Health Seeking Behavior for Child Illness in Guatemala

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Summary

In this paper, we rely on data from the 1995 Guatemalan Survey of Family Health (EGSF) to analyze the relationship between child illness and health seeking behavior. The EGSF is better suited to this type of analysis than most earlier studies because it contains detailed calendar information – from a large random sample of mothers in rural Guatemala – on the nature and timing of illness and treatment behavior for children age five and below.

Information on illness was collected for a total of 3,193 children. This analysis is based on 870 of these children who began a diarrheal or respiratory illness during a 13-day period prior to interview. Estimates are derived from binomial and multinomial logistic models of the probability of seeing any or a specific type of provider on a given day of illness as a function of characteristics of the illness and the child.

The results indicate that modern medical care plays a major role in the treatment of infectious illness among children in rural Guatemala, with visits to pharmacists, doctors and the staff at government health facilities occurring much more frequently than visits to curers and other traditional practitioners. In general, families are much more likely to seek a provider when a child experiences fever and gastrointestinal symptoms, as compared with respiratory and other symptoms, and when a mother perceives the illness to be serious. The estimates also indicate that infants, low parity children, and children assessed as having generally been in good health are more likely to visit providers than other children. However, the particular associations often vary by type of provider.

Introduction

In recent years, epidemiologists and social scientists have devoted increasing attention to studying health seeking behavior associated with the two leading causes of child mortality, namely diarrheal illness and acute respiratory infection (ARI). Among childhood deaths in developing countries

in 1993, about 27 percent have resulted from ARI and another 23 percent from diarrhea (UNICEF 1995). Yet, our knowledge about how and when families in developing countries seek treatment for these prevalent illnesses remains seriously incomplete, for two principal reasons: limitations of the samples used in existing studies and lack of sufficiently detailed information about the nature and timing of illness and treatment behavior.

Many studies of morbidity in developing countries are based on samples of patients in hospitals, clinics, or other facilities. Epidemiologists are well aware that these studies are seriously compromised by selection biases. While medical records for these samples may provide useful information for certain populations in industrialized countries, they are grossly inadequate in most developing countries primarily because most illnesses in these countries receive little formal treatment (Kalter 1992). Although hospital or clinic-based samples have been used to study the etiology of illness in developing countries – for example, see Bale (1990) for studies of ARI – these samples are not appropriate for examining health care behavior, even in the case of severe illness.

Many studies rely instead on samples drawn from one or several communities (see, for example, Van der Stuyft et al.1996 for a study of child illness in two Guatemalan villages). Unfortunately, these studies almost always suffer from relatively small sample sizes (rarely above 500 and often below 100), thereby restricting the types of statistical analyses that can be ultimately be carried out. In addition, few are based on probability samples, which limits their generalizability.

Health interview surveys appear to offer the best vehicle for analyzing treatment behavior on a large representative sample of children. These surveys typically involve a single cross-sectional interview, based on a random sample of a defined population, in which respondents (or mothers, in studies of child illness) are asked to report about the illnesses experienced and health services or treatment used within a specified period prior to interview. While the sampling designs of these surveys are generally adequate, most do not collect sufficiently detailed data to permit meaningful analysis of the relationship between illness and treatment behavior. Specifically, few existing studies have obtained information on the full range of symptoms experienced by the child, all treatments sought (e.g., including

home remedies, biomedical practitioners, and traditional providers), and the timing of both symptoms and treatment. For example, in the second and third rounds of the Demographic Health Surveys (DHS) program, respondents were asked about the presence of several symptoms (typically diarrhea, cough with rapid breathing, and fever) during the most recent-two week period. However, they were not asked to provide any information about additional symptoms that may have occurred during this time or about the duration or timing of any of the reported symptoms (Ryland & Raggers 1998).

