Can insurers improve healthcare quality?
Evidence from a Community Microinsurance Scheme in India

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Abstract

We investigate whether microinsurers can help improve the quality of healthcare, and not just its price. We study Indian patients who had a caesarean section, appendectomy, hysterectomy, or abdominal hernia surgery. We compare indicators of facility's infrastructure; doctor's qualification and knowledge; process of care; and patient satisfaction. Two thirds of insured patients contacted the insurer about their choice of provider. They are directed towards facilities that are part of the insurer's network, which have better infrastructure than non-network facilities. Being insured, however, is not significantly associated with receiving better-quality care, even when controlling for several patient and facility characteristics.

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Introduction

Illness and poor health pose two under-appreciated challenges for poor households. The first challenge is financial: losing earnings while ill and needing to quickly put together money to pay for treatment.[1] The second challenge relates to the quality of the care available to households and the informational difficulties they face in trying to obtain quality care. While access to health care – as measured by the number of facilities and doctor visits – has improved in many low-income countries (Das *et al*., 2008), the actual quality of care – notably measured by health facilities' infrastructure and doctors' competence – remains low (Collier *et al*., 2002; Das *et al*., 2008).[2]

This study focuses on the second challenge: how to improve the quality of care that the poor receive. While it might seem that improving the quality of care is a prerequisite to improving health care finance, we explore the opposite logic. We investigate whether establishing health microinsurance (health insurance targeted to poor households through low premiums and/or low coverage limits) has the potential to use the power of aggregation of patients to improve the quality of care received by insured patients. This power stems from the fact that insurers cover a large number of individuals, and can take advantage of their scale in at least two ways. First, insurers are well-positioned to communicate directly with many individuals, possibly offering advice and incentives to improve their client's health. In comparison, national health information campaigns managed by public health authorities, while they often cover more individuals, are less well targeted. The insurer on which we focus, Uplift India Association, for example, offers a 24/7 medical hotline operated by a team of medical

doctors employed by Uplift. The hotline aims to guide patients to the most suitable health care provider at the critical moment of decision-making. Uplift is also able to tailor advice with knowledge of the quality of treatment for the specific diseases and costs. Second, insurers can leverage the promise of a large and constant revenue stream for health care providers, helping to establish privileged relationships with some providers, to the benefit of the insurer's clients. Uplift, for example, implements this strategy through a partnership with 150 health care providers in the areas where clients live. Partnering with a network of health care providers allows insurers to design contracts that build in a variety of quality-control mechanisms, such as prescribed lists of treatments for illnesses, oversight by qualified doctors on the insurer's staff, or health guidance to providers, all of which improve the insurer's ability to monitor service delivery while reducing the uncertainty faced by poor households.

We compare the actions and experiences of two groups of patients, insured and uninsured, who underwent similar surgical procedures in an urban setting in India. We conducted patient interviews and focus groups, and surveyed the facilities where they received care. We compare measures of structure, process, and outcomes of care.

We find indirect relationships between being insured by Uplift and the quality of care that patients receive. Patients take advantage of Uplift's 24/7 hotline to obtain advice on which health providers to go to. More than two thirds of insured patients in our sample sought advice from the insurer when choosing a health care provider. Many of them may have simply wanted to make sure they visit a provider that makes them eligible to file a claim, but this contact nevertheless allows the insurer to direct its clients towards

facilities that are part of its network and which have better infrastructure than non-network facilities. In our sample, 79 per cent of insured patients had operations in network facilities, versus 42 per cent of uninsured patients. Because 42 per cent of uninsured individuals nevertheless received treatment in network facilities and because the quality differences are not so stark, we do not find statistically significant evidence that insured patients received better care than uninsured patients. Facility infrastructure, treatment process, and patient satisfaction were not statistically different by insurance status, even when controlling for a host of patient characteristics.

These findings support the idea that health microinsurance *can* improve the quality of care that patients receive, but the overall results are weak given the small sample and its diversity.

Health care quality for the poor and microinsurance

Previous research documents that poor households typically receive care of particularly low quality. Das and Hammer (2007), for example, showed that poor households in Delhi did visit health care providers frequently, but the average qualification and competence of the doctors from whom they received treatment was lower than that of the doctors from whom richer households received treatment. In addition, while both poor and rich households favour private facilities over public ones, 'visits to public facilities by poor households were primarily to primary health centers' (Das and Hammer, 2007: w347), which have the lowest average doctor qualification level and competence. Finally, the problem of low competence is compounded by the low level of effort that some doctors

exert. Das *et al*. (2008) observed doctors' practice in India, Tanzania, Indonesia and Paraguay, and showed that this problem is particularly acute for poorer households, since doctors of lower competence also exert less effort. For example, one of the public-sector doctors that the authors observed only ever asks one question (What's wrong with you?) before preparing a concoction of drugs and sending patients on their way.

There is little empirical evidence on whether health microinsurance improves the quality of health care that poor households receive. Most of the medical literature on quality of care relates to traditional insurance in developed countries (for example, Caper, 1988; Campbell *et al*., 2000; Asch *et al*., 2006), and studies that examine quality of care questions in developing countries rarely relate them to microinsurance (for example, Chakraborty and Frick, 2002; Das and Gertler, 2007; Rani *et al*., 2008). Ranson and John (2002) looked at the quality of hysterectomies received by patients insured by the non-governmental organization SEWA, in India. The study found that many of the surgeries were undertaken in potentially dangerous settings and that improving the quality of care for the insured would be rather simple – by establishing a network of trusted providers and directing patients towards network practitioners. The study did not compare the quality of care received by the insured to the quality of care received by the uninsured. Fitzpatrick and Thornton (2010) offered free coverage under the national health insurance scheme to a randomly-selected group of informal workers in Nicaragua. They focus on the impact on children of insured adults. Having health insurance led to an increase in the number of doctor visits for children of covered adults, but only to private providers where the insurance can be used. The authors only invoke anecdotal evidence that these doctors

provide care of higher-quality, but their identification strategy clearly shows that being insured increases the *quantity* of care received.

