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## **Impact of Group-Based Microfinance on Rural Household Income: Evidence from an Indian State**

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### **Abstract**

This paper studies the impact of group-based microfinance interventions on the income of rural households in an Indian state. A stratified random sampling technique was employed to select households from four districts in the state of Orissa. The sample households were further classified into two groups according to their livelihood patterns: agriculture & allied activity and micro-enterprise & trading activity. A comparison between the target group of households participating in microfinance programs and a control group was carried out by a univariate z-test and by multiple regression analysis. The inequality in income distribution was analyzed in terms of the Gini coefficient and the Lorenz curve. The study provides strong evidence of the positive effect of microfinance programs on the income of the participating households.

**Keywords:** Microfinance, household income, rural households

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## **Introduction**

Microfinance has become a widely accepted and effective poverty-alleviation instrument for capital-deficient people in developing countries. It is a major developmental intervention for income generation and poverty alleviation in rural India. The fundamental understanding of the microfinance interventions is that poor can be bankable (Panda, 2009a; Desilva and Denby, 1992). It has been also observed that micro-scale banking is sustainable in addressing poverty issues when the poor are organized in groups (Dash, 2003; Zeller, 2001; Bennett et al., 1996). Microfinance operations through women groups have been found profitable, especially in India (Harper, 1998). These microfinance programs have included credit, thrift, and finance related services and products of very small size designed to improve the living standards of the downtrodden (Makina and Malobola, 2004). Researchers in India and elsewhere have concluded that group-based microfinance can have a significant positive effect on the socio-economic characteristics of the poor (Jain et al., 2003).

Many impact assessment studies of microfinance programs have been conducted in India, and the researchers have arrived at the conclusion that programs based on the Self-Help Group (SHG) have a positive effect on the socio-economic development of the poor (Tripathy, 2006; Sundarapandian, 2006; Nagayya, 2000). A national-level study conducted by the Small Industrial Development Bank of India (SIDBI) using more than 5,000 households in 10 states of India showed that microfinance interventions led to a significant increase in household income of microfinance clients compared with households that did not use microfinance institutions (SIDBI, 2008).

Despite the rapid expansion of the microfinance interventions, the effectiveness of microfinance in achieving its potential has always been questioned. Shamsuddoha and Azad (2004) found that the poverty situation of the microfinance beneficiaries in Bangladesh did not improve substantially. Hulme (2000) discussed the darker side of microfinance while examining whether micro-debt was good for the people or not. Similarly, Buckley (1997) found that microfinance was more of a problem than a solution in Africa. Mosley and Hulme (1998) found that micro-enterprise finance promoted the growth of micro-enterprises but did not act as a strong force for poverty alleviation for the poor in general. Sometimes micro-credits became a burden for women, leading to a negative empowerment and debt trap (Kabeer, 2001). Morduch (1998) in his study in Bangladesh questioned whether microfinance was in fact helping the poor.

Microfinance interventions thus cannot be universally accepted as a tool for income improvement and poverty alleviation. While the ongoing impact-assessment research has made an important contribution to understanding the

complex interactions between microfinance interventions and the various dimensions of poverty reduction, there remains a considerable gap in the potential contribution of various micro-geographical and locational researches, which differ in methodology, scale, and magnitude. In this study we have made an attempt to measure the impact of microfinance interventions on the income of rural households in the state of Orissa in India.

## **Methodology**

The household was chosen as the unit of analysis for assessing the impact of microfinance (Zewde and Tollens, 2008; Pitt and Khandkar, 1996). The impact of microfinance on rural households was measured by comparing the target group, i.e., a group of beneficiary households participating in some group-based microfinance program, with a control group, i.e., a group of households that did not participate in any group-based microfinance program (Panda, 2009b; Kando, 2007; Al-Azzam, 2006).

