Does Micro Health Insurance Raise the Health Awareness and Health Status of Microcredit Members in the Rural Areas in Bangladesh?

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Abstract: This paper examines the impact of MHI on the health awareness and health status of microcredit members in the rural areas in Bangladesh. The paper is based on primary data collected from three areas of Grameen Bank: (I) where MHI has been operated for at least five years, (II) where MHI has been placed recently, (III) where MHI has not yet been placed, but will be placed soon; and two areas of the Society for Social Services (SSS): (I) an area with MHI and (II) an area with no MHI. A total of 329 female microentrepreneurs were interviewed from Grameen Bank areas and 136 from SSS. The overall response rate was 74 percent. Health awareness was measured by constructing some indices on the basis of knowledge about some general health issues (diarrhoea, pneumonia, and vitamin A) and maternal health. Health status was measured based on activities of daily living (ADL) and self-reported health on a 5-point scale asking how good your health was compared to people of your own age. Appropriate regression techniques were applied to analyze health status and health awareness using a broad set of conditioning variables and focusing on the role of MHI. The regression results for the Grameen Bank confirm that MHI had a significant positive impact on health awareness as well as health status. But the results were not as clear in the case of SSS.

1. Introduction

Microcredit is a collateral free small amount of loan, which is provided mainly to the rural poor, especially women. The basic premise of the microcredit movement is the creation of new microenterprises and/or scaling up existing microenterprises for the economic advancement of the poor through giving their access to financial services (i.e., credit and savings services). Microcredit programs were developed in Bangladesh in response to the failure of the traditional financial market as well as the targeted credit programs of the government-owed financial institutions[3] for meeting the credit needs of the rural poor. Micro Health Insurance (MHI), a risk pooling and card based prepaid insurance mechanism, was added to microcredit program as a complement in Bangladesh among others by Grameen Bank in late 1990s for protecting its clients from health risk in response to the absence of traditional health insurance in the low income market and failure of government health centers to serve the poor.

There is empirical evidence that a microcredit program alone can yield some outcomes (e.g., poverty reduction, women empowerment, improvement of educational status) for its

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[3] Microcredit programs have been replicated in other developing countries due to the similar reasons, i.e., market failure and government failure.

participants[4]. Theoretically, these outcomes are generated through a chain of causal relationship between program inputs (credit and saving services), effects (e.g., employment generation, higher production), outputs (e.g., increased income, consumption and nutrition), and primary outcomes (e.g., increased saving and investment, improvement of health and nutritional status). The supplementation of MHI with microcredit can intensify its impacts in all stages through improving health and health economic status of the households (i.e., low level of disease, high productivity, low level of income loss, low level of health expenditure) yielded through a chain of hypothetical causal relationship between program inputs (e.g., healthcare delivery and health promotion services), effects (e.g., increased health awareness, improved health practice, and improved health seeking behavior), and output (e.g., improved health, nutrition as well as vaccination status).

To date there is little empirical evidence on the added effects of MHI in Bangladesh. Mosley (2003) examined the added effects of a piloted MHI scheme of BRAC on some issues, such as asset holding, household expenditure, current saving, educational expenditure, and education level. But the evidence was not conclusive in many cases as the study was conducted on a very pre-matured program using a small sample. Moreover, the study had severe methodological shortcomings as it did not use proper methods for tackling selection bias, program placement bias, spill over effects and open access effects.

This paper has concentrated on some of the process outcomes[5]. This paper examines whether an addition of a MHI scheme to microcredit as a complement increases health awareness and health status of the participating households. The remaining of this paper is organized in the following sections. Section 2 describes the methodological issues, Section 3 presents some background statistics, Section 4 and Section 5 concentrate on health awareness and health status respectively, and Section 6 provides the concluding remark.

[4] As the recognition in the contribution of poverty reduction M. Yunus (the pioneer of microcredit movement in Bangladesh) and Grameen Bank (the pioneering organization of microcredit in Bangladesh) have been awarded Nobel Peace Prize in 2006.

[5] The whole range of issues is being addressed by S A Hamid in his PhD thesis.

2. Methodology

2.1. Method of primary data collection

We tried to find secondary data, but it was not found because there was hardly any study regarding the issue addressed in this paper as mentioned earlier. The data used by Mosley (2003) does not contain sufficient information to deal with the issue. Thus, we needed to collect primary data. But it was unlikely to collect panel data or repeated cross section data because of time constraint. Hence, we moved toward cross section data from primary source.

