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Utilization of Care During Pregnancy in Rural Guatemala: Does Obstetrical Need Matters*

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Dana A. Glei
Corresponding author. Independent Research Consultant.
Santa Rosa, California, U.S.A

Noreen Goldman
Office of Population Research

Germán Rodríguez
Office of Population Research

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Utilization of Care During Pregnancy in Rural Guatemala:
Does Obstetrical Need Matters*

Abstract

This study examines factors associated with the use of biomedical care during pregnancy in Guatemala, focusing on the extent to which complications in an ongoing or previous pregnancy affect a woman's decisions to seek care. The findings, based on multilevel models, suggest that obstetrical need as well as demographic, social, and cultural factors are important predictors of pregnancy care. In contrast, measures of availability and access to health services have modest effects. The results also suggest the importance of unobserved variables – such as quality of care – in explaining women's decisions about pregnancy care.

Introduction

Of the nearly 600,000 women who die each year due to pregnancy-related causes, over 99% live in developing countries (WHO and UNICEF 1996). An additional 50 million women in developing countries experience a pregnancy-related complication each year (NRC 1997). These numbers reflect huge disparities in maternal morbidity and mortality between developing and industrialized countries, with rates in the former countries reaching values 100 times as large as those in the latter (Walsh, J. A., Feifer, C. N., Measham, A.R., and Gertler, P. J. 1993).

Since the 1980s there has been increasing interest on the part of governments and international agencies in improving maternal and child health in poor countries. Many programs, such as the Safe Motherhood Initiative, developed in response to the persistence of high rates of maternal mortality and morbidity, limited training of birth attendants, and concentration of health services in major urban areas. The underlying premise of many of these initiatives is that the vast majority of infant and maternal deaths and disabilities are preventable through high quality care, detection and efficient referral for complications, and access to the essential elements of obstetric care when needed (Mahler, H. 1987; Safe Motherhood IAG 2000).

In this paper, we examine the use of pregnancy-related care in Guatemala, a country characterized by some of the highest maternal and infant mortality rates in Latin America. Recent estimates indicate a maternal mortality rate of 190 per 100,000 live births and an infant mortality rate of 43 per 1,000 (World Bank 1999). Although the use of government health services and private doctors and nurses has grown in recent decades, utilization of these biomedical services for pregnancy-related care continues to be low relative to other Latin American countries (Instituto Nacional de Estadïstica (INE) et al. 1996; WHO 2001). This is especially true in rural areas where most births still occur at home, and prenatal care and delivery

assistance are typically provided by midwives with little or no formal training (Lang, J. B. and Elkin, E. D. 1997; Goldman, N., Glei, D. A., Pebley, A. R., and Delgado, H. 2001a).

During the 1980s, in an attempt to improve the quality of pregnancy-related care and reduce maternal and child morbidity, the Guatemalan Ministry of Health adopted WHO recommendations regarding the training of midwives to serve as extensions of maternal and child health services (Acevedo, D. and Hurtado, E. 1997; Leedam, E. 1985). A recent study indicates that the majority of Guatemalan midwives have attended training (Goldman, N., and Glei, D. A. 2001), during which they presumably were encouraged to send all pregnant women to a government health facility for tetanus vaccination, prenatal examinations, and postpartum follow-up, and to refer high-risk women and those with complications to a doctor or hospital (Cosminsky, S. 1977; Putney, P. J., and Smith, B. 1989). Nevertheless, most midwives (even trained ones) did not refer their clients to a biomedical provider (e.g., the staff of a government health facility or a private doctor) on a regular basis and most pregnant women did not see a biomedical provider during pregnancy.

In this analysis we examine factors associated with the use of biomedical care during pregnancy in Guatemala in an effort to better understand the continued low utilization of biomedical services. We use the detailed data collected in the 1995 Guatemalan Survey of Family Health (known by the Spanish acronym EGSF), a multilevel survey that includes individual, community and provider-level information for a random sample of rural Guatemalan communities and households. To the best of our knowledge, this survey provides a unique source of information for poor countries on the timing of use of different types of care during pregnancy and the timing of pregnancy-related complications. These data, collected using a monthly calendar format, permit us to estimate the extent to which use of biomedical prenatal care is

concentrated among women with an obstetrical need for such care – a topic that has received relatively little attention in developing countries. In addition, the EGSF provides extensive information on many other factors hypothesized to affect utilization of pregnancy-related services, such as the availability of traditional and biomedical health providers, previous pregnancy history, cultural beliefs, socioeconomic status, social networks, and community characteristics and infrastructure.

In the next section of the paper, we review previous studies on the determinants of pregnancy care that motivate the choice of explanatory variables included in our analysis. Next, we describe the data, analytic strategy, and explanatory variables used in the multivariate models. In the final sections, we present the results from the statistical analysis and discuss their implications for pregnancy care in Guatemala.

Determination of Pregnancy Care

Accessibility and quality of health services

The accessibility of health services is often cited as a critical determinant of health care choice in the developing world (Timyan, J., Brechin, S.J. G., Measham, D. M., and Ogunleye, B. 1993). Midwives have been the traditional providers of maternity care in Guatemala since pre-Hispanic times (Hurtado, E., and Saenz de Tejada, E.S. forthcoming) and are available in most communities, even in rural areas (Goldman, N. and Glei, D. A. 2001; INCAP et al. 1997). In contrast, many rural areas have limited access to biomedical health services, a constraint that has been shown to affect the receipt of pregnancy care. For example, using the Demographic and Health Survey (DHS) in Guatemala, Pebley, Goldman, and Rodríguez (1996) found that distance to the nearest government-sponsored clinic is inversely related to use of biomedical care during

pregnancy. In addition, lack of transportation, the cost of transport, and the difficulty of walking for hours to the nearest government health facility pose problems for pregnant women (Acevedo, D., and Hurtado, E. 1997; Villatoro, E., and Hurtado, E. 1986).

The cost of services presents another important constraint on utilization. The average fee charged by doctors for pregnancy and delivery care is about ten times as high as the corresponding fees charged by midwives (Goldman, N., and Glei, D. A. 2001). Government-sponsored health centers and posts are the most affordable source of biomedical pregnancy care, offering prenatal care for free or at a nominal cost (5 cents U.S.). Although access to health insurance or free health care (through non-governmental or religious organizations) could mitigate financial barriers, the vast majority of rural Guatemalan women and their families do not have these alternatives (Goldman, N., Pebley, A. R., and Gragnolati, M. forthcoming).

