

Delivering health insurance through informal financial groups: Evidence on moral hazard and adverse selection

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Moral hazard and adverse selection are potential explanations for missing health insurance in low-income countries. In recent years, informal financial institutions have attempted to complete health insurance markets by offering micro health insurance (MHI). We evaluate an MHI offered through informal financial institutions (Self Help Groups) in Maharashtra, India. Exploiting random assignment of when villages were offered the MHI, we find no support for MHI increasing health care utilization. In contrast, we do find evidence for adverse selection: enrollees are significantly more likely than non-enrollees to report poor health *prior* to the introduction of MHI. This adverse selection persists even when the MHI is offered as a group insurance to Self Help Groups, as opposed to individual insurance. Our results suggest that MHI offered through informal financial groups may not suffer from moral hazard, but does fall short of eliminating adverse selection.

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I. Introduction

Health care is a significant expense for poor households (Banerjee et al. 2009, Dupas and Robinson 2009) and informal risk pooling is incomplete (Townsend 1994, Morduch 1999, Jalan and Ravallion 1999). This suggests that health insurance is an important tool for increasing welfare and reducing vulnerability of the poor. Yet, formal health insurance has been virtually non-existent in most low-income countries (World Health Organization, 2015). These missing health insurance markets are often explained by information asymmetries, such as adverse selection and moral hazard ¹.

In recent years, informal financial institutions² have attempted to overcome these missing markets by delivering health insurance through their platforms, commonly referred to as micro health insurance, MHI (Chandani and Garand, 2013). In this paper, we estimate the extent to which adverse selection and moral hazard are barriers in providing sustainable health insurance through such informal financial institutions.

We evaluate a micro health insurance scheme offered in Maharashtra, India through Self Help Groups (SHGs), a common informal financial institution. The MHI provided discounted prices and reimbursement for inpatient care at selected health care providers, with a cap on the total amount reimbursed. SHG members were offered group insurance—that is, the SHG enrolled as a unit. Additional household members were then offered individual insurance, conditional on the SHG member having enrolled in the MHI. The purpose of insuring the SHG as a unit, rather than

¹ Adverse selection is the concern of insurance demand increasing with adverse health risk, and insurers being unable (or unwilling) to price premiums according to that health risk (Akerlof, 1970). Moral hazard is the concern that becoming insured results in increased demand for medical care and reduced aversion to loss from health (Arrow, 1963).

² Examples of informal financial institutions include microfinance institutions, Self Help Groups (SHGs), Rotating Savings and Credit Associations (ROSCAs), and Village Saving and Loans Associations (VSLAs).

providing individual insurance, was to improve the average health risk of the insured risk pool and overcome adverse selection. 65 percent of SHG members enrolled, a rate significantly higher than most microinsurance programs, in which take-up rates rarely exceed 30 percent (Matul et al. 2013, Platteau et al. 2017).

The MHI was initially offered to 21 randomly selected villages. To study moral hazard, we compare demand for medical care in these villages versus those that had not yet received the MHI. We observe no difference in households' health care utilization after 18 months. The lack of increased health-seeking behavior suggests that moral hazard concerns for the MHI are low.

To study adverse selection, we estimate whether adverse health predicted *future* enrollment in the remaining 22 villages that had not yet received the MHI. Despite insuring groups, we find evidence of adverse selection. Those who reported being ill *prior* to being offered the MHI were 35 percent more likely to enroll. This suggests that baseline adverse health is predictive of insurance demand. The relationship is robust to several additional specifications, including using only variation based on differential enrollment within the same household. However, the severity of adverse selection is greater among those offered individual insurance rather than group insurance. As MHIs generally offer a flat premium to all members³, this association implies that adverse selection is a barrier and persists even when insuring informal financial groups.

We additionally find that SHG members who were *more* tolerant of risk had higher demand for insurance, perhaps exacerbating adverse selection concerns. This pattern is well-documented in a growing literature describing microinsurance demand, and may be a rational response to concerns that insurers may not pay when a loss is realized (see Platteau et al. 2017 for a review).

³ A review of the literature and technical documents on microinsurance suggests that most providers offer communities a microinsurance product for a flat premium. Adjustments seem to be made by changing the premium price for all beneficiaries, rather than charging different premiums based on expected risk (Radermacher et al. 2006).

We are the first, to our knowledge, to document the negative correlation between risk aversion and microinsurance demand outside of an agricultural insurance contract. This suggests that the concern of insurance contracts not covering all losses is more widespread than just the basis risk⁴ found in agricultural insurance contracts. We do not find support for other characteristics predicting demand for the MHI, including poverty level, education, and age.

This paper also contributes to a growing literature describing the effects of MHI (Jutting 2004, Chankova et al. 2008, Jakab and Krishnan 2004, Wagstaff and Lindelow 2008, Hamid et al. 2010, Habib et al. 2016). We are one of the few papers to find that MHI did not increase health seeking behavior. We improve upon the identification strategies primarily used in the literature by exploiting the randomized timing of when MHI was introduced, reinforcing the internal validity of our causal interpretation.

We also add to the literature on adverse selection in low-income countries, where insurance markets are experiencing rapid growth. We contribute to this literature by documenting demand in the context of insuring informal financial groups, offering a robust test of adverse selection by relying on health measures and risk preferences elicited *prior* to the enrollment decisions, and using a novel measure of adverse selection by showing that demand for health insurance is sensitive to present health conditions. Our results build on the literature by finding that group insurance within informal financial institutions may help limit, but not eliminate, adverse selection.

⁴ Basis risk refers to the likelihood that a farmer suffers a loss despite good weather, and therefore is not given a payout from their agriculture insurance contract that is based on a weather index. In general, all insurance contracts generally have the concern of not being able to cover the client for every potential loss. In addition, insurer defaults and lack of trust of an insurer may exacerbate these concerns in settings where insurance is a novel product.

To date, the literature has found mixed support of adverse selection in micro health insurance (e.g., Levine and Polimeni 2012, Wang et al. 2006, Banerjee et al. 2014).^{5,6} One potential explanation is the unit at which the insurance is offered. For example, a recent randomized controlled trial in Pakistan by Fisher et al. (2018) found significant adverse selection for individual insurance, but no adverse selection when the insured unit was the household.⁷ We observe similar heterogeneity – the relationship between adverse health and MHI demand is stronger among dependent household members who were offered individual, rather than group, insurance.

The remainder of this paper is organized as follows: Section 2 describes the context and data, Section 3 describes our methodology, Section 4 estimates the effect of MHI on health care utilization, Section 5 discusses the demand for MHI and adverse selection, and Section 6 concludes.

II. Context and Data

Informal Financial Institutions as Providers of MHI

Self-Help Groups (SHGs) in South Asia are a common grassroots informal financial institution in which 10 to 20 women form a savings-lending group. By 2012, over 100,000,000 households in India were associated with an SHG and the Indian government has advocated using SHGs for

⁵ Platteau et al. (2017) provide an extensive review of microinsurance demand more generally.

⁶ An older literature that is less well-identified also finds mixed results on adverse selection: a handful of papers find that MHI coverage is correlated with poor health (Lammers and Warmerdam, 2010; Bendig and Arun, 2011; Asenso-Okyere et al. 1997, Dror et al. 2007), while others fail to find support for the correlation (Panda et al. 2014, Jutting 2004, Dror et al. 2005). However, these studies generally have used willingness to pay surveys or observed health *after* the decision to enroll in insurance has already been made. The former methodology is limited by its reliance on hypothetical insurance markets and the latter cannot isolate adverse selection from moral hazard. There is also an additional literature of adverse selection not in MHI, but in low income countries more generally (e.g., Bardey and Buitrago, 2017).

