Informal Groups and Health Insurance Take-up Evidence from a Field Experiment*

Matthieu Chemin
McGill University

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Abstract

This paper presents the results of 21 randomized experiments organized in three studies aimed at understanding the reasons for low take-up of in-patient health insurance observed in developing countries. Study 1 finds that traditional interventions (information, assistance to register, or small subsidies) fail at increasing take-up. In fact, only 45 percent took up when offered a full subsidy (with a zero percent retention rate after one year). In contrast, Study 2 finds that presenting the same information to existing tight-knit informal groups raises take-up to 12 percent (still 10 percent after one year). Study 3 explores the mechanisms for this positive effect without any subsidies, and finds support for social learning in groups from early adopters who have tested the system before, and thus alleviate fears of non-reimbursement.

Keywords: health insurance, informal risk-sharing groups
JEL Classification: I13, O17

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More than four billion people in the world had no formal health insurance in 2011[1]. Informal risk-sharing networks help cover some of the health expenditures in developing countries, but do not provide adequate coverage against major health shocks (Gertler and Gruber, 2002; Fafchamps and Lund, 2003). Xu et al. (2007) find that about 100 million people a year are pushed into poverty due to catastrophic health expenditures. A solution may be formal health insurance. In randomized studies, health insurance has been shown to reduce catastrophic health expenditures (King et al., 2009; Baicker et al., 2013) and out of pocket payments (Finkelstein et al., 2012, King et al., 2009; Powell Jackson, 2012), increase utilization of health services (Asuming, 2013; Manning et al., 1988; Powell Jackson, 2012), improve health (Asuming, 2013; Powell Jackson, 2012, Baicker et al., 2013) and well-being (Finkelstein et al., 2012), and thus contribute to the reduction of global poverty.

On the supply side, in-patient health insurance avoids many of the pitfalls associated with insurance provision. For instance, moral hazard (i.e., the idea that individuals will engage in more risky behavior once health insurance is acquired) is unlikely to be a concern since nobody really wants to be hospitalized. Adverse selection (i.e., attracting only the riskiest individuals) could be avoided by targeting people selected for reasons other than health (e.g., microfinance clients as in Banerjee et al., 2014). By offering in-patient health insurance, governments or insurance companies could help the impoverished populations, while making money at the same time, since, the argument goes, poor people would surely be willing to pay a small amount for such a beneficial product. This "win-win" idea has spurred popular media to tout microinsurance, i.e. insurance for the poor, as revolutionary (e.g., The New York Times: "The Microinsurance Revolution", June 2012), and commercial companies to estimate that one billion people could be served within 10 years (Lloyd's, 2009).

Despite the global optimism about microinsurance, the demand for health insurance in developing countries is extremely low, even when affordable and actuarially fair products are available. Only 2 percent of the population in low-income countries have private health insurance[2]. In Kenya, only 10 percent of the population is covered by an actuarially fair in-patient product offered by the National Hospital Insurance Fund (NHIF)[3]. In fact, researchers have found a strong reluctance to take up health insurance: when existing microfinance clients were required to purchase health insurance at the time of renewing their loan, a large fraction of borrowers preferred to give up microfinance in order to avoid purchasing health insurance (Banerjee et al., 2014).

In this paper, together with the NHIF, we implemented a unique randomized experimental design to determine how to increase health insurance coverage among the poor. We present the results from three complementary studies, where the debriefing from the failure of traditional interventions in Study 1 is used to design an innovative intervention in Study

[1] World Bank ASPIRE and Global Findex databases

[2] and only 3 percent have social insurance (World Bank ASPIRE)

[3] a national trustworthy provider, whose insurance is mandatory in the formal sector, but is voluntary in the large informal sector in Kenya.

2, whose operating mechanisms are tested in Study 3. In Study 1, in sub-groups randomly selected out of our sample of 1,705 small scale farmers living at the poverty line in rural Kenya, we offered information about NHIF and assistance to register in conjunction with subsidies of 2, 10, or 30 percent. We find no significant effect on take-up, even when the interventions were delivered by local community leaders, for whom we purchased NHIF, and who were financially motivated, or not, to register people. More surprisingly, a 100 percent subsidy only generated a 45 percent take-up (with a zero take-up rate after one year, when the subsidy was discontinued). This indicates that more fundamental factors beyond lack of information, transaction costs, or the price of coverage, are influencing the poor take-up rate of health insurance.

Qualitative debriefing with individuals who chose not to take up health insurance even when the product was free revealed that a contributing factor to the lack of take-up was uncertainty about whether claims would be honored. In fact, these participants described insurance as a "risky proposition": if the insured event does not occur, they would not get any money back, and if the insured event does occur, they were not sure whether the NHIF will cover their claims. In this context of uncertainty, even if the product is free, any remaining transaction costs may outweigh unsure benefits.

The intuition of Study 2 is that close peers who have tested the NHIF system before (i.e., made a claim and were reimbursed) may share their experience with others in meetings where the NHIF product is discussed. In this regard, these peers could offer reassurance about the reliability of health insurance. An ideal forum for this to take place may be the existing tight-knit informal groups, a widespread phenomenon in developing countries[4]. These groups meet regularly with a system of fines punishing absence, lateness, or lack of contribution. This maximizes attendance and involvement of all members in group discussions, thereby providing a good environment for social learning to occur.

To test this idea, in Study 2, we implemented a randomized intervention based on these groups. In other geographic areas than Study 1, we randomly selected 108 households, and gathered information on their most important informal group, obtained authorization from their group leader, and visited their informal group at their usual meeting time and place. In these groups, we offered the same information and assistance to register as in Study 1. The early adopters present in these groups were not incentivized to talk, considering the failure of financially motivated peers, the local community leaders, to increase take-up in Study 1. Our experiment is thus best viewed as an encouragement design, where we make salient the topic of health insurance in groups, to provide an environment for early adopters to share their story. It is not clear whether such an intervention would increase take-up: discussions about NHIF may have happened organically before the meetings; early adopters

[4]Informal groups can be Rotating Savings and Credit Associations (ROSCAs), clan or family groups, church groups, Chit funds or self-help groups in India, Tontines in West Africa, susu in Ghana (Besley et al., 19930. These informal groups have been extensively studied in the economics literature (Townsend, 1994; Deaton, 1990; Udry, 1991).

may not share their positive experience; or there may be no positive experiences to report. Alternatively, presenting about formal insurance may remind people of their informal risk-sharing arrangements potentially in place in these groups, which would reduce take-up[5]. The impact of presenting to groups on take-up is therefore an empirical question.

We find a 12 percent take-up (10 percent take-up after one year) among individuals randomly selected to receive a presentation *together with their informal group.* This is a remarkably large number given that participants were required to pay the full price of health insurance. We estimate that organizing group meetings is more cost-effective than full subsidies, and more sustainable, since take-up was zero when subsidies were discontinued. *Without any subsidies,* this simple intervention almost brought this community to the take-up rate of Ghana (18 percent in the lowest income quintile for an out-patient subsidized product), one of the highest rate of voluntary health insurance coverage, and generally considered the success story of Sub-Saharan Africa.

Additionally, we find significant spillovers to the geographic neighbors not invited, but part of these informal groups, suggesting the presence of indirect effects as well. By initially targeting 108 households, we reached 2,029 of them, with a 12 percent take-up rate.

In contrast, we also find that organizing meetings among groups of strangers is associated with low attendance rates, and no take-up. This suggests that these existing informal groups are key to our findings, and raises questions about the exact mechanism through this intervention raises take-up. Information delivered in informal groups, or assistance to register are unlikely to explain the results, considering the failure of such interventions in Study 1. Better explanation about the concept of insurance, i.e., in their "own words", by peers in informal groups is also unlikely to explain the results considering the failure of the local community leaders, close and respected peers as well, to generate any take-up in Study 1.

Study 3, organized in another geographic area than Studies 1 or 2, eliminates three other group mechanisms: lower credit constraints (due to potential pooling of resources in groups), savings on transport costs (due to potential delegation of payments to one group member), and solidarity in groups to avoid fines in case of default of payment. Three randomized experiments offering lower but more frequent, i.e., monthly, payments to some individuals, or offering the possibility to pay by M-Pesa, a money transfer application on mobile phones, to save on transport costs, or offering a cover in case of default of payment, are all ineffective at raising take-up.

[5]Formal and informal health insurance are substitutes, and informal insurance should crowd out formal insurance. This is radically different from weather insurance. Dercon et al. (2014) and Mobarak and Rosenzweig (2012) show that formal and informal weather insurance are complements, since informal insurance may cover any remaining basis risk generated by index insurance. They find that take-up in informal groups increases when the group leader is trained to understand this point (Dercon et al., 2014), or when the network indemnifies more against farmer-specific losses (Mobarak and Rosenzweig, 2012). Our paper is different, since formal and informal health insurance are substitutes, and reminding people of their informal insurance should decrease, not increase, take-up.

Another group mechanism may be peer pressure. Healthy group members may pressure sicker ones to register with the NHIF in order to avoid paying for their medical expenses when the group offers an informal health risk-sharing scheme. We argue that this mechanism is unlikely to drive the results. First, we find no evidence of peer pressure in our debriefing with group leaders or participants. Second, we do not find any more take-up in groups offering an informal health risk-sharing scheme, versus not, where peer pressure of this kind does not exist.

In contrast, we provide suggestive evidence that social learning may explain the findings. Debriefing with the group leader after the meetings indicated that in 24 percent of the groups, at least one group member was registered with the NHIF prior to the presentation, had required hospitalization in the last year, got reimbursed by the NHIF, talked about their experience with the group, and helped convinced other members to register. We find that the take-up rate increased from 12 to 17 percent in such groups. Debriefing with our participants indicated that 20 percent of them received a positive piece of advice from an early adopter[6]. Take-up increased by 19 percentage points after a positive advice by an early adopter. Moreover, the null effect in groups of strangers is consistent with the view that social learning occurs primarily among respected friends with frequent interactions.

This paper contributes to an extensive literature on peer effects, and in particular on the positive effects of social learning on technology adoption (e.g., new crops, Bandiera and Rasul, 2006; Conley and Udry, 2010; retirement plans, Duflo and Saez, 2003; weather insurance, Cai, de Janvry and Sadoulet, 2013, Gine, Karlan and Ngatia, 2013). The experimental design used in these papers consists of a two-stage process. In the first stage, information about the product is provided to a random subset of individuals, while the second stage looks at the take-up of departmental colleagues (Duflo and Saez, 2003), friends (Cai, de Janvry and Sadoulet, 2013), or neighbors (Gine, Karlan and Ngatia, 2013). This experimental design is unlikely to work in cases where it is extremely challenging to raise take-up in the first stage, such as in our situation. In Study 1, we found that merely delivering information did not increase take-up. Such an ineffective intervention is unlikely to spillover to other individuals. Offering insurance for free in the first stage would not work either: in Study 1, after full subsidies, only 45 percent take up, zero after one year, which casts doubt on whether people truly valued and understood insurance with these subsidies. In the "local community leader", we closely followed this experimental design, by purchasing insurance for community leaders in the first stage, and observing take-up in the second stage. This did not raise take-up, probably because the community leaders did not have time to experience a health shock, and were therefore unable to reassure people about the promise of the system.

Our paper is the first to provide an alternative experimental design when no intervention can seemingly raise take-up in a first stage: we deliver information to individuals *together*

[6]e.g., "I was told by my friend that when she was admitted in the hospital, the bill was covered by the insurance company"

with their informal groups, that contain early adopters who experienced the system. This increased take-up, and a plausible explanation put forward in Study 3 is that early adopters shared their story in some groups. A limitation of this experimental design is that it only works for already existing, not completely new, products.

This paper also makes an important contribution to the recent literature on formal health insurance take-up by implementing this new experimental design centered on pre-existing informal groups. Consistent with our results from Study 1, research using traditional randomized interventions (e.g., delivering information, assisting with registration, or providing large subsidies) to increase voluntary health insurance take-up has produced only mixed results. Specifically, delivering information about insurance is found to have a positive (Asuming, 2013), null (Dercon et al., 2011), or negative (Thornton et al., 2010; Das and Leino, 2011) effect on take-up, while offering assistance to register is found to have a positive (Thornton et al., 2010) or null (Asuming, 2013) effect on take-up. All four papers find a positive effect of large subsidies on take-up; however, fully subsidizing formal health care insurance may be too fiscally challenging for poor countries (ILO, 2011), thus making the long-term feasibility of subsidies unclear. Moreover, similar to our findings in Study 1, retention rates after subsidies are discontinued are extremely low (e.g., at 10 percent in Thornton et al., 2010). Study 2 provides a unique contribution to this literature with this experimental design that encourages social learning in informal groups. By targeting these groups, we are able to get 12 percent of our sample to voluntarily register; a marked increase compared to traditional interventions. The most comparable paper on health insurance take-up examined "study circles" of nine randomly selected peers formed to discuss insurance (Dercon et al., 2011). The authors find no effect of these study circles on take-up, in line with our null results from "fake" groups where random individuals are grouped together.

This paper relates to two recent papers suggesting informal groups (Idirs in Ethiopia (Dercon et al., 2014), and sub-castes in India (Mobarak and Rosenzweig, 2012)) may be a good way to increase the take-up of another product: weather insurance. They focus on a completely different channel: in the case of weather insurance, formal and informal insurance are complements, since informal insurance may cover any remaining basis risk generated by index insurance. These papers find that take-up in informal groups increases when the group leader is trained to understand this point (Dercon et al., 2014), or when the network indemnifies more against farmer-specific losses (Mobarak and Rosenzweig, 2012). In our case, formal and informal health insurance are not complements, and informal insurance should crowd out formal insurance. Our paper complements these papers by suggesting that targeting informal groups works even when formal and informal insurance are not complements.

This paper generates important implications for developing countries. Developing nations are increasingly looking towards universal health insurance coverage as a way to increase the

health of their population and decrease poverty rates[7], without decreasing prices[8]. This paper finds that presenting information on health insurance to informal groups increases formal health insurance take-up in a cost-effective way. This methodology is applicable to other contexts since informal groups can be readily identified in most developing countries. It is common practice for individuals in developing countries to be members of tight-knit informal groups (e.g., family groups, church groups, clans). For example, in India in 2006, there were 2.23 million self-help groups involving approximately 33 million members (Isern et al., 2007). If these self-help groups contain some early adopters with positive experiences to share, these tight-knit groups constitute an ideal group on which to base formal health insurance take-up interventions.

This paper is organized in the following way: Section 1 provides background information on the NHIF. Section 2 presents the data. Section 3 presents Study 1, while Section 4 presents Study 2, and Section 5 presents the mechanisms tested in Study 3. Section 6 presents a cost-benefit analysis, while Section 7 discusses the external validity of the findings. Section 8 concludes.

