Microfinance on Poverty

a. **Incidence of Poverty (Po) among Sampled Households**

Incidence of Poverty (Po) measures the proportion of poor population whose income is below the absolutely defined poverty line which ₹828 per capita per month. Table 4.35 summarises the results of the FGT poverty indices among sampled households.

Table-4.35: Impact of Microfinance on Poverty

Poverty Indicator	Participants	Non-Participants	Impact	t=statistics	p >|t|
P_0	0.6467153	0.6849132	-0.0381979	0.611497	0.5418
P_1	0.2067379	0.308162	-0.0984241	3.28733	0.0013
P_2	0.0877126	0.1577646	-0.0700521	3.77513	0.0002

Source: Researcher's own calculation based on primary data

A perusal of the table 4.35 reveals that poverty indicators were consistently higher among non-participants compared with participants implying poverty reduction impact of microfinance intervention. For example, the head count ratio (P_0) values were 0.65 and 0.68 among the households in treatment group and control group respectively. This represents the serious incidence of poverty in the study area. The result of head count ratio (P_0) values of 0.65 and 0.68 indicated that 65 percent of the participant households were poor (that is, living below the poverty line of ₹ 828 per capita per month fixed by the Planning Commission of India) as compared to 68 percent of the control group households. This also implies that the incidence of poverty among the participants would be 68 percent had they not been participated in the programme. In other words, the microfinance programme has decreased the incidence of poverty among the treatment group as compared to the households in control group. The results of programme effects are given in the last column of Table 4.35. The negative sign of the value indicates that the incidence of poverty had decreased as a result of programme intervention. The observed head count poverty reduction effect of the programme was 0.038 which is about 4

percentage point decrease as compared to control group. Thus, the incidence of poverty would have been almost four percentage points higher without the programme intervention. Although the impact of microfinance is found to be positive, but the impact on poverty index (P_0) is insignificant.

The intensity of poverty among the sample households measuring the poverty gap is as follows:

b.   Intensity of Poverty (P_1) Among the Sample Households

The intensity or depth of poverty measures the gap between the poor household and the poverty line. The depth of poverty among non-participants (0.31) was higher than that of treatment households (0.21) (Table 4.35). The difference in poverty gap value was estimated to be about 0.10 percentage point. This implies that the microfinance programme decreased poverty gap index (P_1) value by 0.10 percentage point which is about 10 percent. In other words, poverty gap among the participants would be 10 percentage point higher, had they not been joined the programme. The difference of the reduction of poverty gap with the treatment and control group is found to be statistically significant at 1 percent level. The implication of this finding provides the evidence that the government sponsored SGSY's microfinance scheme in the study area has significantly reduced the intensity of poverty among the programme participants.

c.   Severity of Poverty (P_2) among the Sample Households

The severity of poverty index (P_2) measures the extent of poverty as the average of the weighted-sum of the individual poverty gaps where the weights are proportionate poverty gaps themselves. The poverty severity (P_2) value of 0.16 for non-participants was significantly higher than the value of 0.09 for participants in the study area. This means that poverty was more severe among the poor non-participants than that of the poor participant households. This indicates that microfinance programme intervention has decreased the severity of poverty among the participant households as compared to non-participants by 0.07 percentage point. Thus, there was about 7 percent decreased value of the severity of poverty. The estimated result on P_2 is found to be statistically significant at 1 percent level (Table 4.35).

This findings on poverty are consitent with previous studies given by various authors. For example, Nguyen, et al., (2007), found the evidence of the microcredit impact on poverty indices in Vietnam. The programme decreased the head count of poverty for its participants by almost four percentage points, decreased the poverty gap index and the poverty-severity index by almost twenty percent in Vietnam. Arun, et al., (2006), in India indicated the impact of microfinance on household poverty that microcredit significantly reduced the poverty rate in all cases and borrowing for productive purposes had a larger impact in raising the index-based ranking (IBR) indicator for those above the poverty threshold. Setboonsarng and Parpiev, (2008), provided evidence of the microcredit impact on improved agricultural production and animal raising of the poor in Pakistan. Phan, (2012), revealed that the 'true poor' group were more benefited more from involvement with a microcredit programme than low-income households in Vietnam. Furthermore, Ahmed, et al., (2011), in Bangladesh and Ilavbarhe and Imoudu, (2013), in Nigeria revealed that the micro-credit reduced poverty and that the incidence, intensity and severity of poverty were higher anomg non-beneficiaries (without credit) than that of beneficiaries (with credit). Similarly, Abur and Torruam, (2012), in Benue State of Nigeria showed that micro-credit hepled to reduce incidence of severe poverty from 0.52 before micro-credit to 0.022 after micro-credit situation among the respondents. Teng, et al., (2011), observed microfinance as an effective tool for alleviating poverty in Cambodia.

