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Can Micro Health Insurance Reduce Poverty?
Evidence from Bangladesh

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Abstract:

This paper examines the impact of micro health insurance on poverty reduction in rural areas of Bangladesh. The research is based on household level primary data collected from the operating areas of the Grameen Bank during 2006. A number of outcome measures relating to poverty status are considered; these include household income, stability of household income via food sufficiency and ownership of non-land assets, and also the probability of being above or below the poverty line. The results show that micro health insurance has a positive association with all of these indicators, and this is statistically significant and quantitatively important for food sufficiency.

Key words: O12

JEL: Microcredit, Micro Health Insurance, Poverty, Grameen Bank.

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1. Introduction

Microinsurance has been described as 'the protection of low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved' (Churchill 2006:12). Microcredit is the provision of collateral free small loans, especially to women, to enable them to develop household based micro enterprises. An important objective of the microcredit movement is to break the longstanding vicious circle of poverty; from low income, to low saving, to low investment, to low income ... and so on. The growth of microcredit is motivated by the failure of both traditional financial markets and the targeted programs of government owned financial institutions to meet the credit needs of the rural poor. The importance of microinsurance emanates from the limitations of conventional loan-based microcredit programs in protecting the poor from all sorts of vulnerabilities.

Although microcredit has been shown to generate various beneficial outcomes, there is also evidence that not all sectors of the poor can benefit. One such group are those who experience severe health shocks, which reduce work capacity and investment and require a redirection of resources to the consumption of healthcare. Due to increased evidence that microcredit does not help the poorest poor, support has grown for supplementing microcredit with other services in order to improve the effectiveness of the programs. One such supplementary service is micro health insurance (MHI) to protect vulnerable people from health shocks when existing coping strategies fail. In Bangladesh, the provision of health insurance via microcredit schemes is also motivated by the lack of any social health insurance schemes in the formal sector, and the fact that the government seems unable to meet the health care needs of the rural poor.

Grameen Bank[1] (GB) has played the primary role in developing microcredit programs in Bangladesh. The organisation emerged from an action research project by Professor Muhammad Yunus in 1976 examining the possibility of providing banking services for the rural poor. GB as a microfinance institution (MFI) provide a number of services including loans and savings schemes, and it added a MHI scheme in the late 1990s, in order to protect its clients from health risks with the aim of preventing their economic downfall.

These MHI schemes may contribute to reducing poverty via improvements in health as well as reducing the health risks of the insured. Empirical evidence on whether these insurance schemes are meeting their objectives is important for policy decisions concerning expansion and replication of this type of insurance. However, to date there has been very little research on the effects of adding MHI to microcredit. Mosley (2003) examined the effects of the MHI scheme of another microfinance institution known as BRAC (the Bangladesh Rural Advancement Committee). This study did not explicitly examine whether MHI contributes to reducing poverty, but instead it considered outcomes such as assets, household expenditure, current saving, educational expenditure and education level. The evidence was not conclusive as the study was conducted at a very early stage of the MHI program using a small sample. The other impact assessment studies on MHI have concentrated on process indicators, such as healthcare utilization and equality of access to healthcare in the Philippines (Dror *et al*., 2005, 2006); healthcare use and out of pocket expenditure in Senegal (Jutting, 2004); the utilization of healthcare and financial protection from health shocks in Tanzania (Msuya *et al.,* 2007); and cost recovery in Rwanda (Schneider and Hanson, 2007). Thus, there is no good empirical evidence on whether the addition of a MHI scheme to microcredit reduces poverty.

[1] Grameen means 'rural' or 'village' in the Bangla language.

In this paper we examine whether the addition of MHI to the microcredit programs of GB have an effect on poverty. We consider four indicators relating to household poverty status: household income, stability of household income (via food sufficiency and ownership of non-land assets) and the probability of being above or below the poverty line. We use data collected from a primary survey of 329 households in three areas where GB operates microcredit programs. The areas are distinguished according to their experience of MHI: areas with at least five years experience of MHI, those with 2 years or less experience, and those where MHI is not available. Our evidence is based on econometric analysis of the impact of placement of MHI. The study finds an association between MHI and all of the poverty indicators, and this is statistically significant in the case of food sufficiency. In our discussion we consider some of the possible explanations for this finding.

This paper is organized as follows. Section 2 provides some background on microcredit, health and MHI programs in Bangladesh; section 3 illustrates the conceptual framework explaining the possible causal pathways through which adding MHI to microcredit can affect the poverty status of households; Section 4 describes the econometric methodology; Section 5 reports the results and Section 6 discusses them; Section 7 offers some conclusions.

2. Background

There has been a massive expansion in Grameen type microcredit in Bangladesh since the 1990s. The Palli Karma Sahayak Foundation is an apex organization for microcredit funding and capacity building; according to their figures, in December 2005 there were around 700 MFIs in Bangladesh with over 33 million members. The main players in the microfinance sector are GB, BRAC, ASA and Proshika. Some government departments and commercial banks also provide microcredit.

Although microcredit generates various beneficial outcomes (Pitt and Khandker, 1998; Pitt *et al.*, 2003; Khandker, 2005; Gertler *et al.* 2009), there is evidence that those households who experience

severe health shocks are unable to reap much benefit from microcredit. Illness, especially chronic illness, of household members is the main reason that GB borrowers fail to rise above the poverty threshold (Tod, 1996; Wright, 2000). This is because ill health reduces work capacity and investment due to a redirection of resources to consumption of healthcare. Thus welfarists stress the value of adding auxiliary services to microcredit in order to improve the effectiveness of the programs (Dichter, 1996; Jani and Pedroni, 1997; Bhatt and Tang, 2001; Woller *et al*., 1999; Woller and Woodworth, 2001).