Even if services are accessible and affordable, people in developing countries are frequently unable to obtain needed medical supplies and face poor patient management and lack of know-how when they reach a health facility (Sundari, T. K.1992). In Guatemala, health centers are typically run by a doctor and have a professional nurse on staff, but health posts offer more limited services and are usually managed by an auxiliary nurse with only eight to ten months of training or a medical student. In addition, these facilities typically lack critical supplies and medicines (Goldman, N., et al. 2001a; INCAP et al. 1997; MotherCare 1997).

Social, economic, and cultural characteristics

Many other factors may limit access or influence demand for health services during pregnancy. Numerous studies in developing countries have demonstrated consistent relationships between socioeconomic status and use of health services. Higher utilization of biomedical services

among more educated women is believed to result in part from better allocation of financial and other resources, greater control over these resources, more autonomy in household decision-making, greater self-confidence, and stronger demand for satisfactory service from health practitioners (Caldwell, J. C. 1986; Cleland, J. G., and van Ginneken, J. K. 1988; Das Gupta, M. 1990). In their analysis of the Guatemala DHS, Pebley et al. (1996) demonstrate that higher levels of education are associated with increased use of biomedical care during pregnancy. Measures of income and wealth have also been shown to be important predictors of use of pregnancy care (see, for example, Celik, Y, and Hotchkiss, D. R. 2000).

Ethnicity is strongly associated with use of biomedical care during pregnancy in Guatemala. Two main ethnic groups each comprise roughly half of the population: the indigenous people, who are descendants of Mayan and other pre-conquest groups and maintain separate cultural identities and languages, and ladinos, who are of both indigenous and European origins, speak Spanish, and view themselves as part of the mainstream Guatemalan culture. Ethnicity is closely tied to social class: the indigenous population is, with few exceptions, poor, while ladinos are members of all social classes. Many biomedical providers do not speak an indigenous language, even when they serve a predominately indigenous population (Acevedo, D., and Hurtado, E. 1997; Goldman et al. 2001a; INCAP et al. 1997). Moreover, previous qualitative studies have indicated that medical staff in Guatemala may be condescending or discriminatory towards the poor, especially indigenous people (Cosminsky, S. 1982; Hurtado, E., and Saenz de Tejada, E. S. forthcoming). Thus, it is not surprising that indigenous women, especially non-Spanish speakers, are much less likely to use biomedical care during pregnancy than ladinas (Glei, D. A., and Goldman, N. 2000; Pebley, A. R. et al. 1996).

Ethnic identity may also be associated with health beliefs that influence whether care is

sought and whether that care is traditional or biomedical. Traditional beliefs remain common in Guatemala (Cosminsky, S. 1987; Scrimshaw, S. C. M, and Hurtado, E. 1988), although biomedical beliefs may be increasing (Goldman, N, Pebley, A. R., and Beckett, M. 2001b). Previous research on child illness in Guatemala has revealed that women who hold biomedical beliefs related to the causes of diarrhea are much more likely to take their sick children to private doctors as compared with other women (Goldman, N., and Heuveline, P. 2000). These women may also be more likely than those holding traditional beliefs to seek biomedical care during pregnancy.

A woman's role in household decision-making relative to her spouse and other family members may also affect her use of health services (Bloom, S. S., Wypij, D., and Das Gupta, M. 2001; Timyan, J. et al. 1993). Furthermore, social ties with others may influence her decisions about seeking pregnancy care by exposing her to different ideas regarding pregnancy care and by imparting information about providers. In addition, social ties may provide access to providers that are unfamiliar to the woman, either by serving as contacts or by offering material assistance (cash or transportation). Previous research has shown that social contacts outside of her community (e.g., in larger urban areas or abroad) increase the likelihood that a woman holds biomedical beliefs about illness causation (Goldman, N. et al. 2001b).

Factors associated with obstetrical need

Given the importance of previous obstetrical outcomes (e.g., stillbirth, neonatal death or cesarean delivery) and the experience of serious complications during an ongoing pregnancy (e.g., hemorrhage or high blood pressure) for maternal and prenatal health problems (Walsh, J. A. et al. 1993; WHO 1994, 1996), these obstetrical conditions are likely to be important predictors of

prenatal care during pregnancy. Yet, few studies in developing countries have investigated these associations empirically, in part because population-based surveys such as the DHS typically do not collect sufficiently detailed information to permit such an investigation. One exception is a study in Mexico (Potter, J. 1988) – which unexpectedly found that some common non-threatening symptoms (e.g., vomiting) led to higher use of biomedical care whereas serious complications did not – but this study suffers from lack of data on the timing of the complications and provider visits. The findings of other studies are mixed: for example, Bhatia, J. C., and Cleland, J. (1995) determine that a history of fetal loss or neonatal death is positively related to receiving care during the first trimester in India, whereas Pebley, A. R. et al. (1996) find no significant relationship in Guatemala between child mortality and the use of biomedical care during subsequent pregnancies. Jahn, A., Kowalewski, M., and Kimatta, S. S. (1998) determine that prior cesarean delivery is associated with greater use of obstetrical care in Tanzania, but also find no effect of prior perinatal mortality.

The extremes of maternal age and parity (i.e., young and older ages, first born and fifth or higher parity) are associated with higher maternal morbidity and mortality (Walsh, J. A. et al. 1993) and thus may be related to use of biomedical care. These variables may also reflect experience with pregnancy-related matters and, as such, older and multiparous women may be less inclined to seek care. Results from the 1996 DHS in Guatemala reveal that older maternal age is related to more frequent use of biomedical care during pregnancy (Pebley, A. R. et al. 1996).

Data and Methods

The 1995 Guatemalan Survey of Family Health (EGSF)

In the EGSF, interviews were conducted with 2,872 women aged 18 to 35 in 60 small, rural communities (i.e., between 200 and 10,000 inhabitants) within four departments of Guatemala. The departments were selected on the basis of social, economic, and environmental diversity, and ethnic composition. One department is primarily ladino (Jalapa), two are predominantly indigenous (Chimaltenango and Totonicapán), and one has a mixed population (Suchitepéquez). Communities were randomly selected with probability proportional to population size to yield self-weighting samples within departments. Versions of the questionnaire were fielded in Spanish, K'iche', and Kaqchikel. The overall response rate was 89%.