However, our findings contrast with a number of other studies. For example, studies by Coleman, (1999), and Coleman, (2006), in Thailand provided inconsistent evidence of microcredit programme impacts on welfare of poor households. Another study by Setboonsarng, and Parpiev, (2008), in Bangladesh found limited impact on most of the MDGs such as education, health, female empowerment, etc. although the programme had contributed to income generating activities, like animal raising. Similarly, Agbaeze and Onwuka, (2014), observed no significant impact of microcredit on poverty indices of rural households in Nigeria. In Vietnam, a study by Duong and Thanh, (2015) did not find the evidence that microcredit programmes served the need of the poor. Khan and Sulaiman, (2015), revealed that the extreme poor and marginalized segments were

not covered in Pakistan Poverty Alleviation Fund and despite overall positive impact, the programme did not benefit the lower quartile community members in Pakistan.

4.5.5.2. Impact on Income Inequality

The Lorenz curve method Income inequality measured by using first with the help of following Figure-4.2. Second, the quantitative assessment of income inequality was done by the Gini Coefficient and Atkinson method in Table 4.36. Figure-4.2 below demonstrates the income distribution of participants and non-participant households.
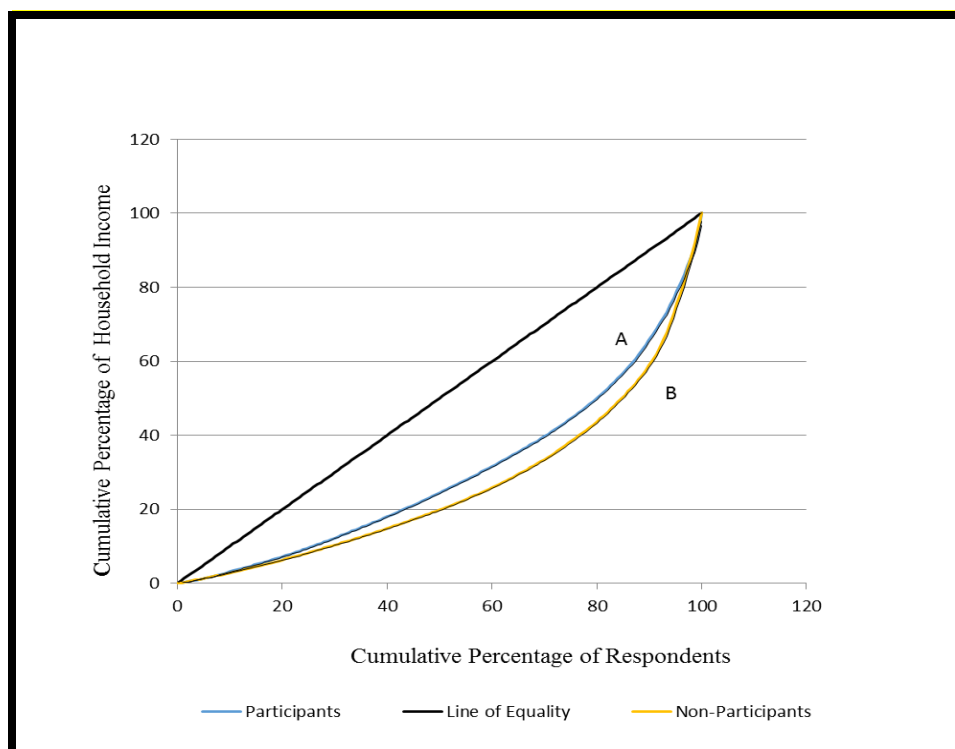

Figure-4.2 Lorenz Curve for Participants and Non-Participants

In the figure-4.2, the cumulative percentage of income is shown in vertical axis and the cumulative percentage of population is measured in horizontal axis. The 45^0 line represents the perfect equality of income distibution anomg the populations. The curved lines are Lorenz curves showing actual income distribution among the participant and non-participant households. The yellow curve (curve B) represents the Lorenz curve of the income distibution of the non-participants whereas another blue curve (curve A) denotes the Lorenz curve of income distribution of the participant households. The Lorenz curve that is at a closer distance from the

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perfect equality (45° line) shows lower levels of income inequality than the one farther to the 45° line.