The lack of adequately detailed information on illness and treatment seriously compromises the resulting analysis of existing studies in several respects. First, illnesses cannot be properly described or classified without a fairly complete report of symptoms. For example, as demonstrated by Goldman et al. (1998a) and shown below, most children experiencing some symptom of diarrhea or ARI suffer from more than a single symptom and many experience both gastrointestinal and respiratory symptoms within a given illness. Second, the failure of many health interview surveys to obtain complete reports of nonbiomedical sources of care necessarily leads to biased estimates of the frequency and determinants of health seeking behavior. And third, the absence of data on timing makes it impossible to interpret estimates of the prevalence of illness or of health seeking behavior. For example, some illnesses or sick children may be less likely to receive treatment than others simply because the illnesses last for a shorter duration. The need to account for duration is particularly important when the information from health interview surveys pertains to a very recent period prior to interview: in these cases, many recent illnesses are still in progress at the time of the survey and may eventually receive treatment even if they have not done so as of the interview date. More generally, the absence of data on the timing of illness prevents the analyst from selecting an appropriate sampling frame of illness episodes to include in the analysis (e.g., those which begin in a specified period; Ross & Vaughan 1986) and inevitably leads to biased estimates of illness frequency and associated measures of treatment.

In this paper, we rely on survey data from the Guatemalan Survey of Family Health (EGSF, 1995) to analyze the relationship between child illness and health seeking behavior. As described in more detail below, through both its sampling design and questionnaire construction, the EGSF has avoided

many of limitations that affect earlier studies of treatment behavior. Of particular importance for the present study is the inclusion of a two-week daily calendar of morbidity and treatment behavior for children age five and below. Based on these calendar data, we use statistical methods for event history analysis to examine how characteristics of diarrheal and respiratory illnesses among children affect their utilization of biomedical and non-biomedical providers.

Subject and methods

Guatemala

Guatemala is the largest country in Central America with a population of approximately 10.5 million in 1995 (CELADE 1997). Although only 108,889 square kilometers in size (Instituto Nacional de Estadística 1988), many rural areas remain relatively isolated from urban Guatemalan life, which is centered primarily in the capital, Guatemala City. Guatemala remains a highly stratified society with large income inequality and the vast majority of the population living below the poverty line (Steele 1994). A majority of the rural population does not have adequate access to such public services as water, sanitation, and electricity (Steele 1994). Roughly half of the population is indigenous – i.e., descendants of Maya and other pre-conquest groups—while the other half, referred to as *ladinos*, speak Spanish, wear European clothing, identify with the national Guatemalan culture, and are of both indigenous and European origins.

As elsewhere in Latin America, Guatemalan mortality rates have fallen since the 1950s, although they remain among the highest in the region. The most recent estimates of infant mortality indicate a national level of about 50 per 1000 for the early 1990s (Instituto Nacional de Estadística et al. 1996; World Bank 1995). Treatment for illness is available from biomedical providers (both through the publicly-financed health care system and through private doctors), from traditional practitioners (such as

midwives and curers), and from popular practitioners who often dispense modern drugs and give injections without biomedical training (Pebley et al. 1996; Cosminsky & Scrimshaw 1980).

The Guatemalan Survey of Family Health

The data for this analysis come from the Guatemalan Survey of Family Health (known in Spanish as the Encuesta Guatemalteca de Salud Familiar or the 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. Approximately 50 women ages 18-35 received detailed individual questionnaires in each of selected communities, for a total of 2,872 women. In addition, interviews with community informants and health providers were carried out in each of the sampled communities.

The analysis presented below is derived entirely from the individual questionnaires administered to women ages 18-35 and is based largely on the section devoted to children's illnesses. In this section of the questionnaire, mothers were asked questions related to diarrheal and respiratory illness for a maximum of two children born since 1990. They were first asked whether each of eight specific symptoms related to acute respiratory infection or diarrhea occurred 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 on the basis of 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 specified 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 the symptoms were perceived as serious, whether the mother asked others (relatives, neighbors or friends) for advice or visited providers regarding their child's illness, and whether any treatment was administered by themselves or by anyone else. Information regarding the presence of symptoms, seriousness and treatment were recorded in the appropriate days of the calendar, indexed from 14 (14 days or two weeks before interview) to zero (the day of interview). Additional information including the nature of the advice and treatment as well as the cost and perceived effectiveness was subsequently obtained (in tabular format) about each of the persons, providers and treatments 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).

Statistical analysis

We begin the analysis by presenting some basic descriptive statistics of the symptoms reported in the EGSF. These estimates are based on the sample of 3,193 children for whom information on illness was obtained. Overall, 45 percent (1,446) of these children experienced at least one symptom during the two-week calendar period. Among these, 870 children experienced their first symptom subsequent to the start of the calendar period. This latter group forms the basis for all estimates of treatment behavior presented in this study. Children whose illnesses began two or more weeks prior to the interview were excluded for two reasons. First, information regarding 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.