1 Background

The take-up of health insurance is extremely low in developing countries (e.g., 10 percent in Kenya; Xu, 2006). In this background section, we explain and discard a number of obvious explanations for this low take-up rate: the lack of actuarially fair insurance products, and the existence of medical fees waiver programs for the poor that would reduce the need to purchase health insurance.

1.1 Availability of insurance products

The low take-up rate cannot be explained by the lack of available products. The National Hospital Insurance fund (NHIF), a state corporation established in Kenya in 1966, provides a generous in-patient health care coverage for all Kenyans. The NHIF product is compulsory for individuals working in the formal sector, and costs a proportion of their income. The same product is voluntary for individuals in the informal sector, and costs 1,920 Ksh ($\simeq$25 USD) per year[9] (regardless of income), payable quarterly, half yearly, or an annual basis.

This product is more expensive than in Ghana and Rwanda, the only two countries in Sub-Saharan Africa that achieved significant coverage with respectively 54 and 92 percent

[7]For example, Kenya has currently set a goal of universal health coverage for its population by 2030 in its current development blueprint, "Kenya Vision 2030". In addition, in 2005, all 194 member states of the World Health Organization committed to the goal of universal health coverage (WHO 2011).

[8]The NHIF is currently making an effort to increase its rates from the current 1,920 Ksh (approximately 25 USD) to 6,000 Ksh (approximately 78 USD) (Deloitte, 2011).

[9]This equates to 2% of the total yearly expenditure per household of 94270 Ksh (1180 USD) in the rural community that we study

of the total population enrolled in 2012 (Lagomarsino, 2012). In Ghana, only 18 percent of the lowest income quintile are covered. The premiums for the informal sector are 8$ per year per household in Ghana, and 1.7$ per year per person in Rwanda, for inpatient as well as outpatient services (Asuming, 2013, Lu et al., 2012). This is significantly more generous than NHIF in Kenya, at 25$ per year per household for inpatient services. However, the premiums in Ghana and Rwanda are heavily subsidized. In Ghana, voluntary household contributions represented less than 5 percent of Ghana's National Health Insurance Scheme's revenues (Lagomarsino, 2012). In Rwanda, significant external donor support was received. In fact, in 2006, with the support from donors such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, the enrollment fees for the poorest 16th percent of the population were dropped (Kalk et al., 2010). The NHIF in Kenya is following a different path with a more expensive in-patient product. If take-up of this product can be significantly raised, it may provide valuable lessons for a more financially sustainable path.

The NHIF covers the entire household for all diseases. Concerning the reimbursement of claims, there are three different categories of hospitals. In Category A hospitals (government hospitals), insured individuals must simply present their membership card upon admission, after which the NHIF pays for maternity stays and all medical treatments, including surgery. In Category B hospitals (private and mission hospitals), there is full and comprehensive coverage; however, where surgery is required, insured individuals may be required to co-pay. In Category C hospitals (private hospitals), the NHIF pays specified daily benefits. Gayle and Obert (2013) find no significant differences in public versus private facilities in objective measures of the quality of service delivery[10]. Currently, the NHIF has the most expansive network of hospitals of any health insurer in the country, covering all public hospitals, mission/faith-based hospitals, and private hospitals, with a coverage of 98 percent of the hospital beds in the country (Deloitte, 2011). There is no age limit for NHIF coverage, and no exclusions based on health.

The registration process is quite tedious[11], and may represent a significant barrier to take-up, especially when working with an illiterate population (as is the case in our sample).

1.2 Actuarial fairness of NHIF

Despite its cost, this NHIF product is actuarially fair. To verify this, we use our data collected on 1,705 households in the rural community of Kianyaga in Kirinyaga County, Kenya, where the self-reported take-up was 15 percent, approximately in line with the Kenyan national average. In our sample, 25 percent of the household members (either household head, spouse,

[10] the diagnosis of seven conditions that can avert a large share of child and adult morbidity and mortality, clinicians' adherence to clinical guidelines in five tracer conditions, and clinicians' management of maternal and neonatal complications

[11] filling out a long form, providing photocopies of the national identification card for all adults and birth certificate for all children, as well as color passport photographs of all family members

or children) reported that they had received treatment in a hospital in the last two years, for an average cost of 17,114 Ksh per hospitalization. This translates into an expected annual cost of hospital treatment of 0.25/2*17,114=2,140 Ksh, more than 1,920 Ksh, the price of NHIF insurance. Further, this calculation is likely an underestimate of the true costs of medical treatments, since 12 percent of the households stated they felt the need for hospitalization in the last two years, but did not go because it would be too expensive. These households would have gone to the hospital an additional 3.4 times during the past two years, on average. In conclusion, NHIF insurance is a beneficial product for risk-neutral individuals, and even more so for risk-averse individuals. Considering these numbers, the low take-up rate is puzzling.

1.3 Waivers and exemptions

This low take-up rate cannot be explained by a belief that poor people would be treated for free. In theory, there exists in Kenya a system of waiver and exemption, i.e. an automatic excuse from payment based on some proxies for financial hardship[12]. However, in practice, waivers or exemptions are extremely rare[13], probably because no explicit policy was put in place to compensate facilities for the foregone revenue (Bitran et al., 2003). Instead of waivers, some hospitals in Kenya practice hospital detainment: patients are detained in guarded wards until they can pay (FIDA 2007; Owino, 1999). These detainments can last for months, and patients are kept in dire conditions.

In light of these arguments (availability of the actuarially fair NHIF insurance product that reimburses medical fees in health care facilities that practice hospital detainment in the absence of payment), the low take-up of NHIF in Kenya is a puzzle. In the next section, we present the sample used in this paper, which allows us to formulate three other potential reasons for the low take-up: lack of information, transaction costs, and credit constraints.

2 Data

The data was collected in 2010 on 1,705 households in Kirinyaga County, Central Province, Kenya. This particular wave of the data collection was part of a longitudinal dataset collected in 2007, 2010, and 2012, on the same participants. Respondents were initially selected in 2007 for their potential interest in a community-based rural micro-hydro electrification project,

[12]The proxies include: occupation, mode of dressing/hairstyles, mode of transport to hospital, recommendation by local administration, direct observation, number of dependents/family size, nature and type of relatives, number and type of accompanying family members, recommendation by social worker (Owino, 1999)

[13]In hospital exit interviews, Sharma et al. (2005) found that despite the fact that 50 percent of their sample reported difficulty in raising the money to pay for medical services, only three percent qualified for waivers.

not in health insurance[14]. The electrification project has not materialized yet, which makes this particular community a typical community in Africa, considering only 7 percent of rural households were electrified in Kenya in 2013, 18 percent in Sub-Saharan Africa (International Energy Agency, World Energy Outlook 2013). In fact, this community shares many common features with the rural areas of the Central Province of Kenya, and more generally Kenya, as can be seen from Table Appendix 1. For example, basic socioeconomic characteristics such as age, marital status, asset ownership, access to water are in the same order of magnitude in our sample, or the rural areas of the Central province in the Census 2009[15]. We also compare our survey with the Kenya Integrated Household Budget Survey (KIHBS) 2005 and Demographic and Health Survey (DHS) 2008, and conclude that our sample shares common features with the rural areas of Central Province of Kenya, an area comprised of almost three million people.

In our sample, people live at the poverty line of 1 USD per day per capita, in line with provincial and national averages. Contributing 25 USD per year may be difficult for such households. This idea is supported by the comparison of the 257 early NHIF adopters in Column (1) of Table 1, to the control group for Study 1 of 365 non-adopters in Column (2); early adopters are significantly wealthier, and have better access to loans and savings than non-adopters, as shown in Column (3).

Education is low, with an average of 8 years of education. Baseline knowledge of NHIF is also low. Column (2) Table 1 shows that only 31 percent of our respondents (who did not already have NHIF) knew about NHIF, which is surprising considering that the NHIF is the most reputed governmental insurance company, and has existed since 1966.

The nearest NHIF office is located in Kerugoya, an hour away by car from Kianyaga and even longer for those who live far from a main road (see Figure 1). Individuals have to travel to the NHIF office to submit their registration form, and then every three months if they choose to pay for the product quarterly. Each trip would require our respondents to take a whole day off of work. Beyond the logistical difficulties, going to an office in an urban center may bring up social considerations such as embarrassment over one's clothing or shoes. These transaction costs may represent a significant hindrance to taking up.

Figure 1 shows a map of the seven hospitals that are in close proximity to Kianyaga, and includes the time and the cost of travel. For major health shocks, the most relevant hospital is Embu Provincial Hospital (one of eight provincial hospitals in Kenya, providing specialized care which includes intensive care, life support, and specialist consultations), an hour by car from Kianyaga. Overall, people reported having a positive experience in

[14] We will discuss in a later section the implications of this feature of the sampling for the external validity of our findings.

[15] In Table Appendix 1, we report the Cohen-d values and p-values of t-tests. T-tests are significant because of the large sample size (2,873,620 observations in the rural areas of Central province). For example, spouse age is 40.28 in our sample, 39.52 in the Census. This difference is statistically significant, but of a small magnitude as evidence by a cohen-d of 0.05.

hospitals. Conditional on being admitted, 85 percent of the respondents were satisfied with their visit at the hospital, and 90 percent found the staff to be friendly. The waiting time was on average two hours (median: 30 minutes), and only 3 percent reported having to pay a bribe (of 450 Ksh on average). People who had not been admitted also had a very good perception of hospitals, with 85 percent of respondents believing that the hospital staff was friendly. The estimated waiting time of these respondents was 3.7 hours (median: 1 hour), and only 7 percent said they would need to pay a bribe (of an average estimated value of 240 Ksh).

The low take-up rate cannot be explained by a preference for traditional healing. Traditional healing is only a minor phenomenon in this community. Qualitative interviews with herbalists confirmed that in the case of an accident or an emergency, or if there is in-patient care needed, the herbalist will refer the patient to a hospital. Herbalists are mainly consulted for out-patient services. In our survey we find that when suffering from a medical condition (e.g., fever, diarrhea, abrasions, burns), only 4 percent used traditional medicine, whereas 70 percent used modern medicine.

This discussion of our sample highlighted three potential factors (lack of knowledge about NHIF, high transaction costs, and poverty) which may represent significant challenges to health insurance take-up, and are investigated in further detail in the following section.

3 Study 1: information, transaction costs, and price interventions

It is quite clear theoretically how providing information about NHIF insurance, lowering transaction costs, or reducing the price of the product may increase take-up (see Appendix 1 for a theoretical framework).

3.1 Participants

Study 1 was implemented in Map 1 (see Figure 2), a random subset of our sample. Map 1 includes 837 of our respondents who did not have NHIF prior to this study. Out of this sample, we randomly selected 472 to receive various interventions, while 365 formed the control group and received no interventions. Column (4) of Table 1 shows the socioeconomic characteristics of the treatment group for Study 1, while Column (5) shows the difference to the control group for Study 1 in Map 1.

None of the basic socioeconomic characteristics (age, education, wealth, household size) are significantly different. Table 1 also shows that households were similar in terms of health, as indicated by the number of past hospital visits, weeks missed at work due to health reasons, and expectations of future hospital visits. Relative to the control group, the treatment group knew slightly more, but trust equally the NHIF. We control for these variables in subsequent

regressions. Participants in the control and treatment group had equal access to formal or informal insurance. Seventy-eight percent of the control group had at least one household member involved in a group providing hospitality[16], similar to the treatment group. Finally, risk aversion[17] is similar in treatment versus control group. We control for all these variables in our regressions.

3.2 Experimental design

Table 2 shows the exact sample sizes used in all interventions. The sample sizes of each interventions were small, but sufficient to detect large effect sizes. We defined a large effect size as a 20 percent take-up rate, slightly higher than the 18 percent take-up rate achieved in the lowest income quintile of Ghana, one of only two countries in Sub-Saharan Africa that achieved significant coverage. An effect size of 20 percent was also deemed feasible considering Thornton et al. (2010) found an overall 20 percent take-up rate after their interventions. For policy implications, 20 percent may actually represent a lower bound considering Ghana and Rwanda reached 54 and 92 percent take-up in the general population, and Kenya targets universal health coverage, i.e. 100 percent take-up rate. Table Appendix 2 shows the statistical power associated with detecting a 20 percent effect size. All cells have a statistical power of at least 80 percent.

3.2.1 Information about the NHIF

To all individuals in the treatment group, we distributed an NHIF brochure (Figure 3), containing all relevant information about the product. The brochure was supplemented with a cartoon (Figure 4) to capture the very basic concept of insurance. Due to low literacy rates, it would have been insufficient to merely hand over the brochure and cartoon. Our fieldworkers, hired from this community, were trained to give a thorough explanation complete with examples, without pressuring respondents to purchase coverage. We also provided a sheet that displayed pictures of the required documentation needed to register.

After the presentation was complete, the fieldworkers answered all questions by repeating the information contained in the cartoon and brochure.

[16] "Hospitality" is a payment obtained from the informal group in case of hospitalization.

[17] Measured by the number of safe choices in a series of 11 choices between more or less safe lotteries; the first choice was between a guaranteed 100 Ksh (safe), or equal chances to get 100 Ksh or 200 Ksh (risky). In subsequent choices, the safe amount is increased by 10 Ksh from 100 Ksh to 200 Ksh. In the end, a random number between 1 and 11 is drawn, and actual payments were given to the respondent according to the choice made. An individual choosing a higher number of safe amounts is deemed more risk-averse than others.

3.2.2 Assistance to register

To address the concern of high transaction costs, we offered in a randomized sub-sample a "Partial Assistance" to register (i.e., we filled out the application form, and took the passport pictures with our webcam). We offered to do this at participants' houses, or in our office if they wished to do so. In another randomized sub-sample, we offered "Full Assistance", which included the partial assistance described above, as well as taking participants' applications to the NHIF office to register on their behalf.

3.2.3 Small subsidies

To estimate the price elasticity, we offered random subsidies of 2, 10, and 30 percent. As evidenced in Table 2 detailing the experimental design, the subsidies were implemented orthogonally to our information and assistance to register interventions, in a 3 (information, partial assistance, full assistance) $\times 3$ (subsidies of 2, 10, 30 percent) design, to investigate all possible combinations of interventions. In practice, an insurance subsidy coupon that detailed the exact price to be paid was provided to participants. Participants could redeem this subsidy at the NHIF office by paying only the remaining portion.

3.2.4 Interventions delivered by community leaders

The interventions described above may be unsuccessful if people do not trust a message delivered by outsiders[18]. To address any concerns of distrust, we implemented the following intervention in a randomized sub-group. We offered free NHIF insurance to two community leaders (one woman and one man), elected by the people to represent them in another development project. These leaders were older, respected community members and well-known by everyone living in their immediate area. Since we wanted to gauge whether their social influence would spur take-up, the leaders offered the same information on the NHIF product (i.e., the brochure, the cartoon, and the map to the office) in the place of our fieldworkers. We provided full assistance to those willing to register.

