

## **IMPACT OF MICROFINANCE ON FOOD SECURITY: SOME EVIDENCES FROM THE DISTRICT OF BANKURA IN WEST BENGAL**

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### **ABSTRACT**

*Poverty is the root cause of food insecurity of a country in a normal period of time with a stable economic situation. Microfinance can be expected to eliminate the poverty from the society through the financial assistance to the financially excluded section of the community. It is likely to improve the food security status of the deprived people. In our study, the households' required calorie obtained from the consumption basket and compared with the requirement of calories at household level medically (Harris-Benedict, 1918). With this end in view, we have collected data from Bankura in the district of West Bengal. Our objective in this paper is to look into the impact of different socio-economic-demographic factors along with microfinance on food security. This empirical study shows that with the access to micro-credit the households do have food security in the District of Bankura in West Bengal.*

**KEYWORDS:** Household, Calorie, Microfinance, Empirical, Food Security.

### **Introduction**

Microfinance is often defined as financial services for poor and low-income strata of the societies offered by different types of service providers. In practice, the term is often used more narrowly to refer to loans and other services from providers which identify themselves as "microfinance institutions" (MFIs). These institutions commonly tend to use new methods developed over the last 30 years to deliver very small loans to unsalaried borrowers, taking little or no guarantee against repayment. These methods include group lending and liability, pre-loan savings requirements, gradually increasing loan sizes, and an implicit guarantee of ready access to future loans if present loans are repaid fully and promptly. More broadly, microfinance refers to a movement that targets a world in which low-income households have permanent access to a high quality and affordable financial services, offered by a range of retail providers. These are generally financing for generating income, building assets, securing consumption, and providing protection for vulnerable section of the society. These services include savings, credit, insurance, remittances, and payments. In other words microfinance typically refers to a range of financial services including credit, savings, insurance, money transfers, and other financial products provided by different service providers, targeted at poor and low-income people.

Microfinance beneficiaries are poor and low-income people who do not have access to other formal financial institutions. They are often self-employed and household-based entrepreneurs. The various "microenterprises" include small retail shops, street vending, artisanal manufacture etc. In rural areas, micro entrepreneurs often have small income-generating activities such as food processing and trade. Most of the microfinance beneficiaries are fall near the poverty line, both above and below. Most of the households belonging to the poorest section of the society including the needy are not traditional

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bank credit beneficiaries because they have no stable cash flows to repay loans. Women also often consist of the major beneficiaries of the microfinance facilities. Now-a-days economist and planners are of opinion that women's access to easy credit helps their family secure food for all. There are also so many evidences of self-dependent men/women due to opportunity of access to easy credit. More importantly, accessing credit to the male/female members of the households will lead to increase in availability of daily calorie within the households. Though increase in availability of daily calorie may not necessarily implying the exact food security situation for the family, but surely it reduces the calorie deprivation in the family.

Whereas, defining food insecurity is a controversial issue as FAO (1985) defined undernourishment as to the proportion of the population whose dietary energy consumption is less than a pre-defined threshold. This threshold is country specific and is evaluated in terms of the number of kilocalories required to conduct sedentary or light activities.

This definition is again refined in The State of Food Insecurity 2001: 'Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2002). Food security status can be measured from four directions; food availability, food accessibility, food utilization and stability'.

Food availability is achieved when sufficient quantities of food are consistently available to all people within a country. It is a function of the combination of domestic food stocks, commercial food imports, food aid and domestic food production.

Food access is secured when all individuals within a household or outside have adequate resources to obtain appropriate foods for a nutritious diet. Food access is defined by the aggregate availability of food, supplied through market at market prices that one can obtain with his available resources at hand. Further the access is determined by the ability of households to get food from their own production and stocks, from the market and from the other sources. Food access is also a function of the physical, societal and policy environment.

Food utilization in its best outcome requires a diet providing sufficient energy and essential nutrients with potable water and adequate sanitation. Food utilization reflected through the nutritional condition of an individual is determined by the quantity and quality of dietary intake, general child care and feeding practices along with health status and its causal factors. Poor infant care, inadequate access and inadequate character of health inspection and repairs are also major determinants of poor health and nutrition. Stability implies anticipation against vulnerability. Families/countries may have sufficient food to feed its all members at present but in future for any sudden shock it may suffer from food deficiencies. So, stability means smooth consumption along with future coping strategy.