Study Objectives, Data, and Methodology

The study examines the experiences of two groups of patients, insured and uninsured, who underwent one of the following surgical procedures: caesarean section, appendectomy, hysterectomy or abdominal hernia surgery. These surgical procedures were selected because they were the most common surgeries among insured patients, and because it was possible to clearly outline a set of benchmark treatment protocols for each type of surgery.

The study was conducted in the city of Pune in Maharashtra. The area is home to a host of healthcare providers, ranging from primary health centres and public and private hospitals to private clinics and nursing homes. These nursing homes typically are one- or two-doctor establishments that are equipped to perform basic surgeries. Some are single-purpose institutions that only perform basic caesarean surgeries, for example, while others are equipped to perform diverse surgical procedures, with or without complications. Many of them are single proprietor or family-run establishments and the quality of care provided varies dramatically. The high number of institutions adds to the uncertainty and increases informational challenges for sick individuals deciding where to be treated.

The insured group consisted of all clients who had filed a claim with Uplift India Association, a non-profit network of nine non-governmental organizations operating in

the greater Pune area, for one of the four surgeries listed above within the past year. All were also active microcredit clients of one of the NGOs in Uplift's network, and members of the health mutual fund. Because relatively few clients underwent the surgeries, we did not select a sample but included all 29 patients in the study.

Uplift's community-based health mutual fund was established to provide health insurance to households who are members of the microcredit operations of three NGOs within Uplift's network. In 2009, Uplift provided insurance to 83,135 members. The health mutual fund assures reimbursement of hospitalization expenses up to INR 15,000 (approximately US$308) per year, for an annual contribution of INR 100 per person. Members are entitled to reimbursement if they choose any of the 150 health care providers in the city that are part of the mutual fund's network of providers. Health providers are included in the network based on demand within the insured community for inclusion of a particular provider, provider's participation in health check-up camps or prevention talks organized by Uplift, the provider's geographical distance from insured community, availability of necessary services in the health care set up, and willingness to offer concessional and affordable rates to Uplift's health mutual fund's members. Uplift's health insurance scheme is not a cashless scheme, which means that clients need to bear the costs of treatment at the time of delivery, and apply for reimbursement thereafter. Decisions on reimbursements are taken in monthly claims committee meetings that are run by insured community members. Claimants are entitled to up to 75% of the treatment costs in a network facility, within the limit of the annual reimbursement cap. Furthermore, as part of the HMF's risk management, claims paid in a month may not

exceed an allocated 1/12 of the annual premium. Claimants thus do not know with certainty the amount which they will receive, even if the claim is within the annual cap.

Once the insured clients and their communities were identified, the research team reached out to non-governmental organizations that were operating in the same communities to identify a group of uninsured clients who had undergone one of the same four surgeries in the past year. Given the non-experimental nature of our research, we wanted to limit the potential selection bias by finding individuals within the same communities as they were more likely to share a similar socioeconomic background and have access to the same health providers as the insured patients. This group included 24 uninsured patients.

We collected data from four different sources. First, we conducted in-depth individual interviews with each patient to understand his/her health seeking behaviour and level of satisfaction with the care experience. Second, we surveyed lead doctors of the facilities that provided care to our sample of patients. Third, we visited the facilities of 18 health providers – 10 facilities in Uplift's network and 8 non-network facilities – to evaluate the quality of their general and medical infrastructure. Finally, we consulted medical files of one patient from each of these 18 health providers, which allows us to discuss the common operating standards of the provider. The analysis exploits both the qualitative nature of the data and statistical methods (Mann-Whitney test, Fisher's exact test, and regression analysis) to test the statistical significance of observed differences between insured and uninsured patients or network and non-network facilities.

The study has several limitations. First, because of the non-experimental design, we cannot measure the causal impact of health microinsurance on the quality of the care that patients receive. Our aim instead is to provide insights into ways in which microinsurance can improve quality of care. Second, the setting for our study was a city with a wide range of health care providers, and the findings cannot be generalized to a context with few providers. Third, the study does not address the full range of healthcare quality issues. For example, we do not address ways that moral hazard might lead to oversupply of treatment to insured patients or to undersupply to uninsured patients.

Sample Description

Descriptive statistics are provided in Table 1. Our study sample consists of 29 insured and 24 uninsured patients. They are primarily married, lower income females with of 7 years of formal education and five household members on average. The average monthly household income for both the insured and uninsured groups was INR 7,966 (approximately US$164), and the average household income per capita was INR 1,671 per month (approximately US$34).

Table 1. Sample statistics and group comparison

The insured and uninsured groups are similar overall in terms of household income, household income per capita, patient education level, head of household education level, household size, and highest education level of the female member. This

finding is reassuring, given the non-experimental nature of our study, and reduces concerns over potential selection bias.

We find significant differences, however, in the age distribution, income level of subgroups, and surgery composition of the two groups. The insured group is 10 years younger on average than the uninsured group, and the difference is statistically significant at the 1% level when tested with a two-sample Wilcoxon rank-sum test. More importantly, though, the surgery composition of the two groups is different, and the difference is strongly statistically significant. Two-thirds of the patients in the insured group underwent caesarean sections, but fewer than a third of the patients in the uninsured group underwent this procedure. The largest number of patients in the uninsured group (41 per cent of them) had hysterectomies, while about 7 per cent of insured patients underwent this surgery. Finally, while the profiles of insured and uninsured respondents who had caesarean sections and hysterectomies are similar, we found several statistically significant differences in the profiles of patients who underwent appendectomies and hernia removal surgery. Insured hernia patients, notably, were younger and had a higher household income per capita than uninsured hernia patients. Insured appendectomy patients, for their part, were poorer, on average, than their uninsured counterparts. Because the distribution of surgical procedures is not equal in insured and uninsured groups and surgery affects all aspects of care, we break down our results by surgical procedure.

