Choices about Treatment for ARI and Diarrhea in Rural Guatemala

Noreen Goldman
Anne R. Pebley
Michele Gragnolati

CCPR-006-00

December 2000

California Center for Population Research
On-Line Working Paper Series

Choices about Treatment for ARI and Diarrhea in Rural Guatemala

Noreen Goldman[1]

Anne R. Pebley[2]

and

Michele Gragnolati[3]

December, 2000

[1]Professor of Demography and Public Affairs, Office of Population Research, Princeton University, Wallace Hall, Princeton, New Jersey 08540. Phone: (609) 258-5724. Fax: (609) 258-1039. E-mail: ngoldman@opr.princeton.edu

[2]Professor and Fred H. Bixby Chair, School of Public Health, University of California at Los Angeles, 650 Charles E Young Drive South, Los Angeles, California 90095.

[3]Human Development Department, Latin America and the Caribbean Region, The World Bank, 1818 H Street, N.W., Washington, DC 20433.

Abstract

This paper uses the 1995 Guatemalan Survey of Family Health (EGSF) to analyze the relationship between child illness and health seeking behavior. The EGSF contains detailed calendar data on the nature and timing of illness and treatment behavior for children age five and below; extensive information about the characteristics of mothers, families and communities; and data on the accessibility of traditional and biomedical providers within and near the community. The analysis is based on 870 children who began a diarrheal or respiratory illness during a two-week period prior to interview. Estimates are derived from a multinomial model of the probability of seeing a specific type of provider on a given day of illness, as a function of characteristics of the illness, child, mother, and community. The results indicate that modern medical care plays a major role in the treatment of infectious illness among children in rural Guatemala. The symptoms associated with the illness, their perceived severity, and mother's beliefs about their causes are important determinants of whether a child is brought to a provider and the type of provider visited. Poverty is a serious constraint on a family's choices about how to treat children's illnesses, whereas education and ethnicity have little effect on treatment behavior when income is held constant. In addition, the availability of modern health facilities within the community – both government-sponsored facilities and private doctors – has a substantial impact on the type of providers sought to treat children's illnesses.

Keywords: Diarrhea; ARI; Health interview survey; Treatment; Providers; Child Illness

Introduction

Social and economic development in Latin America has led to substantial improvements in living conditions and in child survival during the past several decades. However, these gains have been unevenly distributed: although child mortality has declined in all Latin American countries, several poorer countries in the region continue to experience relatively high child mortality rates. The primary causes of persistently high mortality are infectious diseases. Particularly important are diseases for which effective immunization is not widely available, such as diarrhea or acute respiratory infections (ARI).[1] Diarrheal and respiratory infections are common childhood diseases throughout the world. However, in poorer countries, children are more likely to experience repeated infections, to become seriously ill once they contract an infection, and to die, in part because they do not receive appropriate or timely treatment, either at home or from a health care provider.[2]

Family members, and mothers in particular, are generally the key actors in determining how childhood illnesses are treated. They decide what types of remedies and care a child receives at home, whether the child sees a health care provider, what type of provider, and whether to follow the provider's advice or purchase and administer the medication prescribed. Therefore, families' treatment choices are key to reductions in morbidity and mortality from diarrhea and ARI.

In this paper we examine family choices regarding treatment for childhood illness in rural Guatemala. Guatemala is among the poorest countries in the Western Hemisphere, with an average annual income of about US$1,580 in 1997 (World Bank, 1999). The under five mortality rate was 68 deaths per 1000 population in 1990-95, and even higher (74) in rural areas where

60% of the population lives (INE et al., 1996). The Guatemalan population is roughly evenly divided between the indigenous (descendants of Mayan and other pre-conquest groups) and ladinos, defined loosely as all non-indigenous Guatemalans. Ladinos live in both urban and rural areas while the indigenous population is predominantly rural. Average income for indigenous households is substantially lower than for ladino households, although in rural areas both ladino and indigenous households are generally poor (Steele, 1996; Beckett and Pebley, 2000).

Most previous studies of treatment choice in Guatemala and other poor countries are based either on small samples from one or a few communities or on data from large sample surveys which have collected very limited information on illness and treatment (Goldman and Heuveline, 2000). Unlike these studies, our analysis is based on detailed illness and treatment histories from a large population-based sample survey carried out in 60 rural Guatemalan communities in 1995. The first section of the paper outlines our hypotheses about the social and economic determinants of health care choice in rural Guatemala. Second, we describe the data used for this analysis and present descriptive results on health care providers. In the third section, we present an overview of children's illness patterns. The fourth section describes the multivariate analysis of treatment choice and presents results from multivariate models. These results are discussed in the final section.

Determinants of Treatment Choice

As in other poor countries, families in rural Guatemala face choices that are limited by the availability of biomedical health care. For example, while rural health posts and centers

provide free or low cost care in many communities, the quality of care and availability of medical supplies is often poor. Private physicians are available in or near some communities, but their services are generally expensive. By contrast, rural communities almost always have one or more non-biomedical health practitioners who treat children, often at lower cost than physicians (Pebley et al., 1996; Cosminsky, 1987; Weller et al., 1997, Granich, 1999). These practitioners include traditional and popular providers, such as curers (*curanderos*), midwives (*comadronas*), health promoters (*promotores)*[3], massage specialists (sobadores), and spiritual healers (*espiritistas, brujos, and others).* Pharmacists are also important sources of advice and treatment. Furthermore, previous research in rural Guatemala (Van der Stuyft et al., 1996; Weller et al., 1997; Cosminsky, 1987; Delgado et al., 1994; Heuveline and Goldman, 2000) indicates that home treatment of childhood illness, with commercial or home-made remedies, is also very common.

Based on previous research on the determinants of treatment choice (Andersen, 1995; Rosenstock, 1966; Mullen, 1987; House, 1987; Young, 1981) we hypothesize that family choices about treatment for children are constrained or facilitated by three major factors: (1) the availability of health services (both biomedical and non-biomedical) within reasonable distance of the community, (2) family income, and (3) family social ties which provide information, advice and support. As described above, the availability of biomedical health services is often limited in rural Guatemala. Access to non-biomedical providers also varies considerably among communities as we show later in the paper. Family income can be a serious constraint. Poorer families are less likely to be able to pay health care providers' fees or to purchase treatments prescribed. They are also less likely to have access to cars, taxis, or other forms of transportation that allow them to transport a sick child to health care providers who are further away. Social

ties with others can broaden treatment options, in at least three ways: (a) they are potential sources of information about health, treatment of illness, and health care providers, (b) they may provide access to "influential others", such as health care providers, who would not otherwise take the child as a patient, and (c) they are potential sources of material assistance such as cash and transportation.

Within the constraints imposed by health care availability, family income, and social ties, we posit that families make choices about treatment for childhood illness based on: (a) the characteristics of the illness, (b) their beliefs about health, (c) previous experience, (d) advice received from family members and neighbors, (e) parental education, and (f) ethnicity and language.

Not surprisingly, a number of studies have shown that the perceived severity of an illness is one of the most important determinants of treatment choice (Goldman and Heuveline, 2000; Weller et al., 1997; Yoder and Hornik, 1996). When an illness is perceived to be more severe, families are more likely to seek treatment from some type of provider and, specifically, to consult physicians and pharmacists rather than other types of providers (Goldman and Heuveline, 2000). Previous research has also shown that the presence of certain symptoms increases the likelihood of treatment by a health care provider. For example, Goldman and Heuveline (2000) found that children who have fever, and especially fever and gastrointestinal symptoms, are much more likely to be taken for treatment than others.

Beliefs about the causes of illness are likely to affect the choices about treatment. For example, families who believe that infection causes ARI or diarrhea may be more likely to seek help from a biomedical provider (who shares their beliefs) than those who believe the illness is caused by, for example, hot-cold imbalance. Non-biomedical beliefs about the causes of

childhood illness remain common in Guatemala (Cosminsky and Scrimshaw, 1980; Cosminsky, 1987; Tedlock, 1992; Scrimshaw and Hurtado, 1988; Burleigh et al., 1990; Pebley et al., 1999) and many other countries (Weiss, 1988; Pedersen and Coloma, 1983), although biomedical beliefs may have become more prevalent in recent years (Goldman et al., 2000; McKee, 1987). Biomedical and nonbiomedical beliefs about the causes of childhood illness are not necessary mutually exclusive in rural Guatemala: for example, it is not uncommon for adults to believe that diarrhea can be caused both by germs *and* by folk explanations.

