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Evaluating the Health Effects of Micro Health Insurance Placement: Evidence from Bangladesh

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Abstract:

We examine the impact of micro health insurance placement on health awareness, healthcare utilization and health status of microcredit members in rural Bangladesh, using data from 329 households in the operating areas of Grameen Bank. The results are based on econometric analysis conditioned on placement of the scheme, and show that placement has a positive association with all of the outcomes. The results are statistically significant for health awareness and healthcare utilization, but not for heath status. Our study makes an important contribution to the literature as it provides evidence on the impact of MHI on a broad set of health outcomes.

Key words: Microcredit, Micro Health Insurance, Grameen Bank, Bangladesh

JEL: O12

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Title: Evaluating the Health Effects of Micro Health Insurance Placement: Evidence from Bangladesh

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EVALUATING THE HEALTH EFFECTS OF MICRO HEALTH INSURANCE PLACEMENT: EVIDENCE FROM BANGLADESH

1. INTRODUCTION

Microcredit provides collateral free small loans, especially to women, to enable them to develop household based micro enterprises. A key aim is to break the vicious circle of poverty where low income leads to low saving, therefore low investment, thus low income. 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, welfarists stress the value of adding auxiliary services to improve the effectiveness of the programs (e.g. Bhatt, 2001; Woller *et al.*, 1999; Woller and Woodworth, 2001). Insurance can protect vulnerable people from risks and shocks when existing coping strategies fail. 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, and in addition the government has not been able to meet the health care needs of the rural poor.

Grameen Bank[1] (GB) has played a major role in developing microcredit in Bangladesh. The organization 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) provides a number of services including loans and savings schemes. It added a micro health insurance (MHI) scheme in the late 1990s, in order to protect its clients from health

risks with the aim of preventing their economic downfall. Following GB, some other MFIs introduced MHI schemes with similar aims. These schemes may increase the health status of the participating households via increased health awareness and utilization of modern healthcare. Improved health status may lead to higher productivity, higher labour supply, fewer workdays lost, and reduced healthcare expenditure. In addition, if households are insured against health risk, they may invest in high return riskier assets because they do not need to retain cash or to hold highly liquid assets for precautionary purposes. Kochar (2004) 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. The empirical verification of this issue is important for policy decisions concerning the expansion and replication of MHI schemes.

However, to date there has been very little research on the added effects of MHI. Mosley (2003) examined the added effects of the MHI scheme of BRAC[2] on outcomes such as assets, household expenditure, current saving, educational expenditure, and education level. However, the study did not explore the impact on health outcomes. The evidence was not conclusive because the study was conducted at a very early stage of program development using a small sample. Other MHI studies have concentrated mainly on health outcomes: healthcare utilization and the 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). However, there is no existing evidence regarding the impact of MHI on health outcomes in Bangladesh. This is a serious omission given the size of the microcredit sector in Bangladesh; according to the Palli Karma Sahayak Foundation (http://www.pksf-bd.org) in December 2005, there were about 700 MFIs and 33.17 million microcredit members in Bangladesh.

In this paper, we have explored the added effects of MHI on a broad set of health outcomes: health awareness, utilization of modern healthcare and perceived health status. 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 two 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. We find a positive association between MHI and all of our health outcomes; the results are statistically significant for the determination of health awareness and seeking formal care, but not for heath status.

This paper is organized as follows. Section 2 presents a brief description of health, microcredit and MHI programs in Bangladesh; Section 3 describes the methodology; Section 4 gives the findings; Section 5 provides a discussion on the findings and Section 6 provides the conclusion.

2. BACKGROUND

The constitutional commitment of the government of Bangladesh is to provide basic medical care to all its citizens. The government has been investing substantially since independence to develop the health infrastructure as well as strengthen health and family planning services with special attention to the rural population. Providing Primary Health Care (PHC) 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 provided by a Health Assistant and Family Welfare Assistant at the household level; (ii) Health and Family Welfare Centres at the union level[3], 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 (ESP) which was designed to attain Health for All. In addition to public provision of healthcare, there is a large private sector in Bangladesh, that includes both not-

for-profit and for-profit organizations; 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 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).

Microinsurance refers to "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). In order to expand into areas of social protection not covered in conventional loan-based microfinance, GB set up an MHI scheme for the poor to insure against some health risks[4].

The key features of the GB MHI scheme are shown in Table 1. GB sells annually renewable prepaid insurance cards to its clients and offers primary health care directly from health centres that it operates. The service package comprises mainly curative care and maternity and child health care. Non-cardholders can also seek healthcare from these health centres, but they are charged higher prices than cardholders. The annual premium is low; coverage for a family of up to six costs approximately 1.3 times the average daily male wage for GB microcredit members and 1.7 times for non-members. The main benefits include reduced medical consultation fees (40% of the fee to non-cardholders), discounts on drugs and tests, hospitalization benefits and free annual health

checks and immunization. There are three main ways that someone can join the scheme: GB members can join at weekly microcredit meetings where health workers explain the benefits of joining the MHI scheme; GB members can also enrol during the domiciliary visits provided by the health visitors; GB members and non-members may also buy insurance cards directly from the health centres. GB members can have the costs deducted directly from their GB savings accounts.

