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CHILD HEALTH CARE DEMAND IN A DEVELOPING COUNTRY: UNCONDITIONAL ESTIMATES FROM THE PHILIPPINES

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ABSTRACT

This study examines how quality, price, and access to curative health care influence use of modern public, modern private, and traditional providers among 3,000 children age 0-2 years in Cebu, Philippines. The analysis relies on a series of household, community, and health facility surveys conducted in 33 rural and urban communities during 1983–1986. The inclusion of data on potential health care users *and* available providers makes it possible to investigate the impact of the health care environment on demand. Furthermore, since the study is not limited to only those children whose mothers report them as currently ill, it avoids the possible biases caused by using a sample comprised of those who self-report morbidity.

Distance to care is important for reducing demand, unlike user fees that show no significant effects on the use of modern public or private services. The availability of oral rehydration therapy and child vaccines, as well as the proportion of doctors to staff, are important for increasing the use of public care, while supplies of intravenous diarrhea treatments raise the demand for private services. Nonmodern practitioners were used more if they had recently attended an nongovernment- or government-sponsored health training session. Parental human capital and household income increase the utilization of private services. Children who are male and younger than 6 months of age are more likely to be taken to private and traditional providers, the two more expensive types of care.

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1. INTRODUCTION{tc \l1 "1. INTRODUCTION}

This study examines the determinants of demand for child curative health care in a poor country. It looks specifically at how health care quality, price, and access influence utilization of outpatient services for infants in the Philippines. Since low levels of public spending per capita on health have not generally rebounded in most countries since the debt crises of the 1980s, raising revenue for the provision of health care continues to be important.[1] A lack of resources may cause not only the quantity, but quality of services to suffer, which may contribute in part to observed low rates of utilization of public facilities, especially in rural areas. To further inhibit utilization by the rural poor, public delivery systems are frequently characterized by large inequities in access because rural travel times to facilities are often high. Geographic disparities in access also serve to exacerbate insurance market failure in the health sector because the public health care system may fail to insure many of the poorest against the costs of illness. Issues such as these have led many countries to consider establishing user fees for publicly provided care, particularly in urban areas where transport costs are low, and for services that have few public goods aspects.[2] Advocates argue that allocative efficiency could be improved by moving prices closer to marginal costs. Moreover, depending on price responses, revenue could be generated that in theory could be used to improve the quality or expand

[1] See World Bank (1993) for an overall view, and Griffin (1992), Herrin (1992), and Nuqui (1991) for the Philippines.

[2] In other words, those with few positive social externalities, such as treatments not related to reducing the spread of infectious disease.

the quantity of services offered. Opponents maintain, however, that utilization of modern care by those with low incomes would be hindered even more.

A unique set of data from the Island of Cebu, Philippines, is used that consists not only of a large multiwave household survey, but also has detailed information on the attributes of health facilities in the area. Using discrete choice models, factors affecting demand for services for children from modern public, modern private, as well as traditional health practitioners are investigated. The breadth and detail of the data allow the exploration of not only how individual and household characteristics influence utilization, but also the impacts of provider attributes, user fees, and distance to service.

While it is widely acknowledged that service quality should affect utilization, very few empirical demand studies have included information on health provider characteristics along with individual, household, and community data.[3] Poorly trained or insufficient levels of staff and inadequate drug supplies may inhibit use of care even if services are affordable and geographically accessible; additionally, if prices are raised when quality is already poor, utilization may drop off even more. A lack of control for quality is likely to result in biased price estimates; assessing the behavioral changes expected from health forms requires knowledge of how both price *and* quality influence

[3] Those that have are Akin, Guilkey, and Denton (1995), Gertler et al. (1995), Lavy and Germain (1994), Lavy, Palumbo, and Stern (1995), Mwabu, Ainsworth, and Nyamete (1993), and Hotchkiss (1993). Among these, only Lavy and Germain (1994) and Gertler et al. (1995) include children in their sample, and only Gertler et al. (1995) estimate children's demand separately.

demand. Policy formulated on the basis of empirical results that are plagued by omitted variables bias could have unexpected outcomes.

The impacts of reducing public subsidies depend not only on own-price effects, but also on cross-price influences. With a government fee hike, individuals may opt out of the health care market altogether; alternatively, they may switch to other types of care such as private or traditional.[4] Despite the fact that traditional providers are a frequently-used alternative in many countries, demand studies often examine the expected results that changes in public fees will have on *modern* public and private care only; this study provides an exception.[5] It is important from the perspective of designing a public care delivery system to understand when other types of services are used; it may be incorrect to assume that even reasonable quality, low-priced public services will be used in all situations, given cultural influences surrounding health and medicine.

[4] Dynamic price and supply responses of private providers to public fee increases could also influence demand for care, but this is not a focus of the paper.

[5] Studies that have included traditional practitioners as health care alternatives are Alderman and Gertler (1997), Deolalikar (1993), Hotchkiss (1993), Wong et al. (1987), Akin et al. (1986), and Mwabu (1986).

Another attractive feature of the paper is that it provides estimates of price, income, and quality responses that are not conditioned on self-reported morbidity status. Health care demand studies generally look only at individuals who report a current illness; conditioning on morbidity makes some intuitive sense because healthy people will not demand curative services. However, selection bias is an issue if factors associated with seeking care when sick also influence the reporting of health status. Self-reported measures may differ from clinical assessments, often in a nonrandom manner; it is not unusual, for instance, for self-reported morbidity to rise with household income and education.[6] If reporting biases were correlated only with observables, such as education, conditional estimates would not be biased. The problem, however, is often one of common unobserved attitudes toward care-seeking and morbidity. If these do not change as observables change, marginal effects from conditional estimates will be biased because self-reported health status will be correlated with the error term of the health care demand

[6] For example, Sindelar and Thomas (1991) evidence from Peru shows the relationship between maternal education and maternal-reported incidence of child illness follows an inverted-U shape. If more educated mothers have better information and greater awareness of illness symptoms, perhaps because of more experience with health care providers, they may be more likely to report their children as sick. More objective measures of health and nutrition, such as child anthropometric status, are consistently positively affected by maternal education. The ability of adults to perform normal functional activities is also usually positively correlated with income and education (Strauss and Thomas 1995).

equation. For example, those who tend to underreport illness may also tend to avoid modern health care when sick; alternatively, a person with unobservably poor health may be more familiar with the health care system and be more likely to report an illness and to demand care when sick (Dow 1995a). The estimation approach avoids this potentially important source of bias.

Finally, the work adds to our knowledge of the factors affecting utilization of health services for infants; while we are beginning to understand the determinants of adult demand in poor countries, less evidence exists for young children; furthermore, very few of the studies that focus on preschoolers have included explicit information on quality of services.[7] This is an important line of inquiry as the first three years of life are the most crucial in terms of physical and mental growth and development (Martorell 1995). Illness during this period can have devastating effects because feeding, appetite, and absorption of nutrients can be severely interfered with (Adair et al. 1993, among others). Given that many of the underlying causes of child morbidity and mortality are from infectious diseases, which are, in principle, medically treatable or preventable, improving our

[7] Alderman and Gertler (1997), Ii (1996), Gertler et al. (1995), Ching (1995), Deolalikar (1993), Gertler and van der Gaag (1990), Dor and van der Gaag (1987), and Akin et al. (1986) estimate preschooler demand for health services; Bouis et al. (1998) focus on adolescent utilization. Among these, only Gertler et al. (1995) include quality data in their analysis.

understanding of the factors affecting utilization of basic health services for young children deserves greater attention.

The results indicate that health care choices for infants are influenced by access and quality, as well as by parental human capital, and household socioeconomic status and composition. Distance to care substantially reduces demand; after controlling for distance, however, user fees at modern public and private facilities do not have significant impacts. Results for public fees are quite sensitive, though, to how community characteristics other than those describing health facilities are accounted for.[8] Public fee parameters are close to zero and insignificant when detailed data on community influences are in the regression; however, when these attributes are replaced by municipality-level dummies (or are omitted altogether), public user fees have noticeable negative impacts on demand for public care. This is an important finding because results from studies of this type are often used to inform the design of health pricing policies. With the municipality dummies, it could be concluded that demand is somewhat price sensitive, whereas with the detailed community variables, we would assume it is not.

Strong, though varying, quality impacts are found: oral rehydration therapy (ORT), vaccines, and family planning, as well as the composition of staff, have important

[8] Variation in facility price and quality is present because households are matched with the closest facility of each type (public, private, and traditional). The matched facilities may or may not be in the same community as the household itself.

positive effects on demand for public care; availability of intravenous diarrhea treatments raises the chances of private care visits; use of traditional providers is increased if the practitioner has recently attended a health training session.

Higher socioeconomic status and parent human capital increase the likelihood of a child visit to higher-priced, higher-quality modern private providers. Evidence of differential health investments between older and younger children and between boys and girls is also found. Demand for modern curative services rises up to the age of six months and declines sharply thereafter (even though child illness measured by 24-hour recall of symptoms by the mother does not decline accordingly). Utilization is greater for male children despite the fact that their morbidity rates do not differ statistically from those of girls for the two-year period. Boys are also more likely to be taken to more expensive types of care. Moreover, additional male infants in the household who are younger than the index child (the child whose health care was surveyed) reduce the likelihood the index child will have a visit to the two more expensive provider types: modern private and traditional; the presence of younger female infants and older children does not have this effect. Additional adult females in residence increase the chances that the index child is taken for a private facility visit, even after controlling for household income and maternal education level.

2. BASIC MODEL OF HEALTH CARE DEMAND{tc \l1 "2. BASIC MODEL OF HEALTH CARE DEMAND}

A household production model for health inputs and outcomes is presented; it is similar to that used in previous health care demand studies. It is assumed that the household maximizes a utility function, the arguments of which consist of health of the infant (H) and consumption of a composite good (G), conditional on (Z), a set of taste and preference shifters[9]:

$$U = U\,(H, G; Z). \tag{1}$$

Health of the index child is produced by combining inputs in the manner implied by the health production function. This function is modeled as a relation between the health outcome and a set of health input choices; its shape will depend on the underlying health technology. The production function is written

$$H = H\,(C, F; S, M, E, õ\,), \tag{2}$$

where the first two arguments are endogenous inputs into health: C is the quantity and quality of health care chosen and F consists of other health inputs, such as food and

[9] Such a unitary model of decisionmaking, in which households are assumed to make decisions that maximize household utility, does not allow one to explore the processes of intrahousehold decisionmaking. The unitary approach is used because information is not available in these data on individual incomes or ownership of assets within the household.

nutrient intakes and health-related behaviors such as cooking, food storage, sanitation, and excreta disposal practices. *S*, *M*, and *E* are exogenous characteristics influencing infant health: *S* is the set of individual child attributes such as age and gender; *M* consists of household characteristics including age, education, and family background of the child's parents, and *E* is the set of community characteristics influencing health, such as sanitation, water quality, rainfall, temperature, and the general disease environment. It should be noted that *S*, *M*, and *E* can have both direct effects and indirect effects through *C* and *F*. õ represents child- and household-level unobservables such as inherent healthiness of the child.

The household also faces a budget constraint:

$$Y = p_C C + p_F F + G, \qquad (3)$$

where Y is household income, p_C is the price of health care, and p_F are the prices of other health-related inputs; the price of the composite good is normalized to one. The price of health care is comprised of the user fee and access costs such as travel time to the facility.

$$p_C = B + wT, \qquad (4)$$

where B is the user fee, w is the wage rate, and T can represent travel time to and/or waiting time at the facility. Substituting equation (4) into equation (3) gives the full-income budget constraint

$$Y = (B + wT)C + p_F F + G. \qquad (5)$$

Substituting equations (5) and (2) into equation (1) gives the conditional utility function for health care choice j,

$$U_j \ = \ (H_j\,(C_j,\, F_j^*;\, S,\, M,\, E,\, \tilde{o}),\, Y_j \text{ - } B_j\, C_j \text{ - } wT_jC_j \text{ - } p_FF_j^*;\, Z), \tag{6}$$

where F_j* is the optimal choice of other health inputs, given health care choice j.

To specify the utility maximization problem for choice of health care, suppose the individual (the child's mother) faces J feasible alternatives. The unconditional maximization problem is

$$U^* \ = \ \max_j\,(\mathrm{U}_1\,, \ldots\ldots\ldots, \, U_J), \tag{7}$$

where U* is maximum utility. The solution to the utility maximization problem gives the health care alternative that is chosen. When stochastic terms are added, the probability that an alternative is chosen can be interpreted as the demand function in a discrete choice model such as the one specified here.

It should be noted that the dynamics of health production are not taken into account in this analysis. It is assumed, however, that inputs chosen in previous periods, and health in the last period, influence current health. These assumptions imply that in a dynamic model both lagged and expected future values of exogenous variables would enter the reduced-form demands. In the empirical work, several covariates enter with current and past values (e.g., rainfall and food prices), others are time-invariant (e.g., parental education), and the remainder are assumed to change slowly over time (e.g., health care availability and quality). The very young age of the children in the sample, and hence the short time-period over which their existing stock of health is based, makes these assumptions more tenable.