The initial plan for this research was to collect data from Grameen Bank and BRAC. This is because they are the largest two Micro Finance Institutions (MFIs) in Bangladesh, which added MHI to microcredit as a complement in some of their operating areas. We got access in Grameen Bank, but not in BRAC. Then it was tried to get the approval of other organizations which were also added MHI to microcredit as a complement. Society for Social Services (SSS) was found suitable to the nature of the issues to be verified in this research among the organizations provided the approval to use their operating areas. Thus, fieldwork was conducted in Grameen Bank and SSS.

GB branches were stratified in its three distinct types: (I) GB branches with at least five year experience of MHI; (II) GB branches with one or two year experience of MHI; and (III) GB branches with no MHI. Note that in February 2006, Grameen Bank had 1861 branches (Yunus, 2006). Till to December 2005, MHI scheme was being operated in its 30 branches of which 14 branches came under MHI scheme at least five years ago and 2 branches within two years.

In the case of SSS its branches were divided only into two groups: (I) SSS branches with MHI scheme and (II) SSS branches with no MHI. Note that SSS started its health program in 1998 by its own funding in the limited scope. Under this arrangement SSS currently runs 10 health sub-centers. It placed its Mother and Child Health (MCH) program in some of its existing clinics in 2004. This was conducted on its MCH area because MCH program is more extensive than its original program.

A multistage sampling technique was applied. Three GB branches, i.e., Madhabpur, Pakutia and Joymontop, were purposively selected for area I, area II, and area III (as distinguished above) respectively. Madhabpur[6] and Joymontop are located at Singair Upzilla (sub-district) of Manikgonj district and Pakutia is at Nagarpor upazilla of Tangail district. Note that Manikgonj and Tangail are adjacent districts and Nagorpor is closer to Signair. It is also worthwhile to mention that GB has the plan to place MHI soon at Joymontop. In the case of SSS, Kashil and Habla unions were purposively selected for area I and area II respectively from Basail upzilla of Tangail District.

A list of all the villages which holding at least one female centre of GB (SSS) was prepared for each selected GB area as well as SSS area separately. Note that a GB (SSS) centre contains 40-50 microcredit members. In the second stage, 2 villages of each category of each area of the both organizations were selected randomly. Thus, a total of 6 (i.e., 3x2) villages were selected from Grameen Bank operating areas and 4 (i.e., 2x2) villages from SSS operating areas. Hence, a total of 10 (6 from GB and 4 from SSS) villages were selected.

A list of current GB (SSS) microcredit member households was made in each selected GB (SSS) village. This listing was accomplished by using the information obtained from respective branch office of GB (SSS). Only the female microcredit member households were enlisted and interviewed because about 96 percent of the GB members and all the SSS members are female. It is worthwhile to mention that GB provides four types of loan – simple loan, housing loan, loan for struggling members (i.e., beggars) and education loan. The households which belong to the simple loan and struggling loan categories were included in the list. This is because these groups of borrowers normally use their borrowed money in the productive activities for their economic emancipation. Although SSS was supposed to provide loan by categorizing households into three groups: poorest of the poor (hardcore poor), poor, and marginal farmers, practically it provides loan without making any category.

[6] Madhabpur is located at Chanduhar union. Note that a union is the smallest administrative unit of the local government in Bangladesh.

It was attempted to interview all the eligible GB (SSS) member households of each sampled village in order to control for sample selection bias. But some of the GB (SSS) member households in each village could not be interviewed due to either absence of the key respondent (i.e., microentrprenuer) or unwillingness to take part in the interview[7]. Note that the recommendation of the Ethic Review Committee of the Department of Economics, University of Sheffield, was fully followed. Thus, respondents were neither pressurized nor offered motivation to take part in the interview. The overall response rate was 74 percent. A total of 465 households were surveyed of which 329 from GB (136, 85 and 108 from area I, II and III respectively) and 136 from SSS (70 and 66 from area I and II respectively).

The structured questionnaires were used to conduct the household survey. The questionnaires were finalized after incorporating all the feedbacks received from piloting, which was held twice. After putting necessary codes the data was directly entered into computer by using epi-6 software. The data was first transferred into SPSS data files and then transferred into Stata data files by using Stata Transfer Software 7 after cleaning and consistency check. Both SPSS and Stata software were used to analyze data.