An innovative calendar design was used to collect detailed information on pregnancy-related care and complications for each of a woman's last two live births that occurred since January, 1990—a total of 3,350 births to 2,020 women. Mothers were asked whether they experienced each of four serious complications during pregnancy (hemorrhage, convulsions, swelling of the hands or face, or premature rupture of the membranes), and whether they experienced any other serious problems. Interviewers recorded the specific gestational months (labeled 1 through 9) in which each symptom was experienced. Mothers were also asked about persons that they saw during pregnancy, including midwives, nurses, doctors, personnel at health centers and posts, and other traditional and biomedical providers, and the relevant gestational months were noted in the calendar. Subsequently, interviewers obtained information in a tabular format about each provider that the respondent reporting seeing during the pregnancy (such as reasons for seeing the provider, procedures used by the provider, and cost). Information on

family and household characteristics come from sections of the questionnaire on the respondent's background, health beliefs, social networks, economic status, and birth history.

Community informants and providers were also interviewed in each community. Three community informants (the mayor, a woman in a leadership position, and another person who knew the community well) provided information about the community, such as the economic activities, infrastructure, services, transportation, and migration patterns. In addition, the informants provided a listing of health providers and facilities within a 20-kilometer radius. The three listings were subsequently consolidated to construct a census of health providers and facilities for each community (see Peterson, C., Goldman, N., and Pebley, A. R. 1997 for details), which formed the sampling frame for subsequent interviews with providers. The community and provider questionnaires were administered only in Spanish.

Analytical Strategy

We analyze the use of prenatal care in two stages, each of which entails a binary choice: (1) obtaining any form of care during a given month of pregnancy; and (2) obtaining biomedical care in a given month of pregnancy conditional on receiving some form of care in that month. We consider biomedical care as encompassing health centers and posts, private doctors, and private nurses[1] (whether or not these providers or facilities are used on their own or in addition to a midwife). Each of the two stages is modeled with a logit equation, forming what is known as a continuation ratio logit model (Agresti, A. 1990).

[1] Nearly all women who saw a private nurse during pregnancy also saw a private doctor.

We use a *multilevel* logit model in the analysis for two reasons. The first concerns the nature of the sample used for estimation. The EGSF is highly clustered by community (i.e., about 50 women were interviewed in each of 60 communities). Moreover, because of the need to identify the timing of complications relative to the timing of care, we use a longitudinal dataset where each woman contributes observations for up to nine pregnancy months. Under these circumstances, the standard assumption of independence across women in the same community or across months of observation on the same woman is highly suspect. Conventional estimates that ignore clustering are likely to overestimate the precision of the coefficients (Goldstein, H. 1995; Rodríguez, G., and Goldman, N. 2001). In addition, in the case of non-linear relationships such as the logit, failure to account for clustering may lead to inconsistent parameter estimates, which are generally biased toward zero (Pebley, A. R. et al. 1996; Rodríguez, G., and Goldman, N. 1995). Multilevel models provide improved estimates and correct standard errors that account for the hierarchical structure of the data.

The second motivation for using multilevel models is to derive substantive information regarding the degree to which group membership shapes individual behavior (Goldstein, H. 1995; Rodríguez, G., and Goldman, N. 1995). Pebley, A. R. et al. (1996) documented substantial correlation in health care choices in Guatemala: women who used a biomedical provider during one pregnancy were likely to do the same in the next, and women who lived in the same community were more similar in their patterns of prenatal care than were women in different communities. Unfortunately, their analysis was limited by lack of data in the DHS on many potentially important determinants of health care choices, a drawback that may have led to the authors' inability to account for much of the observed clustering.

The multilevel model used in this analysis, known as a three-level random-intercept

model, incorporates a random effect at two levels other than the individual pregnancy month: the community and the pregnancy. This model is described in more detail below. Although we could have included two pregnancies per woman (for women who had two births since January, 1990) by introducing a woman-level random effect to account for correlation between the two pregnancies, we chose instead to select her most recent birth for analysis. This reduced the complexity of the model from four to three levels, making estimation more feasible. In addition, exploratory work suggested that women's behavior is very consistent across pregnancies. Therefore, the inclusion of more than one pregnancy per woman would provide little additional information, yet introduce serious difficulties in estimation. One drawback is that the random effects we estimate at the pregnancy-level reflect unobserved characteristics of both the woman and the individual pregnancy, and we are unable to distinguish between them.

The final sample consists of 17,638 pregnancy months,[2] with an average of 8.9 months per birth and an average of 32.8 births per community. In our notation we use *i* to index communities, *j* to index pregnancies (or women) within communities, and *k* to index pregnancy months. We assume that conditional on random effects z_i and z_{ij}, representing unobserved characteristics of the ith community and of the jth pregnancy (or woman) in that community, the provider choices are mutually independent across pregnancy months. We further assume that the logit of the conditional probability π_{ijk} that the jth woman in the ith community will seek care in the kth month of pregnancy given the random effects satisfies the model:

$$\text{logit}(\pi_{ijk}) = \alpha_k + \boldsymbol{x}'_{ijk}\boldsymbol{\beta}_k + \sigma_p z_{ij} + \sigma_c z_i \qquad (1)$$

[2] Observations with missing data on any of the explanatory variables (2.6%) were excluded.

The second-stage model—for the logit of the conditional probability that the jth woman in the ith community sees a biomedical provider in the kth month of pregnancy—has the same general structure, but with different coefficients. In equation 1, α_k represents the effect of month *k* on the choice; because very few women see a provider in the first few months of pregnancy, we estimate a common effect for the first trimester and individual effects for months four through nine. The covariate vector $\mathbf{x}_{ijk}$ is indexed using three subscripts, but most of its elements represent characteristics that are fixed throughout the pregnancy; the single exception is an indicator of whether the woman experienced a complication in a given pregnancy month, a covariate central to our aims. The model permits the *effects* of the covariates to vary by duration. In order to model these interactions in a parsimonious way, we allowed the effects to vary by trimester rather than month. Incorporating these distinctions, the model can be re-written as:

$$\text{logit}(\pi_{ijk}) = \alpha_k + \boldsymbol{x}^{(1)}_{ij}{}'\boldsymbol{\beta}^{(1)} + \boldsymbol{x}^{(2)}_{ij}{}'\boldsymbol{\beta}^{(2)}_{t(k)} + x^{(3)}_{ijk}\,\beta^{(3)}_{t(k)} + \sigma_p z_{ij} + \sigma_c z_i \qquad (2)$$

where *t(k)* represents the trimester corresponding to month *k*, $\boldsymbol{x}^{(1)}_{ij}$ represents the fixed covariates with constant effects $\boldsymbol{\beta}^{(1)}$, $\boldsymbol{x}^{(2)}_{ij}$ represents the fixed covariates with effects $\boldsymbol{\beta}^{(2)}_{t(k)}$ that vary by trimester, and finally $x^{(3)}_{ijk}$ represents our time-varying indicator of complications, with effects $\beta^{(3)}_{t(k)}$ that vary by trimester.