One common belief in rural Guatemala is that imbalance of hot and cold in the body can cause diarrhea, respiratory illness, and other problems. Hot and cold qualities apply to foods (e.g., beef and sugar are "hot"), but also to activities (e.g., touching cold ground), emotions (e.g., anger) and physical states (e.g., pregnancy). The appropriate treatment for hot-cold imbalance is to restore the balance, usually through intake of foods or liquids, or through other treatments like sweat baths (*temascal)*. Other folk causes include the action of stomach worms (*lombrices*), excessively hot or cold weather, the evil eye, developmental explanations (e.g., illness associated with teething or crawling) and classic folk explanations such as the evil eye, *empacho*, and *susto* (Pebley et al., 1999; Goldman et al., 2000). Traditional providers, such as curers (*curanderos*), are believed to be able to diagnose these conditions and recommend treatment. Although ethnic differences in health behavior are often attributed to differences in health beliefs, indigenous and ladino mothers in rural Guatemala generally give similar answers about the causes of childhood illness (Pebley et al., 1999; Goldman et al., 2000).

Previous childrearing experience and experience with the particular child who is ill are also likely to affect choices about treatment. In general, less experienced parents may be less confident in their own ability to treat a sick child with home remedies and may be more likely to

take the child to a health care provider or to consult family members. Previous experience with the particular child who is ill is also likely to affect treatment: a child who is generally in poor health may be more likely to be taken for treatment when he or she becomes ill. However, Goldman and Heuveline (2000) found that children in very good – not very poor – health were significantly more likely to see a health care provider than other children. One reason may be that parents perceive a *change* from good health to illness as more serious than a chronic state of poor health. However, the observed relationship may be a spurious correlation because variables not included in Goldman and Heuveline's models (such as family income and parental education) may be related both to good health status and to use of providers. We explore this issue further in the analysis section.

Advice from other household members or from neighbors or friends may play an important role in determining the type of treatment a child received. For example, a young mother living with her husband and parents-in-law may depend on her in-laws' or husband's opinion about appropriate treatment. Advice from others may be especially influential in choices made by inexperienced or young parents.

There is a large demographic, public health, and anthropological literature suggesting that more educated parents – particularly mothers – in poor countries use financial and other resources more effectively than more poorly educated parents to find effective treatment when children become ill (Caldwell, 1986; Cleland and Van Ginnekin, 1988; Lindenbaum, 1990; Das Gupta, 1990). More educated mothers are hypothesized to have more self-confidence and more control over family resources, and to demand better service from health care providers. However, Desai and Alva (1998) have recently questioned the effects of maternal education on children's health and survival. One problem with many previous analyses is that they do not

include household income, which, as we have argued above, is a serious constraint on families' ability to seek treatment for sick children in poor countries. The reason for this omission is the difficulty of measuring household income in countries where subsistence agriculture, payment in kind, and informal employment are important sources of income. In this analysis, we use a data set which includes both high quality household income data and data on parental education.

Finally, the indigenous population of Guatemala has substantially higher infant and child mortality, poorer children's health, and lower use of health care services than the ladino population (Robles, 1996; Pebley et al., 1996). Differential health care use by ethnicity may be due to ethnic differences in health beliefs or to language barriers for non-Spanish speaking indigenous families, because most biomedical providers are generally monolingual Spanish speakers (Pebley et al., 1996). Alternatively, ethnic differences may be due to large disparities in household income and in access to health care services between indigenous and ladino families.

Data

We test these hypotheses using data from the Guatemalan Survey of Family Health (known in Spanish as the *Encuesta Guatemalteca de Salud Familiar* or EGSF), conducted by Princeton University, RAND, and the Instituto de Nutrición de Centro América y Panamá in 1995. The EGSF is based on a sample of households in rural communities (i.e., communities with between 200 and 10,000 inhabitants) within four departments of Guatemala (Chimaltenango, Totonicapán, Suchitepequez and Jalapa). The four departments were selected on the basis of social, economic, and environmental diversity, and ethnic composition.

A total of 60 communities were included in the survey, 15 in each of the selected departments. Communities were selected with probability proportional to population size to yield self-weighting samples within departments. The EGSF collected data from: (1) a sample of women, (2) community key informants, and (3) a sample of health care providers in each community. Approximately 50 women ages 18-35 were sampled at random[4] in each community, for a total of 2,872 women. The EGSF community survey collected data from three key informants in each of the 60 communities,[5] who were selected because of knowledge of the community. Data were also collected in interviews with health providers, including one doctor, one midwife, two other providers (primarily traditional providers such as curers, massage therapists or herbalists), and the head of the health post or center that was closest to the community in each location. The total provider sample includes 31 private doctors, 169 other providers, and personnel in 48 health posts or centers. Our analysis employs data from all three parts of the EGSF survey, as described below.

Individual Survey Data

The main part of the analysis is based primarily on data from the individual questionnaire administered to women ages 18-35. In particular, we use the questionnaire's calendar section that recorded data on the timing and nature of illness and treatment behavior for a two-week period prior to survey. In this section, mothers were asked about diarrheal and respiratory illness for a maximum of two children born since 1990. They were first asked whether a child had each of eight specific symptoms related to acute respiratory infection or diarrhea during the preceding two weeks. The eight symptoms are constant cough; "boiling of the chest", panting, wheezing, or difficulty breathing, high fever; weakness, apathy, or lethargy; diarrhea more than three times

a day, blood in stools, and vomiting. Some of these symptoms have been shown in other studies to have high sensitivity and specificity (Kalter et al., 1991; Kroeger, 1983; Boerma & Van Ginneken, 1992). The symptoms were adapted to the rural Guatemalan setting based on medical anthropological research and our own pilot study. For example, Guatemalan mothers frequently mentioned "boiling of the chest" (*hervor de pecho* in Spanish) to refer to the noise made by congestion. This symptom was found to be associated with cough, bronchitis and bronchopneumonia (INCAP, 1994).

If a child experienced any of the eight symptoms, mothers were asked when the symptom began and on which days during the past two weeks the symptom was present. They were also asked about any other symptoms experienced during this time, whether they perceived the symptoms as serious, whether they asked others (relatives, neighbors or friends) for advice or visited providers regarding their child's illness, and whether they or anyone else administered any treatment. Interviewers recorded information on the presence of symptoms, seriousness and treatment in the appropriate days of the calendar, indexed from 14 (14 days or two weeks before interview) to zero (the day of interview). Interviewers subsequently obtained additional information including the nature of the advice and treatment as well as the cost and perceived effectiveness about each person who gave advice, each provider sought for treatment, and each treatment recorded in the calendar. For families with more than one living child born since 1990, the entire section of the questionnaire was asked for both the youngest and the penultimate child (Peterson et al., 1997).

An evaluation of these calendar data revealed several advantages of this approach for the measurement of illness and treatment behavior. In contrast to more conventional questionnaire designs, the calendar data in the EGSF: (1) offer a richer and more complex description of child

illness and treatment behavior and (2) permit a much more complete evaluation of the accuracy of reporting (Goldman et al., 1998). An analysis of data quality indicated that estimates of illness derived from the EGSF calendar are consistent with other available information. However, this evaluation also revealed that estimates of prevalence for the most recent two-week period in both the EGSF and in other data sources are likely to be biased downwards (Heuveline and Goldman, 2000).

Information on family and household characteristics used in this analysis come from sections of the individual questionnaire on the respondent's background, health beliefs, social networks, economic status, and characteristics of each of her births.

Key Informant Data

Data on community characteristics come primarily from the three key informant questionnaires administered in each community in the EGSF. These data are used to describe availability of health services in these communities in the first part of the analysis and, later on, as the primary source of community characteristics in the main analysis. The key informant questionnaire provides information on economic activities, wages, infrastructure, services, transportation, migration and other aspects of community life, along with a listing of providers and health facilities within a 20 km. radius of the communities. The listings of providers and facilities from the three key informants were consolidated to construct a "census" of health care providers for each community, which formed the sampling frame for the provider interviews.

Health Care Provider Data

We use data from the EGSF survey of health care providers in the initial part of the analysis. Specialized questionnaires were developed for different types of providers, i.e., for private doctors, for health posts/centers, and for "other" providers (e.g., curers, midwives, etc.). Each questionnaire contains information on the provider's training and background, types of treatment provided, referrals to other providers, patient load, and fees.

Availability of Health Care

We begin by examining the availability of both biomedical and traditional providers for the 60 communities in the EGSF, based on data in the EGSF census of providers. Availability is measured by proximity to the community, and by whether the providers treat children, how much they charge for the consultation and treatment, and whether they are willing to accept payment in kind or in installments.

