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IMPACT OF MICRO-FINANCE ON INCOME DISTRIBUTION OF RURAL HOUSEHOLDS IN ANDHRA PRADESH

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ABSTRACT

In recent years, micro-finance became an important intervention as a tool for poverty alleviation and rural development. Two important models dominate the sector i.e, the Micro-finance Institution Joint Liability Ground (JLG) model and the Self-Help Group (SHG) model. The study was undertaken in Kadapa and Kurnool districts of Andhra Pradesh with a view to estimating the impact of micro-finance on income distribution of sample respondents. Gini coefficient, Atkinson's measures, Generalised entropy measures and Decile dispersion ratio were used to measure the income inequalities. All the measures revealed that inequality was highest among non-participants and lowest among the members participated in both the micro-finance programmes. The results further revealed that income from agriculture, dairy and non-farm labour were the increasing sources of income inequality and non-farm self-employment was the inequality decreasing source of income.

Introduction

Micro-finance became one of the fastest developing commercially viable business propositions with a social mission not only in India but also in the world. These micro-finance interventions had put their thrust on the understanding that the poor can be bankable. Poor when organised in the form of group were able to own the micro-scale banking operations which were sustainable in the long

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run. These group based micro-finance initiatives had a positive impact on the socio-economic characteristics of the poor and addressed the rural poverty. The micro-finance programmes had a significant impact on increase in income, asset position, productive assets and social status (Duggal et al. 2002). There was strong evidence of positive impact of micro-finance programme on the overall socio-economic growth of poor households. India is the home to the world-wide largest micro-finance sector having grown rapidly in recent years both in terms of size and institutional diversity. Two delivery models dominate the sector: The Micro-finance Institution Joint Liability Group (JLG) model and the Self-Help Group (SHG) model. Both these models had contributed to the observed growth of the sector, but the SHG model was more dominant model in terms of the number of borrowers and loans outstanding. Against this background, the present study was undertaken with the objective of studying the impact of micro-finance on income distribution of sample households.

Methodology

In the selection of districts, mandals, villages and sample respondents, multi-stage purposive cum random sampling was adopted. Two districts in Andhra Pradesh called Kadapa and Kurnool based on the number of SHG and MFI borrowers, were selected purposively. Three mandals from each district with maximum number of SHGs and MFI borrowers were again selected purposively. From each mandal two villages were selected at random. In each village, 10 members who participated in both, SHG and MFI programmes (category-I), 10 members who participated in SHG programme (category-II) and 5 non-participants (category-III) were randomly selected. In all 120 SHG and JLG borrowers, 120 SHG borrowers and 60 non-participants formed the sample for the study. The data pertained to the year 2010-11.

Measure of Inequality: Inequality is a broader concept than poverty in that it is defined over the entire population, and not just for the population below a certain poverty line. The simplest way to measure inequality is by dividing the population into quintiles from poorest to richest, and reporting the levels or proportions of income that accrue to each level. Other than this the following summary measures (Poverty Manual, 2005) of inequality were also used.

Gini Coefficient of Inequality: Gini coefficient of inequality was defined as the proportion of area under diagonal line which is known as Lorenz curve. Its value ranges from 0 to 1. More equal the income distribution, closer is the ratio to zero and if the degree of inequality is greater, then closer is the ratio to one. A Gini ratio of zero would mean that every individual would receive exactly the same income, while a ratio of one would mean an individual received all the income. The following formula was used to calculate the Gini concentration ratio.

$$GCR = 1 - \sum P_j (Q_j + Q_{j-1})$$

Where,

GCR = Gini concentration ratio

Pj = Proportion of families in the j^{th} group

Qj + Qj-1 = Cumulative proportion of incomes in the j^{th} and $j\text{-}1^{th}$

farm households.