⁷ Bhattacharya and Vogt (2014) provide a useful model on employer insurance reducing adverse selection when switching costs are high, and Thomasson (2002, 2003) highlight the role of group insurance in the history of the US health insurance market.

increasing outreach of public interventions (NABARD 2012, GoI 2011). This highlights the ubiquitous role of SHGs as an organizational unit for low-income women. Village Savings and Loan Associations (VSLAs) and Rotating Savings and Credit Associations (ROSCAs), commonly found in low-income countries, are analogous structures and illustrate that these informal financial institutions have a large geographical reach among lower-income populations.

Informal financial credit is commonly used for health shocks (Banerjee et al. 2009; Gertler et al. 2009). This makes informal financial institutions a prime candidate for offering health insurance to improve both their clients' risk smoothing and the expected performance of their credit portfolio. In addition, these institutions have existing platforms for outreach to poorer households and are commonly comprised of smaller internal groups, such as SHGs. Insuring these groups, instead of providing voluntary individual insurance⁸, may increase demand (Janssens and Kramer, 2016), improve the average health of the risk pool (Bhattacharya and Vogt 2014, Fisher et al. 2018)⁹, and reduce adverse selection (Bhattacharya and Vogt 2014). However, insuring SHGs may fall short of generating these benefits due to their relatively small group size and the self-sorting of members into SHGs.

There is some theoretical support that insuring groups will also reduce moral hazard by leveraging local monitoring of health care need and utilization. In many informal financial institutions, members have a direct incentive to reduce moral hazard in credit markets due to the

⁸ Both group insurance and voluntary insurance are common units at which MHIs are provided (Wipf et al. 2006). The majority of microinsurance products studied in the literature, as cited in this paper, have tended to be voluntary individual insurance (or turned into voluntary individual insurance), suggesting that it may be the norm and is the most common setting studied.

⁹ In high income countries, employer insurance is believed to reduce adverse selection by providing group insurance. However, in most low-income countries, self-employment is significantly more common. This makes it difficult to identify heterogeneous groups through which to provide health insurance. Informal financial groups are ubiquitous and therefore a prime candidate for preexisting grouping in communities.

group being jointly liable for all loans. However, in contrast to loans, the risk pool of the MHI extends beyond members of one's own group. Therefore, there is generally no analogous 'joint-liability' condition that incentivizes reducing moral hazard in health care for MHI. Nonetheless, if SHG members do internalize the needs of the larger risk pool (i.e., members from other SHGs more generally), then this may create an incentive to locally monitor moral hazard in health insurance.

Overview of MHI

We partner with Chaitanya, a non-profit institution working on women's empowerment and microfinance in Maharashtra through Self Help Groups.¹⁰ The borrowing patterns in this study's sample are consistent with a significant number of loans being used to finance health shocks: 17% of SHG members with a current loan stated health as the purpose of their loan, second only in loan purpose to business and agriculture.

Chaitanya's MHI, Dipthi Arogya Nidhi (DAN), shares many characteristics common to MHI: distribution through an existing informal financial institution, a flat premium, reducing the cost of health care from the first dollar spent, and a coverage cap and co-pay (Morduch 2006, Liber et al. 2007). The option to purchase the MHI was limited to SHGs in which at least 80 percent of the members in the group purchase the MHI.¹¹ This requirement was intended to address adverse selection. Conditional upon enrolling themselves, SHG members could then decide the number of

¹⁰ The SHGs are united into a larger informal financial institution that provides loans and support; default is rare and joint liability is somewhat more diffuse relative to microfinance institutions. Chaitanya's official policy is that a handful of SHGs (typically at the village level) are jointly liable for loans. Because default is relatively rare and repayment decisions are made locally, it is difficult to confirm how well joint liability is enforced.

¹¹ The 80% requirement, as opposed to requiring all members enroll, was to allow flexibility for members that may legitimately not benefit from the MHI and to protect the majority from any outlier in the SHG that was unyielding in her insurance demand decision.

additional household members to enroll, if any. Thus, SHG members were offered group insurance, and their household dependents were offered individual insurance.

The MHI premium is Rs. 200 (USD 4) per person per year if the SHG member insures none or one additional person in her household, or Rs. 150 (USD 3) per person per year if she insures two or more additional persons in her household.¹² The main provisions of the health insurance contract are discounted prices¹³ (5 to 20 percent) negotiated at a network of private medical facilities (e.g., hospitals, clinics, medical laboratories, and pharmacies), reimbursement for in-patient treatment (60 percent reimbursement at network facilities and 100 percent reimbursement at government facilities, up to a limit of Rs. 15,000 (USD 300) per event), and access to a 24-7 medical health line.¹⁴ The MHI originally included health camps and monthly village visits by a doctor to offer referrals and basic medications, but these features were discontinued during the study.

Study Timeline, Sample, and Data:

Starting in February 2011, Chaitanya introduced the MHI in 21 semi-urban and rural villages of Junner sub-district (*treatment villages*). These villages were randomly selected, stratified by three distinct areas that were increasingly rural (referred to as Block 1, Block 2, and Block 3). We define our baseline sample as a person recorded in a monthly SHG meeting register at least once in the previous three to four months prior to the first introduction of the MHI in their given Block (2,690 SHG members). The remaining 22 villages in the region received the MHI starting in

¹² This premium was arbitrarily determined by Chaitanya and based primarily on member affordability concerns.

¹³ These discounted prices are not possible to verify as there is no verifiable source of what prices would be without the MHI for comparison.

¹⁴ Specific illnesses may have lower coverage caps based on predefined categories of illness type. Relative to other micro health insurance plans, this limit is relatively generous. For example, VimoSEWA, a large micro insurer in Gujarat, India, has a limit of Rs. 2,000 – 6,000 (USD 40 – 120) and RSBY (government insurance for households below the poverty line) has a limit of Rs. 30,000 (USD 600) per year for the entire household (SEWA 2013, RSBY 2013a).

November 2012 (*control villages*). Figure 1 provides a graphical representation of the timing of the MHI and data sources.

In October 2012, before the MHI was introduced in control villages, we conduct a household survey (*Household Health Survey*). A random subset (2,068 SHG members) were selected to be surveyed based on village membership size, and all analysis uses probability weights to account for this sample selection. Due to the significant length of time between identifying the baseline sample¹⁵ and the survey, we observe an 81 percent response rate in both treatment and control villages. This non-response is balanced by treatment status. We limit our analysis to SHG members who were still participating in an SHG at the time of survey. Our analysis sample uses 905 control and 723 treatment SHG members and their household. The online Appendix provides greater detail on the sample selection.

We also collected monthly surveys on SHG members' households' health. These surveys were administered at monthly SHG meetings from October 2011 to July 2012 (*SHG Health Survey*). Survey response is conditional on the occurrence of and attendance in the monthly SHG meetings, resulting in a high non-response rate of 47 percent. 79 percent of SHG members' in control villages and 89 percent of SHG members in treatment villages responded in at least one monthly SHG survey.

Both the *Household Health Survey* and *SHG Health Survey* are conducted prior to control villages received the MHI offer, providing baseline health information for control villages in the absence of an MHI. In both surveys, SHG members were the primary respondents.

¹⁵ It is likely that the method used for defining the original baseline sample included SHG members that were already not actively participating or living in the village, due to the common practice of retaining members on records even after they had relocated.

Enrollment decisions and insurance claims are accessed from Chaitanya’s internal records and are observed until August 2014.

Appendix Table 1 provides descriptive statistics for our sample, using time-invariant characteristics reported in the *Household Health Survey*. Typical of a non-profit, rural, informal financial institution, a significant proportion of SHG members belong to households below the poverty line (41.1%), are categorized as belonging to a disadvantaged caste by the government (53.3%), have household members employed as agricultural laborers (66.9%), and have relatively few years of schooling. SHG members are restricted to adult females, resulting in their non-SHG household members to mechanically be more male and younger. On average, SHG members self-report a risk preference of 6, based on a 0 to 10 scale increasing in tolerance for risk.¹⁶ We observe some non-response for each characteristic, primarily due to sensitivity of questions on caste and poverty status.