Table 1 shows the proportion of communities that have health care providers and facilities in the community and within one hour's travel of the center of the community. We include only the two most common types of non-biomedical providers – midwives and curers. Although midwives' primary focus is pregnancy and delivery, they also treat illness in many cases. Most midwives in these communities are generally traditional birth attendants with, at most, limited biomedical training. Many communities have additional types of non-biomedical providers, such as bonesetters, masseurs and spiritists.

It is clear from Table 1 that access varies markedly depending on type of provider and facility. There are midwives in virtually all communities and curers in the great majority. By

contrast, less than one quarter of communities have a private doctor and in only about half is there a private doctor within one hour of travel time.[6] Most communities have access to a health post or center, and to a pharmacy – although in both cases these facilities are often located outside the community. On the other hand, only four have a hospital in the community and relatively few have access to a hospital within one hour's travel.

In Table 2, we use data from health care provider interviews to examine characteristics of different types of providers. Some traditional practitioners provide several different types of services – for example, midwives may also be curers or other types of providers (e.g., massage specialists). To take this overlap into account, we use three categories of non-biomedical providers in Table 2 – providers who are principally midwives, those who are principally curers, and those who say that they are both midwives and curers.

Virtually all providers considered in Table 2 treat children. The exception is midwives whose main clientele is pregnant women. Nevertheless, almost a quarter of midwives say that they treat children as well.

Fees charged for consultation and treatment vary markedly. Because the fee structure generally differs between biomedical and non-biomedical providers, these two groups of providers were asked about their typical fees in different ways. Doctors and health posts/centers were asked about how much they would charge for a *consultation* (which may not include the cost of drugs or treatments prescribed by these providers) whereas non-biomedical providers were asked about the cost of *treatments* (home remedies, purchased remedies, injections, and other treatments) administered by the provider for diarrhea or respiratory illness.

Consultation at government health centers and posts is free although there is often a nominal per visit fee of 25 centavos[7] (US$0.05) which about half of the posts and centers in the

sample charge. Even though the average fees charged by providers may appear to be modest (e.g., the average fee for private doctors is Q14.70 or about US$3), they are high relative to family income in these communities. Consumption data from the EGSF individual questionnaire show that monthly household income averages approximately Q146 or about US$29 across the 60 communities.[8] Thus, the cost of one visit to a private physician is equivalent to 10% of monthly income. Private physicians' fees are also high in comparison to other providers: the average fee charged by private doctors is more than ten times that fee charged by midwives and midwife/curers and more than five times the fee charged by curers.

Previous research in rural Guatemala suggests that the need to pay health care in cash at the time it is provided is a major obstacle to seeking care for many families (Cosminsky, 1987; Weller et al., 1997). For this reason, providers were also asked their payment terms for patients who cannot afford to pay or do not have adequate cash. Most providers said that they would accept payment in kind or provide free care if a patient is unable to pay. Private doctors are much more likely to say that they would provide free care if patients cannot pay, while other providers are more likely to accept payment in kind in this situation. In the EGSF, practitioners were asked whether they accept payment in kind or provide free care for patients that cannot pay and whether they give credit or accept payment in installments. As shown in Table 2, three-quarters of private doctors say that they give credit and/or accept installment payments, with credit being the most common approach. Among curers, about 91% either give credit or accept installments, and most do both. All midwives and midwife/curers either accept installments or give credit.

In many countries, health insurance provides increased access to health care providers for poorer families. The EGSF collected information on health insurance coverage for respondents

and their families, and on other access that families had to free health care (e.g., through the national social security system (IGSS), or through local governmental, non-governmental, religious, or other organizations). Estimates (not shown) indicate that about 13 percent of respondents and their families had health insurance and about 19 percent had access to free care.

In summary, these results show that private doctors are much less accessible than government health posts and centers, on one hand, and than curers and/or midwives, on the other. This is true in terms of location, fee levels, and payment terms. Health posts and centers are by far the cheapest alternative. Midwives are the most commonly available type of providers, although many of them do not treat children. Curers are somewhat more expensive than health posts and centers and than midwives, and are about as prevalent in or near these communities as health posts and centers. Pharmacies are also relatively common. Although they were not included in the provider survey, the prices at pharmacies obviously vary markedly depending on what type of treatment or medication is purchased.

Patterns of Children's Illness

Next we consider children's illness patterns in EGSF children.[9] As described above, EGSF mothers provided information about their children's symptoms in the individual questionnaire in a calendar format. Data regarding symptoms were obtained from a total of 3,193 children in the EGSF, 45 percent (1,446) of whom experienced at least one symptom during the two-week calendar period. Because our main objective is to examine treatment behavior, we restrict our analysis to 870 of these children whose illness began (i.e., who experienced their first symptom) subsequent to the start of the calendar period, for two reasons.

First, information on very recent visits to providers is more likely to be accurate than data on earlier visits. And second, data on the timing of treatment were not obtained for days prior to the start of the calendar period.

Estimates of the two-week prevalence, median duration, and percent of symptoms perceived to be serious, for each of the eight solicited symptoms of diarrhea and ARI, are presented in Table 3. During the two-week period prior to survey, nearly half (45.3 percent) of children age five and under experienced at least one of these symptoms. There is substantial variability in the persistence of the different symptoms, ranging from about two days for vomiting, blood in the stools, and high fever to 11 days for constant cough. Overall, just under one-quarter of days with symptoms were considered by mothers to be serious, with the prevalence of severity varying by the type of symptom. Vomiting, in particular, is more likely than other symptoms to be considered serious.

Table 4 reveals some of the complexity of illness patterns in terms of the frequency of multiple symptoms. Among the 1,446 children with at least one symptom reported in the calendar, about two-thirds experienced more than one symptom. On average, 1.8 symptoms were reported on a day with some illness. The prevalence of multiple symptoms is considerably higher when measured in terms of the period of the illness, rather than the calendar day. For example, children experiencing symptoms such as vomiting and panting typically experienced three or more accompanying symptoms at some time during the calendar period (not shown).

The frequent occurrence of multiple symptoms during the course of an illness complicates the characterization of the illness in several important ways. Individual symptoms typically start and end on different days, making it difficult to identify the beginning and end of an illness and, consequently, to estimate the frequency of the illness. The occurrence of multiple

symptoms also makes it hard to identify a particular illness and to use standard categories to classify an illness. For example, results not presented here show that among children with at least one reported respiratory symptom, 42 percent were also reported to have had at least one gastrointestinal symptom during the same period – a finding which reduces the utility of categorizing illnesses as *either* respiratory *or* diarrheal. Because of the heterogenous nature of children's illness patterns, we do not identify illness episodes as ARI or diarrhea in this analysis. Rather, we model treatment-seeking behavior as the presence or absence of selected symptoms, recognizing the frequent occurrence of multiple symptoms.

Structuring the analysis around symptoms rather than specific syndromes or diseases (as defined by biomedicine or by folk beliefs) also has a substantive advantage for the analysis of treatment choices. Specifically, what families actually observe and react to is most likely to be children's symptoms.

Determinants of Treatment

Analytical Strategy

In this section, we examine treatment behavior and its determinants. An earlier EGSF study (Heuveline and Goldman, 2000) showed that the vast majority (about 90 percent) of sick children received some form of treatment, generally medicine, but occasionally herbs, teas, or home remedies.[10] As shown in Table 5, among the 870 children who comprise the sample for analysis (i.e., children whose symptoms begin during the calendar period), only about one-third visited a provider during the calendar period. Pharmacists, who dispense advice as well as medication but generally are not professionally trained (Van der Stuyft et al., 1996), were the

providers most apt to have been consulted. Doctors and the staff of government-sponsored health posts or centers were seen more frequently than curers and other types of providers. The category of "other" providers includes primarily health promoters, midwives, and nurses, but also encompasses several non-biomedical providers.

To investigate the relationship between family, community, child, and illness characteristics described earlier in this paper and treatment choices, we use multinomial logistic models in which the day of illness is the unit of analysis. The outcome variable represents visits,[11] if any, to specific types of providers on a given day of illness. These models are far better suited to an analysis of treatment behavior than conventional regression models in which children or illnesses are the units of analysis, since conventional models cannot account for: (1) the fact that the probability of seeking treatment is likely to vary markedly by duration of illness and (2) right censoring of observations, that is, that we cannot examine the entire period of episodes of illness that are in progress at the time of interview and hence we are unable to observe that some sick children see a provider subsequent to the interview. Statistical models that do not take duration and censoring into account provide an incomplete and potentially biased picture of treatment behavior.

