Impact of community based health insurance on access and financial protection: Evidence from three randomised control trials in rural India

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Abstract

Since the 1990s, Community Based Health Insurance (CBHI) schemes have been proposed to reduce the financial consequences of illness and enhance access to health care in developing countries. However, convincing empirical evidence on the ability of such schemes to meet their objectives is scarce. This paper uses data from randomised control trials conducted in rural Uttar Pradesh and Bihar to evaluate the effects of three CBHI schemes on health care utilization and health care expenditure. We find that the schemes have no effect on health care utilization or on health care expenditure. The results suggest that CBHI schemes of the type examined in this paper are unlikely to have a substantial impact on access and financial protection in developing countries.

1. Introduction

Private health expenditure constitutes 81% of total health expenditure in India of which 94% is paid for out of pocket (Berman *et al.,* 2010). Less than 15% of the population is covered by health insurance (Berman *et al.,* 2010; World Health Organization 2012). The absence of pre-financing arrangements for health care exposes many households to financial hardship when confronted with ill-health, or causes them to forego care altogether (Bonu *et al.,* 2009; Binnendijk *et al.,* 2012; Murray *et al.,* 2012). The impoverishing effects of catastrophic health care expenses have been highlighted by Devadasan *et al.,* (2006).

Until relatively recently, large scale public schemes to alleviate the burden of health care expenses on the poor have been largely absent. In 2008, the government launched the Rashtriya Swasthya Bima Yojana (RSBY) which targets those below the poverty line and provides coverage for inpatient care (IP). Following the criticism that the scheme does not cover the costs of outpatient (OP) care, a handful of pilots providing coverage for both IP and OP care have been initiated (Bonu *et al.,* 2009; ICICI, 2012). Since the 1990s, Community Based Health Insurance Schemes (CBHI) of the type examined in this paper, which involve potential beneficiaries in scheme design and management have been proposed as an option to enhance access to care and provide financial protection (Aggarwal, 2010; Dror *et al.,* 2007; Devadasan *et al.,* 2010).

Matching the spread of such schemes, not only in India but also in other developing countries, the number of studies assessing scheme effects has proliferated. Ekman (2004) provides a systematic review of 36 studies published between 1980 and 2002 while Mebratie *et al.,* (2013) provide a systematic review of 46 studies published between 1995 and 2012. Mebratie *et al*., (2013) report that three-quarters of the studies (26 of 35) find a

positive link between access to CBHI and health care utilization and that a majority (9 of 16) find a salutary effect on financial protection. While these effects are promising, the credibility of the estimates presented in a number of studies is hampered by the inability to control for self-selection into insurance schemes. Only a handful of studies control for observed and unobserved characteristics that may have a bearing on insurance uptake and may also influence the outcomes of interest.[1]

Turning to the Indian context, Dror *et al*., (2009) examine the effects of two member-operated and one commercially-operated micro-insurance scheme operating in Maharashtra and Bihar, Aggarwal (2010) investigates the effects of the Yeshasvini CBHI programme in Karnataka and Devadasan *et al*., (2010) assess the effects of a CBHI scheme operating in Tamil Nadu. All three papers report that scheme access is associated with increased utilization of health care. However, none of these papers control for unobserved factors that may influence insurance uptake, although Aggarwal (2010) uses matching and Devadasan *et al.,* (2010) use regression analysis to control for selection on observables. A more convincing methodological approach is followed by Mahal *et al.,* (2013) who use a randomised promotion design to evaluate the effects of a pre-paid health card on access to outpatient care provided by low-skilled community health workers (CHWs) in rural Maharashtra. The authors report that the scheme led to a higher number of visits to CHW, more referrals to doctors and hospitals and reduced length of hospitalisation and reduced OOP, potentially due to timely referrals. While these papers purport to analyse the effect of

[1] Eight of the 46 studies reviewed in Mebratie *et al.*, (2013) use baseline and follow-up data and control for self-selection effects. Five of these are based on data from China (Yip *et al.,* 2008; Wang *et al.,* 2009; Wagstaff *et al.,* 2009; Chen and Yan, 2012; Xuemei and Xiao, 2011). Lu *et al.,* (2012) examine the effect of Rwanda's CBHI scheme, Levine *et al.,* (2012) provide an assessment of a scheme in Cambodia and Parmar *et al.,* (2012) examine a scheme in Burkina Faso. Only one of these studies is based on a randomised control design (Levine *et al.,* 2012). The rest of these papers use difference-in-differences and/or instrumental variables.

community based insurance schemes, the role and involvement of the community in determining scheme benefits and premiums and thereafter managing the schemes is often quite limited. For instance, the Yeshasvini scheme is operated by the state government and is subsidised by the state. The scheme in Tamil Nadu is run by a private insurance company and subsidised by donors. In both schemes community involvement is limited to spreading information about the scheme and mobilising membership. The CHW scheme in Maharashtra was designed, implemented and managed by a foundation and not by potential beneficiaries.[2]

This paper makes two main contributions. First, it adds to the literature by evaluating the effects of three CBHI schemes in northern rural India set up as step-wise clustered randomised control trials (CRCT). We offer one of the few studies which uses an experimental approach to evaluate the impact of CBHI schemes. We use the randomised rollout of the schemes to identify their impact on health care utilization and financial protection, while distinguishing between outpatient care and hospitalizations. In addition to the methodological novelty the paper assesses the ability of CBHI schemes which have been designed, and which are administered and managed by the communities themselves and which do not receive any financial or technical support from a government or a private provider in enhancing access to care and providing financial protection. Whether such stand-alone relatively "pure" community schemes have the ability to enhance social protection in rural India remains to be seen.

[2] Mebratie *et al.,* (2013) classify the 48 CBHI schemes included in their systematic review into three categories. Twenty five schemes were classified as government-run community-involved schemes, seven of them were termed provider-based health insurance schemes and 16 were classified as community-driven and community-managed schemes. The schemes under scrutiny in this paper lie in the last category. Typically, such schemes charge lower premiums, offer less generous packages but have a higher degree of community involvement as compared to other scheme types.

