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MICROINSURANCE UTILIZATION IN NICARAGUA: A REPORT ON EFFECTS ON CHILDREN, RETENTION, AND HEALTH CLAIMS

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ABSTRACT

This report extends analysis on a randomized evaluation of voluntary health insurance in Managua, Nicaragua. We first report the causal effects of having insurance on the health care utilization among children who were covered as dependents. We find that there were large effects on visits to covered health providers, specifically toddlers. We present evidence that this insurance product did not increase wasteful medical consumption: children who were insured but not sick at baseline reported fewer visits to all providers than those who were uninsured but not sick. Importantly, this insurance product did result in some targeting towards less healthy children, as those who were sick at baseline reported significantly more visits to all providers, including covered providers. We also present retention results – in which only 6 percent of those insured were retained 18 months after subsidies were no longer available. Lastly, we present some descriptive statistics of diagnoses at health centers and costs to discuss the implications of the main burdens of disease.

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INTRODUCTION

Recent studies suggest that access to microcredit alone is not linked to important gains in livelihood measures such as health, education, or empowerment of women, particularly over short time periods (Banerjee, Duflo, and Kinnan 2009). These findings have encouraged a growing interest in the role of other formal and informal financial services in protecting and improving the livelihoods of the poor. Savings, which play an important role in asset building, consumption smoothening and risk management, is one tool. However, this tool can be costly in that it does not provide benefits from aggregating the risks in larger communities. There is growing support among policymakers, NGOs, and international organizations that the poor should be given access to lower cost mechanisms that help them cope with risk, such as insurance. This has led to the development of a still nascent "micro-insurance" industry throughout the developing world, which seeks to extend the principles of microcredit to insurance with small, simple, easily accessible policies.

Despite recent and increasing interest in voluntary insurance and micro-insurance programs, there is little rigorous evidence on the effectiveness of these programs, either in targeting those who are vulnerable (including those in the informal sector) or on measuring causal effects more generally. One of the main reasons for this lack of evidence is the difficulty in making causal inferences from cross-sectional or panel studies. In addition, understanding the demand for voluntary health insurance, retention, costing, and how insurance schemes can assist in financing health expenditures, is difficult due to lack of data. Researchers have documented the effects of recent national expansions of formal health insurance systems finding overall strong results on increased utilization of services and decreased expenditures, but conflicting results on the effects of insurance on health outcomes.

In Vietnam, Wagstaff and Pradhan (2005) find that the national expansion of health insurance significantly reduced out-of-pocket expenditure and improved height-for-age and weight-for-age measures of child health five years later. In Mexico, Barros (2008) finds that the expansion of *Seguro Popular* resulted in substitution out of private providers into public (covered) providers and in a randomized analysis of the same program, King et al (2009) finds *Seguro Popular* increased overall utilization. Both authors find decreased out-of-pocket expenditures but no improvements in health. Other studies in developing countries have recently been implemented although many of their results are not yet available.[2]

Although the effects of health insurance in the developing country context are a relatively recent area of research, the effects of health insurance have been a matter of debate amongst researchers in the United States for some time. The notable RAND Health Insurance Experiment (HIE), implemented between 1974 and 1982, was the first successful randomized experiment to provide identification of the causal effect of health insurance. This experiment assigned participants to various cost-sharing plans in six cities across the country, and found significant increases in medical usage with lower cost-sharing, but no effects on health outcomes on either adults or children (see Manning et al, 1987, Valdez et al 1986). The one exception is that low-income adults who were also chronically ill experienced significant increases in reported health status with more generous coverage.[3] However, this study does not specifically compare insured patients with uninsured patients, and so these experimental results cannot speak to the comparative effects between the insured and uninsured.

An active, large body of literature in the US has examined the effects of insurance on newly enrolled clients. Most of this current literature depends upon quasi-experimental identification in the form of variation over time in Medicaid or SCHIP (State Children's Health Insurance Program) eligibility at the state level. For example, in their analysis of Medicaid expansion initiatives that targeted poor children in the United States, Currie and Gruber (1996) find increased eligibility caused an increase in doctor's visits and significant decreases in child mortality. On the other hand, Currie, Decker, and Lin (2008) find that although insurance increases utilization, there was no effect on the current health status of older children, age 9-17 as a result of these expansions. These two findings are not incompatible, but rather could be suggestive evidence of heterogeneous effects of public health insurance based upon the child's age. Davidoff, Kenney, and Dubay (2005) find by comparing the newly eligible with those above an eligibility cutoff that expanded public insurance coverage (SCHIP expansions) decreased unmet need for health, especially for dental care, and increased coverage among those with chronic conditions. Lave and Ricci (1998) find that in comparing children before and after SCHIP expansions in Pennsylvania that health insurance improved access to care: there were large increases in reports of seeing a physician and significant decreases in terms of visiting an emergency room. The authors also report that parents reported that health insurance reduced the amount of family stress.

[2] For a comprehensive list of these recent studies and their methodologies, see: http://www.microinsurancenetwork.org/workinggroup/impact/stocktaking.php. For example, Levine, Hema, and Ramage estimate the effects of a micro-insurance product for 3000 households (10,000 people) in Cambodia over a longer time horizon; Karlan, Zinman, and Gine as well as Duflo, Banerjee, and Hornbeck study the effects of offering health insurance to existing microfinance clients in the Phillippines and India, respectively; Chemin and de Laat randomize access to health insurance in Kenya and have another project in which they bundle health insurance with other microinsurance products, such as funeral insurance. In addition to measuring basic access and effects, Morduch is examining the relationship between health insurance and quality of care.

[3] However, the authors caution that the inability to reject the null of no relationship between costs of coverage and subsequent health status on the subgroup of sick and poor children may be due to a lack of statistical power.

Although the studies described above are only a small slice of the existing literature, it is notable that there are few studies which link adult utilization and outcomes to their children's utilization and outcomes. Moreover, variations in health coverage, health systems, and socio economic well-being across countries or settings likely influence some of the varied findings and suggest a much broader body of work is needed to better understand the impact of health insurance on both children and adults. Additionally, few studies have sought to examine other factors related to health insurance that influence the commercial viability of these products. These include the factors that influence take up and retention of policy holders in voluntary programs and to what extent these may be influenced by the interest on the part of riskier individuals to be insured.[4] Thornton et al. (2010) begin to explore these factors, focusing on the effects of convenience and information as well as price and coverage on voluntary health insurance take up, using a randomly allocated subsidy for the insurance. They find that program costs and streamlined bureaucratic procedures were important determinants of enrollment, whereas participation of local microfinance institutions had a slight negative effect on enrollment. The authors find some evidence of adverse selection, where those with chronic conditions are slightly more likely to be enrolled. Within the literature on health insurance, there has been less research on the determinants of retention, in part because these programs are very new or the data may be unavailable.

We contribute to the research literature by providing experimental estimates of the effect of a voluntary health insurance program in Nicaragua. The insurance coverage was offered by the Nicaraguan Social Security Institute (INSS) to workers from the informal sector who were previously not eligible for this coverage. The coverage allowed patients to choose from a network of private and public providers and differentiated itself from the under-resourced public insurance program by offering provider choice, greater availability of free prescribed medications, and shorter wait times. It was previously offered only to workers employed in the formal sector and paid through matched employer/employee contributions. The INSS piloted the program in 2007, offering insurance through microfinance institutions in the country that were contracted as delivery agents to affiliate clients and collect payments. INSS insurance covered inpatient and outpatient services including generic drugs and common lab exams for individuals, their children through 11 years of age and pregnant spouses (in the case of covered men) including pre and post-natal care. This report extends the analysis of a previous study of this program in Nicaragua that randomized the incentives to enroll in health insurance (Thornton et al., 2010). The original evaluation included two rounds of survey data collected among a representative sample of approximately 2600 informal sector workers who were uninsured in 2007. It examined the health insurance enrollment decision as well as visits and expenditures at various providers among adults in the survey. We extend the initial analysis in three main ways. First, we present the effects of health insurance on the children of those who were insured. Second, we extend retention statistics and examine the determinants of retention among the (small) proportion of those who continued their coverage. Third, we present descriptive statistics of the types of claims made at the covered health centers as well as some statistics on costs.

The survey was conducted in the three largest open-air markets in central Managua. The baseline survey collected information on demographic characteristics,

[4] There is a literature that discusses low take-up among social programs, including health insurance for children (Lo Sasso and Buchmueller, 2004) that require more effort for enrollment (see Remler, and Glied, 2003 for a survey of the literature).

prior and current health services utilization, socioeconomic characteristics, and health care expenditures. Government ID numbers were collected to match respondents to health insurance enrollment data subsequently provided by the social security administration. Eligible respondents were randomly sampled to participate in the survey and study. Eligibility depended on age (between ages 18 and 54), having a government ID, being the owner of the booth, and lacking health insurance coverage. The first two criteria were determined by government eligibility requirements, while the second two were research design considerations intended to target those with limited access to health insurance.

