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The Impact of Insurance Literacy and Marketing Treatments on the Demand for Health Microinsurance in Senegal: A Randomised Evaluation

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Abstract

Mutual health organisations have been present in Senegal for years. Despite their benefits, in most areas take-up rates remain low. Using randomised controlled trials, we evaluate the effect of an insurance literacy module, communicating the benefits and functioning of health microinsurance, as well as three cross-cutting marketing treatments. The results from our various marketing treatments indicate a positive and significant effect on health insurance adoption, particularly for poor households, increasing take-up by around 35–40%. The insurance literacy module does not seem to have a positive impact on take-up decisions. We attempt to provide different contextual reasons for this result.

Key words: community-based health insurance scheme, randomised evaluation, Africa, Senegal

JEL classification: O12, I13, I15

1. Introduction

In developing countries, the poor face high costs when accessing health care and need to insure themselves against health shocks. However, given that formal health insurance is prohibitively expensive, they must often, with proven success, use informal means of insuring themselves (see amongst many others, Fafchamps and Lund, 2003). However, the imperfect nature of this informal insurance entails severe consequences for their aptitudes

in dealing with risk, smoothing their consumption and acquiring human capital (Gertler and Gruber, 2002). Indeed, health shocks lead to direct expenditures for medicine and treatment, which typically require out-of-pocket payments (OOP) and also entail indirect costs related to a reduction in productivity. One World Health Organisation (WHO) study (Leive and Xu, 2008) estimated that OOP payments regularly exceed 50% of total health-care spending in some low-income countries (particularly for some African nations) where national health systems are still nascent at best and only a small proportion of the population own private health insurance.

Public health funding in Senegal has remained stable over recent years while overall per capita health expenditures have been increasing in the same period (World Bank, 2015). The lessening of the state's ability to meet health-care needs has rendered it unable to provide universal insurance for the population. This has led to the emergence of many community-based health insurance schemes (CBHIS) in Senegal.[1] At the same time, the market has been ineffective in providing health insurance to low-income people, even in urban environments. Private insurers are often faced with significant adverse selection problems and high transaction costs, rendering their contracts prohibitively expensive to many. The poor can thus only resort to expedient transfers from relatives, self-insurance (selling assets, using precautionary savings, etc.) or health insurance schemes rooted in local organisations. The latter offer a form of insurance that allows members to pay regular affordable premiums to reduce OOP payments for health care upon falling ill. These schemes vary in design and implementation but are all not-for-profit organisations based on voluntary participation, underpinned by the concepts of mutual aid and social solidarity at the community level. In Senegal, CBHIS are known as '*mutuelles de santé*' or mutual health organisations (MHOs). The number of MHOs in Senegal has grown from just 13 in 1993 to more than 140 in 2007. The first law defining the juridical framework of MHOs was enacted in 2003 and a strategic plan for the development of MHOs (*Plan Stratégique de Développement des Mutuelles de Santé*) was initiated by the Minister of Health in 2004. Despite this growth, estimates from 2004 show that the take-up rate in the greater region of Thiès, the setting for this study, was close to a mere 5% (Smith and Sulzbach, 2008).

The literature analysing the factors influencing demand for CBHIS, based on household data, has burgeoned in recent years; Jütting (2003), Dror *et al*. (2007), Smith and Sulzbach (2008) and Ito and Kono (2010) represent just a few such empirical studies in developing countries. Recent studies have used randomised controlled trials to look at the role of financial literacy and marketing on the uptake of rainfall insurance products (Gaurav *et al.*, 2011; Cole *et al.*, 2013).[2] The primary contribution of this article is that it is one of just a handful to investigate the roles that such literacy and marketing dimensions have on the uptake of health microinsurance (see Thornton *et al.*, 2010 for a study on voluntary health insurance programmes in Nicaragua). In particular, we examine the roles played by a lack of knowledge of these MHOs and a lack of financial literacy amongst locals. We also investigate the effect of marketing treatments that alleviate liquidity constraints. Whilst we initially intended to track individuals for several months after the end of the experiment in

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1 Health microinsurance programmes have also emerged in India (Dror *et al.*, 2007; Banerjee *et al.*, 2014).

2 For a comprehensive review of the role of financial literacy in developed and developing countries, see Lusardi and Mitchell (2014).

order to investigate re-enrolment and welfare issues, logistical problems prevented us from doing so. As a result, the sole focus is on the question of microinsurance uptake.

We surveyed 360 randomly selected households across the city of Thiès, half of which were offered an insurance literacy training programme. Independent of this assignment, all 360 households were randomly selected to receive one of three marketing treatments. These took the form of redeemable vouchers offering different levels of reduction in MHO entry costs. We find that our various marketing treatments have a positive and significant effect on health insurance adoption, increasing take-up by approximately 35–40% for the sample as a whole. After interacting the marketing treatments with income, this effect appears more pronounced for poorer households, confirming the importance of liquidity constraints as a barrier to health microinsurance take-up. Conversely, the insurance literacy module does not seem to have a positive impact on take-up decisions. We attempt to provide different contextual reasons for these results, which indicate that liquidity constraints and not lack of information hinder demand.

The next section elaborates on various reasons explaining low take-up rates in the context of our study. Section 3 presents the supply side of health microinsurance in Thiès. Section 4 describes our experimental survey design and Section 5 presents descriptive statistics. Section 6 introduces our empirical strategy, followed by a discussion of our results in Section 7. Section 8 concludes.

2. Explaining low take-up rates

Our sample of 360 household heads shows that 33% have health insurance of various forms, for all or a fraction of their household members (on average 73% of all household members). The largest share (19%) represents households that have health insurance compulsorily provided by their employer in both public and private sectors. Only 3% of the households subscribe to a private health insurer, while MHO membership appears relatively modest at 11%. The next section elaborates on each of these health insurance products. In our sample, the main justifications mentioned for non-membership were linked to the following: lack of information about the products offered and their existence (55%); liquidity constraints (16%); lack of interest (5%); and lack of trust and confidence (2%). Our investigation focuses on what appears to be the two most important reasons at play, in our context, in explaining low take-up rates.[3]

2.1 Lack of information

Cai et al. (2009) highlight that many farmers in China refuse to purchase heavily subsidised insurance, partly due to the fact that some are unaware of the programmes on offer. Jütting (2003), whose evidence is drawn from a rural region surrounding Thiès, notes that the concept of insurance is alien to a large proportion of people, suggesting that an information campaign might be useful in this respect. A related issue is the lack of knowledge and understanding of insurance principles (Chankova et al., 2008); referring to rainfall

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3 The literature on financial product take-up in developing countries also investigates the role of behavioural factors such as: loss aversion; aversion to contemplating adverse outcomes (Karlsson et al., 2009); prospect theory with narrow framing; limited attention (Karlan et al., 2010) and difficulties in evaluating low-probability events (Barseghyan et al., 2013).

insurance in India, Giné *et al.* (2007) report that 'the most common reason given by those interviewed was that they did not understand the product'. Limited understanding of rainfall insurance mechanisms in rural India is also highlighted by Cole *et al.* (2013), Gaurav *et al.* (2011) and Platteau and Ugarte Ontiveros (2013). Using a meta-analysis covering over 200 studies, Fernandes *et al.* (2014) find a limited impact of financial literacy interventions on financial behaviours, particularly in low-income samples.