The Figure-4.2 has demonstrated that households income distribution curve of non-participants, i.e., curve B (yellow coloured) moved away from the perfect equality. In other words, it means that income distribution of the non-participants had more inequality between people having high incomes and low incomes. But the Lorenz curve, A (blue coloured) represented for income distribution of participants had moved toward the perfect equality line than B. It indicated that income inequality of each households of the participant group was in low level.

Table 4.36: Impact on Income Distribution of the Sampled Households

Indicator	Participants	Non-Participants	Impact	t=statistics	p>|t|
Gini	0.4019981	0.4702152	-0.0682172	1.50946	0.1333
Atkinson	0.1349912	0.1814077	-0.0464165	0.654023	0.5141

Source: Researcher's own calculation based on primary data

Moreover, the Gini coefficient of income of the participants (0.40) was lower than that of the control households (0.47). This implies that the programme has decreased the income inequality among the participant households as compared to control households by about 0.07 point. This reduction also illustrated that income inequality of participants was better than the non-participants. Similarly, Atkinson index also revealed the lower index value of 0.13 for participant households as compared to the value of 0.18 for non-participant households. Thus, the estimated difference of 0.05 can be attributed to the microfinance programme effect. The implication of this findings is that inequality among the participant households decreased from five to seven percentage point is the result of participation in SHG programme. Thus, the SHG-Bank Linkage Programme has helped to reduce inequality among the participant households but it could not signficantly contributed in inequality reduction since the estimated result of t-values of Gini coefficient and Atkinson index are smaller than the table value and hence statistically insignificant (Table 4.36).

This findings of microfinance impact on income inequality are consistent with previuos studies that assesssed employing similar methods. For example, Bansal, (2010), in Punjab, India observed the decline of inequalities in income marginally among the participants as as result of microfinance programme. Nguyen, et al., (2007), in Vietman revealed although small but significant impact of microcredit programme on inequality. A study in Cambodia by Teng, et al., (2011), who concluded that microcredit strongly related to the improvement of household's economics revealed that microfinance reduced income inequality in the year 2009 as copamred to 2008 of the people living in the study area . Abur and Torruam, (2012), showed lower Gini coefficient of 0.04 after microcredit situation as compared to Gini coefficient of 0.6 in pre-microcredit situation with the implication that microcredit reduced inequality of income in post-microcredit situation. However, the above findings contrast with the findings of Banerjee, (2009), that income inequality among the participant group was higher than that of the non-participant members in West Bengal state of India. Similarly, there are studies such as by Nuruzzaman, (2010), in Indonesia and Tchouassi, (2011), in African countries that observed no effect of microcredit on poverty and income inequality.

Concluding Observations

In this chapter, the impact of microfinance programme on income, employment, poverty, income inequality and financial inclusion were analysed. The analysis was first carried out with the help of descriptive statistics such as percentage, compare means, correlation, etc. and then by using Propensity score matching (PSM) method in order to determine the treatment effect of microfinance on the outcome indicators. Both Nearest Neighbour Matching and Kernel Matching estimators were used to compute ATE and ATT. The analysis of primary data displayed that microfinance programme has increased the level of employment and number of employment days per year among the participants as compared to non-participants. It is found that participants are engaged in income generating activities like weaving, animal husbandry, agricultural, etc. which increases employment and income of the participants. It is also found that microfinance programme has increased income and decreased poverty among the participant households as

compared to non-participants. The microfinance programme has also helped to reduce income inequality among the participants as compared to non-participants. The analysis of the primary data also reveals that participation in microfinance is significantly associated with higher degree of financial inclusion and the SHG programme has significant impact on financial inclusion index of the participants as compared to non-participants. The SGSY programme is working as per guidelines of the programme in terms of selected indicators such as membership size, conduct of meeting, savings deposit, maintenance of records and accounts, etc. However, the members of the SHGs have been facing various problems such as marketing, training, etc.

The estimation of ATE and ATT using Nearest Neighbour and Kernel Matching estimators have shown positive and significant impact on the outcome indicators. The estimated ATT of microfinance on monthly income recorded an increment, on an average, of ₹441.71 to ₹390.16 per month more than the non-participants. Similarly, it finds that the microfinance programme has resulted in an increase, on an average, of 119 to 108 days per year over the non-participants in various economic activities. Moreover, the mean impact of microfinance programme on the weighted index of financial inclusion ranges from 35.93 to 33.44 as compared to control households. Furthermore, the microfinance programme has reduced poverty rate by four percent, poverty gap by ten percent and poverty severity by seven percent among the treatment households. In addition, microfinance has reduced inequality between five to seven percentage point in the distribution of income among the participants as compared to control group. Therefore, it can be said that microfinance programme overall has positive impact on all the outcome variables in the study area.