Appendix Table 1 also confirms the validity of our randomization by testing for differences by treatment status. In general, villages are relatively similar along most characteristics by treatment status, though we do observe that households in control villages are more likely to belong to disadvantaged castes and have slightly more male household members. We confirm that our primary results cannot be explained by these observable differences across treatment status.

MHI Enrollment

In Table 1, we report that 58% and 73% of control and treatment SHG members enrolled in MHI for at least one year, respectively. Enrollment for non-SHG household members, who were not subject to group insurance, is significantly lower. Conditional upon the household’s SHG

¹⁶ Self-reported risk preferences have been shown to be correlated with experimental measures of risk preferences and risky behaviors (Dohmen et al. 2005, Falk et al. 2016). This question was only asked of SHG members, so if the SHG member was not the primary respondent, it was commonly not captured in the survey.

member enrolling in the MHI, only 16% and 22 % of control and treatment non-SHG household members enrolled for at least one year.¹⁷ The majority of SHG members chose not to enroll any additional household members. Compliance¹⁸ with group insurance requirements is relatively high: 74 % and 80% of control and treatment SHGs complied with the requirements (i.e., either no SHG members enrolled or at least 80 percent of SHG members enrolled). Relative to most microinsurance, the MHI had high demand among SHG members (Matul et al. 2013, Platteau et al. 2017).

Despite the high demand, over time Chaitanya determined that the operational costs of administering the MHI was unsustainable and the MHI was discontinued by 2018. During the period of the study, the disbursement of payouts to those suffering a relevant health loss was covered by the collected premiums. The proportion of enrolled individuals that filed a claim from February 2011 to August 2014 for reimbursement is 6 percent. The average health expenditure eligible to be claimed was Rs. 11,549 (USD 231) and the average disbursement amount was Rs. 3,416 (USD 68). Though not possible to validate, the amount saved among claimants by discounted negotiated prices is Rs. 1,389 (USD 28). The claims process appeared to work well generally: 86 percent of claims were settled and paid. The primary reason for lower reimbursement amounts was use of non-network facilities, where the initial norm was to reimburse 10 percent.

III. Methodology

Estimating the Effect of MHI on Health Care Utilization and Implications for Moral Hazard:

¹⁷ 11 non-SHG household members (of 4,402) were enrolled in MHI even though no reported SHG member was enrolled, representing .2 percent of observations.

¹⁸ Compliance is calculated for those selected and surveyed in the Household Health Survey. SHG level analysis excludes SHGs for which less than 2 members were surveyed (due to random sampling or survey attrition relative to the original baseline roster from which SHG members were selected for the survey sample).

We compare health care utilization in the randomly assigned treatment villages to that in the remaining control villages:

$$(1) Health_{ihgvb} = \beta_1 Treatment_{vb} + \alpha_b + u_{ihgvb}$$

where *Treatment* is an indicator for belonging to a village that had been offered the MHI, and *Health* is reported health care utilization for individual *i*, in household *h*, in SHG *g*, in village *v*, in block *b*. Standard errors are clustered at the village. The effect of offering the MHI on health care utilization is β_1 (i.e., the intent-to-treat effect of MHI). Though an increase in health care utilization (i.e., $\beta_1 > 0$) does not necessarily imply moral hazard, a necessary condition of moral hazard is that health care utilization will increase. Therefore, the absence of an increase in health care utilization suggests that moral hazard is not a primary concern.

We confirm that our estimate of the effect of the MHI offer is robust to including baseline members that left their SHG during the study period and conditioning on observable differences across treatment status.

Predicting MHI Demand and Implications for Adverse Selection:

We limit our analysis to control villages to estimate which characteristics, including baseline health, predicts demand for MHI. For control villages, the *Household Health Survey* captures information *prior* to the MHI offer. We estimate whether reported health, and other characteristics, is statistically different among SHG members who choose to enroll once MHI becomes available:

$$(2)^{19} \text{Enrolled}_{ihgvt} = \alpha + \delta_1 \text{AdverseHealth}_{ihgvt-1} + \vartheta_{ihgvt}$$

where *Enrolled* is an indicator for whether the individual enrolled for at least one year in the MHI from November 2012 to August 2014, and *AdverseHealth* is a proxy for poor health at the time of the survey for individual *i*, in household *h*, in SHG *g*, in village *v*, at time *t-1*. The subscript *t* indicates the time period when the MHI was available, and *t-1* indicates the time period prior to the introduction of MHI in the village. In addition to *AdverseHealth*, we estimate Eq (2) using the covariates listed in Appendix Table 1 as independent variables to estimate whether these factors predict MHI demand. Standard errors are clustered at the SHG.

A positive δ_1 represents the marginal percentage point increase in the likelihood of enrolling in MHI if a person reported adverse health, thereby indicating adverse selection. We confirm the robustness of the estimate to perfect group insurance for SHGs by a bounding exercise. For all SHGs that do not have the same enrollment status for all members (i.e., 0 or 100% enrollment), we assume that these SHGs either enrolled all their members in the MHI (*upper bound*) or enrolled none of their members in the MHI (*lower bound*). These assumptions create bounded estimates of δ_1 for the case of perfect group insurance.

To the extent that providers are unable (or unwilling) to price premiums based on omitted variables that may be responsible for the correlation, adverse selection will persist. This is especially true for MHI, in which flat premiums are the norm. Therefore, even if the relationship between health and demand is driven by an omitted factor, the correlation still raises concerns of adverse selection in completing health insurance markets.

¹⁹ A linear model, rather than a probit or logit, is used to accommodate fixed effects. All estimations reported in the paper that do not include fixed effects are robust to using a probit and logit model.

We do explore whether the relationship between adverse health and MHI demand persists even after conditioning on factors that may theoretically be available to insurance providers. We expand Eq (2) to include village fixed effects and the covariates listed in Appendix Table 1. We also estimate the relationship for non-SHG household members and expand the model to include SHG and household fixed effects.

Finally, we may be concerned that individuals are altering their health care (and health) in anticipation of being offered MHI. This is unlikely as the expansion of MHI required time and SHG members would have not known how long they would have to wait before being eligible to enroll in MHI. Specifically, the median coverage date started four months after the completion of the survey. Furthermore, claims are low and the average length of duration from enrolling into MHI and filing a claim was approximately 10 months. Together, this suggests that health reported in the survey is unlikely to have been altered based on anticipation of MHI enrollment.

Outcomes of interest:

Our primary outcomes are health status and health care utilization. Households were asked about feeling ill (*Experienced Illness*), visiting a health provider (*Visited Health Provider*), being admitted (*Admitted*), and health related expenditure (*HIS, Health Expenditure*) for each household member over the previous week. They were additionally asked about any illness over the previous year (excluding the previous week) that required significant expenditure (over Rs.1,000 or USD 20), being admitted to a health facility, or bed rest for at least five days, for each household member (*Significant Illness, Annual Recall*).

For health expenditures, we use the recommended inverse hyperbolic sine transformation given the skewed distribution of expenditure (Burbidge et al., 1988). This transformation retains the interpretation of a log (i.e., impacts are in percent changes), but can handle zero values. Given concerns of recall accuracy, our preferred measures use the weekly recall period, following Das et al.'s (2007) findings that shorter recall periods have greater accuracy.