Insurance may protect vulnerable people from risks and shocks. However, traditional health insurance markets are almost entirely absent in the rural areas of Bangladesh. There is no social health insurance scheme even in the formal sector in Bangladesh, and in addition the government has not been able to meet the health care needs of the rural poor despite having a well-established healthcare delivery network

The constitutional commitment of the government of Bangladesh is to provide basic medical care to all of its citizens; they have invested substantially since independence to develop the health infrastructure and to strengthen health and family planning services with special attention to the rural population. Providing primary health care to attain 'Health for All' is the major thrust of the health program. There is a three tier mechanism for providing health care in rural areas: (i) domiciliary services by a Health Assistant and Family Welfare Assistant at the household level; (ii) Health and Family Welfare Centres at the union level[2], and (iii) Upazila Health Complexes (UHCs) at the sub-district level. UHCs provide both outpatient and inpatient services including maternal and child health and family planning; they are the main centre for implementing the Essential Services Package which was designed to attain Health for All. In addition to public provision of healthcare,

[2] There are 482 'upazilas' (or sub-districts) Bangladesh, which are the lowest level of administrative government. Each upazila is sub-divided into smaller local 'unions'.

there is a large private sector in Bangladesh, that includes both not-for-profit and for-profit organisations; the former is relatively small and run by NGOs, MFIs and charitable institutions.

Despite this infrastructure for healthcare delivery, the government has largely failed to meet the health care needs of the rural population and this is due mainly to supply side constraints. Firstly, problems in retaining doctors in UHCs due to poor working conditions; secondly, a lack of proper input mix and skill mix due to under-resourcing and recruitment problems; thirdly unfriendly and unapproachable behaviour of the health care providers which discourages contact from the local population; and finally the charging of unofficial fees. Thus, although there is under utilization in many UHCs, the majority of patients seek healthcare from private providers, especially from informal providers who often have no formal medical qualifications (BBS, 2006).

In order to expand into areas of social protection not covered in conventional loan-based microfinance, and also to help supplement poor government provision of health care, GB set up a MHI scheme to protect its microcredit clients from health risks in order to ameliorate the economic risks that they face. Under this scheme GB sells annually renewable prepaid insurance cards to its clients and also offers primary health care directly from its own health centres. The service comprises mainly curative care and maternity and child health care. Non-card holders can seek healthcare from these health centres but they pay a higher charge for the services compared to the insured cardholders. Following GB, some other MFIs in Bangladesh have also introduced MHI schemes with similar objectives. In terms of the type of insurance provided, the GB scheme is largely pre-payment for health services, rather than a program that covers most catastrophic health costs. Thus it may be the case that the government provision, while inadequate, does provide some coverage for the more catastrophic needs while failing to provide basic health services.

3. Conceptual Framework

A MHI scheme offering both curative and preventive healthcare and health promotion services may increase the health status of the participating households via increased health awareness, improved health practices, and increased utilization of formal healthcare (see Figure 1). Improved health status may lead to higher productivity, higher labour supply, fewer workdays lost and reduced healthcare expenditure. The first two can be regarded as 'augmenting' effects and the latter two as 'stabilization' effects.

Under augmenting effects it is assumed that improved health status leads to an increase in the efficiency of labour supply as well as actual labour supply which increases productivity, and thereby earnings, in the microenterprise[3]. The stabilization effects can be elaborated as follows. First, improved health status leads to lower income loss through reducing the workdays lost due to illness. Second, it reduces both direct and indirect health expenditures because healthcare utilization may be reduced due to improved health status[4]. Thus, the household may maintain health care expenditure from regular income or savings. This may help the household to avoid borrowing or selling of productive assets to meet the medical needs of the household[5], which may prevent falling incomes earned from microenterprise.

In addition, the supplementation of microcredit with MHI may reduce the uncertainty of healthcare expenditure and thus raise investment in all forms of capital. If the household is insured against health risk, it may invest in high return riskier assets because it does not need to retain cash or to hold easily liquidable assets for precautionary purposes. It is worth mentioning that Kochar (2004)

[3] In addition, as in most cases the microentrepreneurs are women, they also tend to take care of sick children and adults in the household, therefore increased health status of household members reduces the time spent caring and thereby increases the supply of effective labour.

[4] It is worth mentioning that this may happen only if there is a substantial improvement in health status, which may not occur in the short run. Thus, healthcare expenditure may not fall in the short run; rather, it may increase because insurance provides incentives to use more health care.

[5] Poor households sell various household assets like livestock, land and grain and take out loans to cover the financial costs of illness (Sauerborn *et al*., 1996).

finds, from a study in rural Pakistan, that overall savings of households rise in the expectation of future illness of adult males, but investments in productive assets decline.

Thus, these two channels (improvement of health status and reduction in uncertainty regarding healthcare expenditure) may result in higher household income. When income rises above subsistence level, the household may increase investment in nutritional improvement, human capital and physical capital. This may also reduce vulnerability that may in turn lead to investment in high return assets. Moreover, surplus income may enhance social capital through increasing the strength of the solidarity of the group members, which may reduce the probability of drop out from the microcredit program. These effects together may lead the household to attain a higher income state in the long run, and thus it reduces the probability of a household being below the poverty line.

4. Methodology

Data

We collected primary data from a quantitative household survey through a cross section design in 2006. We chose to study the MHI component of GB because this MFI operates on a large scale in Bangladesh. In June 2006, MHI was being operated in 32 of GB's branches, of which 14 branches had the scheme for at least five years and 2 had MHI for two years or less. The GB microcredit and MHI programs are identical across the areas that we study. A description of the key features of the GB MHI scheme is given in Table 1.

In order to construct a meaningful study design that would enable us to test causal relationships, GB branches were stratified into three distinct types: (i) GB1 - branches with at least five years experience of MHI; (ii) GB2 branches with one or two years experience; (iii) GB3 - branches without MHI.