India has achieved self-sufficiency in food production after the green revolution. In respect of food insecurity prevailing in Indian economy availability is no longer the major cause. The problem lies in accessibility of food. Due to massive unemployment and low income among the population they have lower purchasing power that leads to lower availability of consumable calorie. As a result a portion of population in India is still suffering from calorie deficiencies.

Though, the government of India has taken various initiatives to increase the accessibility of food among its hunger population. Among them the prime two initiatives are NREGA and TPDS. But, these are not sufficient to increase accessibility at its required level. In that case from last two or three decades there is another private initiatives popularly known as micro finance institution played a significant role to increase purchasing power of the remote people. MFIs are providing credit to remote people that will lead to increasing their purchasing power as well as earning opportunity by starting new small business, street vending, producing handicrafts etc.

In this study we are trying to look into the role of microcredit along with NREGA, TPDS and all other economic and social variables to enhance consumption expenditure and calorie deprivation within the family in Bankura, a district of West Bengal in India.

The rest of the paper has been arranged as follows. We have discussed about some literature which deal with the issues of food security and microfinance and its various implication on different sectors of the economy. In section 3 we have set our objectives. Section 4 analyzes our methodology and database. Empirical findings are reported in section 5. Section 6 concludes these papers along with recommendations from our findings.

### Review of Existing Literature

**M.S. Sriram and Rajesh S.Upadhyayula (2002)** have discussed about the growth and transformation of microfinance originations in India. And they especially have discussed about the factors size, diversity, sustainability, focus and taxation on which the growth and transformation are depends. After analyzing these factors they reach in conclusion that there is no ideal path for spin-off. And suggest that regulatory changes are needed to allow microfinance organization to grow up.

**Alok Mishra (2006)** theoretically discusses about the factors which are related with the evolution of microfinance. And tried to find the missing link of impact assessment of microfinance in Indian economic context, as he thought that for reducing poverty under the MDG is only possible if microfinance implements properly to the needy section of the society.

**Gulsan Ara Parvin (2012)** examined the impact of climate change on the food security of rural poor women and what Microfinance Institutions (MFIs) are doing to enhance their food security in the context of climate change. To meet their goal they have conducted household questionnaire survey, survey of Microfinance Institution and Focused Group Discussion (FGD). According to their findings after facing two devastating cyclone (SIDR & Aila) on coastal Bangladesh, the microfinance institution provide cheapest loan even at 4% interest rate to restore the livelihood of victims.

**Shimelles Tenaw and K.M. Zahidul Islam (2009)** assess the structure of the rural financial services and the role of financial institutions in improving the rural population's livelihoods in Bangladesh and Ethiopia. They highlighted the contributions of micro credit and cooperatives to combat poverty and its significant contribution to agricultural productivity and suggested accordingly.

**Adhikary, M. and K. Sarkar (2012)** analyzed the relative status of the women's empowerment for the women participating in microfinance in the 25 major states of India. One of their serious findings is that women's empowerment to spend money does not lead to any women's freedom in respect of free movement alone outside home. For their purpose they have analyzed (NFHS-3) India (2005-2006) data for major 26 states by applying log-log model.

**M. Adhikary and K. Sarkar (2012)** tried to look into the food security status reflected in consumption profile among various categories of people, in terms of their monthly per capita expenditure (MPCE) on both food and non-food items with the help of NSSO 61st round data. They have also tested the Engels law, and it has been found that empirically the law does not hold true for their dataset. Contrasted with the situation of other caste people the food security status of the socially excluded people has been found to be placed at all-time low level. According to them micro finance provision for those socially excluded people can be a very effective instrument to achieve food security from the demand side.

### Methodology

Food security has been measured by calorie intake of any individual. Measuring availability of calorie in various food items is one of the most controversial jobs. Availability of calorie in different food items varies due to washing, cutting and processing. And also there is a gradation of different food items that have been purchased by different income groups. Here, in this paper to obtain calories present in different food items we have followed the table of food nutrition value of B.Srilakshmi (2008). The nutritional value of different food items may change to some extent due to gradation of different food items and due to not following the proper cooking procedure; but all these effects may be thought to be negligible. So, we have calculated the presence of calorie only in raw food items of monthly purchased food basket.