IV. Effect of MHI on Health Care Utilization

Table 2 finds no statistically significant difference in health care utilization among those in treatment villages versus those in control villages. SHG members and their households who were offered the MHI are equally likely to report visiting a health care provider, being admitted to a health care facility, and having similar health care expenditure in the past week. There is also no difference in experiencing a significant illness in the previous year, with the point estimate being very close to zero. Appendix Table 2 confirms that results are robust to the inclusion of SHG members who have left the organization since the start of the study.

Welfare calculations are difficult to ascertain as an optimal insurance contract may efficiently increase health care utilization.²⁰ However, the presence of inefficient moral hazard does imply increased health care utilization. Therefore, the lack of increased health care utilization suggests

²⁰ When using the supplementary SHG monthly surveys, we find evidence for differential response rates by treatment status – treatment individuals were 5 percentage points less likely to be present (even when including block and month fixed effects). We therefore do not use this survey source for identifying effects of the MHI on health care utilization, as it is not possible to identify whether differences across treatment status are driven by the MHI offer or differential selection into the responding sample. The difference across treatment status generally finds treatment villages report less health care utilization and illness, but this is not robust to corrections for differential attrition.

that concerns for moral hazard may be unwarranted in contexts of providing group insurance to SHG members, at least in the short run.

Appendix Table 3 estimates the effect of the MHI offer separately for SHG members (Panel A) and their non-SHG household members (Panel B). We continue to find no support for increased health care utilization among SHG members, for whom enrollment was significantly greater – 73 percent versus 16 percent. Among non-SHG household members, we do find some support for an increased likelihood of visiting a health care provider and health expenditures, but not for being admitted to a facility or having a significant illness in the previous year.

In Appendix Table 4, we confirm results are robust to controlling for time-invariant observable differences. Due to non-response for these additional covariates, we separately estimate how much the inclusion of covariates is driven by changes in the sample versus the conditioning on the covariates. For each dependent variable, we first estimate how the effect of the MHI offer differs when limiting observations to the sample for which we observe covariates (Column 1 to 2). Then holding the sample constant, we estimate whether accounting for observable differences by including additional covariates changes our estimate of the effect of the MHI offer (Column 2 to 3). We generally find our main results are robust in both magnitude and statistical significance even when conditioning on these demographic characteristics. If anything, accounting for these the covariates further reduces differences in health care utilization by treatment status. For example, we no longer observe statistically significant differences in health expenditures among non-SHG health members when conditioning on additional covariates.

V. Adverse Selection and Predicting Insurance Demand

Table 3, Column (1), estimates insurance demand as a function of baseline health for SHG members, who were offered group insurance. Adverse health in the week of the survey increased the likelihood of enrollment in MHI by 18.8 percentage points, an increase of 35 percent. Being admitted in the previous week increased the likelihood of enrollment by 14.1 percentage points (24 percent), and a one percent increase in health expenditure is associated with increasing enrollment by 3.02 percentage points (6 percent). In contrast, we observe that significant illness in the previous year did not increase the probability of MHI enrollment. This may be due to measurement error given the longer recall period. It may also be that unexpected and temporary large health shocks are more likely to be recalled than chronic health concerns over the longer period.

The slight drop in magnitude after the inclusion of village fixed effects in Column 2 suggests that the relationship between adverse health and insurance demand may partially be due to spatial differences, though most of the variation is within villages.²¹ Column 3 and 4 estimate bounds for adverse selection by assuming perfect group insurance (i.e., no partial enrollment of SHGs).²² The relationship is robust to the bounding exercise, implying that the association between adverse health and insurance demand would persist even with perfect group insurance, as opposed to the more relaxed 80 percent requirement.

The health variation within SHGs is much greater than the variation across SHGs, and there is no statistically significant relationship between an SHG member's health and the health of the

²¹ Even within SHGs that did not comply with 0 or 100 percent enrollment, baseline health status predicts member's enrollment (i.e., expanding Equation 2 to include SHG fixed effects).

²² The estimates in Table 3, Column 3 and 4, are robust to the exclusion of village fixed effects.

other SHG members in her group.²³ This suggests that groups do not appear to be matching on health, but rather that the size of the SHGs results in enough natural variation in health that MHI demand remains a function of the mean health of a group.

Table 4 estimates the demand for MHI among non-SHG household members who were offered voluntary individual insurance (i.e., household members of SHG members enrolled in MHI).²⁴ The columns impose increasingly restrictive identification assumptions by including SHG fixed effects (Column 2), and household fixed effects (Column 3). We again find that individuals with worse health are more likely to enroll in MHI, providing further support of adverse selection in MHI demand.²⁵ We find that the relationship between health and insurance demand persists within households (Column 3), highlighting that even within the same household there is higher demand for insurance for those with poorer health. Among non-SHG household members, general illness increased the likelihood of enrolling in MHI by 106 percent (Column 1). In contrast to SHG members, adverse selection is observed even when considering significant illnesses over the previous year.

Interestingly, the severity of adverse selection is greater among household members that were offered voluntary individual insurance, relative to SHG members that were offered group insurance. Illness at baseline is associated with a 35 percent increase in the likelihood of MHI

²³ The within group sum of squares accounts for over 90 percent of the total sum of squares for weekly recall of experiencing illness (141.17 of 154.12) and we cannot reject the null of equal variances (a p-value of .98 using Bartlett's test of equal variances).

²⁴ Ideally, we could observe insurance decisions for all non-SHG household members; Instead, we only see decisions for the non-random sub-sample of non-SHG household members who had an SHG member enroll in the insurance. On average, this eligible non-SHG household sample is statistically similar to ineligible households (see Appendix Table 5), suggesting the subsample is representative and enrollment decisions as a function of health would have been similar among the ineligible sample as well.

²⁵ The estimated effect on admit rates on enrollment becomes statistically significant at the 10 percent level when using a logit model.

enrollment by SHG members, but over a 100 percent increase by non-SHG household members. This increased probability of enrollment as a function of adverse health among the individually insured non-SHG household members is consistent with the theory of insuring groups, rather than individuals, will reduce adverse selection concerns. These two samples are likely to vary on unobserved characteristics, and thus the differential unit at which insurance is offered is just one possible explanation for the observed difference in the severity of adverse selection.

Appendix Table 6 and 7 confirms that the relationship between adverse health and enrollment persists, even when conditioning on additional characteristics. As in Appendix Table 2, we separately identify the effect of the changing sample from the explanatory power of covariates, by first changing the sample while holding the estimating model constant (Column 1 to 2), and then by adding additional covariates to the model while holding the limited sample constant (Column 2 to 3).

Adverse health predicting MHI demand is also robust to using the alternative *SHG Health Surveys*. The *SHG Health Surveys* asked about household health, rather than the health of individual household members. In Table 5, we estimate whether the health reported in the *SHG Health Surveys* predicts whether *any person* in the household enrolled in MHI. Despite these measures being more aggregated and suffering from attrition, the findings echo those in Table 3 that use the *Household Health Survey*. We find that enrolled households were more likely to report illness and have higher health expenditure in their household in the months prior to the MHI offer. The consistency across the two different survey sources yields additional support for persistent adverse selection in group insurance demand. The *SHG Health Surveys* were administered earlier, highlighting that responses are unlikely to be reflecting anticipated demand for MHI.

Table 3 and 4 document that those with adverse health have higher demand for MHI, regardless of whether the insurance is offered as group or individual insurance. The robustness to household fixed effects suggests that households are indeed responding to baseline health when making enrollment decisions, and that added flexibility in enrollment is likely to increase adverse selection. We additionally show that the relationship cannot be explained by spatial differences in health, the flexibility in group enrollment, or additional observable characteristics. To the extent that insurers are unable (or unwilling) to offer different priced premiums, even if remaining unobservable characteristics drive the correlation between adverse health and MHI enrollment, our results suggests that adverse selection may be a barrier in completing insurance markets.