Moreover, different incentives were given to either the community leader or the participants in different treatment conditions (see Table 2 for exact sample sizes):

- the community leader was given an incentive of 10 percent (of the price of the NHIF insurance, i.e., 192 Ksh) per person registered
- participants were offered an in-kind gift[19] in case of registration (in our case, a chicken, of approximate value 400 Ksh, a sign of respect in this culture)

[18] All the interventions described above were implemented by local fieldworkers from this community, hired by the kenyan NGO Elimu, which has been operating in this community for eight years.

[19] An idea suggested by the CEO of the NHIF

- participants were offered a subsidy of 10 percent (of the price of the NHIF insurance, i.e., 192 Ksh) in case of registration

3.2.5 Full subsidy

In another randomized sub-group, we offered information, and full assistance to register, and subsidies of 90 or 100 percent. Participants still had to visit our office with the proper documents (national identification card for all adults and birth certificate for all children) for us to organize the rest of the registration.

3.3 Results

Table 2 presents (in brackets) the number of people who took up and retained the product one year following the interventions (when all interventions were discontinued). Consistent with the existing literature that finds conflicting findings about information and price as potential determinants of health insurance take-up (Asuming, 2013; Dercon et al., 2011; Thornton et al., 2010; Das and Leino, 2011), all interventions were largely ineffective at raising take-up, except for large subsidies. Table 1 indicates that subsidies of 90 and 100 percent generated a take-up of 28 and 45 percent, respectively. However, retention rates the following year (after the discontinuance of these subsidies) collapsed to almost 0 percent. In any case, offering a subsidy of 100 percent is not a viable option for the Kenyan government, who is determined to increase, not decrease, contributions to the NHIF.

To test the statistical significance of these results, we perform the following regression:

$$
\begin{aligned}
TakeUp_i = \; & \alpha_0 + \alpha_1 Subsidy\_2percent * Information + \\
& + \alpha_2 Subsidy\_2percent * Partial\_assistance \\
& + \alpha_3 Subsidy\_2percent * Full\_assistance \\
& + \alpha_4 Subsidy\_10percent * Information \\
& + \alpha_5 Subsidy\_10percent * Partial\_assistance \\
& + \alpha_6 Subsidy\_10percent * Full\_assistance \\
& + \alpha_7 Subsidy\_30percent * Information \\
& + \alpha_8 Subsidy\_30percent * Partial\_assistance \\
& + \alpha_9 Subsidy\_30percent * Full\_assistance \\
& + \alpha_{10} Community\_leader \\
& + \alpha_{11} Community\_leader * Subsidy\_10percent \\
& + \alpha_{12} Community\_leader * Incentive\_leader\_10percent \\
& + \alpha_{13} Community\_leader * Chicken \\
& + \alpha_{14} Subsidy\_90percent \\
& + \alpha_{15} Subsidy\_100percent \\
& + Interventions\_Study2 \\
& + Interventions\_Study3 \\
& + X_i + u_i \qquad (1)
\end{aligned}
$$

where i corresponds to individual i. The dependent variable is a dichotomous variable if the individual takes up NHIF insurance, 0 otherwise. Probit regressions are used to take into account the dichotomous nature of the dependent variable. Marginal effects are presented, and are calculated at a value zero for the other interventions, and at the mean of the control variables. $Subsidy\_2percent * Information$ is a dichotomous variable equal to 1 if the individual received the information intervention described earlier, as well as a 2 percent subsidy, 0 otherwise. We define similarly the other treatment variables. $Interventions\_Study2$ and $Interventions\_Study3$ pertain respectively to Study 2 and 3, and will be explained below. We present results with and without all control variables X_i of Table 1.

Confirming the basic results of Table 2, Table 3 shows that none of the interventions were successful at raising take-up, except for 90 and 100 percent subsidies. In fact, some coefficients are not even estimable since there is exactly zero take-up in some treatment groups. In those cases, the probit model drops that treatment group from the analysis since there is no variation in the outcome, and the treatment group perfectly predicts failure.

The fact that take-up is not 100 percent with 100 percent subsidy is indicative that other factors than mere information, transaction costs, or price are at play. In the next section, we detail what these reasons might be, which enabled us to design and implement a new intervention to increase take-up.

3.4 Discussion

Qualitative debriefing with people choosing not to take up the NHIF product despite it being free revealed another more fundamental reason for low take-up: people were "unsure whether [their] claims would be honoured" (sentences in quotation marks indicate verbatim answers from debriefing). The credibility of the NHIF was put into question by some respondents who needed to "be assured that [their] funds will be managed well". Respondents wondered about "the steps to follow when NHIF defaults paying bills", suggesting that default by NHIF is a clear possibility. Moreover, many individuals asked if there were repayments of premiums in case one stays healthy[20]. Consequently, instead of reducing risk, people felt that insurance was in fact increasing risk. In this context, it is understandable why only 45 percent took up with a 100 percent subsidy, since the remaining minimal transaction costs (providing documentation, coming to our offices, picking up the NHIF card) may outweigh uncertain benefits.

This perception is confirmed by microinsurance practitioners. In their survey, Brown and Churchill (2000) found that all thirty-two practitioners in a wide range of developing countries indicated that among the poor, people were reluctant to commit to making premium payments for an uncertain benefit. The authors argue that the level of uncertainty is higher with insurance than with savings or credit. With savings, the customer is unsure whether the institution will safeguard their deposits, but the customer may test the relationship at any time by withdrawing funds. With credit, the roles are reversed since it is the lending institution which is unsure whether the borrower will repay the loan. By contrast, with insurance, the client will not know whether the insurer will keep its promise until some uncertain time in the future when the policyholder makes a claim, and this relationship cannot be tested until this time (Brown and Churchill, 2000), which may happen later in the case of in-patient versus out-patient health insurance. In the following section, we describe an intervention that may address the issue of uncertainty about insurance repayments that plagues formal health insurance take-up in developing nations.

[20] "Suppose I contribute for many years and I lead a very healthy life without getting sick, what happens in this case?"; "Is NHIF money refundable if I pay continuously for about 20 years?"

4 Study 2: an intervention based on peer effects

The intuition of Study 2 is that early adopters who have already tested the system before may reinforce the confidence of non-adopters in the system. As one of our respondents put it: "I have no previous experience with insurance, but I have a friend who has NHIF. When that man's wife fell ill, NHIF paid the bill in full. Therefore, I trust the company and understand how it works". An intervention that would somehow encourage advice-giving by peers may raise formal health insurance take-up.

A critical issue to design a successful intervention is to target the relevant reference group, i.e., determine which peers matter (Manski, 1993). It is not clear whether peers must be respected and close friends, meeting and talking regularly, or whether peers can be complete strangers with a positive experience with the NHIF. To define the reference group, the existing literature usually asks individuals who their friends are (Bandiera and Rasul, 2006; Conley and Udry, 2010; Cai, de Janvry and Sadoulet, 2013) or use departmental colleagues (as in Duflo and Saez, 2003).

A key innovation of our paper is that we focus on naturally occurring informal groups for this peer effects intervention. We provide below some basic facts about informal groups, and explain why they are appropriate reference group for a peer effects intervention.

4.1 Background on informal groups

The 1,705 households in our survey participate in a total of 2,995 groups. Eighty-nine percent of households have at least one group. The average size of the groups is 38 individuals. Informal groups consist of ROSCAs (Rotating Saving and Credit Associations) (34 percent), clan or family groups (23 percent), women's groups (15 percent), or church groups (9 percent).

When asked what the main service of the group is, respondents answer social support (63 percent), credit/savings (27 percent), and spiritual (3.5 percent), with only 1 percent indicating insurance as the main service. In practice, group members usually pay a registration fee (mean = 320 Ksh), a yearly membership fee (mean = 254 Ksh), contribute savings (mean = 271 Ksh per month), and receive dividends from loan repayments by others (mean = 130 Ksh per month).

These groups are stable[21], and meet on average 1.6 times a month. A system of fines sanctions the breach of basic group rules. For example, in all groups, there is a penalty for absence (mean = 61 Ksh), lateness (mean = 15 Ksh), and lack of contribution (mean = 72 Ksh). Attendance and involvement of group members at these meetings is thus very high.

[21] the average year of creation of these groups was 2004

4.2 Conceptual framework for a group intervention

Instead of presenting information on the NHIF to individuals as in Study 1, the intuition of Study 2 is to present the same information to other individuals *together* with their informal groups. In our sample, approximately in line with the Kenyan national average, these informal groups contained on average 12 percent of early adopters. Discussing about NHIF in these groups may spur these early adopters in these groups to talk to the rest of the group about their positive experience with the NHIF, and increase take-up. Coming from respected friends, this may reassure non-adopters about the promise of the NHIF to reimburse claims (see Appendix 2 for greater details).

Such an intervention may have no effect if early adopters were already sharing their stories before our intervention. We argue this is unlikely for two reasons. First, as mentioned above, the main purpose of these groups is not health insurance, but more a social gathering with a credit and savings dimension. Second, only 31 percent of our respondents (who did not already have NHIF) knew about NHIF before any of our interventions, an extremely low number given NHIF is the most reputable health insurance governmental agency in Kenya, established in 1966. This indicates that the NHIF was not a topic often discussed in these groups prior to our intervention.

Other than social learning, presenting the NHIF to informal groups may increase take-up for several reasons. Group members may acquire information about the NHIF product directly from the presentations. Alternatively, some groups members, e.g., literate individuals, may offer others assistance to register. Independently from explanations by early adopters, close peers may discuss among themselves NHIF, and understand better the concept of insurance. More sophisticated arrangements could even arise. For example, individuals in groups could pool resources to finance the purchase of health insurance sequentially for each member, effectively lowering credit constraints. In groups, people may designate an individual to collect and forward the monthly contributions, thereby saving on travelling costs and encouraging group members to take-up. In tight-knit groups, members may cover for each other in times of financial stress to avoid paying the five-month penalty fee in case of default of premium payment imposed by the NHIF. Rather than social learning, healthy group members may pressure sicker individuals to register with the NHIF in order to avoid paying their medical bills, if a risk-sharing mechanism was in place in groups. Finally, group members may not learn from early adopters, but simply follow the recommendation of their group leader.

For all these reasons, presenting to existing informal groups, rather than to individuals, may generate a significant take-up. We describe in the next section the intervention designed to test this proposition. After verifying the overall effect of group presentations, we then attempt in a subsequent section to disentangle among all these potential mechanisms through another series of randomized experiments.

4.3 Experimental design

We now detail the procedure followed to organize presentations in "real", i.e., pre-existing, groups.

4.3.1 "Real" Group intervention

Organizing group meetings implies that people other than the initially targeted individuals will also attend these meetings. To avoid as much as possible that our participants from Study 1 also attended these meetings, we implemented Study 2 in Map 2, i.e., a different geographical area than Map 1 (see Figure 2). Map 2 included 617 households who did not have NHIF prior to this study, nor had received any interventions under Study 1. As Map 1 and Map 2 were a random selection of a subset of maps, there are no overall differences between respondents in Map 1 (Column (2) and (4) of Table 1) or Map 2 (Columns (6) and (8)).

Table 4 presents the exact sample size for each intervention of Study 2. Out of the 617 households of Map 2, we randomly selected 108 households, and asked them to identify the most important social group that they belonged to (e.g., ROSCAs, clan or family groups, church groups). They identified 62 different informal groups. We then asked participants if they would like to have information on NHIF insurance presented to their group, and all reported that they would like a presentation. These respondents then referred us to the chairperson of their social group, and we asked the chairperson for approval to come and present about the NHIF. Ninety-two percent (57 groups) agreed to have a presentation at their next meeting. We scheduled that presentation for the date, time, and place of their next group meeting[22]. Overall, 76 percent of our treatment group attended a group presentation.

In each household, we targeted women, since the evidence suggests that women invest more in health than men (Thomas, 1990; Thomas, 1993; Duflo, 2003) and that women are more active in ROSCAs (Anderson and Baland, 2002). In practice, we asked to talk to the wife, and organized a meeting in her group. Nonetheless, we also organized seven male group meetings to gauge the relative impact of organizing female versus male group meetings[23].

In these 57 "real" (i.e. pre-existing, groups), we delivered exactly the same information as in Study 1 (the brochure and cartoon). Two fieldworkers went to each presentation (see

[22] On the morning of the scheduled group presentation (or the day before if the meeting was held in the morning), we contacted the chairperson to confirm the time and place of their group meeting one final time. We also ascertained an estimate of how many group members would be in attendance for the presentation. A fieldworker then purchased the appropriate amount of sodas (about 20 Ksh each) and biscuits (about 5 Ksh each) to distribute to each group member in attendance as a way to thank them for hosting us and agreeing to an NHIF presentation.

[23] In fact, we find stronger effects in male versus female meetings. This is probably due to the fact that females in this community need the approval of their husbands to register with the NHIF (e.g., to the question "Who makes most decisions about large family purchases?", 73 percent indicate the husband or a joint decision; to the question "Do you have to get your spouse's consent before registering for NHIF?", 87 percent of females say yes). Results available upon request.

Figure 4). When we arrived at the group meeting, one fieldworker took attendance and recorded the contact information of all group members who were present, as well as distributed biscuits, sodas, and the informational documents to each member (Figures 5 and 6). After introductions and attendance were completed, the other fieldworker began the group presentation. The same fieldworker presented in all meetings to ensure consistency in our message and presentation style. After the presentation was completed, the presenter answered questions from the audience (on average nine questions per meeting)[24]. Replicating the response style in Study 1, we answered by repeating information contained in the brochure, cartoon, or registration documentation sheet. Consistent with Study 1, we offered full assistance to register to all those willing to register[25].

Importantly, we did not ask or incentivize early adopters to talk. The provision of extrinsic motivation may have crowded out intrinsic motivation of early adopters to share their experience. Group members may also pay less attention to the advice of financially motivated agents. Our experiment is thus best viewed as an encouragement design, where we make salient the topic of health insurance in groups, to provide an environment for early adopters to share their story.

4.3.2 Control group

Out of Map 2, we randomly selected 409 households to be part of a control group. Due to the fact that these households live in the same area, it is possible that some of them also attended group presentations. In fact, as shown in Table 4, we find that 46 percent of this control group attended a group presentation. This control group is thus measuring the indirect effects of group presentations on non-targeted individuals living in the same geographical area. Any take-up in this control group would represent a positive spillover from organizing group presentations.