Atkinson's Inequality Measures: Atkinson coefficient gives an idea of the degree of inequality in population and it helps to determine which end of the distribution (i.e., the poor or the rich) contributes most to the observed inequality (i.e., is there some very rich that contribute to the inequality or rather some that are very poor). In calculating Atkinson coefficient, epsilon (e) was a weighting parameter and it measures aversion to inequality. It has to be a positive number. If we choose epsilon to be one, then the Atkinson measure was more sensitive to changes in the lower end of the income distribution (the poorer). If it approaches to zero (which means that less aversion to inequality) then the Atkinson measure was more sensitive to the upper end (the richer) of the income distribution.

$$A_e = 1 - \left[\frac{1}{N} \sum_{i=1}^{N} \left(\frac{y_i}{\bar{y}} \right)^{1-e} \right]^{\frac{1}{(1-e)}}, e \neq 1$$

$$A_e = 1 - \frac{\prod_{i=1}^{N} (y_i^{1/N})}{\bar{y}}, e = 1$$

Generalised Entropy Measures: Theil index and the mean log deviation measure belonged to the family of generalised entropy inequality measures. The general formula was

$$GE(\alpha) = \frac{1}{\alpha(\alpha-1)} \left[\frac{1}{N} \sum_{i=1}^{N} \left(\frac{y_i}{\bar{y}} \right)^{\alpha} - 1 \right]$$

Where, $\bar{y}$ is the mean income. The values of GE measures vary between 0 and, with zero representing an equal distribution and higher value representing a higher level of inequality. The parameter a in the GE class represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value. For lower values of α , GE is more sensitive to changes in the lower tail of the distribution, and for higher values GE is more sensitive to changes that affect the upper tail. The common values of α used were 0, 1 and 2. GE(1) is Theil's T index, which was written as

$$GE(1) = \frac{1}{N} \sum_{i=1}^{N} \frac{y_i}{\bar{y}} \ln \left(\frac{y_i}{\bar{y}} \right)$$

GE (0) also known as Theil's L, and it is also referred as the mean log deviation measure, is given by

$$GE(0) = \frac{1}{N} \sum_{i=1}^{N} \ln \left(\frac{\bar{y}}{y_i} \right)$$

Decile Dispersion Ratio:: A simple and widely used measure is the decile dispersion ratio, which presents the ratio of the average consumption of income of the richest 10 per cent of the population divided by the average income of the bottom 10 per cent. The decile ratio was readily interpretable by expressing the income of the top 10 per cent (the rich) as a multiple of that of those in the poorest decile (the poor).

Decomposition of Income Inequality: According to the literature, any decomposable inequality measure should have five basic properties. They are (1) Pigou-Dalton transfer sensitivity (2) Symmetry (3) Mean independence (4) Population homogeneity and (5) Decomposability (Adams Jr., 2001).

Pigou-Dalton transfer sensitivity holds if the measure of inequality increases whenever income is transferred from one person to someone richer. Symmetry holds if the measure of inequality remains unchanged when individuals switch places in the income order. Mean independence holds if a proportionate change in all income leaves the measure of inequality unchanged. Population homogeneity holds if increasing (or decreasing) the population size across all income levels has no effect on the measured level of inequality.

The property of decomposability allows inequality to be partitioned either over sub-populations or sources. It is the latter type of decomposition that is the subject of this analysis. Ideally, an inequality measure can be regarded as source decomposable if total inequality can be broken down into a weighted sum of inequality by various income sources. One of the measures of inequality which meets the five preceding properties is the Gini coefficient. The source decomposition of the Gini coefficient can be written as

$$G = \sum_{k=1}^{k} R_k G_k S_k$$

where,

S_k is the share of source k of income in total group income

G_k is the Gini coefficient measuring the inequality in the distribution of income component k within the group, and

R_k is the Gini correlation of income from source k with total income, defined as,

$$R_k = \frac{\mathrm{cov}[Y_k, F(Y)]}{\mathrm{cov}[Y_k, F(Y_k)]}$$

The equation shows that the effect of source k income on overall income inequality can be broken down into three components.

a) The share of income component k in total income (captured by the term S_k)

b) The inequality within the sample of income from source k (as measured by G_k)

c) The correlation between source k income and total income (as measured by R_k)

Using this decomposition, how much of overall income inequality is due to a particular income source was identified. Using the following formula we can identify whether an income source k is inequality-increasing or inequality-decreasing. An income source is inequality-increasing if g_k is greater than unity, if gk is less than unity, the income source is inequality- decreasing.

$$g_k = R_k \frac{G_k}{G}$$

Here g k is the relative concentration coefficient of income source.