Our monthly available calories of the households are being estimated following Harris-Benedict measure (1918). To express it into daily households' available calorie we have divided the value estimated from the following expression by 30 days.

$$\text{Monthly Available Calorie} = \text{Cereals} \times 10 \times 345.5 + \text{Pulses} \times 10 \times 335 + \text{Mustard seeds} \times 10 \times 541 + \text{Sugar} \times 10 \times 398 \\ + \text{Fish} \times 10 \times 104 + \text{Chicken} \times 10 \times 239 + \text{Mutton} \times 10 \times 194 + \text{Vegetables} \times 10 \times 203$$

Our next tusk is to obtain the actual calorie requirement at the household level. Actual calorie requirement for each individual, male or female, has been obtained on the basis of formula proposed by Harris-Benedict (1918). Hence, as the calorie requirement for each member of the family is obtained, we sum up them to get family level calorie requirement per day.

The proposed Harris-Benedict (1918) equations for estimating calories are as follows:

For Men

$$REE/BMR = 66.5 + 13.75(\text{Weight}) + 5(\text{Height}) - 6.78(\text{Age})$$

And for Women

$$REE/BMR = 655.0955 + 9.5634(\text{Weight}) + 1.8496(\text{Height}) - 4.6756(\text{Age})$$

Where, weight has been measured in kilogram, height has been measured in centimeter and age has been measured in number of years. One should note that REE stands for Resting Energy Expenditure and BMR for Basal Metabolic Rate.

Given the standard calorie requirement and actual calorie consumption, we can confirm the number of families with having calorie deprivation/calorie surplus or in proxy term we can say food insecure/secure families. That is, the families with the ratio of actual calorie consumed/availability to the calorie requirement of the families are greater than equals to 100 are said to be food secure, otherwise insecure. Therefore, we categorize the families into two groups – one food secure and the other food insecure. Therefore, food security is the dummy variable that takes the value either 1 or 0. Thus, the dummy variable will take the value 1 if the families have the food security, otherwise 0.

After determining the food security status among the families whether a family is food secure or insecure according to our criteria, we go for analyzing the various factors which may influence the food security status of the families.

In our study we want to explain the consumption expenditure and the ratio of calorie availability to the requirement. That may reflect the food insecurity situation of our study area. If the ratio of availability to requirement is greater than 100 then the household may be considered as food secure otherwise food insecure. But, for the time being without going into dichotomies the households into food secure and insecure, let us try to explain the households' consumption expenditure.

For analyzing the reasons behind a household's calorie deprivation we need the help of logistic regression, because, in our case the dependent variable is binary. Reasons for positive calorie deprivation or food security are estimated by various methods. The most common is a binary response model including logit and probit methods.

Now, given the standard calorie requirement and actual calorie consumed, we can confirm the number of families who are food secure/insecure. That is, the families with actual calorie consumed above and over the standard calorie requirement of the families with food security, otherwise insecure. Therefore, we categorize the families into two groups – one food secure and the other food insecure. Therefore, food security is the dummy variable that takes the value either 1 or 0. Thus, the dummy variable will take the value 1 if the families have the food security, otherwise 0.

Food security is likely to be affected by a set of socio-economic-demographic factors. Economic factor includes the income of the family. Apart from income, we have emphasized mostly on the demographic factors like female-male ratio, family size and dependency ratio. The sociological factors of food security are years of education of the household head, religion and caste. Here also we have considered various basic amenities including microcredit facilities, ownership of the house and having job card and ration card.