Results pertaining to the relationship between health seeking behavior and characteristics of illnesses and children are presented in terms of estimates derived from models of event history analysis. These models, which look at the likelihood that children visit a provider on a given day of illness, are far better suited to an analysis of treatment behavior than conventional regression models. Specifically, standard regression models, in which children or illnesses are the units of analysis, cannot account for (1) varying exposures to the risk of seeking treatment across children with illnesses of different durations; and (2) right censoring of observations, namely that many children are still experiencing symptoms at the time of interview and may subsequently seek a provider.

The event history models estimated in this analysis are (binomial) logistic and multinomial (polytomous) logistic models, in which the outcome variables denote visits to any provider or to specific types of providers on a given day of illness (Hosmer & Lemeshow 1989). These models are similar to discrete-time hazard models (see, for example, Allison 1984), with an important distinction. Whereas hazard models typically look at non-repeatable events, this analysis considers all visits to providers (i.e., not only the first); correspondingly, the sample for analysis contains days of illness subsequent to the first provider visit. Note, however, that the vast majority (94 percent) of visits to providers in our sample are first visits.

The event history models are based on a sample of days pertaining to the 870 children whose illnesses began in the calendar period. The day of interview (day 0) was 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 were 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.

Results and discussion

Symptoms of illness

In Table 1, we present estimates of the two-week prevalence and median duration of each symptom and the frequency with which mothers considered each symptom to be serious. The estimates reveal that the frequency of diarrhea and ARI-related symptoms is high in the rural Guatemalan population. During the most recent two-week period, nearly half (45.3 percent) of children age five and under experienced at least one of the eight symptoms solicited. The estimates also indicate substantial variability in the length 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 to be serious, with the prevalence of severity varying by the type of symptom and being especially high for vomiting.

Table 2 presents the number of children in the sample by the number of symptoms reported during the calendar period (including non-solicited symptoms), along with the average number of symptoms per day. Among the 1,446 children with at least one symptom, about two-thirds have more than one. On average, 1.8 symptoms were reported on a day containing at least one symptom. The average number of symptoms per day is less than the total number of symptoms recorded in the calendar because few children experience all of the reported symptoms simultaneously throughout the period of illness. Rather, individual symptoms typically begin and end on different days from one another, thereby changing the nature of the illness over even a relatively short duration. One consequence of this complexity is that classification of illness becomes problematic. For example, results not presented here reveal that among children with at least one respiratory symptom, 42 percent were reported to also have at least one gastrointestinal symptom during the calendar period. These estimates highlight the need to go beyond conventional categories of illness and consider patterns of symptom in models of treatment behavior.

A description of treatment behavior

The EGSF collected information on treatments administered to the child – regardless of whether the treatments were recommended or administered by the mother, a relative or friend, or a provider – as well as visits to providers. Estimates not shown here indicate that almost 90 percent of the 870 children in our sample received some form of treatment. The vast majority were given medicines, whereas a relatively small proportion were given herbs, herbal teas or other home remedies (Heuveline & Goldman 1998); most of these treatments were recommended by the mother or another member of the family rather than a provider. As shown in the first column of Table 3, only about one-third of sick children visited a provider during the calendar period. Pharmacists, who frequently dispense advice as well as medication but generally do not receive professional training (Van der Stuyft et al. 1996), were the providers most apt to have been consulted, and doctors and the staff of government-sponsored health posts or centers were seen more frequently than curers (i.e., persons who – at least prior to recent years – relied primarily on folk remedies to treat illness) and other types of providers.

The estimates in the right-hand panel of Table 3 reflect the distribution of providers seen by the duration (defined as the number of consecutive days) of symptoms. The estimates suggest that, overall, providers are visited more often in the initial days (most notably the second day) as compared with later durations of illness. For example, just over 10 percent of second days of illness are characterized by a visit to a provider in contrast to only five or six percent of days six and above. However, the patterns vary by the type of provider. We will return to the issue of the timing of provider visits in the statistical analysis presented below.

Modeling treatment behavior

In the initial stages of analysis, a series of exploratory logistic models of the probability of seeking a provider were estimated in order to find a parsimonious representation of the different symptoms (which included the eight solicited symptoms as well as other symptoms volunteered by respondents) and combinations of symptoms experienced by children in the sample. The results indicated that there was little difference in the probability of seeking a provider for various symptoms within a general category (e.g., cough, difficulty breathing, or other respiratory symptoms), and that the presence of fever, especially in combination with gastrointestinal symptoms such as vomiting and diarrhea, was an important determinant of visiting a provider. These results led to a four category classification of illness: (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.