Measuring quality of care

Our framework for analysing quality of care relies principally on Donabedian's framework (1988), which conceptualizes three dimensions of quality of care: structure, process and outcome.

Structure refers to the material and human resources available to the patients. They include the infrastructure and equipment of the facility, as well as the number and qualification of staff members. We constructed several indices to assess the quality of the infrastructure and lead doctors of 18 health care facilities used by patients in our sample. The construction of the indices is detailed in Appendices B and C.

Process refers to 'what is actually done in giving and receiving care' (Donabedian, 1988: 1745). It includes the diagnosis process, the norms of pre, intra and post-operative care, and the methods of information sharing and decision-making adopted by doctors and patients. We examined the process dimension by studying patient files, which contain important information on pre- and post-operative procedures. Details on the calculation of the patient file score are provided in Web Appendix C.

Outcome refers to the effects of care on the health status of patients, as well as changes in patients' knowledge, behaviour and satisfaction. Measuring health outcomes is difficult and costly, and beyond the scope of this study. Instead, we measure patient satisfaction with each of the three dimensions.

Results

<u>Choice of facility</u>

How did the insured and uninsured patients in our sample select the facility where they received treatment? Table 2 shows that almost 70 per cent of insured patients sought advice from Uplift before choosing which health care facility they would receive treatment in, suggesting that information provided by the insurer was an important factor influencing facility choice. Part of the reason for this high rate is that the insurance scheme does not reimburse expenses incurred for treatment in non-network facilities. Many patients therefore consult the insurer only to ensure that the facility in which they are treated is eligible for reimbursement. The consequences on the quality of care that patients receive are potentially large, however, since the insurer can take advantage of the contact to steer patients to better quality provider.

Table 2. Health care provider selection.

Even when patients consulted the insurer for advice, however, they supplemented this advice with other information. Other pieces of information included the perceived cost of the treatment, prior experience or knowledge, recommendation of family or neighbours, and proximity of the facility to their house. One patient, for example, knew in advance that she would need to deliver her baby through caesarean section. She called Uplift, which provided her with a list of facilities in its network, then chose the one in which her family had previously been treated. Similarly, another patient, who had to

undergo a hysterectomy, first evaluated the experience of relatives: '*My daughter's operation and delivery happened in Sasoon. So she said it is a good hospital, let's go there.*' She then consulted with the insurer to confirm her selection.

Table 2 gives patients' primary reasons to choose a specific facility. Note that insured patients may have contacted the insurer to obtain advice on where to undergo surgery, but made their final decision based on another primary criterion. Insured and uninsured patients did not apply the various criteria in proportions that differed statistically. The cost of the procedure was the primary reason cited by most patients in both groups. A larger share of uninsured patients than insured patients relied on prior experience or knowledge, family or friends recommendation, or perceived quality to select which facility they wished to visit. Finally, primary doctors' recommendation was not a commonly cited reason to select a health care provider.

As a result of the availability of advice from the insurer, 79 per cent of all insured patients went to facilities that are part of Uplift's network, while about 42 per cent of uninsured patients chose a network facility. Given that the insured and uninsured individuals in our sample are from the same community, it is not surprising that some uninsured patients received treatment in network facilities. The relatively large proportion of uninsured patients accessing network facilities, however, has important implications for our measure of the quality of care that insured and uninsured patients receive. We return to that point later in this paper. For all patients, however, visiting facilities that are in Uplift's network is important from a quality of care point of view since they are of better quality, as we show in the next section.

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<u>Donabedian's quality of care framework</u>

Patients in our sample received treatment from 27 different healthcare providers. We surveyed 18 of these facilities – 10 network facilities and 8 non-network facilities – that treated 35 of the individuals in our sample to measure the quality of their infrastructure, lead doctors, and treatment process.[3] Our indicators show that Uplift organized a network of facilities with better infrastructure and treatment process, but not better lead doctors, than non-network facilities.

Table 3. Donnabedian's framework: Indicators of structure.

Table 3 shows that network facilities received statistically significantly higher general and medical infrastructure scores than non-network facilities: the medical infrastructure scores, for example, were 71 for network facilities and 47 for non-network facilities. The differences in average scores by network status correspond to tangible differences in the quality of the facilities' infrastructure. For example, toilets were available for patients and their families in 87 per cent of network facilities, but in only 36 per cent of non-network facilities. Similarly, our scoring indicates that good ventilation was maintained in the patient care areas in 92 per cent of network facilities, against 36 per cent of non-network facilities. (Pune has a tropical climate, with temperatures ranging from 30 to 38°C, 86 to 100°F, in the summer). The differences are starker for indicators of medical infrastructure: while 92 per cent of network facilities had infrastructure in line

with those prescribed by the Bureau of Indian Standards for the availability of doctors and nurses (see Web Appendix A), 27 per cent of non-network facilities did. Also, at least 75 per cent of network facilities had the equipment required to perform basic laboratory tests, but fewer than 19 per cent of non-network facilities did.