From the above discussion, we can write that:

$$\text{Food Security} = f(\text{FAMINC}, \text{FEMLR}, \text{FAMSIZE}, \text{DPDNCR}, \text{EDCATION}, \text{RELIGION}, \text{CASTE}, \text{HOWNER}, \text{JOB CARD}, \text{RATIONCARD}, \text{and AMICROCREDIT})$$

We can use the logit model where the log of odds ratio. Thus,  $\ln\left(\frac{p_i}{1-p_i}\right)$  which is simply the logit will be regressed on the determinants of food security. Thus we have

$$\ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 \text{FAMINC} + \beta_2 \text{FEMLR} + \beta_3 \text{FAMSIZE} + \beta_4 \text{DPDNCR} + \beta_5 \text{EDCATION} + \beta_6 \text{RELIGION} + \beta_7 \text{CASTE} + \beta_8 \text{HOWNER} + \beta_9 \text{JOB CARD} + \beta_{10} \text{RATIONCARD} + \beta_{11} \text{AMICROCREDIT} + u_i$$

This logit will be estimated using the maximum likelihood technique.

Finally, we shall calculate the marginal effects of all the explanatory variables on the probability of household being food secure. In other words, we shall look at how the probability of being food secure for the sample households will change due to change in the income, family size, sex of the household head, years of education of the household head, combination of sex and education, religion and caste. Therefore, the marginal effects of change in the determinant of food security on the probability of being food security will be obtained as follows.

$$\frac{d\hat{p}_i}{dx_j} = \frac{d\hat{p}_i}{dz} \frac{dz}{dx_j} = \frac{d}{dz} \left( \frac{e^z}{1+e^z} \right) \frac{dz}{dx} = \frac{e^z}{(1+e^z)^2} \beta_j = \beta_j \hat{p}_i (1-\hat{p}_i)$$

where  $X_j$  is the j-th explanatory variable the marginal effect of which on the probability of food security for the i-th household will be calculated

The hypotheses we want to test are presented below.

- Hypothesis\_1** : Family income is likely to increase the food security. That is, we want to test the null hypothesis  $H_0 : \beta_1 = 0$  against the alternative  $H_1 : \beta_1 > 0$ .
- Hypothesis\_2** : There is a positive relationship between female-male ratio and food security. That is, our null hypothesis is  $H_0 : \beta_2 = 0$  to be tested against the alternative  $H_1 : \beta_2 > 0$ .
- Hypothesis\_3** : There is an inverse relationship between Family size and food security. That is, our null hypothesis is  $H_0 : \beta_3 = 0$  to be tested against the alternative  $H_1 : \beta_3 < 0$ .
- Hypothesis\_4** : There is a negative relationship between dependency ratio and food security. That is, our null hypothesis is  $H_0 : \beta_4 = 0$  to be tested against the alternative  $H_1 : \beta_4 < 0$ .
- Hypothesis\_5** : Education can enhance the earning opportunity which is likely to assure Food security. That is, we want to test the null hypothesis  $H_0 : \beta_5 = 0$  against the alternative  $H_1 : \beta_5 > 0$ .
- Hypothesis\_6** : People from Hindu community may be in a better situation to have Food security. That is, we want to test the null hypothesis  $H_0 : \beta_6 = 0$  against the alternative  $H_1 : \beta_6 > 0$ .
- Hypothesis\_7** : General caste families are able to secure their Food. That is, we want to test the null hypothesis  $H_0 : \beta_7 = 0$  against the alternative  $H_1 : \beta_7 > 0$ .
- Hypothesis\_8** : Families having own house are expected to ensure their Food security. That is, we want to test the null hypothesis  $H_0 : \beta_8 = 0$  against the alternative  $H_1 : \beta_8 > 0$ .
- Hypothesis\_9** : Job card holding families are likely to have their Food security. That is, we want to test the null hypothesis  $H_0 : \beta_9 = 0$  against the alternative  $H_1 : \beta_9 > 0$ .
- Hypothesis\_10** : Families holding Ration card are expected to have their security. That is, we want to test the null hypothesis  $H_0 : \beta_{10} = 0$  against the alternative  $H_1 : \beta_{10} > 0$ .
- Hypothesis\_11** : Access to micro credit to the families is likely to ensure their Food security. That is, we want to test the null hypothesis  $H_0 : \beta_{11} = 0$  against the alternative  $H_1 : \beta_{11} > 0$ .