The research was conducted using primary information collected in a field survey. A multi-stage stratified random sampling method was applied to construct a cross-section of 800 households, which were interviewed using a pre-tested, structured household schedule. In the first sampling stage, 4 districts were randomly selected in the state of Orissa. These four districts represented four different regions: the coastal region, the eastern region, the western region, and the central region of the state. In the second stage, 2 blocks from each district were randomly selected. In the third stage, five villages with ongoing microfinance programs were randomly selected from each block, giving a total of 40 villages. Finally, in the fourth stage, 20 households were selected from each village: 10 households for the target group were selected randomly and another 10 households for the control group were selected by the matching method (Coleman, 1999).<sup>3</sup> In

3 Participation in a microfinance program imposes self-selection in the sense that a person who does not participate in a microfinance program feels that she/he is either better off or worse off relative to group-based microfinance programs. In the selection of the control group, we first drew up a list of households that did not participate in group-based microfinance programs but were likely to participate in the future. From this list of non-participating households the control group was selected by the matching method (Coleman, 1999). Under the matching method, members of the target group are paired with members of the control group that have similar starting values for the relevant characteristics (Weiss and Montgomery, 2004). In the present study matching was done by similar values for income, activity, assets position, family size, and number of literate family members.

total the study sample included 800 households in 40 villages: 400 households in the target group and 400 households in the control group from 40 villages.

It had been observed in previous studies that group-based microfinance interventions, especially in India were aimed mostly at the micro-entrepreneurs, not the farmers (Panda, 2009a). The sample households were accordingly stratified by two livelihood patterns: (i) agriculture & allied activities and (ii) micro-enterprise & trading activities. Households with primary occupation in crop and livestock farming were put under agriculture & allied activity; households with primary occupation in trade and micro-enterprise, such as pottery, blacksmiths, handicrafts, retail stores, food grain trading, etc., were put under micro-enterprise & trading activity. In total, there were 400 sample households each for agriculture & allied activities and for micro-enterprise & trading activities (200 in the target group and 200 in the control group for each activity category).

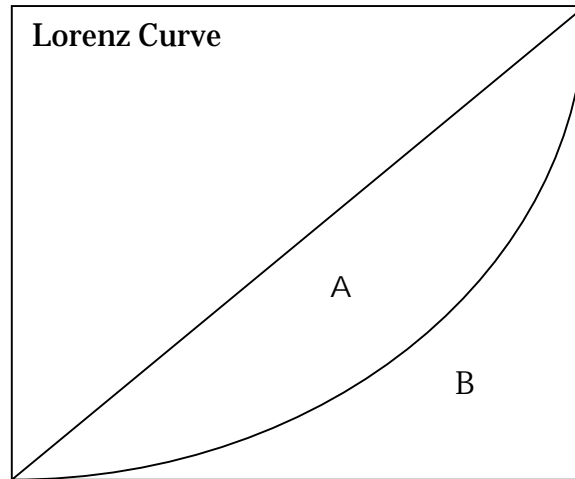
Differences in household income between the target group and the control group were tested by a univariate z-test (Chandel, 1999). The impact of participation in a group-based microfinance program on household income was further analyzed using a linear multiple regression model, with the annual household income as the dependent variable and the participation in a group-based microfinance program as a dichotomous explanatory variable (taking the value “1” for participants and “0” for non-participants. In addition to the effect of participation in microfinance programs, family income is also affected by other household characteristics, whose omission may bias the results (Mosley, 1997). The regression model accordingly included three additional explanatory variables: the number of literates in the household, the value of assets in the household, and the number of family members to address the issues of endogeneity (Panda, 2009b)<sup>4</sup>.