We assume that the random effects are independent and normally distributed with mean zero and variances σ^2_c and σ^2_p at the community and pregnancy levels, respectively. In the equations we have written these effects as the product of their standard deviation, σ_c or σ_p, and a standard normal random variable. In this formulation, the σ's can be interpreted as logit coefficients, representing the effect of a one standard deviation change in the unobserved characteristics of the community or pregnancy, respectively. The σ's can also be interpreted in

terms of intra-class correlations in a latent variable reflecting a predisposition to seek prenatal care (or a predisposition to see a biomedical provider given that one has sought care); see Pebley et al. (1996). These intra-class correlations are defined as:

$$\rho_p = \frac{\sigma_c^2 + \sigma_p^2}{\sigma_c^2 + \sigma_p^2 + \pi^2/3} \quad \text{and} \tag{3a}$$

$$\rho_c = \frac{\sigma_c^2}{\sigma_c^2 + \sigma_p^2 + \pi^2/3} \tag{3b}$$

at the pregnancy and community levels, respectively. Note that the intra-pregnancy correlation is always at least as large (and in our case much larger) than the intra-community correlation, as logic would require, and that each correlation coefficient increases monotonically with the corresponding σ.

The model in equation (2) was estimated using maximum likelihood procedures, based on Gauss-Hermite numerical quadrature (Rodríguez, G., and Goldman, N. 2001).[3] This procedure involves using a set of S-Plus functions, written by Germán Rodríguez, that call routines written in C (Pebley, A. R. et al. 1996; Rodríguez and Goldman 2001). Estimates derived in this manner avoid the biases inherent in approximate methods of inference for binary responses, used in statistical packages such as MLwiN and VARCL (Rodríguez, G., and Goldman, N. 1995).[4]

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[3] Although 20-point quadrature was deemed adequate for the equation predicting whether any provider was seen during a pregnancy month, the equation predicting use of a biomedical provider required 50-point quadrature to achieve reasonable stability for most of the parameters.

[4] An alternative to numerical integration uses a Bayesian framework and Monte Carlo method, the Gibbs Sampler (Zeger, S. L., and Karim, M. R. 1991); this procedure is implemented in the

Because of the computer intensive nature of the estimation procedure, we were unable to estimate models with large numbers of explanatory variables. In order to obtain a relatively parsimonious model, we conducted exploratory model building in Stata (StataCorp 2001) using ordinary logit models corrected for community-level clustering. For each of the two equations, explanatory variables (from the list provided in Table 2) that were not significant at the 0.20 level were excluded from that equation. Subsequently, multilevel models based on the remaining variables were estimated with numerical quadrature and explanatory variables that were not significant at the 0.05 level were dropped. Consequently, in our final model the equation representing any care does not include the same variables as the equation denoting biomedical care given any care.

Explanatory Variables

We employ the behavioral model of health service use (Aday, L. A., and Andersen, R. 1974; Andersen, R. M. 1995; Andersen, R. M., and Newman, J. F. 1973), with minor adaptation, to provide an organizational structure for the determinants of pregnancy care. This framework specifies three categories of population characteristics that are hypothesized to have direct effects

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statistical package Bayesian Inference Using Gibbs Sampling (BUGS). Although BUGS allows greater flexibility and complexity of the model than maximum likelihood, it proved to be extremely time-intensive and convergence was a serious problem. For purposes of comparison, our final model was also estimated in BUGS. Despite problems with convergence, the estimates proved to be reasonably similar to those resulting from maximum likelihood techniques, a finding that confirms earlier results in Rodríguez, G., and Goldman, N. (2001).

on health behavior: predisposing characteristics, enabling resources, and measures of need. Numerous variables belong in more than one of these categories. In such cases, we made an arbitrary classification for purposes of discussion and presentation of results. Below, we present all explanatory variables hypothesized to affect pregnancy care decisions, regardless of whether they are ultimately included in the multilevel model. We classify these variables according to the three categories of the framework and describe the specific measures used to operationalize them.

Predisposing characteristics.

Predisposing characteristics describe the propensity of an individual to use services. These characteristics include demographic factors (maternal age and parity), cultural factors (ethnicity and health beliefs), and variables that affect a woman's status and coping ability (education and autonomy in household decision-making).

Maternal age is coded as a dichotomous variable, indicating whether the mother was below age 20 at the time of the birth. Parity is classified into three categories that reflect the greater health risks associated with first and high parity births: first birth; second, third or fourth order births; and fifth or higher order births.

Ethnicity is based on respondents' self-classification as indigenous or ladino and self-reported ability to speak Spanish. These questions were not asked within the department of Jalapa because the selected communities were almost entirely ladino and the pretest indicated that respondents in Jalapa took offense at these questions. Thus, all respondents in Jalapa are coded as ladino. Information on mothers' health beliefs is derived from responses to a question regarding the causes of child diarrhea. A dummy variable captures those mothers whose beliefs

are related to hygiene or contamination, in an effort to identify families holding biomedical beliefs about illness causation (Goldman, N. et al. 2001b).

A woman's education is represented by the number of years of schooling that she completed. Women's autonomy in household decision-making relative to her spouse is measured by an index derived from women's responses to four questions regarding decisions about food purchases, purchases of medicine, whom the respondent should see if she is sick, and who is in charge of the money for household expenses (Seltzer, J. A., Pebley, A. R., and Goldman, N. 1997). For each item, one point was assigned if the respondent indicated that she makes the decision on her own, resulting in an index ranging from zero to four with an alpha reliability of 0.64. Because this information was asked only of women who were married or in a consensual union, the index is coded to zero for single women and a dummy variable indicating whether or not the respondent was married or in a union at the time of the survey is included in the model.

Enabling Resources.

Enabling resources refer to the means available to obtain services. These factors include economic resources, insurance coverage, accessibility of services, availability of transportation and social connections to persons outside of the community.

Our measure of household income – monthly household consumption per person in the household – is derived from women's reports regarding household consumption of 40 staples and food products bought, harvested, produced, or gathered in the seven days preceding the survey (Gragnolati, M. 1998). Consumption has been shown to more accurately represent long-term household income than earnings and sales of agricultural produce, because it is less subject

to short-term fluctuations (Deaton, A. 1989) and is likely to be more precise, especially in agricultural communities where food may be produced and consumed within the household. Another measure of wealth, which also captures access to health services, identifies respondents whose family owns a car or truck.