The concepts and terms as presented above are useful in the present investigation in getting the proper understanding and perspectives of the problem. The materials and methods particularly the sampling procedure, etc., described in the preceding paragraphs was useful in data collection. The analytical tools, techniques and models presented above helped in processing and analysing the data to arrive at valid conclusions and also in interpreting the results of the study, which are presented in the ensuing chapter.

Results and Discussion

The simplest measurement of inequality sorts the sample from poorest to richest and shows the percentage of income attributed to each decile of the sample. The data on the households and per household income were arranged in the ascending order for the three categories of the sample respondents. The households were classified under ten income deciles and the percentage of households and percentage of total income falling under each income class were worked out and the results presented in Table 1.

Table 1 : Distribution of Sample Respondents According to Income

Level of annual income (in ₹)	Category-I			Category-II			Category-III		
	Per cent household	Per cent income	Total income in each group	Per cent household	Per cent income	Total income in each group	Per cent household	Per cent income	Total income in each group
<40000	1.67 (1.67)	0.54 (0.54)	74,750	15.83 (15.83)	5.31 (5.31)	5,77,000	20 (20.00)	8.22 (8.22)	3,51,680
40001-80000	22.5 (24.17)	12.18 (12.72)	16,76,200	35 (50.83)	23.86 (29.17)	25,94,800	51.67 (71.67)	42.74 (50.96)	18,29,200
80001-120000	40 (64.17)	35.03 (47.75)	48,19,174	25.84 (76.67)	28.2 (57.37)	30,67,000	18.33 (90.00)	25.16 (76.12)	10,77,200
120001-160000	22.5 (86.67)	27.15 (74.9)	37,34,600	13.33 (90.00)	20.56 (77.93)	22,36,000	5 (95.00)	9.25 (85.37)	3,95,800
160001-200000	7.5 (94.17)	11.79 (86.69)	16,22,200	5 (95.00	9.49 (87.42)	10,32,400	-	-	-
200001-240000	2.5 (96.67)	4.84 (91.53)	6,66,000	4.17 (99.17)	9.87 (97.29)	10,73,800	5 (100.00)	14.63 (100.00)	6,26,000
240001-280000	2.5 (99.17)	5.58 (97.11)	7,67,000	-	-	-			
280001-320000	-	-		0.83 (100.00)	2.71 (100.00)	2,95,000			
320001-360000	-	-							
360001-400000	0.83 (100.00)	2.89 (100.00)	3,98,000						

*Figures in brackets indicate cumulative percentages.

From the Table it is observed that 1.67 per cent of the households from category I received less than ₹ 40,000 income per annum. About 15.83 per cent of the households from category II and 20 per cent of the households from category III were falling in this income slab. But the per cent of income received by the households in this income slab was 0.54, 5.31 and 8.22 for category I, II and III, respectively. About 22.5 per cent of the households from category I, 35 per cent from category II and 51.67 per cent from category III received income in the range of ₹ 40,001 to 80,000. And the per cent of income received by the households in this range was 12.18, 23.86 and 42.74, respectively. In the case of category I and II, 24.17 per cent and 50.83 per cent of the households received annual income of less than ₹ 80,000, but their share in total income was only 12.72 and 29.17 per cent. About 71.67 per cent of the households from category III received an annual income of less than ₹ 80,000 and the share of total income received by these households was 50.96 per cent. In the case of category I and II, about 75.83 and 49.17 per cent of households received income of more than ₹ 80,000, and their share in total income was 70.83 and 87.27 per cent. Only 28.33 per cent of the households from category III earned income of more than ₹ 80,000, with a corresponding share in total income of 49.04 per cent. About 35.83 per cent of the households from category I had 52.25 per cent share and 23.33 per cent of the households belonged to category II falling in the above income slab had 42.63 per cent share in total households income. About 10 per cent of the households from category III falling in the income slab of above ₹ 1,20,000 contributed 23.88 per cent share in total households' income. This clearly indicated that distribution of the income was relatively better among the households who participated in both the micro-finance programmes.