The models are based on a sample of days pertaining to the 870 children whose illnesses began in the calendar period; these 870 children belong to 751 families. The day of interview is excluded from the sample because it represents an incomplete day of exposure to seeking treatment. In addition, days in which children did not have any symptoms are excluded because no respondent reported seeing a provider on these days. The final sample for analysis – i.e., all days with symptoms between 1 and 13 days before interview – includes 4344 days, yielding an average of five days of illness for each child in the sample.

Explanatory Variables

As described above, previous research suggests that families' choices about health care in rural Guatemala are determined by: (a) availability of providers, (b) household income, (c) social ties, (d) characteristics of the illness, (e) beliefs about health, (f) previous experience, (g) advice received from family members, (h) parental education, and (i) ethnicity and language. To represent variations in the availability of providers, we include two variables: whether or not there is a health post/center in the community and whether or not there is a private physician in the community. Most communities have midwives and curers so that most of the variation in availability relates to these two types of biomedical care. Our measure of household income is derived from women's reports in the EGSF regarding household consumption of 40 staples and food products bought, harvested, produced, or gathered in the week preceding the survey. Consumption has been shown to represent more accurately longer term household income than earnings and sales of agricultural produce, especially in poor households in developing countries where subsistence agriculture and informal employment are important sources of income (Montgomery et al., 2000; Deaton, 1989).

In the case of social ties, we focus on ties that may provide access to or information about treatment options and health care providers. These ties can be categorized as (1) involvement in the community as a proxy for the amount and diversity of contact the family has with others in their community, and (2) contacts and experience outside the community. Community involvement was measured by whether the respondent participates in a woman's group and whether the respondent or members of her family are involved in community organizations. Contacts and experience outside the community were measured by whether the respondent ever lived in a city or large town and whether her family has relatives in Guatemala City or abroad.

The analysis includes three characteristics of illness on a given day**:** the type of symptoms, duration of symptoms, and mother's perception of the severity of symptoms. Goldman and Heuveline (2000) show that the type of symptoms is well-represented by a four-category classification: (1) only respiratory symptoms; (2) fever with gastrointestinal symptoms; (3) fever without any gastrointestinal symptoms (but possibly with other symptoms); and (4) all other symptoms alone or in combination. Duration of illness is measured as the number of consecutive days with symptoms, grouped in four categories: day 1, day 2, days 3-5, and days 6 and higher. Severity of illness is modeled as a dummy variable indicating whether or not the child's mother reported that the symptoms were serious on a given day.

Mothers' health beliefs are represented by two dummy variables based on a mother's (potentially multiple) responses about the causes of her child's symptoms. The first variable indicates whether the beliefs are related to hygiene or contamination and includes such responses as children putting dirty food or other items in their mouths, mothers not washing hands, and the presence of microbes or an infection (Goldman et al., 2000). This variable is intended to identify families holding biomedical beliefs about illness causation, although it is likely that many of the responses in the hygiene/contamination category do not actually reflect knowledge about germ theory (see, for example, Pebley et al., 1999; McKee 1987). The second variable indicates whether the beliefs are related to traditional folk illnesses such as the evil eye and *empacho*.

Previous experience with this particular child and with childrearing in general is represented by several variables. Variables related to experience with this particular child include the child's age and the mother's overall subjective assessment of the child's general health status. Age is represented by a dummy variable indicating whether the child is an infant (i.e., below 12 months of age). Perceived general health status since the time of birth is indicated

by a dummy variable denoting very good health; the reference category contains children whose health status was assessed as very poor, poor, fair or good. Experience with childrearing in general is represented by the child's parity, that is, the number of live births the mother had including this child.

Advice received from family members is represented by two proxy measures. First, we include a set of dummy variables indicating how many of the mother's parents or parents in-law live in her household or nearby. We hypothesize that parents and in-laws hold more traditional beliefs about children's illness and are more likely to advise daughters or daughters-in-law to treat their children's illness with home remedies or to use non-biomedical providers. Second, we include an index of the mother's role in household decision-making, which we refer to as the household decision-making index (HDI) (Seltzer et al., 1997). Respondents in the EGSF who were married (legally or in a consensual union) were asked four questions regarding household decision making: which household member(s) make decisions about buying food, buying medicine, and seeking treatment when the woman is ill, and about who controls the money for household expenses. Each of these items was recoded as a dichotomous variable that distinguishes between women who report that they make the decision alone and other women. The HDI is calculated as the sum of these four items, so that a higher value on the HDI indicates a higher level of household decision-making autonomy for the respondent. Because this information is restricted to married respondents, the HDI is included along with a dummy variable indicating the respondent's marital status.

For parental educational attainment we include two variables indicating the number of years of school completed by the respondent and by her husband.[12] Ethnicity and language variables are based on responses to questions about ethnic self-identity and about the

respondent's ability to speak Spanish (see Pebley et al., 2000). The models include a set of dummy variables indicating whether the respondent is: (1) ladino, (2) indigenous and speaks Spanish, and (3) indigenous and doesn't speak Spanish.

In addition to the variables described above, the models also incorporate a set of dummy variables denoting the four departments in which the survey took place. The inclusion of these variables compensates for the fact that the EGSF sample is not self-weighting across departments.

Results

Table 6 shows the distributions and means of the outcome variable and the explanatory variables described above; the latter are categorized according to whether the characteristics refer to the illness, child, family, or community. Tables 7 and 8 present estimates derived from a multinomial logit model of the probability that the child saw a provider on a particular day of illness. The outcome includes six categories: pharmacist, health post or center, doctor, curer, other providers, and no provider (which is the base or reference category).

The estimates in Table 7 are exponentiated coefficients from the multinomial model, known as relative risk ratios. Because these ratios are cumbersome to interpret,[13] in Table 8 we present predicted percentages based on the identical multinomial model. These predicted values were calculated by (1) setting all variables except those under consideration (e.g., the four categories of symptoms) to their observed values for each observation in the sample and (2) setting the variables under consideration at a chosen value (e.g., 1 or 0 in the case of categorical variables). For example, the predicted percentages for type of symptom provide a comparison of the percent of days in which the child sees a provider conditional on having each of the specified

symptoms, under the assumption that all variables other than symptom are identical. These predicted percentages refer to a *single day of illness* rather than the entire duration and hence are relatively small in comparison with the likelihood that a provider is consulted sometime during the course of an illness.

Because of the large number of parameters estimated in multinomial logit models, we excluded from the final model in Tables 7 and 8 variables that were *not* significantly associated with the outcome variable, in the interests of parsimony.[14] Significance was assessed by a Chi-square test on the coefficients across the five outcomes.[15] A number of variables shown in Table 6 that were hypothesized to be important determinants of treatment choice were not significant in initial models and were therefore dropped from the final model. These variables include parity, both measures of access to health insurance or free health care, all four measures of social ties, mother's education, husband's education and ethnicity.

In the case of mother's education, husband's education and ethnicity, the results of initial analyses are particularly intriguing. As shown in the first panel of Table 9, when each of these variables is added one at a time to a model containing all of the variables shown in Table 7 – *except* for our proxy measure of income (consumption per capita) – both mother's education ($p=0.01$) and ethnicity ($p=0.03$) are significant, while husband's education is almost significant at the 0.05 level ($p=0.07$). However, because of substantial correlation among these variables – e.g., more educated women and Spanish speakers have higher incomes – none of them remains significant when added simultaneously to a model containing income (see the second panel of Table 9). In contrast, income continues to be significantly associated with seeing a provider ($p<0.001$) even in the presence of these three inter-correlated variables. Thus, additional income seems to be more important than either additional years of education (for the mother or her

spouse) or being ladino. An important caveat is that women and their husbands in this sample had generally low educational attainment, and thus the variability in education was fairly limited. Nonetheless, the literature on the effects of maternal education on child health would suggest that we should have found a significant effect of maternal education independent of income.

The finding that a substantial part of the difference by ethnicity in health care appears to be due to differential social class is consistent with earlier research (Goldman and Pebley, 1994; Pebley et al., 1996). Nonetheless, it is worth noting that there may be differences in the type of providers that indigenous families choose, although the relevant coefficients are not statistically significant. Indigenous mothers appear to be considerably less likely to take sick children to see doctors and more likely to consult pharmacists, compared to ladinos, even when income is held constant.