Understanding MHI Demand Beyond Health:

Table 6 estimates MHI demand among SHG members as a function of the time-invariant characteristics reported in Appendix Table 1. Due to non-response on covariates, this sample is more limited than estimates of adverse health on MHI demand. But as observed in the Appendix Tables 6 and 7, the change in sample does not result in meaningful differences in how baseline health affected MHI demand. This suggests that more general MHI demand estimations based on this limited sample will likely be externally valid to the full sample.

Surprisingly, we find that no general socioeconomic characteristic, such as education or poverty level, predicted enrollment in the MHI.²⁶ We also find no significant effect of demographic

²⁶ Though Table 6 suggests that MHI demand is not sensitive to basic demographic covariates, we expand the model to estimate non-linearities in age and gender bias in insurance demand for children. The most likely household member to enroll is the SHG member's husband – for this reason, we restrict testing for gender bias among enrollment of children. We find no evidence for either of these hypotheses.

characteristics on the enrollment for non-SHG households members offered individual insurance (not shown).²⁷

However, we do find that SHG members who report a *higher* tolerance for risk have slightly greater demand for MHI, though the magnitude of the effect is small.²⁸ This contradicts the common theoretical assumption that insurance demand increases with risk aversion. However, in contexts where health insurance is a relatively new product and suppliers do not have a history of providing insurance, the opposite may be true – those who are *more* tolerant of risk are more willing to try the novel MHI. In addition, members may rationally be responding to the risk that the claims process will not payout on all realized health relevant losses. This surprising relationship has been well-documented in agricultural micro insurance products (Platteau et al. 2017). Column (2) and (3) confirms the robustness of these results by estimating bounds in which we assume SHGs with partial enrollment did not enroll any of their members (*lower bound*) or enrolled all their members (*upper bound*).

Finally, we explore whether MHI demand was influenced by one’s peers. While an SHG member’s eligibility to enroll in MHI depends on her group, the decision to enroll additional household members does not. We estimate whether an SHG member is more likely to enroll her non-SHG household members, who were offered voluntary individual insurance, if other members from her SHG does so. We estimate that an SHG member is four percentage points more likely to enroll additional non-SHG household members for every fellow SHG member that does the same,

²⁷ Female non-SHG household members are less likely to be enrolled in the MHI. However, this is due to significant others, all male, being the most likely household member to enroll.

²⁸ These results are robust to using a probit (.124) or logit model (.077) and without clustering standard errors. The estimates are robust to having estimated each relationship separately, for which survey response is mechanically higher.

even after controlling for the health of the household member (i.e., $\hat{\gamma}_1 = .04$, with a standard error of .006).²⁹ This pattern is consistent with demand patterns documented in the literature for microinsurance (Platteau et al. 2017). One explanation is that insurance demand is influenced by peers' demand, even in the absence of formal requirements. Alternatively, it may be the case that groups share common characteristics, other than health, that increase demand for MHI.

VII. Conclusion

Despite microinsurance being considered “the next revolution” in addressing vulnerability among the poor, health insurance coverage of low-income, self-employed populations remains rare (Morduch 2006). In this paper, we document that MHI through Self Help Groups (SHGs), a common informal financial institution, can have high demand, significantly more so than what is typically observed in new microinsurance products in low-income settings (Matul et al. 2013, Platteau et al. 2017).

We also document that offering MHI did not increase health care utilization, suggesting moral hazard was not a concern in this context. Welfare implications are more difficult to ascertain, as increasing health care utilization in low-income settings may be welfare improving. Specific design features of the health insurance contract may have dampened health seeking behavior (e.g., reimbursement of expenditure). Future research on the effect of separate features of insurance

²⁹ We estimate $EnrolledFamily_{ihgb} = \alpha + \gamma_1 SHGEnrolledFamily_{ihgv} + X_{ihgv}\theta + u_{ihgv}$ for all non-SHG household members, where $EnrolledFamily$ is an indicator for whether the SHG member enrolled any non-SHG household members, $SHGEnrolledFamily$ is the number of fellow SHG members that enrolled any non-SHG household members. We include health characteristics as additional controls. Observations are limited to active SHG members' households surveyed in the Household Health Survey and are weighted to be representative of the target population. Standard errors are clustered at the SHG level.

contracts and the welfare implications of changing health care demand would be informative in designing optimal MHI.

We do find that insurance demand increased with adverse health, even when requiring group insurance for SHG members. Given that most MHI providers charge flat premiums, this correlation suggests that adverse selection may be a barrier to efficient health insurance markets. However, we document a pattern that is consistent with the theoretical prediction of group insurance mitigating the severity of adverse selection and increasing insurance demand relative to individual insurance. Many financial interventions and grassroots outreach in low income countries rely on such small groups, including Self Help Groups, Rotating Savings and Credit Associations (ROSCAs), and Village Savings and Loans Associations (VSLA). Our results suggest that utilizing such groups within these informal financial institutions as a unit for health insurance, relative to insuring individuals, may increase the size and health of the risk pool.

Finally, we find risk aversion to be negatively correlated with insurance demand, suggesting risk preferences may indirectly exacerbate, rather than mitigate, adverse selection. The relationship also highlights that purchasing insurance may be considered a risky investment, a potentially rational response to uncertainty of whether an insurer will pay in the event of a realized loss. Surprisingly though, little else predicts MHI demand. However, the requirement for SHG members to be enrolled in MHI for any household member to become insured does result in more females being insured relative to males. Thus, given known gender biases in health investments, providing insurance through women's SHGs may improve inclusion of women.

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Figure 1: Study Timeline (Not Drawn to Scale)

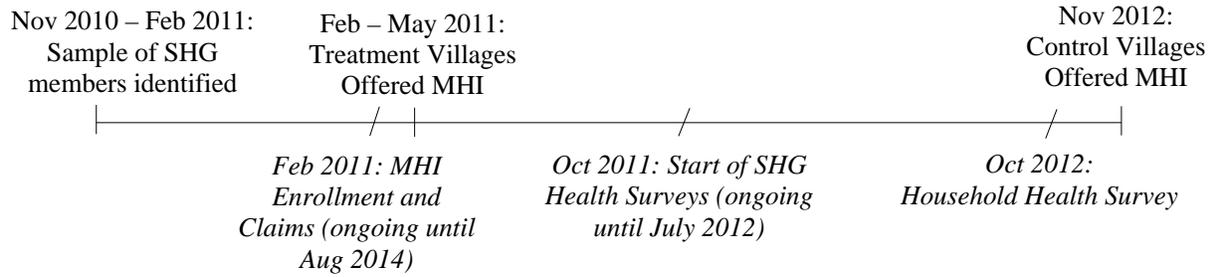


Table 1: MHI Enrollment Rates

	Control	Treatment
SHG Members Enrolled	.58 (905)	.73 (723)
Proportion of Non-SHG HH Members Enrolled	.10 (4,105)	.16 (3,301)
Proportion of Eligible Non-SHG HH Members Enrolled	.16 (2,394)	.22 (2,305)
Proportion of SHGs in Compliance with Eligibility Criteria	0.74 (82)	0.8 (82)

Notes:

- (1) Enrolled is an indicator of having ever been enrolled in the MHI.
- (2) Observations are noted in parentheses.
- (3) Eligible Non-SHG HH Members are household members of an enrolled SHG member. Compliance with Eligibility Criteria for SHGs is an indicator for whether no members in the SHG enrolled or 80 percent or more of members in the SHG enrolled.
- (4) SHG Enrollment excludes SHGs for which data is available for less than two members.
- (5) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

Table 2: MHI Effect on Health Care Utilization

	(1)	(2)	(3)	(4)
Dependent Variable:	Visited Health Provider	Admitted	IHS, Health Expenditure	Significant Illness (Annual Recall)
Treatment (MHI Offer)	0.0184 (0.0111)	0.00890 (0.00870)	0.0606 (0.0750)	0.000616 (0.0110)
<i>Control Mean</i>	<i>0.109</i>	<i>0.0331</i>	<i>0.723</i>	<i>0.0931</i>
<i>Obs (SHG Members and Non-SHG HH Members)</i>	<i>9026</i>	<i>9034</i>	<i>9034</i>	<i>9034</i>

Notes:

- (1) Standard errors are in parentheses and are clustered at the village.
- (2) Block Fixed Effects upon which the randomization was stratified are included as controls.
- (3) Dependent variables use a one week recall period, unless otherwise noted.
- (4) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.
- (5) Statistical significance levels are as follows: *10%, **5%, ***1%.