For our purpose, we have collected data from the various places of Bankura in West Bengal, India. After selecting Bankura as our study area, we have purposively selected four Blocks. Among these four Blocks two are from the Panchayat areas (Onda and Raipur) and other two from the Municipalities (Bankura-1 and Bishnupur). From these four Blocks we have further purposively selected 8-10 villages/wards from each Block. And from each village/ward we have selected 8-10 families randomly and collected data on their Demographic, Economic, Social, Family and Personal information through direct interviewing method. We have collected two sorts of data, one on the household's monthly total purchase of various foods items and the other on the anthropometric information.

## Discussion

Table-1 shows the descriptive summary of the quantitative variables of our study area. The total number of family we have visited is 303. The average daily availability of calorie per family is 8315 Kcal, whereas the minimum availability of calorie for at least two members of a family is 1875 Kcal that is almost equal to the requirement for a single person only as per any standard requirement norms. The average monthly income for the families is Rs-6823/-, with the minimum of Rs-1875/- and maximum of Rs-42,855/-. The average female-male ratio is 1, that is, 1:1 family. Where, minimum ratio is .25 that is female-male ratio is 1:4 and the maximum is 5 indicating ratio in the form 5:1. The mean family size is 4 in absolute number with the minimum of 2 members and maximum of 11 members. The average dependency ratio is .65 where minimum is .25 and maximum is .85. And the mean years of schooling of the head of the households is 2 years with minimum of 1 years schooling and maximum of 5 years schooling.

**Table 1: Summary Statistics of Quantitative Variables from the District of Bankura**

. summarize HHCA FAMINC CONSEXP FEMLR FAMSIZE DPDNCR EDUCATION						
Variable	Obs	Mean	Std. Dev.	Min	Max	
HHCA	303	8314.647	2425.123	2635.083	18237	
FAMINC	303	6823.023	4605.565	1875	42855.8	
CONSEXP	303	4572.868	2226.571	225	12100	
FEMLR	303	1.066517	.8537585	.25	5	
FAMSIZE	303	4.485149	1.411499	2	11	
DPDNCR	303	.649037	.1367309	.25	.8571429	
EDUCATION	303	1.943894	1.016497	1	5	

**Table 2: Summary Statistics of Qualitative Variables from the District of Bankura**

. summarize CADEPRE RELIGION CASTE HOWNER JOBCARD RATIONCARD AMICROCREDIT						
Variable	Obs	Mean	Std. Dev.	Min	Max	
CADEPRE	303	.4917492	.5007589	0	1	
RELIGION	303	.8778878	.327957	0	1	
CASTE	303	.30033	.4591598	0	1	
HOWNER	303	.6270627	.4843856	0	1	
JOBCARD	303	.3366337	.4733401	0	1	
RATIONCARD	303	.7062706	.4562229	0	1	
AMICROCREDIT	303	.4323432	.4962209	0	1	

Table 2 shows the summary statistics of our categorical variable. In our study area 49% of the populations are suffering from calorie deprivation whereas 51% of the populations are found as food secure according to our norm. Our study area is Hindu dominating area; almost 88% of populations are reported as Hindu community. Only 30% of the populations are belongs to the general caste families and remaining 70% are from non-general categories. 63% households are living in their own house and rests are living on rented house. Having job card under the NREGA scheme is found to be as 34% of the population approximately. Households are entitled to subsidized food aid under TPDS or having ration card is 70%. And 43% of the populations having access to microcredit under various micro finance institutions.

The table 3 gives the logit maximum likelihood estimation of households' calorie deprivation. Each slope coefficient in this equation a partial slope coefficient and measures the change in the estimated logit for a unit changes in the value of the given regressor (holding other regressor constant).

The parameter estimate for family income is positive with numerical value of 0.0016 and the coefficient is statistically significant at 1% level. This means that with other variables held constant, that if income of the households increases by a unit, on an average the estimated logit increases by about 0.0016 units. This implies that the probability of food security is likely to increase with family income.

Female-male ratio parameter is found to have negative impact on calorie deprivation but it is statistically insignificant.

The parameter estimate for family size is found to have positive impact on our estimated logit of calorie deprivation but it is also statistically insignificant.

The parameter estimates for dependency ratio is negative but insignificant.

Education has a positive sign but also insignificant.

In the logit regression of food security on its determinants shows that the coefficient Religion dummy is found to be negative and it is statistically significant at 9.6 percent level of significance. This implies that households who belong to non-Hindu categories are likely to have more surplus calorie in comparison to Hindu households.