A multi-stage sampling technique was applied. One GB branch was randomly selected from each of GB1 and GB2; they are Madhabpur and Pakutia respectively. Madhabpur is located at Singair upazila (sub-district) of Manikgonj district and Pakutai is at Nagarpor upazila of Tangail district. One GB branch (Joy Mantap) was selected from GB3. This branch was purposively selected from the same upazila (Singair) as Madhabpur, in order to make a meaningful comparison group. Note that there are 8 branches of GB in Singair upazila and a MHI scheme has been operating in its three unions (Madhabpur, Shaharil and Jamsaha) since 1996. Among the remaining five unions where GB has not yet placed its MHI scheme, Joy Mantap is adjacent to Madhabpur and they are connected by road. It is worth mentioning that GB has decided to introduce its MHI scheme into Joy Mantap in the near future, which may reduce program placement bias in this design. It also may be noted that microcredit was placed at Madhabpur and Joy Matap in 1983 and at Pakutaia in 1986. A MHI scheme was placed at Madhabpur and Pakutaia in 1996 and 2004 respectively.

A list of all the villages holding at least one female centre of GB was prepared for each selected area[6]. In the second stage, 2 villages from each area were selected randomly. Thus, a total of 6 (3x2) villages were selected. In the third stage, two female microcredit centres were selected randomly from each village where more than two microcredit centres existed. Some villages had only one credit centre, in that case it was selected. Note that each credit centre consists of 40-50 microcredit members and they usually live in a particular area of the village. A list of current GB microcredit member households was made in each selected GB loan centre, using information obtained from respective branch offices of GB. We attempted to interview all the eligible member households in the selected microcredit centres of each sampled village, in order to control for sample selection bias.

[6] Since about 96 percent of existing GB members are female, we selected only the female microcredit centres.

We used a set of questionnaires to collect both household level and village level information. We finalised the survey instruments after incorporating comments and suggestions from a number of experts who were sent a preliminary draft of the questionnaires, as well as feedback from two rounds of piloting. We employed a team of six female surveyors comprising of four field investigators, one field supervisor and one quality controller to conduct the survey. Each of the members of the survey team had completed their Masters degree and was experienced enough to conduct the field survey. We provided them with five days training on the purpose and objectives of the study and on the use of the survey instruments.

Female microcredit members were the key respondents, however, some questions (income, expenditure, assets etc.) were asked to household heads and these are predominantly male. The village level information was collected from the offices of the Union Councils and key informants. The data was entered in SPSS v10 and converted to Stata v9 for analysis.

Method

One of the major challenges in estimating the impact of a program (like MHI) using non-experimental data is to deal with endogeneity caused by heterogeneity in unobservable individual characteristics of the participants and non-participants, which may influence both the decision to participate in the scheme and the outcome. Random assignment of individuals into a treatment group and a control group can balance the heterogeneity in unobservable individual characteristics and thus eliminate bias. However, random assignment is not possible here; hence it is necessary to choose an empirical model, which can control for endogeneity.

Following the empirical literature on health insurance and microcredit (Pitt and Khandker, 1998; Waters, 1999; Nanda, 1999; Yip and Berman, 2001; Jowett *et al*., 2003; Trujillo, 2003; Khandker and Faruqee, 2003; Jutting, 2004; Jowett *et al*., 2004) we consider a *structural* equation and a *reduced form* equation to estimate the outcomes of the interest.

In the structural equation:

$$y_{ij} = X_{ij}\beta + A_{ij}\delta + \varepsilon_{ij} \qquad (1)$$

y_{ij} is the outcome of interest (household income, stabilization of household income or probability of being in poverty) for household *i* in village *j)*[7]. X_{ij} is a vector of observed individual, household and village characteristics (education, age, duration of membership in MHI and so on). A_{ij} is a binary variable where A_{ij}=1 if household i of program village j participates in MHI and A_{ij} = 0, otherwise; and ε_{ij} is the stochastic error term. The estimate of δ will give the unbiased effect of MHI on the outcome *y* only if A_{ij} is an exogenous variable.

In the reduced form (or participation) equation:

$$A_{ij} = X_{ij}\beta + Z_{ij}\phi + \mu_{ij} \qquad (2)$$

X_{ij} is as defined in equation (1); Z_{ij} is a distinct set of household or village characteristics that affect only participation in the scheme (A_{ij}), but not the outcome (y_{ij}) conditional on A_{ij}; and μ_{ij} is the stochastic error term. Endogeneity arises when A and ε (or ε and μ) are correlated, resulting in biased estimates of δ.

While conditioning on participation is the commonly used method for analyzing the causal effect of health insurance as evidenced in the literature, this method is not appropriate for our research for a number of the reasons. First, MHI may produce a lot of spill-over effects, because the scheme offered by GB is different from a traditional three-party (the insurer, the insured and health service

[7] The exact specification of the model (linear, binary probit or ordered probit) depends on the nature of the outcome.

providers) health insurance system. As well as pre-paid insurance cards, GB MHI provides healthcare directly to their clients through establishing health centres. In addition, GB MHI offers health promotion services to all the microcredit members living under the catchment areas of the health centre regardless of their participation in MHI[8]. Moreover, the uninsured can seek healthcare from the health centres by paying the standard fees. If these spill-over effects are not taken into account, the impact of MHI will be severely underestimated. Second, there was a very high enrolment rate in MHI at GB1 (96%). Since there are very few observations on the non-participant group, the estimation of equation (1) may not give sensible findings.

Thus, in what follows we focus on outcomes conditioned on *placement* of the program, rather than *participation* in the program. Available empirical literature on this method falls mainly into two groups. One group has compared the program group with a comparison group where the program was in the pipeline (Chase, 2002; Galasso and Ravallion, 2004). The other group has compared the program group with a comparison group where the program has not been placed at the time of survey (Amin *et al*., 1996; Hadi, 2002). The placement model can be written as follows

$$y_{ij} = X_{ij}\beta + P_{ij}\lambda + \varepsilon_{ij} \qquad (3)$$

y and X are as defined previously; P represents program status where $P = 1$ if the household is drawn from a program area where MHI has been operating for at least five years (GB1); and $P = 0$ if the household is drawn from the comparison area where MHI was not placed at the time of survey (GB3). The estimate of λ measures the average treatment effect of MHI. Measuring *average treatment effect* rather than *average effect of treatment on the treated* is sensible because non-participants may also benefit from the availability of MHI due to spill-over effects.