3. SETTING, DATA, AND VARIABLES{tc \l1 "3. SETTING, DATA, AND VARIABLES}

THE SURVEY{tc \l2 "THE SURVEY}

Household, community, and health facility data from the Cebu Longitudinal Health and Nutrition Study are used for this study. These data are a rich resource for examining issues related to child health. The survey period, 1983–86, coincides with a severe economic downturn and the introduction of structural adjustment programs in the country. Unemployment, inflation, and poverty increased during this period; nutrition, health, and education indicators also worsened (Herrin 1990, 1992). The region to which Cebu belongs saw the proportion of underweight children increase during this time; by 1987 this area had the highest prevalence of low weight-for-age children in the country (Glewwe et al. 1994). Furthermore, in this particular sample, half of the children at the age of two years had heights two or more standard deviations below the WHO reference median for their age, suggesting a high prevalence of chronic undernutrition.

The site is Metropolitan Cebu, an area in the central Philippines, which includes Cebu City, the second largest city in the country, and surrounding urban and rural communities. The area is located on the eastern coast of Cebu Island and includes a number of coastal, island, and high elevation villages that vary in environmental, socioeconomic, and agroecological conditions. Following an initial pilot survey, 17 of the 158 urban, and 16 of the 85 rural, *barangays* (communities) in the area were randomly selected to be included in the survey. The sample consisted of all pregnant women in these 33 sample *barangays* who could have delivered a single child between May 1, 1983 and April 30, 1984. Baseline pre-birth surveys were conducted with the 3,327 women who fit this criteria. Subsequent interviews were completed immediately following each woman's delivery and then every two months through the first two years of each index child's life.[10]

[10] A few women were lost to the sample immediately after the baseline survey and a handful more following the postdelivery survey due to outmigration, twin births, stillbirths, miscarriages, and refusal to be interviewed. At the beginning of the bi-monthly longitudinal surveys, the sample consisted of 2,884 woman-infant pairs. The mean number of completed longitudinal surveys for the 2,884 mother-infant pairs was 10.5 out of a possible 12. Missing post-birth surveys were due to migration, withdrawal from the sample, and a few infant deaths.

Information was collected on household composition, human capital, ownership and value of assets, sanitation conditions, health insurance coverage, and limited data on household income and sector of work. Data were collected on the index mother's contraception behavior and fertility history, infant feeding practices, prenatal behaviors during the index pregnancy, type of practitioner used for child delivery, and health care utilization for the index child. Data were also gathered on characteristics of each *barangay* (i.e., community), such as population, water, sanitation, and other infrastructure, the agroecological setting, existence of local community groups, and the presence of health and educational institutions, as well as retail establishments. Monthly rainfall levels for the area were also available.[11] Market food prices for each community were gathered at 10 equally-spaced intervals during the survey period.

In addition, 82 modern health facilities, mainly public and private hospitals and clinics used by the sample population, were also surveyed at two separate intervals, once at baseline and once near the completion of the household surveys. Information on types of treatments offered, prices, hours of operation, payment options, and staffing levels were collected at both rounds. A drug availability indicator for commonly treated ailments was asked for in both surveys; however, detailed drug information was collected only in the second survey. Two health personnel interviews, covering both modern and traditional practitioners, gathered data on education, training, and knowledge of health

[11] The author would like to thank Agnes Quisumbing for sharing this data.

providers. Data on official service fees were collected from modern providers; however, no fee data were collected from traditional practitioners.

CONSTRUCTION OF HEALTH CARE QUALITY AND PRICE VARIABLES{tc \l2 "CONSTRUCTION OF HEALTH CARE QUALITY AND PRICE VARIABLES}

Quality{tc \l3 "Quality}

While the Cebu survey provides much data on quality, ironically, the sheer breadth of the information means that many of the variables are highly correlated. The data reduction method chosen was to construct indices that summarize different aspects of quality (see Peabody et al. 1994). This method was favored over others, such as principal components or factor analysis, because the influence on demand of specific quality attributes can be directly assessed. The approach, therefore, provides planners and policymakers with more useful information than an aggregate quality index can. Quality data were examined using the dimensions put forth by Donabedian (1980, 1988), who provides three types of measures: structure, which refers to the physical presence of resources and staff; process, which are the practices followed by the health practitioners; and outcome, which refers to health outcomes resulting from the care received. Much of the data collected in the Cebu health facility instruments describe structural attributes; while these cannot ensure higher quality care, they are probably necessary for it. In addition, they can often be easily recognized by potential users, so may have a strong influence on demand (Garner, Thompson, and Donaldson 1990). Furthermore, the state of a facility's structural attributes should reflect resource availability, so that in an environment where resources are severely limited, as in many developing countries, they may also serve as indicators of access to services (Peabody et al. 1994).

Structural staff and drug availability indices were constructed.[12] Staffing indices include total number of personnel and the proportions of doctors and nurses in each facility. Number of personnel may capture scale effects that could indicate a wider variety of service availability. A higher proportion of doctors may be perceived as providing better quality, while a higher proportion of nurses may be viewed as providing care that is more patient-oriented and nurturing than a physician's care. Proportions were used because staffing requirements vary according to level and size of facility, so actual numbers of doctors and nurses cannot be directly compared meaningfully.

Providers were asked about usual and current stocks of drugs at the facility. Current, as opposed to usual, stocks were used in the analysis because they were deemed to be less subject to respondent bias and, hence, more accurate; furthermore, current supplies could potentially have been observed at the time of the survey by the interviewer, whereas usual supplies could not without several observations over time on the same facility. Drug indices include diarrhea drugs, which are expected to be crucial determinants of demand since they can have immediate influences on child health. Child

[12] Other studies have also included measures of facility infrastructure, such as electricity, and plumbing, and equipment and supply availability, such as scales, thermometers, stethoscopes, syringes, needles, bandages, etc. (Peabody et al. 1994). These types of data were not collected in the Cebu health facility surveys, so are not among our quality indices.

vaccines and range of family planning methods are also included; while these are not directly related to child curative care, they may indicate an orientation of the facility toward infant and maternal health services that could be important to a mother in deciding where to take her child for care. Mothers may be more likely to make child curative care visits to facilities with these other supplies if they are able to access such supplementary services during the same visit.[13]

[13] As stated above, the detailed drug data were available only after the household surveys were nearly completed. It is possible that this data may not reflect the quality situation faced by households during the survey. To address this issue, means tests were performed on several facility attributes that were collected in both surveys to explore differences between years. Results indicate that the null hypothesis of no difference between the two time periods could not be rejected for eight of nine tests performed. This strengthened confidence in using only the later facility quality data, providing the advantage of including drug supplies in the analysis. While it could be argued that drug supplies can change more quickly than some other health care attributes, and therefore, could have differed between the two time periods, there are no data with which to test this hypothesis.

(Means tests were performed for public and private doctor and nurse ratios, number of child outpatients treated per week, and outpatient waiting times. The only test for which the null of temporal equality could be rejected was public waiting time, which rose from 2.5 to 6.8 minutes. The test of between-period equality of real provided-reported fees for private child outpatient care could also not be rejected. A similar test could not be performed for public fees because public facilities reported fees of zero in both years.)

Prices{tc \l3 "Prices}

Although user fee information was collected in the facility surveys, these data were not used for several reasons: traditional practitioners were not asked for fee data; there are many cases of missing values; and only zero fees are reported for public services. If market price data are not available or adequate, unit expenditures within sampling clusters are sometimes used as a proxy for price. Unfortunately, expenditures for child curative care were not collected in the Cebu study. Data are given, however, on expenditure for prenatal care visits during the baseline round. While this is a different type of service, it is the most complete source of fee information in the survey. We attempted to use this variable to construct hedonic prices for each individual. However, because the facility data are a sample and not a census of facilities in the area, the extent of information available in the survey on health care market conditions was not sufficient to achieve identification of a hedonic price. Therefore, user fees are defined as *barangay* median expenditure per prenatal care visit for each provider type.[14]

[14] Comparing these prices with the few reported by providers in the facility survey, public providers reported charging zero for prenatal and child outpatient services, while the real *barangay* median expenditure per visit for public prenatal care has a mean of 0.54 pesos (1980). Facility-reported real private fees for a prenatal and child outpatient visit, respectively, were 3.25 and 8.75 pesos, while the *barangay* median prenatal expenditure per visit is 4.83 pesos. *Barangay* median per visit expenditure for a prenatal visit to a traditional

provider is 1.06 pesos.

Information was collected in the baseline pregnancy survey on travel times and costs to providers for prenatal care. This information could have been used to measure access, but is endogenous because it is a function of the particular facility chosen by the mother; an alternative would have been to use *barangay* median values of this variable. Supplementary data were obtained, however, for distance from households to each of the modern health facilities in the provider sample.[15,16] This allowed a construct of distance to the nearest facility of each type, which is exogenous because it is not a choice variable.[17] Distance data were not available for traditional providers, probably because many work in less formal settings, making them more difficult for enumerators to locate. Community-level information was used on whether one of these practitioners was present in the *barangay*; if yes, distance was set to zero; if not, distance to the closest available one outside the *barangay* was used.

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[15] The author thanks David Hotchkiss for providing this data.

[16] Strictly speaking, the distance is that between each health facility and 49 geographic points in the area that represent household clusters (to protect the privacy of households).

[17] This assumes that households have not migrated to this location because of attributes of health facilities in the area. It also assumes there is no purposive placement of facilities in areas with high demand due to high morbidity or high incomes.

DESCRIPTIVE STATISTICS{tc \l2 "DESCRIPTIVE STATISTICS}

Health care characteristics are presented in Table 1. Distance and price are highest for private facilities; average private fee per visit is around one-fifth of mean weekly household per capita income. Public facilities, in contrast, are closer and their fees are one-tenth of private fees; traditional providers are the most accessible geographically, and their charges per visit are twice the public rate, but one-fifth the private rate. Public and traditional facilities all provide child outpatient care; however, 10 percent of private facilities do not. Private centers have more staff and higher doctor ratios than public, while mean nurse ratios are similar. A large percentage of public centers have ORT supplies on hand, but very few have intravenous diarrhea treatments. On the other hand, less than half of all private establishments have ORT available, but a large proportion have intravenous diarrhea solutions in stock. Vaccines and family planning supplies are slightly more plentiful at public than private centers. For traditional providers, there is only one staff member in the "facility" and their doctor and nurse ratios and modern drug supplies are set to zero. Quality for these providers is measured by education level and whether a formal health training seminar had been attended recently.

Health care utilization patterns are shown in Table 2. Over all rounds, a curative health care visit in the two months preceding each survey occurred 49 percent of the time. Among the three types of facilities visited, traditional practitioners are used most frequently, followed by private, and then public, services. The rate of overall health care visits increases with household asset values through the first tercile of the distribution and then levels off, as seen in Figure 1. The composition of visits differs, however, by asset status. The level of utilization of public care is nearly constant up through the first tercile and then begins to diminish; private visits, alternatively, rise gradually through the second tercile and then increase more. Traditional care is used at about equal rates among households in the first two terciles but much less by those in the third tercile.

Figure 2 shows the rate of utilization rises with the first eight years maternal education, but more slowly thereafter. Public use increases slightly through the sixth year of maternal schooling (primary school completion), rises very sharply between six and eleven years, and then decreases. Use of private care rises with mother's education, especially after grade ten, while visits to traditional practitioners decrease with maternal education beyond six years.

Overall utilization rises through the child's first six or seven months of age and then falls, as seen in Figure 3. Use of modern care, especially private, is much higher for children in the first six months of life relative to older infants: for 0-6 month-olds, approximately 80 percent of all visits are in modern facilities versus only 50 percent for 7-24 month-olds.

Nonhealth-facility community data are described in Appendix Table 9 with summary statistics in Appendix Table 10. Market food prices were measured at the *barangay*-level 10 different times during survey. Major food items of interest for our analysis are infant formula, cooking oil, and corn, which is the major staple commodity; real unit prices were constructed for each community for each round. Other community variables capture health, sanitation, and physical infrastructure. These include the proportion of households in each community having, respectively, piped or pumped water to their house, a refrigerator, a modern toilet, and sanitary garbage disposal methods[18]; whether the community has frequent water shortages (a common problem in the area), the availability of a bank, and improved roads. Also included are community elevation, which helps capture infrastructure and temperature, and present and lagged values of rainfall.

[18] We use sanitation information aggregated to the *barangay* level because household decisions concerning sanitation are important for child health and could be determined simultaneously with other health investment decisions.

Individual- and household-level variables are also presented in Appendix Tables 9 and 10. They consist of age and sex of the index child, mother s and father s education and age, and mother's height.[19,20] A dummy is also included to indicate whether each parent was absent from the household during the entire first two years of the child s life.[21] Ownership and value of household assets were collected at the baseline survey and include houses, land, vehicles, livestock, agricultural and business equipment, furniture, household appliances, and kitchen equipment. Household structure variables that may reflect household time and resource constraints relevant for child health investments and health production are also incorporated. The presence of other infants in the household may contribute to index child illness through increased pathogen transmission; more children may also result in fewer resources available per child to devote to health. Elderly residents could tighten household time and resource constraints if they are in poor health; on the other hand, they may add to the household's resource base if they are healthy. Certain categories of adults, such as prime-age women, could positively affect health care utilization if they are income earners or if they have strong preferences for investing in child health.[22]

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[19] Maternal height will capture some aspects of her accumulated human capital that are not picked up by her education. Unfortunately, father's height is not available in these data.

[20] Even with these variables, however, parental human capital is probably still not measured completely.

[21] If absent for all 12 survey rounds, the person s characteristics are set to zero in the regressions. If the person was only temporarily absent, her or his individual demographic information is retained for every round.