After the administration of the baseline survey, incentives were randomly offered to some respondents to obtain six months of free voluntary health insurance which was previously unavailable to informal sector workers. Data of enrollment from the social security institute was matched to the survey data. One year later, a follow-up study was conducted among the same individuals, which allows for estimating the causal effects of health insurance. In total, 2,807 respondents were approached for the follow-up survey, and 2608 (93 percent) were successfully re-interviewed; there was no differential attrition by treatment status. Thornton et al (2010) found that randomized subsidies had large effects on the take-up of the insurance product, however, overall take-up was low with only 30 percent of those awarded a six-month subsidy enrolling. However, there were effects of the insurance in the short run: those respondents who received insurance used services at covered facilities and total out-of-pocket expenditures fell by 55 percent. Retention after the expiration was low, with less than 10 percent of insured respondents still enrolled after one year.

In this paper, we extend the analysis to measure the effects of insurance on children of covered adults, predict determinants of retention, and examine claims and costing data. How insurance affects later outcomes on children depends in part on actual utilization of the services as well as quality of services delivered. Moreover, to the extent that health insurance may be most beneficial in the case of extreme health shocks, we may not have the power to detect these types of events with our sample; on the other hand, this insurance additionally provided basic care, prevention and wellness visits, of which we could see increased utilization of these free services among respondents and their children. In our results we find that children who were covered by their parent's insurance had overall more visits to the free health centers. This is mainly driven by younger children, and specifically, toddlers. There were no measured health impacts among children, although we find differential usage among insured families based upon a child's baseline health status: insured children who were sick at the baseline survey report more visits than insured children who were not sick at baseline.

Under rational expectations, individuals choose to enroll in health insurance if the expected utility with insurance exceeds the expected utility without; with a subsidy, we would expect enrollment to be higher as long as the perceived benefits of insurance – such as higher quality providers, lower prices, regular access to care –exceed the costs of enrolling. The decision to continue payment after the subsidy expires also would depend on these factors, although patients may have had an opportunity to learn more about delivery of services and quality of care while enrolled under the subsidy. Following the expiration of their subsidy, respondents were permitted to continue making voluntary payments to retain their insurance status. In contrast to the initial decision to enroll in subsidized insurance, there is a higher willingness-to-pay

threshold for respondents to continue coverage. This is demonstrated in the low retention statistics. We present results suggesting that the amount needed to continue insurance coverage contains factors other than the US$15 monthly premium, such as knowledge of where to make payments. Finally, we explore the possibility that individuals have updated beliefs on the benefits of insurance based upon health status at baseline. We conclude that prior health status and usage of insurance is correlated with retention, which may indicate that those who retained coverage were those with higher expected benefits of insurance.

Lastly, we present descriptive statistics of health utilization data collected from clinics from a subset of respondents. We also discuss costing. Generally, pricing health services is difficult and we also face these difficulties in our data. The majority of reasons for visiting a health center include common complaints of flu, cough, cold, or minor ailments. On the other hand, costing data received from health centers mainly cover only the most expensive services such as child birth or other surgeries. The scope of what we can say with these current data is limited.

In what follows below, Section 2 presents the background on the health insurance program in Nicaragua, the data, and the randomization. Section 3 presents the effects of health insurance on children's utilization and expenditures, Section 4 presents retention, and Section 5 presents some statistics from claims data. Section 6 presents the conclusion.

STUDY SETTING AND DATA

HEALTH INSURANCE PROGRAM FOR INFORMAL WORKERS IN NICARAGUA

In Nicaragua, where our study takes place, approximately 1.2 million workers out of a population of 6 million are employed in the informal sector (Hatt et al, 2009). In theory, urban informal workers in Managua have access to free public sector health services, but these services are under-resourced and 93 percent lack the Social Security health insurance coverage that is available to formal sector workers. When they can afford to, urban informal workers often pay out-of-pocket for higher-quality private services. In January 2007, the government of Nicaragua implemented a pilot project aimed at extending the Nicaraguan Social Security Institute's (INSS) health insurance program to informal sector workers using microfinance institutions (MFIs) as delivery channels. The basic motivation was that informal sector workers are particularly vulnerable to the costs and disruptions of illness and do not have access to formal insurance mechanisms that can protect them from these risks. Additionally, the program was expected to free up public Ministry of Health resources (used by informal workers who although informal, have some discretionary income) and focus limited public resources on the extreme poor.

Health insurance provided through the Nicaraguan government social security system (INSS) extends quality care to its formal sector subscribers, and is based on mandatory payroll and employer contributions. The INSS pilot project primarily offered a mechanism for informal sector workers to access the INSS basic package of services without having a formal employer who can make contributions and deductions on their behalf. This voluntary health insurance, known as *Seguro Facultativo de Salud*, intended to provide clear and understandable information about coverage and eligibility, simple subscription mechanisms that do not raise suspicion that the government intends to tax subscriber income, an appropriate management information system (MIS), and convenient forms of subscription and payment. Health facilities receive a monthly capitation payment for current subscribers. Insured individuals and eligible

dependents pay a flat monthly fee for covered services, but no co-pays at the time of service. The monthly fee is higher in the first two months, at approximately 18 dollars per month, and falls to approximately 15 dollars per month in subsequent months. If a subscriber should wish to dis-enroll, he or she will continue to be covered during a three month grace period after her or she has stopped paying for service before the affiliation is cancelled.

INSS contracted with commercial, not-for-profit and public providers called "Clinics for the Insured" (formerly Empresas Médicas Previsionales, or EMPs) and purchased services on a per-capita basis. The INSS insurance provided all subscribers with a comprehensive package of preventive, diagnostic, and curative health services and medications, including primary and specialist care, medication and laboratory exams, hospitalization, 24-hour emergency care, , childbirth, pre and post-natal care, infant care and vaccinations, child wellness visits through age 5, voluntary family planning counseling and contraception, breast and cervical cancer screenings, HIV and STD counseling, and prevention and treatment of dengue fever and malaria. In addition to the subscriber, the subscriber's wife or companion was eligible for maternity services and dependent children up to the age of 12 were also covered.

At the time of the study, in Managua, approximately 58 percent of small business owners had a loan, the majority with a microfinance institution (MFI). In order to facilitate the uptake of the insurance and the collection of insurance premiums, three MFIs were selected to participate in the pilot project. Each received technical assistance and received training to familiarize them with the project and the process of signing up informal workers for health insurance. Individuals could sign up for the insurance at any branch of the participating MFIs, which then sent all paperwork to the social security office. Alternatively, individuals were able to sign up directly at the Social Security Institute's main office.

DATA COLLECTION AND RANDOMIZATION

Baseline Survey: In early 2007, a few months after the rollout of the insurance program to informal sector workers, a baseline survey was conducted in 7 markets around the city. The markets were selected because they were the main markets in central Managua, each with more than 500 vendors and the researchers were most likely to find a large population of uninsured informal workers. In the first round of the baseline survey, a census of each informal market booth of the Mercado Oriental was conducted to define the sampling frame of possible respondents. Participants deemed eligible through the census were selected randomly and administered the full survey. Eligibility depended on being a certain age (18 to 54), being the owner of the booth, having a government ID, and lacking current health insurance coverage. During the first round, 1,193 market vendors were approached and 61 percent, or 728 market vendors, completed the survey. A second round of the baseline survey was conducted and included six additional large markets in the city. The sampling strategy in this round differed as rather interviewers approached all booths for eligible respondents, rather than randomly select respondents from a sampling frame. Of the 6,192 market vendors approached in the second round, 53 percent, or 3,274 vendors, completed the survey.[5] In total, the baseline survey was administered

[5] In Round 1, there were 225 potential respondents who were away from their booth, 114 who refused to participate, 124 who were deemed ineligible, and 2 who did not complete the study for other reasons. In Round 2, there were 1732 potential respondents who were away from their booths, 21 who refused, and 1065 who were deemed ineligible, and 38 who otherwise did not complete the survey. A common reason for ineligibility was a lack of documentation, and a common reason for refusal was a fear of government retaliation for bypassing the formal system (collection of taxes, for

to a representative sample of 4,002 open-air market vendors in several of the largest markets of Managua. The survey collected information on demographic characteristics; prior and current health services utilization; socio-economic characteristics; and health care expenditures. Government ID numbers were collected in order to match respondents to health insurance enrollment data that would later be provided from the government.