Two variables, derived from the census of providers and facilities, represent availability of providers: whether or not there is a private doctor or private clinic in the community and whether or not there is a health center or post in the community. Another variable, derived from questions asked of the key informants,[5] identifies communities that have that have had bus transport over the past five years along with a main road open throughout the year. Two additional dichotomous variables measure access to health care: whether the woman has health insurance and whether anyone in the household has access to free health services (apart from health posts and centers).

Three variables depict social contact with persons outside the community. A dichotomous variable identifies women who have a relative in Guatemala City or abroad, based on responses in the individual survey. Key informants in the community survey were asked about the frequency with which people in the community leave the country and the frequency with which they move to other parts of Guatemala. Responses to these two questions were

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[5] The following strategy was used to code the community-level variables obtained from the three key informants in each community. If one of the informants gave a different response than the other two, the value given by the two informants was used. If all three informants gave disparate answers, the median value (for ordinal responses) or the response of the mayor or person who had lived longest in the community (for non-ordinal responses) was used.

coded on a five-point ordinal scale, from which we created two dichotomous variables to identify communities where international migration (mainly to the United States and Mexico) and migration within Guatemala (other than to plantations) is common or very common.

Measures of need.

These measures reflect risk factors that indicate need for specialized obstetrical care. The risk factors include a history of cesarean delivery, fetal loss, and infant mortality, as well as complications during the most recent pregnancy that may cause women to seek or be referred to a biomedical provider.

Based on the birth history provided by mothers, dichotomous variables were created to indicate whether any of the respondent's previous births were delivered by cesarean; whether any of her previous children died during the first month of life; and whether she had ever experienced a fetal loss (miscarriage or stillbirth). The timing of fetal losses cannot be determined from data in the EGSF, but it is likely that women who experienced a fetal loss before the survey date did so prior to the most recent birth. As noted earlier, as part of the calendar on pregnancy care, women were asked whether they had experienced each of four serious complications during the most recent pregnancy: bleeding/hemorrhage, swelling of the hands or face (indicating preeclampsia), convulsions (indicating eclampsia), and premature rupture of the membranes ("the water broke early"). A dichotomous variable calculated for each pregnancy month in the sample indicates whether the woman experienced any of these four complications during the given month.

Other variables.

We also include a measure that may capture various attributes associated with the remoteness of the community: distance to Guatemala City, measured from the municipal capital via the most convenient route, not necessarily the shortest one. These data were provided by the Guatemalan *Instituto Geográfico Nacional*. Finally, because of the stratification of the sample by department, we incorporate a set of variables denoting the four departments in which the EGSF took place.

We include three sets of interaction terms that reflect variations in the effects of the covariates over the course of the pregnancy. We explored numerous interactions between duration (i.e., trimester of pregnancy) and the explanatory variables described above and found that only those involving parity, ethnicity, and complications significantly improved the fit of at least one of the two equations in the model.[6]

Results

Characteristics of the Sample

The distributions of all of the explanatory variables considered for inclusion in the model are shown in Table 1, according to whether the variables are measured at the level of the community, mother, birth, or pregnancy month. The sample is restricted to women who had a live birth in the five-year period prior to the interview. These descriptive statistics reveal that

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[6] Wald tests were used to test for the joint significance ($p<0.05$) of the interaction terms involving a given explanatory variable and dummy variables denoting the second and third trimesters of pregnancy.

about one-quarter of the communities in the sample experience frequent migration abroad and a similar proportion experience frequent migration to other parts of Guatemala. Fewer than half of the communities have a government-sponsored health facility, while only 30% have a private doctor or private clinic. Access to biomedical providers is further restricted by the fact that only one-third of communities have bus transport with an accessible road. Moreover, relatively few respondents have their own vehicles or have access to medical insurance or free health services (shown at the mother/family level).

As is true in most of Guatemala, the average level of education of the sample is very low (2.3 years). About two-thirds of the women in the survey are indigenous, most of whom can speak Spanish. About half of the women have relatives in the capital or abroad. Most are married and have relatively low autonomy in household decision-making, being in charge of an average of one in four household decisions. In general, families have few resources with per capita household consumption averaging 23 *quetzales (*approximately U.S. $4.50) per month.

The data in Table 1 also reveal that nearly one-fifth of the women have experienced a fetal loss and 9% have had a prior neonatal death. Given that the vast majority of rural Guatemalans give birth at home, it is not surprising that few have had a prior cesarean delivery. Only two percent of women experienced one of the four mentioned serious complications in a pregnancy month.

A Description of Care during Pregnancy

The types of care sought during pregnancy are shown by month of pregnancy in Table 2. Virtually all women (96%) received some form of care during pregnancy, and about half did so in the fourth month. The proportion rises steadily with gestation, from few women receiving care

during the first trimester to about 90% in the ninth month. Whereas women are progressively more likely to seek a midwife as the pregnancy progresses, the pattern for biomedical care is more complex, rising steadily through the first few months and varying little thereafter.

The midwife is the most frequently sought provider for pregnancy care. According to Table 2, about 84% of women see a midwife at some point during pregnancy, in contrast to about 43% seeing a biomedical provider. The most frequent type of biomedical care is the combination of a health post or center and a midwife. Notably, women who seek biomedical care during the first two trimesters are more likely to seek such care on its own rather than in conjunction with a midwife, whereas women seeking biomedical care in the last trimester are more likely to also see a midwife.

Providers Seen by Experience of Serious Complications

Table 3 explores the relationship between the occurrence of serious complications in a given month and the receipt of pregnancy care in that month.[7] The estimates reveal a clear

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[7] If a complication and a provider visit occurred within the same gestational month, we are unable to determine whether the complication began (or the woman recognized the complication) before or after she sought care. Implicit in our interpretation of the estimates from equation (1) is the assumption that the complication was recognized prior to the provider visit. Given that the EGSF asked about very serious and recognizable complications in non-medical terms, we believe that it is unlikely that the provider identified the complication before the woman. However, it is possible that the complication occurred after, but within the same gestational month, as the provider visit.

association between the two variables, with women who experienced serious complications being about twice as likely to seek biomedical care as their counterparts. In contrast, both groups of women are equally likely to see only a midwife. The effect of complications on the receipt of biomedical care is particularly large during the first trimester, when women with serious problems are more than five times as likely to see a biomedical provider as compared with other women. By the third trimester, the differential is modest. In the next section, we reexamine the effects of complications on the likelihood that a pregnant woman receives biomedical care using a multivariate model that controls for additional determinants of pregnancy care.

Multilevel Model of Pregnancy Care

Table 4 shows the estimated odds ratios for covariates that are significant at $p<0.05$ in the multilevel hierarchical logit model. The standard deviations of the random effects along with the associated intra-class correlations are presented at the bottom of the table.