The results from the first two panels of Table 7 and 8 show that the characteristics of the illness and of the child are important determinants of which types of providers are consulted about children's illnesses. These results are similar to those reported in Goldman and Heuveline (2000). The addition of family and community-level variables does little to alter the coefficients on the illness and child characteristics variables. The estimates by duration suggest that, while families are most likely to visit biomedical providers on the first or second day of illness, they are increasingly likely to consult curers as the illness continues. The probability of consulting any provider (except a curer) is highest for children experiencing fever, and especially fever in combination with gastrointestinal symptoms, and lowest for children with only respiratory symptoms. In addition, mothers are much more likely to consult a provider (e.g., two to three times as likely per day, according to estimates in Table 8) when they perceive the symptoms to be serious. The lack of a significant association between severity and visits to health posts and

centers is probably the result of the minimal fees for visits to these facilities. Thus, families can afford to use them even for relatively minor illnesses.

Mothers' health beliefs about the causes of the child's illness affect the likelihood of seeking a provider, particularly doctors and curers. Children with illnesses for which mothers beliefs are related to hygiene are more likely to see a doctor, while children with illnesses which mothers think are due to folk causes are more likely to see a curer, as compared with their counterparts holding different beliefs. Other types of health beliefs – such as the highly prevalent beliefs related to eating or to hot-cold typologies as causes of illness – were not related to the likelihood of consulting different providers (not shown).

Mothers are more likely to seek treatment for infants than for older children, except for visits to pharmacists. The reason that the age differential is reversed for pharmacists may be that families are reluctant to give medicine to infants without consulting more formal providers. Surprisingly, children perceived to have been in very good health over their lifetimes are more likely to be treated by most types of providers and especially by curers, although only the coefficient on curers is statistically significant. This apparent favoritism toward very healthy children suggests that either families may be more distressed by the appearance of illness among normally healthy children or that they may be more willing to invest their scarce resources in children who are most likely to lead long productive lives.

According to the estimates in Table 8, higher income (as measured by per capita consumption in the household) is associated with a higher probability of visiting each kind of provider, but especially doctors. Unmarried respondents (who are primarily single or divorced) are much more likely than those who are married or in a consensual union to consult a pharmacist or doctor for their sick child. The household decision-making index (HDI), measured

only for married women, has a modest impact on seeking a provider. Higher levels of decision-making authority are associated with a greater probability of consulting a pharmacist and a doctor and a lower probability of consulting "other" providers, but only the last association is statistically significant.

Co-residence or proximity to parents or parents-in-laws also affects the likelihood of seeking health providers. Women who have at least one parent or in-law nearby are considerably more likely than their counterparts to treat their children's illnesses at health posts or centers. Those who have at least two nearby are also much more likely (e.g., almost four times as likely, for the simulated values shown in Table 8) than other women to consult a curer. This result suggests that proximity of children's grandparents has a substantial effect on parental responses to illness. Greater proximity of grandparents makes it more likely that sick children are taken to health posts or centers and to curers.

The estimates in Tables 7 and 8 reveal that availability of health care significantly affects the likelihood of consulting specific providers. Parents are more much likely to take sick children to health posts and centers when there is a post or center in the community. Similarly, parents are much more likely to consult a doctor if there is one in the community. The results also suggest that there is substantial competition among providers. Specifically, availability of physicians is associated with a *decreased* likelihood that families consult a curer. In addition, the presence of a private physician is associated with a reduced probability of visiting a health post or center, and vice versa.

Discussion

Data from the 1995 Guatemalan Survey of Family Health provide a unique opportunity to examine families' choices regarding treatment for child illness in rural Guatemala. Unlike most other studies of health-seeking behavior, these data are based on a large population-based sample and provide extensive information about the child, mother and household, and community of residence. Inclusion of daily calendar-type information on symptoms and treatment permits statistically unbiased estimation of the association between a broad range of explanatory variables and the likelihood of visits to different types of providers. To the best of our knowledge, no previous study has produced estimates of this type for a developing country.

The results confirm findings from small-scale community studies that modern medical care plays a major role in the treatment of ARI and diarrhea among children in rural Guatemala. Mothers are much more likely to take their sick children to pharmacists, doctors, and personnel at health posts and centers than to traditional practitioners. This preference toward biomedical providers occurs in spite of the fact that curers and midwives are available in or near most communities, whereas private doctors are much less accessible and more costly than other providers.

These findings also confirm results by Goldman and Heuveline (2000) indicating that characteristics of the illness are important determinants of health-seeking behavior. In the presence of an extensive set of variables describing the family and the community, the type and severity of symptoms have a large impact on whether a provider is sought and the type of provider sought. In addition, a mother's beliefs about the underlying causes of her child's illness have modest effects on health-seeking behavior. Two variables pertaining to the sick child, both

of which partly reflect the mother's experience with her child, also reveal a significant association with the likelihood of provider visits: the child's age and his or her general health status.

Our results demonstrate that poverty is a very serious constraint on a family's choices about whether and how to treat children's illnesses. The level of family income – as measured by household consumption per capita – is a strong determinant of health-seeking behavior. However, other measures of social status, including a mother's education, her ethnicity, and her husband's education, are not significantly associated with the likelihood of visits to providers, once income is held constant. These findings, which contradict those from many previous studies in Latin America and elsewhere, may reflect the use of a more accurate measure of income in this analysis. If so, some of the effects of parents' (and especially mothers') education on health behavior or health outcomes in earlier studies may in fact be due to unmeasured or poorly measured income or wealth. An alternative explanation is that our findings result from the relatively modest range of education levels in the EGSF sample. For ethnicity, this analysis suggests that the indigenous population's relatively low use of biomedical providers to treat children's illnesses is due more to financial constraints than to cultural beliefs and practices.[16]

Contrary to our hypothesis, the respondent's social ties within and outside the community have little association with health-seeking behavior. These results are in contrast to findings from a study of the diffusion of health beliefs related to hygiene in rural Guatemala, also based on data from the EGSF (Goldman et al., 2000). This study revealed that two measures of a woman's social contacts – her participation in community groups and the presence of relatives abroad or in Guatemala City – were associated with the likelihood that the woman held hygiene-related beliefs about the causes of diarrhea. The findings presented in this paper, which indicate

that similar measures of social ties are not associated with health-seeking behavior, suggest that these indirect linkages (i.e., between social ties and beliefs and between beliefs and visits to providers) may not be sufficiently large to produce a statistically significant effect of social ties on health-seeking behavior. In contrast to the insignificant effects of social ties outside the family, proximity to parents and in-laws does have a notable impact on the type of providers that mothers seek for their children.

Finally, the present analysis demonstrates that the availability of modern health facilities within the community – both government-sponsored facilities and private doctors – has a substantial impact on health-seeking behavior for child illness. This result suggests that future improvements in access to modern health providers in rural Guatemala are likely to lead to more frequent use of providers, as well as to a gradual replacement of traditional with biomedical practitioners, to treat children suffering from infectious diseases.

Acknowledgments

We gratefully acknowledge support for this project from NICHD grants R01 HD27361 to RAND and R01 HD31327 and P30 HD32030 to Princeton University**.** The Guatemalan Survey of Family Health (EGSF) was a joint undertaking involving RAND, Princeton University, and the Instituto de Nutrición de Centro América y Panamá (INCAP), directed by Dr. Hernán Delgado. The authors are grateful to Elena Hurtado, Marie Ruel, Hernán Delgado, and many INCAP staff for their collaboration on the survey, and to Dana Glei and Patrick Heuveline for assistance with the calculations. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

.

Notes

[1] For example, UNICEF (1995) estimates that of all deaths under age five in developing countries in 1993, 27% were due to ARI and 23% to diarrhea.

[2] Children in poor countries also often develop more severe infections because of high levels of exposure to infectious organisms, lower resistance (because of previous infection and poorer nutrition), and concurrent infection.

[3] Health promoters are volunteers who have received limited training in health promotion from health posts.

[4] A complete listing of dwellings in each community provided the sampling frame.

[5] The three informants were chosen to include the mayor or auxiliary mayor of the community, a woman in a leadership position in the community, and a person who did not hold a leadership position but knew the community well. In all but three communities, interviews were carried out with three key informants; one community had two informants and two had four informants, yielding a total of 181 interviews with key informants.

[6] These estimates are based on reports from the three key informants. See footnote in Table 1 for information on how these estimates were obtained when responses differed among the three key informants.

[7] Guatemalan currency is the quetzal (abbreviated as Q), which is equivalent to 100 centavos. At the time of writing, the exchange rate was 7.7 quetzales to the US dollar. However, in 1995 when the EGSF was conducted, the exchange rate was approximately 5 quetzales to the US dollar and therefore we use this rate for conversion.