Despite the better infrastructure, facilities in Uplift's network do not employ better lead doctors. During our survey of the facilities, we interviewed the lead doctor about his/her qualification, experience, and medical knowledge. We measured the latter with a 20-question test of his/her basic medical knowledge. More details on the construction of the measures of lead doctor quality are provided in Web Appendix B. Statistics in Table 3 indicate that lead doctors in network and non-network facilities have similar qualifications, experience, and knowledge. Lead doctors in non-network facility have higher qualifications and more experience than lead doctors in network facilities, on average, but the differences are small and not statistically significant.

Finally, we measured quality in the process of care (Donabedian's framework's second domain of quality) through an index constituted of 21 indicators of whether facilities and doctors took a series of necessary steps in the care of the patient whose file was being evaluated. We examined items such as whether the patient file was correctly documented, whether the necessary medical tests and laboratory analyses were conducted in time, and whether the file includes a consent form signed by the patient or a family (details are provided in Web Appendix C). The 'patient file score' was calculated by averaging 21 binary variables indicating whether as many elements of the proper procedure were followed. For privacy reasons, the patient files are not those of the

patients in our sample, but those of other patients who underwent surgery in the facilities we surveyed. The patient files were obtained from the same lead medical doctors whom we surveyed to create the measures of doctor quality. In most instances doctors chose the file that was most accessible, limiting the possibility that they presented their best-case scenarios. The evaluation was conducted by a medical doctor who was part of the research team. As shown in Table 3, we found that the care provided in network facilities is more compliant with benchmarks than the care provided in non-network facilities: network facilities, on average, score 87 per cent of possible points compared to 77 per cent for non-network facilities, and the difference is statistically significant at the 10 per cent level.

Patient satisfaction

We measured self-reported patient satisfaction with each of the three dimensions of quality of care, as detailed in Web Appendix D. First, an index of patient satisfaction with a facility's infrastructure summarizes patients' satisfaction with the provider's general infrastructure, care infrastructure, and personnel infrastructure. Second, satisfaction with the process of care is measured as an index of nine indicators, such as whether doctors were receptive, paid satisfactory attention to the patient, or provided the patient with satisfactory explanation about the process of care and the surgery's risks and benefits. Finally, overall satisfaction is an average of three indicators rated on a Likert scale: how much does the patient agree that the overall quality of care was 'very good,' how likely is

the patient to choose the same facility in the future, and how likely is the patient to recommend this facility to other patients.

Patient satisfaction scores ranged between 75 and 86 per cent of possible points. In spite of the disparities in facility quality by network status, patients who visited network and non-network facilities indicated similar levels of satisfaction with the facilities' infrastructure, medical treatment, and their overall experience (Table 3). This finding concurs with previous literature that found that patient satisfaction measures may not be a good indicator of quality. In a survey of households in Udaipur, Banerjee *et al.* (2004), for example, find quality of public health facilities to be 'abysmal and unregulated' and health care to be often provided by unqualified private practitioners. The lower quality of providers is also correlated with worse indicators of health, such as lung capacity and body mass index. Yet, villagers are content with the care they receive; for example, 81 per cent of them report that their last visit to the doctor made them feel better. Patients' expectations can explain why their self-reported satisfaction does not vary significantly with the actual quality of care that they receive.

Differences in indicators of quality of care by insurance status

In our sample, the differences in infrastructure and treatment process between network and non-network facilities do not extend to the comparison of insured and uninsured patients. As mentioned, 42 per cent of uninsured patients were operated in network facilities, rendering the comparison of infrastructure quality for insured and uninsured patients not statistically significant. We also did not find any statistically significant

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difference in the level of satisfaction of insured and uninsured patients. A regression analysis allows us to pool our sample together and control for the characteristics that made insured and uninsured patients incomparable, such as the surgical procedure they underwent, their age, and income.

Table 4. Regressions.

This analysis confirms that, controlling for a host of patient characteristics, insurance status is not statistically significantly associated with any of Donabedian's framework's three domains of quality of care, nor patient satisfaction. All but one of the coefficients on insurance status is positive – the insurance status coefficient in a regression of overall satisfaction is negative – but none is statistically significant at the 10 per cent confidence level or higher.

Discussion and Conclusion

We conducted our study in a setting in which individuals have a choice of many health care providers. These individuals, particularly those with less education and financial resources, might have difficulties judging which providers to use and which ones to avoid, but the medical and financial consequences of this choice can be dire. In these settings, health microinsurers have the potential to help their clients receive care of better quality, notably through their power of aggregation. Insurance naturally aggregates clients and their resources. The power of aggregation allows health microinsurers to

evaluate health care providers thoroughly, establish privileged relationships with the best providers, and enforce norms of quality. It can also be turned towards clients: insurers are in a unique position to communicate with a large number of individuals, at a time when they need medical information and guidance towards high-quality health care providers. The insurer that partnered with this study, Uplift Health in Pune, India, has two unique features which help leverage its power of aggregation and contribute to delivering better quality care to its members: (i) it has established a network of healthcare providers, which have to meet certain quality criteria, and (ii) it maintains a 24/7 medical hotline which members are expected to consult in case of illness. The hotline, run by medical professionals employed by Uplift, guides patients to specific providers within Uplift's network.

We exploited a survey of insured and uninsured patients, as well as data from the facilities where they received care. Our data indicate that insured clients did seek advice from the insurer when selecting which health provider to visit, in addition to applying other criteria such as previous experience and family recommendation. This moment of contact allowed Uplift, the insurer, to direct its clients towards facilities in its network, which have better infrastructure and treatment processes than non-network facilities on average. More than three quarters of insured patients visited facilities that are members of the insurer's network of providers. On the other hand, we did not find that insured patients overall went to higher-quality providers than uninsured patients, partly because a large minority of uninsured patients also received care in network facilities.