Table 3: Health and MHI Demand, Insuring SHG Units

	(1)	(2)	(3)	(4)
Dependent Variable: Enrolled				
Panel A: Experienced Illness				
Experienced Illness	0.188*** (0.0346)	0.152*** (0.0304)	0.131*** (0.0272)	0.0869*** (0.0249)
Constant	0.543*** (0.0488)		0.443*** (0.0396)	0.705*** (0.0395)
Panel B: Admitted				
Admitted	0.141** (0.0636)	0.0979* (0.0537)	0.128** (0.0526)	0.0572 (0.0412)
Constant	0.577*** (0.0483)		0.465*** (0.0397)	0.721*** (0.0388)
Panel C: Health Expenditure				
IHS of Health Expenditure (Rs.)	0.0302*** (0.00548)	0.0210*** (0.00452)	0.0191*** (0.00393)	0.0116*** (0.00362)
Constant	0.546*** (0.0490)		0.448*** (0.0396)	0.709*** (0.0393)
Panel D: Significant Illness (Year Recall)				
Significant Illness	-0.0103 (0.0436)	-0.0228 (0.0344)	-0.0368 (0.0338)	0.0149 (0.0297)
Constant	0.586*** (0.0486)		0.478*** (0.0398)	0.722*** (0.0384)
<i>Observations (SHG Members)</i>	905	905	905	905
Village FE	No	Yes	Yes	Yes
Lower Bound	No	No	Yes	No
Upper Bound	No	No	No	Yes

Notes:

(1) Standard errors are in parentheses and clustered at the SHG.

(2) Dependent variables use a one week recall period, unless otherwise noted.

(3) Lower and Upper Bounds refer to bounds based on assuming that for SHGs in which we observe partial enrollment, no members enrolled or all members enrolled.

(4) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

(5) Statistical significance levels are as follows: *10%, **5%, ***1%.

Table 4: Health and MHI Demand, Voluntary Insurance of Non-SHG Household Members

	(1)	(2)	(3)
Dependent Variable: Enrolled			
Panel A: Experienced Illness			
Experienced Illness	0.151*** (0.0389)	0.0881*** (0.0238)	0.0571** (0.0242)
Constant	0.143*** (0.0243)		
Panel B: Admitted			
Admitted	0.0604 (0.0499)	0.0276 (0.0401)	0.0241 (0.0391)
Constant	0.156*** (0.0269)		
Panel C: Health Expenditure			
IHS of Health Expenditure (Rs.)	0.0189*** (0.00576)	0.0105*** (0.00357)	0.00652* (0.00383)
Constant	0.146*** (0.0250)		
Panel D: Significant Illness (Year Recall)			
Significant Illness	0.111*** (0.0285)	0.0769*** (0.0267)	0.0617** (0.0248)
Constant	0.149*** (0.0265)		
<i>Obs (Non-SHG HH Members)</i>	2394	2394	2394
SHG FE	No	Yes	No
HH FE	No	No	Yes

Notes:

(1) Standard errors are in parentheses and clustered at the SHG for Columns 1 and 2, and are robust for Column 3.

(2) Dependent variables use a one week recall period, unless otherwise noted.

(3) Observations are of non-SHG household members, conditional upon the household's SHG member enrolling in MHI.

(4) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

(5) Statistical significance levels are as follows: *10%, **5%, ***1%.

Table 5: Health and MHI Demand using SHG Health Surveys

	(1)	(2)	(3)	(4)
Dependent Variable: Enrolled				
<i>Health Indicator:</i>	Experienced Illness	Admitted	Prolonged Bed Rest	IHS, Health Expenditure (Rs.)
Health Indicator	0.0671** (0.0289)	0.0213 (0.0369)	0.00526 (0.0434)	0.0144*** (0.00471)
<i>Obs (SHG Member - Month)</i>	4117	4119	4112	3435

Notes

(1) Enrolled is an indicator for whether any household member enrolled in the MHI.

(2) Dependent variables use one month recall period, and reflect whether any person in the household experienced the event.

(3) Standard errors are in parentheses and are clustered at the SHG level.

(4) Month Fixed Effects are included as controls.

(5) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted based on the number of times surveyed in the Monthly Health Surveys.

(6) Statistical significance levels are as follows: *10%, **5%, ***1%.

Table 6: Demographic Characteristics and MHI Demand, SHG Members

	(1)	(2)	(3)
Dependent Variable	Enrolled (Observed)	Enrolled (Lower Bound)	Enrolled (Upper Bound)
Risk Preference	0.0285*** (0.00694)	0.0191** (0.00795)	0.0180** (0.00682)
Age	0.00105 (0.00203)	0.00000284 (0.00210)	0.00108 (0.00172)
Education	-0.00656 (0.00791)	-0.0127 (0.00802)	-0.00367 (0.00717)
Below the Poverty Line	-0.00459 (0.0596)	-0.00501 (0.0681)	-0.0875* (0.0486)
Pucca (Proper) House	-0.0324 (0.0337)	-0.0398 (0.0322)	-0.0171 (0.0267)
Disadvantaged Caste	-0.0906 (0.0813)	-0.0385 (0.0991)	-0.118 (0.0770)
Agricultural Cultivator	-0.0596 (0.0777)	-0.0795 (0.0830)	-0.0235 (0.0810)
Agricultural Laborer	0.0240 (0.0481)	-0.00228 (0.0522)	-0.00754 (0.0459)
Household Size	-0.0121* (0.00712)	-0.00588 (0.00741)	-0.0119* (0.00690)
Constant	0.627*** (0.163)	0.627*** (0.179)	0.835*** (0.146)
<i>Obs (SHG Members)</i>	638	638	638

Notes:

(1) Standard errors are in parentheses and clustered at the SHG.

(2) Lower and Upper Bounds refer to bounds based on assuming that for SHGs in which we observe partial enrollment, no members enrolled or all members enrolled.

(3) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

(4) Statistical significance levels are as follows: *10%, **5%, ***1%.

Appendix

A. Variable Definitions

Age: Reported age in years.

Agricultural Cultivator: Indicator that the primary occupation of the household (largest amount of income) is being an agricultural cultivator on one's own farm.

Agricultural Laborer: Indicator for any person in the household having a primary occupation (largest amount of income) as an agricultural laborer on another's farm.

Below the Poverty Line: Indicator for anyone in the household having a government ration card that indicates being Below the Poverty Line, including Antyodaya Anna Yojana indication.

Disadvantaged Caste: An indicator for the household belonging to a scheduled caste, scheduled tribe, other backward caste, nomadic tribe, or special backward caste.

Female: Indicator for being female.

Household Size: Number of household members. Household is defined as family members who have lived in the house in the past year or at least 15 days.

Education: Highest level of education completed. 0 to 12 refer to each grade, 13 indicates some college, 14 indicates a bachelors degree, and 15 indicates an advanced degree.

Pucca (Proper) House: Enumerator's review of the house's infrastructure from 1 to 3, where 3 refers to only natural materials used and 1 refers to cement walls.