2.2 Liquidity constraints

Whether poor populations can afford microinsurance schemes is a crucial question. Jütting (2003) finds that the poorest are represented in MHOs to a lesser extent than those with an average or high income. Chankova *et al.* (2008) find similar results using data from Ghana, Mali and Senegal. Giné *et al.* (2008) also show that take-up rates of rainfall insurance increase with household wealth in rural Andhra Pradesh. Whilst only 16% of our sample mentioned liquidity constraints as the reason for non-membership, it is also likely that individuals were reluctant to admit lack of funds to justify the fact that they were not members. This figure may thus be biased downward.

2.3 Lack of trust

Trust can also play an important role in individual decision-making with regards insurance. Cai *et al.* (2009) show that the very low take-up by Chinese farmers of a government sponsored insurance for sows may be explained, among other reasons, by the lack of trust towards governmental institutions. Cole *et al.* (2013) show that endorsement from a third party makes people 40% more likely to purchase rainfall insurance.

Trust is likely to play an important role in both the sustainability of MHOs and their capacity to attract new members. Recent history in Thiès has shown that, in rare cases, some MHOs have ceased their activities or been temporarily unable to provide their members with insurance (Ferrera-Domingo (2002) lists some cases of defaulting MHOs). As claimed by Karlan (2005), answers on trust in General Social Surveys have predictive power on financial decisions such as repayment rates and saving patterns at the household level, and are a good proxy of the capacity to enter into binding relationships. A set of questions in our questionnaire were related to this issue; we asked individuals to weigh their trust on different items by putting aside marbles out of a maximum of ten on an increasing scale. Each answer was rescaled with regard to the trust given to the mother and the family, respectively. For the sample of non-members who were aware of the existence of MHOs, we find that in both cases the median relative trust of MHOs given was eight out of ten. This suggests that these grassroot movements benefit from a largely positive *a priori* knowledge from locals and appear as trustworthy. This might explain why trust does not appear to be an important factor in explaining the low take-up rates observed.

3. The supply side

Health care in Thiès is organised according to a tiered system consisting of health huts (staffed by community health workers), health posts (staffed by nurses and certified midwives) and health centres (staffed by medical doctors, nurses and certified midwives). The health district of Thiès has one regional public hospital and one privately run mission hospital (*St-Jean de Dieu*). Data for this region show that the ratio of inhabitants to health

centres is seven times greater than WHO standards, but the ratio of inhabitants to health posts is in line with international norms (ANSD, 2008).

In the absence of universal public health care, only three forms of health insurance are present in our sample. The first, and of relatively little importance, is offered by private insurers. They provide insurance according to different scales and often require their clients to open a saving account within their own institution (Partenariat pour la Mobilisation de l'Epargne et le Crédit au Sénégal, etc.). The second type refers to compulsory insurance provided by employers with a minimum number of employees. Employees contribute a fraction of their wage to their firms' health fund known as *Institution de Prévoyance Maladie* (IPM), which is then used for partial cover when health problems occur. Public servants have access to a more generous type of IPM where they, their spouse and often up to two children (under 18), are partially insured in case of health-related expenditures. The third type consists of MHOs. Their appeal lies in the fact that they require the payment of affordable monthly premiums, mostly ranging from 200 to 500 CFA (0.30–0.76 Euro) per person covered.[4] MHOs are particularly attractive to the large numbers of self-employed and informal sector workers who have difficulty in accessing private insurance. Upon subscription, the household head pays a one time membership fee ranging from 1,000 to 3,000 CFA, which covers the registration cost. This includes receipt of a booklet listing all registered household members, which acts as an official document when visiting a health provider. The MHOs we surveyed did not operate any selection amongst potential candidates. The only screening involved takes the form of a 'period of observation', during which members are expected to pay individual premiums for 3 months, but are not entitled to make any claims. This 3-month period is designed to minimise adverse selection by testing whether new members can commit to a strict monthly schedule of contributions and prevents people from signing up for an MHO upon becoming sick. Any arrears on payments of premiums can lead to exclusion from coverage for that member. Whilst the rules are strict, the administrators of some MHOs have admitted to allowing a certain degree of flexibility. These not-for-profit grassroot schemes are managed by a non-remunerated governing body headed by a president and have written rules.

The various MHOs in the city are relatively well spread out across its territory; thus most neighbourhoods have access to one. There is no obligation to join the closest MHO. Indeed, one can opt for any MHO. For these reasons, we consider distance to the headquarters of the closest MHO as unlikely to have explanatory power over uptake. Once insured by one of the three schemes described above, members can directly access specified health facilities and are required to pay a fraction of the fees. The remainder of the fees are covered by the insurer. At their core, such transactions have agreements (or conventions) negotiated between each respective health provider (huts, posts or the two centres) and MHO operating in Thiès. As such the agreement of the insurer, prior to a consultation or the treatment of a particular patient, is not required. The array of interventions covered and the extent of the coverage vary from one MHO to the next. However, they generally

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4 Considering the average household size of 6.7 members, the household monthly premium should range from about 1,340 to 3,350 CFA. This corresponds to a negligible share of household income (0.6–1.5%). Taken together, entry fees and a 3-month observation period for the average household may range from 5,000 to 13,000 CFA, a share ranging from 2.2 to 5.8% of average monthly household income.

cover 25–75% of consultation costs and between 50 and 100% of medical exams, hospitalisations, and various inpatient care fees at hospitals.

As IPMs do not offer full coverage for consultation or inpatient care and do not cover all members of a household, there is ample scope to complement this coverage with that of an MHO. In all, 18% of all households exposed to the marketing treatment (21 out of 117) responded positively, even if they already had a form of health insurance. This suggests the intention to either complement existing means of insurance or to cover additional members of the household, kin or both. In particular, of the 21 households, 7 complemented an IPM insurance, 11 an existing MHO insurance and 3 another private form of health insurance.

4. Experimental design

In early 2010, we developed a partnership with GRAIM (*Groupe recherche d'appui aux initiatives mutualistes*), a Senegalese NGO promoting the work of local MHOs active in greater Thiès. As such, GRAIM acts as a regional coordinator and the intermediary for most MHOs in negotiating conventions with health providers. This partnership enabled us to draw on its knowledge to design and deliver our educational modules. Thiès was chosen for two main reasons. Firstly, it is one of the largest cities in Senegal with a population of about 240,000 inhabitants. Secondly, some of the local MHOs are the oldest in Senegal, having been active for 15 years; thus, the city possesses a well-established supply of MHOs.

