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The decision-making process of health care utilization in Mexico

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Abstract

Using individual-level data from the 2000 Mexican Survey of Satisfaction with Health Services we estimate a two-part negative binomial hurdle model to evaluate the decision-making process of health care utilization in Mexico. We find that there are income-related differences in utilization associated with the first visit to a physician, as well as substantial utilization differences by region, employment, insurance and financial status. There are also income-related differences in the first visit to a specialist but not in the number of days hospitalized. The results suggest that increasing initial access to services via income and insurance coverage and providing financial resources to underserved regions can substantially improve access to care and, ultimately, population health.

Keywords: Health care utilization; Decision-making process; Mexico

1. Introduction

Understanding the factors that drive changes in the demand for health care in Mexico is an important economic development and health policy concern [1]. More than half of the Mexican population lacks health insurance and is dependent on the publicly-sponsored health care system, and only about a third of the health care services demanded in the country are actually delivered through the private sector [2].

Access to health care has been identified as an important issue in developing public policies toward fighting poverty and improving population health [3]. For example, Mexico's National Development Plan 2000–2006 contends that good health is a necessary condition to achieve equality in economic/social opportunities. The Plan states that there is a need to develop quality health care arrangements that are open to all Mexicans and that are accessible to everyone regardless of socioeconomic status [4]. Thus, gaining a better understanding on the decision-making process that determines the utilization of health services in Mexico would be useful to assess the performance of policies related to health care system access.

This study analyzes the decision-making process that determines the demand for health care in Mexico. Although informed choice and shared decision-making between patients and physicians are common practices in many developed countries, these modes

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of patient–doctor interaction are less prevalent in developing countries [5]. In the case of Mexico, the doctor–patient relationship can be characterized as paternalistic in the sense that the physician takes most of the responsibility for the medical decision-making and patients are less involved in, for example, the diagnosis, prognosis and proposed treatment [5,6]. As a result, patients initially decide to contact physicians based on their personal needs, but subsequent doctor–patient contact is most likely determined by the physician. Thus, viewing the demand for health care as a two-stage decision process in this setting is particularly appealing because it is likely that the patient decides first to obtain initial health care and the physician then determines the treatment intensity.

Using individual-level data from the 2000 Mexican Survey of Satisfaction with Health Services (*Encuesta de Satisfacción con los Servicios de Salud, 2000*), we estimate two-part negative binomial hurdle models to evaluate the health care demand decision-making process. The first part of the model evaluates whether a person decides to utilize a given service and the second part assesses the levels/quantity of health care after the initial service is rendered. Splitting the decision-making process into two parts can provide policy-relevant insights because the first decision—initial utilization—is usually made by the individual and the second decision—the level of health care after the first utilization—is mostly determined by the health care provider. Three types of services are analyzed: visits to doctors/physicians, visits to specialists and days hospitalized, all within the previous year to the survey.

The paper is organized as follows. Section 2 discusses contextual issues related to the utilization of health care services in Mexico. Section 3 develops a two-part hurdle model of health care utilization. Section 4 presents the data and the empirical findings. Section 5 provides a summary of the results, their policy implications and some concluding remarks.

2. Health care services in Mexico: the context

The health care system in Mexico is characterized by a clear differentiation between public and private services. Health care entities in the public system are financed out of general taxation, through funds allocated by central and state governments and through taxation on personal labor income (paid jointly by worker and employers) in the formal sector. For these employees, institutions such as the Mexican Institute for Social Security (IMSS), the Social Security Institute for Government Workers (ISSSTE) and Petróleos Mexicanos (PEMEX) provide health-related services, while the general public (those not covered by systems linked to employment) access services primarily through the National Health Secretariat (SSA) and IMSS-Solidarity systems, paying a small fee.

Although governmental institutions provide services for almost everyone, 52.2% of the Mexican population are uninsured and rely on the government-provided health care system, 47.7% use IMSS, ISSSTE, and PEMEX employment-related systems, and the rest have private insurance [2]. Yet, the private sector controls about 30% of hospital beds and employs 34% of all doctors. The private sector also accounts for 32% of all consultations with physicians.

According to the National Health Secretariat [7], health care in Mexico accounts for only 5.7% of GDP, of which 2.8% comes from public sources. In comparison, other Latin American countries such as Uruguay, Colombia, and Costa Rica allocate 10, 9.3, and 8.7% of their respective GDP into health services. Average health expenditures in Latin American countries are about 6.1% of GDP.

The Mexican government allocates twice the resources to the population already affiliated with the social security system than to the uncovered population. At the regional level, richer Mexican states get more resources for health. When compared to poorer states, richer states also have a relatively larger share of their population with some type of access to health care [7].