Risk Preference: How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please rate yourself on a scale of 0 to 10, where 0 means you are "unwilling to take any risks" and 10 means you are "very much prepared to take risk".

B. Details on Treatment Assignment and Analysis Sample

Treatment Selection

A village list of where Chaitanya was operational in the sub-district was provided by local staff employees. Stratifying on three blocks (increasingly tribal and rural), 30 villages were randomly selected to be in the treatment group (i.e., offered the MHI) and 31 villages in the control group. Immediately following the start of the study, it became known that 18 villages on the original list did not have functioning SHGs. These villages were balanced across treatment and control villages (9 villages each) and were dropped from the study and no data was ever collected in these villages. In addition, two villages' treatment status was switched from the original randomization: all results are robust to excluding these villages or maintaining the original randomized treatment status. The final sample was 21 treatment villages (1,314 SHG Members) and 22 control villages (1,311 SHG Members). MHI coverage began in February 2011 for Block 1 and May 2011 for Block 2 and 3. The MHI became available in control villages in November 2012, with the earliest coverage beginning in December 2012.

Analysis Sample

The baseline membership roster was constructed by reviewing Self Help Group (SHG) meeting records from October 2010 – January 2011 for Region 1 and February 2011 – April 2011 for Region 2 and 3. It is likely that the method used for defining the original roster included SHG members that were not actively participating or living in the village, due to the common practice of retaining members on records even after they had relocated.

In October 2012, a comprehensive *Household Health Survey* was completed for a randomly selected subset of SHG members from the baseline membership roster. In villages with few SHGs, all SHG members were selected. In villages with more SHGs, SHG members were randomly selected to be surveyed. The analysis in the paper is weighted accordingly. The *Household Health Survey* was conducted at the SHG Member's home by a team of fifteen hired surveyors (only one local to Junnar sub-district).

Due to the significant length of time between the sample creation and the survey, our response rate to the survey is 81 percent in both treatment and control villages. The primary reason for not participating in the survey was member relocation, primarily to cities, which is unlikely to be a

function of the MHI offer. Only 2 report relocating for health purposes and 7 refused to participate. The non-response is balanced across treatment status. 61 SHG members reported they were no longer active SHG members and are excluded from our analysis (though we confirm robustness to their inclusion). This results in 905 and 723 active SHG members being surveyed in control villages and treatment villages, respectively. We use this final sample for all analysis, with probability weights to account for the probability of being selected for the survey.

The selection of survey respondents was based on SHG membership, not by households. Therefore, multiple SHG members from the same household may have been selected to be surveyed. As this information is known only through the survey itself, whether SHG members are from the same household cannot be identified for the entire sample. We therefore conduct all analysis based on the perspective of the SHG member, for both the SHG member herself or her non-SHG family members. While this does not affect our analysis for SHG members, it does result in non-SHG household members being weighted by SHG membership. That is, for SHG members belonging to the same household, non-SHG household members may appear more than once in the analysis sample. Of those identified, 80 percent of SHG members' households are only represented once (1,306 SHG members), 16.71 percent are represented twice (272 SHG members), 2.58 percent are represented three times (42 SHG members), and .49 percent are represented four times (8 SHG members). Note, this only affects estimations of non-SHG household members.

Additionally, from October 2011 to July 2012, *SHG Health Surveys* were conducted during the SHG member's monthly meeting. The *SHG Health Surveys* were conducted during standard SHG meetings by the regular Chaitanya field staff. The *SHG Health Surveys* are therefore limited by whether the SHG member attended the meeting and on the occurrence of the meeting. As a result, the non-response rate is 55.82%. To maintain consistency in our analysis, we limit observations to those selected to be in the *Household Health Survey* and weight observations accordingly.

Both surveys collect household level health information, and are conducted in different settings by different enumerators.

C. Appendix Tables

Appendix Table 1: Sample Summary Statistics

	All Villages	Control Villages		Treatment Villages		Difference
		Mean	Obs	Mean	Obs	
Panel A: SHG Members						
Below the Poverty Line	0.410	0.467	868	0.353	685	0.114
Pucca (Proper) House	1.638	1.716	903	1.560	720	0.156
Disadvantaged Caste	0.533	0.706	859	0.363	685	.343**
Agricultural Cultivator	0.773	0.775	897	0.771	719	0.004
Agricultural Laborer	0.671	0.704	899	0.638	720	0.066
Household Size	5.809	5.887	905	5.730	723	0.157
Age	41.74	41.34	904	42.13	723	-0.79
Education	5.221	5.152	868	5.288	719	-0.136
Risk Preference	6.067	6.108	750	6.024	625	0.084
Panel B: Non-SHG Household Members						
Female	0.361	0.346	4079	0.376	3270	-0.03***
Age	28.32	28.21	4098	28.43	3293	-0.22
Education	6.456	6.412	3970	6.499	3286	-0.087

Notes:

- (1) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.
- (2) Below the Poverty Line, Disadvantaged Caste, Agricultural Cultivator, and Agricultural Laborer are indicator variables reflecting the household. Pucca House is increasing in the infrastructure of the house, from 1 to 3. Education refers to the number of years of education. Risk Preference is a variable from 0 to 10, increasing in the member's preference for risk. All variable definitions can be found in the Online Appendix.
- (3) Reported difference is based on raw means, but statistical significance is determined by a regression which includes block fixed effects on which the randomization was stratified and standard errors clustered at the village level.

Appendix Table 2: MHI Effect on Health Care Utilization, Including Former SHG Members

	(1)	(2)	(3)	(4)
Dependent Variable:	Visited Health Provider	Admitted	IHS, Health Expenditure	Significant Illness (Annual Recall)
Treatment (MHI Offer)	0.0196* (0.0110)	0.00919 (0.00860)	0.0677 (0.0731)	0.00176 (0.0113)
<i>Control Mean</i>	<i>0.109</i>	<i>0.0337</i>	<i>0.725</i>	<i>0.0932</i>
<i>Obs (SHG Members and Non-SHG HH Members)</i>	<i>9327</i>	<i>9337</i>	<i>9337</i>	<i>9337</i>

Notes:

- (1) Standard errors are in parentheses and are clustered at the village.
- (2) Block Fixed Effects upon which the randomization was stratified are included as controls.
- (3) Dependent variables use a one week recall period, unless otherwise noted.
- (4) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.
- (5) This table differs from Table 2 in that former SHG members are included in analysis.
- (6) Statistical significance levels are as follows: *10%, **5%, ***1%.

Appendix Table 3: MHI Effect on Health Care Utilization, by SHG membership

	(1)	(2)	(3)	(4)
Dependent Variable:	Visited Health Provider	Admitted	IHS, Health Expenditure	Significant Illness (Annual Recall)
Panel A: SHG Members				
Treatment (MHI Offer)	-0.0256 (0.0244)	0.00223 (0.0131)	-0.209 (0.165)	-0.0279 (0.0237)
<i>Control Mean</i>	<i>0.194</i>	<i>0.0560</i>	<i>1.272</i>	<i>0.178</i>
<i>Obs (SHG Members)</i>	<i>1627</i>	<i>1628</i>	<i>1628</i>	<i>1628</i>
Panel B: Non-SHG HH Members				
Treatment (MHI Offer)	0.0284*** (0.0102)	0.0104 (0.00889)	0.123* (0.0698)	0.00699 (0.0106)
<i>Control Mean</i>	<i>0.0902</i>	<i>0.0280</i>	<i>0.602</i>	<i>0.0745</i>
<i>Obs (Non-SHG HH Members)</i>	<i>7399</i>	<i>7406</i>	<i>7406</i>	<i>7406</i>

Notes:

- (1) Standard errors are in parentheses and are clustered at the village.
- (2) Block Fixed Effects upon which the randomization was stratified are included as controls.
- (3) Dependent variables use a one week recall period, unless otherwise noted.
- (4) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.
- (5) Statistical significance levels are as follows: *10%, **5%, ***1%.