[Table 1]

3. DATA AND METHODOLOGY

(a) Data

We collected primary data from a household survey in GB areas in 2006. At this time the MHI scheme was being operated in 32 GB branches; 14 of these had MHI for at least five years; and the remaining 18 for less than five years (two for two years or less). GB microcredit and MHI programs are identical across these branches. In order to construct a meaningful study design, we stratified branches 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.

The sample selection was multistage. One GB branch was selected randomly from each of GB1 and GB2; these are Madhabpur and Pakutia respectively. Madhabpur is located at Singair upazila (sub-district) of Manikgonj district; it has had a microcredit scheme since 1983 and MHI was added in 1996. Pakutai is at Nagarpor upazila of Tangail district it has had a microcredit scheme since 1986 and MHI was added in 2004. One GB branch (Joy Mantap) was purposively selected from GB3; it was chosen from the same upazila (Singair) as Madhabpur, in order to make a meaningful comparison group. There are 8 GB branches in Singair 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 has had a microcredit scheme since

1983; it is adjacent to Madhabpur and they are connected by a main road. GB planned to introduce its MHI scheme into Joy Mantap in the near future[5], which may reduce program placement bias in this design.

Around 96 percent of GB members are female, so we selected only female members for our study. A list of all the villages holding at least one female centre of GB was prepared for each selected area. In the second stage, two villages from each area were selected randomly; a total of six villages. In the third stage, two female microcredit centres were selected randomly from each village where more than two microcredit centres existed. 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 minimise sample selection bias.

We used a set of questionnaires to collect both household level and village level information. The survey instruments were finalized after incorporating comments from a number of experts who were sent a preliminary draft, as well as feedback from two rounds of piloting. We employed six experienced female surveyors, comprising four field investigators, one field supervisor and one quality controller. They were given five days of training on the purpose of the study and on the survey instruments.

The main respondents were the female microcredit members, but some questions about household finances (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. One researcher entered the data and a second researcher checked the data entry.

(b) Method

One of the major challenges in estimating the impact of a program like MHI using non-experimental data is to deal with endogeneity – heterogeneity in unobservable individual characteristics of the participants and non-participants, which influences both the decision to participate in the scheme and the outcome. Random assignment of individuals into a treatment group and a control group is one solution but this 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 (e.g. Pitt and Khandker, 1998; Waters, 1999; Jutting, 2004) we firstly consider a structural equation:

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

y_{ij} is the outcome of interest (health awareness, utilization of formal healthcare or health status) of household i in village $)$[6]. X_{ij} is a vector of observed individual, household and village characteristics (for example education, age, duration of membership in MHI). A_{ij} is a binary variable where $A_{ij}=1$ if household i of 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.

We then consider a reduced form (participation) equation:

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

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 analysing 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 spillover or open access effects. This is because the MHI scheme offered by GB is different from a traditional three-party (the insurer, the insured and health service providers) health insurance system. GB MHI provides healthcare directly to their clients through establishing health centres instead of simply paying coverage. In addition, GB MHI offers health promotion and health education to all the microcredit members living in the catchment area of the health centre regardless of their participation in MHI. Moreover, the uninsured can seek healthcare from the health centres by paying the standard fees. If these spillover effects are not taken into account, the impact of MHI will be severely underestimated. Second, there is a very high enrolment rate in MHI at GB1 (96%), so there are very few observations in the non-participant group, hence the estimation of equation (1) may not give reliable 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 has compared program and comparison groups where the program was in the pipeline (Chase, 2002; Galasso and Ravallion, 2004), the other has compared program and comparison groups where the program has not been placed at the time of survey (Amin *et al*., 1996; Hadi, 2002). The 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 obtain benefits from MHI due to spillover effects.

The major concern with 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.

We took the following measures to select a suitable comparison area. First, selecting the program area (GB1) and control area (GB3) from the same small geographical area 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 were placed in their area, to control for demand side bias. Note that the willingness to enrol in MHI in GB3 was 98%, which is 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 is also worth stressing that we conducted the survey on women microcredit members and these are a relatively homogeneous group of people, in both the program area and the control area.

(c) Dependent Variables

Our analysis considers three types of health outcome measures: health awareness, health status and heath care utilization, which can be considered to be related in a causal chain. We explore the relationships between our outcome measures in the results section. The cross section data used here

does not enable us to draw causal inferences but studying the outcomes independently is also a valuable contribution to the literature on the effects of MHI in Bangladesh.

(i) Health awareness

Health awareness is measured in relation to three important aspects of health: diarrhoea, vitamin A deficiency and maternal health during pregnancy. These health problems cause a huge disease burden in Bangladesh[7] and have been the focus of the ESP, which is targeted at ensuring health care for vulnerable groups. The problems arising from these three conditions can be reduced by increasing awareness about danger signs and treatments. This information is disseminated by the Ministry of Health and Family Welfare via posters, radio and television. In addition, the GB MHI scheme promotes this information in its health education activities.