The impact of microfinance on the equality of household-income distribution was assessed by calculating the Gini coefficient and the Lorenz curve for the target group and the control group (Panda, 2008). The Lorenz curve (Figure 1) is a graph showing the cumulative proportion of household income (vertical axis) for a given proportion of sample households (horizontal axis). The bulge area *A* in Figure 1 is a measure of income inequality and the Gini coefficient *G* may be expressed as

4 Households having a higher asset position, e.g., more land, agriculture implements, or machinery, are likely to scale up their business or production processes and thus achieve higher income. Similarly, higher literacy status of an individual allows him/her to take up a better paid job (if wage labor) or better manage the business (farming and enterprise), thus earning higher income/returns. The household size also influences the household income as all family members participate in some way in family farming and business enterprise and the household earns the return to their labor in terms of profit or net cash-inflow.

$$G = \frac{A}{A + B}$$

**Figure 1: A schematic diagram of the Lorenz curve**



This ratio obviously lies between 0 and 1. In case of perfect equality of income distribution, the Lorenz curve coincides with the 45° line, the bulge area *A* vanishes, and  $G = 0$ . With total inequality (one household having all the income), area *B* vanishes, area *A* fills the entire half-square, and  $G = 1$ . The smaller the value of the Gini coefficient, the greater is the equality of income distribution.

The Gini coefficient also can be calculated by the formula,

$$G = 1 - \sum_{k=1}^{k=n-1} (X_{k+1} - X_k) (Y_{k+1} + Y_k)$$

where  $X$  is the percentage cumulative frequency of households and  $Y$  is the percentage cumulative frequency of household income, with  $X$  and  $Y$  ordered from lowest to highest values by the quantiles  $k$  (Panda, 2008).

## Results and Discussion

Participation in microfinance programs was observed to have a statistically significant effect on household income. The household income in the target group

was found to be 26.4% higher than in the control group<sup>5</sup> (the difference was statistically significant at 1% by z-test). This result is consistent with the findings of Kumari and Rao (2001) and Dahiya et al. (2001). Similar results (positive impact on household income by microfinance programmes) were obtained in previous studies (SIDBI, 2008; Mishra et al., 2001; Panda, 2009b, for the state of Orissa). The positive effect of group-based microfinance interventions on household income has been previously observed not only for India but also for other developing countries (Mourji, 2000; Weiss and Montgomery, 2004).

The household income in the target group showed less variation than that in the control group, as is evident from the coefficients of variation presented in parentheses in Table 1.

**Table 1: Comparison of household income between target and control group**

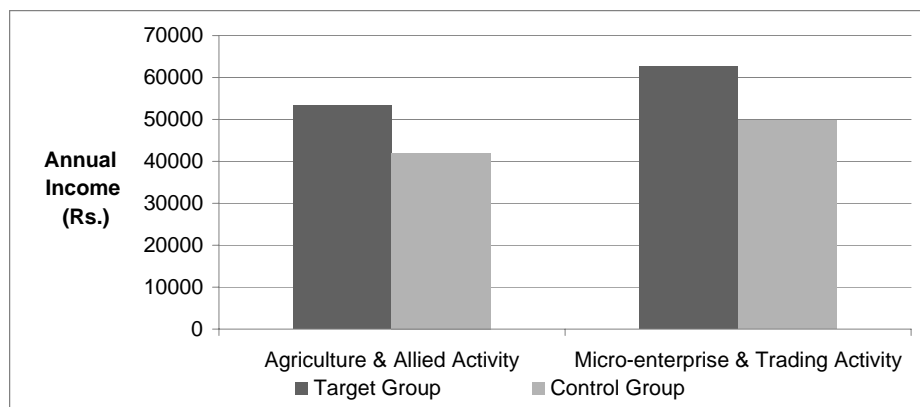
Occupation	Number of observations in each group	Average annual income per households (rupees)		Percentage difference over control group	z -value
		Target group	Control group		
Total sample	400	58,015 (28.7)	45,887 (35.9)	26.4***	10.35
Agriculture & allied activity	200	53,368 (30.5)	42,006 (38.7)	27.0***	6.99
Micro-enterprise & trading activities	200	62,661 (25.2)	49,767 (31.8)	25.9***	8.16

\*\*\* Significant at 1 per cent level.

Figures in parentheses represent the coefficient of variation.