[22] It is arguable whether household composition variables should be treated as exogenous in a model of health care demand; assuming that they are exogenous implies that fertility decisions and other household

Several of the household variables enter the regressions as linear splines; these include child age, mother and husband education, mother height, and household asset values. Spline transformations provide a way to assess the relationship between an explanatory variable and an outcome of interest semi-parametrically. The variable is divided into piecewise linear segments, and the coefficient on each interval represents *the slope* for that interval. For example, the coefficient on the first segment of the child age variable gives the effect of an additional month of age up to the sixth; the second segment gives the effect of an additional month of age after the sixth. For each regressor entered as a spline, the hypothesis that the slopes of the adjacent segments are equal was rejected in each case.

4. EMPIRICAL MODEL{tc \l1 "4. EMPIRICAL MODEL}

INTRODUCTION{tc \l2 "INTRODUCTION}

The demand for child curative outpatient services is defined as the initial type of facility chosen for a consultation if the child had a curative visit during the two months preceding each longitudinal survey. As discussed above, the options differ substantially in terms of price and quality. The demand for a particular alternative is the probability that it yields the highest utility among those available. In a discrete modeling framework,

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composition changes are exogenous for child health care demand; see further discussion in Section 5.

this probability is interpreted as the demand function; its functional form depends on the functional form of the conditional utility function and the distribution of the stochastic terms. We assume utility is linear in health and consumption, which implies the conditional utility function (6) is now

$$U_j \;=\; \alpha_{1j}\, H_j\,(C_j, F_j^*; S, M, E, \upsilon\,) \;+ \alpha_{2j}\,(Y_j - B_jC_j - wT_jC_j - p_F F_j^*) + \varepsilon_j \qquad \text{for } j = 1 \text{ to } J, \qquad (8)$$

where F_j* is the optimal choice of other health inputs given health care choice j, ε_j is a zero mean random disturbance term with finite variance and is uncorrelated across alternatives and individuals, and α_{1j} and α_{2j} are parameters to be estimated. This error term is assumed to have a Gumbel distribution, leading to the multinomial logit specification. Parents make care choices based on the comparison of indirect utility functions for each variety of health care available, including that of no treatment (or self-treatment). In practice, specification of demand is based on the difference between the utility of each market care alternative and that of no care. Under the assumption that there are no user fees or access costs for the no-visit option, the conditional utility function for this alternative is

$$U_n \;=\; \alpha_{1n}\, H_n(C_n, F_n^*; S, M, E, \upsilon) \;+ \alpha_{2n}\,[Y_n - p_F F_n^*] + \varepsilon_n \qquad \text{for } j \neq n. \qquad (9)$$

So the difference in utility between each market health care option and no visit is

$$U_j - U_n = \alpha_{1j}\, H_j\,(C_j, F_j^*; S, M, E, \upsilon) - \alpha_{1n} H_n\,(C_n, F_n^*; S, M, E, \upsilon) + \alpha_{2j} Y_j - \alpha_{2n} Y_n$$

$$- [\alpha_{2j} p_F F_j^* - \alpha_{2n} p_F F_n^*] - \alpha_{2j}[B_jC_j - wT_jC_j] + \varepsilon_j - \varepsilon_n \qquad \text{for } j \neq n. \quad (10)$$

This is the structural demand equation. The option giving the highest $(U_j - U_n)$ is the one chosen.

Substituting out for the reduced-form determinants of *H*, *Y*, *F*, and *C*, we obtain the indirect conditional utility function for each alternative. These equations express the conditional utilities in terms of assets, prices, and other reduced-form determinants. This leads to the estimated specification

$$V_j = â_{0j} + â_{1j}\, S + â_{2j}\, M + â_{3j}\, A + â_{4j}\, E + â_{5j}\, B_j + â_{6j}\, wT_j$$

$$+ â_{7j}\, Q_j + â_{8j}\, P_F + â_{9j}\, õ + å_j \qquad \text{for } j = 1 \text{ to } J, \quad (11)$$

where j is the type of health care chosen; S is a vector of individual child characteristics; M is a vector of household characteristics; A is the value of household assets; E is a vector of community health characteristics; B_j is the user fee for health care choice j; w is the wage rate, and T_j is the time incurred to obtain health care from choice j, so that wT_j is the time cost of care; Q_j is the vector of quality aspects describing facility type j; and P_F is the vector of prices for other health inputs, such as nutrition and sanitation. $â_j$'s are parameters to be estimated and $å_j$ is a zero mean random disturbance term with finite variance and is uncorrelated across alternatives and individuals. The variable õ captures individual child and household unobservables and it includes elements such as innate healthiness of the child and household-level heterogeneity in health technology and preferences.[23] An attempt to construct a predicted wage for all mothers was made; however, sufficient data were not available to achieve identification of this variable, so maternal age, education, and height are used to capture its exogenous underlying

[23] These unobservables are dealt with by employing robust standard errors that are corrected for repeated observations on individual mother-child pairs. Panel data methods are not used to address these unobservables for two reasons: first, many of the variables of interest, such as parental education, are fixed, and others, such as health care quality, change only slowly over time; second, panel data methods for the empirical estimation of unordered limited-dependent variables are not yet well-developed.

determinants.[24] Total household asset values are used to proxy for household resource levels. We cannot model utility derived from consumption net of health expenditures as other health care demand studies have because consumption and expenditure data were not collected in the survey. Household income is not used because labor supply of the household is likely to be affected by child ill health because extra time is required for health care use and other caring activities. Assets are reflective of the household's long-run resources, so are correlated with current income and consumption. Furthermore, liquid assets play an important role in consumption smoothing.

SPECIFICATION: FLEXIBLE HEALTH CARE PARAMETERS{tc \l2 "SPECIFICATION: FLEXIBLE HEALTH CARE PARAMETERS}

A unique feature of this model (11) is that the health facility parameters are allowed to vary by type of care; the approach is more flexible than that used by most other health care demand studies. Given the wide variation in the nature of the facility types, e.g., personnel levels and training, drug availability, and inevitably other unmeasured aspects of service, one can make a strong argument that care from different

[24] Wages were investigated as explanatory variables but are not used in the estimation for several reasons. First, in the household survey, many individuals, especially women, report not having income from wages. Second, 40 percent of the female wage observations in the data come from the baseline survey when most of the women were in their last trimester of pregnancy; this value of time is probably not what it would be under normal conditions. Third, many of the wages are classified as "self-employment" wages. These values should not be used to infer market wages because of the difficulty of distinguishing net income from an enterprise versus returns to entrepreneurship, risk-taking, and capital investment. Fourth, barangay level data on wages from the community surveys was sparse and showed little variation. Finally, the community data do not contain sufficient information on local labor market demands, sectoral composition, unemployment rates, etc., to use as exclusion restrictions for identification of wages in the health care demand equations.

segments of the health care market can reasonably be considered different goods. In a recent paper that compares various assumptions underlying previous discrete choice models of health care demand, Dow (1995b) finds that constraining price and quality coefficients to be equal across health care alternatives is the most strongly rejected of all, and imposition of the assumption can have large effects on elasticities, which is important, given the policy focus of responses to user fees. Another weakness of the constrained approach is that it does not allow different *sets of characteristics* to impact the probability of visiting different types of providers. Forcing divergent flavors of health care to be influenced by the same set of attributes, and imposing the restriction that each of these attributes have the same effect on each variety of service, may be unrealistic. In the empirical work, the effects of imposing this constraint were explored. Equation (12) gives a "constrained" version of the conditional indirect utility function, where all health care choices are forced to have the same set of attributes and the coefficients on these variables are forced to be equal across facility types. (Note the coefficients for the health facility attributes, B_j, wT_j, and Q_j, no longer carry the subscript j.)

$$V_j = \beta_{0j} + \beta_{1j} S + \beta_{2j} M + \beta_{3j} A + \beta_{4j} E + \beta_5 B_j + \beta_6 wT_j + \beta_7 Q_\mathrm{j} + \beta_8 P_F + \beta_{9j} \upsilon + \varepsilon_j. \qquad (12)$$

This model is expected to yield very different results from the baseline flexible specification.[25]

[25] In these specifications, only own-provider attributes enter each indirect utility function; those of the other alternatives enter the model when the decisionmaker compares expected utility from each respective provider and chooses the one yielding the highest V_j. An alternative approach allows characteristics of substitute providers to enter directly into each V_j. The facility coefficients on B, T, and Q would then carry "jk" subscripts. Experimental results with estimating this version of the model are not presented here. Individual and household effects were virtually unchanged from the baseline results, and most own-facility influences were

ECONOMETRIC METHODS{tc \l2 "ECONOMETRIC METHODS}

As discussed above, the model is estimated using multinomial logit. An important property of this model is the independence of irrelevant alternatives assumption (IIA), which states that the odds of facility type *i* being chosen over facility type *k* are independent of the availability of alternatives other than *i* and *k*. This implies that an additional alternative could be added to the model without changing the odds ratios of each of the original options. If any of the alternatives are similar, however, this may be an unreasonable restriction to place on behavior.

A more general, discrete choice model that is able to accommodate different structures of error term correlation is the nested multinomial logit model. It allows for correlation across subgroups of alternatives; those that are closer substitutes can be grouped so that cross-facility responses are more flexible within than across groups (Gertler and van der Gaag 1990).[26] One grouping scheme for our model would be to collect the market alternatives into one group, given that they are more similar to one another than to the self-care option. If we consider these to be two different levels of a

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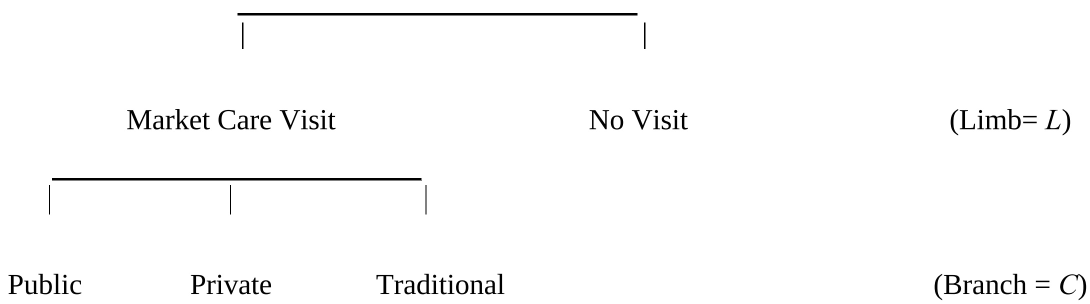
robust to the inclusion of cross-facility influences. Cross-effects were in some cases of the expected sign and in other cases not; the unexpected cross-effects probably arose from high actual and spurious correlations among health characteristics across facility types: public and private user fees and distance are highly correlated, as are many of the quality measures. Dor and van der Gaag (1987) obtain similar types of results when experimenting with models that allow cross-effects and then restrict them to zero.

[26] An even more general model that does not impose any cross-facility elasticity restrictions is the multinomial probit specification. It is very difficult to estimate, however, when the model has more than three alternatives. Furthermore, the size of this model (number of parameters and observations) added to the practical obstacles of using multinomial probit.

choice tree, the choice to visit a facility or not is in one level, and what type of facility to choose is in another.



A more disaggregated decision tree might be a three-level version, the first level being visit or no visit, within visits, a modern or traditional provider, and within modern, a public or private practitioner.[27] This and the previous decision tree are experimented with in the empirical work. To test whether the groupings are appropriate, a measure of similarity of the grouped alternatives is available. The inclusive value is defined as the log of the denominator of the grouped set. Its parameter is one minus the correlation between the error terms of the grouped set. If the hypothesis that this parameter is equal to one cannot be rejected, the alternatives should not be grouped. In the two-level case, the model would then collapse into a multinomial logit model (McFadden 1981).

[27] Still other possibilities exist, such as separating hospital- from clinic-level care within each modern alternative. In this sample, however, there were only a very small number of hospital visitors (4 percent of all observations), so this was not a feasible method of disaggregating modern visits for this study.

In estimating the multilevel tree, the facility characteristics influence the facility-choice decision, while the individual, household, and nonfacility community variables are allowed to affect whether a market visit occurs, and conditional on a market visit, the type chosen. Allowing the demographic and community variables to enter multiple levels of a decision tree is an unusual addition to the nested multinomial logit model; most allow any particular regressor to enter only a single level of the tree, which may not always reflect the decisionmaking process accurately.[28]

The nested logit model can be estimated sequentially or simultaneously, using maximum likelihood methods. For sequential estimation of the two-level model, the market care choice conditional on using care is estimated as MNL. The inclusive value is then calculated for this limb and included as a regressor in the decision of whether to have a market visit or not, which is estimated as logit. The parameter estimates on the health care attributes are efficient for the subset of market care users, since these variables appear only in the facility-choice level of the tree. The estimated coefficients for the variables that appear in both levels, i.e., all the nonhealth-facility variables, are consistent but not fully efficient, due to the use of the "estimated" inclusive value parameter (Amemiya 1978). Since this parameter is the basis for accepting or rejecting the nesting structure, obtaining an efficient estimate is important.[29] This was accomplished through

[28] Derivations of marginal effects for this specification are available from the author upon request.