To ease interpretation of the results, we have also calculated predicted (or simulated) probabilities of seeking care and of seeing a biomedical provider among those who seek care in a given month; these predictions are based on the full sample of pregnancy months. Table 5 shows predicted probabilities for each variable in our model, calculated by (1) setting pregnancy duration to five months;[8] (2) setting the variable of interest to each of its possible categories or to preselected values (and setting any interactions with duration accordingly); (3) leaving all other variables at their observed values; and (4) setting the community and pregnancy random effects

[8] We chose five months because this duration marks the midpoint of pregnancy and avoids the extremely low probabilities in early pregnancy and the high probabilities in late pregnancy.

to zero. The results represent an estimate of the average probability of seeking care (or of seeing a biomedical provider among those who seek care) in the fifth month of pregnancy, for a woman in the indicated category (e.g., having a first birth), controlling for other variables.

Table 6 shows additional calculations for a subset of variables that interact with pregnancy duration, namely birth order, ethnicity and serious complications. For these variables, we present predicted probabilities for the first trimester and for each pregnancy month thereafter. These estimates provide a sense of how much the effect of each of these variables changes with pregnancy duration.

The estimates pertaining to the duration of pregnancy in Tables 4 and 6 confirm the pattern detected in Table 1. The likelihood that a woman visits some provider increases dramatically throughout pregnancy, with almost all women seeing someone in their final month. In contrast, the probability that a woman visits a biomedical provider (conditional on having seen someone) varies little by gestation.

Predisposing characteristics.

Among the variables hypothesized to affect use of pregnancy care, all of the predisposing characteristics except for the age of the mother are significant in at least one of the two equations. As shown in Table 6, women expecting their first birth are more likely to receiving care early in pregnancy than their multiparous counterparts. Among women who receive some care, women having their first child are also more likely to visit biomedical providers during pregnancy (Table 5), but the differences by gestation are not significant. A similar pattern is apparent by ethnicity: ladinas are much more likely to receive some care during the early months than indigenous women, and when they seek care, are more likely to visit a biomedical

provider. Use of biomedical services is especially low among indigenous women who do not speak Spanish.

As hypothesized, women holding biomedical ideas about illness causation are more likely than their counterparts to visit a biomedical provider when they seek care, although the difference is modest. Education is one of the strongest predictors of whether biomedical is sought. For example, we estimate that only 12% of women without formal schooling seeking care in the fifth month of pregnancy visit a biomedical provider, in contrast to 42% of women with six or more years of schooling, after controlling for other characteristics (Table 5). In addition, married women are much more apt than single women to seek care during pregnancy, although there is little difference in the choice of provider. Nonetheless, among women in a marital or consensual union, greater autonomy in household decision-making is related to more frequent use of biomedical care given receipt of some care.

Enabling resources.

Only one of the enabling factors hypothesized to affect use of pregnancy care is significant. Women living in communities characterized by frequent migration abroad are more likely than other women to receive pregnancy care, and when they do are much more likely to use a biomedical provider. Contrary to expectation, none of the measures of access and affordability of biomedical care – biomedical services in the community, access to bus transport, vehicle ownership, health insurance coverage, access to free care, and household consumption – is significantly related to pregnancy care.

Measures of need.

In contrast to the findings regarding enabling resources, indicators of need emerge as important factors in decisions pertaining to pregnancy care, particularly whether to seek biomedical care. Women who had a previous cesarean delivery are much more likely to select a biomedical provider relative to those without such a history. Specifically, as shown in Table 5, among women who visit a provider in the fifth month of pregnancy, 46% of those with a prior cesarean delivery are predicted to see a biomedical provider as compared to only 22% of their counterparts. A history of fetal loss is also positively related to the use of any provider and a biomedical provider, albeit the effects are not large.

Serious complications also have a substantial effect. Women with complications in a pregnancy month are more likely to visit a provider in that same month and are more likely to see a biomedical provider if they do seek care, as compared to women without complications. As suggested by the data in Table 3, the association between the presence of complications and the receipt of care depends upon the duration of pregnancy, although the interaction is significant only with regard to the receipt of any type of care. Women with complications in early pregnancy are much more likely to obtain care than those without complications, but the presence of complications has little effect in the final trimester (presumably because almost all women obtain care by this stage).

Further insights into the effects of complications on the types of providers seen can be gleaned by calculating the predicted probabilities that (1) a woman visits a biomedical provider

in a given month; and (2) a woman visits only a midwife in a given month.[9] These probabilities are as follows: 0.29 and 0.57, respectively, for those who experienced a serious complication as compared to 0.19 and 0.50 for those with no complication (data not shown). These estimates reveal that even when women experience a serious complication, they are still much more likely to rely solely on a midwife than to seek biomedical care.

*Other variables***.**

Distance to Guatemala City is significantly associated with the use of care during pregnancy, especially biomedical care. Women in more remote communities are *more* likely to see some provider in a pregnancy month, but when they do they are much *less* likely to see a biomedical one. This variable may capture the cultural and social isolation of women living in remote areas or unmeasured aspects of access to health facilities. Large differences in the likelihood of obtaining pregnancy care are also apparent across departments, perhaps due to regional variation in belief systems or unmeasured characteristics of communities and health services.

Clustering.

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[9] To obtain the predicted probability of seeing a biomedical provider, P(Biomedical), we calculate the product of P(Any) and P(Biomedical|Any) for each pregnancy month and then average across the sample of months. The probability of seeing only a midwife is the difference between P(Any) and P(Biomedical), also averaged across the sample of months.

Despite the rich set of covariates considered for inclusion in the multivariate model, the random effects are substantial. For example, the estimated σ_p of 5.38 (Table 4) in the second equation implies that the odds of seeing a biomedical provider when a woman seeks care are more than 200 times higher for a pregnancy with unobserved effects one standard deviation above the mean as compared to the average pregnancy. This high level of clustering is reflected by the extremely high values of the intra-pregnancy correlations (0.62 for use of any type of care and 0.90 for biomedical care given some care). These estimates reveal that a given woman is very likely to seek similar types of care throughout her pregnancy.

Although the community-level random effects are considerably smaller than the pregnancy effects, they are nevertheless sizeable, especially in light of the numerous community-level variables considered for inclusion in the model. The estimated σ_c of 1.45 (for biomedical care) implies that the odds of seeing a biomedical provider when care is sought are about four times higher for a woman living in a community with unobserved effects one standard deviation above the mean as compared to the average community.