Visiting any provider

The estimates presented in Table 4 are odds ratios derived from a series of logistic models that examine the probability that a day of illness results in a visit to a provider as a function of various characteristics of the children and their illnesses. All models include a series of dummy variables that best capture the duration of illness (day 1, day 2, days 3-5, and days 6+), the four category representation of symptoms described above, and a set of dummy variables denoting the four departments in which the survey took place. The inclusion of these dummy variables compensates for the fact that the EGSF sample is not self-weighting across departments.

The estimates for model 1 are consistent with the duration effects noted above: providers are most frequently sought on the second day of illness and are least likely to be visited after the fifth day, but the effects are small and not statistically significant. The odds ratios for symptoms are large (and significant)

and indicate that children with respiratory symptoms are least likely to seek providers, while those with fever and especially fever together with gastrointestinal symptoms are especially likely to visit providers.

The results in model 1 raise the issue of whether certain symptoms are more likely than others to lead to treatment by providers because families view them as more serious. The estimates from model 2, together with those from a logistic regression model (not shown) in which the outcome variable denotes whether or not mothers perceive symptoms on a particular day to be serious, reveal that: (1) mothers are far more likely to perceive the combination of fever and gastrointestinal symptoms as serious and less likely to assess respiratory symptoms as serious compared with other patterns of illness (results not shown); (2) days of illness in which symptoms are perceived as serious are much more likely to result in provider visits (model 2 in Table 4); and (3) even in the presence of a control variable for a mother's perception of seriousness, the presence of fever or the combination of fever and gastrointestinal symptoms is much more likely to lead to provider visits than the presence of other symptoms (in fact, the odds ratios for model 2 vary little from those in model 1). Interestingly, the addition of a variable (or a series of dummy variables) to model 1 or 2 to denote the total number of symptoms experienced on a given day reveals that the number of symptoms is not significantly related to provider-seeking behavior (but the number of symptoms is significantly related to mothers' perceptions of seriousness; results not shown).

The results from models 1 and 2 support findings by Yoder and Hornik (1996), who use sample survey data from six sites in Asia and Africa to demonstrate that a mother's perception of severity of illness is most closely related to three symptoms (vomiting, fever, and lassitude) and that both the types of symptoms experienced and the perceived severity have separate effects on treatment choice. These results, together with our findings, suggest that families' perceptions about the efficacy of treatments in curing or ameliorating specific symptoms, along with their perceptions of severity, are likely to affect their use of providers.

In model 3, several characteristics of the child – namely, parity, age (whether the child is an infant), and a mother's perception of the general health status of the child since the time of birth (very

poor; poor, fair or good; or very good) – have been added to model 2. The results indicate that infants and low parity children are more likely to be seen by providers as compared with other children. In addition, the mother's perception of her child's health status is significantly associated with treatment behavior. Children perceived as generally having very good health are much more likely to visit providers while children viewed as generally being in very poor health are least likely (although not significantly so because of the small number of children in this category), as compared with other children. The inclusion of a variable denoting gender (not shown) revealed no significant sex difference in health seeking behavior, a finding that is consistent with results from other studies in Latin America.

The final model in Table 4 incorporates several additional indicators of the illness, namely a measure of health beliefs and two measures that summarize previous treatment behavior. The former variable is derived from a question about a mother's perceptions of the causes of their child's illness and identifies responses related to either hygiene (e.g., children putting dirty food or other items in their mouths or mothers not washing hands, which are plausible pathways through which children develop diarrheal illnesses) or contamination (e.g., infection or microbes, which are causative agents for both gastrointestinal and respiratory illnesses; Goldman et al. 1998b). This variable attempts to identify families holding relatively modern 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). Mothers reported such beliefs for about six percent of children in the sample. The additional variables in model 4 indicate (1) whether any treatment (e.g., medicine or traditional remedies) was administered for this illness prior to the given day, in the absence of a visit to a provider; and (2) whether a provider was sought for this illness prior to the given day.