- 5 Similar results emerged on the regional level in the four districts selected for analysis. The strongest impact of microfinance programs on household income was observed in the western region, while the least impact was found in central region. In all the four regions, the annual household income in the target group was significantly higher than in the control group (by 32%, 26%, 25%, and 23% in the western, eastern, coastal, and central region respectively). The coefficient of variation in the annual household income was lower for the target group than for the control group in all the four regions.

**Figure 2: Annual household income in the target and control group by occupational activity**



A significant impact of participation in microfinance programs was observed (for each of the two occupational patterns present in the sample – agriculture & allied activity and micro-enterprise & trading activity (Table 1, Figure 2). The income achieved by the households in the target group was 27.0% higher than the control group income for agriculture & allied activity (statistically significant) and 25.9% higher than for the micro-enterprise & trading activity (statistically significant). This result could be associated with a higher frequency of credit use in the former occupational pattern, as reported by Koul and Mohan (2009). Household income in the target group showed less variability (as measured by the coefficient of variation) than that in the control group for both occupational patterns (Table 1). Overall, the household income in the agriculture & allied activity group was found to be lower than in the micro-enterprise & trading activity group. This occupation effect was observed irrespective of the participation in microfinance programs (Table 2, Figure 2).

Inequality in household-income distribution in the target group and the control group was analyzed using the Gini coefficient (Table 3) and the Lorenz curve (Figure 3). The Gini coefficient of the target group was lower than that of the control group (0.15 and 0.20 respectively), suggesting greater equality in the distribution of household income in the target group. However, the differences in the Gini coefficient between the target and the control group were slight and the



**Table 2: Comparison of household income between agriculture & allied activity and micro-enterprise & trading activity in target and control group**

Study group	Micro-enterprise & trading activity n = 200	Agriculture & allied activity n = 200	Percentage difference over agriculture & allied activity
Target group	62,661	53,368	17.41**
Control group	49,767	42,006	18.47**

\*\* Significant at 5 per cent level.

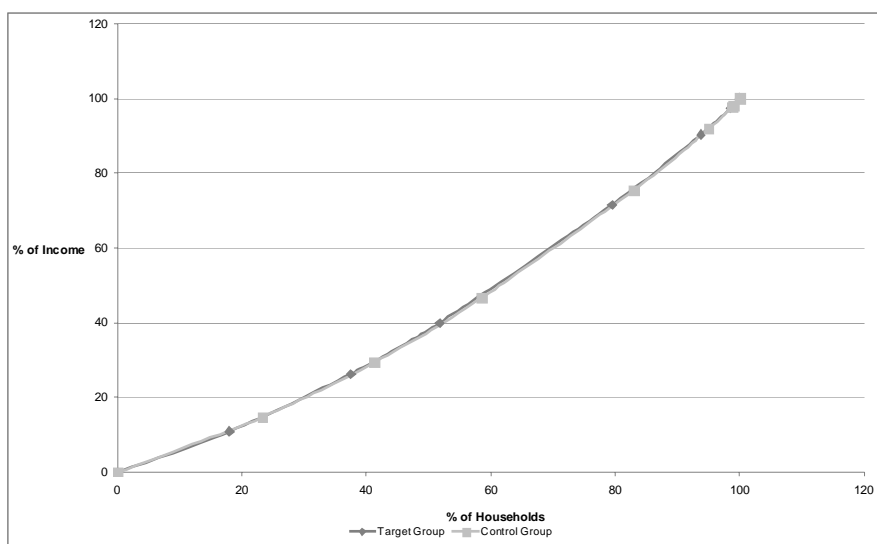
Lorenz curve of the target group practically overlapped that of the control group (Figure 3). This finding points to a weak (though positive) impact of the microfinance interventions on producing more equality in income distribution among the beneficiary households.<sup>6</sup> The result is consistent with the findings of Panda (2008). The suggestion of greater equality in income distribution due to microfinance interventions is observed in the Gini coefficients of both occupational activity groups (Table 3).