There are many barriers preventing an adequate access and use of health services in Mexico and they cause distortions in the demand of health care or the decisions by individuals to consult physicians at any given time. These barriers include, for example, income, distance to health care providers and organizational constraints [8,9]. The first barrier derives from the fact that some services may be expensive for certain income groups, workers may lose wages if absent when seeking services, or simply some individuals may lack the minimal resources necessary to access health care services. The poorer population spends on average 4.1% of their income on health-related goods and services, while the

wealthier population spends about 2.7% [7]. Distance barriers arise from the geography of the health ambulatory services, given that in some areas it is necessary to travel long distances to access health services. Access is also more difficult as this population tends to be dispersed.

Finally, organizational constraints arise from either the lack of patient confidence in the providers of health care services, or from the low quality of these services. Data from a recent health care quality survey shows that 40% of the poorest population is concerned about service quality and the low support received from health service providers, while 60% reported not obtaining the needed services in a timely manner [7]. The different individual experiences in the quality of services offered is clearly a reflection of disparities in public and private expenditures in the health sector, with the quality of services in the private sector usually perceived to be better than the services provided by the government to formal sector workers (IMSS, ISSSTE, and PEMEX), and these in turn being better than the services available to the uninsured population. In addition, there are significant inefficiencies derived from the fragmented structure of health services, such as the use of multiple public and private providers and multiple insurance programs.

3. Two-part hurdle model of health care utilization

The demand for health care can be viewed as a derived demand in the sense that these services are required to maintain or improve a certain health status. As such, health care is essentially an input in the production of health [10]. Individuals decide whether they should initially seek services from, for example, a physician, a specialist or to visit a hospital, by evaluating the marginal benefits and costs of improving their health. On the other hand, physicians primarily decide whether an individual should get additional medical attention (e.g., repeat visits/appointments).

This view of the demand for health care is particularly relevant in the case of Mexico given that most of the medical decision-making after initial contact with the health care system is likely determined by the health care provider and, thus, patients are less likely to be involved in the proposed treatment [5,6]. Informed choice and shared decision-making between patients and doctors are prevalent practices in industrialized countries but doctor–patient interactions in the developing world are likely to be more paternalistic, and the health care provider is more likely to decide the course of treatment [5,11].

The dual process described above can be modeled using a two-part hurdle model for count data in order to separately identify the variables that affect these decisions [10]. Conceptually, this is a more intuitively appealing way of modeling health care utilization than only using either Poisson or negative binomial (negbin) models. Studies have shown that two-part models provide a better fit to health care utilization data than Poisson/negbin models [12,13].

The variables that are likely to be related to the demand for health care include morbidity indicators that are related to the need for services, as well as demographic, socioeconomic and household-specific structural factors that are related to health care utilization. These variables have been previously linked theoretically and empirically to health care utilization [12,13].

Following [10,14], individuals first decide whether or not to seek medical care, which can be modeled using a logit or probit model (this is the hurdle). Second, physicians decide the number of subsequent visits to the doctor (or the number of days hospitalized), which can be modeled using either a zero-truncated Poisson or negative binomial model. A Poisson model is traditionally used to model count data, such as the number of visits to a doctor/specialist or days hospitalized, where the observed variable can only assume non-negative integer values. In this case, some individuals have not visited a doctor or hospital and others may have had visited at least once in a given period of time.

Although the Poisson specification has been extensively used in the health care utilization literature, the negbin model is preferred because the Poisson distribution assumes that the mean and variance are equal, while the negbin model allows for overdispersion and, thus, is less restrictive. The negative binomial distribution is essentially a mixture of the Poisson and Gamma distributions and the negbin model is obtained by including a term to capture unobserved heterogeneity [15].

The parameters for the two-part hurdle model can be obtained by maximizing a likelihood function that has two parts. The decision to visit a physician/hospital is modeled using a probit model and the number of vis-

its/days is estimated using a truncated-at-zero negbin model. The two parts do not share any parameters and, as such, they can be estimated separately using maximum likelihood [10].

4. Data and empirical results

The analysis in this paper is based on microdata from the 2000 Mexican Survey of Satisfaction with Health Services (*Encuesta de Satisfacción con los Servicios de Salud, 2000*). The survey was conducted by Opinion Research Corporation International, Mexico and the Mexican Foundation for Health (FUNSALUD). The sampling design and basic results have been discussed in detail elsewhere [16,17]. A nationally representative sample of 1304 individuals over the age of 18 was selected for interviews on questions related to perceptions of the Mexican health system, problems accessing health services and the quality of health care. In addition, demographic and socioeconomic indicators were also collected (e.g., age, schooling, education, income, and employment variables). The sample was stratified according to the size of the locality of residence (less than 20000 inhabitants, 20000–400000 inhabitants and more than 400000 inhabitants) and it is representative of both adult users and nonusers of health care services [16]. The survey oversamples the disabled, those who were hospitalized within the last 12 months and those reporting fair or poor health. The survey also includes data on the number of visits to doctors/physicians, number of visits to specialists and number of days hospitalized, which are the dependent variables in the two-part hurdle models. After deleting observations with missing values, our final sample size was 1056.