We use data collected during the spring of 2010 on 360 randomly selected households across the whole territory covered by the city authorities, which represents an area of approximately 20 km^2. We sampled the number of surveyed households across all fifteen Thiès neighbourhoods according to their respective share of the overall population estimates (based on the 2002 census). An official map of the city was used to select a number of streets spreading across each neighbourhood. Each street was assigned a number of households according to its length and density. For every street, we used a pseudo-random process, by which every fifth lot according to a specific direction was picked. Since many households live on the same lot in semi-detached rooms, enumerators randomly selected one room by lot according to a clock-wise selection varying from lot to lot. In the case where a lot was found empty or the head of household was not present, enumerators were instructed to set appointments and revisit the household later, otherwise the household was replaced.[5] Given the small number of households sampled from such a relatively large area, we argue that spillovers within the sample are unlikely.

Our baseline survey aimed to obtain information on individual and household characteristics, through a questionnaire administered to the household head, lasting about 40 min. No monetary compensation was offered for answering the questionnaire. We also gathered information from the household head concerning work, income, and a number of other factors which are described in greater detail below. In our context, and this can safely be extended to the broader national level, the husband is generally considered to be the breadwinner and the head of the house. As such, he is expected to provide insurance for the members of his household. This should provide ample justification as to why we collected

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5   Overall, five households did not want to participate in our study (1.4% of the targeted sample) and
    were replaced.

these key variables affecting health insurance intake from the head. The data described and analysed below are thus at the household level.

Treatments were randomly assigned at the household level. Selected households in each neighbourhood were listed sequentially and assigned, through a random number generator, to receive one of the six sub-treatments we detail below. We proceeded this way in order to avoid imbalances between our treatments within neighbourhoods. At the end of our first visit and after completion of the baseline questionnaire, households selected for the information session were invited to attend an insurance literacy module. Our information session was held on a non-working day in the city centre, before our marketing treatment was implemented. Invitations were directly handed to heads of household. The module consisted of a 3-h educational presentation, offered by the GRAIM, on health microinsurance and specifically the functioning of MHOs (including the differences across various active MHOs in Thiès) and their origins in the region. A lesson on personal financial management that explored the notions of savings, risk and insurance was also given. Case studies looking at health expenditures of different MHO members and non-member households were given in order to illustrate the different concepts introduced. Sessions were held in groups containing a maximum of 20 individuals at a time. GRAIM has been running a training programme for several years for small communities eager to set up their own MHO and was therefore in an ideal position to run this module. It was slightly modified in order to be presented to randomly selected households. The same individual was in charge of running all the sessions, during which interactions with the participants were encouraged. Since the city covers a sizeable area, we reimbursed transportation costs for all individuals who had attended in order to minimise disincentives to attend. We gave 1,000 CFA to every individual, which in Thiès, is the exact return fare for a taxi journey from any corner of the city to where the meetings were held.[6] Households were informed that transportation costs would be covered at the time of the invitation. Phone calls to household heads were made a day or two before, to remind them of the educational session. The comparison group of 180 households received nothing.

After the insurance literacy training was completed, all households were shortly revisited and received a marketing treatment in the form of one out of three vouchers. The assignment of vouchers was orthogonal to the invitation to the educational session. The 360 households were split into three randomly chosen subsamples (of 120 households each) with each receiving an additional marketing treatment in the form of 1 of 3 vouchers. So for the 180 households invited to attend the insurance literacy module, 60 received voucher 1, 60 voucher 2 and 60 voucher 3 (a similar distribution applies for the 180 households who did not receive an invitation to the module). Voucher 2 offered a full refund of membership fees in an MHO, which represented on average an amount of 1,750 CFA (membership fees for the MHO joined by voucher holders ranged from 1,000 to 3,000 CFA). Voucher 3 provided a full refund of membership fees (equivalent to voucher 2) plus a refund of 250 CFA/month per new member covering fees linked to the observation period of 3 months (refunds were made for each new member for up to 3,000 CFA, which is the equivalent of a 3-month premium for four people at 250 CFA/month). The refunds offered

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6 We ensured, as much as we could, that the individuals who got their transportation reimbursed did actually pay for transport. We thus think that opportunism is unlikely to explain participation in the session (i.e., individuals attending just to obtain a little additional income).

with vouchers 2 and 3 were such that respondents did not have to pay cash up front and then wait for a reimbursement. The vouchers actually reduced the initial cash outlay as these refunds were directly transferred to MHO treasuries. Voucher 1, a placebo treatment, had no monetary value attached, instead representing a simple invitation to the GRAIM in the event that the household was keen to know more about MHOs and the insurance products offered. The recipients of vouchers 2 and 3 had a period of 2 months to redeem the voucher by visiting the GRAIM and filling in an application form to join the MHO of their choice. Unfortunately, we could not collect information on how long households remained members following redemption of the voucher. Subscription is thus not measured in terms of how long they remained enroled.[7] To ensure that our dependent variable was accurately constructed, we phoned all households who did not redeem their voucher 1 month after the redemption date to ask whether, in the meantime, they had joined an MHO but not used their voucher.

5. Descriptive statistics

Table 1 reports summary statistics for the main socio-economic characteristics we consider in our study and which will be included in the empirical estimation below. The majority of household heads are male and live in a couple. The average household comprises over six members. Forty-six percent of heads attended secondary school or had higher levels of education (above 6 years of schooling). Household head's income represents the sum of all sources of monthly income (labour income or wage, rent and received transfers). Due to the sensitivity of questions related to income, and the reticence to provide exact amounts, answers were in most cases (68% of all answers) collected according to intervals. An aggregated measure of income was constructed by adding the midpoint values for the ten income intervals, or exact values when given, to rents and transfers. From this, the mean of monthly head of household income is 133,591 CFA. We then categorised this variable into quintiles.[8] We also computed a synthetic measure of durable assets owned by the households as a proxy for wealth. This represents the sum of a list of items comprising, amongst others, a series of kitchen and home appliances, mobile phone, bicycle, motorcycle, car, sewing machine, different pieces of furniture, etc. As a proxy for income stability, we use a dummy for identifying whether the head of household is working for a public institution. We also include a dummy for self-employed individuals (the benchmark group is employed by private firms).[9] The intuition is that with respect to wages earned in informal activities (petty retailing, craftsmen, transport, etc.), public servants and formal employees of the private sector are likely to have a steadier stream of income and thus find it easier to commit to the payment of monthly premiums. Around 20% of heads in our sample work for the state. We also use dummy variables to measure whether households were using one of three saving devices: rotating savings and credit associations (ROSCAs), banks or microfinance

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7   This also means that we could not study the actual increase in access to and use of health services that MHO membership provided.

8   Our results are robust to the use of an alternative variable, namely household's income. This was similarly computed by adding spouse's income (mean of 222,340 CFA).

9   Our results hold if we use a single dummy variable regrouping all formal sector employees, working in either the private or public sector.