MEASURES OF INCOME INEQUALITY

Gini Coefficient of Income Inequality

The values of Gini coefficient and coefficient of variation are presented in Table 2. The Gini coefficient for the households from category I, II and III were 0.24, 0.27 and 0.30, respectively. This indicated that the annual income of category I was more fairly distributed than category II and the annual income of category II was more fairly distributed than category III. These results were further confirmed by the estimates of coefficient of variation (C.V), which were 46.61, 56.90 and 59.70 per cent for households of category I, II and III, respectively.

Table 2 : Gini Coefficient and Coefficient of Variation for Annual Households' Income Distribution Among Three Categories

S.No.	Category	No. of Observations	Gini coefficient	Coefficient of Variation (%)
1	Category-I	120	0.24	46.61
2	Category-II	120	0.27	56.90
3	Category-III	60	0.30	59.70

Atkinson Coefficient

From the Table 3 it is observed that if e=0, there was no inequality on the three groups, which means the Atkinson measure was not sensitive to the upper end of the income distribution. If e=1, the value of Atkinson coefficient for category I, II and III were 0.091, 0.116 and 0.138, respectively. If e=2, the value of Atkinson coefficient was 0.175, 0.228 and 0.256 for the categories I, II and III, respectively. From the above results it is observed that increasing epsilon, referred higher inequalities and the Atkinson measure was more sensitive to the changes in the lower end of the income distribution. Further, it is clear that the inequality was highest among non-participants and relatively lower among the members who were borrowing from both micro-finance programmes.

Table 3 : Atkinson's Coefficient and Generalised Entropy Measure of Income Inequality

S.No.	Category	Atkinson's coefficient			Generalised Entropy measure		
		e=0	E=1	e=2	?=0	a=1	a=2
1	Category-I	0	0.091	0.175	0.041	0.042	0.603
2	Category-II	0	0.116	0.228	0.054	0.051	0.620
3	Category-III	0	0.138	0.256	0.065	0.065	0.666

Generalised Entropy Measures

If it is assumed a is zero, GE was more sensitive to changes in the lower tail of the distribution. If α is zero, the value of GE were 0.041, 0.054 and 0.065 for category I, category II and category III, respectively. For higher values of α, GE was more sensitive to changes that affect the upper tail. If α=1, the value of

the GE was 0.042, 0.051 and 0.065 for category I, II and III, respectively. If α =2, the value of GE was 0.603, 0.620 and 0.666, respectively (Table 3). The value of GE was highest for all the values of α in the case of category III and lowest for category I which indicates less inequality in the case of category I compared to category II and category III.

Decile Dispersion Ratio

Decile dispersion ratios of the three categories of the households were calculated and presented in Table 4. From the Table it is observed that the decile dispersion ratio of category I, II and III were 4.96, 5.85 and 6.99, respectively. The decile dispersion ratio indicated that in category I, the average income of the richest 10 per cent of sample households was 4.96 times more than the average income of the poorest 10 per cent. In the case of category II, the average income of the richest 10 per cent of sample households was 5.85 times more than the average income of the poorest 10 per cent. And for category III, the average income of the richest 10 per cent of sample households was 6.99 times more than the average income of the poorest 10 per cent. From the results it is interesting to note that, participation in micro-finance programme reduced the difference between the average income of the top 10 per cent richest households to bottom 10 per cent households.

Table 4 : Decile Dispersion Ratio of Income Inequality

S.No.	Category	Average income of the richest 10 per cent sample households	Average income of the poorest 10 per cent sample households	Decile dispersion ratio
1	Category-I	2,29,750	46,312.5	4.96
2	Category-II	2,04,591.67	34,958.33	5.85
3	Category-III	1,70,300	24,346.67	6.99

Therefore, it is clear that the provision of the assets like dairy, kirana and hotel enabled the beneficiaries to generate additional income, which not only improved their standard of living but generated savings too. In addition to these benefits, the income inequalities also got reduced.

Decomposition of Income Inequality

Decomposing the Gini coefficient provides two ways of measuring the contribution of any income source to overall income inequality. First, it is possible to identify how much of overall income inequality is due to any particular source of income. Second, it

explains whether inequality in an income source serves to increase or decrease overall income inequality.