The study suggests that health microinsurers can take concrete steps to improve the quality of the medical care that their clients receive. Further research is needed, in at least three directions. First, our study does not address the question of whether insurers steer clients to better facilities or lead facilities to improve their quality. The latter could act together with the former to multiply the impact on poor households' care. Second, we do not measure the causal impact of health microinsurance on the quality of care the households receive. Impact evaluations that take into account the self-selection of households into insurance are needed to address bias due to unobservable characteristics that affect both households' decision to buy insurance and the quality of care that they seek and receive (Bauchet and Morduch, 2010; Radermacher *et al*., forthcoming). Third, the costs and benefits for insurers of leveraging their power of aggregation to increase the quality of the care need to be established. Microinsurers' power of aggregation is real, but leveraging it demands a proactive behaviour. Uplift took an active role in selecting a set of providers and in guiding clients to these providers. The possibility for patients to easily contact their insurer – notably through the 24/7 hotline – was critical in making the provider recommendation work for clients, but being proactive in managing provider quality and guiding patients is costly for microinsurers. According to Uplift the costs of the 24/7 health hotline are fully recovered by directing clients to the most adequate provider offering the best rates for quality treatment. A careful study can establish whether enabling access to better care is not only attractive for the insured but also attractive for the insurer. The ultimate question is whether by allocating more resources

to higher-quality providers, microinsurers might provide incentives to further enhance

healthcare quality and help crowd out substandard providers.

Endnotes

[1] Microinsurance is designed to reduce the financial impact of health shocks on poor households (for example, Ranson, 2002; Jütting, 2004; Chankova *et al*., 2008; Franco *et al*., 2008).

[2] Banerjee *et al.*, for example, report from a medical survey in rural Rajasthan, India, that, on average, 36 per cent of the personnel in (public) primary health centers were absent during random visits. Because each visit to these public centers costs INR 71 on average, and visiting a private doctor costs only INR 13 more on average, even poor households turn to private providers. This is no solution though: more than 80 per cent of 'doctors' in private facilities have no medical training whatsoever (Banerjee *et al*., 2004).

[3] Pune experienced a significant swine-flu outbreak at the time of the survey and some public facilities did not answer the survey as they were designated testing facilities and thus overly busy.

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Table 1. Sample description and group comparison.

	Number of obs.	Full sample	Patients		
			Insured	Uninsured	p-value
Surgical procedures (%)					
Caesarean section	53	49.1	65.5	29.2	
Hysterectomy	53	22.7	6.9	41.7	<0.01
Appendectomy	53	15.1	17.2	12.5	
Abdominal hernia	53	13.2	10.3	16.7	
Patient age	53	32.0	27.2	37.9	<0.01
* Caesarean section*	*26*	*25.3*	*24.4*	*27.6*	*0.17*
* Hysterectomy*	*12*	*43.7*	*44.0*	*43.6*	*1.00*
* Appendectomy*	*8*	*27.5*	*29.0*	*25.0*	*0.18*
* Abdominal hernia*	*7*	*42.3*	*30.3*	*51.3*	*0.07*
% female patients	53	88.7	89.7	87.5	-
Years of education of patient	53	7.1	8.1	5.8	0.28
Years of education of household head	53	7.8	8.0	7.5	0.27
% married patients	53	90.6	93.1	87.5	-
Household size	52	5.2	5.0	5.4	0.95
Household income per capita (INR)	52	1,671	1,453	1,946	0.38
* Caesarean section*	*26*	*1,475*	*1,415*	*1,638*	*0.49*
* Hysterectomy*	*12*	*1,913*	*1,625*	*1,970*	*0.91*
* Appendectomy*	*8*	*2,441*	*1,506*	*4,000*	*0.02*
* Abdominal hernia*	*7*	*1,014*	*1,494*	*533*	*0.05*
Patient occupation (%)					
Unemployed	53	3.8	0.0	8.3	
Housewife	53	47.2	51.7	41.7	
Daily wager/maid	53	18.9	13.8	25.0	0.06
Government employee	53	5.7	0.0	12.5	
Self-employed	53	20.8	27.6	12.5	

The p-values are obtained from Mann-Whitney tests for continuous and binary variables, and from Fisher exact tests for categorical variables.

Table 2. Health care provider selection.

	Number of obs.	Full sample	Patients		
			Insured	Uninsured	p-value
Patient consulted insurer prior to facility choice (%)	29	69.0	69.0	n/a	n/a
-- Sample: Insured patients only					
Caesarean	*19*	*63.2*	*63.2*	*n/a*	
Hysterectomy	*2*	*100.0*	*100.0*	*n/a*	*0.84*
Appendectomy	*5*	*80.0*	*80.0*	*n/a*	
Abdominal hernia	*3*	*66.7*	*66.7*	*n/a*	
Primary reason to select the facility where treated (%)					
Proximity	53	11.3	13.8	8.3	
Prior experience/knowledge	53	20.8	17.2	25.0	
Cost	53	26.4	24.1	29.2	
Network affiliation	53	7.6	13.8	0.0	0.62
Quality	53	11.3	10.3	12.5	
Friend/family recommendation	53	13.2	10.3	16.7	
Primary doctor recommendation	53	9.4	10.3	8.3	
Visited facility that is in Uplift's network (%)	53	62.3	79.3	41.7	0.01
Caesarean	*26*	*80.8*	*94.7*	*42.9*	*<0.01*
Hysterectomy	*12*	*33.3*	*50.0*	*30.0*	*0.60*
Appendectomy	*8*	*37.5*	*40.0*	*33.3*	*0.86*
Abdominal hernia	*7*	*71.4*	*66.7*	*75.0*	*0.82*

The p-values are obtained from Mann-Whitney tests for continuous and binary variables, and from Fisher exact tests for categorical variables.