Table 1: Random Assignment of Treatments, Univariate Tests

	Whole sample		Not invited		Invited		Difference	Voucher 1		Voucher 2		Voucher 3		F-test*
	Mean	s.d.	Mean	s.d.	Mean	s.d.		Mean	s.d.	Mean	s.d.	Mean	s.d.	
Head is male	0.733	0.443	0.75	0.434	0.717	0.452	0.033	0.758	0.43	0.7	0.46	0.748	0.436	0.51
Head attended primary school	0.2	0.401	0.2	0.401	0.2	0.401	0	0.166	0.374	0.215	0.412	0.218	0.415	0.62
Head attended sec. school or more	0.461	0.499	0.489	0.501	0.433	0.497	0.056	0.517	0.502	0.4	0.492	0.471	0.501	1.56
Household size	6.731	3.212	6.533	2.903	6.928	3.49	−0.394	7.1	3.46	6.35	3.143	6.748	3.009	1.61
Already insured	0.325	0.469	0.406	0.492	0.244	0.431	0.161**	0.358	0.482	0.3	0.46	0.319	0.468	0.43
No insurance knowledge	0.525	0.500	0.483	0.501	0.567	0.497	−0.083	0.475	0.04	0.57	0.079	0.529	0.079	1.1
Intermediate insurance knowledge	0.100	0.300	0.056	0.23	0.144	0.353	−0.089***	0.133	0.014	0.083	0.028	0.084	0.029	1.109
Highest insurance knowledge	0.375	0.485	0.461	0.5	0.289	0.455	0.172***	0.392	0.037	0.347	0.074	0.387	0.075	0.304
Head is public employed	0.197	0.398	0.233	0.424	0.161	0.369	0.072*	0.208	0.408	0.2	0.402	0.185	0.39	0.09
Head is self-employed	0.428	0.495	0.433	0.497	0.422	0.495	0.011	0.425	0.496	0.413	0.494	0.445	0.499	0.13
Durables	6.597	3.109	7.078	3.262	6.117	2.878	0.961***	6 717	3 131	6 358	2 961	6 731	3 251	0.53
First income quintile	0.203	0.403	0.139	0.347	0.283	0.452	−0.144***	0.208	0.408	0.217	0.414	0.202	0.403	0.15
Second income quintile	0.247	0.432	0.244	0.431	0.239	0.428	0.006	0.233	0.425	0.242	0.43	0.244	0.431	0
Third income quintile	0.172	0.378	0.161	0.369	0.178	0.383	−0.017	0.142	0.35	0.167	0.374	0.202	0.403	0.67
Fourth income quintile	0.178	0.383	0.222	0.417	0.133	0.341	0.089**	0.217	0.414	0.167	0.374	0.16	0.368	0.73
Fifth income quintile	0.200	0.401	0.233	0.424	0.167	0.374	0.067	0.2	0.402	0.208	0.408	0.193	0.397	0.04
Saving device	0.569	0.496	0.617	0.488	0.522	0.501	0.094*	0.6	0.525	0.501	0.588	0.494	0.73	
Reported sickness	0.669	0.471	0.7	0.46	0.639	0.482	0.061	0.675	0.47	0.658	0.476	0.681	0.468	0.07
Strongly risk-averse	0.561	0.497	0.567	0.497	0.555	0.498	0.011	0.608	0.49	0.479	0.502	0.596	0.493	2.50*
Patient	0.414	0.493	0.383	0.487	0.444	0.498	−0.061	0.391	0.49	0.463	0.501	0.386	0.489	0.9
MHO take-up	0.253	0.435	0.227	0.42	0.277	0.449	−0.05	0.017	0.128	0.314	0.467	0.528	0.497	33.78***
N	360		180		180			120		121		119		

Notes: Column 'Difference' reports the difference between Not Invited and Invited. Column 'F-test' reports the values of a test of joint significance of the coefficients of a regression with the row variable as explanatory and dummies for vouchers as regressors; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

institutions. Access to a savings device might help a household to buffer health shocks by alleviating credit constraints, thus rendering MHOs less attractive. Alternatively, having access to savings may help households pay for membership fees and premiums, making MHO membership more feasible. Furthermore, being a member of an ROSCA might imply some discipline in saving which could in turn help an individual to commit to an MHO's premium. With regard to the health status of the household, 67% of heads reported one of their household members having been sick in the previous 12 months. More sickness is likely to lead to greater demand for health care and hence for health insurance.[10] The mean of health-related monthly expenditure for a household is 8,320 CFA, which represents around 3.7% of mean household income. We measure baseline knowledge of insurance and its basic concepts as a score given by the sum of correct answers to a series of seven true or false questions on the nature of insurance.[11] We then create three dummies for different levels of knowledge: no insurance knowledge (score equal to 0), intermediate (score from 1 to 4) and high insurance knowledge (5–6).

A set of questions in our questionnaire was related to trust, risk and time preferences. We asked individuals to weigh their trust on different items by setting aside marbles, out of a maximum of ten, on an increasing scale. Each answer was rescaled with regard to the trust given to the mother and the family, respectively. For the sample of non-members who were aware of the existence of MHOs, we find that in both cases the median relative trust on MHOs given was eight out of ten. This tends to show that these grassroot movements benefit from a largely positive *a priori* knowledge from locals and appear as trustworthy.[12] We measure risk preferences through a variable which takes a value of one if the household head is strongly risk-averse (which is the case for 56% of them), i.e., always opted for the certain outcome when presented with a set of hypothetical choices between gambles and certain gains and losses, using a similar methodology as Voors *et al.* (2012). Each individual had to choose between certain outcomes (gain/loss of 200, 250 and 300 CFA) and simple gambles with probability 1/4 to win/lose 1,000 CFA and probability 3/4 to win/lose nothing. We ran this exercise with the same amounts multiplied by a factor of ten. We also turned to the methodology put forward in Voors *et al.* (2012) to elicit discount factors. In this case, from a list of different hypothetical amounts to be received in 1 month, household heads had to choose the one that would make them indifferent from receiving 10,000 CFA

10   Some empirical studies focusing on developed countries show that advantageous selection into health insurance may arise as a consequence of higher preventive care (Fang *et al.*, 2008). To the best of our knowledge, the majority of studies have not found such a phenomenon in developing contexts, where adverse selection appears to be a problem for health microinsurance programmes (Wang *et al.*, 2006; Spenkuch, 2012), although Banerjee *et al.* (2014) is a notable exception.

11   The seven questions are (a) Is the insurance premium reimbursed if one does not get sick? (b) Does the insurer make expenses just in case of sickness? (c) In case of sickness can one member consult a health provider at reduced prices, as the insurer covers part of the fees? (d) If insured, can one receive a payment in case of death? (e) Can the insurer help in repaying any sorts of loans? (f) If I am not insured and I get sick, am I in charge of all health-care expenditure relating to that illness? (g) If I have health insurance, do I start receiving money after 1 year?

12   Given that we have a measure of trust only for the subsample of non-members aware of the existence of MHOs we did not include this variable in our regression models. It would have significantly reduced the size of our sample for estimation.

francs today. The list of amounts used in this question is as follows: 10,500, 11,000, 12,500, 15,000, 17,500, 20,000, 25,000 and 30,000 CFA, representing the following discount factors at 1 month: 5%, 10%, 25%, 50%, 75%, 100%, 150% and 200%, respectively. We then generated a binary variable taking the value of one when the individual belonged to the more patient half of our sample.