Decomposition of Income Inequality for Category-I

The Gini decomposition results for category I are presented in Table 5. The results indicated that income from non-farm labour had the highest share (40 per cent) in total income inequality. The reason was that it accounted for 18 per cent share in total income, and income from this source was unfairly distributed indicated by the Gk value 0.77 and its correlation with total income was high (R_k =0.56). Income from dairy had the second largest share (30 per cent) in total income inequality. Income from dairy had 21 per cent (second highest) share in total income, the income was unfairly distributed indicated by the G_k value 0.72 and it had high correlation with total income (R_k =0.45). Agricultural income occupied third largest share in total income inequality (20 per cent). It accounted for 15 per cent share in total income, its Gini coefficient value was 0.74 which meant unfair distribution and it was highly correlated with total income (0.34). Non-farm self-employment had highest share (35 per cent) in total income, but its contribution to total income inequality was very low (10 per cent). The income from this source was also unfairly distributed indicated by the Gk value 0.62, but the correlation between income from non-farm self-employment and total income was very low (R_k =0.09).

Table 5 : Decomposition of Income Inequality for Category-I

S. No.	Income source	Proportion of households receiving income source (Pk)	Share in total income (Sk)	Gini coefficient for income source (Gk)	Gini correlation with total income (Rk)	Contribution of income source to overall income inequality (SkGkRk)	Relative concentration coefficient of income source g=Rk Gk/G)	Percentage contribution to overall income inequality
1	Wages from agricultural labour	0.28	0.09	0.81	0.01	0	0.04	0
2	Wages from non-agricultural labour	0.36	0.18	0.77	0.56	0.08	2.16	40
3	Wages from NREGS	0.06	0.01	0.96	0	0	0	0
4	Non-farm self-employment	0.56	0.35	0.62	0.09	0.02	0.28	10
5	Farm-profit	0.43	0.15	0.74	0.34	0.04	1.26	20
6	Profit from dairy	0.5	0.21	0.72	0.45	0.06	1.62	30
7	Migration income	-	0	0	-	-	-	-
8	Benefits from government	0.06	0	0.96	-0.06	0	-0.29	0
9	Other sources	0.02	0.01	0.98	0.09	0	0.44	0

The relative concentration coefficient (g) value for the income sources i.e., non-farm labour, non-farm self-employment, agriculture and dairy was 2.16, 0.28, 1.26 and 1.62, respectively. These values revealed non-farm labour, agriculture and dairy were inequality increasing sources of income and non-farm self-employment was the inequality decreasing source of income.

Decomposition of Income Inequality for Category II

From Table 6 it is observed that agriculture contributed for highest share in income inequality i.e., 45.45 per cent in category II. The share of non-farm employment in the total income was 23 per cent. The income from this source was unfairly distributed and it was highly correlated with total income. Income from dairy enterprise and non-farm labour contributed 18.18 per cent each to total income inequality. Non-farm self-employment contributed only 9.09 per cent in total income inequality. The share of non-farm employment in the total income was 23 per cent. Even though it was unfairly distributed, as indicated by the G_k value 0.67, the correlation between income from non-farm self-employment and total income was 0.14 which means very low. Hence, its contribution to income inequality was very less. In category II, the relative concentration coefficient (g) values for income sources of agriculture, dairy and non-farm labour were 1.64, 1.18 and 1, respectively. The g values indicated that these income sources were inequality augmenting sources and the non-farm self-employment was the inequality decreasing source of income indicated by the g value of 0.43.

Table 6 : Decomposition of Income Inequality for Category-II

S. No.	Income source	Proportion of households receiving income source (Pk)	Share in total income (Sk)	Gini coefficient for income source (Gk)	Gini correlation with total income (Rk)	Contribution of income source to overall income inequality (SkGkRk)	Relative concentration coefficient of income source g=Rk Gk/G)	Percentage contribution to overall income inequality
1	Wages from agricultural labour	0.31	0.1	0.77	0.12	0.01	0.42	4.55
2	Wages from non-agricultural labour	0.35	0.17	0.76	0.29	0.04	1	18.18
3	Wages from NREGS	0.02	0	0.98	0.03	0	0.13	0
4	Non-farm self-employment	0.52	0.23	0.67	0.14	0.02	0.43	9.09
5	Farm-profit	0.6	0.27	0.67	0.54	0.1	1.64	45.45
6	Profit from dairy	0.5	0.16	0.72	0.36	0.04	1.18	18.18
7	Migration income	0.01	0	0.99	0.12	0	0.54	0
8	Benefits from government	0.09	0	0.93	0.05	0	0.21	0
9	Other sources	0.12	0.07	0.91	0.17	0.01	0.7	4.55