Randomization: At the end of the baseline survey, respondents were invited to choose a lottery ticket randomly out of a stack of unmarked, pre-sealed envelopes. The lottery prizes included a blank lottery ticket (control group); an INSS brochure on the insurance product; a 2-month insurance subsidy or a 6-month insurance subsidy.[6] Table 1 (Columns 1 and 2) presents summary statistics of those assigned to the various subsidy groups at baseline (Panel A).

Affiliation data from INSS: The INSS provided access to data indicating which respondents signed up for insurance and the place of affiliation (INSS or a participating MFI). These data could be linked to our survey data via government ID numbers, which individuals provided during the survey and when enrolling in the insurance.

Follow-up Survey and Attrition: During the spring of 2008, a follow-up survey was conducted among a subset of the original survey respondents, those who had booths in the largest markets (Oriental, Huembes,

Table 1: Random Assignment Status, Enrollment and Retention

	Total		Enrolled in Insurance		Retained Insurance	
	Number	Percent	Number	Percent of Total in Subidy Category	Number	Percent of Insured in Subsidy Category
Panel A: Respondents in Baseline Survey	(1)	(2)	(3)	(4)	(5)	(6)
No Subsidy	1399	0.350	21	0.015	6	0.286
Two-Month Subsidy	246	0.061	37	0.150	5	0.135
Six-Month Subsidy	2357	0.589	716	0.304	39	0.054
TOTAL	4002	1.000	774	0.193	50	0.065
Panel B: Respondents in Follow-up Survey						
No Subsidy	1223	0.469	19	0.016	6	0.316
Six-Month Subsidy	1385	0.531	512	0.370	27	0.053
TOTAL	2608	1.00	531	0.204	33	0.06

Notes: No Subsidy Consists of 125 respondents in a pure control group (received information only) and 1274 respondents in a brochure and information group at baseline.

example). Refusal rates, eligibility, or availability of respondents may affect the external validity of the study. Note that because the program design involves randomly allocating subsidies for health insurance within those who agree to participate, our estimates of the causal determinants of health insurance enrollment and effects of having insurance are internally valid.

[6] There was also a cross-randomization that instructed respondents to sign up at either a local MFI or at the INSS. The results from this randomization are not discussed in this paper, and will not affect our results because enrollment location is orthogonal to subsidy status.

and Iván Montenegro). Respondents who had randomly been allocated 2 month subsidies were not approached to be interviewed at the follow-up survey due to the relatively low take-up rate among this group. A total of 2,806 respondents were approached for the follow-up survey. Out of these, 93 percent completed the follow-up survey (N=2608). There is almost no difference in the completion rate between each of the treatment groups, which is reassuring for the external and internal validity of the study design (not shown).

Claims and costing data: In 2008, a subset of individuals who had signed up for the insurance indicated which EMP they had affiliated with. Data for each individual was collected from the clinic to record reason for visit, diagnosis, exams and treatment. These were collected directly from the clinic with explicit oral consent from each of the participants as well as permission from the INSS and the clinics.

We next present the main empirical strategy and set of results for the effects of insurance on children, retention, and costing.

EFFECTS OF INSURANCE ON CHILDREN`S UTILIZATION, EXPENDITURES, AND HEALTH

EMPIRICAL STRATEGY

We first turn to measuring the effects of parental insurance coverage on children who were under 12 and were eligible for insurance coverage. Because the study involved the randomized subsidies that varied the incentive for signing up for health insurance, we can estimate the causal effects of living with a parent who received health insurance. Table 2 presents baseline household and children statistics separately by those who received a subsidy and those who did not.[7]

There were 1614 households representing 2993 children; 2170 children were age 11 and under. The average household has 4.8 people, a median income of C$3752 and the average respondent parent has 9 years of education.[8] Nearly 40 percent of parents were clients of microfinance organizations and 80 percent were married. Total health costs for the family over the past year were approximately C$1937 (~US$102). The average child in the full sample, age 15 and under, is approximately 8 years old, and gender is approximately equally split. The majority of the children age 5 and older are enrolled in school (93 percent). In terms of health, 76 percent of children were sick in the past year although only 25 percent report visiting the doctor in the past year. The total number of times sick was 2.2, and total costs over the past year for the child averaged C$570 (~US$530). Importantly, 25 percent of children report forgoing treatment due to lack of money in the past year. For almost every baseline parent-level variable as well as child-level variable, there is no statistically significant difference between those whose parent was offered a subsidy, and those whose were not (Column 4). This provides supporting evidence that randomization at the family level resulted in balanced groups at the child level.

We next present the effects of having a parent with insurance on children's health utilization and expenditures, instrumenting insurance enrollment with the randomized encouragement to enroll in the first stage. To evaluate the effects of having health insurance we estimate the following among children

[7] Because we present the main results among the follow-up sample in which there were no 2-month subsidy winners, we do not present this group, although statistics are similarly balanced by this group based upon baseline characteristics.

[8] The exchange rate in 2007 was C$1.87=$US 1.

under 12 in the sample, those who were eligible for health insurance coverage:

(1) $$Y_{if} = \alpha + \beta Insurance_f + \varphi' X + \varepsilon_{if}$$

Where Y_{if} represents for child i in family f, health utilization or expenditures at various providers within the past year at the follow-up study, and *Insurance* represents whether or not a parent in family f, received insurance. We also control for a number of baseline variables such as the level of dependent variable, household size, log family income, age of child, age-squared, number of times the child was sick at baseline, whether the child was never sick in past year, the gender of the child, and market fixed effects. In certain specifications we also control for the total number of visits to any health provider or the total log expenditures. Individuals whose family did not report valid income data were imputed to the median, and

Table 2: Baseline Characteristics of Households and Children

	All	No Subsidy (Control)	6-Month Subsidy (Treatment)	Difference (Control - Treatment)
Panel A: Household Characteristics	(1)	(2)	(3)	(4)
Size of Household	4.81	4.76	4.85	-0.09
Parent MFI	0.39	0.39	0.39	0.00
Median Parent Income	3752	3752	3752	0.00
Parent Married	0.80	0.82	0.78	-.03 *
Years of Education	9.31	9.25	9.36	-0.11
Parent Age	35.94	35.77	36.10	-0.33
Family's Total Health Costs	1937.45	1939.11	1935.95	3.16
Family's Total Last Health Cost	737.53	760.22	716.84	43.38
Family's Total Number of Visits	11.95	12.20	11.72	0.48
Family's Total Times Sick	6.78	6.99	6.59	0.39
Households (N)	1614	770	844	--
Panel B: Child Characteristics				
Age	8.00	7.94	8.05	-0.11
Female	0.48	0.48	0.49	-0.01
Child in School	0.93	0.93	0.94	0.00
Doctor in Past Year	0.25	0.25	0.24	0.01
Ever Sick	0.76	0.76	0.77	-0.01
Times Sick	2.16	2.19	2.14	0.05
Forgone Treatment	0.24	0.26	0.22	0.04
Last Health Cost in 2007	220.61	211.45	228.91	-17.46
Total Health Costs for Child	569.74	533.23	602.83	-69.59
Children (N)	2993	1423	1570	--

Notes: Panel A uses one observation per household for respondents with at least one child. Panel B uses as the child-level observations, and clusters standard errors by family. (**) indicates difference is significant at the 5% level; (*) indicates the difference is significant at the 10% level. All income and expenditure data are in 2008 Cordobas. Valid income data are not available for 207 families. "Control" refers to parents who were randomly assigned to the Information Only or Brochure group and "Treatment" refers to parents who were randomly assigned to the 6-month subsidy group. Currently attending school and days of school missed was calculated for children age 5 and older. Last cost in 2007 was calculated by using the 2283 children whom had a last illness reported. Children who were not sick in the past year are included as zeros for number of times sick, days of school missed due to illness, and all visit/spending variables.

regressions were run with a dummy variable indicating a missing value (14 percent of adult respondents did not report their income). These controls were chosen due to their relationship with healthcare utilization to improve the precision of the estimates. However, results are not sensitive to the omission of all of these baseline controls. We present robust standard errors that are clustered by family, as there are often more than one child under 12 in a household: the average household in the sample has 1.85 children, and 77 percent of children under 12 have at least one sibling.

It is likely that there are both observable and unobservable characteristics associated with the decision to enroll in insurance. We therefore use an instrumental variables strategy to estimate equation (1). We estimate a two-stage least squares model and instrument parental insurance with whether the parent was offered a six month subsidy with the following first-stage equation:

$$(2) \qquad Insurance_f = \alpha + \beta SixMonth_f + \varphi' X + \varepsilon_{if}$$

where *SixMonth* is an indicator for whether or not the parent respondent was randomly assigned a six-month subsidy and *X* is the same vector of baseline control variables as in (1). In this encouragement design, the six month subsidy, uncorrelated with the error term, induces the marginal household into insurance coverage. Note that our causal effects are local average treatment effects as in Imbens and Angrist (1994), and do not measure the population average effect, and thus do not tell us the expected impact of providing insurance coverage to all families of informal workers.