Table 1 also shows univariate tests for random assignments of treatments across samples. Randomisation with respect to voucher assignment appears satisfactory. However, a number of significant differences appear between treatment and control regarding invitation to the literacy module. Household heads that were not invited to the module are on average richer (a smaller proportion in the first quintile of income and larger proportion in the fourth quintile) and wealthier, according to the number of durables owned. Non-invited individuals also appear to be significantly more likely to be employed by a public institution and more knowledgeable about insurance and its basic concepts. Finally, the subsample of non-invitees is significantly better insured against health expenditures (through MHOs, IPMs, etc.). Even when we consider the large number of tests and use Bonferroni correction, 'Already insured, Highest insurance knowledge, Durables and First Income quintile' remain significantly different (at 10%) between treated and control across the invitation dimension. The reason that we observe these and the reason why our design gave those results are unclear to us. There was no difference in the refusal rate to participate in the study by treatment. To the best of our knowledge, none of our enumerators displayed strategic behaviour in selecting households and the assignment of treatments was conducted in a proper fashion that should have prevented this outcome. When turning to balance checks in a multivariate framework where treatment variables are regressed on all relevant observable characteristics (see Appendix A, Table A1 in Supplementary material; all our appendices are available online through the journal website), most of the imbalances registered in the univariate framework vanish. Some concerns remain though: the likelihood of being invited to the education session is significantly linked to being less wealthy (measured by the variable 'durables') and having some insurance knowledge.

Table 2 decomposes uptake according to the educational and marketing treatments. One notices that our compliance rate for the educational treatment is relatively low; only 105 out of the 180 (58%) invited actually attended the module. It also shows that, for the subsample of households invited to the module, the difference in terms of uptake between those who attended the insurance literacy training and those who did not is negligible (24 versus 17). The table shows that voucher 1 had almost no impact on increasing uptake, with 89 out of 91 new uptakes being generated by either voucher 2 or 3. It is also interesting to note that 21 of the 91 who took insurance already possessed some health insurance (11 MHO, 7 IPM and 3 private insurers), indicating that MHO membership can complement current health insurance by covering additional members or by topping up existing insurance.

6. Empirical specification

To assess the impact of our two different treatments we use the following model

$$Uptake_i = \alpha Invited_i + \delta 1 Voucher2_i + \delta 2 Voucher3_i + X_i'\beta + \varepsilon_i,$$

Table 2: Uptake Distribution across Treatments

	N	Take-up (*n*)	Take-up rate % (*n/N*)	Take-up rate % (*n/360*)
Already had some form of insurance	117	21	18	6
MHO members	37	11	30	3
IPM members	69	7	10	2
Private insurance	11	3	27	1
Educational treatment				
Invited to educational session	180	41	23	11
Attendants	105	24	23	7
Of which already insured	27	6	22	2
Non-attendants	74	17	23	5
Of which already insured	17	4	24	1
Not invited to educational session	180	50	28	14
Of which already insured	73	11	15	3
Marketing treatments				
Voucher 1	120	2	2	1
Of which already insured	43	0	0	0
Voucher 2	121	38	31	11
Of which already insured	36	8	22	2
Voucher 3	119	51	43	14
Of which already insured	38	13	34	4
Vouchers 2 + 3	240	89	37	25
Of which already insured	74	21	28	6
Whole sample (#obs)	360	91	25	25

where 'Uptake' is a dummy variable taking the value one if the household subscribes to an MHO following one of our treatments. A household, indexed by the subscript i, subscribes if it redeems its voucher. To ensure that our dependent variable was accurately constructed, we phoned all households who did not redeem their voucher 1 month after the redemption date to ask if, in the meantime, they had joined an MHO but not used their voucher. This allowed us to account for the membership of two additional households. 'Invited' is a dummy variable, which equals one if the household was invited to the insurance literacy module. 'Voucher 2 (3)' is a dummy variable equalling one if the household was given voucher 2 (or voucher 3). X' is a vector of other covariates including household heads' characteristics (gender, education, income and employment status), an indicator of household wealth, two proxies for the status of the household's health, the household's level of insurance literacy and risk and time preferences.

The coefficients of interest are α, $\delta 1$ and $\delta 2$, which measure the effects on the probability of joining an MHO, of being invited to attend the educational module and of receiving either voucher 2 or voucher 3. In this context, α measures the 'intention-to-treat' effect in the reduced form. Because the compliance rate was not perfect (58% of people invited accepted the offer of insurance literacy training) we also estimate the average treatment effect of insurance literacy on the probability of take-up using IV in a structural model. Given that households self-select in attending the training session, it becomes necessary to correct for such a problem. Random assignment to the education module is used as an

instrument for attending the module (first stage). The latter is then used to estimate the 'treatment on the treated' effect (second stage). To investigate the role of liquidity constraints on health microinsurance take-up, we examine heterogeneous effects. In particular, we interact the marketing treatment variable (grouping both vouchers 2 and 3) with income quintiles.

Given our small sample and the imbalance between treated and control groups across the 'Invited to the education session' dimension, we reweight the observations of our control subsample in order to perfectly balance covariate distributions in the treated and control groups along the first three sample moments (i.e., mean, variance and skewness), using entropy balancing (carried out using the 'ebalance' stata routine). A brief description and theoretical details of the procedure are supplied in Appendix A in Supplementary material. Table A2 in Supplementary material shows how the differences between treated and control groups disappear along the first three sample moments after applying this reweighting technique on all the variables used in our regressions. Regression Tables 3 and 4 are presented after rebalancing has been carried out (Appendices B and C in Supplementary material show the results without rebalancing). Both sets of tables show that none of the results, with regards the treatments, depend on reweighting the sample or multiple hypothesis testing.

7. Results and discussion

Columns 1–3 in Table 3 display the results of our ordinary least squares (OLS) model on the probability of take-up while columns 4–6 exhibit the same specifications estimated by 2SLS where presence at the education session is instrumented by being invited. It should be noted that the F statistics, used to identify the power of an instrument, deliver such high values that weak instruments do not to be an issue. Columns 1 and 4 keep the controls to a minimum, columns 2 and 5 add basic independent variables while columns 3 and 6 present results with the full set of control variables. Results obtained (not shown) with a Probit model are similar. All regressions show that being either invited to or present at the educational module does not increase the likelihood of taking up microinsurance. They also clearly display that both vouchers significantly increase microinsurance uptake, by 35 and 44 percentage points, respectively. The coefficients of these variables are not significantly different from each other. The significant, positive and sizeable effect of our voucher treatments seem in line with the trend of the literature on formal insurance in developing countries, where take-up does not skyrocket even after generous subsidies. For example, Cole et al. (2013) find that even when an index insurance policy was so highly subsidised as to yield an expected return of up to 181%, only half of the households offered the policy purchased it. In Thornton et al. (2010), a subsample of households offered a 6-month health insurance subsidy, worth US$96, was 33% more likely to enrol on the insurance programme. Banerjee et al. (2014) found that bundling health microinsurance with microcredit led to a decrease in take-up.