Respondents were asked to state the: (i) main treatments for diarrhoea; (ii) major natural food sources of vitamin A; (iii) major health danger signs during pregnancy. A list of all correct answers was provided to the interviewer but not shown to the respondent (see Table-A1 in the Appendix); the list also included an 'other' option to code incorrect responses. Respondents could therefore give multiple correct answers, multiple incorrect answers or state that they 'do not know'. These responses were used to construct four separate indices of health awareness, giving a weight of one to each correct answer and zero to an incorrect answer or 'do not know'. A pooled index was constructed incorporating all three health issues with equal weight[8]. The indices are given below:

$$AD_i = \frac{d_i}{n_d} \quad , \tag{4}$$

$$AVA_i = \frac{v_i}{n_v} \tag{5}$$

$$AANC_i = \frac{anc_i}{n_{anc}} \tag{6}$$

$$PI_i = \frac{1}{3}\left[\frac{d_i}{n_d} + \frac{v_i}{n_v} + \frac{anc_i}{n_{anc}}\right] \quad (7)$$

where AD_i, AVA_i and $AANC_i$ are indices of awareness of diarrhoea, vitamin A and ante-natal care respectively and PI_i is the pooled (general) health awareness index for household i. n_d represents the total number of major methods of treatment for diarrhoeal disease and d_i represents the number correctly stated by respondent i. Similarly, n_v represents the total number of major sources of vitamin A and v_i the number of correct responses given; n_{anc} is the total number of major danger signs arising during pregnancy and anc_i the number of correct responses.

Most of the previous literature on awareness about diarrhoeal diseases (Konde, 1992; McLennan, 1998), vitamin A deficiency (Genebo and Gelaw, 2000) and maternal health (Smith *et al.*, 2004; Xue *et al.,* 2007) has relied on closed questions. We have used open questions to provide the respondents with sufficient scope to articulate their knowledge.

(ii) Utilization of formal (modern) healthcare

The survey asked about any conditions suffered by any household members during the previous month. For all individuals experiencing acute or chronic illnesses[9] we asked whether they received treatment for their condition in the past month, and what type of healthcare they received[10]. Healthcare was classified as: (i) informal - including self-treatment and care provided by practitioners with no formal medical training (e.g. drug store salesmen and traditional healers); (ii) public provision[11]; (iii) provided by MHI; and (iv) private (formal) provision[12]. Categories (ii) to (iv) are classified as formal (or modern) healthcare.

(iii) Health status

We use two measures of health status, self-assessed (general) health (SAH) and an index of physical functioning. For the former the microentrepreneur is asked how good their current health is compared to people of their own age, with responses on a five point scale: excellent, good, fair, poor and very poor. This is a standard question used in many national surveys, such as the European Community Household Panel and the US Panel Study of Income Dynamics. It is subjective and therefore may be prone to reporting bias. Most of the evidence on the validity of self-assessed health comes from the developed world and here a number of studies have shown it to be strongly correlated with more objective measures, such as mortality and the onset of a number of serious health conditions, even after controlling for socio-economic factors, physician health assessments and the presence of specific health conditions (see for example Idler and Benyamini, 1997; Hurd and McGarry, 1995).

As an alternative, and arguably more objective, measure we have also used a set of physical functioning indicators usually termed activities of daily living (ADL). These indicators are ability to: carry a heavy load for 20 metres, sweep the floor or yard, walk for five kilometres, take water from a tube-well or a pond, bend, kneel, or stoop. This follows Gertler and Gruber (2002) and Gertler *et al.* (2009) who used this type of measure in the Indonesian context. For each function respondents can choose one of three responses: can do it easily (score 3), can do it with difficulty (score 2), unable to do it (score 1). An index is constructed, where the magnitude is one if the respondent is able to perform all the ADL easily, and zero if she is unable to perform any ADL.

$$ADL = \frac{Score - MinScore}{MaxScore - MinScore} \qquad (8)$$

4. FINDINGS

(a) Descriptive Statistics

Sample characteristics are summarized in Table 2. A total of 329 households were surveyed; 136 were from GB1, 85 from GB2 and 108 from GB3. The overall response rate was 73 percent, with

little variation across the three areas; and little variation in response rates between the insured and the uninsured[13]. The participation in MHI among the households interviewed in the survey was 82 percent (96 percent at GB1 and 59 percent at GB2).

There is no significant difference in socio-demographic features, apart from duration of membership in microcredit, average household income and sources of income, between the program area (GB1) and the control area (GB3). 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. 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 five years experience of MHI (the average experience is about six 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 of the microentrepreneurs were married in all the sampled areas; the majority had no formal education; 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[14]; and this was around 44 percent for the microentrepreneurs in GB1. A good number (28%) of microentrepreneurs in 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 in 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 labor were the major occupations of household heads in all the areas.

Table 3 reports correlations between the different outcome measures. There are significant correlations between almost all of the measures; in particular the pooled health awareness index is strongly correlated with SAH, ADL and formal health care use, and formal health care use is strongly correlated with health awareness. Chronic disease status is also included here since it is used as a control variable in our multivariate analysis; it is closely correlated with self-reported health and ADL.