Overall, approximately 30 percent of those assigned to the six-month subsidy enrolled in insurance, compared to 15 percent of the two-month subsidy group and 1.5 percent of respondents not awarded any subsidy. These basic results are presented in Table 1, Columns 3 and 4. An example first stage result for a specification of visits to an EMP on the sample of eligible children (age 11 and under at baseline) is presented in Appendix A. There was a relatively large effect of the subsidies on enrollment; the six-month subsidy increased the likelihood of take-up by 31 percentage points.

Household size is overall negatively related to enrollment, although this effect is small in magnitude at 1.5 percentage points. Baseline measures of usage are also correlated with the decision to enroll in insurance, with an increase in the probability of enrollment of 0.9 percentage points for each additional visit to all providers. Although this is small in magnitude, it is significant at the 5 percent level. Other controls are not statistically significantly related to the decision to enroll at conventional levels: income, education, age of child, gender, and overall medical utilization, but are still useful in the second-stage equation at reducing residual variation. The F-statistic of the excluded instruments is large at 215.76.

RESULTS

Table 3 presents the main results of having a parent with health insurance on utilization and log expenditures at various health care providers. In this table, each column within the panel represents a separate IV regression where the outcome variable is either visits or expenditures in total or at a specific provider. Panel A shows that among those children under age 12, having a parent with insurance increases overall number of visits in the past year by 1.3 visits – an large increase where the average number of visits is 3.57 (Column 1). These additional visits are mainly driven by 0.57 more visits to the free clinics (EMPs), significant at the 1 percent level, as well as an insignificant increase of 0.36 visits to pharmacies. We cannot distinguish between visits to pharmacies in which drugs were provided free of

charge through the Voluntary Insurance Program or those in which respondents needed to pay for their drugs. There were no large increases or decreases detected at other providers. In terms of expenditures on health, the point estimate on the effects of a parent having insurance on total logged expenditures is -0.47, but not statistically significant (Panel B, Column 1). This is mainly driven by reductions at pharmacies, private hospitals, private doctors, and laboratory tests.[9] Importantly, there is no effect on having a parent with insurance on the likelihood of being sick, days missed at school (among children age 5 and over), or any other measures of health over the past year (not shown). The exception is an *increase* of .7 more times sick over the past year, significant at the 5% level. Because parental health insurance causes more frequent illness while not changing the actual likelihood of being sick, we interpret this result as evidence of increased health-seeking behaving as a result of insurance coverage, or moral hazard.

While the total number of visits increase overall (not only due to substitution), and expenditures go down, measures of health are not improved.

Table 3: Effect of Insurance on Visits and Expenditures, Children 11 and Under

Panel A: Number of Visits	Total Visits (1)	Pharmacy (2)	EMP (3)	MINSA (Free Clinic) (4)	Public Hospital (5)	Private Hospital (6)	Private Doctor (7)	Labs (8)
Parent Enrolled in Health Insurance	1.334**	0.354	0.567***	0.213	0.010	0.201	-0.062	0.051
	(0.626)	(0.295)	(0.149)	(0.263)	(0.131)	(0.224)	(0.168)	(0.126)
Constant	4.213***	1.946***	-0.013	1.425***	0.488**	0.387*	-0.113	0.093
	(0.873)	(0.402)	(0.164)	(0.430)	(0.198)	(0.235)	(0.207)	(0.152)
Observations	2170	2170	2170	2170	2170	2170	2170	2170
R-squared	0.098	0.066	0.111	0.028	0.016	0.020	0.028	0.045
Mean of Dependent Variable	3.565	1.482	0.248	0.644	0.191	0.375	0.317	0.309
Panel B: Log Expenditures	Total Expenditures (1)	Pharmacy (2)	EMP (3)	MINSA (Free Clinic) (4)	Public Hospital (5)	Private Hospital (6)	Private Doctor (7)	Labs (8)
Parent Enrolled in Health Insurance	-0.467	-0.291	0.028	-0.022	-	-0.198	-0.134	-0.280
	(0.470)	(0.462)	(0.020)	(0.029)	-	(0.325)	(0.295)	(0.258)
Constant	4.029***	3.999***	-0.005	0.035	-	0.973**	0.061	0.128
	(0.589)	(0.582)	(0.006)	(0.030)	-	(0.428)	(0.364)	(0.346)
Observations	2170	2170	2170	2170	-	2170	2170	2170
R-squared	0.125	0.115	0.01	0.004	-	0.092	0.046	0.05
Mean of Dependent Variable	3.640	3.391	0.004	0.009	-	0.808	0.691	0.597

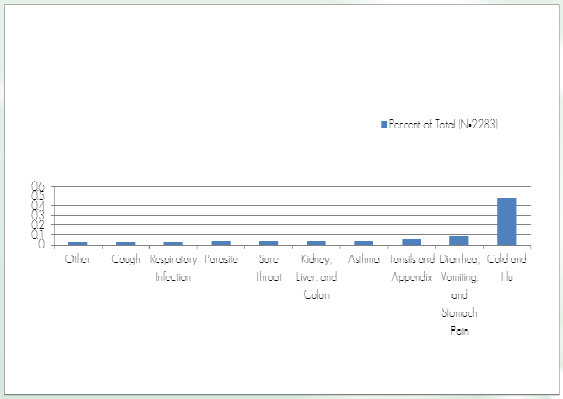
Notes: Sample is children of respondents aged 11 and younger at date of baseline survey(n=2170). Above regressions are 2SLS-IV estimates where "Parent Enrolled in Health Insurance" is instrumented with random assignment status. First-stage F-statistic is above 200 in all regressions. Panel A: Dependent variable is visits to various providers for the child over the past year. Regressions control for number of times sick, household size, logged family income, age, age-squared, number of times sick at baseline, ever sick in past year, child gender, total log health expenditures, and market fixed effects. Panel B: Dependent variable is logged expenditures at various providers for the child over the past year. Regressions control for baseline level of dependent variable, household size, logged family income, age, age-squared, number of times sick at baseline, total logged expenditures, never sick in past year, child gender, total visits to the provider, and round and market fixed effects. Individuals who were never sick in the past year were recorded as zero visits and zero expenditures. All income and expenditure data are reported in 2008 Cordobas. Individuals without valid income or expenditure data were imputed to be the median and regressions were run with a dummy variable indicating the missing value. Robust standard errors in parentheses, clustered at the family level. *** p<0.01, ** p<0.05, * p<0.1

[9] Due to uniformly zero expenditure at public hospitals, we are unable to estimate the equation for that type of provider.

The lack of improvement in health status could be due to the fact that health insurance was provided for less than a year and changes in health status take longer to detect. It could also be that the types of visits were not likely to assist in overall health, or that the typical disease or care for which health insurance is most effective is very rare (critical illness, serious accidents, etc.). Figure 1 displays the top ten most frequent categories of the illness categories among all children in the sample. For example, the typical reasons for the last visit to a health provider among children happen to be common minor ailments such as cough and flu. Of all children who were sick at baseline, nearly 50 percent were sick with what was described as "Cold and Flu"; the next largest category was "Diarrhea, Vomiting, and Stomach Pain" at 9 percent. Having additional visits to the provider might not help with overall health if parents only bring their child in for these reasons. Moreover, there may have been an improvement in the efficient usage of medicine by passing through a doctor first, rather than relying on self-medicating (such as taking antibiotics for viral infections) although we cannot observe that in our data.

We next examine heterogeneous effects of parental insurance by baseline health status, as measured by whether the child was reported at baseline as being sick in the past year. If health status is correlated over time within an individual, these subgroups could provide insight on the efficiency of health insurance in serving those who are most in need of healthcare.[10] Table 4 present these results. Utilization rates of those who were sick and insured are significantly different than those who were not sick and insured (not shown). For utilization of services at each provider category as well as total visits, children of insured parents who were sick at baseline utilized providers more than uninsured children, and insured children who were not sick at baseline used fewer providers than uninsured children. Children who were sick at baseline and had insured parents report 2 total visits and approximately 0.6 more visits to EMPs (covered providers) than children of the uninsured. These results are each significant at the 1 percent level, and indicate that relatively sick children received more healthcare with insurance than those without. Although imprecisely estimated, children sick at baseline who had insured parents also went to the pharmacy 06 more times (significant at the 10% level), and went to private hospitals and free public health clinics approximately 0.3 more times.