The results for model 4 indicate that families holding "modern" beliefs are more likely to see a provider in comparison with families holding other beliefs. (The estimated odds ratio remains virtually unchanged when the sample is restricted to only those days with gastrointestinal symptoms.) However, results not shown here reveal that variables denoting traditional health beliefs (such as those that ascribe illness to various folk illnesses) are not significantly related to the likelihood of seeking a provider. The

estimates for model 4 also reveal that children who have already received some form of treatment (i.e., from mothers or other relatives) are less likely to seek providers on subsequent days as compared with untreated children, and that those who have already sought a provider are less likely to do again. The extension of the model to include interaction terms between duration and previous treatment/ provider history revealed that these terms were not significantly different from zero.

Variation by type of provider

The results in Table 4 suggest that numerous characteristics of the illness and of the child are strongly associated with the likelihood of visiting a provider. In order to assess the extent to which these covariates have disparate effects across providers, we estimated a multinomial model with six outcomes (pharmacist, health post, doctor, curer, other and the omitted category of no provider). This model has almost the same covariate structure as model 4 (in Table 4); the only difference is exclusion of the variable that denotes very poor health, because of inadequate sample size.

The estimated relative risk ratios (i.e., exponentiated coefficients) from a multinomial model are considerably more complicated to interpret as compared with odds ratios from a logistic model. For example, in a multinomial model, a relative risk ratio greater than unity for a dichotomous variable does not always imply that the probability of the particular outcome is greater when the dichotomous variable is unity as compared with zero. As a result, we present the relative risk ratios is the appendix and present predicted (or simulated) percentages in Table 5. The predicted values were obtained by setting all variables except those under consideration (e.g., the four types of symptoms in the first panel of the table) at their observed values for each day of illness and setting the variables under consideration at a preselected value (e.g., 1 or 0 in the case of categorical variables). The estimates for duration of illness were obtained by simultaneously assigning values to the duration variables and the variables denoting previous treatment and provider history to yield three sets of estimates (no treatment used and no provider seen in the past; treatment used on day 1 and no provider seen; and treatment used on day 1 and provider

seen on day 2). When interpreting the resulting values, it is important to note that these percentages refer to a *single* day of illness and hence are relatively small.

The predicted values in Table 5 indicate that the type of symptoms experienced and the perceived severity of the symptoms have large impacts on the likelihood of seeing a provider. Children experiencing fever and especially the combination of fever and gastrointestinal symptoms have much higher probabilities of seeing a biomedical provider as compared with children with respiratory or other symptoms, whereas the differentials by type of symptom are much more modest – and follow a different pattern – for those seeking curers. Interestingly, days characterized by serious symptoms are significantly more likely than other days to result in provider visits, with the exception of visits to health centers and posts (p-values are shown in the appendix). This finding is probably due to the minimal fees associated with visits to these government-sponsored health facilities. Days of illness perceived as serious are most likely to be treated by doctors or pharmacists.

The estimates in Table 5 also reveal that mothers who hold modern health beliefs are more likely to visit health post/center staff, doctors, and those classified as other providers, but are less likely to seek traditional curers (although not all of the results are statistically significant). These findings suggest an important relation between modern health beliefs and the use of biomedical providers.

The first panel of estimates by duration indicates that pharmacists are more likely to be sought early on during the illness, in comparison with other types of providers, and that, with the exception of curers, the probability of seeing a given provider is highest between the second and fifth days, decreasing at longer durations. The second and third panels reveal that the use of (home) treatments greatly diminishes the subsequent likelihood of seeing a provider and that provider visits at a given duration reduce the probability of additional visits at a later point in time, with the exception of visits to a curer or "other" provider.

The remaining estimates in Table 5 indicate variation across providers in the association with a child's age, parity, and overall health assessment. The reversal of the age differential for pharmacists is not surprising since families are apt to be reluctant to administer medicines to infants, even though they

are apparently more likely to take infants to doctors, curers or other providers. Interestingly, children perceived to have been in very good health are more likely to be taken to doctors and to curers, as compared with other children, but are no more likely to visit health posts and centers.

Although some of the differentials in Table 5 appear to be modest, recall that, with the exception of the estimates by duration, the simulated percentages reflect changes in a single variable at a time and refer to only one day of illness. Overall, these estimates suggest huge differentials in the likelihood of seeking a provider according to characteristics of the illness and the child. For example, results from the multinomial model reveal that on a day of illness characterized by fever and gastrointestinal symptoms that were assessed as serious, an infant would face a 31 percent chance of seeing some type of provider. By contrast, on a day with only respiratory symptoms not considered serious, an older child would face the corresponding probability of only three percent (estimates not shown). These differences would become much larger if we were to focus on the entire course of an illness rather than on a single day.