Another control group that may be used to measure the causal impact of attending group presentations is the control group of Study 1. Since it is located in Map 1, it is less likely that this control group attended group presentations. This is confirmed by Table 4: only 15 percent of this control group attended. The control group in Map 2 is used to measure spillovers to neighbors, while the comparison of the treatment group to the control group in Map 1 is used to measure the causal impact of getting a presentation on NHIF *together* with her/his informal group.

[24]The majority of the questions (43 percent) were on the benefits of the NHIF (e.g., which hospitals are covered, who is covered in the household, what diseases), 20 percent were on the cost of NHIF insurance (e.g., amount and frequency of payments, and penalty in case of delayed payment), 14 percent on the steps needed to register (e.g., documents, where to go), 6 percent on reimbursement in case one stays healthy, 5 percent on the group versus individual registration.

[25]In practice, we offered to all those willing to take-up NHIF in the group to fill out the registration form, take the passport pictures with our camera, and take their application to the NHIF office in Embu to register on their behalf. Exactly like in Study 1, we offered to do this at participants' houses, or in our office if they wished to do so.

4.4 Results

4.4.1 Take-up

In contrast to the individual interventions of Study 1, organizing group presentations shows encouraging results. Attendance was high: 76 percent attended a real group presentation, as evidenced in Table 4. In this treatment group, 15 percent took up NHIF. Of those attending a group presentation, 18 percent took up.

The effect of these groups presentations spilled over to the control group in Map 2. Fourty six percent attended. Seven percent took up. Of those who attended, the take-up rate is 14 percent, close to the 18 percent take-up rate in the treatment group conditional on attending a meeting.

The 15 percent take-up rate in the treatment group is higher than the 2 percent overall take-up rate in the control group of Study 1. It is more than half the registration rate with a subsidy of 90 percent. This is a large effect, keeping in mind that people have to pay the full price of insurance in group presentations.

The effect of group presentation is statistically significant. In Table 3, "Real Group Intervention" is a dichotomous variable equal to 1 if the individual was invited to a group presentation, 0 otherwise. The take-up after being invited to a group presentation is 12 percentage points higher than in the control group of Study 1. The spillover effects are also statistically significant: the control group of study 2 is 4 percentage points more likely than the control group of study 1 to register.

For clarity, Table 5 groups "Subsidy: 90 percent" and "Subsidy: 100 percent" into one variable "Subsidy: 90 or 100 percent", and all other treatments of Study 1 in another one called "Individual interventions Study 1". The word "individual" refers to the fact that all these treatments were targeted at individuals, not groups as in Study 2. We perform regressions of the following form:

$$\begin{aligned} TakeUp_i &= \alpha_0 + \alpha_1 Individual\_interventions\_Study1_i + \alpha_2 Subsidy\_90\_or\_100percent_i \\ &\quad + \alpha_3 Real\_Group_i + \alpha_4 Control\_Group2_i \\ &\quad + \alpha_5 Fake\_Group_i + \alpha_6 Individual\_interventions\_Study3_i \\ &\quad + X_i + u_i \end{aligned} \tag{2}$$

where "Fake Group" and "Individual interventions Study 3" refer to interventins discussed below.

Column (1) of Table 5 shows that all individual interventions were unsuccessful at raising take-up, while high subsidies and group presentations significantly raised take-up.

4.4.2 Retention

In column (2) of Table 5, the dependent variable is take-up a year after the interventions, after all treatments were discontinued. Take-up a year after the individual interventions of Study 1 was exactly zero, while take-up a year after a high subsidy was not significantly different from zero. While high subsidies are associated with high take-up rate in the short-term, their effect disappears once they are discontinued. In contrast, take-up a year after the group presentations was still ten percentage points higher than in the control group of Study 1. This provides a first indication that people truly value health insurance after group presentations, not after subsidies.

4.4.3 Instrumental variable estimates

The effects presented thus far are intent-to-treat estimates, i.e., the effect of being invited to a meeting. To recover the causal impact of attending a meeting on take-up, we instrument the endogenous decision to attend the meeting by the exogenous invitation to the meeting. Column (3) of Table 5 presents the OLS version of column (1), and shows that 12 percent of the invitees took up. Column (4) presents the first stage, showing that being invited to a meeting increases the probability to attend a meeting by 62 percentage points over a baseline of 16 percent attendance rate in the control group of Study 1, exactly in line with Table 4. Column (5) presents the IV results, and shows that causal impact of attending a meeting is a 19 percentage points increase in take-up (the ratio of 12 to 62).

4.4.4 Robustness checks

The next columns show that adding incrementally the control variables of Table 1, such as socioeconomic characteristics (Column 6), health (Column 7), formal insurance (Column 8), informal insurance (Column 9), and risk-aversion (Column 10), does not affect the main result of the paper, i.e. the significant effect of group presentations.

Overall, these results point to large direct and indirect effects of organizing group presentation. Take-up is higher for individuals directly targeted, as well as neighbors attending the meetings.

5 Mechanisms

Considering the large effects of group presentations, it is important to understand the mechanisms driving this result. Is the effect driven by some group dynamics? Could this phenomenon be replicated even outside of groups? First, we note that the group effect is unlikely to be driven by the information delivered, or the assistance to register offered in the meetings, considering the failure of such interventions in Study 1. Moreover, it is unlikely that peers in informal groups explained better the concept of insurance. First, our cartoon was designed

after an extensive pilot with community members to convey in simple terms the concept of insurance. Second, our fieldworkers were all hired from this community, and knew how to explain insurance in "people's words". Third, local community leaders in Study 1, close peers were ineffective at raising take-up. We next turn to another sequence of randomized experiments that attempt to disentangle the mechanisms driving the result.

5.1 "Fake" group intervention

We first ask whether the higher take-up in groups is specific to these existing informal groups, or whether the effect could be the same for newly formed groups of strangers. This question is important since the existing literature suggests that peer effects, and social learning in particular, are especially strong among existing friends, not strangers (Bandiera and Rasul, 2006; Conley and Udry, 2010; Cai, de Janvry and Sadoulet, 2013). Moreover, this question is important for policy implications: could this intervention be replicated in places where informal groups do not already exist?

To test this proposition, we randomly selected 100 households in Map 2 out of the whole sample comprising early adopter and non-adopter households. We created seven "fake" groups, i.e. groups formed randomly. These fake groups contained a total of 11 early adopters, with at least one early adopter in every fake group.

To reduce travel costs, we selected participants who lived in a 15 minute walking radius of the meeting place. We invited participants to a meeting, and followed exactly the same methodology as in the real groups.

In fact, only 18 percent of the invitees attended a fake meeting. This low attendance rate highlights the difficulty of having people attend meetings not organized in the context of their "real" group. This is in sharp contrast with the real group presentations, where we were able to reach 76 percent of our intended participants, and a total of 2,029 individuals not invited. Thus, gaining access to existing informal groups allowed us to reach out to a wider population more effectively.

Table 3 shows a 7 percent take-up rate in fake meetings. However, this is due to most participants in this "Fake group intervention" attending real meetings. As this intervention was organized in Map 2, there was significant spillovers from the real meetings to this group. Fifty-nine percent of this sample attended a real group meeting. The take-up conditional on attending a real group meeting is 13 percent, similar to the conditional take-up of the control group in Map 2. Table 3 shows that the take-up in the fake group was not significantly different from the take-up in the control group of study 2, as evidenced by the high p-value of a t-test comparing the take-up in the fake groups versus the control group of Study 2. This shows that take-up in this group was driven by spillovers from the real group intervention, not by the meager attendance to the fake groups.

In conclusion, we find fake groups to be largely ineffective at raising take-up. In line with

the existing literature, this indicates that interactions among respected friends rather than strangers are key to promoting take-up.

5.2 Study 3: Group mechanisms

In Study 3, we implemented three randomized experiments to mimic unique features of groups. To avoid any contamination from group presentations organized in Map 2 of Study 2, we implemented Study 3 in Map 3 (see Figure 2). Only 8 percent of households in Map 3 attended a real group presentation. There are no overall differences between respondents in Map 1 or Map 3 (Column (10) of Table 1). Table 6 shows the exact sample sizes for the experimental design of Study 3.

5.2.1 Lower credit constraints in groups

Similar to a ROtating Savings and Credit Association (ROSCAs), 12 group members could contribute 160 Ksh to a common pot, and collect 1920 Ksh to register one of their members for a full year in the first month. On the second month, a second individual would be registered, until all group members are registered. This mechanism could lower credit constraints, allowing people to contribute 160 Ksh ($\simeq$2 USD) per month, as opposed to 1920 KSh ($\simeq$25 USD) per year.

In fact, the NHIF decided to allow individuals registering in groups to contribute 160 Ksh monthly. Their argument was that in groups, a designated individual could collect monthly contributions of other group members, and deliver them to the NHIF office, thereby avoiding overcrowding of their offices. The NHIF did not allow individuals to contribute 160 Ksh monthly, since it may have caused overcrowding.

If contributing the yearly amount is difficult for farmers living at the poverty line of 1 USD per day per capita, then lower but more frequent payments may increase insurance take-up.

To test whether this feature of group versus individual registration could drive take-up, we offered to 32 randomly selected households in Map 2 who had not received any other intervention, the possibility to pay the monthly group price of 160 Ksh. Table 6 shows that only 1 household took up. Lower but more frequent payments do not significantly raise take-up, as evidence by the insignificant coefficient of "160 Ksh per month" in Table 3. In fact, many people asked us after the group presentations if they could pay the yearly instead of the monthly amount in groups, for simplicity. Lower credit constraints afforded by groups is thus unlikely to explain the main result of the paper.

5.2.2 Lower transaction costs in groups

Other than social learning, a major advantage of registering in groups could be that one designated individual collects the contributions and brings them to the NHIF office, to save

on travelling costs. To mimic this unique feature of group versus individual registration, we randomly offered to 33 households to pay monthly payments via M-Pesa, a money transfer application on mobile phones[26]. This allowed these individuals to forgo that inconvenient trip to an NHIF office.

Table 6 shows that none of the households in this treatment group took up[27]. Lower transaction costs in groups are thus unlikely to be the main explanation for our findings.

5.2.3 Group solidarity to avoid penalties

Another major advantage of registering in groups may be the possibility to avoid the penalty of five months of coverage (800 Ksh $\simeq$10 USD) imposed by NHIF in case of default of payment. In tight-knit groups, members may cover for each other in times of financial stress. When we ask: "Say you register for NHIF with your group, and for some reason you are unable to pay one month. In your opinion, would members of your group cover you for that month, and allow you to pay them back next month?", 59% of our sample said yes. This may increase take-up, independently of social learning.

To test this feature of groups versus individual registration, we randomly offered to 106 households to cover for them if they were unable to pay the 160 Ksh payment one month. Table 6 shows that only 2 households decided to take up after this offer. This effect is not significantly different, as evidenced in Table 3 with the insignificant coefficient of "160 Ksh per month and Cover". Therefore, solidarity in groups is unlikely to explain the results.

In Table 5, "Individual interventions Study 3" is a dichotomous variable equal to 1 whenever "160 Ksh per month", or "160 Ksh per month by M-Pesa", or "160 Ksh per month and Cover" is equal to 1, and confirms that these three interventions were ineffective at raising take-up.

Overall, these three randomized experiments show that take-up in groups cannot be explained by lower credit constraints, reduced travelling costs, and cover for one another in case of financial stress. Moreover, the effect cannot be easily replicated in groups of strangers. This suggests that more complex interactions occur in groups, specifically among respected friends. We now provide suggestive evidence that social learning from early adopters plays a role in higher take-up.

5.2.4 Social learning from early adopters

To understand more about the group dynamics, we videotaped and transcribed all conversations within the group meetings. Presenting the NHIF product to groups triggered

[26] Cellphones are now ubiquitous in Kenya, even among the rural poor: as of 2009, 47 percent of Kenyans had a cellphone and 80 percent of people report having access to a cellphone either through direct ownership or sharing (Aker and Mbiti 2010). Also as of 2009, M-Pesa subscriptions in Kenya were up to 8 million people, with nearly 40 percent of all Kenyans reporting to have used M-Pesa's services (Aker and Mbiti 2010).

[27] And the probit model is unable to estimate a coefficient in Table 3.

discussions by early adopters. For example, in one group, an early adopter said: "My child was hospitalized in three hospitals. [...] In all these hospitals, NHIF covered the entire medical bills. In total, NHIF paid more than 100,000 Ksh." In only one group, we witnessed a negative story by a friend of a group member[28].

Early adopters also talked about the NHIF after the meetings were over. To capture these interactions, approximately two weeks after the meetings, we tracked 40 chairpersons and asked 1) whether some group members were registered with the NHIF prior to the presentation, 2) whether these NHIF members required hospitalization in the last year, 3) got reimbursed by the NHIF, 4) talked about their experienced to the group, and 5) helped convinced other members to register. The chairpersons answered yes to these five questions in 24 percent of the groups.

We thus define a group-level dichotomous variable "Early Adopter Talked About Positive Experience", equal to 1 in such cases, 0 otherwise. We then regress take-up of the 1,572 individuals in real groups[29] on this dichotomous variable in the following regression:

$$TakeUp_i = \alpha_0 + \alpha_1 Early\_Adopter\_Talked\_About\_Positive\_Experience_i + u_i$$

Standard errors are clustered at the group level. These results cannot be interpreted causally, since "Early Adopter Talked About Positive Experience" is potentially endogenous, as it was not induced experimentally. Groups where early adopters shared their positive experience may be different from others. A potential threat to the identification of the causal effect of early adopters may be unobservables driving both early adopters sharing their experience, and non-adopters suddenly taking up NHIF insurance.

Keeping these limitations in mind, Column (1) of Table 7 shows that take-up increased by 10 percentage points in groups with a positive experience shared by a previously registered group member. The constant term in this regression is 6 percent, showing that take-up was much lower in real groups where this did not happen.

Early adopters also gave advice on the NHIF following the meetings. When we debriefed 167 households that attended a real group meeting[30] on average six months after the meetings, we asked "Have you discussed registration with group members who already had NHIF insurance?". We also asked what type of advice they obtained. Twenty percent of them

[28] "I have a relative who underwent a theatre operation in a public hospital. She said that they were made to pay for it after being told that theatre charges are different from other hospital bill and they are not covered by NHIF. The NHIF card was also taken to the District Commissioner's office for reasons that were not clear to her before she could be released from the hospital." In this case, the hospital should not have charged for this "theater operation". The card should not have been taken to the District Commissioner's office. This story may add considerable uncertainty about NHIF repayment of claims.