[29] McFadden (1981) provides a correction procedure to adjust the standard errors of parameters in the marginal choice model, but it is extremely complicated, however, even for a two-level model (Hensher 1986). An alternative is to estimate the model simultaneously by maximum likelihood methods and obtain fully efficient estimates. While this is the preferred approach, obtaining full information maximum likelihood estimates for this model proved practically infeasible because of the large number of individual-, household-, and community-level variables. With this approach, any variable that does not describe a health facility (i.e.,

the use of the bootstrap sampling procedure.[30] Additionally, repeated observations on mother-child pairs in this data result in high intracluster correlation that produces artificially low standard errors if not corrected for. We therefore identify these clusters in the resampling so that the sample drawn during each replication is a bootstrap sample of clusters.

Two potential weaknesses of the sequential approach in general are that the lower levels of the model are estimated using observations on only those individuals who had those particular alternatives in their feasible choice set, and who actually chose one of these options: the first issue is not problematic, since all persons had each of the alternatives available to them. The second issue may be a concern, however, because persons choosing market health care at any point in time could be a select group and different in both observable and unobservable ways from those who do not. In cross-sectional data, using only this subgroup could produce biased parameter estimates. In this panel, however, even though for 50 percent of *child-round* observations, there was no health care visit, among individual children themselves, only 4 percent did not have a

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does not vary by health care alternative) must be interacted with its respective alternative-specific dummy, or it drops out of the regression. This increases the number of parameters for this set of regressors from S to S*(J-1), J being the number of health care alternatives, here from 62 to 186. Furthermore, because the health facility coefficient are also allowed to vary by alternative, the model's size is increased even more. This coupled with the large number of observations in the data (over 30,000) resulted in computing constraints.

[30] This amounts to estimating the full decision tree many times over, with N observations being drawn each time with replacement from the N observations; in this random drawing, some of the original observations will appear once, some more than once, and some not at all. At each pass (called a replication), the estimator is applied to the data and the resulting parameter estimates are saved as a data set. Using the collection of estimated parameter sets from these replications, one can calculate the standard deviation of each statistic, which is an estimate of its standard error (StataCorp 1997). Although the average of the bootstrapped statistic is used in the calculation of the standard deviation, it is not used as the estimated value of the statistic itself; the point estimate is the original observed statistic computed using the original N observations (StataCorp 1997). Bootstrap methods are detailed in Efron (1982) and Efron and Tibshirani (1986).

health care visit at all in their first two years of life. Fifty percent of children had a visit for half of their time-observations, and 75 percent had a visit for one-third of their time-observations in the survey. Given that 96 percent of children had at least some market care utilization during the survey period, selection bias into market care is probably not a major source of bias.

Finally, as discussed in the introduction, these estimates have the advantage of not being conditioned on self-reported health status. This approach avoids the disparities between clinical and self-reported morbidity measures that may arise from nonrandom sources such as income, education, or unobserved preferences and attitudes (Gertler and Rose 1997). While it would be ideal to have both conditional and unconditional estimates from the same sample in order to compare the direction and magnitude of possible bias that results from using the conditional sample, this is not feasible using the Cebu data. In order to estimate both, illness and health care utilization data must be available for the same recall period. In these data, however, morbidity is based on 24-hour and 7-day recalls, while utilization is based on a two-month recall.[31]

[31] The data sets used by Dow (1995a, 1995b) and Deolalikar (1993) allow estimation of both conditional and unconditional demands.

5. RESULTS{tc \l1 "5. RESULTS}

Determinants of provider choice are presented first for the baseline flexible parameters model and then alternative specifications are discussed. For most results, standard errors are Huber-corrected for the intracluster correlation arising from repeated observations on mother-child pairs over the 12 survey rounds. This is an unusual extension to the multinomial logit model with panel data.

INDIVIDUAL AND HOUSEHOLD INFLUENCES{tc \l2 "INDIVIDUAL AND HOUSEHOLD INFLUENCES}

The impacts of individual and household characteristics do not vary to any degree across the different specifications and so are discussed first. Table 3 shows a large number of important individual- and household-level influences on choice. Starting at the individual child-level, male children have a higher likelihood of being taken for a private visit, the most expensive and highest quality type of care. Given that reported illness does not vary by child sex for the overall sample, this finding may indicate that male children are treated preferentially for health care investments. This could arise for several potential reasons: parents may have the perception that boys are more vulnerable to illness, since their *reported* morbidity levels are occasionally slightly higher than girls' in the first year of life; alternatively, if boys are more likely than girls to contribute to parent economic security in the future, perhaps their health needs are attended to first.[32]

[32] Alderman and Gertler (1997) also find in rural Pakistan that conditional on an illness being reported, there is a tendency to use high-quality providers more often for boys. In a conditional model, if there exists bias

Male children are also more likely than girls to have a traditional health care visit. Traditional services are higher priced than public and may offer certain special types of treatment not available in modern centers. Similar explanations of male preference or the perception of male child vulnerability to illness could hold here as in the case of private visits.[33]

Chances of a visit to each type of facility increase significantly with child age through six months; the strongest effect is on demand for traditional services, followed by private, and then public.[34] For children older than six months, age reduces the probability of public and private visits drastically, but does not influence demand for traditional care. This is true despite the fact that reported morbidity levels off but does not decline after six months of age. The nature of illness changes slightly, however, with age: "other" illnesses become somewhat more prevalent, while diarrhea and FRI rates drop mildly. Perhaps parents perceive and/or cope with child sickness differently as the child ages; it is possible modern services are seen as less efficacious, appropriate, or necessary for older infants versus newborns.

against reporting of girls' illness, then only the very sickest girls will appear in the sample. If this holds, then in an unconditional version of such a model, it is possible that the high-quality pro-male bias could be even stronger.

[33] In the conditional model of Alderman and Gertler (1997), boys' demand for traditional services is no greater than girls'. However, in their study area, traditional practitioners have the lowest prices among all the health care alternatives, which is not true in Cebu.

[34] 0-6 months is the period when reported child illness levels accelerate most rapidly.

Maternal education has strong positive effects on the probability of using private care; both spline segments are significant, with the impact of the first spline (schooling up to the fifth year) being particularly large. The first spline of maternal height (centimeters up to 150) also has a positive influence on modern private and public demand, indicating that this variable may capture accumulated human capital and family background characteristics of the mother not being picked up by education. Maternal height over 150 centimeters, however, lowers the probability of a public visit, possibly because these mothers have healthier children and use less care, and the care they do use is private care. Father's education after the fifth year (the second spline) has a negative impact on the chances of a public or traditional visit, but not a private visit. This may reflect paternal preference for fewer health care visits to lower-quality facilities.

Household assets through the first tercile value and insurance coverage greatly enhance private demand. Assets over the first tercile, however, reduce demand for public and traditional, but not private, care. Assets are an indicator of higher household income, and up to a certain threshold, they may reflect preference for better quality care. Beyond this threshold, however, the influence of additional household resources on reducing child illness most likely outweighs preferences for consuming more high quality care. Insurance coverage probably also captures some elements of income and preference for quality and may reduce the high price of private services.[35]

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[35] Health insurance coverage could obviously be endogenous in a model of health care demand because it is a past health investment decision that could be highly correlated with current health decisions. While formal exogeneity tests are not performed due to lack of suitable instrumental variables, whether excluding this

Additional infants, particularly males, in the household who are younger than the index child decrease the chances that the index child has a visit to the two more expensive provider types: private and traditional. It is possible that additional children may tighten household income constraints and reduce the number of visits possible to more expensive providers for all children in residence. However, because additional female infants do not have a significant effect, this is probably not just a simple resource crowding story, and may reflect household preference for investing first in the health of newborn males.

Demand for private care increases with the number of adult females in residence. This may indicate a preference for higher-quality child health care services; alternatively, private facilities are furthest away, so more adult females may loosen household time constraints for obtaining health services. Additional elderly males in the household reduce child visits to private and traditional, the two more expensive types of care; their

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regressor altered the results of household assets or human capital was examined. No changes are observed on the impacts of demand for any type of care. These results are available from the author upon request.

presence may impose time and income burdens on the household and reduce allocations to child health.[36]

COMMUNITY INFLUENCES{tc \l2 "COMMUNITY INFLUENCES}

Turning to nonhealth-facility *barangay* variables, better infrastructure generally reduces the likelihood of using public care, which may signal that infrastructure and public health services act as substitutes in the production of child health. Improved infrastructure has almost no effect on private care. A higher proportion of refrigerator owners in the *barangay* raises the chances of a public visit; while this could reduce illness through better household sanitation, it is also reflective of higher incomes that could increase demand. Living on an island also increases the likelihood of a public visit; islands have higher relative income levels but less access to modern private care. Increased time to water sources decreases utilization of all types of care. The effects on demand for traditional health services are mixed: better infrastructure generally reduces

[36] Household composition could also be endogenous in a model of health care demand if residence and migration decisions of individuals are influenced by child health considerations. Formal exogeneity tests are not performed due to a lack of suitable instrumental variables; however, we examined whether excluding household composition changed the results on assets or human capital. Estimated coefficients for public and traditional care are not altered, while the positive influence of the second asset spline on the probability of using private care is strengthened only slightly. These results are available from the author upon request.

utilization of traditional providers, while other indicators that reflect higher household incomes increase demand: island status, fewer water shortages, banks, and a higher percentage of refrigerator owners.

HEALTH FACILITY INFLUENCES{tc \l2 "HEALTH FACILITY INFLUENCES}

Baseline Model{tc \l3 "*Baseline Model*}

The health facility variables were entered in successive steps in the baseline model for the purpose of investigating how their impacts change when moving from a model with distance only to one that includes user fees, and finally to one with quality added. These are presented in Table 4. The version with only distance shows very strong negative own-distance effects; each of the Huber-corrected Z-statistics is greater than 4.2. The magnitude of the effect is largest for traditional visits, followed by public and then private.[37] When user fees are added, distance does not lose any influence, and user fee coefficients are near zero and not significant. With facility quality included, distance remains negative and very significant. Public and private fee effects remain close to zero; for traditional care, however, the fee effect becomes positive and significant. This result was unexpected and may arise from actual and spurious correlations among traditional quality, price, and other regressors.

[37] Alderman and Gertler (1997) also find that traditional health providers have the highest price elasticities.

Among the quality variables, more personnel and a higher ratio of doctors in public facilities raise demand for public services; personnel has no influence on demand for private care. Practitioner training increases the likelihood of attending a traditional provider.

Drug supplies show strong impacts on public, and to a lesser extent, private demand. Currently available ORT treatments and vaccines at public facilities raise demand for public care, while availability of intravenous diarrhea treatments reduces it. The first two effects are what we might expect, but the latter is not. The fact, however, that the drug supplies are defined as those *currently* in stock may be driving this result. The availability of a drug at any particular point in time reflects the interaction of both supply and demand factors. Low stocks could be due to supply bottlenecks, low expected demand, or high current demand. For instance, if public clinics with intravenous drugs are in areas with high demand   poorer areas with high diarrhea levels or high-income areas with greater demand for services, their stocks may be diminished quickly; this would produce a negative correlation between demand for services and availability of drugs (Mwabu, Ainsworth, and Nyamete 1993). In these data, correlations reveal that supplies of intravenous solutions at public clinics are associated with more children treated per week, lower public health care prices, and lower availability of ORT at the same facility; it is also related to poor community infrastructure and higher infant illness levels in the community. Each of these factors could increase the demand for intravenous fluids at public centers. Alderman and Lavy (1996) emphasize that drug indices defined as current stocks may lead to an underestimation of drug demand, and provide a lower bound for the true estimates.

For private services, the supply of intravenous diarrhea treatments increases the chances of a visit. The other current drug supply indices, (ORT, vaccines, and family planning) have strong negative impacts. Correlations show that ORT at private clinics is associated with indicators of high demand: more children treated per week in the facility, higher community levels of diarrhea, and lower prices for care. Furthermore, availability of ORT at private facilities is related negatively to ORT stocks at *public* facilities in the same *barangay*; this may indicate that public and private facilities serve complementary roles within communities: public concentrating on the provision of simpler forms of diarrhea treatment and private on more sophisticated, higher-cost forms of treatment. Private vaccine stocks are associated with more children attended per week at the facility, and with higher community education, infrastructure, and infant FRI levels; these factors could increase demand for vaccines and result in low current stocks. Family planning supplies at private facilities are correlated with fewer child outpatient visits and fewer diarrhea treatments and child vaccines in the facility, but with better education and infrastructure in the *barangay*; these point to low expected demand for this service at facilities where children are treated.

Effects of Removing Nonfacility Community Controls{tc \l3 "Effects of Removing Nonfacility Community Controls}

This study experimented with replacing the nonfacility community variables with municipality dummies to see what effects, if any, this would have on health care parameters.[38] Table 5 presents this set of regressions with provider characteristics included in successive steps. In the distance-only version, the distance effects are more negative and significant for public visits relative to when nonfacility community influences are controlled for; the downward bias may imply that distance now captures omitted community characteristics that have important negative influences on the probability of a public visit. We saw previously that community effects mainly reduced visits to public clinics. There was no change in the private results. The impact of distance on traditional visits, however, is now biased in a positive direction: its former large negative parameter is now small in magnitude and not significant, indicating that traditional distance could now be picking up omitted community influences that as a group have a positive impact on demand for traditional services.

The same changes in the distance results are found in the specification with distance and user fees included. The impacts of private and traditional user fees are insignificant as they were in the baseline model; the *public user fee result,* however, *changes dramatically*: its parameter is now negative, large in magnitude, and significant at the 1 percent level.