Appendix Table 4: MHI Effect on Health Care Utilization, Including Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable:	Visited Health Provider			Admitted			IHS, Health Expenditure			Significant Illness (Annual Recall)		
Panel A: SHG Members and Non-SHG HH Members												
Treatment (MHI Offer)	0.0184 (0.0111)	0.0188 (0.0120)	0.0136 (0.0123)	0.00890 (0.00870)	0.00975 (0.00963)	0.00939 (0.00964)	0.0606 (0.0750)	0.0642 (0.0794)	0.0229 (0.0775)	0.000616 (0.0110)	0.00125 (0.0112)	-0.00332 (0.00945)
<i>Obs</i>	9026	7861	7861	9034	7868	7868	9034	7868	7868	9034	7868	7868
Panel B: SHG Members												
Treatment (MHI Offer)	-0.0256 (0.0244)	-0.0273 (0.0266)	-0.0320 (0.0254)	0.00223 (0.0131)	-0.000655 (0.0147)	0.00291 (0.0142)	-0.209 (0.165)	-0.217 (0.180)	-0.268 (0.168)	-0.0279 (0.0237)	-0.0239 (0.0260)	-0.0216 (0.0298)
<i>Obs</i>	1627	1418	1418	1628	1419	1419	1628	1419	1419	1628	1419	1419
Panel C: Non-SHG HH Members												
Treatment (MHI Offer)	0.0284*** (0.0102)	0.0295** (0.0110)	0.0254** (0.0122)	0.0104 (0.00889)	0.0122 (0.0102)	0.0110 (0.0107)	0.123* (0.0698)	0.130* (0.0738)	0.0993 (0.0774)	0.00699 (0.0106)	0.00685 (0.0112)	0.00163 (0.00994)
<i>Obs</i>	7399	6443	6443	7406	6449	6449	7406	6449	6449	7406	6449	6449
<i>Limited Sample</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
<i>Includes Control Variables</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>

Notes:

- (1) Limited Sample refers to including only observations for which additional covariates are observed.
- (2) Control variables are those listed in Appendix Table 1. That is, an individual's sex, age, and education, and whether the household is below the poverty line, belonging to a backward caste, are primarily agricultural cultivators, members work as agricultural laborers, and household size.
- (3) Standard errors are in parentheses and are clustered at the village.
- (4) Block Fixed Effects upon which the randomization was stratified are included as controls.
- (5) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.
- (6) Statistical significance levels are as follows: *10%, **5%, ***1%.

Appendix Table 5: Non-SHG Household Members' Health by SHG Member's Enrollment Status

Dependent Variable:	(1) Experienced Illness	(2) Admitted	(3) Health Expenditure (Rs. 1,000)	(4) Significant Illness (Annual Recall)
Enrolled SHG Member	-0.000379 (0.0113)	-0.00632 (0.00736)	-0.00245 (0.0198)	-0.00218 (0.00441)
Constant	0.0978*** (0.00820)	0.0318*** (0.00586)	0.0841*** (0.0133)	0.0356*** (0.00326)
<i>Obs (Non-SHG HH Members)</i>	4105	4105	4105	4104

Notes:

(1) Standard errors are in parentheses and are clustered at the SHG level.

(2) Dependent variables use a one week recall period, unless otherwise noted.

(3) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

(4) Statistical significance levels are as follows: *10%, **5%, ***1%.

Appendix Table 6: Changing Sample Sizes with Additional Covariates for SHG Members

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: Enrolled						
Panel A: Experienced Illness						
Experienced Illness	0.188*** (0.0346)	0.174*** (0.0405)	0.170*** (0.0407)	0.152*** (0.0304)	0.148*** (0.0359)	0.150*** (0.0380)
Panel B: Admitted						
Admitted	0.141** (0.0636)	0.148* (0.0756)	0.145* (0.0740)	0.0979* (0.0537)	0.0901 (0.0663)	0.0807 (0.0675)
Panel C: Health Expenditure						
IHS of Health Expenditure (Rs.)	0.0302*** (0.00548)	0.0289*** (0.00659)	0.0271*** (0.00654)	0.0210*** (0.00452)	0.0205*** (0.00539)	0.0202*** (0.00570)
Panel D: Significant Illness (Annual Recall)						
Significant Illness	-0.0103 (0.0436)	-0.0333 (0.0513)	-0.0391 (0.0504)	-0.0228 (0.0344)	-0.0373 (0.0408)	-0.0484 (0.0391)
<i>Observations (SHG Members)</i>	905	638	638	905	638	638
Village FE	No	No	No	Yes	Yes	Yes
Limited Sample	No	Yes	Yes	No	Yes	Yes
Includes Control Variables	No	No	Yes	No	No	Yes

Notes:

(1) Limited Sample refers to including only observations for which additional covariates are observed.

(2) Control variables are those listed in Appendix Table 1. That is, an individual's sex, age, and education, and whether the household is below the poverty line, belonging to a backward caste, are primarily agricultural cultivators, members work as agricultural laborers, and household size.

(3) Dependent variables use a one week recall period, unless otherwise noted.

(4) Standard errors are in parentheses and are clustered at the SHG.

(5) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

(6) Statistical significance levels are as follows: *10%, **5%, ***1%.

Appendix Table 7: Changing Sample Sizes and Covariates for Non-SHG Household Members

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable: Enrolled									
Panel A: Experienced Illness									
Experienced Illness	0.151*** (0.0389)	0.166*** (0.0432)	0.160*** (0.0419)	0.0881*** (0.0238)	0.0905*** (0.0256)	0.0921*** (0.0262)	0.0571** (0.0242)	0.0633** (0.0262)	0.0641** (0.0266)
Panel B: Admitted									
Admitted	0.0604 (0.0499)	0.0701 (0.0572)	0.0706 (0.0556)	0.0276 (0.0401)	0.0345 (0.0423)	0.0373 (0.0433)	0.0241 (0.0391)	0.0326 (0.0421)	0.0366 (0.0424)
Panel C: Health Expenditure									
IHS of Health Expenditure (Rs.)	0.0189*** (0.00576)	0.0225*** (0.00669)	0.0219*** (0.00665)	0.0105*** (0.00357)	0.0123*** (0.00378)	0.0127*** (0.00392)	0.00652* (0.00383)	0.00858** (0.00417)	0.00858** (0.00422)
Panel D: Significant Illness (Annual Recall)									
Significant Illness	0.111*** (0.0285)	0.109*** (0.0317)	0.0962*** (0.0307)	0.0769*** (0.0267)	0.0787*** (0.0279)	0.0635** (0.0280)	0.0617** (0.0248)	0.0495* (0.0256)	0.0465* (0.0257)
<i>Obs (Non-SHG HH Members)</i>	2394	2060	2060	2394	2060	2060	2394	2060	2060
SHG FE	No	No	No	Yes	Yes	Yes	No	No	No
HH FE	No	No	No	No	No	No	Yes	Yes	Yes
Limited Sample	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Includes Control Variables	No	No	Yes	No	No	Yes	No	No	Yes

Notes:

(1) Limited Sample refers to including only observations for which additional covariates are observed.

(2) Control variables are those listed in Appendix Table 1. That is, an individual's sex, age, and education, and whether the household is below the poverty line, belonging to a backward caste, are primarily agricultural cultivators, members work as agricultural laborers, and household size.

(3) Dependent variables use a one week recall period, unless otherwise noted.

(4) Standard errors are in parentheses and are clustered at the SHG.

(5) Observations are limited to active SHG members surveyed in the Household Health Survey and are weighted to be representative of the target population.

(6) Statistical significance levels are as follows: *10%, **5%, ***1%.