(i) Health awareness

The mean difference between (i) GB1 (established MHI) and GB2 (new MHI), (ii) GB1 and GB3 (without MHI), and (iii) GB with MHI (both GB1 and GB2) and GB3 is positive and highly significant for all health awareness indices and the pooled index (see Table 4). Diarrhoea awareness (AD) is substantially higher than the other indices.

[Table 4]

(ii) Utilization of formal (modern) healthcare

About 59 percent of the households (193 out of 329) had at least one acute or chronic diseased person during the month prior to the survey. A total of 286 individuals had been sick in 193 households (85 in GB1, 48 in GB2 and 60 in GB3). We focus on the last episode of disease in each household. Most (94%) of the sick individuals received treatment. A substantial proportion of the insured did not seek healthcare from MHI in either GB1 or GB2. The majority of the households (52%) did, however, seek treatment from MHI in GB1 while the majority of the households in GB2 and GB3 sought healthcare from informal providers (see Table 5; Panel A)[15]. The proportional difference in the use of formal care between GB1 and GB2 and between GB1 and GB3 is positively significant at the one percent level (see Table 5; Panel B).

[Table 5]

(iii) Health status

The largest share of respondents reported their health status as *good* in each area (see Table 6; Panel A). The program area (GB1) had better health status compared to the comparison area (GB3). At GB1 about 84 percent of the respondents reported their health status as excellent, good or fair. The corresponding figures for GB2 and GB3 were 73 percent and 68 percent respectively.

[Table-6]

There is a positive proportional difference between GB1 and GB3 in the *good* and *fair* categories of SAH and a negative difference in the *poor* category (see Table 6; Panel B)[16]. However, the difference is not significant for any category of SAH. For the ADL index, mean health status is high for all sub-sets of the data (see Table 6; panel B). The difference between GB1 and GB2, as well as between GB1 and GB3, is positive and significant at the five percent level.

(b) Multivariate Analysis

The regression results are presented in Table 7. The estimation technique is chosen depending on the form of the dependent variable: (i) OLS for the continuous pooled health awareness index *(PI*), since the histogram of the data is approximately normal[17]. We concentrate only on the pooled index because the descriptive statistics reveal similar results for all of the separate components; (ii) a probit model for the dichotomous variable utilization of formal healthcare; (iii) an ordered probit for SAH of the microentrepreneur, where very poor = 0, poor =1, fair =2, good =3 and excellent = 4[18]. (iv) a Tobit model for the ADL index (as recommended by Austin *et al.,* 2000 and Austin, 2002)[19]. The Tobit model is censored at full health because the distribution of the index is highly skewed to the left i.e. a substantial number of respondents have a score of one indicating a ceiling effect. For ease of interpretation all of the outcome variables are increasing in health (or health awareness); also all of the models are estimated conditioned on the placement of the program. The coefficient estimates for all models are reported in Table 7 and the marginal effects for the probit and ordered probit models are shown in the Appendix, Table A2.

The key explanatory variable of interest is MHI placement (1 = yes, 0 = no), and we expect a positive relationship with all of our outcome variables. The control variables included in these models are as follows. Age and squared age (in years) and marital status (1 = married, 0 = otherwise) of the microentrepeneur are included in models (i), (iii) and (iv). The direction of the relationship between health awareness and age is unclear a priori; experience may increase awareness but memory problems may decrease it. Marital status is likely to have a positive association with health awareness, especially in relation to maternal health, and there is also empirical evidence that health status is positively related to marriage, although most of this comes from developed countries. Model (ii) includes age (and squared age) and sex (1 = male, 0 = female) of the diseased person; for age the relationship with the outcome (utilization of formal health care) is not known a priori, but for sex we expect a negative relationship since the insurance cardholders are largely female and many are of childbearing age so are likely to seek formal care during pregnancy and for their children. All of the models, apart from (ii), include education level of microentrepreneur (completed years) and this is expected to be positively related to health awareness, but the direction of the effect on SAH and ADL is not clear. Model (ii) includes education of the household head because the head usually decides where to seek healthcare; we expect this to be positively related to utilization of formal care. Model (ii) includes a dummy for whether the diseased person is chronically ill (1= chronically ill, 0 = otherwise) and we expect this to be positively related to the utilization of formal care; models (iii) and (iv) have a similar dummy for chronic disease status of the microentrepeneur and this is expected to be negative related to health status. All models include duration of membership in microcredit this is expected to be positively related to health awareness because the programs provide information on basic health promotion. We also expect it to be positively related to seeking formal health care, but there is no clear a priori relationship with health status. All models also include the literacy rate of the village (as a percentage) and it seems reasonable to expect that this is positively related to health awareness and utilization of formal care. Models (ii) to (iv) include per capita household income, which is

expected to contribute positively to all outcomes. Since TV and radio are used to convey government health messages, ownership is expected to be positively related to health awareness. Thus, model (i) includes ownership of TV and radio (1 = yes, 0 = no).