2.2. Empirical methods

The outcomes of interest (i.e., health awareness, health status) were estimated conditioned on the household's participation in MHI. Following the model applied by Pitt and Khandker (1998) and Khandker and Faruqee (2003) the following quasi-reduced form of outcome equation[8] was considered.

$$y_{ij} = X_{ij} b_y + E_{ij} d + m_j^y + e_{ij}^y \qquad (1)$$

where y_{ij} is outcome of interest (e.g., health awareness) of household *i* in village *j*, E_{ij} is a binary variable that indicates the enrolment status in the MHI scheme (i.e., E_{ij} = 1, if the household has the option to enroll in MHI and enroll in it, = 0, if the household has the option,

[7] Double visit was held in the absent households. As there was harvesting season while the survey was conducting it was not possible to capture all the absent households because the respondents were outside home till night from early morning. As we had the female field investigators, they were not able to visit the absent households at night. It is also worthwhile to mention that harvesting was one of the main reasons for unwillingness to take part in the interview.

[8] Exact specification of the model will be designed as per the nature of outcome (i.e., whether the outcome is continuous or binary).

but does not enroll)[9], m_j^y is the unobserved determinants of y_{ij} that is fixed within a village, and e_{ij}^y, a nonsystematic error, refers unobserved determinants of y_{ij} that vary over households where $E(e_{ij}^y \mid X_{ij}, m_j^y) = 0$, and X_i is a vector of observed individual, household and community/village characteristics. The estimation of equation (1) may not provide the unbiased result (i.e., estimates of d, the coefficient of E_{ij}, may be biased) if there is endogeneity in participation as participation in MHI is voluntary in both organizations. The participation equation can be written as

$$E_{ij} = X_{ij} b_e + Z_{ij} f + m_j^e + e_{ij}^e \qquad (2)$$

where, Z_{ij} is a distinct set of household or village characteristics that affect only participation in the scheme (E_{ij}), but not outcome (y_{ij}) conditional on E_{ij}; m_j^e is unobserved determinants of E_{ij} that is fixed within a village and e_{ij}^e, a nonsystematic error, refers unobserved determinants of E_{ij} that vary over households where $E(e_{ij}^e \mid X_{ij}, Z_{ij}, m_j^e) = 0$. It is attempted to use instrumental variables to correct the endogeneity (if any).

As the non-enrolled households have the access to health centers run my MHI scheme and provision of health care (especially preventive health care) usually has huge externalities, the predicted impact to be found from equation (1) may not provide the true impact of the program even after correction of endogeneity. This is because the program effect in equation (1) may be severely underestimated if the externalities and open access effects are not taken into account with program effects. Thus, detecting the spill over effects (i.e., externalities and open access effects) the following reduced form model can be estimated

$$y_{ij} = X_{ij} b + P_{ij} g + m_j + e_{ij} \qquad \mathbf{(3)}$$

where, $P_{ij} = 1$, if the household lives in program village, but does not enroll and $P_{ij} = 0$, if the household lives in non-program village. If the coefficient of P_{ij} (i.e., estimator of g) is (significantly) different from zero, then it can be inferred that there are spill over effects of MHI on the non-participants in the program areas. Hence, the actual impact of MHI should be the

[9] Enrolment is defined here as whether the household is currently holding the insurance card.

sum of predicted impact found from the estimation of equation (1) and the predicted spill over effects found from the estimation of equation (3).

It is found from the sample drawn for this study that the participation rate in GB area where MHI has been operated for more than five years is 96 percent and it is 90 percent in SSS area. This rate is about 59 percent where GB placed MHI recently. The willingness to accept MHI scheme is found also very high where it has not been placed yet. This figure is found 98 percent in GB area and 97 percent in SSS area. As participation rate as well as willingness to participation rate in MHI is found very high the program effect can be measured simply by using a program dummy variable:

$$y_{ij} = X_{ij} b + PP_{ij} y + e_{ij} \quad (4)$$

$$y_{ij} = X_{ij} b + DP_{ij} l + e_{ij} \quad (5)$$

Where, $PP_{ij} = 1$, if MHI is in operation in village j, otherwise = 0; $DP_{ij} = 1$, if it was placed at least five years ago, otherwise = 0.

3. Background statistics

This section presents some statistics regarding the characteristics of the sampled areas, length of membership in microcredit and MHI, and socio-demographic characteristics of the microentrepreneurs (i.e., respondents). Microcredit program was placed in 1983 at GB area I and area III and in 1986 at area II. It was placed in 1994 at SSS area I and area II. MHI was placed in 1996 and 2004 at GB area I and area II respectively. At SSS area I it was placed in 2004[10]. The literacy rate was 38%, 40% and 46% at GB area I, area II and area III respectively and 47% and 56% in the SSS area I and II respectively. There are not such variations in other characteristics, such as general infrastructure (e.g., electricity connection, market place, and bank branch), educational infrastructure, general health infrastructure, and number of major NGOs working.