Caste dummy is found to have positive effect but its effect is not significant.

The coefficient of job card dummy in the logit regression is found to be positive and statistically significant at 3.6% level of significance. This implies that those households who have job card are likely to have more food security than households without job card. A more meaningful interpretation of this job card is in terms of odds, which can be obtained by taking antilog of the slope coefficient. Thus, the antilog of the job card coefficient of 1.926 is 6.86. This suggests that the household who have the job cards are 6.86 times as likely to have daily calorie surplus in contrast to the households who don't have job card, other things remaining the same. Simply speaking, the probability of food security increases with the holding of job cards.

The ration card dummy in the logit regression of food security is also found to be positive and highly significant. This implies that there is a positive relation between ration card and calorie surplus. It can be explained in terms of odds as that the household who have the ration cards are 4.49 times as likely to have daily calorie surplus as the household who don't have ration card, other things remaining the same. In other words, the probability of food security improves with holding of ration cards.

Finally consider the effect of access to microcredit on food security. The coefficient of access to microcredit in our logit model of food security is found to be positive and statistically significant at 1% level of significance. Since, access to microcredit is also a dummy variable and found to be positive this implies that there is a positive relation between microcredit opportunity and calorie surplus. Explained in terms of odds ratio, we can infer that the household who have the opportunity of getting credit from micro finance institutions are 7.24 times as likely to have daily calorie surplus as the household who don't have that opportunity, other things remaining the same. This implies that the access to microcredit brings food security to courtyard of those who do have fortunately access to microcredit.

Although some of the variables in our estimated logit equation are not individually statistically significant, together all the regressors have a significant impact on the households daily calorie deprivation, as the LR statistics is 356.41 with a p value of about 0.000, which is very small.

The table 4 gives the marginal change in probability of calorie deprivation. The marginal or partial change in probability is important as it gives the change in probability caused due to a unit change in explanatory variable.

The coefficient of income is 0.00005 suggest that households with higher income have a .005% higher probability of having negative calorie deprivation. If the distribution of population goes up by 1 percentage point in favor of non-Hindu families, the probability of having negative calorie deprivation goes up by about 5 percent.

The coefficient of house ownership suggests that for 1 percentage point increase in house ownership number, the probability of having negative calorie deprivation goes up by about 5 percent.

Similarly, if distribution of job card goes up by 1 percentage point, the probability of having availability of daily calorie to that of requirement for the families goes up by about 5 percent. Similarly, if distribution of ration card goes up by 1 percentage point, the probability of having availability of daily calorie to that of requirement will also goes up by about 7 percent.





Having own house of any kind Kaccha/ Paaka is the status symbol of households socio-economic condition. Definitely, having own house families are richer than the families of living on rented house. In that respect own house households are suffering lesser calorie deprivation (if any) than those of rented households.

Having job card of one or two members of the families implies that the households will have access to secured income opportunity or additional income opportunity for at least 100 days of a year. So, the secured 100 or more days' income opportunity with primary occupation of the households will definitely help them purchase the necessary consumption goods as well as ensure calorie security which may be equivalently considered, in other words, as food security. Similarly, having ration card for all members or some members of the family will give them access to the subsidies from the food program of the government under TPDS. Accessing to food at the cheaper rate will benefit the households in two ways. First, it increases the monthly food grain availability for the family. And second, it releases the income of the households to buy other necessary consumption goods as rice, wheat, sugar and kerosin oil (available through ration system) are not to be purchased whole amount from the open market. And finally, access to micro credit is just like an earning opportunity. Households with credit facilities may start a new small business or home based handicraft works as it is evident from various studies. Increasing/adopting new income opportunity will lead to more income to consume and calorie security as required. In our study in the district of Bankura in West Bengal, it is also evident that the households with having micro credit facilities are able to spend more on consumption and their calorie deprivation is lesser than the households not having micro credit facilities.

Therefore, the necessary condition for removing poverty or food insecurity is tantamount to increasing income opportunity. And, though not panacea, micro finance can be prescribed as one of the best ways of creating income opportunity after job card, if it is provided and guided in the right direction.

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