The paper is organised as follows: Section 2 describes the CBHI schemes. Section 3 discusses the data while section 4 outlines the empirical approach. Section 5 presents the results and the final section contains a discussion and concluding remarks.

2. CBHI Schemes

The CBHI schemes were introduced in 2010 by the Delhi-based Micro Insurance Academy in partnership with three local NGOs in Kanpur Dehat and Pratapgarh districts in Uttar Pradesh and in Vaishali district in Bihar. The two states are amongst India's most populated and least educated with large gender disparities (Planning Commission, 2011). Enrolment in the schemes was offered to households connected to Self Help Groups (SHG). SHGs are groups of 10-20 women living in the same village who come together and agree to save a specific amount each period and are generally trained and supported by NGOs (Fouillet and Augsburg, 2008).

At each of the three sites, the target group was defined as all members of households with at least one woman registered by March 2010 as a member of a SHG. The 91 villages in the three districts were grouped into 48 clusters (15 in Pratapgarh, 17 in Kanpur Dehat and 16 in Vaishali). Clusters were formed by combining contiguous villages such that they contained roughly an equal number of SHG households (60 to 80). Subsequently, at each site, the clusters were randomly assigned to one of the three implementation waves (2011-2012-2013). In each of the implementation waves, all SHG households within the selected clusters were offered an opportunity to enrol in the CBHI schemes. By the end of the project the entire target population had been offered a chance to join the schemes. Additional details on the design of the experiment are available in Doyle *et al.,* (2011).

Preparations for the scheme started in the second half of 2010 with a campaign to raise insurance awareness including the screening of a movie in the intended treatment areas and numerous meetings held at the SHG level. From June to December 2010, based on a set of four to six initial benefit packages designed by MIA, the intended subscribers of the first wave engaged in an exercise called, Choosing Health Plans Altogether (CHAT), which offered them a chance to choose benefit packages.[3] The choice of benefit packages took place in three steps. In the first stage of the CHAT exercise, individual SHG members determined the benefit package they preferred. In the second stage the individual members debated their choices and the SHG group was asked to provide a first and a second choice package. In the third stage all the SHG groups met and debated their choices and the package that was chosen by most groups was retained in each district (for details, see Dror *et al.,* 2014). Scheme rollout took place in February 2011 in Vaishali and Pratapgarh and in March 2011 in Kanpur Dehat. Prior to scheme rollout, SHG members were chosen to form parts of the claims committees and governing bodies that steer the day to day operation of the insurance scheme. The claims committees meet about every three weeks to decide on claims and pay-outs, which are settled on a cash basis.

Table I shows the benefit packages chosen across the three sites in the first year of the project (2010). Although site specific annual premiums are not considerably different, reflecting local priorities, the packages chosen do vary. During the first year of the scheme, members in Vaishali chose cover exclusively for outpatient care while those in Pratapgarh opted only for inpatient care. Members in Kanpur Dehat opted for a shallower coverage of

[3] The benefit packages offered to the SHG members were designed on the basis of information available in the baseline data and take into account local health care costs, availability of facilities and the probability of experiencing different health problems.

both. A potential reason for the preference for only outpatient coverage in Vaishali could be the penetration of the government run RSBY programme that provides insurance coverage for inpatient care (a premium of INR 30 per person per year (PPPY) for an annual coverage of INR 30,000 (Berman *et al.,* 2010).[4] Changes to the benefit packages could be made annually (prior to the next enrolment wave) but were mainly limited to the inclusion of outpatient care in Pratapgarh (see Annex I for coverage in 2012).

It is important to note that throughout all sites and years, coverage for outpatient care is restricted to designated practitioners, mainly Rural Medical Providers (RMPs).[5] While not necessarily licensed, these providers are responsible for a majority of health care visits for outpatient care (Raza *et al.,* 2013; Gautham *et al.,* 2011). RMPs are contracted on a yearly capitation basis, with monthly instalments, and are expected to provide care and medicines free of charge to the insured. For other covered expenses, receipts are provided by the beneficiaries and reimbursements are decided upon by the claims committees.

Initially, the intention was that enrolment would be at the household level. However, this was not followed as households claimed that paying premiums for all household members was a heavy financial burden. Hence, scheme administrators decided that provided women linked to the SHG enrolled, they could join the scheme alone or with selected members of their household.

[4] Below-poverty-line households living in the three districts where the CBHI schemes are offered are eligible to enrol in the RSBY. In these districts the RSBY scheme covers only inpatient care while the CBHI offers communities an option to cover both types of care. Our data suggest that the two schemes complement each other as at the time that the package choices were offered to wave 1 households, Vaishali district had an RSBY uptake rate of 48 while RSBY uptake was 18 percent in Pratapgarh and 15 percent in Kanpur Dehat.

[5] By 2013, the Kanpur CBHI scheme had begun offering the services of a qualified doctor who visited the office of the local partner NGO and other designated places on a weekly basis.

During the first wave of implementation, at least one individual from 39% of the households that had been offered insurance joined the scheme while during the second wave the corresponding figure was 45%. In terms of individuals, these figures translate into an individual insurance uptake rate of 23% in wave 1 and 24% in wave 2. Dropout rates are quite high with 54% of the households (42% of individuals) who enrolled in the first wave renewing in the second, followed by a renewal of 25% of those originally enrolled households (17% of individuals) during the third wave. Analysis of enrolment decisions from the first wave reveals that except for hospitalization, which increases the probability of enrolling by 10 percentage points in Kanpur Dehat, there is no evidence that enrolment is motivated by previous illnesses (Panda *et al.,* 2014). While direct evidence of adverse selection may seem modest, households with children seem to be more risk averse or expect a higher need for health care and are substantially more likely to enrol. The marginal effects are 17 to 20 percentage points in Pratapgarh and Vaishali.