Looking across the columns in Table 7, education of microentrepreneur and ownership of TV and radio contribute positively to increase health awareness; sex of the diseased person, length of membership in microcredit program and per capita income have strong relevant influence on seeking healthcare from formal provider; and chronic disease status of microentrepreneur consistently influences the health status of both of the measures. In all cases the coefficient on MHI placement status is positive and it is statistically significant in determining health awareness and seeking healthcare from formal source. Turning to the marginal effects in Table A2, these appear sensible with MHI having a large effect on utilization of formal health care.

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

5. DISCUSSION

Our findings suggest that MHI placement contributes to increasing awareness of important health problems and to the probability of seeking formal care. However, the contribution of MHI to improvement in health status is yet to be evidenced. A number of factors may contribute to this result. First, there may be some reporting bias regarding the health status of the microentrepreneurs.

The majority report themselves to be in good health and it is possible that respondents, regardless of whether living in program area or comparison area, may have the idea that if they do not claim themselves to be healthy they may not obtain microcredit in the future. Second, MHI schemes provide basic primary healthcare, which may take a relatively long time to generate a significant impact on health status. 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[20].

Third, many insured households do not seek treatment from the MHI health centres, instead they mainly seek healthcare from informal providers. There are a number of potential reasons for this (both demand side and supply side), and evidence for these was gathered during qualitative interviews with respondents during the fieldwork. There are the relatively high costs of seeking healthcare from MHI compared to available alternatives (especially, informal providers); the main sources of these costs are consultation fees and drugs. MHI schemes charge consultation fees (co-payments) to deter over utilization of health care by the insured (moral hazard), and these 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. In addition, there are usually a number of alternative providers close to the home, compared to one busy MHI health centre. Further, as observed during our interview work, there is a substantial lack of understanding around risk-sharing and the role of insurance among the insured; a finding also reported by Desmet *et al*., (1999) in their study of insurance in Bangladesh.

Fourth, there may have some program placement bias, i.e., MHI may have been placed in the areas where people had poorest health. Although some measures were undertaken this study could not fully control for program placement bias using cross section data. The GB MHI scheme has been gradually placed where government provision was not functioning well. If MHI was placed earlier

in the areas with the worst health we would expect this to bias our results against finding an effect of MHI placement. Finally, improvement of health status is a dynamic effect of MHI, thus a single cross section may not be adequate to capture the full impact of MHI.

Our study uses primary data collected expressly for the purpose of assessing the impact of MHI, and we apply appropriate methods of analysis, however there are still some limitations; these largely arise from time and resource constraints[21]. First, the study is limited to a single cross section, and further work should focus on collecting longitudinal data in order to control for unobserved heterogeneity and reduce endogeneity bias, and also because it is more appropriate for the analysis of dynamic outcomes. Second, our sample is not completely representative of the insured population. Although the GB MHI scheme is open to everyone, irrespective of GB microcredit status, the scheme does centre on microcredit members so we have focused on them[22].

While GB microcredit does try to include the poorest of the poor, it (like many similar schemes) may miss them. Finally, we only measure the health status of microentrepreneur, and not the health status of all the members in the households.

6. CONCLUSIONS

This study has outlined the mechanisms by which adding MHI to microcredit schemes can contribute to improving health awareness, health seeking behaviour and health status. We have investigated this in the context of GB, the largest microcredit organization in Bangladesh. Where MHI is available take-up rates are very high and there are large potential spill-over effects, so we have focused on the effects of MHI placement. Our results show a positive association between MHI placement and all of our health outcome measures. The results are statistically significant for the determination of health awareness and seeking formal care, but not for health status. 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. Nevertheless, the study makes an important contribution to the literature as it provides comprehensive evidence on the impact of MHI on a broad set of health outcomes.

Our findings are potentially important for the expansion or replication of MHI by MFIs in Bangladesh. However, in practice most MFIs do not have the capacity (either managerial or financial) to expand this provision. MHI has been mainly operated in the areas where government healthcare facilities are not functioning well. Thus, one possible solution is for government to contract out its poorly functioning health centres to the existing micro insurers. This could generate a number of benefits including saving the rental or construction costs of new health centres, enhancing the confidence of both clients and health personnel regarding the sustainability of the program, and avoiding inefficient duplication of health service provision.

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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. The program is identical in all areas.
Mechanisms for providing health services	• Mainly through static clinics[(1)]. • Also via mobile clinics, satellite clinics and domiciliary visits (by the health workers). • Limited emergency services through static clinics. • Referral services via agreements with some hospitals.
Technical staff	• An MBBS (Bachelor of Medicine and Bachelor of Surgery) doctor. • A female DMF (Diploma in Medical Faculty). • An office manger, a female paramedic, 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.
Eligibility criterion	• GB member households or any villagers living within 8 km of 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 cardholders	• Co-payment: § Medical consultation fee, cardholder: TK.10 (US $0.14) § Medical consultation fee, non-cardholder: 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 premiums and co-payment.
Cost recovery rate	• 100% (including the managerial costs and overhead costs of Regional Office and Head Office) in most of the old health centres.
Joining mechanism	• at weekly microcredit meetings for GB members • via health visitor domiciliary visits for GB members • at health centres; for GB members or non-members.