Breakdowns of the 'reasons to select the facility were treated' by surgery are not provided for clarity. Differences in reasons to select facility by facility network status and patients insurance status are not statistically significantly.

Table 3. Indicators of structure, process, and patient satisfaction.

	Network facilities	Non-network facilities	p-value
Structure: Facility quality			
General infrastructure score	87.0	76.2	0.09
Medical infrastructure score	71.1	47.3	0.04
Number of observations	10	8	
Structure: Lead doctor quality			
Qualification index	3.0	3.3	0.92
Experience index	7.2	8.3	0.58
Knowledge index	15.2	14.0	0.30
Knowledge Skill Matrix score	25.4	25.4	0.92
Number of observations	10	7	
Process			
Patient file score	87.2	76.8	0.09
Number of observations	9	8	
Patient satisfaction			
Satisfaction with facility infrastructure	75.5	78.9	0.28
Satisfaction with medical treatment	80.1	85.9	0.06
Overall satisfaction	83.8	83.3	0.78
Number of observations	53	53	

We surveyed 18 of the 27 facilities where a total of 35 individuals in our sample received treatment. We are missing one observation from a lead doctor in a non-network facility, and one patient file score from a network facility. The p-values test the difference between insured and uninsured patients in network facilities. They are obtained from Mann-Whitney tests. We surveyed 15 of the 21 facilities where individuals in our sample were treated. These facilities treated 26 individuals in our sample. Facility quality scores can be read as per centages of possible points; details on their construction are provided in Web Appendix A. The qualification index takes values 1, 3 and 6 as detailed in Web Appendix B. The experience index takes values 1, 3, 6, 9, or 12 as described in Web Appendix B. The knowledge index ranges from 0 to 20, as detailed in Web Appendix B; this score is missing for two lead doctors. The knowledge skill matrix score is the sum of the qualification, experience and knowledge scores, and ranges from 1 to 38; its construction is detailed in Web Appendix B. The patient file score can be read as a per centage of possible points; details on its construction are provided in Web Appendix C.

Table 4. Facility quality and patient satisfaction.

Dependent variable:	Facility infrastructure score	Lead doctor knowledge skill matrix	Patient file score	Satisfaction with infrastructure	Satisfaction with medical treatment	Overall satisfaction
Mean (dependent variable):	0.796	0.699	0.873	0.765	0.821	0.833
Patient is insured	0.073	0.115	0.009	0.068*	0.010	-0.028
	(0.054)	(0.072)	(0.008)	(0.040)	(0.046)	(0.056)
Surgery: Hysterectomy	-0.114	-0.033	0.009	0.035	0.079*	-0.005
	(0.078)	(0.092)	(0.006)	(0.051)	(0.043)	(0.118)
Surgery: Appendectomy	-0.083	0.066	0.010***	0.048**	0.106***	0.140***
	(0.086)	(0.091)	(0.004)	(0.019)	(0.033)	(0.052)
Surgery: Abdominal hernia	-0.717**	0.201	-0.030	0.126***	0.198***	0.168***
	(0.329)	(0.146)	(0.028)	(0.020)	(0.020)	(0.050)
Public (government) facility	0.220***	0.186***	0.138***	-0.064**	-0.046	-0.002
	(0.050)	(0.067)	(0.035)	(0.031)	(0.067)	(0.092)
Patient age	0.010***	0.001	-0.000	0.002	-0.002	0.002
	(0.002)	(0.004)	(0.000)	(0.002)	(0.002)	(0.005)
Patient is a woman	-0.162***	0.246	-0.017***	0.108***	0.282***	0.571***
	(0.030)	(0.229)	(0.004)	(0.032)	(0.064)	(0.210)
Years of education of patient	0.002	0.002	0.002**	-0.002	0.002	0.002
	(0.005)	(0.006)	(0.001)	(0.005)	(0.003)	(0.009)
Patient is married	-0.105***	0.018	0.020	0.080	0.099	-0.103*
	(0.035)	(0.142)	(0.021)	(0.051)	(0.091)	(0.062)
Household income per capita (US$)	0.073	0.115	0.009	0.068*	0.010	-0.028
	(0.054)	(0.072)	(0.008)	(0.040)	(0.046)	(0.056)
Number of observations	34	33	33	52	52	52

note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by facility in parentheses. The coefficients are marginal effects obtained after generalized linear model regressions with binomial family and logit link. The dependent variables are expressed in percentage of possible points (range 0-1). For columns 1-3, the number of observations equals the number of patients who received treatment in the 18 facilities we surveyed. The doctor knowledge matrix score is a composite measure of the qualification, experience and knowledge of the lead doctor in each facility. The patient file score is a composite measure of the degree to which the facility follows benchmarks for each surgery. Patient satisfaction measures are described in Web Appendix D.

Web Appendix A. Indices of facility infrastructure

Two members of our research team visited and assessed a total of 18 of the 27 health care facilities used by the insured and uninsured groups. The assessment aimed to verify the availability of equipment that were necessary for the surgical procedures under review, and rated essential aspects of the health institutions' infrastructure. Facilities were scored along three separate dimensions: (i) general infrastructure, (ii) medical infrastructure.

Indices of facility infrastructure were built by averaging binary variables (1 if the element of infrastructure was present/available, 0 if not). They can be read as percentages.