[29] Our sample consists of only 1572 out of the 2029 total attendees of real groups, since we managed to interview only 40 of the 57 chairpersons

[30] the 82 households from the treatment group that attended a meeting, and an additional 85 households randomly selected from the real group meetings

received a positive advice (e.g., "I was told by my friend that when she was admitted in the hospital, the bill was covered by the insurance company"[31]). Twenty-four percent of them received a positive advice from a non-adopter. Only three percent of them received a negative advice[32].

To verify whether these overwhelmingly positive discussions and advice by early adopters in real groups may have spurred NHIF take-up, we focus on this sample of 167 attendees, and perform the following regressions:

$$\begin{aligned} TakeUp_i &= \alpha_0 + \alpha_1 Positive\_advice\_Early\_Adopter_i + \alpha_2 Positive\_advice\_Non\_Adopter_i \\ &\quad + \alpha_3 Negative\_advice\_Early\_Adopter_i + \alpha_4 Negative\_advice\_Non\_Adopter_i + u_i \end{aligned}$$

Column (2) of Table 7 shows that take-up increases by 19 percentage points after a positive advice by an early adopter. Unsurprisingly, a positive advice by a non-adopter does not affect take-up. Moreover, negative advice from adopters or non-adopters reduced take-up, but were extremely rare events.

These discussions and influence of early adopters are unique to "real", i.e., existing informal groups. In the seven fake groups, only one early adopter intervened. Moreover, in the fake groups, there were no discussions or advice from early adopters two weeks or six months after the meetings since these fake groups did not meet regularly after the initial meeting. This suggests that our intervention generated a discussion about health insurance in real groups, not in fake groups, led by early adopters, which increased take-up. We now investigate other potential mechanisms that may occur in groups.

5.2.5 Influence by group leader

In contrast to fake groups, real groups have a leader, who may themselves have NHIF insurance. Rather than early adopters reassuring others with their positive experience of the system, we may observe high take-up in groups simply because group members follow the decision of their leaders. To test this proposition, we asked whether the chairpersons were registered with the NHIF. The chairpersons were registered in 61 percent of the groups. We then regress take-up on the take-up of the chairperson and find no effect in Column (3)

[31] Other quotes are: "she told me that the insurance is good because she has benefited from it, and it covers the bill that one cannot afford to pay", "the person whom she consulted had been hospitalized for 3 months and the NHIF paid all her bill", "she learnt that NHIF is good and keeps its promise", "she told her there was a time she was admitted at hospital and her bill was covered", "someone said NHIF is very important because they already benefited from it", "it has covered some of them who had huge hospital bills", "they told her about the good service offered by NHIF if one is hospitalized". In only one case, an individual received a negative advice: "they told me that NHIF card was delayed a lot. They regret registering".

[32] "she was told that whenever she delays the fee she will be penalized"

[32] A retired government official said: "when I was involved in a car accident in 2010, NHIF footed the entire bill of 200,000 Ksh. I didn't pay for anything for the period that I was hospitalized"

of Table 4, over and above discussions by early adopters. This suggests that early adopters, not group leaders, are instrumental in driving take-up.

In fact, group members generally asserted independence from their chairperson: when asked if they preferred to learn about the NHIF as a group from our field officers, or to be taught by their chairperson after he/she had been trained, 95 percent of the sample expressed a preference for group presentations. Moreover, the absence of any effect of the community leader intervention in Study 1 lends support to the idea that people are not easily influenced by leaders.

5.2.6 Peer pressure

Rather than social learning, high take-up in groups may be driven by peer pressure. Peer pressure may occur because of a unique feature of these informal groups: 78 percent of the real groups already provide informal health insurance, called "hospitality" in Kenya. In these groups, each member contributes a fixed amount (usually 200 Ksh) when one group member is admitted to a hospital. Group members get on average 2,859 Ksh if one of their household members is hospitalized[33].

If the majority of group members were healthy, these healthy group members would benefit from not having to pay hospitality to the few sick members[34]. These sick members could register with the NHIF, thereby exerting a positive externality on all other healthy group members. Healthy group members could then compensate the sick member to incentivize them to register with the NHIF. This would generate a "win-win" situation, but would of course exacerbate adverse selection, by selecting out of the group the sickest members (see Appendix 3 for a formal derivation).

In fact, despite its intuitive appeal, peer pressure is unlikely to drive the main result of this paper for three reasons. First, to the question "Say you are registered for NHIF. Then you fall sick and have to go to the hospital, but you are covered. Will your group still pay-out the same amount of 'hospitality' regardless of your coverage?", 96 percent of the individuals answered yes. Hospitality and the NHIF thus appear to be cumulative, rather than substitutable[35]. The mechanism whereby healthy members select out the sickest to avoid paying their hospitality seems unlikely in practice.

Second, we did not find direct evidence of peer pressure in our qualitative data. When we asked about advice from group members, we witnessed only one case of peer pressure: "they insist that he should try and be a member, they would be happy if he were to register".

Third, we provide a direct test of the presence of peer pressure. Eighty-three percent

[33]The group provides insurance for other reasons too: group members get on average 916 Ksh if one of their household members is sick, and 80 percent of the households receive aid in case of a funeral.

[34]Group members may be of varying health situation in a group since the primary reason of existence for these groups is not health insurance, but social support.

[35]Even if NHIF covers for all in-patient costs, people still need a "hospitality" to pay for travel costs, medicine unavailable at the hospital, lost work days, etc.

of the individuals in the "Real groups" intervention were part of a group providing hospitality (in Table 1, "Any group with hospitality in household?"). Hence, 17 percent had no hospitality, and in such groups, there should be no peer pressure. If peer pressure was driving our results, the effect of the group presentation should be concentrated in groups with hospitality. We thus interact the dichotomous variable "Any group with hospitality in household?" with the variable "Real Group Intervention". Column (1) of Table 8 repeats the baseline estimates of Table 5, and Column (2) of Table 8 shows the result. There is no more take-up in groups with hospitality than in groups without. This casts doubts on peer pressure as a mechanism driving the main result of the paper.

5.2.7 Adverse selection

Even though they are not peer pressured to register, the sickest households might nonetheless register with NHIF. This may have consequences for insurance companies. To investigate this, we interact baseline health measures with the variable "Real Group Intervention". Column (3) of Table 8 shows the results, using a dichotomous variable equal to 1 if any member of the household was admitted in a hospital in the last two years, 0 otherwise, as a health measure. Within the real group intervention, there is no evidence that those households that visited hospitals in the last two years are more likely to register. This result is confirmed in columns (4) and (5), when using our two other health measures from Table 1 ("Weeks missed from work/school/daily duties", and "Probability that you, spouse, or child hospital next year (Beads: 0=Least likely, 10=Most likely)". Overall, there is no evidence of adverse selection in the real group intervention.

6 Cost-benefit of group presentations vs subsidies

To show the desirability of group presentations versus subsidies, we undertake a cost-benefit analysis of this group presentation intervention, compared to other interventions. Each presentation had an average of 38 members in attendance. Each meeting cost about 3410 Ksh (42 USD)[36]. A 12 percent take-up rate in groups would see five people registering in this 38-members group.

Using a full subsidy to register five people would necessitate meeting 11 people, since according to our estimates, only 45 percent would take up. Even if the costs of meeting these 11 people were zero, paying a full subsidy to five individuals over the course of one year would cost 5*1,920=9,600 Ksh (120 USD), significantly more than organizing one group presentation.

[36] For each group presentation, we distributed sodas and biscuits to each member. Sodas cost approximately 20 Ksh each, for a total of 760 Ksh on average per presentation. A box of biscuits cost 250 Ksh. The average cost of a taxi to transport two fieldworkers to each meeting was about 1000 Ksh. The daily salary of a fieldworker was 700 Ksh. The total for all of these costs was 3410 Ksh (42 USD).

Moreover, retention after one year of full subsidies is zero. This is in sharp contrast with a take-up of 10 percent one year after the group presentations, and significant word of mouth in the community because of these group presentations. Out of the 2,029 attendees, 174 households not in our sample were registered a year later, and 99 individuals not in these groups came to our office to register because they heard about the group presentations. Group presentations, more than subsidies, created a process of registration to formal health insurance in this community. Group presentations are thus a more cost-effective than subsidies at raising take-up.

7 External validity

How generalizable are these findings to other communities? As evidenced in Table Appendix 1, this community is representative of other rural communities in the Central province of Kenya in particular, and Kenya in general, in terms of basic socioeconomic characteristics.

Respondents were initially selected in 2007 for their potential interest in a community-based rural micro-hydro electrification project, that has not materialized yet. One might worry that people interested in getting electricity may be more entrepreneurial, open minded, or wealthier. These characteristics may also be associated with high interest in health insurance, and high take-up. Even though interventions are randomized, their effects would be overestimated, and findings could not be generalizable to other communities.

In fact, the failure of all interventions in Study 1 speaks against this hypothesis. Take up is significantly lower than in other existing studies. Delivering information, offering assistance to register or small subsidies did not increase take-up. Full subsidies momentarily increased take-up to 45 percent. Take-up went back to zero after the subsidies were discontinued. This community thus represents a particularly challenging community for the purpose of health insurance take-up.

In light of this, the significant and large results of Study 2 are all the more striking. Thanks to a simple group intervention, take-up went up to 12 percent, close to the 18 percent take-up in the lowest income quintile in Ghana. In fact, the group intervention of Study 2 could potentially have even greater effects in slightly less disadvantaged communities (living above the poverty line of 1$ per day per capita, living closer than 2 hours from an NHIF office or hospitals).

Another threat to the external validity of the findings is that the same intervention in groups of strangers did not increase take-up, implying that the findings of this paper may only be applicable to contexts where informal groups exist already. In fact, informal groups are a pervasive phenomenon in developing countries, under the name of Rotating Savings and Credit Associations (Roscas), Chit funds, self-help groups, sub-castes in India (Mobarak and Rosenzweig, 2012), Tontines in West Africa, susu in Ghana (Besley et al., 1993), Idirs in Ethiopia (Dercon et al., 2014). Their properties have been extensively studied in the

literature (Townsend, 1994; Deaton, 1990; Udry, 1991). Moreover, we use a particularly broad definition of informal groups, including ROSCAs, as well as clan or family groups, and church groups.

A limitation of our findings is that our experimental design can only be used with existing products, such that some early adopters had time to experience the system. In our case, the NHIF was set up in 1966. This experimental design cannot be used with new products, since there would be no early adopters.

8 Conclusion

In this paper, we present the first randomized experiment mobilizing informal groups to extend formal health insurance to the poor. We find that 12 percent of the group members register (with still a 10 percent take-up after one year), a remarkably large number compared to 45 percent take-up with a 100 percent subsidy (and 0 percent take-up after one year), and no take-up after offering 1) information, 2) assistance to register, 3) small subsidies of 2, 10, or 30 percent, 4) information from a respected community leader, 5) the possibility to contribute lower and more frequent payments, 6) the possibility to pay for insurance directly by cellphone, 7) a cover in case of default of payment of insurance premiums. We also find zero take-up after organizing the same meetings with strangers.

Through a detailed qualitative debriefing, we find that a plausible explanation for this result is that previously registered members shared their positive experience about the NHIF which convinced others to take up.

Organizing meetings in existing informal groups is also a formidable way to reach people by leveraging on the system of fines punishing any absence, lateness, or lack of contributions. By organizing only 57 group meetings, we were able to reach 2,029 people. 169 register, up to 174 a year after the group presentation. Take-up is likely to increase even more in the future through social learning from these newly registered members: if they have been sick, all of these newly registered members said that their experience with the NHIF was positive; 97 percent were satisfied with the NHIF (sick or not); 95 percent said they had talked to other group members about their experience with the NHIF; and said they managed to convince, on average, one other person to register.

This paper suggests an important practical implication for governments, international organizations, and insurance companies. Most developing countries, including Kenya, are engaged in the process of providing universal health coverage to their citizens, without lowering contribution rates. How they will achieve this is unclear. International organizations such as the World Bank argue that risk management can be a powerful instrument for development (World Development Report 2014). But to reap the potential rewards of these risk management tools, people need to adopt them in the first place. Commercial companies such as Lloyds estimate that one billion people could be served within 10 years (Lloyd's,

2009). However, the actual demand for insurance, in our case in-patient health insurance, is in fact extremely low, even with information, assistance to register, and subsidies. The "win-win" proposition of microinsurance, reducing poverty and making money at the same time, is unlikely to occur on its own. To realize the potential of microinsurance and transform it into a revolution, this paper provides a simple way to reach to the poor and increase take-up: organizing meetings in pre-existing informal groups to harness the power of social learning from previously registered members who can reassure others about the promise of insurance.