Source: Hamid et al., 2005b; Ahmed et al., 2005; and various official documents of SSS and Grameen Kalyan of GB.
Notes: (1) Static clinics are the normal clinics where patients come to seek health services; in contrast to 'satellite clinics' where the physicians/nurses visit a location regularly to provide care. (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
No. of households	136	85	108		
Survey response rate (%)	75	68	73	.05	.05
Membership rate of households in GB microcredit program (%)	34	32	33	0.02	0.01
Average duration of membership in microcredit program (years)	9.62 (6.95)	6.42 (6.05)	6.84 (6.25)	3.19***	2.77***
Membership rate of households in MHI program (%)	96	59	-	37.5***	-
Average length of membership in MHI program (years)	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
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 male wage (USD)	1.3 (0.90)	1.4 (0.93)	1.2 (0.97)	-0.01	0.01
Average female wage (USD)	0.85 (0.81)	0.86 (0.76)	0.83 (0.80)	-0.01	0.02
Average household income in USD	1301 (728)	974 (489)	874 (414)	326***	427***
Income sources[(1)]					
wages/salaries	0.18	0.25	0.26	-.07***	-.08***
agriculture	0.23	0.26	0.28	-.03***	-.05***
business	0.36	0.28	0.35	.08***	.01***
other	0.23	0.21	0.11	.02***	.12**
No. of MFIs working in area	5	6	5		

Note: 1. t-tests are used to test the statistical significance of the difference in each case. *** indicates significant at the 1% level, **5% level, * 10% level. Magnitudes in round parentheses are standard deviation.

(1) Denotes proportion of total household income from each source.

Table 3: Pairwise correlations between outcome measures

	Health awareness				Health status			
	Vit A	Diar	Mat	Pooled index	SAH	ADL	Chronic Disease status	formal health care use
Vit A	--	0.50***	0.57***	0.83***	0.19***	0.12*	-0.12*	0.35***
Diar	--	--	0.49***	0.82***	0.14**	0.13**	0.12*	0.36***
Mat	--		--	0.64***	0.11*	0.07	0.02	0.34***
Pooled index	--	--	--	--	0.17***	0.13**	0.02	0.45***
SAH	--	--	--	--	--	0.81***	-0.14**	0.09
ADL	--	--	--	--	--	--	-0.18***	0.14*
Chronic disease status								0.31**
formal health care use	--	--	--	--	--	--		--

Note: *** indicates significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. Spearman's rank correlation used where outcomes are ordinal.

Table-4: Mean and mean difference in health awareness index by GB branch type

Different groups of GB members	**Health awareness indices**			
	AD	**AVA**	**AANC**	**Pooled index**
	diarrhoea	**Vitamin A**	**Antenatal**	
GB1 (established MHI)	0.60(0.15) [136]	0.34(0.19) [136]	0.42(0. 17) [136]	0.45(0.12) [136]
GB2 (new MHI)	0.36 (0.15) [85]	0.19 (0.14) [85]	0.20 (0.19) [85]	0.25(0.11) [85]
GB3 (without MHI)	0.39 (0.17) [108]	0.16 (0.16) [108]	0.16 (0.17) [108]	0.23(0.13) [108]
GB1 and GB2	0.51(0.19) [221]	0.28(0.19) [221]	0.33(0.21) [221]	0.37(0.15) [221]
Difference between GB1 and GB2	0.24***	0.16***	0.22***	0.20***
Difference between GB1 and GB3	0.21***	0.18***	0.26 ***	0.22***
Difference between GB2 and GB3	-0.03	0.03	0.04	0.02
Difference between GB with MHI (GB1 and GB2) and GB3	0.12***	0.12***	0.18***	0.14***

Note: t-tests are used to test the statistical significance of the difference in each case. *** indicates significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. A two-tailed test is considered for each case. Figures in round parentheses are standard deviations. Figures in square parentheses are the number of observations.

Table-5:

Panel A: Percentage distribution of households by the source of healthcare

Sources of Healthcare	Percentage distribution of households					
	GB1		GB2		GB3	
	%	n	%	n	%	n
Informal	29.6	24	63.6	28	75.4	43
Public	2.5	2	6.8	3	7.0	4
MHI	51.8	42	15.9	7	1.8	1
Private	16.1	13	13.6	6	15.8	9
Total	100	81	100	44	100	57

Panel B: Proportional difference in the utilization of formal (modern) care by different groups of GB members

Proportional difference (in percentage) in the utilization of formal care	
Difference between GB1 and GB2	34.01***
Difference between GB1 and GB3	45.81***
Difference between GB2 and GB3	11.80

Note: t-tests are used to test the statistical significance of the difference in each case. *** indicates significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. A two-tailed test is considered for each case.