[8] This estimate is derived from information about 40 staples and food products that household members bought, harvested, produced, or gathered in the seven days preceding the survey. It excludes less frequent expenses such as cosmetics, transportation, clothing, medical payments

and celebrations.

[9] Patterns of illness among children in the EGSF are described in more detail in Goldman et al. (1998) for diarrheal illness and in Heuveline and Goldman (2000) for diarrheal and respiratory illnesses.

[10] Mothers reported that in most cases these remedies were given based on recommendations by the mother or other family members rather than on the advice of a provider.

[11] All visits to providers (i.e., not only the first visit for a given illness episode) are included in the analysis.

[12] "Husbands" include both legally married husbands and male partners in consensual unions. Husbands are generally, but not always, the child's father.

[13] Relative risk ratios are more complicated to interpret than odds ratios from (binomial) logistic models, because the probability of a particular outcome in a multinomial model is not the complement of the probability of the reference category. For example, in a multinomial model, a relative risk ratio greater than unity for a dichotomous variable does not necessarily imply that the probability of the particular outcome is greater when the dichotomous variable is one as compared with zero.

[14] Although not significant, we retained the duration variables in the model because duration serves as the underlying time metric for treatment behavior.

[15] Marital status and its interaction with the household decision-making index were tested jointly.

[16] In contrast, indigenous women's heavy reliance on the traditional midwife rather than on biomedical providers for pregnancy care is strongly associated with social and cultural factors (Glei and Goldman, 2000).

References

Andersen R M., 1995. Revisiting the behavioral model and access to medical care - does it matter. *Journal of Health and Social Behavior* 36(1), 1-10.

Beckett, M., Pebley, A.R., 2000. Ethnicity, language, and economic well-being in Guatemala. Unpublished manuscript.

Boerma, J. T., Van Ginneken, J.K., 1992. Comparison of substantive results from demographic and epidemiological survey methods. Chapter 3 in J. T. Boerma (ed.) *Measurement of Maternal and Child Mortality, Morbidity and Health Care*. Liège: Ordina Editions.

Burleigh, E., Dandano, C., Cruz, R., 1990. Colors, humors and evil eye: indigenous classification and treatment of childhood diarrhea in highland Guatemala. *Medical Anthropology* 12(4), 419-41.

Caldwell, J. C., 1986. Routes to low mortality in poor countries. *Population and Development Review* 12(2), 171-220.

Campbell, KE., Marsden, P.V., Hurlbert, J.S., 1986. Social resources and socioeconomic status. *Social Networks* 8, 97-117.

Cleland, J. G., van Ginneken, J.K., 1988. Maternal education and child survival in developing countries: the search for pathways of influence. *Social Science and Medicine* 27(12), 1357-1368.

Cosminsky, S., 1987. Women and health care on a Guatemalan plantation. *Social Science and Medicine* 25(10):1163-1173.

Cosminsky S., Scrimshaw M., 1980. Medical pluralism on a Guatemalan plantation. *Social Science and Medicine* 14B, 267-278.

DasGupta, M., 1990. Death clustering, mother's education and the determinants of child mortality in rural Punjab. In J.C. Caldwell et al. (eds.) *What We Know About Health Transition: The Cultural, Social and Behavioural Determinants of Health*, Australian National University, Health Transition Series No. 2 (Vol. I), 441-461.

Deaton, A., 1989. *Savings in Developing Countries: Theory and Review*. Proceedings of the World Bank Conference on Development Economics 61-96. Washington, D.C.: The World Bank.

DeClerque, J, Bailey, P., Janowitz, B., Dominik, R. Fiallos, C., 1992. Management and treatment of diarrhea in Honduran children: factors associated with mothers' health care behavior. *Social Science and Medicine* 36(6), 687-695.

Delgado, E., Sorensen, S. C. Van der Stuyft, P., 1994. Health seeking behavior and self-treatment for common childhood symptoms in rural Guatemala. *Annales de la Societe. Belge de Médecine. Tropica* 74, 161-168.

Desai, S, Alva, S., 1998. Maternal education and child health: Is there a strong causal relationship? *Demography* 35(1), 71-81.

Goldman, N., Heuveline, P., 2000. Health-seeking behaviour for child illness in Guatemala. *Tropical Medicine and International Health* 5(2), 145-155.

Goldman, N., Pebley, A.R., Beckett, M., 2000. Diffusion of ideas about personal hygiene and contamination in poor countries: evidence from Guatemala. Forthcoming in *Social Science and Medicine*.

Goldman, N., Vaughan, B. and Pebley, A. R., 1998. The use of calendars to measure child illness in health interview surveys. *International Journal of Epidemiology* 27, 505-512.

Gragnolati, M., 1999. *Children's Malnutrition in Rural Guatemala: A Multilevel Statistical Analysis.* PhD Dissertation. Princeton University.

Granich, R., Cantwell, M.F., Long, K., Maldonado, Y., Parsonett, J., 1999. Patterns of health seeking behavior during episodes of childhood diarrhea: a study of Tzotzil-speaking Mayans in the highlands of Chiapas, Mexico. *Social Science and Medicine* 48, 489-495.

Heuveline, P., Goldman, N., 2000. A Description of child illness and treatment behavior in Guatemala. *Social Science and Medicine* 50, 345-364.

House, J.S., 1987. Social support and social structure. *Sociological Forum* 21(1), 135-146.

INCAP, 1994. Household management of ARI, multi-centre study in Central America. Progress Report, February 1994.

INE (Insituto Nacional de Estadística), MSPYAS (Ministerio de Salud Pública y Asistencia Social), USAID, UNICEF and DHS (Demographic and Health Surveys), 1996. *Enuesta Nacional de Salud Materno Infantil*, Calverton, Maryland: DHS/Macro International, Inc.

Kalter, H. D., Gray, R.H., Black, R.E., Gultiano, S.A., 1991. Validation of the diagnosis of childhood morbidity using maternal health interviews. *International Journal of Epidemiology* 20(1),193-198.

Kroeger, A., 1983. Health interview surveys in developing countries: a review of the methods and results. *International Journal of Epidemiology* 12(4), 465-481.

Lindenbaum, S., 1990. Maternal education and health care processes in Bangladesh: the health and hygiene of the middle classes. In J.C. Caldwell et al. (eds.) *What We Know About Health Transition: The Cultural, Social and Behavioural Determinants of Health*, Australian National University, Health Transition Series No. 2 (Vol. I), 425-440.

McKee, L., 1987. Ethnomedical treatment of children's diarrheal illnesses in the highlands of Ecuador. *Social Science and Medicine* 25(10), 1147-1155.

Montgomery, M.R., Gragnolati, M., Burke, K.A., Paredes, E., 2000. Measuring living standards with proxy variables. *Demography* 37(2), 155-174.

Mullen, P.D., Hershey, J., Iverson, D.C., 1987. Health behavior models compared. *Social Science and Medicine* 24, 973-981.

Pebley, A.R., Goldman, N., Rodríguez, G., 1996. Prenatal and delivery care and childhood immunization in Guatemala: do family and community matter? *Demography* 33(2), 231-237.

Pebley, A.R., Hurtado, E., Goldman, N., 1999. Beliefs about children's illness. *Journal of Biosocial Science* 31, 195-219.

Pebley, A.R., Robles, A., Goldman, N., 2000. Ethnic identity and the use of ethnic symbols in rural Guatemala. Submitted.

Pedersen, D., Coloma, C., 1983. Traditional medicine in Ecuador: the structure of non-formal health systems. *Social Science and Medicine* 17(17), 1249-1255.

Peterson, C., Goldman, N., Pebley, A. R., 1997. The 1995 Guatemalan Survey of Family Health (EGSF): Overview and Codebook. DRU-1538/3-NICHD. RAND, Santa Monica, CA.

Robles, A., 1996. Mortalidad adulta entre poblaciones indígenas y no indígenas de Guatemala y Bolivia. *Notas de Población* 24(64), 33-61.

Rosenstock, I.M., 1966. Why people use health services. *Milbank Memorial Fund Quarterly* 44, 94-106.

Scrimshaw, S.C.M., Hurtado, E., 1988. Anthropological involvement in the Central American diarrheal disease control project. *Social Science and Medicine* 27(1), 97-105.

Seltzer, J.A., Pebley, A.R., and Goldman, N., 1997. Wives' role in household decision-making in rural Guatemala. Paper presented at the annual meetings of the Population Association of America, March 27-29, Washington, D.C.