[8] It is also reasonable to expect that the benefits of health promotion will extend beyond microcredit members to any of local people.

The major concern in this method is to control for program placement bias (the particular features that attract an organization to place the program in an area) and geographical heterogeneity, which may affect the outcomes. Social programs like MHI are rarely placed randomly; rather placement depends on both demand and supply side factors. The best way to ameliorate the effects of program placement bias is to select a suitable comparison area, and to do this we took the following measures. First, selecting the program area (GB1) and control area (GB3) from the same small geographical region to reduce geographical heterogeneity; second, choosing the control area where there is potential for placing the program in the near future to reduce the supply side bias of program placement; and third, conducting a survey to see whether eligible households in the control area would be willing to be insured if MHI was placed in their village, to control for demand side bias. Note that willingness to enrol in an MHI scheme was 98 percent in GB3, which was very similar to actual enrolment in GB1 (96%).

In addition, we used a similar method to select the households from the program area and control area. It should also be noted that we conducted the survey on female microcredit members and this group is likely to be relatively homogeneous across the program and control areas.

Poverty measurement indicators

In order to gain a deeper understanding of the impact of MHI on poverty status we consider four different outcome measures which relate to poverty: household income, household non-land assets, food sufficiency and the probability of being above or below the poverty line. These outcomes can also be related to the mechanisms illustrated in Figure 1. Household income relates directly to boxes 5, 8 and 16, which reflect enhanced income via health improvements. Food sufficiency and ownership of non-land assets relate to boxes 6 and 7, where income is stabilized via reduced work days lost and lower health care expenditure leading to increased investments in all forms of capital; in addition food sufficiency contributes directly to higher nutritional status (box 10). The final

poverty measure is a direct reflection of boxes 8 and 16 (higher income, which crucially may then be above subsistence level).

Clearly we are using outcome measures at one point in time, derived from a cross section survey, to reflect the results of the dynamic processes outline in Figure 1. We might expect that some of our indicators will react more quickly to the potential beneficial effects of MHI than others; for example it seems reasonable to expect that food sufficiency and per capita income may be the first to change whereas accumulation of non-land assets and increasing incomes above the poverty line may take longer to achieve.

Total household income is constructed from a series of questions on all sources of income of all members of the household in the last 12 months[9]. In the analysis we use the log of age and sex adjusted per capita income[10]. Household non-land assets and food sufficiency are used to proxy for the stability of income. Food sufficiency is an appropriate proxy because it varies with fluctuations in income level. Also ownership of non-land assets are suitable because poor people usually depend on selling these liquidable assets to cope with any income shock. Respondents were asked to classify their household food consumption for the year as either: in deficit for the whole year, sometimes in deficit, neither in deficit nor surplus, or in surplus for the whole year. There were very few observations in the 'deficit for the whole year' category, so this group is merged with the 'sometimes deficit' group to create a 3 point ordered food sufficiency scale, where 0 = in deficit, 1 = neither deficit nor surplus and 2 = in surplus. Information on ownership of non-land assets was constructed from a series of questions about all non-land assets and their estimated current market price. We use the current value of all household non-land assets whether they contribute to

[9] We have measured gross income rather than net income (income retained after deduction of production costs) because the respondents find it difficult to state the costs of production accurately.

[10] The weights used to construct age and sex adjusted household size are : 1.0 for males aged over 18 years, 0.9 for females aged over 18; 0.94 for males aged 13-18, 0.83 for females aged over 13-18; 0.67 and 0.52 for a children aged 7-11 and 4-6 respectively; 0.32 for toddlers aged 1-3; and 0.05 for infants. These weights are based on a South Indian dietary survey and are also used by Townsend (1994).

household income or not. As for per capita income we have used age and sex adjusted household size to measure per capita non-land assets.

We use the 'cost of basic needs' approach to measure the poverty line; here the cost of a normative bundle of goods needed to meet minimum nutritional requirements plus the costs of non-food basic need items is defined as poverty line expenditure. Following Ravallion and Sen (1994) we use 2112 calories and 58 of grams protein as the minimum daily calorie requirement of an adult for the food poverty line, and then take 35 percent of the food poverty line income as the appropriate non-food allowance. We then define households as falling below (=0) or above (=1) the poverty line according to these criteria.

5. Findings

Descriptive statistics

A total of 329 households were surveyed of which 136 were from GB1, 85 from GB2 and 108 from GB3. The overall response rate in the survey was 73 percent (75, 68 and 73 percent in GB1, GB2 and GB3 respectively)[11]. There was little variation in response rates between the insured and the uninsured. The participation in MHI among the households interviewed in the survey was 82 percent (96 percent at GB1 and 59 percent at GB2). Respondents in GB3 were asked whether they would like to enrol in MHI if it was placed in their area. The willingness to participate in MHI at GB3 was 98 percent.

There is no significant difference in socio-demographic features, apart from duration of membership in microcredit, between the program area (GB1) and the control area (GB3) (see Table 2). Also there is no difference in main sources of income, general infrastructure and occurrence of

[11] The main reason for non-response is that we could not interview some households due either to absence of the key respondent or unwillingness to take part in the survey; this was largely because the survey was conducted during harvesting season where a number of household members are away from home for long periods. In order to reduce this problem one repeat visit was made to absent households. It is worth mentioning that respondents were not pressurized nor offered motivation to take part in the interview.

natural calamities. In addition household health care expenditure and workdays lost do not differ significantly between GB1 and GB3, which may cast doubt on some of the causal pathways described in Figure 1. There is a significant difference in most of these features (duration of membership in microcredit program, male and female education, and age and sex structure) between GB1 and GB2 (see Table 2). As per the design of the study there is a significant difference in duration of membership in MHI between these two areas. At GB1, about 64 percent of the insured had at least 5 years experience of MHI (the average experience is about 6 years) and at GB2, 96 percent had only one years experience.