Table-6

Panel A: Mean ADL score and percentage distribution of households by self-reported health status of the microentrepreneurs

Self-reported health status	Percentage distribution of households					
	GB1 (Established MHI)		GB2 (new MHI)		GB3 (no MHI)	
	%	n	%	n	%	n
Excellent	0.7	1	0	0	4.6	5
Good	57.4	78	38.8	33	45.4	49
Fair	25.7	35	34.1	29	17.6	19
Poor	16.2	22	25.9	22	28.7	31
Very poor	0	0	1.2	1	3.7	4
Total	100	136	100	85	100	108
Mean ADL score (st. dev)	0.88 (0.19)		0.81 (0.22)		0.82 (0.23)	

Panel B: Difference in mean ADL index and proportional difference in self reported health status between different sub-sets of GB members

Proportional difference (in percentage)	Self-reported health status			Difference in mean ADL index
	Good	Fair	Poor	
Between GB1 and GB2	19.27*	-8.38	-10.88	0.07***
Between GB1 and GB3	8.09	8.15	-16.23	0.06**
Between GB2 & GB3	-11.18	16.53	-5.35	-0.01

Note: t-tests are used to test the statistical significance of the difference in each case. *** indicates significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. A two-tailed test is considered for each case.

Table 7: Multivariate Analysis Results

Explanatory variables	(i) OLS estimation of health awareness (*PI*)	(ii) Probit Utilization of formal healthcare =1	(iii) Ordered probit self-rep. health (very poor = 0, poor =1, fair =2, good =3, excellent = 4)	(iv) Tobit ADL index
Age of microentrepreneur	-0.007 (0.006)	-	0.058 (0.050)	0.009 (0.016)
Squared age of microentrepreneur	0.0001 (0.0001)	-	-0.001* (0.001)	-0.0003 (0.0002)
Age of the diseased person	-	-0.023 (0.018)	-	-
Squared age of the diseased person	-	0.0003 (0.0002)	-	-
Sex of the diseased person (1= male)	-	-0.569** (0.266)	-	-
Marital status of microentrepreneur (1= married)	0.039 (0.035)	-	0.074 (0.297)	-0.014 (0.106)
Education of microentrepeneur or household head[(1)]	0.014*** (0.004)	0.076* (0.041)	0.012 (0.038)	-0.009 (0.011)
Chromic disease of the household member (1= yes)	-	0.533* (0.305)	-	-
Chronic disease of microentrepreneur (1= yes)	-	-	-0.351** (0.172)	-0.130** (0.057)
Duration of membership in microcredit program	0.002 (0.001)	0.040** (0.019)	-0.009 (0.013)	-0.003 (0.004)
Ownership of TV and Radio (1= yes)	0.036** (0.018)	-	-	-
Per capita household income (100 USD =1 unit)	-	0.164** (0.078)	.076 (.047)	0.030* (0.016)
Literacy rate (percentage)	0.007 (0.005)	0.069 (0.067)	0.014 (0.052)	-0.009 (0.015)
MHI placement (1= yes, 0= no)	0.222*** (0.022)	1.402*** (0.321)	0.203 (0.204)	0.057 (0.067)
Constant	0.041 (0.241)	-3.907 (2.625)	-	1.315** (0.670)
Cut point 1	-	-	-1.918 (2.116)	-
Cut point 2	-	-	-0.383 (2.134)	-
Cut point 3	-	-	0.280 (2.133)	-
Cut point 4	-	-	2.455 (2.105)	-
Sigma	-	-	-	0.320 (0.023)
No. of observations	244	138	244	244
F-statistics /Wald chi^2 / LR chi^2	31.58***	43.66***	32.95***	40.48***
R^2/ Pseudo R^2	0.479	0.308	0.0456	-
Log pseudo likelihood/ Log likelihood	-	-66.196	-271.011	-112.476
RESET	F(3, 232) = 0.82 Prob > F = 0.486	chi2(1) = 0.23 Prob > chi2 =0.628	chi2(1) = 0.18 Prob > chi2 = 0.669	F(1, 234) = 0.00 Prob > F = 0.968

Notes: *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Figures in the parentheses are Huber-White robust standard errors for ordered probit model and simple standard errors for tobit model. Coefficients reported for probit and ordered probit models; marginal effects are shown in Appendix Table A2.
(1) Education of the household head is applicable only for model (ii).

APPENDIX

Table-A1: Questions used to collect data for health awareness

How can you treat diarrhoea? (Multiple responses are applicable)	What are the major natural food sources of vitamin A? (Multiple responses are applicable)	What are the major signs that arise at the time of pregnancy, which are very dangerous to the mother? (Multiple responses are applicable)
1. OR saline	1. Carrot	1. Severe headache and blurry vision
2. Solution of salt and sugar/gur	2. Sweet potato	2. Eclamsia
3. Water of green coconut	3. Sweet pumpkin	3. Unsmooth delivery/ Delayed delivery
4. Melted rice	4. Ripe papaya	4. Excessive bleeding
5. Consult with doctor	5. Ripe banana	5. High fever
6. Do not know	6. Molasses	6. Does not know
7. Others (specify)	7. Amaranth leaves	7. Others (specify)
	8. Do not know	
	9. Other (specify)	

Note: The respondents were not shown possible answers during the interview.