Variation is also found in the length of membership in MHI as well as microcredit in both GB and SSS areas. In the GB area I about 64 percent of the insured had at least five year experience

[10] MCH program was started in March 2004, but SSS was conducting a card based health program in limited scope since 1998

of MHI and in the GB area II 96 percent had one year experience in MHI. In the SSS area I, majority (60%) of the insured had two years experience of MHI. In GB area I about 66 percent of the microcredit members had ≥ 5 years experience of microcredit and in area II and area III 42 percent and 44 percent had ≥ 5 years experience respectively. In SSS area I, 70 percent had ≥ 5 years experience of microcredit and in area II 28 percent had ≥ 5 experience of microcredit.

Almost all the microentrepreneurs had their age between 17 and 64 years irrespective of the sample areas and study organizations. Most of them belonged to reproductive age (15-49) group. More than 90 percent of the microentrepreneurs were married in all the sampled areas in the both organization. Majority of the microentrepreneurs irrespective of the sample areas and study organizations had no formal education. But formal education rate was found higher among the microentrepreneurs of GB area II and SSS area II compared to other areas of GB and SSS. Majority of the microentrepreneurs in GB area II, area III and SSS area I had household based self-employment. About 44 percent and 47 percent of the microentrepreneurs had household based self-employment at GB area I and SSS area II respectively. A good number (28 % and 12 % respectively) of microentrepreneurs of these two areas had small business. Many microentrepreneurs (18 %, 22%, and 17 % for the three GB areas respectively, and about 33 % and 30% for the two SSS areas respectively) directly did not involve into any economic activity and gave the money borrowed from MFIs to someone else in the household or outside household.

4. Health awareness

Health awareness of the microentrepreneur was measured based on some general health issues (e.g., treatment of diarhoea, signs of pneumonia, and sources of vitamin A) and maternal health. A structured question contained all the correct answers including a ‘do not know’ option regarding each of the general health issues stated above was asked to the microentrepreneurs. First, a separate index for each of the general health issue was constructed giving the same weight to each correct answer and ‘0’ to ‘do not know’ option. Then a pooled index incorporating all the general health issues (i.e., treatment of diarhoea, signs of pneumonia, and sources of vitamin A) was constructed for general health awareness. Equal weight was

considered for each general health issue in the pooled index. Therefore, each question carries 1/3 value of general health awareness. The indices are given below:

$$LAD_i = \frac{d_i}{n_d} \quad (6)$$

$$LAPn_i = \frac{Pn_i}{n_{pn}} \quad (7)$$

$$LAV_i = \frac{v_i}{n_v} \quad (8)$$

$$LGHA_i = \frac{1}{3}\left[\frac{d_i}{n_d} + \frac{Pn_i}{n_{pn}} + \frac{v_i}{n_v}\right] \quad (9)$$

Where, $LAD_i =$ level of awareness about diarrhea, $LAPn_i =$ level of awareness about pneumonia, $LAV_i =$ level of awareness about vitamin-A, and $LGHA_i =$level of general health awareness; d_i, Pn_i, v_i represents the number of (correct) answers responded by microentrepreneur i about diarrhea , pneumonia and vitamin-A respectively; and n_d, n_{pd}, n_v represents the number of correct answers incorporated in the question regarding diarrhea, pneumonia and vitamin-A respectively. Note that $d_i = pn_i = v_i = 0$ if the microentrepreneur answers 'do not know' option.

A structured question regarding the five main danger signs arise during pregnancy was asked. The question also contained a 'does not know' option. An index for awareness about maternal health was constructed giving the same weight to each danger sign. The index is given below:

$$(LMHA)_i = \frac{mh_i}{n_{mh}} \quad (10)$$

Where, $(LMHA)_i$ = level of knowledge about maternal care, $mh_i =$ the number correct answers responded by microentrepreneur i about the dangers of pregnancy and n_{mh} = the number of danger signs of pregnancy (i.e., $n_{mh} = 5$). Note that $mh_i = 0$ if the respondent answers 'do not know' option.

The mean difference between program area and comparison area(s) were calculated first to see the nature of the data. Mean awareness score in all cases except diarrhea was found in the proper order between the GB study areas as it was expected (shown in Table-1). The difference in mean awareness score between area I and II, and area I and III was found significant for both general health (both individually and pooled) and maternal health. The mean difference between area II and III was found positive for all cases except diarrhea but not significant for any case.