Figure 1: Top 10 Reported Last Illness Categories in 2007



Notes: Above are percent of total illnesses among children age 15 and under, for those who reported a last illness. The figure is limited to the top ten types of illness. The "Other" category refers to illnesses with very low incidence in the sample (less than 5 observations). Examples are alopecia, cancer, epilepsy, etc. The categories omitted from the above figure are (in order from most common to least common): allergies, skin problems, glandular problems, accidents, anemia, ear problems, chickenpox (includes smallpox and measles), blood problems (including heart and circulatory problems), dental problems, other types of infections, headaches, reproductive system problems, and eye/vision problems.

Children who were not sick at baseline but had insured parents report nearly 2.2 fewer visits to all providers, weakly insignificant at conventional levels (p-value of .108) and .8 visits less to pharmacies, although this is imprecisely estimated (p-value .182). Similarly children healthier at baseline with insured

[10] In our sample, the correlation between being sick at baseline and being sick at follow-up is low at 0.16.

parents report 0.2 fewer visits to public health clinics and public hospitals, 0.3 fewer lab visits, 0.3 fewer visits to private hospitals, and 0.5 fewer private doctors, although all of these results are insignificantly different from zero. These relatively healthy children reported 0.24 more visits to EMPs, but this estimate is also not statistically significantly different from zero. These effects suggest that baseline health status of the child is an important determinant of medical care utilization, and that improving access to providers does not necessarily imply increased utilization if children are already relatively healthy. This also suggests that improved access to care via insurance may increase efficiencies in use of care by not increasing inappropriate medical utilization or moral hazard and improving appropriate medical utilization among those who need it.

We also examine heterogeneous effects of parental insurance by child's age and whether the child has siblings on healthcare usage at various providers. There is a generally monotonically decreasing effect of parent's insurance on EMP visits with increasing age categories of the child (not shown). Insured children ages 3-5 and 6-8 had 0.6 more EMP visits on average as compared to non-insured (estimates significant at the 5 and 1 percent levels, respectively). Insured children age 9-11 report .184 more visits to EMPs, although this result is not significant at conventional levels. The largest effects of the insurance are among the youngest children, those aged 2 and under, who increased EMP visits by .79 visits; this increase is significant at the 5 percent level (Panel C of Table 4). Overall total visits are 0.2 higher for toddlers with insured parents, but this difference is insignificantly different from zero. These differences

Table 4: Heterogeneous Impacts of Parental Insurance on Provider Utilization

Panel A: Child Sick at Baseline (N=1729)	Total Visits (1)	Pharmacy (2)	EMP (3)	MINSA (Free Clinic) (4)	Public Hospital (5)	Private Hospital (6)	Private Doctor (7)	Labs (8)
Parent Enrolled in Health Insurance	1.984***	0.578*	0.625***	0.279	0.0478	0.306	0.0273	0.119
	(0.69)	(0.32)	(0.16)	(0.28)	(0.15)	(0.25)	(0.18)	(0.14)
R-squared	0.068	0.042	0.114	0.029	0.015	0.014	0.021	0.040
Mean of Dependent Variable	3.87	1.61	0.28	0.68	0.21	0.41	0.33	0.34
Panel B: Child Not Sick at Baseline (N=441)	Total Visits (1)	Pharmacy (2)	EMP (3)	MINSA (Free Clinic) (4)	Public Hospital (5)	Private Hospital (6)	Private Doctor (7)	Labs (8)
Parent Enrolled in Health Insurance	-2.211	-0.877	0.242	-0.168	-0.195	-0.324	-0.541	-0.347
	(1.37)	(0.66)	(0.26)	(0.65)	(0.23)	(0.29)	(0.39)	(0.27)
R-squared	0.053	0.015	0.089	0.046	0.024	0.05	0.036	0.037
Mean of Dependent Variable	2.38	0.99	0.11	0.51	0.10	0.23	0.25	0.18
Panel C: Children Age <=2 (N=395)	Total Visits (1)	Pharmacy (2)	EMP (3)	MINSA (Free Clinic) (4)	Public Hospital (5)	Private Hospital (6)	Private Doctor (7)	Labs (8)
Parent Enrolled in Health Insurance	0.216	-0.277	0.786**	-0.095	0.293	0.123	-0.525	-0.088
	(1.537)	(0.701)	(0.366)	(0.563)	(0.399)	(0.464)	(0.401)	(0.349)
R-squared	0.085	0.062	0.142	0.045	0.039	0.060	0.040	0.046
Mean of Dependent Variable	3.395	2.103	0.387	0.828	0.339	0.597	0.453	0.559

Notes: Each cell above represents a different 2SLS coefficient of whether the parent was enrolled in health care, where parental insurance was instrumented using random assignment. The sample in Panel A is children under 12 who reported being sick at baseline; the sample in Panel B is children under 12 who reported not being sick in the previous year at baseline. Panel C is the sample of children age 2 and under. Regressions control for demographic and health variables. *** p<0.01, ** p<0.05, * p<0.1

could be related to the types of illnesses that children of differing ages might face or related to differential investments that parents give children. Notably, children who were not officially covered by the insurance (those who were ages 12-15) report no difference in EMP visits but do report declines in total visits to all providers of 1.7 fewer visits (significant at the 5% level), and declines at both private hospitals and private doctors of .5 and .4 fewer visits. This is potentially due to sibling or family spillovers in the fact that if parents or family members are attending these private providers less (i.e., either to go to EMPs more often – they may be less likely to take their older children).[11]

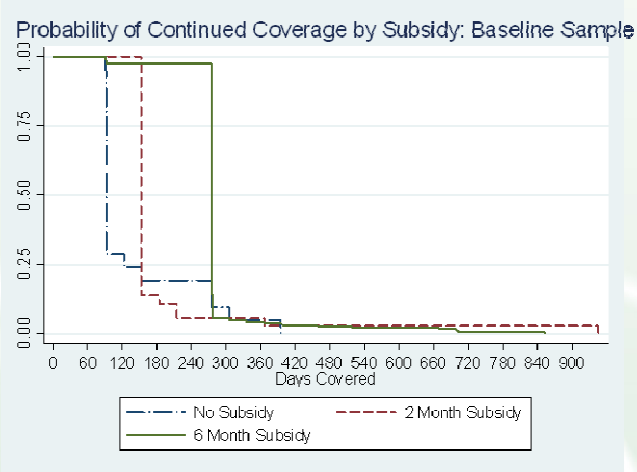
RETENTION

We next present results on health insurance retention, defined as having made at least one voluntary payment following the expiration of subsidy. Table 1 (Columns 5 and 6), presents summary statistics on health insurance enrollment and retention by randomization status. We present these statistics for two samples, those in the baseline sample (Panel A), and those who were also in the follow-up sample (Panel B). As noted above, there was a relatively large effect of the subsidies on enrollment. However, overall retention rates were low at approximately 6.5 percent 18 months after subsidies expired. Although the number of insured individuals in each treatment category is small, the general trend is that retention rates decline with increasing subsidy amounts from 29 percent to 5 percent, suggesting that those who were induced to enroll with larger subsidies may be those who place the lowest value on the insurance product and might be less likely to continue payments. This has important implications for the design of other subsidized insurance programs.

[11] However, among children age 12-15 at baseline, having at least one covered sibling and living with an insured parent increased their own EMP visits by 0.14 visits (p-value of .122,Fitzpatrick and Thornton 2010).

Figure 2 shows the hazard rate or the probability of continued health insurance coverage over time by subsidy amount among respondents in the baseline sample. The large drop after the expiration of the free health insurance subsidies is clear in this figure – as soon as individuals must start their own payments, they no longer continue with health insurance coverage.

Figure 2: Retention



Notes: Hazard models reflect the probability of continuing to be insured, given that the respondent is still insured. The sample is the 774 insured respondents in baseline survey according to official INSS enrollment records. The "No Subsidy" group has 21 respondents; the "Two-Month Subsidy" group has 37 respondents and the "Six Month Subsidy" group has 716 respondents.

Table 5 presents OLS regressions predicting retention among the baseline sample (Columns 1-4) and the follow-up sample (Columns 5-8) by including variables that may affect the relative costs and benefits to insurance and thus the probability of continued coverage.). We estimate for respondents in the baseline sample:

$$(3) \quad Retention = \alpha + \beta * 6Month + \delta * 2Month + \varphi' X + \varepsilon$$

Similarly, we estimate the following equation for respondents in the follow-up sample:

$$(4) \quad Retention = \alpha + \beta * 6Month + \varphi' X + \varepsilon$$

Those assigned to the two-month subsidy were not interviewed at the follow-up. Because our measure of

retention comes from administrative data and our predictors come from baseline, we can include those who enrolled from this subgroup in some of our analyses. We include random assignment status an indicator for a two-month subsidy winner and a six-month subsidy winner indicator in equation (3), when analyzing the baseline sample only. When analyzing the follow-up study we estimate for both equations (3) and (4) the omitted category in both specifications is not receiving any subsidy.