3. Data

3.1 Data collection

We use three rounds of household panel data collected from SHG-linked households living in each of the three sites. The surveys covered *all* eligible households. In all the surveys the primary respondents were the SHG members themselves or the head of the household if the member was unavailable. The baseline survey was canvassed before any household was offered enrolment (March-May 2010) and covered 3,686 households (21,366 individuals).[6] In April-May 2011, SHG-linked households residing in a third of the clusters were offered a

[6] All targeted households (SHG members) in the three districts were included in the survey. The study was designed to detect a "small" to "medium" effect. At each site the minimal detectable effect size is 0.4 standard deviations while it is 0.2 standard deviations for the full sample. The calculations were based on a 5% probability of committing a Type I error, power of 80% and an intra-cluster correlation of 5%.

chance to enrol in the scheme. The second survey was conducted between March and May 2012 during which 3,318 households (18,403 individuals) were re-interviewed, of whom 1,596 individuals were new to the households by means of marriage, birth and split households. Subsequently, enrolment was offered to a second cohort, that is, an additional one third of the target group. The third survey was conducted between March and May 2013 and comprised 3,307 households (18,322 individuals) of whom 4,285 individuals were new additions over the two previous years. The three surveys yielded a balanced panel of 3,027 households (14,037 individuals) of which about two-thirds of the sample (2,516 households) are considered the treatment group as they had been offered a chance to enrol in the schemes by May 2012 while the remaining households who had not been offered a chance to enrol by May 2012 are referred to as controls. Figure I provides an overview of the timing of the surveys in relation to the offer of enrolment. Additional details on potential problems due to attrition bias are provided in the next section.

3.2 Variables

The main outcome variables of interest relate to health care utilization and health care expenditures. Detailed information on health care use conditional on illness in the 30 days preceding the survey was collected for outpatient care and 12 months preceding the survey for inpatient care. Information on health care costs (consultation fees, costs of medicine and lab/imaging tests) and the manner in which a household finances costs was gathered for both outpatient and inpatient care. This information was used to define the probability that a household resorted to hardship financing, that is, a household met health care costs

by borrowing from high interest rate lenders, cutting back on essential costs[7] or had to sell assets (Binnendijk *et al.,* 2011).

In addition to these outcome variables the surveys gathered information on a range of demographic (age/gender indicators, household size, gender of household head), socioeconomic (educational attainment, occupational status, scheduled caste/tribe status and per capita household expenditures) and health related characteristics. Information on per capita consumption (net of healthcare spending, in constant 2010 prices) is based on a 30-day recall period for store bought and home grown food items and a 12 month recall period for household durables and investments in agricultural equipment.

3.3 Summary Statistics

Table II presents baseline means of outcome variables for individuals residing in clusters that were offered a chance to enrol in the scheme by 2012 (treatment group) and individuals living in clusters that were not offered a chance to enrol by 2012 (control group). Statistics are provided for the pooled sample and for each site (see Annex II for site specific details). For the pooled sample, three of the nine outcome variables are statistically different across the treatment and control groups but the gaps are not substantial. For instance, the probability of seeking outpatient care conditional on reporting an illness is statistically different but the means are 80.7 and 78.5 percent in the treatment and control group, respectively. Similarly, the probability of seeking inpatient care is 2.7 percent in the treatment group and 3.1 percent in the control group. The site specific means show that there are no statistically significant differences in the outcome variables in Kanpur Dehat and that in the other sites the differences are limited to one or two outcomes. The

[7] This includes delays in paying bills for rent, fuel, agricultural/business inputs, pulling children out of school or reducing food consumption.

differences observed in the probability of using outpatient care in the pooled sample emanate from both Pratapgarh and Vaishali. In Pratapgarh the treatment group is more likely to seek outpatient care (79.3 versus 72.9 percent) and in Vaishali the treatment group is less likely to seek outpatient care (83.7 versus 86.8 percent).

Baseline means for a set of demographic and socio-economic characteristics are provided in Annex III. For the pooled sample, a number of the covariates are statistically different across treatment and control groups but again the differences are not substantial. The treatment group has slightly smaller households (6.74 versus 6.85 members) and a slightly higher proportion of household members with secondary education (29.3 versus 26 percent). However, they are more likely to belong to the lowest consumption tertile (36.7 versus 39.4 percent) and are more likely to belong to lower castes - (34 versus 29 percent). Although there are differences in magnitude, the site specific means display similar patterns, except for one trait. The proportion of lower caste households in the treatment group is much lower in Kanpur while it is higher in the case of the other two sites.

The overall impression emerging from an assessment of the baseline characteristics across the two groups is that, while not perfect, the clustered-randomization approach has delivered comparable groups. There is no clear link between treatment status and socio-economic traits. While some of the pre-treatment outcomes and demographic and socio-economic traits are statistically different, except for caste affiliation, the differences are not substantial. As discussed in the next section our empirical approach controls for time-invariant attributes such as caste and such factors are unlikely to have a bearing on estimates of the effect of being offered CBHI on the outcomes of interest.

4. Empirical strategy

4.1 Intention to treat effect

We first investigate whether being offered CBHI membership has an effect on healthcare utilization and financial protection, that is, the intention-to-treat effect (ITT). For the binary health care utilization outcomes ($y_{ivt}$for individual *i* in village *v* at time *t*) we use an ordinary least squares model specified as:

$$y_{ivt} = \gamma offer_{vt} + x'_{ivt}\beta + t_t + \alpha_v + \varepsilon_{ivt}. \quad (1)$$

The model includes year indicators (t_t) to capture time trends in healthcare use common to both treated and control groups, village fixed effects (α_v) to capture time-invariant village level characteristics[8], a set of time varying individual variables (x_{ivt}) and the key variable of interest ($offer_{vt}$) which is switched on if households in village *v* had been offered the possibility of enrolling in the CBHI program at time *t*. For half the treatment group the post-treatment period is two years while for the other half it is one year. Arguably, these post-treatment time periods are long enough to allow us to detect the effect of access to insurance on health care use, especially outpatient care.