Table-1: Difference in mean score between GB program and comparison areas

GB	**Mean awareness score**				
	Diarrhoea	Pneumonia	Vitamin-A	General health awareness (Pooled index)	Maternal health
Areas with ≥ 5 years experience of MHI(I)	.5956 (.15486)	.4153 (.14960)	.3449 (.18703)	.4463 (.12189)	.4176 (.17294)
Areas with recent placement of MHI (II)	.3600 (.15368)	.2019 (.16108)	.1884 (.13640)	.2473 (.10010)	.2000 (.19024)
Areas with no MHI (III)	.3889 (.16595)	.1695 (.19170)	.1615 (.16014)	.2379 (.13395)	.1574 (.17519)
Difference in mean score between area I &II	Mean diff.= .39000**	Mean diff.=.21345**	Mean diff. =.15646**	Mean diff. = .19903**	Mean diff. = .21765
Difference in mean score between area I &III	Mean diff.= .20670**	Mean diff.=.24585**	Mean diff. = .18335**	Mean diff. = .20845**	Mean diff. = .26024**
Difference in mean score between area II&III	Mean diff. = -.02889	Mean diff. =.03240	Mean diff. =.02689	Mean diff. =0.00942	Mean diff. = .04259

** Significant at 5% level
* Significant at 10% level
Note: (1) Number in parentheses is the standard error
(2) Equal variances' are assumed in every case
(3) Two-tailed test is considered for each case

The mean difference was found negative for all cases apart from vitamin-A, but not significant between SSS area I and area II (See Table-2). Several factors may be responsible for the negative mean difference. The literacy rate as well as formal education among the microentrepreneurs is higher in area II compared to area I. MHI could not make up the lacking of health awareness prevailed in area I before placing the program because of short duration of the scheme.

Table-2: Difference in mean score between SSS program and comparison areas

SSS	**Mean awareness score**				
	Diarrhoea	Pneumonia	Vitamin-A	General health awareness (Pooled index)	Maternal health
Area with MHI (I)	.5229 (.13744)	.3677 (.11042)	.3085 (.13694)	.3956 (.08546)	.3657 (.17684)
Area with no MHI (II)	.5455 (.17023)	.3835 (.12329)	.2925 (.14719)	.4023 (.10820)	.4000 (.16077)
Difference in mean score between area I &II	Mean diff. = -.02260	Mean diff. = -.01579	Mean diff. = .01597	Mean diff. = -.00670	Mean diff. = -.03429

** Significant at 5% level
* Significant at 10% level
Note: (1) Number in parentheses is the standard error
(2) Equal variances' are assumed in every case
(3) Two-tailed test is considered for each case

It is noticeable that mean score is higher in all cases in both program and comparison areas of SSS compared to comparison areas of GB. This may happen because of higher literacy rate in SSS areas compared to GB areas. In other words, GB area is less advanced than the SSS area.

It was computed the mean difference between the insured and uninsured in the program area of both organizations to understand the program effect. In GB area the mean difference was found positive in all aspects of health awareness apart from diarrhea, but it was not found significant in any case (see Table-3). In the SSS area mean difference was found positive in all aspects of health awareness, but it was found significant only for maternal health. The spill over effects and open access effects may be responsible for non-significant mean difference in the case of GB. Duration of the operation of the scheme, in addition to spill over effects, may be a cause of non-significant mean difference for SSS.

Table-3: Difference in the mean score between the insured and the non-insured in area I of both organizations

GB	Mean awareness score				
	Diarrhoea	Pneumonia	Vitamin-A	General health awareness (Pooled index)	Maternal health
Insured	.5939 (.15480) [131]	.4170 (.15158) [131]	.3471 (.18605) [131]	.4471 (.12220) [131]	.4198 (.17161) [131]
Uninsured	.6400 (.16733) [5]	.3718 (.07832) [5]	.2860 (.22610) [5]	.4260 (.12462) [5]	.3600 (.21909) [5]
Mean difference between the insured and the uninsured	Mean diff. = -.04611	Mean diff. =.04519	Mean diff. = .06113	Mean diff. =.02110	Mean diff. = .05985
SSS					
Insured	.5238 (.13645) [63]	.3745 (.11321) [63]	.3110 (.13478) [63]	.3989 (.08382) [63]	.3810 (.16739) [63]
Uninsured	.5143 (.15736) [7]	.3064 (.05405) [7]	.2860 (.16512) [7]	.3657 (.10114) [7]	.2286 (.21381) [7]
Mean difference between the insured and the uninsured	Mean diff. = .00952	Mean diff. =.06810	Mean diff. = .02497	Mean diff. =.03317	Mean diff. = .15238**

** Significant at 5% level
* Significant at 10% level

Note: (1) Figure in round parentheses is the standard error and in the square parentheses is the number of observations.
(2) Equal variances' are assumed in every case
(3) Two-tailed test is considered for each case

As many factors other than MHI can influence the health awareness score, appropriate regression techniques (as explained in Section 2.2) was used to find the true effect of MHI scheme. A regression model like eq.(1) was constructed for each index.