Decomposition of Income Inequality for Category III

It is observed that 33.33 per cent of inequality in income distribution of households from category III was from agriculture (Table 7). Income from agriculture accounted for 20 per cent share in total income, income from this source was very unfairly distributed as indicated by the Gk value 0.79 and it was highly correlated with total income indicated by the Rk value 0.66. Dairy enterprise was the second largest source of income inequality, which contributed for 30 per cent share in total income inequality. The reason was 19 per cent of the total income was from dairy enterprise and its Gk (0.75) and Rk (0.64) values were high. And the third largest contributor of income inequality in category I was wages from non-farm labour. It had second largest share in total income and income of the households was unfairly distributed and it was highly correlated with total income. Non-farm self-employment which had highest share (28 per cent) in total income contributed less to the income inequality. The reason was income from non-farm self-employment was fairly distributed (G_k =0.56) compared to the other sources of income and it was not highly correlated (R_k =-0.16) with total income. The decomposition results were further used to distinguish between inequality-increasing and inequality- decreasing sources of income.

The analysis of decomposition of income inequality amply revealed that the share of non-farm self-employment in the total income of the beneficiaries stood at 35, 23 and 28 per cent for the categories I, II and III, respectively. Thus, its contribution to the income inequalities of the said three categories was low at 10, 9.09 and 6.67 per cent, respectively. This trend merits the point that the activities (non-farm) provided through both the micro-finance programmes enabled the beneficiaries to earn substantial income to supplement their family incomes, besides not raising any alarm regarding creating another issue of glaring inequalities among them.

Table 7 : Decomposition of Income Inequality for Category-III

S. No.	Income source	Proportion of households receiving income source (Pk)	Share in total income (Sk)	Gini coefficient for income source (Gk)	Gini correlation with total income (Rk)	Contribution of income source to overall income inequality (SkGkRk)	Relative concentration coefficient of income source g=Rk Gk/G)	Percentage contribution to overall income inequality
1	Wages from agricultural labour	0.28	0.1	0.79	0.12	0.01	0.32	3.33
2	Wages from non-agricultural labour	0.32	0.22	0.76	0.5	0.08	1.27	26.67
3	Wages from NREGS	0.05	0.01	0.95	0.15	0	0.48	0
4	Non-farm self-employment	0.62	0.28	0.56	-0.16	0.02	0.3	6.67
5	Farm-profit	0.37	0.2	0.79	0.66	0.1	1.7	33.33
6	Profit from dairy	0.4	0.19	0.75	0.64	0.09	1.6	30
7	Migration income	0	0	0	-	-	-	-
8	Benefits from government	0.15	0.01	0.85	0.04	0	0.11	0
9	Other sources	0	0	0	-	-	-	-

According to the relative concentration coefficient (g), the three sources of income i.e., agriculture, dairy enterprise and non-farm labour represented the inequality-increasing sources of income. This means that, additional increments of agricultural, dairy and non-farm labour income would increase income inequality and non-farm self employment was the inequality-decreasing source of income.

From the above results it is concluded that in all the three categories, non-farm labour, agriculture and dairy enterprise were the inequality-increasing sources of income and non-farm self-employment was the inequality-decreasing source of income. Hence providing credit facilities through micro-finance activities to the rural households would reduce the inequality in income distribution.

Conclusion

All the measures of income inequality revealed that inequality was highest among non-participants and lowest among the members participated in both the micro-finance programmes. Decomposition of Gini coefficient revealed that in all the three categories, income from agriculture, dairy and non-farm labour were the major sources of income inequality. These three were inequality-increasing sources of income and non-farm self-employment was the inequality-decreasing source of income. Equal distribution of income among the people is one of the important goals of policy makers, and therefore, promoting inequality-decreasing sources of income through micro-finance would achieve this goal to a greater extent.

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