Neither the intention-to-treat (columns 1 and 2) nor the treatment on the treated (column 4) effects of insurance literacy training is significant. This result is only slightly surprising given that only 55% of all 360 households noted a lack of information and knowledge was the reason they had not joined an MHO. Indeed, it could be that insurance literacy was already sufficiently high and that most people we invited to the training grasped the

Table 3: Determinants of Insurance Take-Up (Rebalanced Sample)

Dep. variable: MHO take-up	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	IV	IV	IV
Invited to the education session	−0.0282 (0.0581)	−0.0283 (0.0510)	−0.0283 (0.0484)			
Present at the education session				−0.0484 (0.0991)	−0.0484 (0.0845)	−0.0484 (0.0790)
Voucher 2	0.288*** (0.0578)	0.320*** (0.0550)	0.346*** (0.0548)	0.286*** (0.0567)	0.317*** (0.0531)	0.342*** (0.0524)
Voucher 3	0.400*** (0.0666)	0.425*** (0.0596)	0.439*** (0.0576)	0.398*** (0.0653)	0.423*** (0.0570)	0.437*** (0.0545)
First income quintile		0.223*** (0.0783)	0.328*** (0.0863)		0.229*** (0.0799)	0.339*** (0.0885)
Second income quintile		0.266*** (0.0742)	0.339*** (0.0828)		0.266*** (0.0715)	0.342*** (0.0799)
Third income quintile		0.116 (0.0841)	0.174** (0.0809)		0.118 (0.0819)	0.178** (0.0781)
Fourth income quintile		0.176** (0.0824)	0.186** (0.0823)		0.175** (0.0795)	0.187** (0.0785)
Male		0.121* (0.0643)	0.124* (0.0634)		0.120* (0.0619)	0.123** (0.0602)
Age		−0.00103 (0.00196)	−0.000526 (0.00212)		−0.00106 (0.00190)	−0.000580 (0.00203)
Household size		0.0134* (0.00776)	0.0150** (0.00745)		0.0135* (0.00752)	0.0150** (0.00711)
Head attended primary school		−0.0928 (0.0682)	−0.124 (0.0751)		−0.0944 (0.0659)	−0.125* (0.0719)
Head attended secondary or more		0.0198 (0.0738)	−0.00141 (0.0790)		0.0185 (0.0708)	−0.00500 (0.0745)
Already insured			−0.0678 (0.0738)			−0.0637 (0.0697)
No insurance knowledge			−0.195*** (0.0705)			−0.190*** (0.0672)
Intermediary insurance knowledge			−0.0556 (0.108)			−0.0561 (0.103)
Head has public employment			0.0201 (0.0785)			0.0212 (0.0745)
Head is self-employed			0.0643 (0.0576)			0.0621 (0.0547)
Durables			0.0135 (0.0117)			0.0145 (0.0111)
Savings device			0.0495 (0.0591)			0.0518 (0.0564)
Reported sickness over the year			−0.0714 (0.0559)			−0.0720 (0.0533)
Strongly risk-averse			0.0320 (0.0568)			0.0297 (0.0548)
Impatient			0.00769 (0.0631)			0.00928 (0.0605)
Constant	0.0273 (0.0334)	−0.470*** (0.169)	−0.559** (0.262)	0.0285 (0.0356)	−0.465*** (0.164)	−0.569** (0.250)
Neighbourhood FE	No	Yes	Yes	No	Yes	Yes
Observations	360	360	360	360	360	360
R-squared	0.155	0.284	0.326	0.152	0.282	0.324

Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 4: Heterogeneous Effects (Rebalanced Sample)

Dep. variable: MHO take-up	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
Invited to the education session	−0.0221 (0.0479)	−0.0634 (0.0499)	−0.0169 (0.0929)	−0.0221 (0.0485)	−0.0252 (0.0574)	−0.0221 (0.0486)
Voucher	0.188** (0.0752)	0.349*** (0.0682)	0.382*** (0.0441)	0.346*** (0.0743)	0.382*** (0.0434)	0.397*** (0.0509)
Voucher × first income quintile	0.240** (0.113)					
Voucher × second income quintile	0.352*** (0.113)					
Voucher × third income quintile	0.168 (0.131)					
Voucher × fourth income quintile	0.0854 (0.155)					
Invited to education session × voucher		0.0620 (0.0831)				
Invited × No insurance knowledge			−0.00112 (0.119)			
Invited × intermediary insurance knowledge			−0.0315 (0.195)			
Voucher × no insurance knowledge				0.0150 (0.0940)		
Voucher × intermediary insurance knowledge				0.159 (0.175)		
Invited × already insured					0.0126 (0.114)	
Voucher × already insured						−0.0663 (0.0888)
First income quintile	0.146 (0.0907)	0.336*** (0.0861)	0.328*** (0.0866)	0.335*** (0.0854)	0.330*** (0.0869)	0.333*** (0.0868)
Second income quintile	0.0893 (0.0897)	0.353*** (0.0832)	0.347*** (0.0850)	0.365*** (0.0828)	0.349*** (0.0839)	0.351*** (0.0838)
Third income quintile	0.0741 (0.0823)	0.195** (0.0782)	0.190** (0.0795)	0.195** (0.0783)	0.191** (0.0803)	0.196** (0.0790)
Fourth income quintile	0.0922 (0.0999)	0.175** (0.0806)	0.172** (0.0820)	0.184** (0.0803)	0.174** (0.0823)	0.178** (0.0802)
Already insured	−0.0643 (0.0726)	−0.0639 (0.0751)	−0.0627 (0.0760)	−0.0592 (0.0758)	−0.0696 (0.102)	−0.0180 (0.0720)
No insurance knowledge	−0.187*** (0.0707)	−0.200*** (0.0687)	−0.200* (0.103)	−0.207*** (0.0662)	−0.200*** (0.0689)	−0.200*** (0.0686)
Intermediary insurance knowledge	−0.0203 (0.114)	−0.0579 (0.108)	−0.0416 (0.177)	−0.161 (0.109)	−0.0585 (0.109)	−0.0607 (0.109)
Controls + neighbourhood FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	360	360	360	360	360	360
R-squared	0.334	0.320	0.319	0.322	0.319	0.320

Robust standard errors in parentheses, $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

basic concepts and the need for health microinsurance. In all, 51% of the heads randomly invited to attend the module had mentioned dearth of information as the reason explaining their lack of membership; only 58% of these actually attended. Several other reasons may explain the lack of a significant effect in our context. It could also be that the product offered by MHOs is simple enough to understand without the need for training. Gaurav et al. (2011) found that their educational module treatment on rainfall insurance in Gujarat in India improved uptake by just 8% and was thus not considered to be a cost-effective marketing tool. With data from the same country, Giné et al. (2007) emphasise the role of insurance literacy for rainfall insurance take-up. The complexity of rainfall insurance makes it more likely to benefit from an insurance literacy module. However, this remains debatable, as Cole et al. (2013) find no significant effect (and surprisingly negative coefficients) of attending an educational module on rainfall insurance uptake in India.

The quality of the educational module could also have played a role. In this regard, we did not test participants' financial literacy after their exposure to the module and are thus unable to formally test the effect of this. However, we know that the person in charge of organising the module had been running several dozen similar programmes over recent years and was a senior member of staff at GRAIM. Moreover, our compliance rate was relatively low: only 58% of people invited turned up to the offer of insurance literacy training. We discuss this issue in greater detail below. For most households, the head attended the information sessions. However, even if (s)he is convinced by the benefits, this does not necessarily translate into membership as (s)he may have relatively little bargaining power within the household.