A test was conducted to examine the endogeneity of the membership of MHI using the procedure applied by Water (1999) and Jutting (2004). Under this procedure the reduced form participation equation i.e., eq.(2), was estimated first. Then each equation was estimated including the residuals of the participation equation as a regressor. But the coefficient of the residuals was not found significant for any equation for GB data. Thus, participation in GB MHI was not found as an endogenous variable. Thus, it was not needed to use instrumental variables

for any of these equations for GB data. The same procedures were also applied for SSS data. The coefficient of residuals was not found significant at 5% level for any case, but it was significant at 10% level for maternal health and pneumonia. Thus, use of instrumental variables was not important for SSS data as well.

A linear regression was run for each health awareness index by using a number of variables as control. They are as follows: (1) duration of membership in microcredit program (D_MM), (2) annual Household income (HH_I), (3) number of female belongs to age group 15-49 (F_15-48), (4) average education level in the household (A_edu), (5) number of children in the household aged between 0-17 (Ch_ 0-17), (6) sex of household head (HH_sex), (7) education of household head (HH_edu), (8) age of microentrepreneur (M_age), (9) education of microentrepreneur (M_edu), (10) membership in other microcredit program (M_OMP) , (11) ownership of television (owning TV), (12) ownership of radio (owning radio), (13) employment status of microentrepreneur (M_employment), (14) marital status of microentrepreneur (M_Marital_st.), (15) distance to the nearest health centre (Distance_N_H_C), and (16) enrolment status in MHI (E_MHI).

A special case of the White test (see Wooldridge, 2000:260) was used to detect the heteroskedasticity. But heteroskedasticity was not detected in neither of the regression model. For GB data the coefficient of enrolment was found positive for all cases apart from diarrhea, but not significant (see Table-4). The possible reasons behind the insignificant impact of enrolment in MHI on health awareness score are as follows. First, GB MHI scheme usually conducts its health promotion activities through counseling to the microentrepreneurs during center meeting, which holds once a week for the disbursement of loan and collection of installment, disregarding whether she has the enrolment in MHI. Second, health assistants provides counseling by domiciliary visits to all microcredit members in the catchments areas irrespective of whether she has enrolled in MHI. Third, health center is open for all who live in the 8 km radius of the health center, i.e., everybody in the locality has access to the health center.

Table-4: Estimation of program effect for GB data

Control variables	Dependent variables				
	LAD	*LAPn*	*LAV*	*LGHA*	*LMHA*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
(Constant)	.709**	.406**	.202	.436**	.119
D_MM	.003	.002	.004	.003	-.002
HH_I	.000	.000	.000	.000	.000
F_15-49	.018	-.039	.043	.008	.006
A_edu	.017**	.005	.016*	.012**	.008
ch_0_17	.006	.016	-.003	.006	-.018
HH_sex	-.029	-.036	.003	-.021	-.020
HH_edu	-.003	-.001	.000	-.001	.000
M_age	-.004*	.001	-.002	-.002	.002
M_edu	.005	.012	.009	.008	.009
M_OMP	-.013	.006	.001	-.003	.042
Owning TV	.004	-.003	.025	.008	-.010
Owning Radio	.008	-.011	.027	.009	-.044
M_employment	.015	-.047	-.043	-.025	.016
M_Marital st.	-.030	.058	.068	.030	.159*
Distance_N_H_C	-.004	-.044	.026	-.008	.063*
E_MHI	**-.046**	**.004**	**.051**	**.005**	**.065**

** Significant at 5% level
* Significant at 10% level

For SSS data the coefficient of enrolment was also found positive in all aspects of health awareness. Pneumonia and maternal health was found significant at 10 percent level (see Table-5). Thus, there is an indication that MHI has impact on increasing health awareness of the microcredit members. Short duration of the scheme may be a cause of the non-significant impact of MHI. Spill over effects may not be high like GB because SSS provides awareness building services only through the domiciliary visits by its community health counselors.