Discussion

The detailed data available in the EGSF have permitted us to obtain a more thorough understanding of the interplay of a large number of factors that potentially affect women's decisions about whether to obtain care during pregnancy and what type of care to seek. Although many of the results are consistent with our hypotheses and the findings of earlier research, they reveal an unexpected and important result. The availability of private physicians and government-sponsored health facilities within communities, the accessibility of these

services, and a family's ability to afford them have little effect on their decisions to use these services during pregnancy. Only one "enabling resource," whether migration abroad is common in the woman's community, is significantly associated with using biomedical pregnancy care. This variable may reflect access to information and financial resources that facilitate obtaining health services, or it may capture a woman's exposure to different ideas about health and pregnancy care.

The lack of an association between a family's income (measured here by household consumption) and the utilization of biomedical services is not altogether surprising because many pregnant women rely on government facilities that provide services at little or no cost. What is more puzzling is the absence of a relationship between the proximity of these services and their use. One plausible explanation may be the inadequate quality of some of the biomedical care, especially in government facilities. As noted earlier, health posts and centers are often staffed by minimally trained personnel, offer a limited range of services, and typically lack critical supplies and medicines (INCAP et al. 1997). Guatemalan women themselves have offered reasons for their low utilization of biomedical care, including fear of the treatments or the personnel, condescending attitudes of the providers, refusal by their spouses, embarrassment, perceptions of poor quality of care, limited hours of service, and inability of the medical staff to speak indigenous languages (Cosminsky, S. 1982; Hurtado, E., and Saenz de Tejada, E. S. forthcoming).

In contrast to our findings related to availability and accessibility of biomedical health services, predisposing factors—which encompass an array of demographic, social and cultural attributes of women—emerge as important determinants of pregnancy care. A woman's ethnicity and her level of education appear to be among the strongest predictors of whether she

receives biomedical care during pregnancy. Ladinas and more educated women are much more likely to visit biomedical providers than their indigenous and less educated counterparts. Other predisposing factors that appear to be important include parity, health beliefs, marital status, and women's autonomy in household decision-making.

One of the primary objectives of this paper has been to assess the extent to which a woman's obstetrical need, as indicated by negative outcomes for previous pregnancies and complications during an ongoing pregnancy, influences her decisions. The results indicate that these variables are indeed significant determinants of pregnancy care. Women with serious complications are much more likely than their counterparts to visit a biomedical provider. Yet, even these women are more likely to rely solely on a midwife than to seek a biomedical provider.

As noted earlier, given the richness of data collected in the EGSF, we anticipated that this study would find lower levels of intra-cluster correlation than Pebley, A. R. et al. (1996) in their analysis of the Guatemala DHS. Although we cannot compare the two sets of estimates directly (e.g., the Pebley et al. analysis included a mother-level effect while the present study includes a pregnancy-level effect), there is little doubt that the random effects estimated in this paper are large, particularly at the pregnancy-level. These results suggest that there are individual or family-level decision dynamics regarding whom a woman sees during a particular pregnancy that are not captured by the observed covariates. In other words, in spite of detailed information about the woman's pregnancy, herself and her family, and her community, we continue to know relatively little about why a minority seek biomedical services, often in conjunction with a midwife, while the majority rely solely on the midwife, even when faced with life-threatening symptoms. Important unmeasured factors may relate to a women's previous experience with health personnel and facilities, the influence of her spouse and other relatives, and her belief

systems regarding pregnancy and appropriate care. Of particular importance may be the quality of care that she anticipates receiving from traditional and biomedical providers.

These findings have important implications for health policy in Guatemala. The results imply that improving access to biomedical services is unlikely to have a dramatic impact on utilization in the absence of additional changes. They also suggest that, even if access to health facilities improves, large differences by ethnicity and education level are likely to persist. Efforts on the part of the government to increase utilization of services during pregnancy have not been very successful. Current efforts aimed at incorporating midwives into the formal health care system may need to extend their focus beyond the modification of midwife practices to consider the provision of culturally appropriate, high quality services by traditional and biomedical providers alike.

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TABLE 1. POTENTIAL COVARIATES OF PREGNANCY CARE, MEAN OR PERCENT IN CATEGORY

Variable	Mean or Percent
Community Level	(n=60)
Distance from municipal capital to Guatemala City (in km)	150.4
Doctor or private clinic within the community (%)	30.0
Health center or post within the community (%)	41.7
Bus service available and principle road open all year (%)	33.3
Migration abroad is common in the community (%)	23.3
Migration within Guatemala is common in community (%)	26.7
Mother/Family Level	(n=2,020)
Ethnicity/language[a]	
Ladina (%)	35.0
Indigenous, speaks Spanish (%)	51.9
Indigenous, does not speak Spanish (%)	13.1
Biomedical health beliefs (%)	30.8
Highest grade completed (in years)	2.3
In a marital or consensual union (%)	91.7
Autonomy in HH decision-making (index from 0-4)[b]	1.0
Monthly per capita household consumption (in quetzales)[c]	23.2
Mother has medical insurance (%)	4.0
Family has access to free medical services (%)	17.2
Family has a car or truck (%)	7.6
Has relatives in Guatemala City or another country (%)	51.0
Birth Level (Most Recent Birth)	(n=2,020)
Mother less than age 20 at birth (%)	14.6
Parity	
First birth (%)	17.5
Second, third, or fourth order birth (%)	51.1
Fifth or higher order birth (%)	31.4
Had a prior cesarean delivery (%)	4.5
Had a prior neonatal death (%)	8.8
Ever had a fetal loss (%)	19.6
Pregnancy Month Level (Most Recent Birth)	(n=18,028)
Serious complication during the pregnancy month (%)	2.1

Note: The total number of cases is shown in parentheses, but all descriptive statistics are based on non-missing data. Missing cases comprise fewer than 2% of the total number of cases on any one variable.

[a] Respondents in Jalapa were not asked questions about ethnicity or language ability; all were coded as ladino.

[b] Among women in a marital or consensual union (n=1,852).

[c] At the time of the survey, one *quetzal* was worth between 18 and 20 cents U.S.