The lack of significance from the information treatment might also indicate that expectations about the product were overly optimistic and that once the details and fees were known, such insurance became clearly uninteresting or unaffordable. Such results can also be found in Thornton et al. (2010) who study a voluntary health insurance programme for informal sector workers in Nicaragua, finding that a treatment involving the distribution of an informational brochure alone reduces the likelihood of enrolment in the insurance programme by five percentage points relative to the control group which received nothing. Cole et al. (2011) offers financial subsidies among the unbanked in Indonesia, which significantly increased the share of households that opened a bank savings account within the subsequent 2 months. They also offer an orthogonal treatment providing a financial literacy module, which has no effect on the likelihood of opening a bank savings account for their overall sample. Another reason that could explain our result is the fact that around a quarter of the households invited, a non-negligible share, already had health insurance before attending.

It is worth mentioning that our computations show that our test for α could detect expected effect size at the design phase (of 10–15%) with power well above the widely considered satisfactory threshold of 70%. For size effects comparable to the one we have for voucher 2, our power is above 95%. Tables D1 and D2 in Appendix D in Supplementary material show that for both the coefficients of 'invited to the education session' and '*vouchers*' our results offer convincing evidence to indicate that our sample size calculation was powered to detect statistically significant differences from the various groups. However, one should notice that D1 only indicates an upper bound on power for the information treatment, as it does not incorporate the risk of partial compliance which severely affected our experimental design (58% participation rate to the session). In the light of that, our

research design is actually powered to only detect large effects of the informational treatment (standardised effect size between 0.38 and 0.49, for significance levels ranging from 0.05 to 0.1 and power between 0.7 and 0.8).

Despite these results, we do not claim that information is of little importance if one wants to increase MHO membership and the uptake of health microinsurance. Information may be more likely to have a significant impact if it is targeted towards the neediest and in different contexts. What we wish to highlight is that for the cost it represents, such informational sessions, at least in our context, appear to be less cost-effective in increasing uptake than voucher 2 (and 3). An invitation to the information module represents three types of costs: transportation costs of 1,000 CFAF, a small fee for distributing the invitation (around 100 CFAF per household) and costs of about 500 CFAF per attendee to pay for the individual in charge of running the module, making an overall cost of 1,600 CFAF per household. Voucher 2 costs on average 1,750 CFAF for membership fees alongside some minimal fees for voucher distribution (around 100 CFAF per household), making an overall cost of around 1,850 CFAF per household. When compared, the impact of voucher 2 is greater than twice the absolute value of the impact of the informational session for less than twice its cost. Given that the effects of vouchers 2 and 3 are not statistically different, we can conclude that removing the entry fees to MHO subscription is the most cost-effective treatment among those considered and aimed at increasing adoption.[13]

We henceforth highlight other results of interest in Table 3.[14] Households from the first four income quintiles are significantly more likely to take-up MHO insurance than the richest households (the benchmark group is the richest quintile). This result is not in line with other related papers on the determinants of participation in MHOs (notably Jütting, 2003 and Jowett, 2003). The poorest do not appear to be excluded from subscribing to an MHO and the richest are likely to use other means to insure themselves (private insurer, own funds, etc.). This result is also consistent with the fact that liquidity constraints were only mentioned by 16% of the households surveyed in explaining lack of membership. However, whether a head of household is self-employed or works as a public servant, has no significant impact (the benchmark group is to be employed by a private firm). This appears to indicate that the stability of one's source of income is an irrelevant factor. Male headed households, as well as bigger households, are more likely to join MHOs. We also included a dummy variable 'already insured', which takes the value one if the head has health insurance (IPM, MHO or private). Although, this variable appears to exhibit a negative sign in the models presented, it is not statistically significant.[15] This conveys that, conditional on the other factors, already being insured decreases the likelihood of taking up microinsurance on average but also that enough individuals in this situation still join MHOs for the coefficient to be mostly insignificant. This reflects the discussion at the end

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13   Our design does not allow to investigate the cost-effectiveness of our interventions in relation to household or MHO welfare. The reaction of variables such as health, health-care utilisation and insurance claims to our treatments would be an interesting extension of our work which we leave to future research.

14   Given that we have a measure of trust only for the subsample of non-members aware of the existence of MHOs, we did not include this variable in our model. It would have significantly reduced the size of our sample for estimation.

15   Our main results hold if we restrict the sample to those without insurance at the baseline.

of Section 3. Indeed, most IPMs, MHOs and private insurers do not offer full coverage for consultation and inpatient care fees and do not cover all members of a household, leaving some scope to complement this coverage with that of an MHO. Other market imperfections such as credit constraints can contract poor households' demand for microinsurance. In this respect, we use the dummy 'saving device' (taking the value one if the households are using one of three saving devices: ROSCAs, banks or microfinance institutions), which allows us to measure the impact of having access to financial institutions that can alleviate credit constraints on microinsurance uptake. Our results show that this variable has no significant impact. Neither does our proxy for wealth. These two results seem to indicate that credit constraints do not represent an important obstacle to uptake.[16] It is also interesting to note that, with respect to membership fees and monthly contributions, the vast majority of the groups that we encountered allowed their members some flexibility. Members can pay in delayed instalments, which may attenuate liquidity and credit constraints. Another noteworthy, and expected, result pertains to the highly significant and negative coefficient on the 'No insurance knowledge' dummy (in the rebalanced sample), testifying that those who do not understand the principles of health insurance are less likely to join an MHO. Finally, in a region prone to various chronic and recurrent infections such as malaria, it was expected that households that contain unhealthy members would be more likely to join an MHO. However, the results indicate that households that reported recent episode of sickness (measured by the variable 'reported sickness', which takes the value one for a household where one of its members has suffered from any kind of sickness in the previous 12 months) were not more likely to join MHOs. This suggests that adverse selection is not likely to be an issue in the context of this study.

Neither the risk aversion nor the time preference variables appear to significantly influence uptake of our microinsurance product. This result is robust to different definitions of time and risk preferences. For risk preferences, we consider the subsamples of risk-averse agents (always opting for the certain amount) for small and large stakes, for gains and losses. For time preferences, we employ different time horizons and stakes, namely we elicit 2 days, 2 weeks, 1 month and 6 month discount factors for small (1,000 CFA) and large (10,000 CFA) stakes and construct a dummy taking the value of one when the individual belonged to the more patient half of our sample. The coefficients were not statistically significant in any combination of the time and risk variables.[17]

Table 4 presents the results of heterogeneous effects, through interacted variable regressions. The first column presents the interaction between income quintiles and both vouchers 2 and 3 combined (the variable 'voucher' takes value one if an individual received either voucher 2 or 3). These results suggest that liquidity constraints are likely to be binding for the poorer and a barrier to health microinsurance take-up. While our marketing treatments are likely to constitute a negligible share of income for the richest households, therefore not impacting their take-up decision, they clearly matter for the poorest households' decision. When the educational module is interacted with the marketing treatment ('voucher') and

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16   Our sample shows that 33% of household heads tried to borrow from the formal sector in the past and the vast majority of them (94%) obtained the desired loan. Our data also show that it is the relatively richer households who attempted to get a loan. Nevertheless, it shows that, to a certain extent, credit is available in Thies.