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Table 1: Balance of observable characteristics
(p-value in brackets)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Early adopters	Non-adopters									
		Control 1	Diff. (2)-(1)	Treatment 1	Diff. (2)-(4)	Control 2	Diff. (2)-(6)	"Real Groups"	Diff. (2)-(8)	Treatment 3	Diff. (2)-(10)
Socio-Economic characteristics											
Age	43.62	46.74	3.12***	47.46	-0.72	47.12	-0.38	46.42	0.32	46.86	-0.12
			(0.01)		(0.49)		(0.73)		(0.84)		(0.93)
Total years of schooling completed	10.53	8.16	-2.37***	8.09	0.07	8.18	-0.02	8.13	0.03	7.56	0.60*
			(0.00)		(0.79)		(0.95)		(0.95)		(0.09)
Female household head	0.09	0.19	0.10***	0.16	0.03	0.16	0.03	0.21	-0.02	0.21	-0.02
			(0.00)		(0.28)		(0.24)		(0.64)		(0.63)
Household size	3.58	3.67	0.09	3.73	-0.05	3.76	-0.09	3.64	0.04	3.42	0.25*
			(0.45)		(0.64)		(0.42)		(0.82)		(0.06)
Daily expenditure per capita (USD)	1.56	0.98	-0.58***	1.00	-0.02	0.97	0.01	0.88	0.10	1.16	-0.18
			(0.00)		(0.72)		(0.89)		(0.30)		(0.16)
Household farms?	1.00	0.99	-0.01	0.99	-0.01	1.00	-0.01*	1.00	-0.01	1.00	-0.01
			(0.23)		(0.23)		(0.08)		(0.21)		(0.11)
Head is plot owner? (1=Yes, 0=No)	0.81	0.80	-0.01	0.83	-0.03	0.81	-0.01	0.78	0.02	0.78	0.02
			(0.72)		(0.27)		(0.79)		(0.70)		(0.50)
Area of plot cultivated (acres)	1.35	1.16	-0.20**	1.32	-0.16*	1.26	-0.10	1.45	-0.29**	1.26	-0.10
			(0.05)		(0.06)		(0.20)		(0.03)		(0.33)
Total loans outstanding (000 Ksh)	13.31	4.43	-8.87***	5.85	-1.41	4.70	-0.26	4.87	-0.44	5.39	-0.96
			(0.00)		(0.40)		(0.84)		(0.82)		(0.62)
Total savings (000 Ksh)	16.94	7.60	-9.35***	8.22	-0.62	8.99	-1.39	7.94	-0.34	8.95	-1.35
			(0.00)		(0.63)		(0.30)		(0.84)		(0.39)
Work in formal sector? (1=Yes, 0=No)	0.19	0.02	-0.17***	0.04	-0.02	0.05	-0.03**	0.04	-0.02	0.03	-0.01
			(0.00)		(0.15)		(0.02)		(0.21)		(0.48)
Health											
Hospital in last 2 years for you, spouse or children?	0.34	0.23	-0.11**	0.26	-0.03	0.22	0.01	0.32	-0.09*	0.24	-0.01
			(0.01)		(0.38)		(0.88)		(0.10)		(0.74)
Weeks missed from work/school/daily duties	1.09	1.70	0.61**	1.94	-0.23	1.40	0.30	1.95	-0.24	1.79	-0.08
			(0.01)		(0.30)		(0.16)		(0.50)		(0.78)
Prob you, spouse, or child hospital next year (0 to 10=Most likely)	2.33	2.82	0.49***	2.65	0.17	2.48	0.34**	2.51	0.30	2.33	0.49**
			(0.01)		(0.28)		(0.04)		(0.22)		(0.02)
Formal insurance											
Know NHIF? (1=Yes, 0=No)	0.85	0.31	-0.54***	0.39	-0.08**	0.42	-0.11***	0.28	0.03	0.31	-0.00
			(0.00)		(0.02)		(0.00)		(0.53)		(0.92)
Trust insurance companies? (1. Not at all-4. Very much)	3.36	3.24	-0.13*	3.32	-0.08	3.25	-0.02	3.25	-0.01	3.29	-0.06
			(0.08)		(0.17)		(0.81)		(0.92)		(0.51)
Have another insurance? (1=Yes, 0=no)	0.07	0.02	-0.04***	0.03	-0.00	0.01	0.01	0.01	0.02	0.02	0.00
			(0.01)		(0.96)		(0.31)		(0.29)		(0.80)
Informal insurance											
Social networks insurance	0.56	0.70	0.13***	0.69	0.00	0.68	0.01	0.70	-0.01	0.66	0.04
			(0.00)		(0.93)		(0.67)		(0.88)		(0.33)
Any group with hospitality in HH? (1=Yes, 0=No)	0.86	0.78	-0.08**	0.82	-0.04	0.80	-0.02	0.83	-0.05	0.79	-0.02
			(0.01)		(0.10)		(0.42)		(0.25)		(0.63)
Risk-Aversion											
Number of safe lotteries chosen	0.53	0.56	0.03	0.53	0.03	0.56	-0.00	0.48	0.07*	0.59	-0.04
			(0.33)		(0.26)		(0.96)		(0.07)		(0.28)
Number of observations	257	365		472		409		108		171	

"Control 1" is the control group of Study 1 in Map 1. "Treatment 1" is the treatment group for Study 1. It includes all interventions from Study 1, i.e. information, assistance t register, small subsidies, community leader and large subsidies. "Control 2" is the control group of Study 2 in Map 2. "Real Groups" is the main intervention of Study 2, the "real groups" intervention. "Treatment 3" includes all interventions of Study 3, i.e., 160Ksh, 160Ksh with Mpesa, and 160Ksh with cover.

Table 2: Experimental Design and results of Study 1 in Map 1

Note: Number of participants by treatment arm

(in brackets, first number is take-up of NHIF right after intervention, second number is take up one year after)

	Information	Partial Assistance	Full Assistance	Total
Subsidy: 2%	16 (1,0)	27 (0,0)	11 (0,0)	54 (1,0)
Subsidy: 10%	25 (0,0)	14 (0,0)	17 (0,0)	56 (0,0)
Subsidy: 30%	24 (1,0)	20 (0,0)	21 (1,0)	65 (2,0)
Total	65 (2,0)	61 (0,0)	49 (1,0)	175 (3,0)
Community leader			72 (3,0)	
+ Subsidy: 10%			21 (2,0)	
+ Chicken			46 (1,0)	
+ Incentive to Community leader: 10%			17 (1,0)	
Total commmunity leader			128 (6,0)	
Total interventions Study 1			302 (9,0)	
Subsidy: 90%			88 (26,1)	
Subsidy: 100%			82 (40,1)	
Total high subsidies			170 (66,2)	
Control group Study 1			365 (7,1)	

Table 3: Treatment effects

	(1) Take-up
STUDY 1:	
Subsidy: 2 percent * Information	0.00
	(0.025)
Subsidy: 2 percent * Partial assistance	.
Subsidy: 2 percent * Full assistance	.
Subsidy: 10 percent * Information	.
Subsidy: 10 percent * Partial assistance	.
Subsidy: 10 percent * Full assistance	.
Subsidy: 30 percent * Information	0.01
	(0.034)
Subsidy: 30 percent * Partial assistance	.
Subsidy: 30 percent * Full assistance	0.05
	(0.050)
Community leader	-0.00
	(0.019)
Community leader * Subsidy: 10 percent	0.10
	(0.092)
Community leader * Incentive leader: 10 percent	0.05
	(0.075)
Community leader * Chicken	-0.01
	(0.015)
Subsidy: 90 percent	0.27***
	(0.049)
Subsidy: 100 percent	0.45***
	(0.056)
STUDY 2:	
Real Group Intervention	0.12***
	(0.036)
Control Study 2	0.04***
	(0.015)
P-value of T-test of Real group vs Control Study 2	0.02
Fake Group Intervention	0.07**
	(0.032)
P-value of T-test of Fake groups vs Control Study 2	0.30
STUDY 3:	
160 Ksh per month	0.01
	(0.032)
160 Ksh per month by MPESA	.
160 Ksh per month and Cover	-0.01
	(0.011)
Observations	1,342
Pseudo R-squared	0.21

Probit regressions, robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. "." indicates zero take-up in treatment group. In such cases, the treatment group perfectly predicts failure, and the probit model drops that treatment group from the analysis. Marginal effects are presented (at a value zero for the other interventions, and at the mean of the control variables).

Table 4: Experimental Design and results of Study 2 in Map 2

	Number households	Take up (percent)	Attended real group (percent)	Take up conditional on real group
Real group intervention	108	15	76	18
Control group in Map 2	409	7	46	14
Control group in Map 1	365	2	15	11
Fake group intervention	100	9	59	13

Table 5: Impact of group presentations versus subsidies on take-up and retention

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Model	Probit	Probit	OLS	First stage	IV			Probit		
Dependent variable	Take-up	1 year after	Take-up	Attended	Take-up			Take-up		
Individual interventions Study 1	0.00		0.00	-0.02	0.01	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.010)		(0.014)	(0.026)	(0.014)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Subsidy: 90 or 100 percent	0.36***	0.01	0.36***	0.02	0.36***	0.35***	0.36***	0.35***	0.35***	0.35***
	(0.038)	(0.008)	(0.038)	(0.035)	(0.038)	(0.040)	(0.041)	(0.041)	(0.041)	(0.041)
Real Group Intervention	0.11***	0.10***	0.12***	0.62***		0.12***	0.12***	0.13***	0.13***	0.13***
	(0.034)	(0.033)	(0.034)	(0.043)		(0.037)	(0.039)	(0.039)	(0.039)	(0.040)
Control Group Map 2	0.04***	0.01	0.04**	0.31***	-0.02	0.04**	0.04**	0.04**	0.04**	0.04**
	(0.015)	(0.007)	(0.016)	(0.032)	(0.022)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Fake Group Intervention	0.06**	0.03	0.06**	0.45***	-0.02	0.07**	0.07**	0.07**	0.06**	0.06**
	(0.029)	(0.020)	(0.030)	(0.051)	(0.038)	(0.030)	(0.031)	(0.029)	(0.029)	(0.029)
Individual interventions Study 3	-0.01		-0.01	-0.12***	0.01	-0.01	-0.00	-0.00	-0.00	-0.00
	(0.010)		(0.013)	(0.029)	(0.014)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)
Attended					0.19***					
					(0.054)					
Constant			0.02***	0.16***	-0.01					
			(0.008)	(0.018)	(0.012)					
Controls as in Table 1:										
Socio-economic characteristics						x	x	x	x	x
Health							x	x	x	x
Formal insurance								x	x	x
Informal insurance									x	x
Risk-aversion										x
Observations	1,489	1,016	1,489	1,489	1,489	1,351	1,244	1,238	1,220	1,206
R-squared	0.20	0.14	0.165	0.227	0.182	0.22	0.23	0.24	0.24	0.24

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. "Individual interventions Study1" is a dichotomous variable equal to 1 for all interventions in Study 1 except high subsidies, 0 otherwise. "Subsidy 90 100percent" is a dichotomous variable equal to 1 if the individual received a subsidy o 90 or 100 percent in Study 1. "Real Group Intervention" is a dichotomous variable equal to 1 if the individual was invited to a group presentation, 0 otherwise. "Control group Map 2" is the control group in Map 2. "Fake Group Intervention" is a dichotomous variable equal to 1 if the individual was invited to a fake group presentation, 0 otherwise "Individual interventions Study 3" refers to all interventions in Study 3 designed to test the mechanisms through which the group presentation work. Column (1) is a probit regression with take-up as a dependent variable. The dependent variable in Column (2) is take-up after one year. Column (3) is an OLS regression of Take-up. Columns (4) and (5) are the two stages of an instrumental variable analysis. In Column (4), the dependent variable is "Attended", a dichotomous variable equal to 1 if an individual attended a real group presentation, 0 otherwise. In Column (5), "Attended" is instrumented with "Real Group Intervention", the invitation to a real group presentation. Column (6), (7), (8), (9), and (10) include the exact same controls as in Table 1.

Table 6: Experimental Design and results of Study 3 in Map 3

160 Ksh per month	32 (1,0)
+ Payment by M-pesa	33 (0,0)
+ Cover in case of non-payment	106 (2,0)
Total 160 Ksh per month	171 (3,0)

First number: number of participants, Second number: take-up of NHIF, third number: take-up after one year

Table 7: Social learning
(dependent variable: Take-up of NHIF)

	(1)	(2)	(3)
Early adopters talked about positive experience?	0.105		0.111
	(0.041)**		(0.043)**
Group leader has NHIF?			0.003
			(0.018)
Positive advice by early adopter		0.192	
		(0.093)**	
Positive advice by non-adopter		-0.085	
		(0.068)	
Negative advice by early adopter		-0.153	
		(0.047)***	
Negative advice by non-adopter		-0.260	
		(0.058)***	
Constant	0.066	0.196	0.072
	(0.010)***	(0.039)***	(0.011)***
Observations	1572	167	1357
R-squared	0.02	0.05	0.03

OLS regressions, robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%. In column (1), "Early adopters talked about positive experience?" is a dichotomous variable equal to 1 if any of the group members already registered with NHIF required hospitalization in the last year, got reimbursed by NHIF, talked about their experienced to the group, and helped convinced other members to register. The sample includes all individuals in the real groups. In column (2), "Positive advice by early adopter" is a dichotomous variable equal to 1 if the individual received a positive advice by an early adopter. The sample includes 167 attendees. In column (3), "Group leader has NHIF?" is a dichotomous variable equal to 1 if the group leader has NHIF, 0 otherwise.

Table 8: Heterogeneous effects

	(1)	(2)	(3)	(4)	(5)
Interacting variable: X		Group with hospitality?	Hospital in past?	Weeks lost	Expect hospital?
Individual interventions Study 1	0.00	-0.00	0.00	0.00	0.00
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Subsidy: 90 or 100 percent	0.36***	0.30***	0.38***	0.36***	0.39***
	(0.038)	(0.077)	(0.043)	(0.045)	(0.062)
Real Group Intervention	0.12***	0.14*	0.11***	0.10**	0.14***
	(0.034)	(0.078)	(0.039)	(0.041)	(0.050)
Control Group Map 2	0.04**	0.04**	0.04***	0.04**	0.04**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)
Fake Group Intervention	0.06**	0.06**	0.06**	0.07**	0.07**
	(0.030)	(0.031)	(0.030)	(0.031)	(0.033)
Individual interventions Study 3	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
X		0.02**	0.03*	0.00	0.00
		(0.011)	(0.015)	(0.002)	(0.003)
X*Subsidy: 90 or 100 percent		0.08	-0.07	0.00	-0.01
		(0.088)	(0.082)	(0.012)	(0.017)
X*Real Group Intervention		-0.02	0.02	0.01	-0.00
		(0.087)	(0.077)	(0.013)	(0.013)
Constant	0.02***	0.01	0.02**	0.02**	0.02*
	(0.008)	(0.012)	(0.008)	(0.008)	(0.011)
Observations	1,489	1,457	1,489	1,457	1,336
R-squared	0.165	0.171	0.168	0.170	0.175

OLS regressions, robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%. In column (2), we interact X with "Subsidy: 90 or 100 percent", and with "Real Group Intervention". We include level terms (X), and interacting terms. X is "Any group with hospitality in HH? (1=Yes, 0=No)" in column (2), "Hospital in last 2 years for you, spouse, or children? (1=Yes, 0=No)" in column (3), "Weeks missed from work/school/daily duties" in column (4), and "Prob you, spouse, or child hospital next year (Beads: 0=Least likely, 10=Most likely)" in column (5).