[38] Individual and household impacts are virtually unchanged, so they are not discussed.

In the model with quality added, distance is still a major inhibitor of public and private visits. Private fee effects are close to zero as they were in the baseline model. Now, however, instead of being positive and significant as in the baseline results, traditional fees are close to zero in magnitude and insignificant. Lastly, the public fee coefficient is sizable, negative, and significant at the 15 percent level, unlike the baseline findings.[39]

None of the quality results changed sign, although a few changed in magnitude and significance. Public family planning now appears to significantly increase public demand. For private care, all the drug indices lose significance and the negative influences of doctor and nurse ratios gain significance; formal training of traditional providers becomes insignificant.

The finding of a large downward bias in the public user fee effect when detailed community influences are replaced by municipality dummies is important because results from studies of this type may be used to inform health pricing policies. With the municipality dummies, we would conclude that demand is somewhat price sensitive, whereas with the detailed *barangay* variables we would say that raising fees on the margin is not likely to influence utilization of public health services. Furthermore, the

[39] In the analogous specification with distance, fee, and quality, but with community characteristics removed altogether, the public user fee effect is negative, large in magnitude, and statistically significant at the 10 percent level.

quality effects change significantly, depending on the specification. The differences in these results could have potentially important implications for how they influence public health spending decisions. These considerations are discussed more in the last section of the paper.

Conditional Logit Specification{tc \l3 "Conditional Logit Specification}

Aside from the issue of potential influences of nonhealth-facility community factors, many studies use a conditional logit approach in which (1) the same set of health care attributes is assumed to affect demand for different kinds of care, and (2) each of these characteristics is constrained to have the same impact on demand regardless of the type of provider. There is a wide variation, however, in the nature of services offered from various segments of the health care market, (e.g., personnel levels and training, drug availability, and inevitably other unmeasured aspects of service), and the argument can be made that these are, in fact, different goods. In our baseline model, different *sets of attributes* were allowed to influence the probability of a visit to each type of care, and attributes that are relevant to all services (e.g., distance and price) are allowed to have heterogeneous impacts on demand. This paper now demonstrates how provider results change when a conditional logit model is used, similar to others that have been estimated in the literature.[40]

[40] In transforming the facility data to be used for the conditional logit model, either (1) descriptors that do not apply to a particular type of care must be included for that choice with the value set to zero, or (2) only the facility variables common to all choices are retained in the analysis. We discuss the results of doing the

Table 6 shows that the previously observed differential influences of quality and price are masked by this type of model. Number of personnel is no longer significant, whereas before it raised demand for public care. Doctor and nurse ratios now increase demand for all types of care; formerly only doctor ratios increased the chances of a public visit. ORT and vaccine availability increase demand across the board; previously they had positive and negative effects, respectively, on demand for public and private care. Intravenous diarrhea supplies have negative demand impacts; previously they had positive and negative effects, respectively, on public and private care. Family planning methods are not important, whereas before they reduced the probability of visiting a private facility. Training and education of traditional providers increase the chances of a visit to each facility type, instead of just to traditional facilities.[41]

Results from this baseline flexible MNL model indicated that when influences of price and quality on demand are allowed to vary by the nature of the facility, there are indeed heterogeneous responses. Furthermore, the flexible specification allows for the

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former in the text. When the latter approach is taken, only price, distance, and "facility treats child outpatients" dummy are kept. Results from this regression show large negative impacts of distance, but no effects of user fees or the treatment dummy.

[41] It should be noted that standard errors are not corrected for intra-individual correlation due to repeated observations on individuals; therefore, the Z-statistics presented are somewhat higher than they should be.

possibility of having a different set of quality aspects affect the probability of using different kinds of care. Forcing different flavors of health care to be affected by the same set of attributes, and imposing the restriction that each of these attributes has the same effect on every kind of service is unrealistic and limits the policy insights that can be drawn concerning how price and quality changes can be expected to affect demand for care from different types of providers.

Nested Multinomial Logit Specification{tc \l3 "Nested Multinomial Logit Specification}

Results for the nested multinomial logit model are presented in Appendix Table 11. Because the choice is now estimated in two levels, the base comparison categories differ, which implies that the estimated coefficients from the nested model cannot be directly compared to those from the baseline MNL model. Marginal effects are therefore calculated for the unconditional probability of a visit to each facility type for both the MNL and NMNL models; these are presented in Table 7.

In Appendix Table 11, the parameter on the inclusive value is 0.36 and its Z-statistic is large. The fact that the parameter is less than one implies that the error terms in the conditional utility functions for the market alternatives are correlated and the single-level MNL model is rejected in favor of this one.[42] The parameter being between

[42] This study also experimented with the three-level nested MNL model that was described in the empirical modeling section: a. visit or not; b. if visit, modern or traditional; c. if modern, public or private. It found that when public and private care were grouped into a "modern care" branch separate from traditional, it could not reject that the inclusive value parameter on this branch was equal to one. Therefore, the three-level tree was collapsed into the two-level tree discussed here.

zero and one indicates that the data reject neither the distributional assumptions nor the functional form of the utility function, and the model is therefore consistent with utility maximization (McFadden 1981). The magnitude and significance of the parameter is very close to the results found for children in rural Côte d'Ivoire and rural Peru by Gertler and van der Gaag (1990).

For public demand, the marginal effect of distance is reduced slightly in the nested version. Public user fee remains positive but increases in magnitude. (Its NMNL coefficient, however, is still not statistically significant.) Public quality results are not altered to a great extent: nurse ratio is the only effect that changes direction, from positive to negative; the negative impact of availability of public intravenous diarrhea treatments is larger.

For private care, the influence of distance is very close to zero in the nested specification, instead of being negative as in the baseline model. The private user fee effect is close to zero in both cases. None of the private quality effects change direction, and their magnitudes are generally reduced slightly. The negative influences of vaccine and family planning availability are affected most, both moving toward zero.

Nesting alters the impacts of some traditional provider characteristics. The distance parameter does not change; however, the positive influence of user fee is reduced to one-third its original value. The effect of schooling level of traditional providers does not change, but the positive influence of their having participated in formal health training is increased.

These results are derived from a model that may be deemed more realistic because it allows correlation in the error terms of the market care alternatives, thus allowing them to be more similar to one another than to the option of no visit. The findings, however, do not vary greatly from the baseline specification. Indeed, other discrete-choice studies have shown that the importance of IIA is diminished if the choices available to the consumer are carefully defined so that they differ from one another in terms of the attributes provided and prices charged (Akin, Guilkey, and Denton 1995 and Chen 1987, quoted in Hotchkiss 1993). Descriptive statistics of the facility attributes confirmed that this was indeed the case in the data, hence the similarity of MNL and NMNL findings.

POLICY SIMULATIONS{tc \l2 "POLICY SIMULATIONS}

Simulations were performed to analyze the effects on demand of hypothetical changes in public health care and household characteristics. Much of the policy discussion in this area focuses on the likely effects of public health reforms on utilization, particular among the poorest households. Predicted responses are therefore derived for the sample as a whole and for households by value of asset holding.

Operationally, the simulations involve first calculating probabilities of utilization from the baseline model, using actual values of explanatory variables. The value of a potential policy lever is then altered and new probabilities are calculated using the baseline regression coefficients. Note that the simulated responses to hypothetical policy levers are valid only for changes *on the margin*. Table 8 presents the results for (1) all households, (2) households in the lowest asset tercile, and (3) households in the upper two asset terciles. Reading across a row gives the predicted probability for each alternative within asset classes; the probabilities in each row sum to 100 within asset levels.

Making ORT available at all public facilities increases the probability of public utilization by 17 percent. Low-asset households respond less to this change than high-asset households, the estimated percentage increases being 7 and 24, respectively. The probability of a low-asset household using each of the other three options is reduced by 1 percent; for high-asset households, the reduction in the other alternatives is around 3 percent.

Increasing the range of available child vaccinations at public centers raises the probability of a public visit by 29 percent. Disparities in responses by asset class are not as strong as they were for ORT changes; the increase in the probability of a visit by poorer households is 25 percent and for richer households is 31 percent. Private, traditional, and noncare use are each reduced by about 4 percent across the board.

Improving the number of family planning methods offered at public facilities raises the probability of a public visit by 18 percent. Reactions vary by asset status, however; the chances of a public visit among the poor are reduced by 11 percent, while the likelihood for better-off households is increased by 36 percent. In response to this policy change, the poor would increase their use of the other three alternatives slightly; the chances of a high-asset visit to each nonpublic facility type would be decreased by around 4.5 percent.

Simultaneously enacting the three drug supply improvements enhances the likelihood of public utilization by 74 percent overall, by 19 percent for the poor, and by a full 106 percent for better-off households. For the overall sample and for the upper-income group, the percentage increase for the simultaneous improvements is greater than the sum of the increases from each of the three individual improvements; it is approximately equal to the sum for the poor. The reduction in visits to each nonpublic facility type is around 13 percent for the upper-income group, and around 3 percent for the poor.

For the most remote households, a simulation reducing their barriers to access was done. In terms of policy, this could correspond to building facilities in underserved areas or improving transportation infrastructure in order to reduce travel times. For the 25 percent of households furthest from a public facility, reducing their distance to that of the 75th percentile results in a 5 percent increase over the baseline probability of using public care. The response among low-asset households is only 2 percent, while that for the high-income is 8 percent. For all groups, new public users consist mainly of former non- and traditional visitors.

Raising mother education by one sample standard deviation (3.7 years) is expected to raise public demand by approximately 4 percent overall. The increase among the poor, however, is much greater: their predicted probability of a public visit is increased by 13 percent, and large numbers of these new users come from those who previously had no health care visit. Among upper-income households, more education results in only a 1 percent increase in public utilization.

Increasing the value of household assets by one sample standard deviation shifts overall and high-asset utilization by increasing the chances of a private visit, and reducing the use of public, and to a lesser degree, traditional care. This simulated change boosted all poor households into the nonpoor category, so simulated changes in their demand are not presented.

In sum, the policy simulations reveal that improving the aspects of public quality that could directly benefit children, specifically vaccine and ORT availability, raises demand for public health care, especially among the poor. Increasing family planning at public clinics raises public demand only among high-asset households. Simultaneously expanding all three of these services has large positive impacts on the utilization of public care by the upper income group, and positive but less striking effects for the poorest. Reducing distance to public care leads to positive but small increases in public utilization, the effect being greater for the nonpoor. Increasing maternal education has large influences on public-sector utilization by poor households, especially former non-users of health services. Raising the level of household assets increases the demand for private services.

6. CONCLUSIONS AND POLICY IMPLICATIONS{tc \l1 "6. CONCLUSIONS AND POLICY IMPLICATIONS}

This research seeks to add to the literature on child health care demand in developing countries in several ways. First, this is one in only a small group of empirical health care demand studies to use data not only on characteristics of individuals and households, but also on health providers. This provides the opportunity to examine how specific aspects of the health care environment drive demand. Furthermore, the empirical model allows differential price and quality responses by type of care. Most analyses make the dual assumptions that (1) the same set of health care attributes impact the demand for different flavors of care, and (2) the influences on utilization are homogeneous across provider types. These assumptions limit the insights that can be drawn concerning how quality and price changes at different types of providers will affect demand for care.

A second contribution of the study is that traditional health providers are included in the set of modeled health care alternatives. These are used frequently in developing countries but are not always included in empirical demand studies.

Third, the model provides estimates of price and income responses that are not conditioned on self-reported morbidity status; this approach avoids the selection bias inherent in using a sample of only those who report themselves as ill. Self-reported health measures may be endogenous for empirical estimation of health input demands because of unobservables that may affect both health reporting and health service utilization when an illness occurs.

Fourth, previous research has focused mainly on care for adults; this is one of only a few studies to examine children's demand. This is an important line of inquiry since the first three years of life are crucial in terms of physical and mental development that could be hindered by illnesses that go untreated.

Results from the baseline flexible MNL model indicate that distance to facilities has consistently strong negative impacts on utilization of all care types. Furthermore, it appears from these estimates that distance is a larger inhibitor of demand than are monetary user fees. Service charges have virtually no impact on modern care use.[43] (Moreover, when disaggregated by asset status, the findings show that the poor are no more sensitive to price than the rich.[44]) In the context of health service reforms, this may

[43] Results for price responses from the health care demand literature are mixed. Alderman and Gertler (1997), Lavy and Germain (1994), Akin, Guilkey, and Denton (1995), Gertler et al. (1995), Hotchkiss (1993), Gertler and van der Gaag (1990), Mwabu (1989), and Gertler, Locay, and Sanderson (1987) find that demand for care is price sensitive, while Mwabu, Ainsworth, and Nyamete (1993), Schwartz, Akin, and Popkin (1988), Akin et al. (1986), Birdsall and Chuhan (1986), and Heller (1981) find that demand for care is not price sensitive; De Ferranti (1985) found that higher price actually increased demand.

[44] Results of this disaggregated model are available from the author.

call for improving transportation infrastructure or for the provision of basic services in remote areas, along with a possible small increase in user fees.

While the impact of modern fees is close to zero and insignificant in the baseline model, their influences were sensitive to how community attributes, other than those describing health facilities, were controlled for. Public charges have strong negative impacts on public demand when other community attributes are either replaced by municipality-level dummies or omitted altogether. This is an important finding since results from these types of studies may be used to guide pricing policies for public care in poor countries: with the municipality dummies we would conclude demand is sensitive to small price increases, whereas with the detailed community controls, we would conclude that it is not. Because the presence and quality of health facilities is expected to be highly correlated with other community characteristics, robustness checks such as those in this paper should be performed routinely. Health care price and quality results from models where community attributes are not carefully accounted for should be interpreted with caution.