The healthcare spending variables are skewed and censored at zero, which makes linear models such as ordinary least squares unsuitable. We therefore use a fixed effects Poisson model (FEP) to assess the effect of being offered CBHI on healthcare spending. FEP models are well suited to dealing with such outcomes (Mihaylova *et al.,* 2011; Buntin and Zaslavsky, 2004; Manning and Mullahy, 2001). While Poisson models are typically used for count data, they do not require the variable of interest to follow a Poisson distribution, only that the

[8] We use village level rather than individual level fixed effects as the IV versions of the non-linear models cannot accommodate individual fixed effects. Results from the ITT models were robust to using a logit model for the binary outcomes rather than a linear probability model. The results were also robust to the inclusion of individual fixed effects rather than village fixed effects.

conditional mean is correctly specified (Santos and Tenreyro, 2006; Wooldridge, 2001).[9] For the expenditure outcome variables, y_{ivt}, that is, healthcare expenditure incurred by individual *i* in village *v at* time *t*, we specify the FEP model as:

$$E(y_{ivt}|offer_{vt}; x_{ivt}; t_t; \alpha_v) = \exp(\gamma offer_{vt} + x'_{ivt}\beta + t_t + \alpha_v). \quad (2)$$

The estimated coefficients may be interpreted as percentage changes in *y* due to a unit change in the explanatory variables.

4.2 Average treatment effect on the treated

In the context of incomplete insurance uptake, the ITT effect is a lower bound of the effect of actually enrolling in the CBHI schemes, that is, the average treatment effect on the treated (ATET). Since households in the control group were not able to access CBHI, the ATET is simply the ITT scaled by the proportion of those offered CBHI that actually enrolled. While the offer of insurance was randomized, uptake is not exogenous. To estimate the ATET while accounting for self-selection into the CBHI schemes we estimate models that are similar to (1) and (2) but use the randomized offer of CBHI as an instrument for actual uptake (Imbens and Wooldridge, 2009).[10] The first stage of these IV models is specified as:

$$uptake_{ivt} = \theta offer_{vt} + x'_{ivt}\rho + t_t + \alpha_v + \mu_{ivt}. \quad (3)$$

Subsequently, models for the binary healthcare utilization outcomes are estimated using two-stage least squares and for healthcare expenditures, IV-Poisson models are estimated using a two-step GMM estimator.[11]

[9] The FEP is optimal when the conditional variance is proportional (not equal) to the conditional mean, but also consistent when this is not the case.

[10] Since no one in the control group can access CBHI and there is imperfect compliance in the treatment group, the local average treatment effect (LATE) is equal to the ATET.

[11] See Annex IV for first stage regression results.

In all models, standard errors are adjusted to allow for serially and/or spatially correlated shocks at the cluster level (Bertrand *et al.,* 2004; Angrist and Pischke, 2009). We first estimate models using the pooled data, followed by site specific estimates. All statistical analysis is done in Stata 13.

4.3 Attrition

The rate of attrition between 2010 and 2012 was 21.36% and between 2012 and 2013 it was 17.91%, or a total attrition rate of 39.21% at the individual level. At the household level, the rate of attrition by 2012 was 17.67% and 8.56% in the following year, leading to a total of 26.23%. We examined the probability of attrition between the baseline and the endline surveys as a function of demographic and socioeconomic characteristics and also examined whether attrition rates vary across survey enumerators. The estimates suggest that attrition may be attributed to migration for work as unemployed males in the age group 14 to 55 and who have completed middle to high school are most likely to exit the sample.[12] To account for potential problems of attrition bias, we constructed inverse probability weights by running wave-specific probit models of remaining in the sample by the next wave on baseline covariates (Jones *et al.*, 2013). Including these weights in our regression models led to negligible changes in the estimates (the results are available on request).

5. Results

5.1 Effects on health care use

The top panel of Table III displays the impact of the randomized offer of insurance (ITT) and the uptake of insurance (ATET) on the probability of using out- and inpatient care based on

[12] An examination of the link between the probability of attrition and enumerator codes suggests that variation over enumerators accounts for a negligible proportion of variation in attrition.

the pooled data. For outpatient care we consider the probability of seeking outpatient care from any provider and the probability of seeking outpatient care from RMPs. As mentioned earlier, the CBHI scheme covers the cost of using outpatient care from designated medical practitioners, mainly RMPs. For all three utilization outcomes, the ITT estimates are statistically insignificant. Scheme uptake is about 23% and since the ITT effects are reduced form estimates as opposed to the ATET which is based on using offer of insurance as an instrument, as may be expected, the ATET estimates are four times larger but remain statistically insignificant.

Site specific results are reported in Table IV (top panel). In Kanpur Dehat, the offer of insurance leads to a 4 percentage point increase in the probability of seeking outpatient care from any provider with the entire increase coming from an increase in the probability of using RMPs but the effects are not statistically significant at conventional levels. In Vaishali, the CBHI has no effect on utilization. Surprisingly, and an issue to which we return later, in Pratapgarh, an offer of insurance leads to a statistically significant 7 percentage point decline in the probability of seeking outpatient care. Actual uptake of CBHI leads to a large decline (51 percentage points) in the probability of using outpatient care.[13] The decline in use of outpatient care is partly, although not statistically significant, due to a reduction in the use of RMPs but the main change is that households in Pratapgarh are less likely to use care from general practitioners/specialists (not shown in table). Per se, a substitution from the use of outpatient care provided by practitioners whose costs are not covered by the

[13] Outpatient care was only included in the CBHI schemes offered in Pratapgarh in wave 2 as opposed to wave 1 as in the case of the schemes in Kanpur Dehat and Vaishali. Restricting estimates for Pratapgarh only to the baseline and endline surveys (see Figure 1) also yields negative, albeit statistically insignificant estimates of the CBHI scheme on the probability of using outpatient care.

scheme to those whose costs are covered (RMPs) is not unexpected, however, the negative coefficient on the use of RMPs does not support this view.