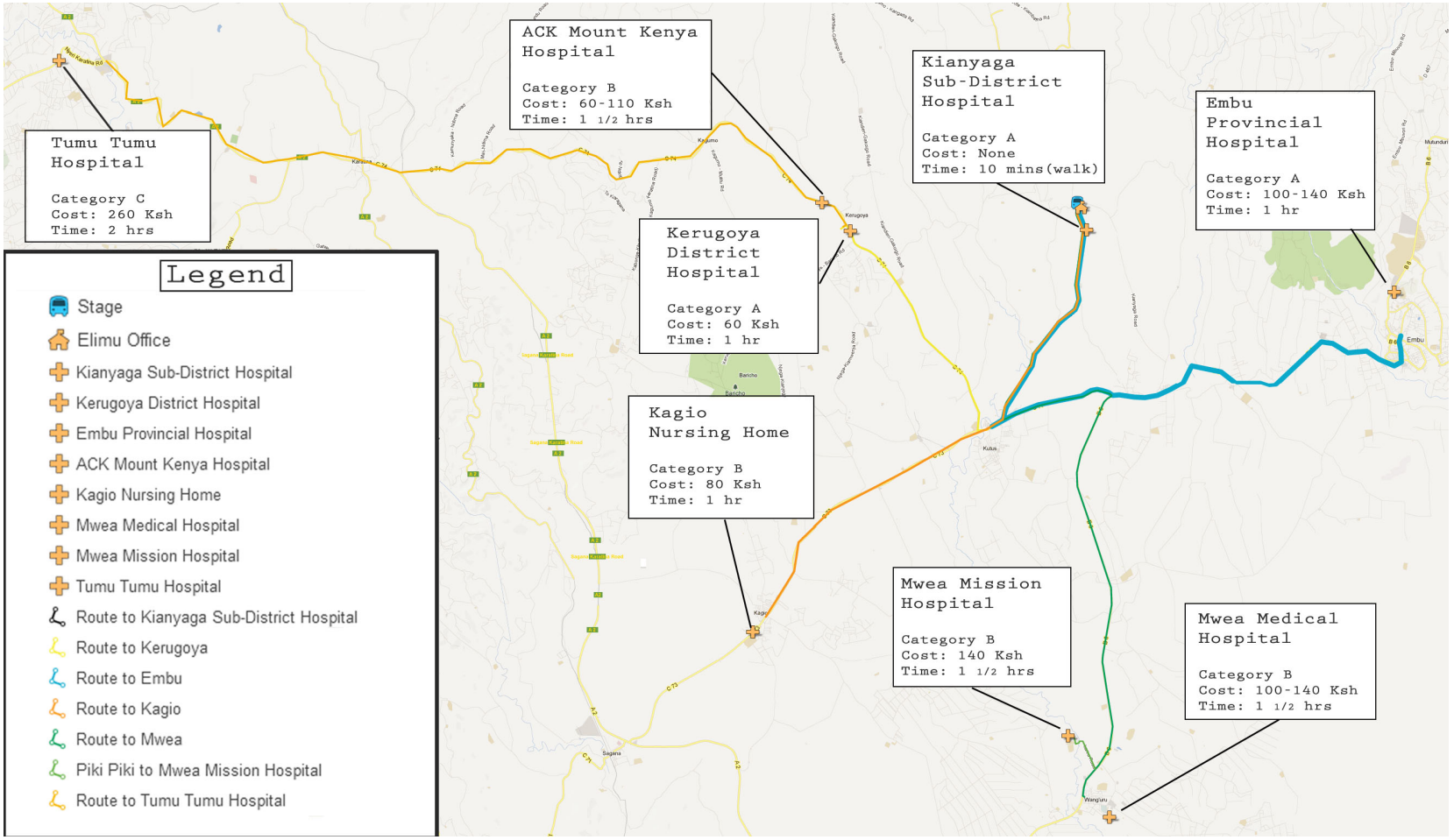

Figure 1: map of hospitals (with time and cost of travel)

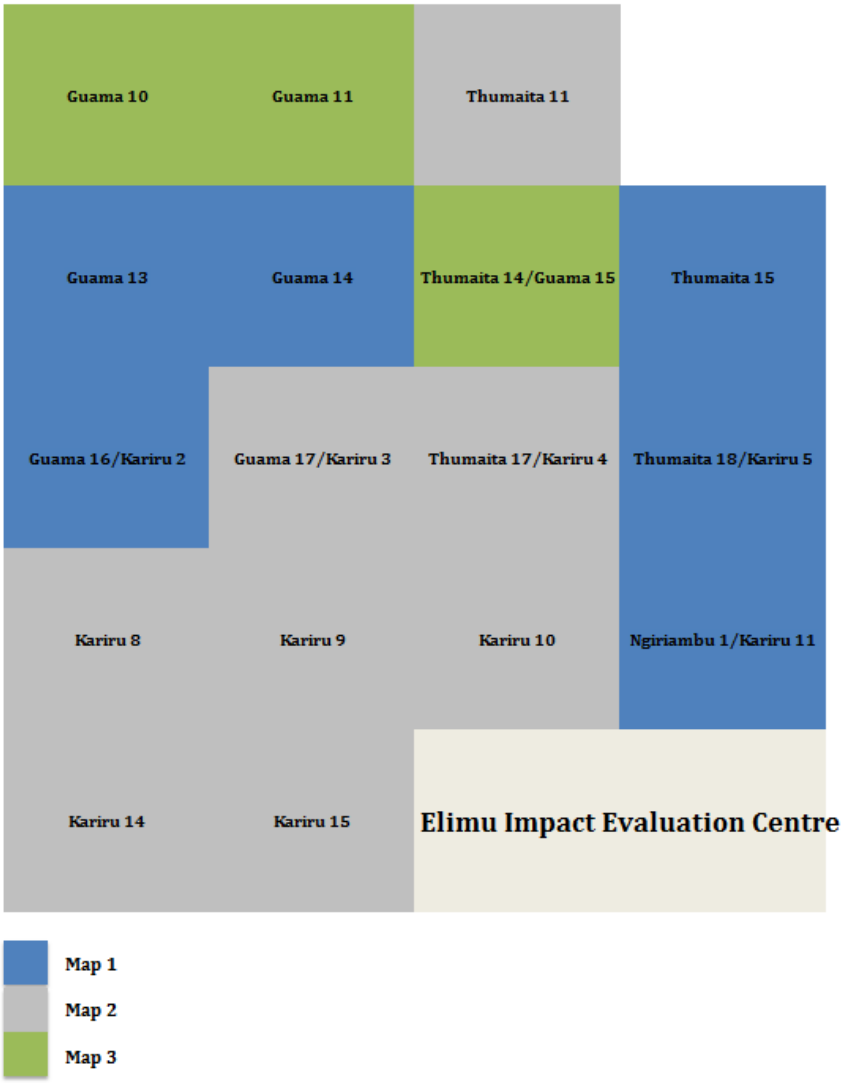
Guama 10
Guama 11
Thumaita 11
Guama 13
Guama 14
Thumaita 14/Guama 15
Thumaita 15
Guama 16/Kariru 2
Guama 17/Kariru 3
Thumaita 17/Kariru 4
Thumaita 18/Kariru 5
Kariru 8
Kariru 9
Kariru 10
Ngiriambu 1/Kariru 11
Kariru 14
Kariru 15
Elimu Impact Evaluation Centre
Map 1
Map 2
Map 3

Figure 2: Map

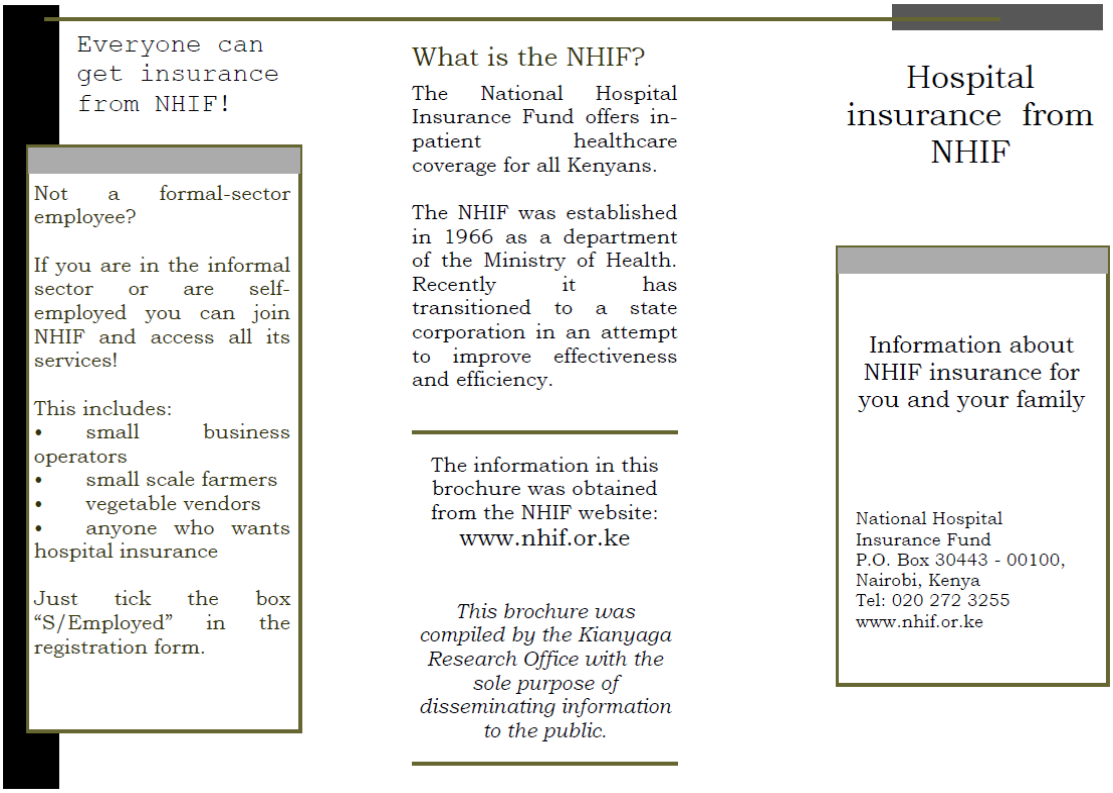

Figure 3: Brochure (to fold in three, page 1)

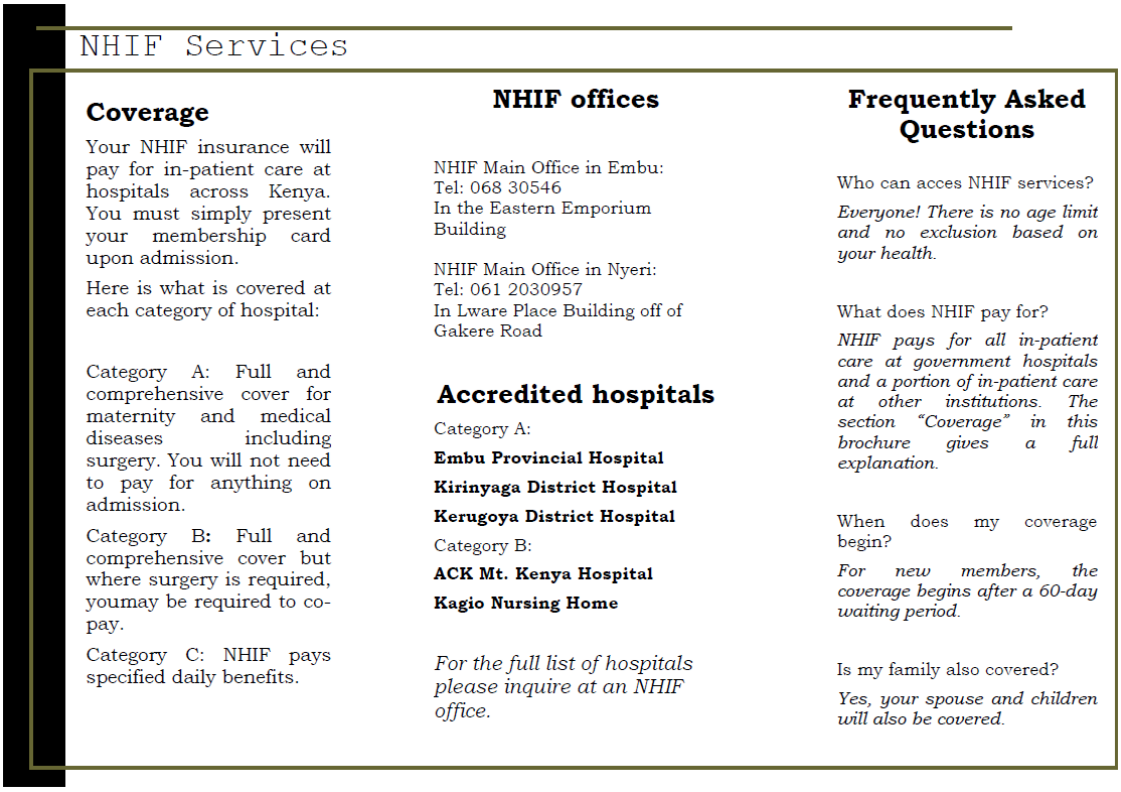

Figure 3: Brochure (page 2)

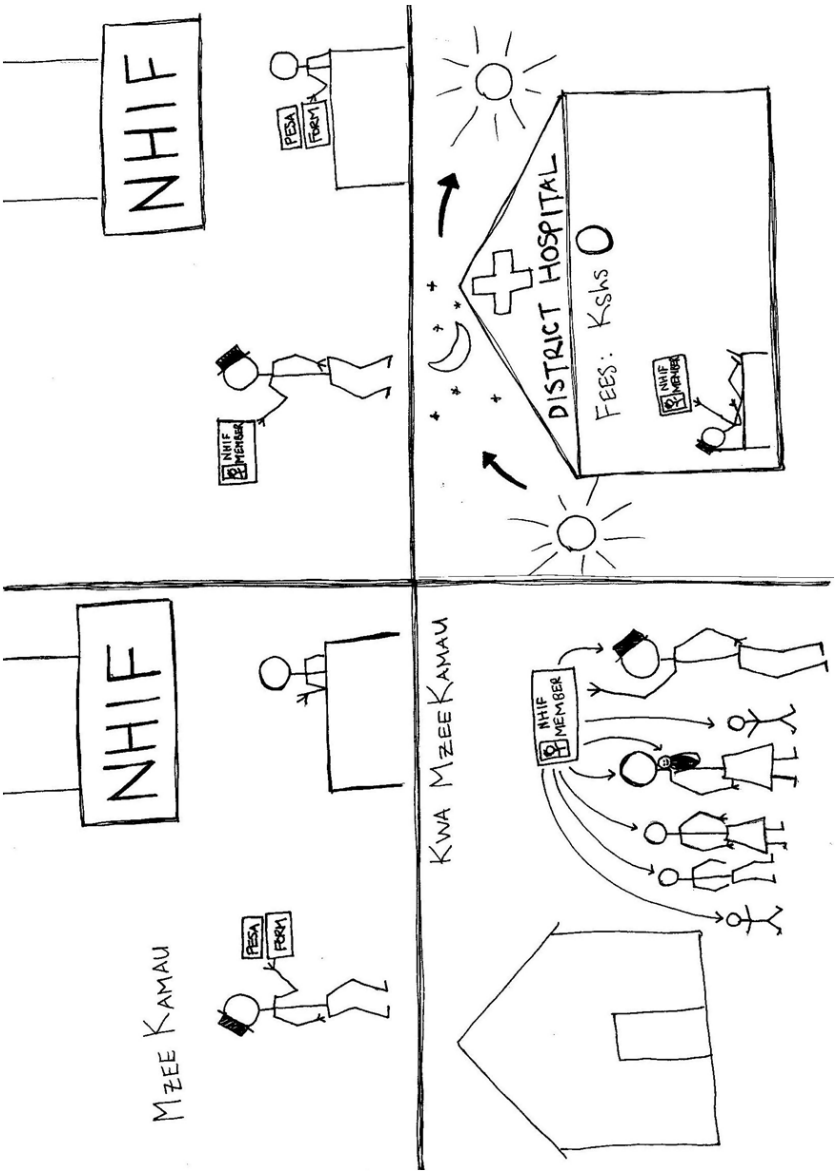

Figure 4: Cartoon

Figure 5: a group meeting

Figure 6: Presenting and recording meetings

Figure 7: Taking attendance and distributing sodas

Appendix 1: Study 1

Suppose individuals start with an initial wealth of w. With probability p, they experience an accident, and incur the medical costs c. Individuals have a risk-averse utility function u, with $u' > 0$, and $u'' < 0$. The expected utility W is:

$$W = (1-p)u(w) + pu(w-c)$$

An individual may purchase insurance at a premium π, that reimburses a fraction γ of the medical costs in case of accident. In addition, individuals may experience a psychic cost X of purchasing insurance (transaction costs to register, fear of showing lack of solidarity to existing informal group...). The expected utility W_I of an insured individual is:

$$W_I = (1-p)u(w-\pi-X) + pu(w-\pi-X-c+\gamma c)$$

Since u is concave, $\frac{\partial W_I}{\partial \gamma} = pcu'(w-\pi-X-c+\gamma c) > 0$, $\frac{\partial W_I}{\partial X} < 0$, and $\frac{\partial W_I}{\partial \pi} < 0$. Interventions providing information on the benefits of insurance (to increase γ), providing assistance to register (to decrease X), and providing subsidies (to reduce π) unambiguously increase the demand for insurance.