When the empirical specification allows the effects of service attributes to vary by provider type, heterogeneous demand responses are found. Results differ from the more common specification where each type of service is forced to have the same set of elements describing it and each element is constrained to having an identical impact on demand regardless of the nature of the service. Imposing such restrictions puts unnecessary limits on the policy insights that can be drawn concerning how price and quality changes can be expected to affect demand for care from different types of providers.

The quality attributes that increase demand for modern care are mainly drug supplies. This may be positive from a policy perspective since these can often be provided by governments more readily than can expensive equipment, facilities, or well-trained personnel. Besides their potential to increase utilization of modern services, they could also have immediate positive effects on infant health (also, see Alderman and Lavy 1996). The simulations revealed, however, that wealthier mothers responded much more to drug supplies. In fact, vaccine availability at modern facilities was the quality attribute that most increased demand among poor children. If availability of this preventive service is a strong incentive for poor mothers to bring their children in for a curative visit, it is encouraging for policy because this is one of the best investments that can be made to improve the health of poor children in terms of cost per disability-adjusted life year ($12–$30 per DALY, as quoted in World Bank 1997). This also means, though, that provision of other drugs may primarily benefit those with more wealth and education.[45] Information campaigns targeted toward low-income mothers that explain the benefits of other drugs may enhance utilization of modern health care by the poor.

[45] When the model was disaggregated by household asset status and then by maternal education level, both higher asset and more educated mothers responded much more to facility quality.

Such information on the determinants of utilization among different income groups in a specific area can be especially useful, given that public health care authority and resource decisions were decentralized to *barangays*, municipal, and provincial governments beginning in the early 1990s. Under the 1991 Local Government Code, elected authorities assumed full responsibility for financing and delivering public health services (Lieberman 1996). While the implications of this policy changes for service delivery are still being analyzed (World Bank 1994), one would hope that implementation of service improvements that are responsive to the needs of different segments of the local population would be more feasible than under the former centralized system.

Quality and price effects were not greatly affected by the use of the nested empirical specification.[46] However, similar to the case with public price parameter, some results were sensitive to the manner in which other community influences were controlled for. Moreover, a few of the quality measures, mainly current drug supplies, had unexpected negative impacts on demand. This could be driven by the fact that drug supplies are defined as those *currently* in stock. The availability of a drug at any particular time reflects the interaction of both supply and demand factors; if a certain drug is out of stock, it may be due to excess demand for it. If public clinics with intravenous drugs are in areas with high demand poorer areas with high diarrhea levels or richer

[46] Interesting cross-effects between public and traditional services were found in the full-effects model not presented here. Increasing barriers to access (distance or user fee) at public raises demand for traditional and vice versa. This signals that public facilities could in principle be major channels for the delivery of efficacious modern health services in developing countries if access barriers were reduced and quality enhanced.

areas with higher demand for care, their stocks may be depleted quickly. This suggests that facilities may be placed nonrandomly; while formal tests of this hypothesis cannot be performed because complete facility quality data are not available at two different points in time (using the method of Pitt, Rosenzweig, and Gibbons 1995), an informal test was performed to get an indication of how facility quality is related to community illness rates. The complete set of regressors from the health care demand model was used to estimate a logit model of reported 24-hour recall of illness. Several of the public drug supplies had *positive effects* on reported morbidity[47]; this indicates that facilities are most likely purposefully located in sicker areas.

For the individual- and household-level variables, it was found that utilization of modern services is increased by maternal human capital and household assets. Mother education and height increase demand for private care; these mothers probably have stronger preferences for quality; alternatively, human capital may be a complement to the use of more advanced types of care. With higher assets and health insurance coverage, households switch from public and traditional care into private services. This wealth bifurcation in where people seek care could have equity considerations that are relevant

[47] Public ORT and vaccine availability each *increased* infant morbidity, as did the joint effects of doctor ratio, nurse ratio, and intravenous diarrhea solutions. On the other hand, infant illness was decreased by the presence of more personnel in public facilities. For private care, number of personnel and doctor and nurse ratio each had *significant positive* effects on reported illness.

for policy: it implies that investing resources in public facilities may be a good method of targeting health care resources to the poor because they are the primary users of these services. Similar results were found in Jamaica by Gertler and Sturm (1997) and in Indonesia by Frankenburg (1995).

Demand is greater for children who are male and less than 6 months of age; these two groups are also more likely to be taken to more expensive private and traditional providers. The presence of infant males younger than the index child also reduces the chances of an index child visit to private and traditional care (the two more costly types). These results serve to underscore the importance of investing in public health facilities since this is the only type of provider that girls are just as likely as boys to be taken to.

A final set of policy-related issues are recommendations for future data collection efforts. Ideally, health care utilization questions should not be conditioned on morbidity self-reports; furthermore, in order to estimate both conditional and unconditional demands, there should be at least one common recall period for the health care utilization and morbidity questions. If possible, quality data should be collected at two different points in time in order to address the issue of endogenous placement of facilities. Finally, careful attention needs to be paid to how drug supplies are defined and reported.

TABLES{tc \l1 "TABLES}

Table 1 Health care characteristics by facility type

	Public	Private	Traditional
Distance to closest (kilometer)	0.64	2.05	0.03
User fee (1980 pesos)	0.54	4.84	1.07
Doctor ratio	0.12	0.30	na
Nurse ratio	0.50	0.54	na
Number of personnel	40	50	1
ORT in stock (0-1)	0.86	0.37	na
Intravenous diarrhea treatments in stock (0-1)	0.15	0.75	na
Vaccine availability index (percent of 4 basic)	0.45	0.23	na
Family planning methods index (percent of 7 methods)	0.38	0.29	na
Medn traditional education in *barangay* (years)	na	na	5.12
Medn traditional formal training in *barangay* (0-1)	na	na	0.78

na = not available.

Table 2 Utilization by demographic group

	Type of health facility visited				
	Public	Private	Traditional	No visit	Number of observations
All	11.66	17.05	20.46	50.83	31,030
Male	11.79	18.14	20.60	49.47	16,425
Female	11.51	15.83	20.32	52.33	14,541
Low education (1-5 years)	10.02	11.95	22.99	55.05	9,701
High education (≥6 years)	12.40	19.37	19.31	48.92	21,329
Low asset (tercile 1)	13.32	13.04	21.38	52.26	9,545
High asset (terciles 2-3)	10.92	18.83	20.05	50.20	21,485
Age 0-6 months	18.39	21.61	8.78	51.22	6,492
Age 7-24 months	9.87	15.84	23.55	50.73	24,538

Note: Percentage of group using. Average over the 12 survey rounds.

Table 3 Determinants of facility choice for child curative care Baseline flexible specification

	Public versus none		Private verus none		Traditional versus none	
	Coefficient	Z-statistic	Coefficient	Z-statistic	Coefficient	Z-statistic
Public facility						
Distance nearest public (kilometers)	−0.360	−4.46				
Price public visit	0.092	0.31				
Number personnel, public	0.006	4.55				
Doctor ratio, public	1.544	3.41				
Nurse ratio, public	0.116	0.38				
ORT available, public	1.042	4.72				
Other diarrhea drug available, public	−1.221	−4.16				
Vaccine availability index, public	0.615	4.37				
Famp availability index, public	0.335	1.13				
Private facility						
Distance nearest private (kilometers)			−0.069	−2.42		
Price private visit			−0.017	−0.81		
Private provides postnatal			0.439	1.11		
Number personnel, private			0.002	1.25		
Doctor ratio, private			−0.400	−1.05		
Nurse ratio, private			−0.230	−0.52		
ORT available, private			−0.403	−2.00		
Other diarrhea drug available, private			0.305	2.12		
Vaccine availability index, private			−0.757	−1.92		
Famp availability index, private			−0.601	−2.09		
Traditional provider						
Distance nearest traditional (kilometers)					−1.990	−5.41
Price traditional visit					0.241	2.10
Years of education median, traditional provider					0.010	1.31
Formal training median, traditional provider					0.466	6.42
Child						
Child is male	0.098	1.34	0.200	3.08	0.122	2.20
Child age (1-6 months)	0.042	2.15	0.121	6.72	0.372	15.15
Child age (7-24 months)	−0.082	−12.66	−0.063	−12.52	−0.002	−0.33
Household						
Mother absent all 2 years	−0.227	−0.43	−0.206	−0.36	−0.924	−1.57
Mother's education 0-5 years	0.039	1.17	0.083	2.41	0.039	1.55
Mother's education more than 6 years)	0.020	1.48	0.028	2.70	−0.002	−0.20
Mother's age (years)	−0.021	−2.51	−0.009	−1.28	−0.009	−1.42
Mother's height to 150 centimeters	0.023	1.82	0.030	2.71	0.004	0.46
Mother's height more than 150 centimeters	−0.021	−2.04	−0.004	−0.46	−0.004	−0.62
Husband absent all 2 years	0.194	0.68	0.251	0.99	−0.575	−2.55
Husband's education 0-5 years	0.054	1.56	0.006	0.17	−0.032	−1.35
Husband's education more than 6 years	−0.029	−2.22	0.012	1.23	−0.025	−2.74
Husband's age (years)	0.008	1.19	0.005	0.69	−0.005	−1.04
Insurance	−0.087	−1.27	0.192	3.42	−0.016	−0.30
Asset value lowest third	0.018	0.14	0.667	5.89	0.034	0.36
Asset value upper two-thirds	−0.005	−2.38	0.001	1.04	−0.002	−1.99
Mother is senior woman	−0.121	−0.96	0.119	1.15	−0.060	−0.65
Grandmother present	0.045	0.37	0.067	0.69	−0.019	−0.20
Number of younger males	−0.063	−0.47	−0.365	−3.04	−0.195	−2.32
Number of younger females	0.092	0.62	−0.184	−1.44	−0.120	−1.29

(continued)

Table 3 (continued)

	Public versus none		Private versus none		Traditional versus none	
	Coefficient	Z-statistic	Coefficient	Z-statistic	Coefficient	Z-statistic
(Household)						
Number of older males under 6 years	0.026	0.66	−0.045	−1.28	0.029	0.95
Number of older females under 6 years	0.066	1.66	−0.012	−0.34	0.067	2.16
Number of males 6-13 years	0.043	1.13	−0.019	−0.57	0.006	0.20
Number of females 6-13 years	0.011	0.29	−0.014	−0.44	−0.020	−0.70
Number of males 14-20 years	0.022	0.50	−0.034	−0.94	0.036	1.03
Number of females 14-20 years	−0.078	−1.74	0.091	2.76	0.019	0.59
Number of males 21-60 years	−0.012	−0.24	0.019	0.47	−0.046	−1.29
Number of females 21-60 years	0.012	0.26	0.071	2.02	0.000	−0.01
Number of males over 60 years	−0.077	−0.61	−0.189	−1.82	−0.168	−1.66
Number of females over 60 years	0.018	0.14	0.036	0.38	0.044	0.50
Community nonhealth facility						
High elevation	−0.946	−4.83	−0.241	−1.31	0.012	0.08
Island	0.673	3.88	0.284	0.75	0.236	2.15
Community average piped/pump water house	−2.117	−1.30	1.321	1.02	−0.849	−0.75
Community average sanitary garbage disposal	−1.089	−1.96	0.250	0.61	−1.900	−5.32
Community frequency water shortages	0.395	2.53	0.022	0.15	−0.428	−4.52
Community has improved roads	−0.777	−4.94	−0.048	−0.41	−0.023	−0.31
Community has bank	−0.285	−2.08	0.081	0.52	0.277	2.70
Community average refrigerator owners	6.714	1.92	−1.016	−0.38	6.186	2.65
Community median time to water source	−0.124	−3.49	−0.085	−3.41	−0.057	−3.12
Community average modern toilet	−0.165	−0.33	−0.567	−1.79	−1.704	−4.59
Corn price present	0.001	1.27	0.000	−0.21	0.000	0.25
Corn price lag 2 months	−0.001	−0.58	−0.001	−1.63	0.001	1.51
Corn price lag 4 months	0.001	0.92	−0.001	−1.30	0.003	3.76
Vegetable oil price present	−0.075	−0.79	−0.119	−1.45	−0.143	−1.91
Vegetable oil price lag 2 months	−0.026	−0.29	0.160	2.07	0.094	1.32
Vegetable oil price lag 4 months	−0.031	−0.32	0.206	2.45	0.131	1.72
Infant formula price present	−0.020	−0.36	0.020	0.43	0.003	0.08
Infant formula price lag 2 months	−0.104	−2.04	−0.063	−1.42	−0.057	−1.40
Infant formula price lag 4 months	−0.080	−1.70	−0.050	−1.23	−0.061	−1.65
Rainfall present	0.000	0.68	0.000	−0.25	0.000	−1.12
Rainfall lag 2 months	0.000	1.35	0.000	0.69	0.000	−0.44
Rainfall lag 4 months	0.000	1.64	0.000	1.11	0.000	1.60
Rainfall lag 6 months	0.000	0.50	0.000	−1.09	0.000	0.72
Rainfall lag 8 months	0.000	−0.27	−0.001	−3.78	0.000	0.02
Rainfall lag 10 months	0.000	−0.36	−0.001	−2.26	0.000	1.12
Rainfall lag 12 months	0.000	1.04	0.000	−0.99	0.000	2.03
Rainfall lag 14 months	0.000	0.66	0.000	−1.26	0.000	1.20
Rainfall lag 16 months	0.000	−0.02	0.000	−1.70	0.000	−1.83
Rainfall lag 18 months	0.001	2.14	0.000	−0.28	0.000	2.17
Rainfall lag 20 months	0.000	0.64	−0.001	−2.55	0.000	0.89
Rainfall lag 22 months	0.000	−0.94	−0.001	−2.25	0.000	−0.33
Rainfall lag 24 months	0.000	0.50	−0.001	−2.77	0.001	2.81
Constant	−4.514	−2.15	−5.482	−2.93	−2.836	−1.82

Number of observations: 30,919 Log likelihood: −35,349.89 Pseudo R2: 0.0636

Notes: Outcome of no visit is the base comparison category. Regression standard errors are Huber-adjusted for repeated observations on mother-child pairs.