Steele, D., 1994. Guatemala. Chapter 6 in *Indigenous People and Poverty in Latin America: An Empircal Analysis*, G. Psacharopoulos and Patrinos, H.A. (eds.). Latin America and the Carribean Technical Department: Regional Studies Program, Report No. 30.

Stoner, B. P., 1985. Formal modeling of health care decisions: some applications and limitations. *Medical Anthropology Quarterly* 16, 41-46.

Tedlock, B., 1992. *Time and the Highland Maya*. Albuquerque, NM: University of New Mexico Press.

Van der Stuyft , P., Sorensen S.C., Delgado E., Bocaletti E., 1996. Health seeking behaviour for child illness in rural Guatemala. *Tropical Medicine and International Health* 1, 161-170.

Weiss, M.G., 1988. Cultural models of diarrheal illness: conceptual framework and review. *Social Science and Medicine* 27(1), 5-16.

Weller, S.C., Ruebush II, T.R., Klein, R.E., 1997. Predicting treatment-seeking behavior in Guatemala: a comparison of the health services research and decision-theoretic approaches. *Medical Anthropology Quarterly* 11(2), 224-245.

World Bank, 1999. *World Bank Development Indicators*. Washington, DC: World Bank. From *http://www.worldbank.org/data/wdi/home.html*.

Yoder, P. S., Hornik, R. C., 1996. Symptoms and perceived severity of illness as predictive of treatment for diarrhea in six Asian and African sites. *Social Science and Medicine* 43, 429-439.

Young, J.C., 1981. *Medical Choice in a Mexican Village*. New Brunswick, NJ: Rutgers University Press.

Table 1. Availability of health provider and facilities within and nearby the community[a]

	In the community (%)	Within one hour (%)
Providers		
Private doctor	21.7	53.3
Private nurse	6.7	8.3
Midwife	96.7	100.0
Curer	83.3	86.7
Facilities		
Government hospital[b]	0.0	25.0
Private hospital	5.0	21.7
IGSS[c]	1.7	28.3
Gov't. Health Center *or* Health Post[d]	41.7	88.3
Private Pharmacy	56.7	86.7
Number of Communities	60	

Source: Key informant interviews in the EGSF

[a] In cases where more than one key informant identified a particular provider and gave discrepant answers pertaining to this provider, answers were reconciled by: (a) using the answers provided by two of the three informants if two informants agreed as to whether the informant was in the community; (b) selecting the least expensive mode of transport among the given responses and then averaging the responses regarding travel time for that mode of transport; and (c) selecting the least "biomedical" type of provider when informants disagreed about the type of provider.

[b] Ministry of Public Health and Social Assistance (MSPAS) hospitals.

[c] IGSS stands for Instituto Guatemalteco de Seguridad Social (Guatemala Social Security Institute). IGSS generally serves industrial or plantation workers and is paid for by the national government and employers.

[d] Part of the MSPAS rural health care system. Posts provide primary care and refer to centers, which provide more complex treatment.

Table 2. Percent of providers that treat sick children, average costs of treatment, and types of payment accepted, by type of provider

	Health post/center	Private doctor	Midwife[a]	Curer[b]	Midwife and curer
% that treat sick children	100.0	96.7	22.9	96.0	87.5
Average fee (quetzales)[c]	0[d]	14.7	1.2	2.4	1.3
% that accept:					
Payment in kind (if patient cannot pay cash)		16.7	63.6	50.0	64.3
No fee (if patient cannot pay)		60.0	27.3	32.0	28.6
% that accept:					
Credit only[e]		50.0	25.0	35.3	30.0
Installment only[e]		0.0	62.5	5.9	20.0
Credit and installment[e]		25.0	12.5	50.0	50.0
Total number of providers	48	30	48	50	16

Source: Provider interviews in the EGSF

[a] Includes midwives who may identify themselves as other types of providers (e.g., massage specialists) but not as curers.
[b] Includes curers who may identify themselves as other types of providers (e.g., massage specialists) but not as midwives.
[c] Average cost based on the mean cost per visit for treatment of diarrhea or treatment of respiratory problems in the case of health posts/centers and private doctors, and the average cost for homemade remedies, purchased remedies and injections in the case of midwives and curers. Information on costs, payment in kind, and credit and installments is based only on providers that treat sick children.
[d] While almost no health post or center charges for these treatments, about half have an initial fee, typically 25 centavos (about US$0.05).
[e] These estimates are based only on providers who charge patients that cannot pay for services.

Table 3. Prevalence of symptoms, median duration, and percent of days with a given symptom that was considered serious, by type of symptom

Symptom	Two-week period prevalence (%)[a]	Median Duration (days)[b]	Percent of days serious[c]
Constant cough	19.8	10.8	22.6
Boiling of the chest	12.0	8.7	25.7
Panting	5.6	7.2	30.8
High fever	24.4	2.3	30.4
Weakness	12.6	7.7	28.5
Diarrhea	21.8	4.5	26.8
Blood in the stools	1.4	2.5	27.2
Vomiting	4.8	1.7	42.5
Any of the eight solicited symptoms	45.3	5.8	22.8

Source: Adapted from Goldman and Heuveline (2000)

[a] Estimates of prevalence are based on 3,193 children.

[b] Estimates of median duration are based on life tables and refer to the number of consecutive days with the symptom, for symptoms beginning subsequent to day 14 of the calendar. A given child may contribute more than one episode to the estimate if the symptom stopped and resumed on a later day during the two-week period.

[c] Estimates of percent of days when symptoms are considered serious are based on the total sample of 10,742 days with symptoms.

Table 4. Mean number of symptoms per day, among children with a given number of symptoms in the calendar

Number of symptoms in the calendar	Number of children	Percent of children	Mean number of symptoms per day[a]
None	1747	54.7	
1	507	15.9	1.0
2	392	12.3	1.4
3	254	8.0	1.9
4	140	4.4	2.4
5	88	2.8	2.8
6	49	1.5	3.2
7	13	0.4	3.9
8	2	0.0	4.3
9	1	0.0	5.9
Total	3193	100.0	1.8[b]

Source: Adapted from Goldman and Heuveline (2000)

[a] Based on all days between the first and last occurrence of a symptom.
[b] Based on days with at least one symptom.

Table 5. Distribution of type of provider seen among sick children

Provider	% children seeing provider within calendar period
Pharmacist	9.7
Doctor	6.9
Someone in the health post/center[a]	7.1
Curer	4.4
Other[b]	5.4
No provider	67.9
Number of children	870

Source: Adapted from Goldman and Heuveline (2000)

[a] Also includes clinics and health technicians.

[b] Other providers primarily include health promoters (volunteers associated with the Ministry of Health who receive minimal training in basic health issues), midwives and nurses.

Table 6. Distributions and mean values of outcome and explanatory variables

	Number of Days	Percent Distribution or Mean
TOTAL	4344	
OUTCOME VARIABLE		
Provider		
None	4004	92.2%
Pharmacist	92	2.1%
Someone in health post/center	65	1.5%
Private Doctor	70	1.6%
Curer	55	1.3%
Other	58	1.3%
Missing	0	0.0%
EXPLANATORY VARIABLES		
ILLNESS CHARACTERISTICS		
Duration of illness		
Day 1	927	21.3%
Day 2	829	19.1%
Day 3-5	1521	35.0%
Day 6+	1067	24.6%
Missing	0	0.0%
Type of symptom		
Respiratory only	1165	26.8%
Fever, no gastrointestinal	1046	24.1%
Fever & gastrointestinal	334	7.7%
Other	1799	41.4%
Missing	0	0.0%
Severity of symptom		
Symptom is serious	888	20.4%
Symptom is not serious	3456	79.6%
Missing	0	0.0%
Cause of illness		
Hygiene-related beliefs	289	6.6%
Other	4034	92.9%
Missing	21	0.5%
Folk illness beliefs	312	7.2%
Other	4011	92.3%
Missing	21	0.5%
CHILD CHARACTERISTICS		
Age		
Infant 0-1	1156	26.6%
Ages 1-5	3188	73.4%
Missing	0	0.0%
General health status		
Very good	102	2.3%
Not very good	4242	97.7%
Missing	0	0.0%