<u>Index of general infrastructure</u>

The index of general infrastructure averages the following indicators:

- Proper signage/display boards depicting services provided are present at access points of the healthcare setup.
- Registration/inquiry area is present at the access point.
- Reception area has adequate sitting arrangement for patient attendants.
- Drinking water is available to patients and attendant.
- Toilets are available in the waiting area.
- Screening curtains for patient are present during examination in out-patient department.
- In-patient department has clean linen on the patient beds.
- Good ventilation is maintained in the patient care areas.
- Pleasant temperature and humidity (with fans/air-conditioners) is maintained in patient care areas.
- Waste segregation bins are present in patient care areas.
- Dressing material/first aid are available in the in-patient department.
- Operation theater has uninterrupted power supply.
- Operation theater is air-conditioned with optimum temperature and humidity.
- Operation theater is well illuminated.
- Trolleys/wheelchairs are present for patient transportation.
- Clean and dirty utility areas are present in the operating room.

- Water supply is present at all times.
- Storage area for medical records is present.
- Materials like mops, antiseptic solutions are present to maintain hygiene and cleanliness in the patient care areas.
- The facility has a kitchen or pantry which provides food to patients.

Index of medical infrastructure

The index of medical infrastructure averages the following indicators:

- Out-patient department has all the following basic equipment:
    - BP apparatus,
    - thermometer,
    - stethoscope,
    - examination bed
    - X-ray illuminator
- All the following essential medicines are available in the in-patient department:
    - morphine,
    - pethidine
    - buscopam,
    - diclophenac are available
    - penicillin group antibiotics
    - cephalosporins antibiotics
    - metronidozole
    - quinolones
    - domperidone
    - emset
    - benzodiazepines
- Both doctors and nurses are available (as per benchmarks of Bureau of Indian Standards in the in-patient department):
    - Nurses-to-patient ratio is at least 1:6
    - On-duty doctor available 24/7

- Attending doctors are sufficiently qualified and experienced (Minimum qualification of MBBS and at least 90% with one year experience or more).
- Nurses are sufficiently qualified and experienced (BSC/Diploma and at least 90% with one year experience or more).
- Technicians are sufficiently qualified and experienced (DMLT/BMLT/ECG technology/OT technology and at least 90% with one year experience or more).
- All the following life support pieces of equipment are present in the operation theater:
  - ventilators,
  - pulse oximeters,
  - respiratory ventilators
  - cardiovascular respiratory monitors
- Essential drugs (anesthetic drugs and analgesics) are present in the operation theater with a buffer stock.
- Zones of operating room are well demarcated (scrubbing area/changing area/operating area).
- Sterilizing equipments are present in the operating rooms, such as boiler, autoclave.
- Ambulance services are present for patient transfer.
- Ambulance is equipped with all the following life saving pieces of equipment:
  - intravenous fluids
  - airway devices
  - cardiovascular drugs
  - analgesics
  - antiemetic
- Common hematology and serology tests like complete hemogram are conducted in the health care setup.
- Common hematology and serology tests like blood sugar are conducted at the facility.
- Common hematology and serology tests like kidney function tests are conducted at the facility.
- Common hematology and serology tests like liver function tests are conducted at the facility.
- Common hematology and serology tests like urine examination are conducted in at the facility.
- Common hematology and serology tests like PT with INR conducted at the facility.
- Common radiological investigations like X-ray are carried out at the facility.
- Common radiological investigations like ultrasound are carried out at the facility.
- A sufficient quantity of all the following reagents and equipments are available at times for emergency laboratory tests:
  - slides,

- o microscopes,
- o centrifuges
- o common glassware apparatus
- Intravenous fluids (normal saline, dextrose saline, dextrose solution) are available for inpatients for medical and surgical patients.
- Anesthesia doctors are available for common surgeries.
- Aseptic Intravenous cannulaes are available for intravenous drug therapy for patients.
- Instruments/apparatus like ECG machine are available for pre anesthetic checkups.
- Instruments/apparatus like sphygmomanometer (blood pressure machine) are available for pre-anesthetic checkups.

Overall infrastructure index

The overall index takes into account all items in the general infrastructure and medical infrastructure indices.

Web Appendix B. Index of doctor quality: Knowledge Skill Matrix Score

The second index for the structure dimension measures the knowledge and skills of the doctors. We conducted interviews with the lead medical doctor at the facilities visited by our insured and uninsured groups. Note that the indices of doctor quality apply to the lead doctor in each facility, not necessarily to the doctors who treated the patients in our sample. They are proxies for the qualification, experience, and knowledge of the medical staff in the facilities where individuals in our sample received treatment rather than indicators of the characteristics of individual doctors. Each lead doctor answered questions about his/her personal experience and qualifications, and more general questions about the health facility. The research team, which included a medical doctor, also administered a multiple-choice test to assess their knowledge about the surgical procedures and medical practices under review. The Knowledge Skill Matrix score was the aggregate score of the number of years of experience, medical qualification and results from the multiple-choice test. Doctors received points for their years of experience, different qualification levels and each correct answer on the test.

The Knowledge Skill Matrix is divided into 2 main categories.

Qualification and Experience

The qualification scale is as follows:
- BAMS/BHMS=0
- MBBS/BAMS+Post Graduate/BHMS+Post Graduate=1
- MBBS/MS = 3
- MBBS/MS/MCH = 6

Another score is given for experience (post MBBS), as follows:
- 0-2 years = 1
- 3-5 years = 3
- 6-9 years = 6
- 10-20 years = 9
- > 20 years = 12

Knowledge Assessment

The knowledge assessment consists of a series of 20 questions on pre-operative, operative and post-operative procedures for 6 common surgical procedures: appendectomy, cesarean section, complete intestinal obstruction, cholecystectomy, hysterectomy, and abdominal hernia surgery. The questions were designed to test the doctor's basic knowledge. The full list of questions is available upon request.

Each correct answer is worth 1 point, for a maximum score of 20.

Aggregation of these two categories into a final score

The three scores are added to create the Knowledge Skill Matrix score. For example, a doctor with a MBBS/MS degree, 9 years of experience, and 12 correct answers on the knowledge assessment test would receive a Knowledge Skill Matrix score of 21.