5.2 Effects on financial protection

ITT and ATET estimates of the effect of insurance on out of pocket health care expenditure for outpatient and inpatient care and the on the probability of hardship financing are provided in the lower panel of Table III. Estimates are provided conditional upon the use of care and also for the full sample. For the sample as a whole, there is no evidence that access to the CBHI scheme works towards reducing out-of-pocket expenditures.

Site specific results (Table IV) show that the CBHI has no effect on health expenditure or on the probability of hardship financing in Kanpur Dehat and in Vaishali. Since utilization of care has not changed one may expect a decline in health care expenditure due to the insurance, however, this is not case. In the case of Pratapgarh, the ITT estimates indicate that, conditional on use, access to CBHI leads to a 16.4 percent decline in outpatient care expenditure while the ATET effects indicate an 80 percent decline. Given the reduction in the use of health care the decline in health care expenditure is tautological and should not be interpreted as a protective influence of the scheme. [14]

6. Discussion and concluding remarks

This paper utilized data from three randomised control trials to evaluate the impact of community based health insurance (CBHI) schemes offered to families of women belonging

[14] In principle, a decline in expenditure conditional on use may be interpreted as evidence of financial protection. However, we find that in Pratapgarh not only is there a decline in the incidence of outpatient health care use (reported in Table 4) but also a statistically significant decline in the number of outpatient visits {ITT: -0.164 (Std. Err: 0.077);ATET: -1.251 (Std.Err: 0.657)}.

to self-help groups in rural India on healthcare utilization and financial protection. Our analysis revealed that at the aggregate level, the schemes had no impact on enhancing access to outpatient or inpatient care and nor did we find any impact on healthcare expenditure. Site specific estimates showed that in two of three sites the schemes had no impact on utilization and health care expenditure. However, perversely, at one of the sites (Pratapgarh) we found that access to insurance led to a decline in utilization of outpatient care. This unexpected result is unlikely to be due to problems with the identification strategy or attrition bias as we found that the clustered-randomized control approach used in this paper delivered comparable treatment and control groups and the estimates were robust to correcting for attrition bias. Based on the evidence assembled in the paper we conclude that the three schemes are not functioning as expected and not only are they unsuccessful at reducing the cost of accessing health care but at one site the scheme seems to be making it more difficult for households to access care. The lack of scheme success is also underlined by the high scheme drop-out rate. Panda *et al.,* (2015) report that two years after scheme introduction only about 17% of those who had enrolled in 2011 renewed their membership.

Our assessment of the qualitative field work which is based on interviews with 33 households who had enrolled in the scheme for at least one year as well as discussions with the organization implementing the scheme provides clues on the underlying reasons for the unexpected effects. Sixteen of the households reported that they had to pay for outpatient services and medicine for conditions that should have been covered by the insurance scheme. Ten of the 33 households dropped out after a year and the most common reasons for dropping out included - poor quality of services provided by the designated providers

and double spending, that is, expenditure on premiums *and* the need to pay for care from non-designated providers.[15] The insurance scheme offers access to outpatient care at designated providers who are paid on the basis of a capitation system. Since the designated providers are chosen in consultation with the community it is unlikely that the perception of poor quality services is due to refraction between designated and desired providers. The most likely explanation is that the provider payment system which pays RMPs a fixed fee per patient per year provides an incentive for RMPs to lower the quality of care offered to the insured and/or to charge for services and drugs as compared to those who are not covered by insurance and pay on a fee-for-service basis. The gap between the fee paid to RMPs per insured individual and the expected fee-for-service per visit supports this argument. For instance, in 2012 an RMP was paid INR 40 per insured per year while the estimated cost per visit to an RMP was INR125 (see, Raza *et al.,* 2013). While these explanations are based on a small sample, they do shed light on why scheme enrolment has not had the expected effects.[16] Problems related to the capitation system have also been mentioned as the main reason for the absence of positive effects of CBHI in Burkina Faso (Fink *et al.,* 2013).

With regard to inpatient care, the lack of an effect is likely to be related to the small sample size given the infrequency of hospitalizations in the target population. Furthermore, coverage for inpatient care is relatively shallow, which is a more general problem in the

[15] In one instance the designated provider charged a fee as he had not received money from the insurance scheme. In other cases the respondents mentioned that CBHI is a waste of money as they had paid a premium and had also paid for care from non-designated providers.

[16]A low degree of competition between providers might also exacerbate the incentive to underprovide in a capitation system. For instance in wave 2, there were 0.28 RMPs per village in Pratapgarh while it was 0.5 in the other two sites.

context of community based schemes which operate without subsidies and which is likely to limit the effects that such schemes may have on financial protection.[17]

There are some limitations to this study. The focus only on SHG households hinders generalizability, the number of clusters per site limits the power of the study design and the explanations provided for the unexpected effects may be considered speculative. Notwithstanding these limitations, the results of this study display that CBHI schemes, at least of the type set up in the current experiment, which do not receive external financial or technical support and rely mainly on expected beneficiaries to finance, administer and manage the scheme are unlikely to have a large effect on enhancing access to care and providing financial protection.

[17] For instance, in Pratapgarh in 2012 the maximum coverage per inpatient care event was INR 4000, while at baseline, conditional upon use, inpatient care expenses incurred by individuals who were offered insurance in the preceding year was INR 12,000.