(continued)

Table 3 (continued)

	Chi-square test statistics for Jt significance of coefficient groups					
	Public versus none		Private verus none		Traditional versus none	
	Chi-square	P-value	Chi-square	P-value	Chi-square	P-value
Facility	132.49	0.00	23.97	0.00	58.37	0.00
Fee and distance	21.17	0.00	6.04	0.05	29.86	0.00
Personnel	47.76	0.00	2.61	0.46	44.72	0.00
Drug availability	107.79	0.00	11.02	0.03	na	na
Individual, household						
Child age	164.62	0.00	164.04	0.00	256.16	0.00
Mother education	4.75	0.09	18.18	0.00	2.47	0.29
Mother height	5.30	0.07	7.98	0.02	0.43	0.81
Husband education	5.80	0.05	1.74	0.42	12.45	0.00
Value assets	5.68	0.06	36.26	0.00	3.97	0.14
Household composition	13.38	0.50	31.36	0.00	17.01	0.26
Community	146.28	0.00	124.55	0.00	193.27	0.00
Infrastructure	93.94	0.00	26.20	0.00	83.75	0.00
Food prices	10.05	0.35	21.78	0.01	39.32	0.00
Rainfall	15.91	0.26	61.14	0.00	39.75	0.00

n.a. = not available.

Table 4 Facility choice for child curative care visit: Provider attributes included in successive steps with full set of community controls

	Distance only		Distance and fee		Distance, fee, quality	
	Coefficient	Z-statistic	Coefficient	Z-statistic	Coefficient	Z-statistic
Public visit versus no visit						
Distance nearest public (kilometers)	−0.363	−4.71	−0.352	−4.51	−0.360	−4.46
Price public visit			0.130	0.70	0.092	0.31
Number personnel public					0.006	4.55
Doctor ratio public					1.544	3.41
Nurse ratio public					0.116	0.38
ORT available public					1.042	4.72
Other diarrhea drug available public					−1.221	−4.16
Vaccine availability index public					0.615	4.37
Famp availability index public					0.335	1.14
Constant term	−3.159	−1.59	−3.222	−1.62	−4.514	−2.15
Private visit versus no visit						
Distance nearest private (kilometers)	−0.099	−4.22	−0.102	−4.29	−0.069	−2.43
Price private visit			−0.020	−1.23	−0.017	−0.82
Private provides postnatal					0.439	1.11
Number personnel private					0.002	1.25
Doctor ratio private					−0.400	−1.05
Nurse ratio private					−0.230	−0.52
ORT available private					−0.403	−2.00
Other diarrhea drug availability private					0.305	2.13
Vaccine availability index private					−0.757	−1.92
Famp availability index private					−0.601	2.09
Constant term	−5.358	−3.05	−5.073	−2.87	−5.482	−2.93
Traditional visits versus no visit						
Distance nearest traditional (kilometers)	−1.298	−4.67	−1.369	−4.59	−1.990	−5.41
Price traditional visit			0.035	0.32	0.241	2.10
Years education median traditional provider					0.010	1.31
Formal training median traditional					0.466	6.42
Constant term	−2.725	−1.75	−2.761	−1.78	−2.836	−1.82

Notes: Outcome of no visit is the base comparison category. Regression standard errors are Huber-adjusted for repeated observations on mother-child pairs. The full set of individual, household, rainfall, and community variables that appear in baseline model are included here.

Table 5 Facility choice for child curative care visit: Provider attributes included in successive steps with community controls replaced by municipality dummies

	Distance only		Distance and fee		Distance, fee, quality	
	Coefficient	Z-statistic	Coefficient	Z-statistic	Coefficient	Z-statistic
Public visit versus no visit						
Distance nearest public (kilometers)	−0.483	−7.43	−0.504	−7.81	−0.627	−8.08
Price public visit			−0.789	−5.17	−0.432	−1.44
Number personnel public					0.005	3.70
Doctor ratio public					1.885	3.01
Nurse ratio public					1.006	4.33
ORT available public					1.175	4.13
Other diarrhea drug available public					−0.646	−2.51
Vaccine availability index public					0.234	1.84
Famp availability index public					0.878	3.13
Constant term	−4.179	−2.22	−3.684	−1.97	−6.376	−3.34
Private visit versus no visit						
Distance nearest private (kilometers)	−0.110	−6.95	−0.115	−6.96	−0.128	−6.88
Price private visit			0.004	0.29	−0.006	−0.32
Private provides postnatal					1.487	3.92
Number personnel private					0.000	0.06
Doctor ratio private					−0.963	−2.37
Nurse ratio private					−0.897	−2.17
ORT available private					−0.063	−0.31
Other diarrhea drug available private					−0.329	−1.46
Vaccine availability index private					0.104	0.20
Famp availability index private					−0.500	−1.64

Constant term	−6.178	−3.71	−6.207	−3.72	−6.886	−4.02
Traditional visit versus no visit						
Distance nearest traditional (kilometers)	−0.182	−1.06	−0.173	−0.99	−0.237	−1.32
Price traditional visit			−0.041	−0.55	0.009	0.12
Years education median traditional provider					−0.005	−0.82
Formal training median traditional					0.061	0.96
Constant term	−3.890	−2.76	−3.808	−2.68	−3.888	−2.72

Notes: Outcome of no visit is the base comparison category. Regression standard errors Huber-adjusted for repeated observations on mother-child pairs. The full set of individual and household variables, as well dummies for eight municipalities, are included in the regression.

Table 6 Effects of health care price and quality on choice Facility effects constrained to equality

	(conditional logit regression)	
Variable	coefficient	Z-statistic
Distance	−0.147	−8.03
User fee	−0.002	−0.11
Postnatal services	−0.129	−0.31
Number personnel	−0.001	−1.30
Doctor ratio	0.869	6.25
Nurse ratio	0.608	4.63
ORT Available	0.257	4.88
Other diarrhea drug available	−0.131	−1.84
Vaccine availability index	0.668	9.44
Fampl availability index	−0.045	−0.44
Years education medicine traditional	0.012	3.05
Formal training medicine traditional	0.296	6.58
Public intercept	−5.361	−3.75
Private intercept	−6.684	−5.03
Traditional intercept	−4.205	−3.62

Observations: 30,919
Log likelihood: -35,472.48
Pseudo R2: 0.1724

Notes: Outcome of no visit is the base comparison category. Regression standard errors are not Huber-adjusted for repeated observations on mother-child pairs. Full set of individual, household, rainfall, and community variables which appear in baseline model is included here.

Table 7 Unconditional marginal facility effects: Multinomial versus nested multinomial logit models

	Inclusive value for nested specification: Coefficient = .359 t = 3.46					
	Public versus none		Private versus none		Traditional versus none	
	MNL	NMNL	MNL	NMNL	MNL	NMNL
Public facility						
Distance nearest public (kilometers)	−0.032	−0.025				
Price public visit	0.008	0.025				
Number personnel public	0.001	0.001				
Doctor ratio public	0.139	0.115				
Nurse ratio public	0.010	−0.046				
ORT available public	0.094	0.103				
Other diarrhea drug available public	−0.110	−0.179				
Vaccine availability index public	0.055	0.047				
Famp availability index public	0.030	0.041				
Private Facility						
Distance nearest private (kilometers)			−0.009	−0.001		
Price private visit			−0.002	0.001		
Private provides postnatal			0.059	0.068		
Number personnel private			0.000	0.000		
Doctor ratio private			−0.054	−0.033		
Nurse ratio private			−0.031	−0.011		
ORT available private			−0.054	−0.044		
Other diarrhea drug available private			0.041	0.038		
Vaccine availability index private			−0.102	−0.066		
Famp availability index private			−0.081	−0.020		
Traditional provider						
Distance nearest traditional (kilometers)					−0.310	−0.310
Price traditional visit					0.038	0.011
Years education median traditional provider					0.002	−0.001
Formal training median traditional					0.073	0.121

Notes: Outcome of no visit is the base comparison category. Full set of individual, household, rainfall, and community variables that appear in baseline model are included in this regression.

Table 8 Mean simulated probabilities of facility choice, by household asset level

	Public			Private			Traditional			No visit		
	All	Low	High	All	Low	High	All	Low	High	All	Low	High
Actual utilization	11.7	13.3	10.9	17.1	13.0	18.8	20.5	21.4	20.1	50.8	52.3	50.2
Baseline predicted probabilities	11.7	13.3	10.9	17.1	13.1	18.8	20.5	21.4	20.1	50.8	52.2	50.2
Make ORT available at public	13.7	14.3	13.5	16.6	12.9	18.2	20.1	21.2	19.6	49.6	51.6	48.7
percent change from baseline	*17.1*	*7.5*	*23.9*	*−2.9*	*−0.8*	*−3.2*	*−2.0*	*−0.9*	*−2.5*	*−2.4*	*−1.3*	*−3.0*
Make full range vaccines available at public	15.1	16.6	14.3	16.4	12.6	18.1	19.7	20.6	19.3	48.8	50.2	48.3
percent change from baseline	*29.1*	*24.8*	*31.2*	*−4.1*	*−3.1*	*−3.7*	*−3.9*	*−3.7*	*−4.0*	*−3.9*	*−4.0*	*−3.8*
Make full range family planning available at public	13.8	11.8	14.8	16.6	13.3	17.9	20.0	21.7	19.3	49.6	53.1	48.0
percent change from baseline	*17.9*	*−11.3*	*35.8*	*−2.9*	*2.3*	*−4.8*	*−2.4*	*1.4*	*−4.0*	*−2.4*	*1.5*	*−4.4*
ORT, vaccine, and family planning at public	20.3	15.8	22.5	15.3	12.7	16.2	18.6	20.8	17.6	45.9	50.7	43.7
percent change from baseline	*73.5*	*18.8*	*106.4*	*−10.5*	*−2.3*	*−13.8*	*−9.3*	*−2.8*	*−12.4*	*−9.6*	*−3.1*	*−12.9*
Reduce dist. to public for most remote households	12.3	13.6	11.8	17.0	13.0	18.7	20.3	21.3	19.9	50.4	52.0	49.7
percent change from baseline	*5.1*	*2.3*	*8.3*	*−0.6*	*0.0*	*−0.5*	*−1.0*	*−0.5*	*−1.0*	*−0.8*	*−0.6*	*−1.0*
Increase mother's education by 1 s.d. (3.7 years)	12.2	15.0	11.0	18.6	12.7	20.8	20.1	22.5	19.3	49.2	49.8	48.9
percent change from baseline	*4.3*	*12.8*	*0.9*	*8.8*	*−2.3*	*10.6*	*−2.0*	*5.1*	*−4.0*	*−3.1*	*−4.8*	*−2.6*
Increase assets by 1 s.d. (2,836 pesos)	10.3		9.9	18.9		19.5	19.5		19.4	51.3		51.2
percent change from baseline	*−12.0*		*−9.2*	*10.5*		*3.7*	*−4.9*		*−3.5*	*1.0*		*2.0*

APPENDIX TABLES{tc \l1 "APPENDIX TABLES}

Table 9 Exogenous variables Cebu, Philippines, 1983–86

Child	
Child's sex	1 = male, 0 = female
Child's age	Days since birth
Household	
Mother's education	Highest grade completed
Mother's age	Years
Mother's height	Centimeters
Husband's education	Highest grade completed
Husband's age	Years
Mother not in household	Mother never present in household during child's first two years.
Husband not in household	Husband never present in household during child's first two years
Mother senior woman	Mother is household head, spouse of head, or mother of head
Grandmother present	Sample woman's mother or mother-in-law present
Number of younger males	Number of males younger than sample
Number of younger females	Number of females younger than sample child
Number of older males under 6	Number of males older than sample child but younger than 6
Number of older females under 6	Number of females older than sample child but younger than 6
Male children age 6-13	Number of males age 6-13
Female children age 6-13	Number of females age 6-13
Males age 14-20	Number of males age 14-20
Females age 14-20	Number of females age 14-20
Males age 21-60	Number of males age 21-59
Females age 21-60	Number of females age 21-59
Males age 60 or over	Number of males age 60 or over
Females age 60 or over	Number of females age 60 or over
Household assets	Deflated value of total household asset holdings/1,000 in 1980 pesos
Health insurance	Child covered by health insurance
Health facility	
Distance to public/private	Kilometers from house to nearest public or private facility
Distance to traditional	Kilometers to nearest traditional facility from *barangay* center
Facility user fees	*Barangay* median deflated household expend. per visit by facility type, 1980 pesos
Postnatal provided	Facility provides child postnatal services
Number personnel	Total number personnel at facility
Doctor ratio	Proportion of doctors to total staff
Nurse ratio	Proportion of nurses to total staff
ORT availability	Facility has ORT supplies in stock (0-1)
Other diarrhea treatment available	Facility has intravenous diarrhea treatments in stock (0-1)
Vaccine availability index	Percentage of four basic child vaccinations facility has in stock
Family planning availability index	Percent of seven possible family planning supplies/treatments currently provided
Years education traditional provider	Median value of training of traditional providers in the community
Formal training traditional	Median value of training of traditional providers in the community