We include baseline demographic and socioeconomic characteristics in vector *X* that may be correlated with the decision to continue enrollment in the insurance product. These include log family income, whether or not the respondent had any savings, the level of savings, , age, gender, and whether the respondent was a microfinance client; as well as indicators of

Table 5: Predictors of Retention for Insured Respondents

	Baseline Sample				Follow-up Sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Assigned to 2 Month Subsidy	-0.151	-0.158	-0.152	-0.152				
	(0.116)	(0.118)	(0.119)	(0.119)				
Assigned to 6 Month Subsidy	-0.232**	-0.235**	-0.228**	-0.227**	-0.264**	-0.266**	-0.271**	-0.273**
	(0.100)	(0.098)	(0.100)	(0.100)	(0.108)	(0.106)	(0.106)	(0.107)
Assigned to pay at MFI	-0.022	-0.023	-0.023	-0.022	-0.017	-0.020	-0.018	-0.019
	(0.017)	(0.017)	(0.017)	(0.017)	(0.020)	(0.020)	(0.020)	(0.020)
Logged Income		0.002	0.004	0.003		-0.010	-0.012	-0.012
		(0.011)	(0.012)	(0.012)		(0.013)	(0.013)	(0.013)
Savings (Any)		-0.070	-0.066	-0.066		-0.079	-0.072	-0.073
		(0.102)	(0.100)	(0.100)		(0.118)	(0.114)	(0.114)
Savings (Logged Amount)		0.017	0.016	0.016		0.021	0.019	0.019
		(0.016)	(0.016)	(0.016)		(0.018)	(0.018)	(0.018)
Age			-0.001	-0.001			0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)
Male			-0.030	-0.029			-0.015	-0.012
			(0.018)	(0.020)			(0.021)	(0.023)
Years of Education			0.001	0.001			0.002	0.002
			(0.002)	(0.002)			(0.003)	(0.003)
Number of Children			-0.009	-0.009			-0.008	-0.008
			(0.008)	(0.008)			(0.010)	(0.010)
Number of Children <12			0.002	0.003			-0.004	-0.003
			(0.010)	(0.010)			(0.012)	(0.012)
Number in HH 60 and Over			-0.007	-0.007			-0.010	-0.011
			(0.026)	(0.026)			(0.033)	(0.033)
MFI Client			-0.008	-0.008			-0.002	-0.003
			(0.018)	(0.018)			(0.021)	(0.022)
Chronic Health Condition				0.007				-0.008
				(0.019)				(0.023)
Smoker				-0.002				-0.016
				(0.028)				(0.033)
Ever Sick in Past Year				-0.0042				0.0151
				-0.026				-0.029
Constant	0.296***	0.271**	0.301**	0.303**	0.324***	0.392***	0.386**	0.380**
	-0.0993	-0.133	-0.142	-0.149	-0.107	-0.144	-0.156	-0.162
Observations	774	774	774	774	531	531	531	531
R-squared	0.041	0.051	0.058	0.058	0.044	0.059	0.064	0.065

Notes: OLS estimates of simple linear regressions reported above with fixed effects by market. All variables are taken from respondent responses in baseline survey for those who enrolled in INSS insurance. Columns (1)-(4) reports information for respondents in baseline survey; Columns (5)-(8) reports estimated coefficients for respondents in both baseline and follow-on survey. Individuals assigned to the 2-month subsidy group were not followed up due to budget reasons. Retention (0/1) is defined from official INSS records, where the respondent made one payment following the expiration of their subsidy. Missing values for logged income, logged savings, any savings, and MFI client status were imputed to be the mean and then a dummy variable was included to account for the imputation for relevant columns. Robust standard errors in parentheses, clustered at the market level. (*) significant at 10% level; (**) significant at 5% level; (***) significant at 1% level.

health including having a chronic health condition, whether the respondent was a smoker, and whether the respondent was ever ill in the past year. We include several additional controls in this specification compared to equations (1) and (2) that were not available in the children's sample analysis above. Note that we are conditioning on an endogenous decision (enrolling in insurance) and that results should be interpreted as factors that predict retention conditional on enrollment.

Overall, baseline measures of income, demographic factors, or reported health status had no significant impact on the likelihood of remaining insured (Table 5). Random assignment status is consistently negatively correlated with respondent retention. Individuals assigned to receive a 6 month subsidy were 23 to 27 percentage points less likely to make a voluntary health insurance payment when controlling for other variables. Note that the omitted group where there was no subsidy is retained at least partially due to the fact that these are insured respondents and those in the control group were paying for the insurance.

In the case where we restrict the sample further to only those insured respondents who were offered the six-month subsidy then the results are broadly similar with some slight differences. In that case, having any savings is negatively associated whereas the logged savings amount is positively associated with retention status, although both are insignificant (not shown). The number of children younger than twelve in the household is a significant predictor of not retaining insurance at the 10 percent level; notably, no measures of health or other demographic variables are significant (not shown). Note that due to the low levels of take-up and retention, it is not clear if we find no correlation because the lack of an overall relationship, or if we are simply not powered to detect a significant relationship.

To determine the extent that utilization and prior health history correspond to retention status, we also estimate equation (3) based on whether the respondent was sick in the past year at baseline.

Table 6: Predictors of Respondent Retention by Baseline Health Status

	Baseline Sample				Follow-up Sample			
	Not Sick		Sick		Not Sick		Sick	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2 Month Subsidy	-0.775***	-0.660***	-0.151	-0.147				
	(0.138)	(0.198)	(0.118)	(0.121)				
6 Month Subsidy	-0.974***	-0.870***	-0.193*	-0.187*	-0.913***	-0.855***	-0.223**	-0.234**
	(0.035)	(0.105)	(0.100)	(0.099)	(0.072)	(0.106)	(0.108)	(0.108)
Constant	1.012***	0.775***	0.261***	0.193	1.003***	0.667***	0.289***	0.305*
	(0.024)	(0.214)	(0.098)	(0.149)	(0.025)	(0.219)	(0.107)	(0.168)
Demographic Controls?	No	Yes	No	Yes	No	Yes	No	Yes
Observations	122	122	652	652	88	88	443	443
R-squared	0.310	0.379	0.034	0.062	0.299	0.506	0.037	0.069

Notes: Above are OLS estimates of predictors of retention,measured by administrative data, based upon characteristics of respondents at baseline. Sample is insured respondents in the baseline survey (columns 1-4) and the follow-up survey (columns 5-8). The 2 Month subsidy group was not followed up at the endline survey. All regressions include market fixed effects. Demographic controls include logged family income, any savings, logged amount of savings, age of respondent, gender, years of education, number of children, number of children under age 12, number of individuals in the household age 60 and over, whether the respondent was an MFI client, whether the respondent was assigned to enroll at an MFI, and measures of baseline health status. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Results presented in Table 6 are striking and indicate a strong degree of adverse retention. Among those who were healthy at baseline and who selected into insurance, being awarded the six month subsidy is associated with a lower likelihood of retention between 87 and 97 percentage points depending upon the sample and whether the estimate includes controls. In contrast, those who were sick at baseline and awarded a 6 month subsidy were approximately 19 percentage points less likely to be retained compared to insured respondents not awarded any subsidy. This is likely related to usage of the product: insured respondents who retained insurance reported 3.4 EMP visits on average at follow-up as compared to 1.4 EMP visits for insured respondents who were not retained, a simple mean difference that is significant at the 1 percent level (not shown).

We gain additional insight into retention by examining some of the reasons individuals reported initially enrolling in the insurance program at the follow-up survey. Table 7 presents differences in reported reasons for enrollment (among those who were enrolled), by retention status. Given there were only 33 retained individuals in the sample to make comparisons, most of the differences are not statistically significant. However, there are some general patterns. Retained respondents generally were 21 percentage points more likely to enroll for free care, 15 percentage points more likely to state they look for good doctors, 12 percentage points more likely to state they enrolled for cheap care, 15 percentage points more likely to state convenient care, and 3 percentage points more likely to enroll because they were frequently sick, although these differences are not statistically different from zero. Retained respondents were 15 percentage points less likely to report enrolling for free medicines, although this is not statistically different from zero. While there was no statistical difference in knowledge of where to initially sign up for the health insurance between those retained and those not retained, there was a large and statistically significant difference in the likelihood of knowing where to continue make payments. 94 percent of those who continued paying reported knowing where to pay, versus 56 percent of those who did not continue paying reporting they knew where to make payments. While this finding may not be surprising ex-post, the implications are important and may get overlooked in the implementation of health insurance programs. Reducing transaction costs and educating individuals on how to make payments could be essential in the success of a program.