Table-A2: Marginal effects for the ordered probit and probit models in Table 8.

Explanatory variables	Probit	Ordered probit self reported health				
	utilization of formal healthcare =1	v poor =0	poor =1	fair =2	good =3	excellent = 4
Age of microentrepreneur (years)	-	-0.002	-0.015	-0.006	0.020	0.003
		(0.002)	(0.014)	(0.005)	(0.017)	(0.003)
Squared age of microentrepreneur	-	0.000	0.0003*	0.0001*	0.0004*	0.000
		(0.000)	(0.0002)	(0.0001)	(0.002)	(0.000)
Age of diseased person (years)	-0.009	-	-	-	-	-
	(0.007)					
Squared age of diseased person	0.0001	-	-	-	-	-
	(0.0001)					
Sex of diseased person (1 = male)	-0.224**	-	-	-	-	-
	(0.102)					
Marital status of microentrepreneur (1= married)	-	-0.002	0.075	-0.007	0.026	0.003
		(0.009)	(0.083)	(0.026)	(0.106)	(0.012)
Education of microentrepreneur (in years)	0.030*	0.000	0.096	-0.001	0.004	0.001
	(0.016)	(0.001)	(0.010)	(0.004)	(0.013)	(0.002)
Chromic disease status of household member (1= yes)	0.208*	-	-	-	-	-
	(0.115)					
Chronic disease status of microentrepreneur (1= yes)	-	0.013	0.099*	0.028**	-0.126**	-0.014*
		(0.009)	(0.052)	(0.012)	(0.063)	(0.008)
Duration of membership in microcredit program (in years)	0.016**	0.000	0.002	0.001	0.023	0.000
	(0.008)	(0.000)	(0.003)	(0.001)	(0.004)	(0.001)
Per capita household income (100 USD =1 unit)	0.065**	-0.002	-0.020	-0.008	0.026	0.004
	(0.031)	(0.002)	(0.013)	(0.005)	(0.017)	(0.003)
Literacy rate (percentage)	0.027	-0.000	-0.004	-0.001	0.026	-0.001
	(0.027)	(0.001)	(0.014)	(0.005)	(0.018)	(0.002)
MHI placement (1= yes, 0= no)	0.515***	-0.006	-0.051	-0.020	0.071	0.009
	(0.098)	(0.007)	(0.056)	(0.019)	(0.072)	(0.010)

Notes

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

[2] One of the large MFIs in Bangladesh; its full name is Bangladesh Rural Advancement Committee.

[3] There are 64 districts in Bangladesh, and 482 'upazilas' (or sub-districts), which are the lowest level of administrative government; each upazila is sub-divided into smaller local 'unions'.

[4] Some other organizations (BRAC, Society for Social Services, Sajida Foundation, Shakti, Dhaka Community Hospital, Nari Uddug Kendra, Dushtha Shasthya Kendra, and Integrated Development Foundation) also offer a prepaid health program in Bangladesh but the GB program is the largest.

[5] GB did place its MHI scheme here later on, but it was subsequently withdrawn due to establishment of a hospital by a local philanthropist.

[6] The exact specification of the model depends on the nature of the outcome (continuous, binary, ordered).

[7] For up-to-date statistics on the health profile on Bangladesh, see www.searo.who.int

[8] Equal weights were chosen in the absence of information regarding the disease burden of each issue separately.

[9] Diseases are broadly classified into acute and chronic based on the UMS Chronic Disease List, www.ukzn.ac.za/ukznms/CDL%202006.pdf

[10] Information was collected regarding the first contact with a health provider for those who sought treatment.

[11] Public providers consist of the medical personnel of different government hospitals.

[12] Private providers include the medical personnel of private and NGO hospitals and clinics, and private practice of public providers.

[13] We could not interview some households due either to absence of the key respondent or unwillingness to take part. The survey was conducted during harvesting season hence people were away from home for long periods during the day. One repeat visit was made to absent households. Respondents were not pressurized nor offered motivation to take part in the interview.

[14] Livestock rearing, poultry feeding, farming, tailoring, etc. fall in this category.

[15] While MHI is not available in GB3, one of the households of GB3 sought healthcare from MHI at the special request of the Branch Manager of the microcredit program.

[16] As there are very few observations in the *excellent* and *very poor* categories, we have merged *excellent* with *good* and *very poor* with *poor*.

[17] In further analyses we also applied an ordered probit model by breaking down the index into 5 equal groups; the results do not differ significantly from the OLS results reported here.

[18] In a Wald test for the parallel odds assumption underlying this model, which compares the estimates to those from a generalized ordered probit model (Boes and Winkelmann, 2006), the null hypothesis cannot be rejected

[19] We also estimated the ADL model using interval regression with robust standard errors, and the results are very similar to the tobit results reported here.

[20] 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.

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

[22] In purely practical terms our data collection was facilitated by the cooperation of GB. It would have been much more difficult for us to access people with no connection to GB, and given we had no funding for this work we decided not to do this.