Appendix 2: Study 2: Social learning on claims reimbursement

The key concern raised in Study 2 is that individuals may not know ex-ante what γ, the fraction of medical costs reimbursed, is. The intutition of this Study is that γ may depend positively on the advice a of 1) previously registered NHIF members, 2) in one's circle of respected friends, i.e. the informal risk-sharing group, 3) who got reimbursed by NHIF, 4) and shared his experience in the group.

Since u is concave, $\frac{\partial W_I}{\partial a} = pcu'(w-\pi-X-c+\gamma c)\gamma'(a) > 0$. More advice by early adopters may raise formal health insurance take-up.

Appendix 3: Peer pressure in groups

We call h, the hospitality paid by each member when one group member is admitted to a hospital. Suppose now that there are N healthy and 1 sick group members[37], with respective probabilities p_L (low) and p_H (high) to fall sick. The welfare $W_{G,S}$ for a healthy individual (without any formal health insurance) in a group G with one sick member S:

$$W_{G,S} = (1-p_L)u(w-p_L(N-1)h-p_Hh) + p_Lu(w-p_L(N-1)h-p_Hh+Nh-c)$$

If the sick individual registers with NHIF, and is not part of the group anymore:

$$W_{G,-S} = (1-p_L)u(w-p_L(N-1)h) + p_Lu(w-p_L(N-1)h+(N-1)h-c)$$

As p_L is low, the healthy group member benefits by not having to pay hospitality to the sick member. In case of sickness, the hospitality is reduced to $(N-1)h$ since the sick member is not asked to contribute. For a risk-neutral individual, the gain of selecting out the sick member is:

$$W_{G,-S} - W_{G,S} = (1-p_L)p_Hh - p_L(-p_H+1)h = (p_H-p_L)h > 0$$

The intuition for this result is that the healthy member has to contribute less to the sick member (but also gets some reduced hospitality). A healthy member should thus be willing to compensate, or apply pressure on, sick members up to $(p_H-p_L)h$.

For a sick individual, the utility function of being part of the group is:

$$W_G = (1-p_H)u(w-p_LNh) + p_Hu(w-p_LNh+Nh-c)$$

which for a risk-neutral individual collapses to $W_G = w + (p_H-p_L)Nh - p_Hc$

The utility function of registering with NHIF is:

$$W_I = (1-p_H)u(w-\pi-X) + p_Hu(w-\pi-X-c+\gamma c)$$

which for a risk-neutral individual collapses to $W_I = w-\pi-X-p_H(1-\gamma)c$.

For a sick individual, being in a group is beneficial since they pay low hospitality to others (since others are healthy), but receive high overall hospitality. Sick members should have even less incentive than healthy members to

[37] One could imagine the opposite situation with 1 healthy and N sick group members. In this case, the healthy member has strong incentive to defect to NHIF to avoid paying high hospitality payments. This would generate advantageous, not adverse, selection. We argue that this is unlikely to happen since an individual would be subject to fines, or exclusion from groups providing social support, credit, savings, and other types of insurance, in case of non-payment of hospitalities.

join NHIF. However, if each healthy group member compensate the sick member up to their gain established above $(p_H - p_L)h$, then registering with NHIF becomes more attractive. Adverse selection should thus be exacerbated in groups. Peer pressure will also be higher in groups with low social distance.

Table Appendix 1: Comparison 2007 sample with 2009 Kenya Population and Housing Census

The values displayed next to each outcome are Cohen-d values adjusted for uneven group size. The values in parentheses are p-values.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	2007 sample	Census 2009											
		Central/Rural		Central		National/Rural		National		Western/Rural		Western	
			(1)-(2)		(1)-(4)		(1)-(6)		(1)-(8)		(1)-(10)		(1)-(12)
Household Head Age (Years)	47.57	47.32	0.01	44.16	0.21	44.65	0.18	42.00	0.35	44.91	0.16	44.29	0.20
			(0.42)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Spouse Age (Years)	40.28	39.52	0.05	37.50	0.20	36.03	0.31	34.72	0.43	35.81	0.33	35.56	0.35
			(0.01)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Marital Status: Single	0.05	0.03	0.12	0.04	0.02	0.01	0.29	0.03	0.12	0.01	0.46	0.01	0.37
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Marital Status: Married	0.82	0.93	0.43	0.92	0.36	0.96	0.70	0.95	0.56	0.96	0.74	0.96	0.70
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Marital Status: Divorced	0.01	0.02	0.03	0.02	0.03	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.01
			(0.01)		(0.01)		(0.10)		(0.04)		(0.23)		(0.18)
Has Car	0.056	0.035	0.11	0.052	0.02	0.021	0.24	0.043	0.06	0.015	0.32	0.021	0.24
			(0.00)		(0.33)		(0.00)		(0.00)		(0.00)		(0.00)
Has Television	0.39	0.31	0.18	0.40	0.03	0.16	0.63	0.28	0.24	0.16	0.62	0.18	0.53
			(0.00)		(0.14)		(0.00)		(0.00)		(0.00)		(0.00)
Walls: Stone	0.12	0.20	0.19	0.33	0.43	0.06	0.30	0.17	0.11	0.01	1.04	0.01	0.94
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Water Source: River/Pond/Stream	0.37	0.37	0.01	0.26	0.25	0.33	0.09	0.24	0.33	0.18	0.51	0.17	0.53
			(0.60)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)

Comparison 2007 sample with Kenya Integrated Household Budget Survey (KIHBS) 2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	2007 sample	KIHBS 2005											
		Central/Rural	(1)-(2)	Central	(1)-(4)	National/Rural	(1)-(6)	National	(1)-(8)	Western/Rural	(1)-(10)	Western	(1)-(12)
Income	5050	4548	0.08	5959	0.12	3822	0.18	6458	0.06	3107	0.36	4132	0.15
			(0.02)		(0.00)		(0.00)		(0.007)		(0.00)		(0.00)
Household Head Age (Years)	47.58	49.98	0.16	45.97	0.11	47.35	0.01	44.34	0.21	47.93	0.02	45.39	0.14
			(0.00)		(0.00)		(0.48)		(0.00)		(0.52)		(0.00)
Spouse Age (Years)	40.28	41.92	0.12	39.09	0.09	38.38	0.14	36.72	0.27	39.27	0.08	37.41	0.22
			(0.006)		(0.02)		(0.00)		(0.00)		(0.08)		(0.00)
Religion: Protestant	0.54	0.52	0.05	0.51	0.07	0.43	0.22	0.44	0.21	0.52	0.06	0.52	0.06
			(0.15)		(0.03)		(0.00)		(0.00)		(0.13)		(0.07)
Walls: Stone	0.14	0.17	0.14	0.32	0.52	0.05	0.29	0.12	0.04	0.01	0.39	0.02	0.39
			(0.05)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Floors: Cement	0.58	0.37	0.43	0.52	0.12	0.21	0.86	0.39	0.39	0.13	0.97	0.30	0.59
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Water Source: River/Pond/Stream	0.37	0.29	0.17	0.23	0.31	0.29	0.18	0.21	0.40	0.19	0.39	0.15	0.51
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Distance to Water (min)	11.23	11.42	0.02	10.69	0.04	20.05	0.34	16.65	0.23	13.07	0.14	11.46	0.02
			(0.71)		(0.25)		(0.00)		(0.00)		(0.00)		(0.59)

Comparison 2007 sample with Kenya Demographic and Health Survey (DHS) 2008

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	2007 sample	DHS 2008											
		Central/Rural		Central		National/Rural		National		Western/Rural		Western	
			(1)-(2)		(1)-(4)		(1)-(6)		(1)-(8)		(1)-(10)		(1)-(12)
Has Car	0.056	0.41	0.07	0.47	0.04	0.027	0.16	0.070	0.06	0.017	0.18	0.029	0.12
			(0.06)		(0.23)		(0.00)		(0.00)		(0.00)		(0.00)
Has Television	0.39	0.33	0.12	0.36	0.06	0.16	0.55	0.29	0.22	0.17	0.47	0.21	0.37
			(0.00)		(0.06)		(0.00)		(0.00)		(0.00)		(0.00)
Household Head Age (Years)	47.58	48.42	0.06	46.85	0.05	46.20	0.09	43.80	0.24	48.00	0.03	45.57	0.13
			(0.13)		(0.17)		(0.00)		(0.00)		(0.48)		(0.00)
Spouse Age (Years)	40.28	42.00	0.10	40.61	0.02	38.33	0.14	36.96	0.25	38.52	0.10	37.02	0.19
			(0.007)		(0.58)		(0.00)		(0.00)		(0.00)		(0.00)
Household Head Education (Years)	8.34	7.00	0.29	7.35	0.21	5.59	0.61	7.07	0.23	6.23	0.42	6.74	0.34
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Spouse Education (Years)	7.79	6.99	0.21	7.28	0.13	5.25	0.63	6.53	0.28	6.15	0.43	6.48	0.34
			(0.00)		(0.003)		(0.00)		(0.00)		(0.00)		(0.00)
Number of Children	1.59	1.68	0.06	1.62	0.02	2.32	0.40	1.98	0.22	2.44	0.57	2.24	0.43
			(0.08)		(0.50)		(0.00)		(0.00)		(0.00)		(0.00)
Marital Status: Single	0.05	0.07	0.10	0.08	0.15	0.04	0.01	0.08	0.15	0.02	0.13	0.03	0.07
			(0.00)		(0.00)		(0.57)		(0.00)		(0.00)		(0.05)
Marital Status: Married	0.82	0.69	0.31	0.69	0.32	0.74	0.19	0.72	0.21	0.74	0.19	0.74	0.17
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Marital Status: Divorced	0.01	0.07	0.37	0.08	0.40	0.05	0.20	0.06	0.20	0.04	0.20	0.05	0.22
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)

Table Appendix 2: Statistical Power of Experimental Design of Study 1
Note: in percentage terms

	Information	Partial Assistance	Full Assistance	Total
Subsidy: 2%	83	96	68	99
Subsidy: 10%	95	78	85	99
Subsidy: 30%	94	90	91	99
Total	99	99	99	100
Community leader			99	
+ Subsidy: 10%			91	
+ Chicken			99	
+ Incentive to Community leader: 10%			85	
Total commmunity leader			100	
Total interventions Study 1			100	
Subsidy: 90%			100	
Subsidy: 100%			100	
Total high subsidies			100	

Note: 5 percent significance level, pooled standard deviation of take-up in all control and treatment groups: 0.27, size of control group: 365

Table 1: Descriptive Statistics (for presentation)

(p-value in brackets)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Early adopters	Non-adopters							
		Control group		Study 1		Study 2			
			Diff. (2)-(1)		Diff. (2)-(4)	Real groups	Diff. (2)-(6)	Other	Diff. (2)-(8)
Age	43.62	47.70	4.07***	47.46	0.24	46.42	1.27	46.86	0.84
			(0.00)		(0.84)		(0.43)		(0.56)
Total years of schooling completed	10.53	8.32	-2.21***	8.09	0.23	8.13	0.19	7.56	0.76**
			(0.00)		(0.44)		(0.66)		(0.04)
Household size	3.58	3.78	0.20	3.73	0.06	3.64	0.15	3.42	0.36**
			(0.13)		(0.64)		(0.40)		(0.01)
Monthly expenditure per capita (000 Ksh)	3.61	2.34	-1.27***	2.32	0.02	2.03	0.31	2.67	-0.33
			(0.00)		(0.89)		(0.19)		(0.31)
Household farms?	1.00	0.99	-0.01	0.99	-0.01	1.00	-0.01	1.00	-0.01
			(0.33)		(0.38)		(0.24)		(0.14)
Total loans outstanding (000 Ksh)	13.31	5.04	-8.27***	5.85	-0.80	4.87	0.17	5.39	-0.35
			(0.01)		(0.68)		(0.93)		(0.87)
Total savings (000 Ksh)	16.94	7.84	-9.11***	8.22	-0.38	7.94	-0.10	8.95	-1.12
			(0.00)		(0.80)		(0.95)		(0.51)
Work in formal sector? (1=Yes, 0=No)	0.19	0.03	-0.16***	0.04	-0.01	0.04	-0.01	0.03	-0.00
			(0.00)		(0.58)		(0.56)		(0.98)
Hospital in last 2 years for you, spouse or children? (1=Yes, 0=No)	0.34	0.23	-0.11**	0.26	-0.03	0.32	-0.09	0.24	-0.02
			(0.02)		(0.41)		(0.12)		(0.74)
Know NHIF? (1=Yes, 0=No)	0.85	0.32	-0.53***	0.39	-0.06*	0.28	0.05	0.31	0.01
			(0.00)		(0.09)		(0.38)		(0.81)
Trust insurance companies? (1. Not at all-4. Very much)	3.36	3.16	-0.20**	3.32	-0.16**	3.25	-0.09	3.29	-0.13
			(0.01)		(0.02)		(0.41)		(0.14)
Social networks insurance	0.56	0.71	0.15***	0.69	0.02	0.70	0.01	0.66	0.06
			(0.00)		(0.63)		(0.89)		(0.22)
Number of safe lotteries chosen	0.53	0.58	0.05	0.53	0.05*	0.48	0.09**	0.59	-0.01
			(0.12)		(0.08)		(0.03)		(0.68)