The factors that are expected to be associated with the demand for health care services in Mexico would be health status, demographic, socioeconomic and household-specific variables. The indicators were chosen based on previous research on the determinants of health care utilization [12,13]. Demographic and morbidity variables included in the models are age (in years), a gender dummy variable, self-reported health status dummies (excellent, good, fair, and poor health), and a disability status dummy. Socioeconomic variables include dummies for city size (small, medium, large; i.e., less than 20000 inhabitants, 20000–400000 inhabitants and more than 400000 inhabitants, respectively), geographic region (northern, central and southern states, and the Mexico City Metropolitan Area), years of education, employment status (employed versus otherwise), monthly household income categories (0–1136 pesos, 1137–3400 pesos, 3401–5684 pesos, 5685–7958 pesos, 7959–11369 pesos and 11370 pesos or more), government-sponsored health insurance, private health insurance and a dummy as to whether the respondent had health-induced financial difficulties. The number of adults and children in the household are also included to control for family/household structure. Two additional variables are included in the models for hospitalization days: the hospital waiting time and a hospital quality index to capture supply effects. These variables are included in order to control for potential unobserved heterogeneity in the second part (negbin) portion of the model.

The mean age of respondents in our overall sample is 37.9 years of age and 53.2% of them are female. About 89.2% report to be in good or excellent health and 10.8% report to have fair or poor health. Less than 4% are disabled. The mean number of adults and children per household is 3.8 and 2.0, respectively. When it comes to city size, 21.3% of Mexicans in the sample reside in small localities, 56.3% reside in medium urban areas and 22.3% reside in large urban areas. A quarter of the sample comes from the Mexico City Metropolitan Area, 33.5% are from southern states, 18.9% from northern states and 22.7% from central Mexico states. The mean level of education is 8.1 years and 55.5% of respondents are employed. About 36.2% have household income of 1136 pesos or less, 33.5% earn from 1137 to 3400 pesos, 16.6% earn from 3401 to 5684 pesos, 6.5% earn from 5685 to 7958 pesos, 5.3% earn from 7959 to 11369 pesos and only 1.9% earn 11370 pesos or more. Roughly 43.8% of respondents have government-sponsored health insurance, 7.2% have private insurance and 31.7% report to have health-induced financial difficulties.

Tables 1–3 report the basic descriptive statistics for the variables included in the analyses. Each table reports the means conditional on whether the person did not seek a service, used the service once, and more than once. Note in Table 1 that 39% of those surveyed had not visited a physician in the past year. When it comes to visits to the doctor, those who are relatively older and in poorer health are more likely to have visited doctors

Table 1
Visits to doctors/physicians

Variable	No visits		One visit		More than one visit	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age	35.634	14.542	34.554	12.263	42.023	16.096
Female	0.452	0.498	0.487	0.502	0.652	0.477
Excellent health	0.119	0.324	0.094	0.293	0.085	0.280
Good health	0.842	0.365	0.828	0.378	0.705	0.456
Fair health	0.034	0.182	0.067	0.252	0.169	0.375
Poor health	0.005	0.070	0.010	0.099	0.041	0.197
Disabled	0.012	0.111	0.014	0.116	0.073	0.261
Adults	3.977	2.616	3.370	1.762	3.616	1.938
Children	2.152	1.955	2.111	1.966	1.762	1.644
Small locality	0.221	0.416	0.182	0.387	0.214	0.411
Medium locality	0.557	0.497	0.570	0.497	0.569	0.496
Large locality	0.221	0.416	0.248	0.433	0.216	0.412
North	0.117	0.321	0.265	0.443	0.254	0.436
Central	0.257	0.437	0.184	0.389	0.204	0.403
South	0.375	0.485	0.227	0.420	0.323	0.468
Mexico City Metropolitan Area	0.251	0.434	0.324	0.470	0.219	0.414
Education	7.991	4.680	8.425	4.171	8.123	5.093
Employed	0.604	0.490	0.662	0.475	0.450	0.498
Income (0–1136 pesos)	0.362	0.481	0.286	0.454	0.297	0.457
Income (1137–3400 pesos)	0.335	0.473	0.373	0.485	0.294	0.456
Income (3401–5684 pesos)	0.166	0.373	0.185	0.389	0.218	0.413
Income (5685–7958 pesos)	0.065	0.247	0.109	0.312	0.085	0.279
Income (7959–11369 pesos)	0.053	0.224	0.041	0.199	0.073	0.260
Income (11370+ pesos)	0.019	0.136	0.006	0.079	0.032	0.177
Government insurance	0.302	0.459	0.513	0.502	0.586	0.493
Private insurance	0.041	0.199	0.075	0.264	0.112	0.315
Health-induced financial difficulties	0.263	0.441	0.414	0.494	0.352	0.478
N	412		143		501	