Table 7: Factors Affecting Retention: Enrollment and Knowledge

	Retained Respondents (n=33) (1)	Non-Retained Respondents (n=498) (2)	Difference (1) - (2) (3)
Enrolled for Free Medicine	0.387	0.535	-0.148
Enrolled for Good Doctors	0.387	0.237	0.150
Enrolled for Cheap Care	0.290	0.172	0.119
Enrolled Because Frequently Sick	0.065	0.039	0.025
Enrolled for Convenience	0.290	0.144	0.147
Enrolled for Free Care	0.355	0.144	0.211
Knows Where to Pay	0.939	0.558	0.381**
Knows Where INSS office Is	0.757	0.671	0.086

Notes: Above means are from thesample of respondents who enrolled in insurance as a result of the intervention (N=531). "No Subsidy" group includes respondents who received both the informational brochure as well as nothing (pure control). Retained is defined as a respondent making at least one payment following the expiration of their subsidy. Data come from responses in the Follow-On Survey. Standard errors for t-test of differences in means are clustered by market.

EMP CLAIMS

Our last set of tables presents descriptive statistics from EMP claims data. These data were collected from a subset of the EMP clinics in Managua, those at

which the insured respondents affiliated. Appendix B presents the sample of those who had records collected from the EMPs. There were 444 respondents who were randomly selected from the baseline (414 of whom had follow-up data; Panel B). Of these, 173 reported visiting an EMP and had EMP records located, 180 had no records located and also reported no EMP visits in the survey, and 61 had no records located although reported visiting at least once in the follow-up survey. These discrepancies could be due to reporting biases in the survey, or due to lack of recording at the EMP.

Table 8: Comparisons in EMP Affiliation between survey and claims data

At which EMP did you affiliate at? (According to survey)	Survey matches Claims Data	Survey does not match Claims Data	Accuracy Percentage
Clínica Medintegral	21	1	0.955
Cruz Azul	50	3	0.943
Salud Integral	4	3	0.571
Sumedico	15	1	0.938
Hospital Central Managua	12	2	0.857
Hospital Bautista	10	1	0.909
Centro Quirurgico Med	4	0	1.000
Hospital Militar	23	0	1.000
Hospital Metropolitan	1	1	0.500
Monte Espana	3	0	1.000
Roberto Huembes	2	0	1.000
Overall EMP accuracy	145	12	0.924

Note: This table compares survey responses of EMP affiliation with actual data collected from the EMP. Survey responses taken from respondents only (no spouses or dependents) who completed both baseline and follow-on survey, whom we were able to match with their claims data and who gave responses for having affiliated with an EMP. Percentages are out of a total of survey responses for each EMP. "Other" was reported for 12 survey responses and no EMP was given for 35 responses; those values are excluded from this comparison.

Table 8 presents the accuracy in EMP affiliation between the survey data and EMP claims records. Each respondent who enrolled in the insurance program was asked which EMP her or she affiliated with during the follow-up survey. We then compare these answers with claims made at each of the EMPs. Overall, there was 92 percent accuracy. We also compare self-reports in utilization at the follow-up survey among those with and without actual claims data from the EMPs. Table 9 presents a comparison in survey answers among those who were insured and had claims data at EMPs with those who were insured and did not have claims data at EMPS.

Panel A reports the means of number of visits by claims data groups. Insured respondents with claims data reported 2.77 more visits to all providers than insured respondents without claims data. Specifically, insured respondents reported 0.63 more pharmacy visits, 0.36 more laboratory visits, 2.24 more EMP visits, and .22 fewer private hospital visits than insured patients without claims data.

This indicates that those with EMP claims data are those who utilized all providers, including EMPs more. There were no statistically significant differences for levels (Panel B) or logs (not shown) of expenditures by claims data status, although there is a general trend that those without claims data spent more on average at all types of providers except public hospitals.

Figure 3 presents the visits to the EMPs over time as collected by the date on the EMP record. EMP visits occurred several months after the baseline survey – usually right after affiliation and enrollment. These visits then leveled off.

Figure 3: Visits to EMPs from Claims Data, Cumulative Frequency

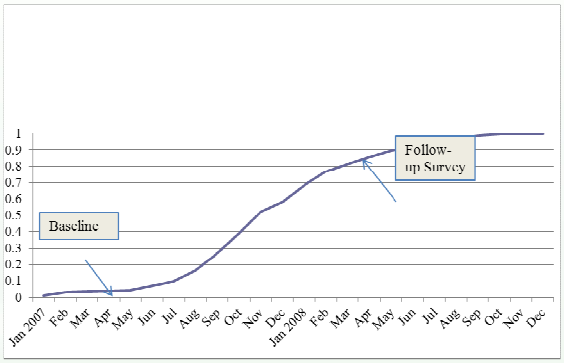


Table 10 presents the type of diagnosis from the EMP data. The majority of visits were related to infections (27 percent), aging (17 percent), reproductive health (14 percent) and gastrointestinal issues (12 percent). In classifying these by severity (Panel B), almost half (49 percent) were acute, non-life-threatening with 33 percent chronic such as allergies, arthritis, or heart/respiratory conditions. Generally, measures of health and EMP services correspond with between the claims data and the survey data.[12]

In order to examine the costing of services provided, we obtained records of procedures and costs that were undertaken in 2008. To do this, we went to several health providers across Managua and asked for a cost list of services. This listed each diagnosis, procedure undertaken, the total procedure cost, as well as the cost covered by insurance. One difficulty with combining the costing analysis with the survey – and with analyzing costing in general – is that the limited costing analysis undertaken by health providers. Outpatient care costs were unavailable and the majority of the procedures that are reported from the health providers are low-frequency events that have larger costs.

Table 10: Types of diagnoses at EMPs

Panel A: Overall Diagnosis

Diagnosis	Percentage
Accidents	0.02
Other	0.06
Infections and skin	0.27
Aging-related (arthritis, heart, cholesterol)	0.17
Family Planning/ Reproductive Health	0.14
Gastrointestinal and diarrhea	0.12
Headache, back pain, other pain	0.07
Lab tests and exams	0.05
Diabetes & Nutrition	0.05
Allergies, asthma	0.03
Mental health	0.02
Total	1.00

Panel B: Classification of Disease by Severity

Condition	Percentage
Chronic Condition	0.33
Acute, typically non-life-threatening and/or treatable	0.49
Acute, life-threatening	0.09
Preventive Care	0.10
Total	1.00

Notes: These data are from EMP collected records and represent 420 total individuals with 1354 total visits to the EMP. This table presents analysis at the diagnoses level from a total of 1565 diagnoses (where 32 diagnoses were missing). Each visit had an average of 1.2 diagnoses where patients could be diagnosed with multiple diseases at each visit. Note that patients could be diagnosed with up to 2 diagnoses. "Other diagnoses" includes diseases not elsewhere classified, typically due to low incidence among this population. Examples of diseases classified as "other" include lupus, alopecia, cancer, among others. Panel B is a general classification of diseases by approximate level of severity.

On the other hand, respondents in our survey were more likely to have gone to a health provider for treatment of minor health concerns such as eye check-ups or treatment for cold or flu. A study with a larger sample size (in order to capture more respondents with more serious procedures) would be needed for a richer costing analysis.

CONCLUSION

This paper presents new evidence of the effect of adult health insurance coverage on children's health

[12] For example, there was 76 percent accuracy and 86 percent accuracy for whether the respondent had received medicine or shots for their last illness at the EMP in 2007 and 2008 respectively. Note there were few insured respondents who had claims data covering the relevant range who also reported a last illness (14 in 2007 and 228 in 2008).

service utilization, determinants of retention among adults and data from medical claims. We find that, children who were covered by their parent's insurance have no observable pattern of substitution but rather more visits to medical providers overall. This result is driven by younger children, specifically toddlers. This finding suggests that coordinated medical usage between parents and children could be taken advantage of in program design aimed at improving the frequency of medical visits of small children. The "one stop shop" format of Nicaragua's EMPs, where outpatient and inpatient care is available for adults and children within one clinical infrastructure may be able to provide benefits to children when entire families are insured. We find no health impacts among children, although the time in which they were covered was short. However, subgroup analysis of children who were sick at baseline versus those who were not displayed a consistent pattern: children who were sick at baseline utilized insurance disproportionately more than those who were uninsured and children who were not sick at baseline utilized insurance differentially less than those who were uninsured.