17   Results are not shown, but are available upon request.

insurance knowledge we find no significant heterogenous effect on the uptake, as confirmed by columns 2 and 3. The marginal effects of the interactions with the education session are never statistically significant and do not bring additional effects with regard to uptake.[18] Other regressions, not presented, interacting income and insurance knowledge corroborate the story that vouchers and income seem to drive most of the effect. Vouchers 2 and 3 combined have a strong and significant impact on microinsurance uptake, this effect being statistically significant for the poorest individuals in the sample. We also found that the marginal effects (not shown) of the interactions of the level of education (the dummies 'head attended primary school' and 'head attended secondary school or more') with the education session are insignificant. It should also be noted that these results do not depend on the particular features of our randomisation exercise, since our main results hold with and without rebalancing the control sample.

Table 5 shows the determinants of attendance at the educational module. The independent variables include all control variables from Table 4 except 'voucher', which was distributed after the training was completed. As discussed above, only 105 of 180 invited households (58%) attended the educational module. This is despite the fact that invitations were directly handed to heads of household and we followed them up by calling to further advertise the module. The results suggest that two variables are consistently significant in explaining participation in the educational module, namely being among the poorest members of our sample (first income quintile) and owning durables. We find that the variables related to head's employment type, income, household's size and health status are insignificant. Insurance knowledge seems to be mostly insignificant in explaining attendance at the educational session, with the exception of the dummy regarding 'no insurance knowledge' which is significant at the 10% level in one of four models.

We also examine the determinants of which MHO new subscribers decided to join. There seems to be no pattern between household characteristics, the voucher received (either 2 or 3) and whether or not they were invited to (attended) the education module, with the MHOs they decided to join in terms of membership fees, premiums and coverage. This partially comes from the fact that the MHOs selected are relatively similar. A discussion related to this issue is provided in Appendix E in Supplementary material.

8. Conclusion

We offered a customised insurance literacy module communicating the benefits arising from personal health insurance and explaining the functioning of MHOs to randomly selected households in the city of Thiès. We simultaneously measured the effect of three cross-cutting marketing treatments using a randomised controlled trial.

Our findings reveal that the insurance literacy module had no significant impact on health insurance take-up, while our marketing treatments have a large and positive significant impact on the households' purchase decisions, a result that holds in both the original

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18   Given the relatively large number of hypotheses we test, we also applied Bonferroni corrections to all our regressions. All results from Table 3 and most results from Table 4 (all those concerning voucher, and the first two quintiles of income) remain. Since Bonferroni corrections are known to be overly conservative, not taking account of the correlation between outcomes, we can prescribe a high level of confidence to our results.

Table 5: Determinants of Participation in the Educational Module

Dep. variable: participation in the education session	(1)	(2)	(3)	(4)
	OLS	OLS	Probit	Probit
First income quintile	0.331** (0.132)	0.366*** (0.136)	0.343*** (0.109)	0.409*** (0.110)
Second income quintile	0.0848 (0.143)	0.0540 (0.143)	0.0986 (0.139)	0.0619 (0.152)
Third income quintile	0.161 (0.136)	0.0750 (0.136)	0.176 (0.123)	0.0753 (0.141)
Fourth income quintile	0.0186 (0.145)	−0.0227 (0.153)	0.0300 (0.140)	−0.0134 (0.158)
Male	−0.0531 (0.0948)	0.0227 (0.0927)	−0.0594 (0.0983)	0.0491 (0.109)
Age	−0.00155 (0.00323)	−0.00287 (0.00351)	−0.00182 (0.00337)	−0.00352 (0.00376)
Household size	−0.000509 (0.0118)	0.000499 (0.0118)	0.000137 (0.0125)	0.00103 (0.0130)
Head attended primary school	−0.0270 (0.105)	−0.119 (0.109)	−0.0290 (0.111)	−0.159 (0.124)
Head attended secondary or more	−0.109 (0.107)	−0.168 (0.107)	−0.120 (0.111)	−0.228* (0.118)
Already insured	0.123 (0.112)	0.140 (0.113)	0.125 (0.113)	0.151 (0.115)
No insurance knowledge	0.101 (0.102)	0.122 (0.108)	0.111 (0.105)	0.139 (0.115)
Intermediary insurance knowledge	−0.0843 (0.129)	−0.0556 (0.133)	−0.0856 (0.133)	−0.0639 (0.142)
Head has public employment	−0.0238 (0.121)	0.0330 (0.122)	−0.0356 (0.126)	0.0234 (0.129)
Head is self-employed	−0.0387 (0.0889)	−0.0182 (0.0913)	−0.0461 (0.0922)	−0.0362 (0.101)
Durables	0.0324** (0.0143)	0.0409** (0.0167)	0.0375** (0.0167)	0.0510*** (0.0193)
Savings device	0.0763 (0.0829)	0.0492 (0.0878)	0.0925 (0.0881)	0.0831 (0.0964)
Reported sickness over the year	−0.0746 (0.0790)	−0.0582 (0.0868)	−0.0871 (0.0817)	−0.0703 (0.0926)
Strongly risk-averse	−0.0402 (0.0754)	−0.0141 (0.0947)	−0.0499 (0.0788)	−0.0417 (0.100)
Impatient	0.0844 (0.0791)	0.0313 (0.0952)	0.0924 (0.0803)	0.0355 (0.0973)
Constant	0.356 (0.282)	0.209 (0.373)		
Neighbourhood FE	No	Yes	No	Yes
Observations	180	180	180	177
R-squared	0.121	0.204		

Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Note that three observations are lost in column (4) due to one of the fixed effects explaining, conditionally on all covariates, perfectly the dependent variable.

and reweighted samples. What appears from various descriptive statistics and results from an econometric analysis is that the key element driving new membership is the allocation of either voucher 2 or 3. This is particularly the case for the poorer households, who are more likely to be liquidity constrained. Crudely interpreted, these results suggest that what really matters is not education, but rather compensation in the form of reduced fees for membership and the period of observation. Should the state or the city authorities wish to increase take-up rates, the most efficient way would be to alleviate liquidity constraints and the financial barriers to entry by offering a subsidy akin to voucher 2. This voucher is significantly less costly than voucher 3, but shows a similar impact on uptake. If information is to be provided, then it would have to be targeted and given more conveniently. We nevertheless remain cautious of such results by emphasising that they are based on a relatively small sample. Unfortunately, our study does not touch upon the critical issue of membership sustainability over time once membership has been acquired.

MHOs could represent a unique way to reach relatively poor people and informal workers who do not have access to an IPM. The networks they represent in such districts should be considered a serious asset. Because they are well established and experienced institutions, there is potential to reach underprivileged households at a relatively low cost.

Supplementary material

Supplementary material is available at *JAFECO* online.

Acknowledgements

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