Almost all the microentrepreneurs were aged between 17 and 64 years irrespective of the sample areas. Most of them were of reproductive age (15-49 years). More than 90 percent were married in all the sampled areas. The majority of the microentrepreneurs, irrespective of the sample areas, had no formal education. But the formal education rate was higher in GB2 compared to other areas. The majority of the microentrepreneurs in GB2 and GB3 had household based self-employment[12]; and this was around 44 percent for the microentrepreneurs in GB1. A good number (28%) of microentrepreneurs of this area had small businesses. Some microentrepreneurs (18%, 22%, and 17% for GB1, GB2, and GB3 respectively) were not directly involved in any economic activity. Rather, they gave the money borrowed from MFIs to someone else either within or outside the household. Microentrepreneurs were themselves the household head in some cases (15%, 14%, and 10% at the GB1, GB2, GB3 respectively), but the vast majority of households were male headed. Like microentrepreneurs, the majority of the household heads had no formal education. Small business, farming and day labour were the major occupations of household heads in all the areas.

There is substantially higher mean per capita income and per capita non-land assets in GB1 compared to GB3 or GB2 (see Appendix Table-A1); the differences between GB1 and GB2 and

[12] Note that livestock fattening, poultry feeding, farming, tailoring, etc. fall in this category.

between GB1 and GB3 are significant at the 1 percent level (see Table 3). The data shows that the majority of the households do not have food deficit irrespective of MHI placement status (see Appendix Table-A2). Although food surplus status is higher in GB1 compared to GB2 or GB3, the differences are not significant at any conventional level (see Table 3).

According to the cost of basic needs method per capita annual poverty line expenditure was US $155.77 in GB1 and US $156.05 in GB3. Table 4 shows the percentage of GB member-households above the poverty line. A substantially higher proportion of households are above the poverty line in GB1 compared to GB3 and this difference is significant at the 10 percent level.

Multivariate analysis

The regression results are presented in Table 5. The estimation technique is chosen depending on the form of the dependent variable. Models (i) and (ii) are estimated by OLS for the continuous variables log per capita income and log per capita non-land assets, since the histograms of the log-linear data for both of these variables are approximately normal[13]. An ordered probit model is estimated for food sufficiency level (iii); where food deficit = 0, neither deficit nor surplus = 1 and surplus = 2. Model (iv) is a binary probit for the probability of being above the poverty line, where household living below poverty line = 0 and above poverty line = 1. Table 5 reports the coefficient estimates for the probit models and marginal effects are reported in the Appendix, Table A3.

The following control variables are included in all of these models. Education level of the household head and the microentrepreneur (both measured as completed years of education); three dummy variables for the occupation status of the household head: high (business and service), medium (farming, small business, and boatman), and low (day labour, rickshaw/van pulling, fishing, household based self-employment and begging), which is the reference category;

[13] In further analyses we also applied robust regression and quintile regression to these models and the results do not differ significantly from the OLS results reported here.

proportion of income earners in the household; number of individuals from the household living abroad (who tend to send remittances to the family in Bangladesh); amount of owned cultivable land (in decimals[14]); amount of owned homestead land (in decimals); years duration of membership in the microcredit program; number of persons in the household with a chronic disease. In addition, we have controlled for village literacy rate. Our expectations are that all of the control variables, other than number of people with a chronic disease, will have a positive association with each of the dependent variables.

Looking across the columns in Table 5, there are three variables that appear to consistently contribute positively to the four outcome measures; these are household head having a high grade occupation, the number of household members living abroad and the amount of cultivable land owned by the household. The amount of owned homestead land effects three of the four outcomes but not the probability of being above the poverty line. The education of the household head and the length of membership in the microcredit scheme affect two of the four outcomes. None of the other variables have a significant effect across all of the outcomes. The remaining coefficient estimates all have the expected signs in all of the models. Quantitatively the number of household members living abroad and the household head having a high grade occupation make the largest contribution to all four outcomes; for example from Table A3 we see that the household head having a high grade occupation increases the probability of being in food surplus by 0.142 percentage points and increases the probability of being above the poverty line by 0.209 percentage points. In all cases the coefficient on MHI placement status is positive and it is statistically significant in determining food sufficiency. The marginal effects in Table A3 show that being in an area where MHI has been available for at least five years increases the changes of being in food surplus by 0.086 percentage points. This is a relatively large effect, being similar in size to having another person from the household living abroad and second only to the household head having a high grade occupation.

[14] Decimals are a standard unit of area in Bangladesh; 100 decimals are equal to one acre.

In terms of the diagnostic statistics, the models appear to be well specified; each of them is jointly significant at the 1 percent level according to the F- and Wald tests and there is no evidence of misspecification according to the RESET tests. The explanatory power of the models is respectable for this type of cross section analysis with primary data. In addition to explore the effects possible collinearities between the explanatory variables, each variable was excluded in turn and this made little difference to the existing coefficient estimates.

6. Discussion

Our results suggest that MHI placement has a significant beneficial effect on food sufficiency but is not significant in contributing to our other poverty indicators. There are a number of possible reasons for finding a statistically insignificant association with income, non-land assets and the probability of being above the poverty line. Firstly, MHI may take time to generate a significant impact on household income via improvements in health status and thus the dynamic effects may not have been observed in our cross section analysis, where the average time of program placement in GB1 was only 6 years. It is reasonable to expect that food sufficiency may react before the ownership of non-land assets and rising above the poverty line, which rely on an accumulation of surplus income over time; however, via these dynamic arguments we may expect per capita incomes to rise relative quickly as a result of MHI placement and our evidence suggests they do not. Secondly, the result may be due to the type of insurance and health care provided through this MHI scheme. GB does not provide secondary or tertiary healthcare from its health centres and although it maintains a referral mechanism for the higher levels of healthcare, this does not function effectively as we observed during the survey[15]. As was seen in Table 2, health care expenditure and workdays lost (the main determinants of stabilization of household income in Figure 1) did not differ

[15] Officially there is a provision that an insured household will receive up to TK.2000 (about US $29) annually as referral (hospitalization) benefits. This benefit was provided via external funding from the ILO. However the fund has been exhausted so the benefit is not longer provided in practice.

significantly between the program area (GB1) and comparison area (GB3). The adverse effects of protection against moral hazard may be a possible reason for the former. Co-payments are used to deter over utilisation of health care by the insured, but qualitative information collected during our survey revealed that these co-payments, although relatively small, are a strong deterrent to these very poor households, who then prefer to use informal health care providers who may offer credit terms, even if the total cost of health care is then higher.