Summary and conclusion

The estimates obtained in this analysis confirm and quantify previous findings, derived largely from small community-based studies, that modern medical care plays a major role in the treatment of infectious illnesses among children in rural Guatemala. Although only one-third of illnesses result in a visit to a health provider, pharmacists, doctors, and personnel at government-sponsored health facilities are much more likely to be seen than are curers and other traditional practitioners. Visits to biomedical providers are far more common than are explicit biomedical health beliefs about the causes of illness among women's own children.

The results from statistical models indicate that the likelihood of a provider visit depends considerably on the characteristics of the child and his or her illness. In general, families are much more likely to seek treatment from a provider when a child experiences fever and gastrointestinal symptoms such as vomiting or diarrhea, as compared with respiratory and other symptoms, whether or not the

mother assesses these symptoms as serious. While gastrointestinal illnesses are likely to benefit from medical attention, particularly given the high risks of malnutrition and mortality associated with dehydration from these illnesses, it is likely that many of the respiratory symptoms experienced by these children also need attention. Although some of the respiratory symptoms may reflect only the common cold, the respiratory symptoms selected for explicit mention in the EGSF questionnaire (e.g., panting/wheezing/difficulty breathing) are frequently associated with *lower* respiratory infections, such as bronchitis and pneumonia, which often warrant medical intervention.

Estimates from the multinomial model indicate that factors affecting the likelihood of seeking treatment often vary by the type of provider. In particular, the illness characteristics that are associated with the highest frequency of visits to curers, namely non-hygiene related beliefs and higher durations of illness, are opposite of those associated with the highest frequency of visits to biomedical providers. This result suggests that families seek different types of providers for contrasting reasons and at varying stages of illness. Moreover, some variables which are important determinants of visits to doctors, such as perceived severity of illness and the general health status of the child, show little association with visits to the virtually free government health facilities. The apparent favoritism toward very healthy children with regard to doctor (and curer) visits, but not with respect to government facilities, suggests that families may be more willing to invest their scarce resources in those children who are most likely to lead long productive lives.

This study highlights the advantages of the calendar approach for studying treatment behavior associated with child morbidity. The collection of detailed data on the timing and nature of symptoms and treatments in the EGSF permits statistically unbiased estimation of the association between a broad range of characteristics of illnesses and children and the likelihood of visits to different types of providers. To the best of our knowledge, such estimates of treatment, derived from a large probability sample, have not previously been obtained for developing countries.

In addition, the collection of extensive information in the EGSF about family, household and community characteristics permits considerable extension of the model of treatment behavior considered

in this analysis. For example, as suggested by previous research in Guatemala and elsewhere in Latin America (see, for example, Annis 1981; Van der Stuyft et al. 1996; Young 1981), a family's social network and support systems, a family's economic resources, and the availability and accessibility of providers and facilities in the community are likely to affect the frequency with which families seek providers for their children's illnesses, as well as the type of providers sought. Inclusion of a broad range of family, household, and community-level variables in the statistical analysis is currently underway.

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Table 1 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 (%)[1]	Median Duration (days)[2]	Percent of days serious[3]
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

[1] Estimates of prevalence are based on 3,193 children.
[2] 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.
[3] Estimates of percent of days when symptoms are considered serious are based on the total sample of 10,742 days with symptoms.

Table 2 Mean number of symptoms per day, by total number of symptoms recorded in the calendar

Number of symptoms in the calendar	Number of children	Mean number of symptoms per day[1]
None	1747	
1	507	1.0
2	392	1.4
3	254	1.9
4	140	2.4
5	88	2.8
6	49	3.2
7	13	3.9
8	2	4.3
9	1	5.9
Total	3193	1.8[2]

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

Table 3 Proportion of children and days of illness with visits to provider by type of provider