Retention in the insurance program was low overall. The most important difference found in the survey between those who continued making payments is having the knowledge of where to pay for the insurance. Thornton el al. (2009) notes that respondents interviewed in focus groups after the follow up survey that did not re-enroll in the insurance recommended that the INSS provide better information about what benefits were covered, how to enroll, what fees are charged, and how to make payments. The study quotes a market vendor from the Huembes Market saying "I think that is the reason that most people don't pay into the insurance, we don't know where to do it or with whom to do it. I think there needs to be more publicity …". Further analysis of these interviews shows that respondents offered additional reasons for not re-enrolling including that they didn't't use the insurance over the coverage period. One male respondent found that self-medication was a sufficient option and did not see the value of insurance. Another woman noted that her baby did not receive good care and that she instead took him to a private doctor after visiting an EMP. Respondents that re-enrolled in the insurance, however, suggested that they saw value in this product. Some respondents remarked that health insurance provided them with peace of mind, saying that if an unexpected grave illness hit them or their families, they knew that their health insurance would enable them to pay for the necessary treatments. Others noted that the high cost of critical illness would be difficult to cover otherwise. When discussing alternatives to insurance, one woman noted, "Where was I going to find $1,500 dollars?" Another respondent mentioned that she once had to take out a one-month loan with a high 20 percent monthly interest rate in order to cover emergency hospital fees. A third respondent shared that she prayed to God that she would not have to take out a loan to cover medical costs. The differences in perception of value among those who did and didn't't enroll suggest that coverage benefits were likely not tailored to all segments that received the insurance. Additionally, both the survey responses and qualitative interviews suggest that logistics and implementation should not be overlooked when designing these types of voluntary health insurance programs.

Lastly, we present some descriptive statistics of utilization data collected from EMPs which generally were consistent with the survey data. While available costing data was difficult to match to our survey data, most visits were related to relatively simple, inexpensive outpatient procedures. This speaks to some of the qualitative responses referenced above

from respondents that did not re-enroll in the insurance, which suggest that the coverage of simple illnesses may not be attractive to respondents who are relatively healthy or childless. Comprehensive coverage may be more attractive to families with small children, however, and could have spillover benefits when families are covered as noted above. Conversely, the results also suggest that having these less sick participants enrolled in insurance could reduce the overall costs by improving the risk pool. These tradeoffs have yet to be explored in detail and difficulties in obtaining actuarial data have constrained much of the analysis of health insurance programs to date.

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Appendix A: First-Stage Subsidy Effect on EMP Visits in 2008

	Parent Enrolled in Health Insurance
Parent Offered 6 Month Subsidy	0.307 ***
	(0.021)
Household Size	-0.015***
	(0.004)
Logged Parent Income	0.010
	(0.009)
Parent's Years of Education	0.001
	(0.003)
Age (2007)	0.001
	(0.009)
Age-Squared	0.000
	(0.001)
Female	-0.008
	(0.015)
Number of Times Sick (2007)	-0.002
	(0.004)
Total Number of Visits (2007)	0.009**
	(0.002)
Ever Sick (2007)	0.027
	(0.023)
Constant	-0.045
	(0.091)
Number of Observations	2170
R-squared	0.1971
F-statistic	215.755

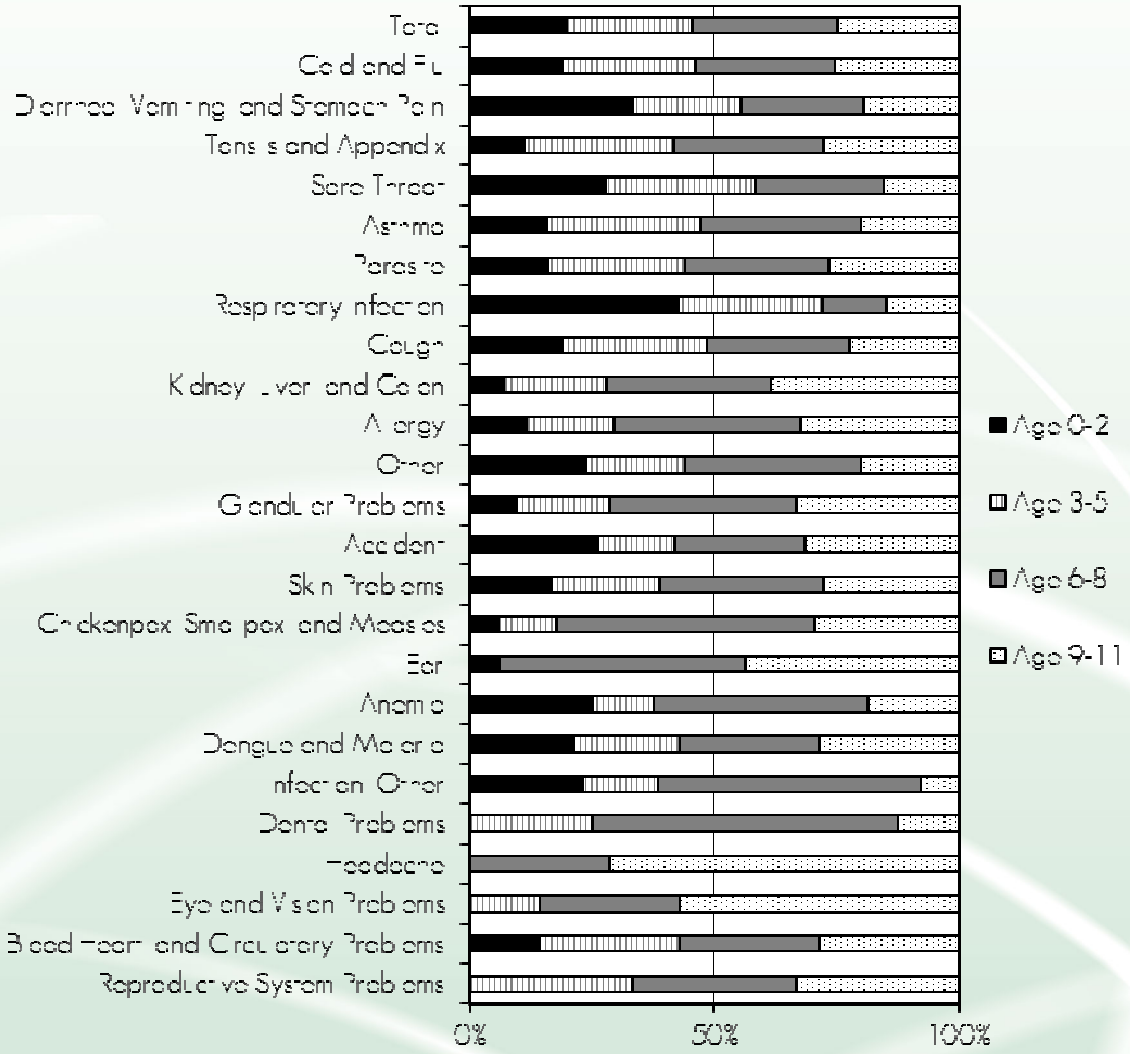
Notes: Sample is children of respondents aged 11 and younger at date of baseline survey in 1334 households. Above is one first-stage estimate where "Parent Enrolled in Health Insurance" is instrumented with random assignment status; first-stage F-statistic of the excluded instrument reported in the bottom row. Dependent variable in the second-stage is the total reported visits to an EMP for the child over the past year. All income and expenditure data are reported in 2008 Cordobas. Individuals without valid income or visit data were imputed to be the median and regressions were run with a dummy variable indicating the missing value. Total number of visits is calculated as the sum of visits at each type of provider over the past year; children who were not sick in the past year were included as zeros. Regressions include fixed effects by market and round. Robust standard errors in parentheses, clustered at the family level. *** p<0.01, ** p<0.05, * p<0.1

Appendix B: Data and Sampling

			Treatment (Any	
Panel A: Survey Data Collection		Total	subsidy)	Control
	Baseline Survey 2007	4002	2603	1399
	Percent insured	0.19	0.29	0.01
	Follow-up Survey 2008	2608	1385	1223
	Percent insured	0.20	0.37	0.01
Panel B: EMP Data Collection		Total	Treatment	Control
Selection:				
	Insured Respondents Selected from the Baseline	444	412	32
	Selected Respondents also in the Follow-up	414	412	2
Results:	EMP records located	173	173	0
	No EMP records located - reported no visits in survey data	180	179	1
	No EMP records located - reported visits at least one in survey data	61	60	1

Notes: In Panel A, at baseline "Treatment" is composed of the 2357 respondents assigned to the 6-month subsidy group and 246 respondents assigned to the 2-month subsidy group. There were 1274 respondents who received an informational brochure and 125 respondents who received nothing (empty envelope) at baseline. The 2-month subsidy group was not part of the Follow-On survey. In Panel B, the "Results" section is restricted to respondents who were selected to be sampled from baseline who participated in both waves of the survey. There were 9 additional members of the Control group with EMP records located that did not participate in the Follow-On survey.

Appendix C: Illness Percentages by Age



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