Of course one possible further explanation is that in fact the addition of MHI to microcredit does not contribute to most poverty indicators. However, we should be wary before reaching this conclusion because while our study uses primary data collected expressly for assessing the impact of MHI, and applies appropriate methods for analysing the data, there are still some limitations which largely arise from time and resource constraints[16]. First, although panel data or repeated cross section data is the most suitable for analysing dynamic outcomes, our study uses a single cross section of households. In addition, our study does not provide evidence on whether MHI can reach the poorest of the poor because we used a sample of microcredit members and not the population as a whole. It has been shown that microcredit is not always able to reach the ultra poor (Amin and Topa, 2003 Navajas *et al*., 2000) but they are clearly a key group for policy concerns.

7. Conclusion

This study has outlined the causal mechanisms by which adding MHI to microcredit schemes can contribute to improving the poverty status of households. We have evaluated this in the context of Grameen Bank, the largest microcredit organisation in Bangladesh. Our results show a positive association between MHI placement and household income, owner of non-land assets, food

[16] There was no external research funding for this study.

sufficiency and reduction of poverty. The results are statistically significant for the determination of food sufficiency and here they are quantitatively important. A number of reasons have been suggested for our findings, which include problems in detecting long-term effects with our cross section data as well as shortcomings of the MHI scheme in question, including a lack of proper referral services and the adverse effects of protection against moral hazard. Given the former problem it may not be sensible to draw generalized conclusions from our findings. Nevertheless, the study makes an important contribution to the literature as it is the only comprehensive evidence on the impact of MHI on poverty reduction.

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Table-1: A picture of the key features of the MHI scheme of GB

Key features	Grameen Kalyan of GB
Type of organization	• Insurer as well as a health service provider.
Area coverage	• December 2008: 39 unions of 25 sub-districts of 10 districts[1]. The program is identical
Mechanisms for providing health services	• Mainly through static clinics. • Also via mobile clinics, satellite clinics and domiciliary visits (by the health workers). • Limited emergency services through its static clinics • Referral services through making agreement with some hospitals.
Technical staff	• An MBBS (Bachelor of Medicine and Bachelor of Surgery) doctor. • A female DMF (Diploma in Medical Faculty) doctor. • An office manger, a female paramedic (RH), a laboratory technician and six community health assistants. • Some Trained Traditional Birth Attendants (TTBA) trained by Grameen Kalyan.
Categories of services covered	• Preventive care including antenatal care (ANC) • Curative care (mainly outpatient care). • All the basic diagnostic services including ultra-sonography • Some health promotion activities
Type of curative services provided	• Essential Services Package (ESP) including safe delivery.
Enrolment status	• Voluntary
Proof of enrolment	• Insurance card
Affiliation unit	• Household. The program is identical for all enrolees (i.e. the same level of premium and the same benefit package is applicable for every household).
Eligibility criterion	• GB member households or any villagers living within an 8 km radius of each health centre.
Access of non-insured households to curative care	• Yes
Premium	• Annual premium (covering up to 6 members) [2] § For a GB member family: TK.120 (US $1.74) § For a non member family: TK.150 (US $2.17) • Average daily wage § Male: TK.90 (US $1.30) § Female: TK.60 (US $0.87)
Benefit package for the card holders	• Co-payment: § Medical consultation fee for a card holder: TK.10 (US $0.14) § Medical consultation fee for a non-card holder: TK.25 (US $0.36) • Discount: Discount for basic medicine[3] on MRP: 25%, for pathological tests on listed price: 30-35%, and for referred consultation visit: 50%. • Hospitalization benefit: Annually up to 2000TK (US $29) for a family. • Free: Annual basic check up for head of the family; immunization against six-diseases, domiciliary visits by health assistants.
Additional health services package	• School health package, Eye Mega Camp for cataract operations, and regular cataract operation programs.
Financing mechanism	• An initial endowment fund of Grameen Bank. • Revenue generation from co-payment.
Cost recovery rate	• 100% (including the managerial costs and over head costs of Regional Office and Head Office) in most of the old health centre.

Source: Hamid *et al.*, 2005; Ahmed *et al*., 2005; and various official documents of SSS and Grameen Kalyan of GB.

Note: 1. There are 64 districts in Bangladesh.

2. TK.20 is charged for each additional member.

3. Basic medicine: 15 essential medicines are enlisted in the schedule of Government of Bangladesh.

Table-2: Socio-demographic characteristics of the sampled population

Key features	GB1	GB2	GB3	Difference between GB1 and GB2	Difference between GB1 and GB3
Membership rate (%) of households in GB microcredit program	34	32	33	0.02	0.01
Average duration (in year) of membership in microcredit program	9.62 (6.95)	6.42 (6.05)	6.84 (6.25)	3.19***	2.77***
Average length of membership in MHI program	6.01 (2.96)	1.00 (0.20)	-	5.02***	-
Average education level (male)	2.97 (3.16)	4.21 (3.86)	2.97 (3.43)	-1.24***	0.00
Average education level (female)	2.28 (2.73)	2.80 (3.33)	2.23 (2.95)	-0.51*	0.05
Average household size	4.84 (1.39)	4.90 (1.72)	4.62 (1.3)	-0.06	0.23
Male population (%)	50.91	44.84	51.50	0.06**	-.01
Female population (%)	49.09	55.16	48.50	-0.06**	0.01
Average age	25.37 (18.94)	27.45 (20.19)	26.74 (19.29)	-2.08*	-1.38
Average wage (male) in USD	1.3 (0.90)	1.4 (0.93)	1.2 (0.97)	-0.01	0.01
Average wage (female) in USD	0.85 (0.81)	0.86 (0.76)	0.83 (0.80)	-0.01	0.02
No. of MFIs working	5	6	5		

Note: 1. T-statistics are used to test the significance of the difference between the study group and the control cohort.
2. *** indicates significant at the 1% level, **5% level, * 10% level.
3. Magnitudes in round parentheses are standard deviation.