Web Appendix C. Patient file score.

The patient file score was calculated by averaging for each patient the values of the following 21 binary variables:

1. Face Sheet contains all of the following information about the   Yes (1)   No (0)
   patient:
   - Name
   - Address
   - Age
   - Sex
   - Registration number

2. General history & physical examination of patients, including   Yes (1)   No (0)
   primary assessment of patients, by the concerned doctor:
   - Sign symptoms
   - History of present illness
   - Past medical history/allergies
   - General examination
   - Local examination

3. Doctor's orders having a chronological order of the preoperative management: **Yes (1)   No (0)**
   - Nothing by mouth
   - Intravenous fluid therapy
   - Intravenous antibiotics
   - Analgesics administered
   - Laboratory and serology tests required for surgery including complete hemogram, LFT, KFT, PT with INR and urine examination
   - X-ray abdomen (if indicated in benchmark treatments)
   - Ultrasound abdomen (if indicated in benchmark treatments)

4. Consultation Record contains subsequent assessment of patient who was hospitalized. Repeated physical examination, including local examination of abdomen for intestinal obstruction, cholecystectomy and appendectomy: **Yes (1)   No (0)**
   - Review of investigation reports
   - Monitoring of temperature, pulse and BP
   - Monitoring fluid intake and output
   - Monitoring of ryles tube aspirate (if indicated in benchmark treatment)

5. Doctor's orders containing a clear, legible handwriting. **Yes (1)   No (0)**

6. Consent form duly signed by patients before any surgical procedure is initiated. **Yes (1)   No (0)**

7. Anesthesia record including a pre-anesthetic checkup record documented by a qualified anesthesiologist:
    - General examination (pallor, icterus, clubbing, cyanosis)
    - Blood pressure
    - Random sugar
    - Systemic examination(particularly chest and cardiovascular system)
    - X-ray chest
    - ECG

    Yes (1)   No (0)

8. Operation record: operative notes in chronological order of steps of surgery (as per the benchmark treatments for ailments.)

    Yes (1)   No (0)

9. Documented notes on blood transfusion, including steps to take in case of transfusion reaction.

    Yes (1)   No (0)

10. Nurses notes for:
    - Urine/intake output chart
    - Medication

    Yes (1)   No (0)

11. Nurses notes for temperature, pulse, respiration chart.

    Yes (1)   No (0)

12. Nurses daily record.

    Yes (1)   No (0)

13. Discharge summary containing the details of the illness including preexisting ones.

    Yes (1)   No (0)

14. Discharge summary containing the details of the illness   Yes (1)   No (0)
including clinical findings.

15. Discharge summary containing the details of treatment initiated   Yes (1)   No (0)
and medical advice on discharge.

16. Discharge summary containing the details of any complication   Yes (1)   No (0)
encountered during treatment, and its subsequent treatment.

17. Discharge summary containing the details of the final condition   Yes (1)   No (0)
of patients on discharge.

18. Laboratory forms, including hematology, microbiology, clinical   Yes (1)   No (0)
chemistry.

19. Tissue report forms (histopathology).   Yes (1)   No (0)

20. Other investigation report forms e.g. X-ray, ECG and   Yes (1)   No (0)
ultrasound.

21. Special investigation report forms e.g., CT scan, MRI,   Yes (1)   No (0)
Pulmonary Ffunction test, clinical immunology and hormone
assay.

Web Appendix D. Measures of patient satisfaction.

All patient satisfaction measures were rated on a Likert scale ranging from 0 (lowest satisfaction) to 4 (highest satisfaction). Depending on the tone of the question, we recoded answers so that a higher score is always better. We presented patients with the following illustration to help them indicate their level of satisfaction to the interviewer:

To construct the indices, we summed all values and divided by the total number of possible points. The scores can therefore be read as percentages.

Patient satisfaction with facility infrastructure

Patients were asked how much they agree with the following statements about the facility in which they received care:
- The facility has enough signboards defining the scope of services it can provide.
- The hygiene, general cleanliness as well as ventilation was excellently maintained by the staff.
- The reception had the adequate space for your relatives to wait without problems during hospitalization.
- The room where you stayed was nice.
- Clean drinking water was made available to you at all times.
- Food was provided during your hospitalization.
- The food provided was of good quality.
- The noise caused discomfort to you during your hospitalization.
- The patient care trolley/wheelchair was available to you whenever needed.
- The ambulance service was provided to you whenever needed.
- The electricity supply was never interrupted.
- The medicines were readily available whenever you required it.

- The equipment used was fully functional.
- Medical personnel that attended to you during your hospitalization seemed properly trained in patient care.
- You had direct access to a specialist to address your need.
- You had to wait a long time to get an appointment with the doctor.

Patient satisfaction with process of care

Patients were asked how much they agree with the following statements about the facility in which they received care:
- The facility took more than the expected time to find out what you are suffering from.
- You were subject to unnecessary tests.
- The doctors asked for your consent before initiating the surgery.
- The doctors always listened to your problems carefully.
- The doctors explained the reasons of your illness satisfactorily.
- All the information on your case was properly convened from the first doctor that attended you to the subsequent practitioners who treated you during your hospitalization.
- The doctors properly explained to you the risks/benefits related to the proposed treatment.
- The doctors paid personal attention towards your recovery.
- The doctors seemed more concerned about selling you something than about your recovery.

Overall patient satisfaction

Patients were asked how much they agree with the following statements about the facility in which they received care:
- Overall, the quality of care you received at this facility was very good.
- In the future, you would visit the same facility where you have received your treatment.
- You will refer your friends and family to this same facility.