Provider	% Children seeing provider within calendar period	% of given day with visits to provider							
		Consecutive days with symptoms							
		1	2	3	4	5	6	7	8+
Pharmacist	9.7	3.0	3.4	2.3	0.8	1.6	1.3	1.1	0.8
Doctor	6.9	1.6	2.1	1.8	1.9	1.8	1.6	0.4	0.8
Someone in the health post/center[1]	7.1	1.2	2.1	1.7	1.9	1.8	0.9	0.7	1.1
Curer	4.4	0.7	1.2	1.2	0.8	2.3	1.3	1.5	2.1
Other[2]	5.4	1.7	1.6	1.4	1.5	1.0	0.6	0.7	1.1
No provider	67.9	91.8	89.8	91.6	93.1	91.5	94.4	95.6	94.1
Total	100	100	100	100	100	100	100	100	100
Number of children	870								
Number of days	4344	927[3]	829	654	481	386	320	271	476

[1] Also includes clinics and health technicians.
[2] Other providers primarily include promoters (volunteers associated with the Ministry of Health who receive minimal training in basic health issues), midwives and nurses.
[3] The number of "first" days of illness exceeds the total number of children in the analysis because 57 children experienced two "episodes" of illness—i.e. one or more consecutive days without any symptom was recorded between two days with (potentially different) symptoms.

Table 4 Estimated odd ratios and p-values for logistic models of the probability of seeing any provider on a given day of illness, by characteristics of the illness and the child[1]

	Model 1		Model 2		Model 3		Model 4	
	Odds ratio	p-value	Odds ratio	p-value	Odds ratio	p-value	Odds ratio	p-value
Illness Characteristics								
(Day 1)								
Day 2	1.25	0.19	1.23	0.23	1.23	0.23	2.00	<0.01
Days 3-5	1.00	0.99	0.99	0.94	1.01	0.96	1.97	<0.01
Days 6+	0.72	0.08	0.76	0.14	0.79	0.21	1.77	<0.01
(Other symptoms)								
Respiratory only	0.58	<0.01	0.63	0.01	0.61	<0.01	0.62	0.01
Fever, no gi	1.76	<0.01	1.78	<0.01	1.76	<0.01	2.16	<0.01
Fever & gi	3.09	<0.01	2.68	<0.01	2.79	<0.01	3.28	<0.01
(Symptoms not serious)								
Symptoms serious			2.13	<0.01	2.30	<0.01	2.23	<0.01
(Other health beliefs)								
Hygiene-related beliefs							2.05	<0.01
(No prior treatment)								
Prior treatment[2]							0.24	<0.01
(No prior provider)								
Prior provider							0.48	<0.01
Child Characteristics								
(Ages 1-5)								
Age 0-1					1.44	<0.01	1.44	<0.01
Parity					0.88	<0.01	0.88	<0.01
(Poor-good health)								
Very poor health					0.25	0.18	0.30	0.24
Very good health					3.38	<0.01	3.83	<0.01
Pseudo R^2	0.043		0.057		0.077		0.115	
Number of days	4344		4344		4344		4323	

Omitted categories are shown in parentheses.

[1] All models include a set of dummy variables to represent the four departments in which the EGSF took place.
[2] Prior treatment denotes the child having received some form of treatment but not having seen any provider.

Table 5 Predicted percentages[1] seeking different types of providers on a given day of illness, by selected characteristics of the illness and the child, estimated from multinomial model in the appendix

	Pharmacist	Health post[2]	Doctor	Curer	Other[3]	No one
Illness Characteristics						
(Other symptoms)	1.6	1.0	1.2	1.7	0.7	93.9
Respiratory only	1.6	0.8	0.9	0.3	0.5	95.9
Fever, no gi	3.2	2.7	2.3	1.1	2.7	87.9
Fever & gi	3.5	3.8	3.8	2.8	2.9	83.2
(Symptoms not serious)	1.7	1.4	1.1	1.1	1.1	93.6
Symptoms serious	3.5	1.7	3.2	2.1	2.2	87.4
(Other health beliefs)	2.1	1.4	1.4	1.3	1.1	92.6
Hygiene-related beliefs	2.1	2.5	3.6	0.4	6.0	85.5
I. No treatment/provider						
(Day 1)	3.0	1.2	1.6	0.6	1.6	91.9
Day 2	4.9	3.4	3.0	1.3	1.8	85.6
Days 3-5	3.2	4.1	3.4	1.8	1.6	85.9
Days 6+	2.9	3.2	2.5	2.5	1.3	87.7
II. Treatment day 1						
(Day 1)	3.0	1.2	1.6	0.6	1.6	91.9
Day 2	1.2	0.7	0.7	0.6	0.9	95.8
Days 3-5	0.8	0.9	0.8	0.8	0.8	95.9
Days 6+	0.7	0.6	0.6	1.2	0.7	96.3
III. Treatment day 1 & provider day 2[4]						
Days 3-5	0.3	0.2	0.3	0.9	0.8	97.5
Days 6+	0.3	0.1	0.2	1.2	0.6	97.5
Child Characteristics						
(Ages 1-5)	2.5	1.3	1.6	0.8	1.0	92.8
Age 0-1	1.2	2.0	1.7	2.2	2.3	90.5
Parity 2	2.3	1.7	1.7	1.6	1.7	91.0
Parity 6	1.8	1.3	1.4	0.7	0.7	94.0
(Very poor-good health)	2.2	1.5	1.5	1.0	1.3	92.5
Very good health	*	1.2	4.3	8.2	3.5	82.9
Number of days	4323					