Table-3: Mean/ proportional difference in different poverty indicators between different groups of GB members

Different indicators of poverty measurement	Difference between GB1 and GB2	Difference between GB1 and GB3	Difference between GB2 and GB3
Mean per capita income	82.07***	102.32***	20.24
Mean value of per capita non-land assets	81.50***	65.33***	-16.16
Proportional difference in surplus of food	13.53	18.14	4.61

Note: 1. T-statistics are used to test the significance of the difference between the study group and the control cohort.
2. *** indicates significant at the 1% level, ** significant at the 5% level and * significant at the 10% level.
3. Two-tailed test is considered for each case.

Table-4: Percentage of households living above poverty line by MHI status

Different groups of GB members	Percentage of household above poverty level
GB1 (established MHI)	80.88 (110)
GB3 (no MHI)	69.44 (75)
Proportional difference (in percentage) between GB1 and GB3	11.44*

Note: 1. T-statistics are used to test the significance of the difference between the study group and the control cohort.
2. Figures in parentheses are the number of observations.
3. *** indicates significant at the 1% level, ** 5% level, * 10% level.
4. Two-tailed test is considered.

Table 5: Regression results

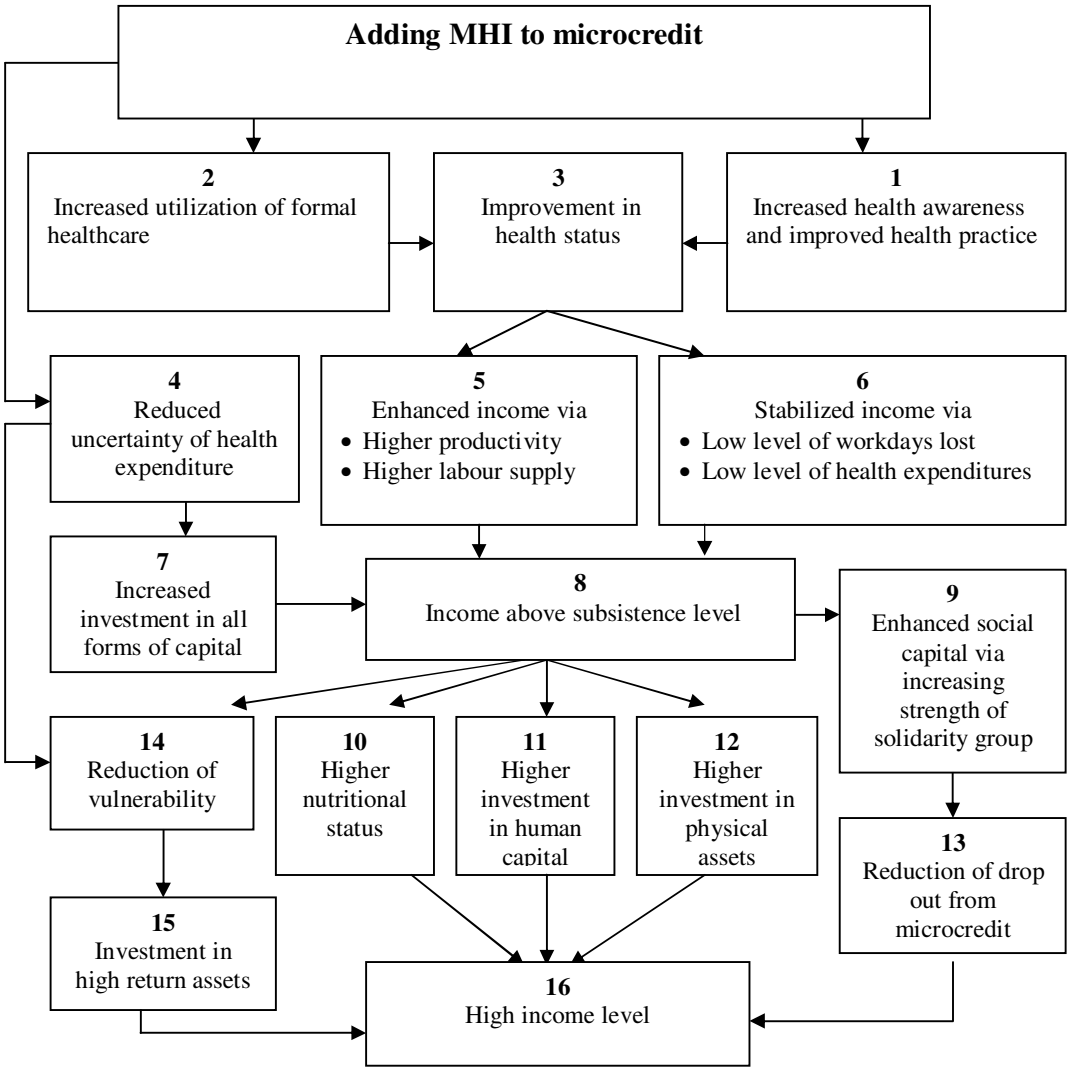
	(i) OLS	(ii) OLS	(iii) ordered probit	(iv) probit
	Log of (annual) per capita income	Log of per capita non-land assets	Food sufficiency: (deficit = 0, neutral = 1, surplus = 2)	Poverty status (0 = below poverty line and 1 = above)
Education of the household head (years)	0.026***	0.006	0.091***	0.062
	(0.009)	(0.023)	(0.028)	(0.038)
Household head in medium grade occupation	0.155***	0.215	0.047	0.216
	(0.061)	(0.140)	(0.171)	(0.204)
Household head in high grade occupation	0.285***	0.538***	0.532**	1.41***
	(0.084)	(0.212)	(0.245)	(0.478)
Education of the microentrepreneur	0.012	0.067**	0.028	0.051
	(0.014)	(0.030)	(0.038)	(0.058)
The ratio of income earners to household size	0.182	0.663**	0.089	0.198
	(0.158)	(0.322)	(0.412)	(0.540)
No. of persons from household living abroad	0.480***	0.595***	0.399*	1.021***
	(0.088)	(0.136)	(0.224)	(0.378)
Owned cultivable land (decimals)	0.002***	0.003***	0.005***	0.009**
	(0.001)	(0.001)	(0.002)	(0.004)
Owned homestead land (decimals)	0.003*	0.011**	0.021***	-0.005
	(0.002)	(0.005)	(0.008)	(0.009)
Membership in GB microcredit (years)	0.008	0.016*	0.042***	0.013
	(0.005)	(0.010)	(0.013)	(0.017
No. of chronic diseased persons	-0.051*	-0.066	-0.001	0.060
	(0.030)	(0.064)	(0.089)	(0.128)
Village literacy rate (%)	0.006	0.021	-0.004	-0.037
	(0.055)	(0.096)	(0.050)	(0.062)
MHI status (1= established MHI, 0 = no MHI)	0.110	0.171	0.398*	0.122
	(0.169)	(0.285)	(0.236)	(0.282)
Constant	4.775**	2.671	-	1.258
	(2.050)	(3.533)		(2.457)
Cut point 1			0.504	
			(1.955)	
Cut point 2			2.241	
			(1.952)	
observations	244	244	244	244
F statistics	15.54***	7.38***		
Wald chi-squared			83.75***	46.62***
R-squared	0.421	0.268		
Pseudo R-squared			0.152	0.166
RESET	F(3, 224) = 0.43 Prob > F = 0.735	F(3, 224) =1.86 Prob > F = 0.123	chi2(1) = 0.21 Prob > chi2 = 0.644	chi2(1) = 0.67 Prob > chi2 = 0.412