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9. Tables and figures

Table I: CBHI package details in 2011 (wave 1)

Sites	**Pratapgarh**	**Kanpur Dehat**	**Vaishali**
Annual CBHI premium per person/per year (INR)	176	192	197
Coverage for hospitalization			
Fees (maximum coverage per episode, INR)	6000	3000	-
Wage loss (per day, INR)[1]	100	75	100
Transport (maximum coverage per episode, INR)[2]	100	100	-
Coverage for outpatient care			
Fees (INR)	-	Unlimited	Unlimited
Lab tests (per year, INR)[3]	-	-	200
Imaging tests (per year, INR)[4]	-	-	300
Coverage for maternity care			
Caesarean (per episode, INR)	5000	-	-

Notes:

"-" indicates "Not Included in package"

[1] In Pratapgarh wage losses covered from the 3rd to the 6th day, in Kanpur Dehat from the 4th to the 13th day and in Vaishali from the 4th to the 9th day

[2] For hospitalization of more than 24 hours.

[3, 4] Maximum amount, per person per year

Table II: Means of outcome variables at baseline –
Treated (offered CBHI by 2012) and control (not offered CBHI by 2012) groups

	Individuals offered enrollment by 2012	Individuals not offered enrollment by 2012	Test: Treated=Control
	Treated Mean	Control Mean	p-value
	1	2	3
Reporting an illness (1/0)	0.34	0.33	0.23
Health care utilization (1/0)			
Sought outpatient care conditional upon reporting illness	0.81	0.79	0.04
Sought outpatient care from RMP conditional upon reporting illness	0.37	0.37	0.67
Sought inpatient care	0.027	0.031	0.06
Individual health care expenditures (conditional upon use)			
Outpatient care expenses (INR)	666	611	0.27
(standard deviation)	(2052)	(1500)	
Hardship financing for outpatient care (1/0)	0.183	0.177	0.57
Inpatient care expenses (INR)	12079	13361	0.40
(standard deviation)	(14723)	(19142)	
Hardship financing for inpatient care (1/0)	0.55	0.50	0.25
Health care expenditures (full sample)			
Outpatient care expenses (INR)	226	203	0.17
(standard deviation)	(1237)	(910)	
Inpatient care expenses (INR)	325	418	0.07
(standard deviation)	(3102)	(4115)	

Notes: Columns 1 and 2 show means for the pooled data at baseline for treated and control groups, respectively. Column 3 shows p-values from t-tests performed across the two groups at baseline. The number of observations varies depending on the outcome. The full sample size is 21,372 observations with N = 6265 in Kanpur, 7814 in Pratapgarh and 7293 in Vaishali.

Table III: Effects of the randomized offer (ITT) and uptake of insurance (ATET) on healthcare utilization and financial protection at the pooled level

	ITT		ATET	
	Marginal effect	**Standard error**	**Marginal effect**	**Standard error**
Health care utilization [α]				
Sought outpatient care conditional upon reporting illness[¥]	-0.016	(0.021)	-0.065	(0.082)
Sought outpatient care from RMP conditional upon reporting illness[¥]	0.001	(0.017)	0.005	(0.069)
Observations		*22569*		
Sought inpatient care[¥]	-0.001	(0.004)	-0.005	(0.017)
Observations		*38045*		
Health care expenditures (conditional upon use) [α]				
Outpatient care expenses[γ]	-0.044	(0.063)	-0.203	(0.173)
Hardship financing for outpatient care[¥]	0.001	(0.020)	0.002	(0.081)
Observations		*22569*		
Inpatient care expenses[γ]	0.102	(0.252)	0.047	(0.135)
Hardship financing for inpatient care[¥]	0.016	(0.33)	0.047	(0.135)
Observations		*914*		
Health care expenditures (full sample)				
Outpatient care expenses[γ]	-0.059	(0.060)	-0.225	(0.206)
Observations		*58099*		
Inpatient care expenses[γ]	0.121	(0.256)	0.882	(1.013)
Observations		*38045*		

Notes: * P<0.1; ** P<0.05; *** P<0.01.

[α] Sample restricted to those who reported an illness.

[¥] ITT estimates based on OLS; ATET estimates based on IV. Both models include village level fixed effects.

[γ] ITT estimates based on a Poisson model; ATET estimates based on an IV Poisson model. Both models include village level fixed effects.

Table IV: Effects of the randomized offer (ITT) and uptake of insurance (ATET) on healthcare utilization and financial protection – site specific estimates

	Kanpur Dehat				Pratapgarh				Vaishali			
	ITT		ATET		ITT		ATET		ITT		ATET	
	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error
Health care utilization [α]												
Sought outpatient care conditional upon reporting illness[¥]	0.041	(0.026)	0.163	(0.113)	-0.068**	(0.024)	-0.513**	(0.256)	-0.005	(0.028)	-0.017	(0.082)
Sought outpatient care from RMP conditional upon reporting illness[¥]	0.04	(0.033)	0.162	(0.137)	-0.028	(0.023)	-0.215	(0.188)	-0.008	(0.023)	-0.024	(0.068)
Observations		*6506*				*8187*				*7944*		
Sought inpatient care[¥]	0.002	(0.004)	0.010	(0.023)	-0.003	(0.004)	-0.012	(0.018)				
Observations		*16479*				*21566*						
Health care expenditures (conditional upon use) [α]												
Outpatient care expenses[γ]	0.045	(0.106)	0.316	(0.396)	-0.164***	(0.061)	-0.794**	(0.349)	0.000	(0.072)	-0.031	(0.220)
Hardship financing for outpatient care[¥]	0.01	(0.028)	0.041	(0.109)	-0.007	(0.011)	-0.05	(0.074)	0.008	(0.024)	0.024	(0.071)
Observations		*6506*				*8187*				*7944*		
Inpatient care expenses[γ]	-0.196	(0.312)	0.301	(0.261)	0.542	(0.425)	-0.114	(0.125)				
Hardship financing for Inpatient care[¥]	0.093	(0.99)	0.301	(0.261)	-0.045	(0.82)	-0.114	(0.125)				
Observations		*416*				*498*						
Health care expenditures (full sample)												
Outpatient care expenses[γ]	0.107	(0.095)	0.507	(0.598)	-0.238***	(0.077)	-1.078***	(0.385)	-0.028	(0.072)	0.049	(0.264)
Inpatient care expenses[γ]	-0.093	(0.304)	2.840	(3.207)	0.385	(0.402)	0.547	(1.207)				
Observations		*16479*				*21566*				*20054*		