Table-5: Estimation of program effect for SSS data

Control variables	Dependent variables				
	LAD	*LAPn*	*LAV*	*LGHA*	*LMHA*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
(Constant)	.715**	.105	.891**	.557**	.702**
D_MM	.007	.004	-.001	.003	.008
HH_I	.000	.000	.000	.000	.000
F_15-49	-.039	.018	-.032	-.017	.026
A_edu	.009	-.014	.000	-.002	-.050**
ch_0_17	.016	-.024	-.011	-.006	.013
HH_sex	-.097	.115	-.189*	-.054	-.188
HH_edu	-.010	.002	.001	-.002	.010
M_age	-.004*	-.001	-.002	-.002*	-.005*
M_edu	-.009	.013	.006	.003	.009
M_OMP	.024	.083**	.022	.042*	.073
Owning TV	.016	.057	-.050	.007	.039
Owning Radio	-.007	.014	.067	.026	-.042
M_employment	-.023	.014	-.042	-.019	.045
M_Marital st.	-.049	.083	-.125	-.026	-.152
Distance_N_H_C	.064	-.007	-.157**	-.033	-.010
E_MHI	**.017**	**.095***	**.052**	**.054**	**.132***

** Significant at 5% level
* Significant at 10% level

The linear regression was run by constructing the model like eq(3) for each type of health awareness index in order to detect the spill over effects. For GB data the coefficient of *P* was found positive for all cases and significant for diarrhea, pneumonia and general health awareness (see Table-6). Thus, it can be argued that there is some spill over effects of GB MHI, which may have undermined the estimated effects of MHI.

Table-6: Estimation of spill over effects for GB data

Control variables	Dependent variables				
	LAD	*LAPn*	*LAV*	*LGHA*	*LMHA*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
(Constant)	.079	.135	.139	.115	-.238
D_MM	.000	.000	-.001	.000	-.004
HH_I	.000	.000	.000	.000*	.000
F_15-49	-.009	-.013	-.037	-.019	-.040
A_edu	.016	.001	.001	.006	-.010
ch_0_17	.010	.017	.013	.013	.031*
HH_sex	.103*	.053	.007	.053	.061
HH_edu	-.008	.011	.015*	.005	.006
M_age	.000	-.004	-.001	-.001	.004
M_edu	.019*	.004	.004	.009	.008
M_OMP	-.006	-.021	.026	-.004	-.090
Owning TV	.077**	.113**	.048	.077**	.091**
Owning Radio	.165	.064	.147	.123	.151
M_employment	-.018	-.018	.006	-.009	.068
M_Marital st.	.078	.011	-.015	.026	.099
Distance_N_H_C	-.068*	-.051	-.018	-.045	.032
P	**.243****	**.165***	**.077**	**.158****	**.073**

** Significant at 5% level
* Significant at 10% level

The linear regression was also run by constructing the model like eq.(4) and eq.(5) for each index. The program (*P*) as well as duration of program (*DP*) was found significant for each health awareness index for GB data[11] .

Thus, it can be inferred that MHI, especially GB MHI, has significant contribution on raising the health awareness of the microentrepreneur of the participating households.

Results are not shown here because of tightness of the page limit.

5. Health status

Health status is not directly observable and it is endogenously determined. Thus, we hardly have any direct technique of quantifying it in micro level (i.e., individual level) other than some proxy indicators, which are basically qualitative in nature. The empirical studies, which estimated the association with general health status (not diseases specific health status) with earnings, consumption, productivity or wage, mainly used two types of proxy indicators: self-reported health status (Luft, 1975; Lee, 1982; Gertler and Gruber 2002; and Grossman and Benham, 1974; Grossman, 1976 and Luft, 1978 as cited by Lee, 1982) and physical functioning measures (Gertler and Gruber, 2002).

In our study health status was measured by both self-reported health status and physical functioning indicator. Self-reported health status was measured by the five point scale (excellent, good, fair, bad and very bad) asking how good your health is compared to people of your age. Following Gertler and Gruber (2002), activities of daily living (ADLs) was used to measure health status under physical functioning approach. But it was used only intermediate ADLs (i.e., ability to carry a heavy load for 20 meters, sweep the floor or yard, walk for 5 kilometers, take water from a tube well or a pond, bend, keel, or stoop) rather than basic ADLs (ability to bathe yourself; clothe yourself; stand from sitting in a chair; go to toilet and rise from sitting on the floor) or both.