Note: 1. *** indicates significant at the 1% level, ** 5% and * 10%.

2. Figures in parentheses are robust standard errors.

3, Coeffcients reprted here for probit and ordered pribit modekls Marginal effects are shown in Appendix Table A3.

Figure 1: Potential effects of adding MHI to microcredit



Appendix

Table-A1: Summary statistics of different poverty indicators

Different groups of GB members	Mean per capita income (in US $)	Mean per capita non-land assets (in US $)
GB-1 (established MHI)	342.67 (174.63)	223.49 (203.44)
	[136]	[136]
GB-2 (new MHI)	260.60 (134.96)	141.99 (106.24)
	[85]	[85]
GB-3 (without MHI)	240.35 (121.44)	158.15 (127.07)
	[108]	[108]
GB (Total)	287.88 (155.59)	180.99 (162.82)
	[329]	[329]

Note: 1. Magnitudes in round parentheses are standard errors.
2. Magnitudes in the square parentheses are the number of observations.

Table-A2: Percentage distribution of households by food sufficiency level

Different groups of GB members	GB-1 (established MHI)	GB-2 (new MHI)	GB-3 (without MHI)
Deficit in whole year	2.21 (3)	7.06 (6)	5.56 (6)
Sometimes deficit	22.06 (30)	31.76 (27)	32.41 (35)
Neither deficit nor surplus	49.26 (67)	48.24 (41)	53.70 (58)
Surplus	26.47 (36)	12.94 (11)	8.33 (9)
Total	100.00 (136)	100.00 (85)	100.00 (108)

Note: Figures in parentheses are the number of observations.

Table-A3: Marginal effects for the ordered probit and probit models in Table 5.

	Food sufficiency level			
	Food Deficit = 0	neither deficit nor surplus = 1	surplus = 2	Poverty status (0 = under poverty line, 1 = above)
Education of the household head (years)	-.030***	0.009**	0.020***	0.016
	(0.009)	(0.004)	(0.006)	(0.010)
Household head in medium grade occupation	-.015	0.005	0.010	0.056
	(0.055)	(0.018)	(0.037)	(0.053)
Household head in high grade occupation	-.148**	0.005	0.142*	0.209***
	(0.058)	(0.025)	(0.075)	(0.038)
Education of the microentrepreneur	-.009	0.003	0.006	0.013
	(0.012)	(0.004)	(0.008)	(0.015)
The ratio of income earners to household size	-.028	0.009	0.020	0.051
	(0.134)	(0.043)	(0.091)	(0.140)
No. of persons from household living abroad	-.129*	0.041	0.088*	0.264***
	(0.073)	(0.027)	(0.050)	(0.096)
Owned cultivable land (decimals)	-.002***	4.95×10^{-4} **	0.001**	0.002***
	(0.001)	(2.6×10^{-4})	(4.3×10^{-4})	(0.001)
Owned homestead land (decimals)	-.007***	0.002**	0.005**	-0.001
	(0.003)	(0.001)	(0.002)	(0.002)
Membership in GB microcredit (years)	-.014***	0.004**	0.009***	0.003
	(0.004)	(0.002)	(0.003)	(0.004)
No. of chronic diseased persons	2.988×10^{-4}	-9.57×10^{-5}	-2.03×10^{-4}	0.016
	(0.029)	(0.009)	(0.019)	(0.033)
Village literacy rate (%)	.001	-3.71×10^{-4}	-0.001	-0.010
	(0.016)	(0.005)	(0.011)	(0.016)
MHI status (1= established MHI, 0 = no MHI)	-.130*	0.045	0.086*	0.032
	(0.078)	(0.030)	(0.051)	(0.074)

Note: 1.marginal effects for dummy variables evaluated for discrete a change from 0 to 1
2. *** indicates significant at the 1% level, ** 5% level, and * 10% level.
3. Figures in parentheses are standard errors.