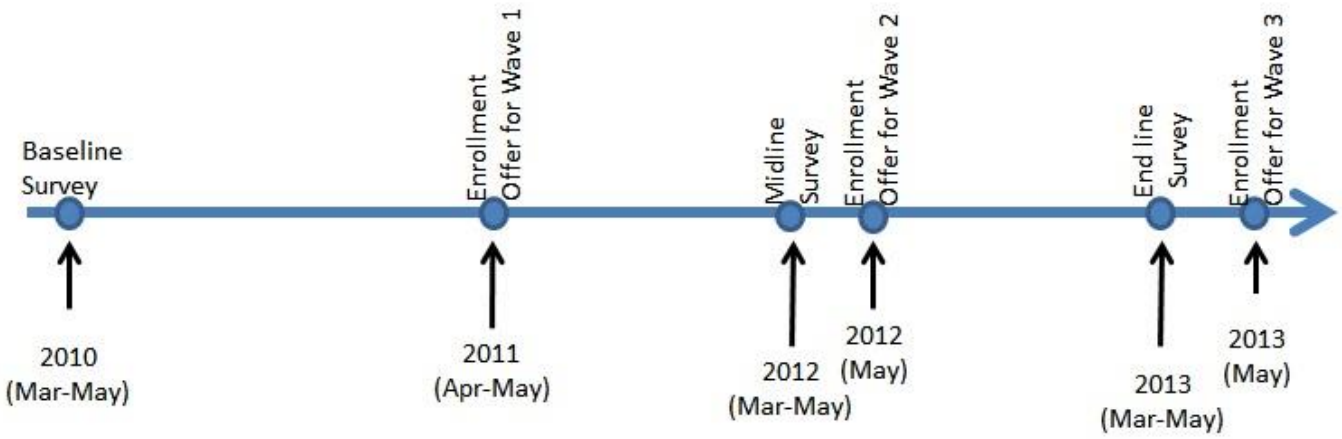
Notes: * P<0.1; ** P<0.05; *** P<0.01.

[α] Sample restricted to those who reported an illness.

[¥] ITT estimates based on OLS; ATET estimates based on IV. Both models include village level fixed effects.

[γ] ITT estimates based on a Poisson model; ATET estimates based on an IV Poisson model. Both models include village level fixed effects.

Figure I: Timing of the surveys in relation to offer of enrolment



10. Annex

Annex I: CBHI package details in 2012 (wave 2)

Sites	**Pratapgarh**	**Kanpur Dehat**	**Vaishali**
Annual CBHI premium per person/per year (INR)	250	192	197
Coverage for hospitalization			
Fees (maximum coverage per episode, INR)	4000	3000	-
Family Coverage	30,000	25,000	-
Wage loss (per day, INR)[1]	100	50	100
Transport (maximum coverage per episode, INR)[2]	100	250	-
Accident Coverage	-	400	-
Family Coverage	-	1000	-
Coverage for outpatient care			
Fees (INR)	Unlimited	Unlimited	Unlimited
Lab tests (per year, INR)[3]	-	-	200
Imaging tests (per year, INR)[4]	-	-	300
Coverage for maternity care	-	-	-
Caesarean (per episode, INR)	-	-	-

"-" indicates "Not Included in package"

[1] For Pratapgarh wages losses covered for the 3rd-7th day, for Kanpur Dehat 3rdh-6th day, for Vaishali 4th-9th day

[2] For hospitalization of more than 24 hours.

[3, 4] Maximum amount, per person per year

Annex II: Baseline means of outcome variables across treated (offered CBHI by 2012) and control (not offered CBHI by 2012) groups disaggregated by site

	Kanpur Dehat				Pratapgarh				Vaishali			
	Treated (mean)	**Control (mean)**	**p-value (1)**	**N**	**Treated (mean)**	**Control (mean)**	**p-value (2)**	**N**	**Treated (mean)**	**Control (mean)**	**p-value (3)**	**N**
Reporting an illness (1/0)	0.321	0.326	0.722	6265	0.373	0.356	0.150	7814	0.32	0.308	0.293	7293
Health care utilization (1/0)												
Sought outpatient care conditional upon reporting illness	0.791	0.774	0.411	2021	0.793	0.729	0.000	2877	0.837	0.868	0.064	2309
Sought care from RMP conditional upon reporting illness	0.448	0.427	0.384	2021	0.339	0.338	0.944	2877	0.329	0.365	0.108	2309
Sought inpatient care	0.028	0.031	0.532	6265	0.022	0.023	0.766	7814	0.032	0.042	0.026	7293
Health care expenditures (conditional upon use)												
Outpatient care expenses (INR)	783	672	0.385	2021	524	459	0.248	2877	738	755	0.822	2309
(standard deviation)	(2977)	(1585)			(1448)	(1254)			(1658)	(1686)		
Hardship financing for outpatient care (1/0)	0.23	0.239	0.660	2021	0.077	0.062	0.173	2877	0.272	0.269	0.879	2309
Inpatient care expenses (INR)	17000	22000	0.178	179	10000	13000	0.165	171	9608	7863	0.212	254
(standard deviation)	(19447)	(28461)			(11219)	(16557)			(11605)	(8825)		
Hardship financing for inpatient care (1/0)	0.532	0.439	0.244	181	0.31	0.255	0.457	171	0.735	0.685	0.399	254
Health care expenditures (full sample)												
Outpatient care expenses (INR)	252	219	0.443	6265	196	164	0.134	7814	236	232	0.878	7293
(standard deviation)	(1726)	(958)			(920)	(780)			(999)	(998)		
Inpatient care expenses (INR)	481	681	0.144	6265	218	296	0.204	7814	305	331	0.685	7293
(standard deviation)	(4302)	(6251)			(2201)	(3145)			(2661)	(2397)		

Notes: Columns show baseline means disaggregated by sites across the treated and control groups. P-values (1-3) refer to t-tests performed across the treated and control groups at baseline. The number of observations varies depending on the outcome. The sample size is 6265 in Kanpur, 7814 in Pratapgarh and 7293 in Vaishali.