(continued)

Table 9 (continued)

Community nonhealth facility	
Piped/pumped water	Percent sample households in *barangay* w piped or pumped water into house or yard
Sanitary garbage	Percent sample households in *barangay* with sanitary garbage disposal
Water shortage	Frequent water shortages experienced in *barangay* (0-1)
Improved roads	*Barangay* has concrete or asphalt roads (0-1)
Bank dummy	*Barangay* has modern or "rural" bank (0-1)
High elevation	High elevation *barangay* (0-1)
Island	Island *barangay* (0-1)
Corn price	Deflated bi-monthly *barangay* corn prices per kilogram, 1980 pesos
Vegetable oil price	Deflated bi-monthly *barangay* vegetable oil prices per kilogram, 1980 pesos
Minimum formula price	Minimum real bi-monthly *barangay* infant formula price per milliliter, 1980 pesos
Rainfall	Monthly levels for region (millimeter)

Table 10 Summary statistics

Variable	Mean	Standard deviation
Child		
Child is male	0.53	0.50
Child age in months	12.73	6.92
Household		
Mother absent all 2 yrs	0.00	0.05
Mother educ years	7.36	3.71
Mother age years	27.43	6.19
Mother ht cm	150.77	5.10
Husband absent all 2 yrs	0.04	0.19
Husband educ years	7.43	4.10
Husband age years	29.18	8.78
Child covered by insurance	0.34	0.47
Asset value-1980 pesos/1000	8.72	34.68
Mother is senior woman	0.81	0.39
Grandmother present	0.21	0.41
Number of younger males in households	0.04	0.21
Number of younger females in households	0.04	0.20
Number of older under 6 yr male	1.06	0.85
Number of older under 6 yr female	0.99	0.84
Number of males 6-13	0.56	0.84
Number of females 6-13	0.56	0.84
Number of males 14-20	0.32	0.67
Number of females 14-20	0.43	0.72
Number of males 21-60	1.22	0.67
Number of females 21-60	1.22	0.74
Number of males over 60	0.06	0.24
Number of females over 60	0.08	0.27
Community nonhealth facility		
High elevation *barangay*	0.06	0.23
Island *barangay*	0.10	0.30
Comm avg piped/pumped water to house	0.13	0.08
Comm avg sanit garbage disposal	0.80	0.10
Comm has freq water shortages	0.14	0.35
Comm has improved roads	0.74	0.44
Community has bank	0.22	0.41
Comm avg fridge owners	0.07	0.04
Comm mdn time to water source	2.00	2.19
Comm avg modern toilet in house	0.40	0.20
Corn price-current month	198.51	33.05
Veg oil prc-current month	1.02	0.33
Formula prc-current month	2.72	0.48

Number of children: 2,884
Number of child-round observations: 30,919

Table 11 Nested multinomial logit Facility choice for child curative care

	Public versus traditional		Private versus traditional		Visit versus none	
	Coefficient	Z-statistic	Coefficient	Z-statistic	Coefficient	Z-statistic
Inclusive value					0.359	3.46
Public Facility						
DistNearestPublic(km)	−0.252	2.79				
PricePublicVisit	0.248	0.77				
NumberPersonnelPublic	0.008	5.08				
DoctorRatioPublic	1.144	2.19				
NurseRatioPublic	−0.461	1.30				
ORTAvailablePublic	1.019	4.18				
OthrDiarDrugAvlPublic	−1.780	5.37				
VaccAvailIndxPublic	0.463	2.86				
FampAvailIndxPublic	0.407	1.22				
Private Provider						
DistNearstPrivate(km)			−0.011	0.31		
PricePrivateVisit			0.008	0.24		
PrvtProvidesPostNatal			0.849	2.00		
NumberPersonnlPrivate			0.001	0.63		
DoctorRatioPrivate			−0.413	0.85		
NurseRatioPrivate			−0.142	0.24		
ORTAvailablePrivate			−0.548	2.30		
OthrDiarDrugAvlPrivat			0.474	2.59		
VaccAvailIndxPrivate			−0.824	1.68		
FampAvailIndxPrivate			−0.255	0.75		
Traditional Provider						
DistNearstTraditl(km)	1.895	3.72	1.895	3.72		
PriceTraditionalVisit	−0.065	0.41	−0.065	0.41		
YrsEducMedianTrdlPrvdr	0.008	0.69	0.008	0.69		
FormlTraingMedianTrdl	−0.742	5.09	−0.742	5.09		
Child						
ChildisMale	−0.077	0.93	0.048	0.63	0.145	3.30
ChildAgeMos1-6	−0.317	10.94	−0.242	8.53	0.217	6.78
ChildAgeMos7-24	−0.084	11.46	−0.065	10.66	−0.024	4.00
Household						
MotherAbsentAll2Yrs	0.739	1.11	0.737	1.80	−0.598	0.30
MotherEduc0-5Years	−0.003	0.08	0.032	0.85	0.046	1.92
MotherEduc>=6Yrs	0.024	1.67	0.037	3.14	0.007	0.88
MotherAge(Years)	−0.012	1.34	−0.002	0.240	−0.010	2.00
MotherHtto150cm	0.022	1.63	0.03	2.140	0.010	1.11
MotherHt>=150cm	−0.012	1.02	0.00	0.460	−0.007	1.17
HusbandAbsentAll2Yrs	0.818	2.50	0.90	3.120	−0.316	1.75
HusbandEduc0-5Years	0.096	2.52	0.05	1.350	−0.020	0.87
HusbandEduc>=6Yrs	−0.001	0.10	0.04	3.290	−0.016	2.00
HusbandAge(Years)	0.015	2.21	0.01	1.830	−0.002	0.50
Insurance	−0.026	0.34	0.23	3.640	0.015	0.37

(continued)

Table 11 (continued)

	Public versus traditional		Private versus traditional		Visit versus none	
	Coefficient	Z-statistic	Coefficient	Z-statistic	Coefficient	Z-statistic
Household (continued)						
AssetValue-LowestThird	−0.031	0.23	0.63	5.030	0.153	1.82
AssetValue-UpperTwoThrd	−0.002	0.96	0.00	1.970	−0.001	0.00
MotherIsSeniorWoman	−0.106	0.75	0.16	1.410	−0.025	0.33
GrandmotherPresent	0.065	0.45	0.089	0.81	0.005	0.06
#YoungerMalesInHH	0.096	0.68	−0.231	1.83	−0.212	3.12
#YoungerFemalesinHH	0.182	1.18	−0.105	0.78	−0.118	1.57
#OlderUnder6YrMale	0.021	0.45	−0.064	1.51	0.008	0.33
#OlderUnder6YrFeml	0.009	0.20	−0.072	1.71	0.046	1.77
#Males6-13	0.042	0.97	−0.024	0.66	0.004	0.16
#Females6-13	0.029	0.69	0.002	0.07	−0.013	0.62
#Males14-20	−0.026	0.53	−0.081	1.88	0.018	0.64
#Females14-20	−0.100	1.90	0.070	1.79	0.021	0.88
#Males21-60	0.033	0.60	0.060	1.27	−0.025	0.83
#Females21-60	0.013	0.25	0.088	1.93	0.021	0.72
#MalesOver60	0.068	0.47	−0.016	0.14	−0.147	2.07
#FemalesOver60	0.000	0.00	0.021	0.19	0.021	0.30
ConstantTerm	−0.644	0.26	−3.384	1.52	−2.207	1.62
Number of observations		15207			30919	
Pseudo R2		0.1177			0.0209	
Log likelihood		-14,402.588			-20,980.033	

Notes: Standard errors in the "visit vs none" column are cluster bootstrapped on 500 replications to account for estimated inclusive value. All standard errors are Huber-adjusted for repeated observations on mother-child pairs. Rainfall and community variables that appear in the baseline model are included in this regression.

FIGURES

Figure 1   Health care utilization, by log value household assets

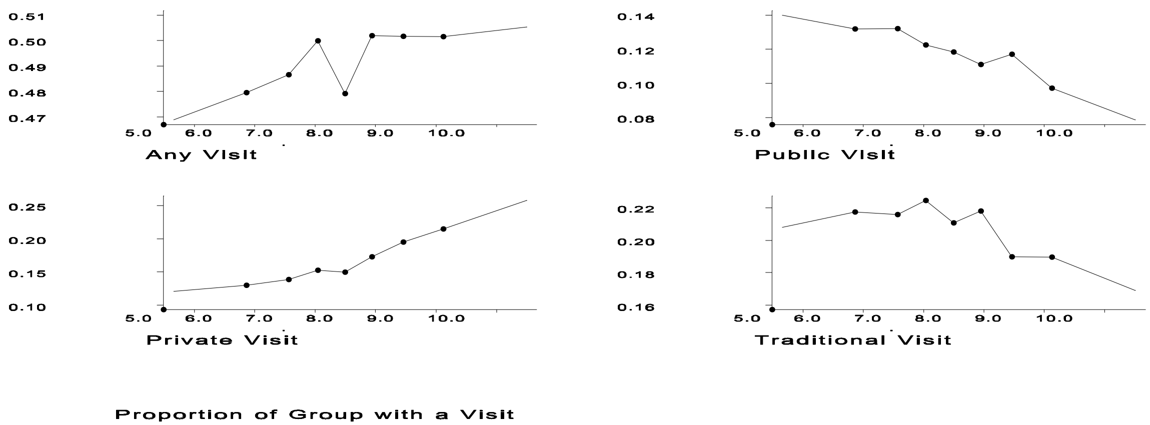


Figure 2 Health care utilization, by mother years of education

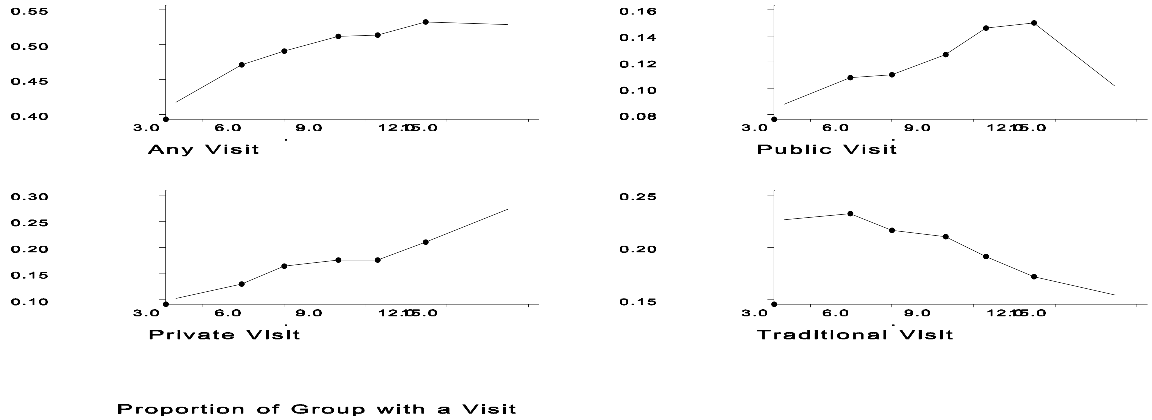
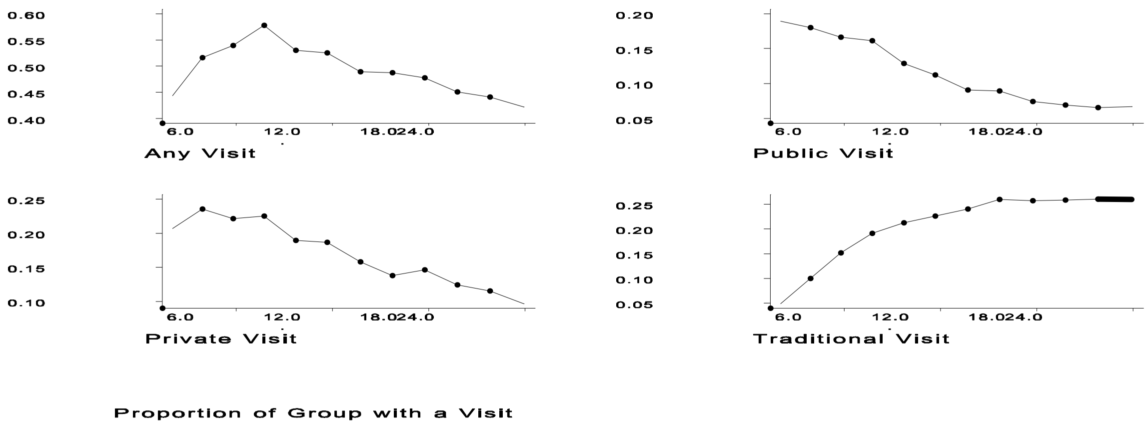


Figure 3 Health care utilization, by child month of age



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