TABLE 2. TYPE OF PREGNANCY CARE BY MONTH OF PREGNANCY

		Month of Pregn								
Providers seen	F									
None (%)	3.7	9	8	6	5	3	2	1	1	1
Midwife only (%)	53.5			1	2	3	4	5	5	6
Any biomedical provid	42.8			1	2	2	2	3	3	2
Midwife & HCP (%)	19									
Midwife & doctor/nu	9									
Midwife & HCP & d (%)	2									
HCP only (%)	5									
HCP & doctor/nurse	0									
Doctor/nurse only (%	6									
Number of Observations										

HCP = Health center or post

TABLE 3. PROVIDERS SEEN IN A PREGNANCY MONTH BY EXPERIENCE OF SERIOUS COMPLICATIONS AND TRIMESTER

By Trimester of Pregnancy	Serious Complication in a Pregnancy Month: No	Serious Complication in a Pregnancy Month: Yes	Chi-Sq Tes
Total			
Number of pregnancy months	17,650	378	
No provider (%)	45.1	20.6	
Midwife only (%)	34.6	38.9	
Biomedical provider (%)	20.3	40.5	
First trimester			
Number of pregnancy months	5,993	64	
No provider (%)	81.9	42.2	
Midwife only (%)	9.9	10.9	
Biomedical provider (%)	8.2	46.9	
Second trimester			
Number of pregnancy months	5,953	104	
No provider (%)	38.6	27.9	
Midwife only (%)	36.9	32.7	
Biomedical provider (%)	24.5	39.4	
Third trimester			
Number of pregnancy months	5,704	210	
No provider (%)	13.2	10.5	
Midwife only (%)	58.1	50.5	
Biomedical provider (%)	28.7	39.0	

TABLE 4. ODDS RATIOS AND RANDOM-EFFECTS PARAMETERS FROM HIERARCHICAL LOGIT MODEL OF CARE DURING A PREGNANCY MONTH

Variable	An Provi	If A Biome
Duration of pregnancy[a]		
(1st trimester)	--	--
4th month of pregnancy	8.63***	1.16
5th month of pregnancy	25.62***	1.59*
6th month of pregnancy	74.20***	2.08***
7th month of pregnancy	34.15***	2.54***
8th month of pregnancy	64.44***	1.79**
9th month of pregnancy	80.01***	0.68*
Predisposing characteristics[b]		
(1st birth)	--	
Second, third, or fourth order birth	0.54***	0.33*
Interaction: 2nd trimester * second, third, or fourth order birth	1.54***	--
Interaction: 3rd trimester * second, third, or fourth order birth	2.19***	--
Fifth or higher order birth	0.40***	0.59
Interaction: 2nd trimester * fifth or higher order birth	1.64***	--
Interaction: 3rd trimester * fifth or higher order birth	3.81***	--
(Ladina)	--	--
Spanish-speaking indigenous	0.29***	0.22*
Interaction: 2nd trimester * Spanish-speaking Indigenous	1.16*	--
Interaction: 3rd trimester * Spanish-speaking Indigenous	6.36***	--
Non-Spanish-speaking indigenous	0.16***	0.03***
Interaction: 2nd trimester * non-Spanish-speaking indigenous	0.99	--
Interaction: 3rd trimester * non-Spanish-speaking indigenous	20.70***	--
Biomedical health beliefs	--	2.32**
Highest grade of schooling completed	1.06**	1.83***
In marital or consensual union	3.31***	0.39
Autonomy in HH decision-making (for women in union)	--	1.64**
Enabling factors		
Migration abroad is common in the community	1.55*	10.95***
Measures of need[b]		
Had a prior cesarean delivery	--	15.77***
Ever had a fetal loss	1.32*	4.30***
Serious complication during the pregnancy month	29.45***	3.25***
Interaction: 2nd trimester * complication during pregnancy month	0.11***	--
Interaction: 3rd trimester * complication during pregnancy month	0.05***	--
Other variables		
Distance to Guatemala City (in km)	1.005***	0.95***
(Jalapa)	--	--
Suchitepéquez	2.15***	0.07**
Chimaltenango	1.71**	0.01***
Totonicapán	0.70	0.29
Random effects parameters		
Community-level standard deviation (σ_c)	0.67	1.45
Pregnancy-level standard deviation (σ_p)	2.20	5.38
Intra-community correlation (ρ_c)	0.05	0.06
Intra-pregnancy correlation (ρ_p)	0.62	0.90
Number of pregnancy months	17,6	9,8

[a]Effects of duration are shown as odds ratios relative to the first trimester: $\exp(\alpha_k - \alpha_1)$ according to equation 1. These duration effects apply to the reference category for variables that interact with duration (i.e., parity, ethnicity/language,

complications).

[b]For variables that have interactions, we present the odds ratio in the first trimester, $\exp(\beta_{t(1)})$, and the additional effects in the second and third trimester, $\exp(\beta_{t(2)} - \beta_{t(1)})$ and $\exp(\beta_{t(3)} - \beta_{t(1)})$, respectively.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

TABLE 5. PREDICTED PROBABILITIES OF CARE FOR THE FIFTH MONTH OF PREGNANCY BY SELECTED VALUES OF COVARIATES

Selected Value of Covariate	P(Any)	P(Biomedical|Any)
First birth		0.28
2nd, 3rd, or 4th birth		0.21
5th or higher order birth		0.24
Ladina		0.31
Spanish-speaking indigenous		0.19
Non-Spanish-speaking indigenous		0.09
Non-biomedical health beliefs		0.21
Biomedical health beliefs		0.27
No formal schooling		0.12
Three years of schooling		0.23
Six years of schooling		0.42
Not married or in a consensual union		0.29
Married or in a consensual union		0.23
Autonomy in decision-making: 0		0.20
Autonomy in decision-making: 2		0.27
Autonomy in decision-making: 4		0.35
Migration abroad is not common in the community		0.19
Migration abroad is common in the community		0.38
No prior cesarean delivery		0.22
Had a prior cesarean delivery		0.46
Never had a fetal loss		0.21
Ever had a fetal loss		0.32
No serious complication in current pregnancy month		0.23
Serious complication in current pregnancy month		0.32
Distance to Guatemala City: 100 km		0.45
Distance to Guatemala City: 200 km		0.12
Jalapa		0.46
Suchitepéquez		0.23
Chimaltenango		0.10
Totonicapán		0.35

Note: Probabilities are based on the model shown in Table 4. See the text for method of calculation.
na=Not applicable; variable was not significant and therefore, not included in the equation.

TABLE 6. PREDICTED PROBABILITIES OF CARE BY DURATION OF PREGNANCY AND SELECTED VALUES OF COVARIATES

	Month of Pregnancy						
Selected Value of Covariate	1st Trimester	4th	5th	6th	7th	8th	9th
P(Any)							
First birth	0.						
2nd, 3rd, or 4th birth	0.						
5th or higher order birth	0.						
Ladina	0.						
Spanish-speaking indigenous	0.						
Non-Spanish-speaking indigenous	0.						
No serious complication	0.						
Serious complication	0.						
P(Biomedical|Any)	0.						

Note: Probabilities are based on the model shown in Table 4. See the text for method of calculation.