Annex III: Baseline means of control variables across treated (offered CBHI by 2012) and control (not offered CBHI by 2012) groups

	Pooled			Kanpur Dehat			Pratapgarh			Vaishali		
	Treated (mean)	**Control (mean)**	**p-value (1)**	**Treated (mean)**	**Control (mean)**	**p-value (2)**	**Treated (mean)**	**Control (mean)**	**p-value (3)**	**Treated (mean)**	**Control (mean)**	**p-value**
Demographics												
Female children 0-13	0.178	0.183	0.383	0.160	0.164	0.654	0.163	0.171	0.409	0.209	0.212	0.752
Female aged 14-55 years	0.290	0.289	0.825	0.287	0.286	0.933	0.309	0.308	0.957	0.273	0.269	0.723
Female older than 55 years	0.038	0.040	0.524	0.035	0.038	0.646	0.041	0.049	0.134	0.037	0.032	0.281
Male aged 0-13 years	0.193	0.199	0.364	0.170	0.173	0.813	0.193	0.189	0.654	0.213	0.231	0.081
Male aged 14-55 years	0.263	0.252	0.095	0.309	0.304	0.687	0.255	0.243	0.238	0.232	0.219	0.219
Male older than 55 years	0.038	0.038	0.932	0.039	0.035	0.544	0.039	0.041	0.603	0.036	0.037	0.894
Household size	6.749	6.853	0.011	6.842	7.184	0.000	7.263	7.323	0.445	6.127	6.046	0.127
Socioeconomics												
No education	0.367	0.394	0.000	0.313	0.331	0.166	0.353	0.353	0.997	0.430	0.493	0.000
Primary education	0.267	0.268	0.961	0.252	0.252	0.973	0.255	0.269	0.197	0.293	0.280	0.246
Secondary education	0.293	0.260	0.000	0.339	0.306	0.013	0.311	0.293	0.101	0.234	0.184	0.000
Higher secondary education	0.073	0.078	0.130	0.096	0.111	0.075	0.081	0.086	0.484	0.043	0.043	0.901
Expenditure tertile: Low	0.395	0.372	0.002	0.245	0.239	0.625	0.501	0.448	0.000	0.413	0.402	0.374
Expenditure tertile: Mid	0.300	0.337	0.000	0.297	0.317	0.110	0.289	0.345	0.000	0.315	0.344	0.019
Expenditure tertile: High	0.305	0.291	0.046	0.458	0.444	0.291	0.211	0.207	0.710	0.272	0.255	0.134
Household belongs to scheduled tribe/caste	0.339	0.294	0.000	0.233	0.326	0.000	0.399	0.306	0.000	0.367	0.254	0.000
Self-employed in agriculture	0.108	0.101	0.131	0.205	0.177	0.011	0.065	0.071	0.288	0.070	0.070	0.947
Self-employed in non-agriculture	0.045	0.044	0.945	0.025	0.035	0.022	0.051	0.036	0.002	0.054	0.061	0.211
Other employment	0.022	0.026	0.079	0.019	0.021	0.629	0.033	0.044	0.012	0.015	0.011	0.278
Casual wage labourer	0.090	0.089	0.898	0.049	0.057	0.159	0.102	0.091	0.141	0.112	0.114	0.811
Not working	0.051	0.057	0.081	0.043	0.064	0.001	0.066	0.065	0.870	0.043	0.043	0.961
Doing housework	0.203	0.201	0.751	0.211	0.205	0.580	0.203	0.206	0.752	0.195	0.191	0.705
Student	0.481	0.481	0.980	0.448	0.440	0.591	0.480	0.487	0.603	0.511	0.509	0.902
N	21372			6265			7841			7329		

Notes: Columns show means at the pooled level and by sites at baseline across the treated and control groups. P-values (1-3) refer to t-tests performed across the treated and control groups at baseline. N=21,372 in 2010, 16,807 in 2012 and 14,037 in 2013.

Annex IV: First-stage regression results

	Outpatient Uptake		Inpatient Uptake	
	marginal effects	standard Error	marginal effects	standard Error
Female children 0-13	0.007	0.005	0.003	0.005
Female older than 55 years	0.003	0.005	-0.001	0.005
Male aged 0-13 years	0.007	0.005	0.003	0.005
Male aged 14-55 years	0.012**	0.006	0.007	0.005
Male older than 55 years	0.013*	0.007	0.006	0.007
Household size	-0.001	0.001	-0.001	0.001
Female headed household	-0.007	0.006	-0.006	0.006
Household belongs to a scheduled tribe/caste	0.018	0.012	0.023	0.014
Primary education	-0.007**	0.003	-0.006*	0.003
Secondary education	-0.004	0.004	-0.005	0.005
Higher secondary education	-0.004	0.007	-0.006	0.007
Self-employed in non-agriculture	-0.017	0.01	-0.021*	0.011
Other employment	-0.001	0.012	-0.002	0.012
Casual wage labourer	-0.003	0.006	-0.004	0.006
Not working	0	0.005	-0.002	0.005
Doing housework	0.006	0.008	0.003	0.008
Student	0.004	0.004	0.003	0.004
Expenditure tertile: Low	-0.003	0.01	-0.005	0.011
Expenditure tertile: High	-0.003	0.008	0	0.008
Offer	0.336***	0.039	0.324***	0.032
N				*58099*

Notes: Results based on an OLS model. * P<0.1; ** P<0.05; *** P<0.01.