Omitted categories are shown in parentheses.
* Parameter cannot be estimated because there are no children in "very good health" that visited a pharmacist.

[1] For example, the estimated percentage seeing a pharmacist for days with only respiratory symptoms (1.6) was obtained from the sample of days of illness as follows: all variables except the three dummy variables denoting symptoms were set to their observed values, whereas the three dichotomous variables denoting (1) respiratory symptoms only, (2) fever but no gastrointestinal symptoms, and (3) fever plus gastrointestinal symptoms were set to 1, 0 and 0 respectively.
[2] Also includes health centers, clinics and health technicians.
[3] Other providers primarily include promoters (volunteers associated with the Ministry of Health who receive minimal training in basic health issues), midwives and nurses.
[4] Estimates for day 1 and day 2 are the same as in the previous panel.

Appendix. Relative risk ratios and p-values for a multinomial model of the probability of seeing specific types of providers on a given day of illness, by characteristics of the illness and the child[1]

	Pharmacist		Health post[2]		Doctor		Curer		Other[3]	
	RRR	p-value	RRR	p-value	RRR	p-value	RRR	p-value	RRR	p-value
Illness Characteristics										
(Day 1)										
Day 2	1.82	0.04	3.20	<0.01	2.06	0.05	2.40	0.11	1.23	0.62
Days 3-5	1.19	0.58	3.82	<0.01	2.32	0.02	3.42	0.02	1.13	0.77
Days 6+	1.03	0.95	2.84	0.03	1.70	0.26	4.79	<0.01	0.87	0.79
(Other symptoms)										
Respiratory only	0.96	0.89	0.84	0.66	0.68	0.35	0.14	<0.01	0.75	0.59
Fever, no gi	2.28	<0.01	3.19	<0.01	2.09	0.02	0.67	0.29	4.59	<0.01
Fever & gi	2.61	<0.01	4.79	<0.01	3.85	<0.01	2.05	0.07	5.32	<0.01
(Symptoms not serious)										
Symptoms serious	2.26	<0.01	1.35	0.31	3.21	<0.01	2.31	<0.01	2.41	<0.01
(Other health beliefs)										
Hygiene-related beliefs	1.10	0.82	2.02	0.13	2.99	<0.01	0.30	0.25	6.93	<0.01
(No prior treatment)										
Prior treatment[4]	0.21	<0.01	0.18	<0.01	0.20	<0.01	0.38	0.02	0.41	0.03
(No prior provider)										
Prior provider	0.36	<0.01	0.20	<0.01	0.41	0.02	1.02	0.96	0.91	0.82
Child Characteristics										
(Ages 1-5)										
Age 0-1	0.51	0.02	1.64	0.07	1.15	0.61	2.97	<0.01	2.47	<0.01
Birth order	0.93	0.22	0.92	0.22	0.94	0.32	0.78	<0.01	0.80	<0.01
(Very poor-good health)										
Very good health	*	*	0.94	0.95	3.45	0.03	11.34	<0.01	3.42	0.06
Pseudo R^2	0.135									
Number of days	4323									

Omitted categories are shown in parentheses.
* Parameter cannot be estimated because there are no children in "very good health" who visited a pharmacist.

[1] All models include a set of dummy variables to represent the four departments in which the EGSF took place.
[2] Also includes clinics and health technicians.
[3] Other providers primarily include promoters (volunteers associated with the Ministry of Health who receive minimal training in basic health issues), midwives and nurses.
[4] Prior treatment denotes the child having received some form of treatment but not having seen any provider.

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