The activities listed in the basic ADLs are more appropriate for severely chronic ill and elderly persons. Thus setting these activities for measuring the health status of the adults may not be sensible. Moreover, there is strong correlation between intermediate and basic ADLs. For instance, the person who is capable of carrying a heavy load for 20 meters; sweeping the floor or yard; walking for 5 kilometers; or taking water from a well she must satisfy all the components of basic ADLs. Following Gertler and Gruber (2002) three options were placed to the respondents for each of the activities: can do it easily; can do it with difficulty and unable to do it. Then a numeric code was set for every option of each type of activities, i.e., 3 for ‘can do it easily’, 2 for ‘can do it with difficulty’ and 1 for ‘unable to do it’. The following index was used to measure the health status of the microentrepreneur following Gertler and Gruber (2002). The magnitude of the index is 1 if the microentrepreneur is able to perform all the ADLs easily, and zero if she is unable to perform any ADLs.

$$Health_i = \frac{Score - MinScore}{MaxScore - MinScore} \quad (1)$$

The self reported health status was found better in the program area compared to comparison areas in both organizations. In GB area I about 84 percent reported their health status as not bad (i.e., excellent, good and fair). The corresponding figure for GB area II and area III is about 73 percent and 68 percent respectively. About 87 percent reported their health as not bad in the program area of SSS while the corresponding figure for the comparison area is about 82 percent. For both organizations the insured had better health status than the uninsured. In the GB area I about 86 percent of the insured reported their health as not bad while 40 percent of the uninsured reported the same. In the SSS area I 87 percent of the insured reported their health as not bad while about 86 percent of the uninsured reported the same.

The mean difference of ADL score between the program area and comparison area (s) was found positive and significant for GB data and positive, but not significant for SSS data (see Table-7).

Table-7: Difference in mean ADL index between the areas and between the insured and the uninsured

GB	Mean health score (ADL index)	**GB**	Mean health score (ADL index)
I. Area with ≥ 5 years experience of MHI	.8809 (.18520) [136]	Insured	.8863 (.18219) [131]
II. Area with recent placement of MHI (II)	.8094 (.22180) [85]	Non-insured	.7400 (.23022) [5]
III. Area with no MHI (III)	.8231 (.23266) [108]	Difference in mean score between the insured and the non-insured	.14626*
Difference in mean score between area I &II	.07147**		
Difference in mean score between area I &III	.05773**		
SSS		**SSS**	
I. Area with MHI	.8029 (.20988) [70]	Insured	.8063 (.20547) [63]
II. Area with no MHI	.7909 (.19512) [66]	Non-insured	.7714 (.26277) [7]
Difference in mean score between area I &II	.01195	Difference in mean score between the insured and the non-insured	.03492

** Significant at 5% level
* Significant at 10% level
Note: (1) Figure in round parentheses is the standard error and in the square parentheses is the number of observations.
(2) Equal variances' are assumed in every case
(3) Two-tailed test is considered for each case

The mean difference of ADL score between the insured and the non-insured was also found positive and significant (at 10 percent level) for GB data and positive, but not significant for SSS data.

The regression model was constructed for both self-reported health status and ADL index following eq. (1):

$$SRHS_{ij} = X_{ij}b + E_{ij}d + m_j + e_{ij} \quad (12)$$

$$ADLHS_{ij} = X_{ij}b + E_{ij}d + m_j + e_{ij} \quad (13)$$

where, *SRHS* **(**self-reported health status**) =** 1, if the microentrepreneur reported her health status as not bad (i.e., excellent, good and fair), = 0, otherwise (i.e., bad and very bad); *ADLHS* is the health status measured by ADL index shown in eq. (11).

Like health awareness index, enrolment (E) was not found as endogenous variable at any model in both data sets. The logit regression was run for eq (12) and linear regression was run for eq.(13) using the both data sets. Test was also conducted to detect heteroskedasticity, but heteroskedasticity was not detected. The variables used as control in each model are as follows: (1) duration of membership in microcredit program (D_MM), (2) annual Household income (HH_I), (3) household size (h_size), (4) average education level in the household (A_edu), (5) number of children in the household aged between 0-5 (Ch_ 0-5), (6) per capita daily calorie intake, (7) age of microentrepreneur (M_age), (8) education of microentrepreneur (M_edu), (9) membership in other microcredit program (M_OMP), (10) employment status of microentrepreneur (M_employment), (11) marital status of microentrepreneur (M_Marital_st.), (12) smoking status of microentrepreneur (13) distance to the nearest health centre (Distance_N_H_C), and (14) enrolment status in MHI (E_MHI).

The coefficient of enrollment was found positive and significant for both methods of health measurement for GB data set. The coefficient of enrolment found was found negative for self-reported health status and positive for ADL index, but not significant at any method of measurement of health status for SSS data set.

6. Conclusion

An inference can be made from this study, although there is some shortcoming due to inability of using panel data, that GB MHI has significant contribution on raising the health awareness as well as health status of the microentrepreneur of the participating households. There is some indication of SSS MHI on raising the health awareness and health status, but the finding is not clear to draw a clear cut conclusion.

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