Parity		
1	840	19.3%
2	763	17.6%
3	766	17.6%
4	710	16.3%
5	494	11.4%
6+	771	17.8%
Missing	0	0.0%
FAMILY CHARACTERISTICS		
Consumption per capita		
Mean	4312	23.1
(Standard Deviation)		(14.8)
Missing	32	0.7%
Mother's education		
Mean	4312	2.4
(Standard Deviation)		(2.7)
Missing	32	0.7%
Husband's education		
Mean	4048	3.3
(Standard Deviation)		(3.1)
Missing	296	(6.8%)
Ethnicity/language		
Ladino	1723	39.7
Indigenous, speaks Spanish	2240	51.6%
Indigenous, doesn't speak Spanish	341	7.8%
Missing	40	0.9%
Marital status		
Unmarried	236	5.4%
Married	4079	93.9%
Missing	29	0.7%
Decision-making index (HDI)		
Mean	4061	1.1
(Standard Deviation)		(1.1)
Missing	283	6.5%
Number of parents & in-laws		
0	2976	68.5%
1	545	12.5%
2+	794	18.3%
Missing	29	0.7%
Any family member has health insurance		
Yes	504	11.6%
No	3805	87.6%
Missing	35	0.8%
Family is entitled to free health care services		
Yes	781	18.0%
No	3528	81.2%
Missing	35	0.8%
Respondent belongs to a woman's group		
Yes	542	86.6%
No	3762	12.5%
Missing	40	0.9%
Respondent or family member in community organization		
Yes	1385	31.9%
No	2919	67.2%
Missing	40	0.9%

Respondent ever lived in a city or large town		
Yes	379	8.7%
No	3965	91.3%
Missing	0	0
Respondent has a relative in Guatemala City or abroad		
Yes	2365	54.4%
No	1758	40.5%
Missing	221	5.1%
COMMUNITY CHARACTERISTICS		
Health care facilities in the community		
Health post or center	1720	39.6%
Neither facility	2624	60.4%
Missing	0	0.0%
Doctor or private clinic	1142	26.3%
Neither	3202	73.7%
Missing	0	0.0%

Table 7. Estimated relative risk ratios from a multinomial model of the probability of visiting specific types of providers on a day of illness[a]

	Pharmacist	Health post	Doctor	Curer	Other
ILLNESS CHARACTERISTICS					
Duration of illness					
Day 1	1.079	1.734	1.153	1.828	0.918
Day 2	0.554*	1.535	0.999	2.156	0.782
Day 3-5	0.417*	0.843	0.673	2.712	0.674
(Day 6+)					
Type of symptom					
Respiratory only	1.803	0.574	0.809	0.116**	0.723
Fever, no gastrointestinal	2.004**	1.974*	1.838*	0.538	3.969**
Fever & gastrointestinal	2.191*	3.599**	3.059**	1.804	4.744**
(Other)					
Severity of symptom					
Symptom is serious	2.357**	1.371	3.410**	2.544**	2.808**
(Symptom is not serious)					
Cause of illness					
Hygiene-related	1.034	1.939	2.984**	0.405	4.997**
(Other)					
Folk illnesses	0.948	0.693	0.585	3.882**	0.835
(Other)					
CHILD CHARACTERISTICS					
Age					
Infant 0-1	0.530*	1.895*	1.284	3.032**	2.136*
(Ages 1-5)					
General health status					
Very good health	----	0.565	2.185	13.756**	2.651
(Not very good health)					
FAMILY CHARACTERISTICS					
Consumption per capita	1.007	1.010	1.025**	1.011	1.030**
Marital status					
Unmarried	2.486*	1.128	3.353**	0.884	0.317
(Married)					
Interaction: HDI & marital status	1.153	1.073	1.136	0.913	0.707*
Number of parents & in-laws					
(0)					
1	0.925	1.962*	1.013	0.925	0.675
2+	0.778	1.971	0.710	4.271**	1.592
COMMUNITY CHARACTERISTICS					
Health care facilities in the community					
Health center or post	0.998	3.474**	0.571	1.553	1.468
(Neither)					
Doctor or private clinic	1,547	0.512	3.219**	0.451*	2.819**
(Neither)					
Pseudo R^2	0.148				
Number of days	4294				

[a] The model also includes a set of dummy variables to represent the four departments in which the EGSF took place.

***** P-Value < 0.05; ****** P-Value < 0.01.

Table 8. Predicted percentages visiting different types of providers on a day of illness, based on multinomial model in Table 7

	Pharmacist	Health post	Doctor	Curer	Other	No one
ILLNESS CHARACTERISTICS						
Duration of illness						
Day 1	2.9	1.2	1.6	0.7	1.6	92.0
Day 2	3.1	2.0	1.8	1.2	1.4	90.5
Day 3-5	1.6	1.8	1.7	1.4	1.3	92.3
(Day 6+)	1.3	1.0	1.2	1.7	1.1	93.7
Type of symptom						
Respiratory only	1.8	0.8	1.0	0.3	0.6	95.6
Fever, no	3.0	2.2	2.1	1.0	2.5	89.3
Fever &	3.1	3.6	3.2	2.6	2.8	84.7
(Other)	1.6	1.2	1.2	1.7	0.7	93.5
Severity of symptom						
Symptom is serious	3.6	1.7	3.3	2.2	2.4	86.8
(Symptom is not	1.7	1.4	1.1	1.0	1.1	93.7
Cause of illness						
Hygiene-related	2.0	2.5	3.7	0.5	4.5	86.8
(Other)	2.2	1.5	1.4	1.3	1.1	92.5
Folk illness	2.1	1.0	1.0	3.3	1.1	91.6
(Other)	2.2	1.6	1.6	1.0	1.4	92.3
CHILD						
Age						
Infant 0-1	1.3	2.2	1.7	2.3	2.0	90.6
(Ages 1-5)	2.4	1.3	1.5	0.8	1.1	92.8
General health status						
Very good health	*[a]	0.7	2.7	9.4	2.3	84.9
(Not very good health)	2.2	1.5	1.5	1.0	1.3	92.4
FAMILY CHARACTERISTICS						
Consumption per capita						
25^{th} percentile	2.0	1.4	1.1	1.2	0.9	93.3
Median	2.1	1.5	1.3	1.3	1.1	92.8
75^{th} percentile	2.2	1.6	1.7	1.4	1.4	91.8
Marital status & HDI						
Unmarried	4.6	1.6	4.4	1.1	0.4	87.7
Married & HDI=0	1.7	1.4	1.2	1.4	1.9	92.3
Married & HDI=1	2.0	1.5	1.4	1.3	1.4	92.4
Married & HDI=2	2.3	1.6	1.6	1.2	1.0	92.3
Number of parents & in-						
(0)	2.3	1.2	1.7	0.8	1.3	92.7
1	2.1	2.3	1.7	0.8	0.9	91.2
2+	1.7	2.1	1.1	3.0	1.9	90.0
COMMUNITY						
Health care facilities in the						
Health center or post	2.1	3.0	1.2	1.6	1.6	90.5
(Neither)	2.1	0.9	2.1	1.1	1.1	92.5
Doctor or private clinic	2.8	0.9	3.2	0.7	2.4	90.0
(Neither)	1.9	1.9	1.1	1.5	1.0	92.7

[a] No observations in this cell

Table 9. Estimated relative risk ratios from multinomial models that include other's education, husband's education, and ethnicity[a]

	Pharmacist	Health post	Doctor	Curer	Other
Variables added one at a time to model in Table 7 excluding consumption per capita					
Mother's Education[b]	0.954	1.081	1.091*	1.104	1.113*
Husband's Education[c]	0.930	1.044	1.099*	1.002	0.996
Ethnicity[d]					
(Ladino)					
Indigenous, speaks Spanish	2.174*	1.581	0.419*	1.794	0.416
(Indigenous, doesn't speak Spanish*)*	3.332*	0.807	0.175*	0.577	0.285
Variables added simultaneously to model in Table 7					
Mother's Education[e]	1.023	1.093	1.003	1.057	1.063
Husband's Education[f]	0.920	0.992	1.054	0.946	0.915
Ethnicity[g]					
(Ladino)					
Indigenous, speaks Spanish	2.091	2.366	0.551	2.140	0.831
(Indigenous, doesn't speak Spanish)	3.301	1.051	0.304	0.563	0.715
Expenditure per capita[h]	1.011	1.011	10.19*	1.011	10.30**

[a] Results below are derived from chi-square tests; degrees of freedom are indicated in parentheses
[b] Chi(5) = 14.7; P-value = 0.012
[c] Chi(5) = 10.3; P-value = 0.068
[d] Chi(10) = 19.7; P-value = 0.033
[e] Chi(5) = 4.3; P-value = 0.506
[f] Chi(5) = 7.6; P-value = 0.179
[g] Chi(10) = 13.7; P-value = 0.185
[h] Chi(5) = 23.5; P-value = 0.000
***** P-Value < 0.05; ****** P-Value < 0.01.