**Table 3. Gini coefficient of annual income distribution for target and control groups by occupational activity**

Study group	Number of observations in each group	Sample Gini coefficient	
		Target group	Control group
Total sample	400	0.15	0.20
Agriculture & allied activity	200	0.16	0.21
Micro-enterprise & trading activity	200	0.13	0.18

6 The Gini coefficient was found to be lower for the target group than for the control group in all the four regions of the state of Orissa (0.10 and 0.16 respectively in the coastal region; 0.15 and 0.20 respectively in the western and the central region; 0.14 and 0.17 in the coastal region). The microfinance interventions may have contributed to greater equality of income distribution, although the effect may not have been statistically significant.

**Figure 3: Lorenz curves for income distribution in target and control groups**



The univariate z-test results presented above were strengthened by a multiple regression analysis, with annual household income (in rupees) as the dependent variable. Four explanatory variables were used in the regression: (i) participation in a group-based microfinance program (a binary 1-0 variable), (ii) number of literates in the household, (iii) number of family members, and (iv) the value of the assets in the household (in rupees). The regression was run for the entire sample (800 observations) and also for each occupational activity separately (400 observations for each activity category).

The multiple regression estimates are presented in Table 4. The participation in microfinance programs is seen to have a positive effect on the annual household income for the total sample and for each activity group separately – agriculture & allied activity and micro-enterprise & trading activity. This is evident from the highly significant positive coefficient of the corresponding explanatory variable in line 2 of Table 4. Participation in microfinance programs was one of the factors contributing to higher household income and thus leading to poverty alleviation. Both the literacy status and the value of assets (endogenous variables) controlled by the household also significantly determine the household income.

**Table 4. Multiple regression results using annual household income (in rupees) as the dependent variable**

	Predictors	Total sample (n=800)		Agriculture & allied activity (n=400)		Micro-enterprise & trading activity (n=400)	
		coefficient	t- ratio	coefficient	t- ratio	coefficient	t- ratio
1	Constant	25200.4***	8.40	27049.2***	5.92	29288.4***	8.88
2	Participation in group- based microfinance program (binary 1-0 variable)	9760.8***	8.12	1349.5***	5.59	5547.2***	7.72
3	Number of literate	2627.7***	4.25	5259.9***	6.82	3321.3***	7.23
4	Value of assets (rupees)	0.02953***	7.07	0.02928***	5.12	0.06388***	6.43
5	Number of family members	758.1	1.50	557.5	0.89	726.5**	1.89
	R-square	0.82		0.84		0.93	

\*\*\*Significant at 1% level, \*\*Significant at 5% level

## Conclusions

The present study established the existence of a statistically significant positive effect of group-based microfinance interventions on the income of beneficiary households. The income in the target group of households participating in microfinance programs was on average 26.4% higher than the household income in the control group.

Group-based microfinance interventions led to an increase in household income under both occupational patterns – agriculture & allied activity and micro-enterprise & trading activity. The impact on household income was found to be higher for the agriculture & allied activity than the micro-enterprise & trading

activity. There were also regional differences in the impact of microfinance programs: the highest increase in annual household income due to microfinance interventions was observed in the western region of the state of Orissa, followed by the eastern region, the coastal region, and the central region in this order.

Under the Indian group-based microfinance programs the beneficiaries not only receive production and consumption loans: they also participate in business development training for their occupational activities (Panda, 2009a). The achievement of higher household income in the target group thus could be due to the combined effect of production loans and capacity building programs for production and business enhancement. The observed differential effect of microfinance interventions for different occupational patterns was probably due to differences in the individual business and farming capabilities of the microfinance beneficiaries in the two activity categories.

The present study found strong evidence of income enhancement in households participating in microfinance programs, but the microfinance interventions did not have a significant impact on the equality of income distribution. The donors and policy makers should therefore place greater emphasis on the equality of income distribution in the design of microfinance programs, as otherwise the effect of higher income combined with unchanged inequality of income distribution would create distinct income classes among the beneficiaries. Regional differences in the impact of microfinance programs on household income were observed in this study, and policy makers and donors should ensure equal application of microfinance programs across all regions.

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