more than once. Those residing in northern states and those with relatively high household income are also more likely to have visited a physician more than once. Moreover, those with any type of insurance—public or private—are more likely to visit a physician not only once but also multiple times.

Individuals who have multiple visits to specialists are older and in poorer health, as expected. Again, there appear to be regional differences in seeking medical care from specialists in that individuals residing in the north are more likely to have visited a specialist at least once, if not more, while those in both the central and southern areas of Mexico are less likely to have done so. We also observe similar income-related patterns for those visiting specialists as for those visiting physicians with the higher relative income individuals being more likely to visit specialists more than once.

When it comes to the number of days hospitalized within the last year, women accounted for about two-thirds of those hospitalized both for 1 day and for more than 1 day. Unlike what was observed for physician/specialists visits, those with relatively high household income were less likely to have been hospitalized for more than 1 day, perhaps because individuals with higher household income are more likely to use preventive services than those with lower household income. Furthermore, individuals hospitalized for more than 1 day had lower educational levels than those not hospitalized or hospitalized for only 1 day.

Tables 4–6 report the results of the two-part hurdle models (visits to doctors/physicians, visits to specialists and days hospitalized). Note that the models have a reasonable fit, as measured by the pseudo-R^2s, which range from 0.158 to 0.326 for the probit (hurdle) part

Table 2
Visits to specialists

Variable	No visits		One visit		More than one visit	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age	36.980	14.882	38.462	15.268	43.486	16.086
Female	0.491	0.500	0.622	0.487	0.722	0.450
Excellent health	0.112	0.316	0.062	0.242	0.079	0.270
Good health	0.807	0.395	0.788	0.411	0.664	0.474
Fair health	0.068	0.251	0.133	0.341	0.197	0.399
Poor health	0.013	0.115	0.017	0.131	0.059	0.237
Disabled	0.022	0.147	0.042	0.202	0.121	0.328
Adults	3.858	2.403	3.314	1.813	3.490	1.692
Children	2.142	1.919	1.604	1.491	1.406	1.519
Small locality	0.215	0.411	0.210	0.409	0.205	0.405
Medium locality	0.564	0.496	0.568	0.497	0.556	0.498
Large locality	0.221	0.415	0.222	0.417	0.240	0.428
North	0.160	0.367	0.286	0.453	0.295	0.457
Central	0.238	0.426	0.232	0.424	0.145	0.353
South	0.358	0.480	0.221	0.417	0.286	0.453
Mexico City Metropolitan Area	0.244	0.430	0.261	0.441	0.274	0.447
Education	7.896	4.764	9.127	4.972	8.509	4.472
Employed	0.590	0.492	0.506	0.502	0.359	0.481
Income (0–1136 pesos)	0.348	0.477	0.285	0.453	0.223	0.418
Income (1137–3400 pesos)	0.330	0.471	0.307	0.463	0.308	0.463
Income (3401–5684 pesos)	0.183	0.387	0.187	0.391	0.225	0.419
Income (5685–7958 pesos)	0.074	0.262	0.059	0.236	0.134	0.341
Income (7959–11369 pesos)	0.051	0.219	0.107	0.310	0.067	0.251
Income (11370+ pesos)	0.015	0.120	0.056	0.230	0.042	0.202
Government insurance	0.374	0.484	0.659	0.476	0.660	0.475
Private insurance	0.054	0.226	0.130	0.338	0.142	0.350
Health-induced financial difficulties	0.312	0.463	0.298	0.459	0.375	0.485
N	751		134		171	

and from 0.035 to 0.111 for the truncated negbin part. The pseudo-R^2s are somewhat higher for the model on hospitalization days than for doctor or specialist visits.

Table 4 shows that the individual decision to seek health services and the physician decision regarding additional medical attention are both responsive to age and lower health status. The coefficients for age, fair health and poor health are each positive and statistically significant for both the probit model of the decision to visit a doctor and the truncated negbin model of the subsequent number of visits, with the impact being the greatest for respondents in poor health. The square of age was also included to capture nonlinearities but its coefficient was statistically insignificant in all the models. Women are also more likely to initially visit a physician than men, but there are no gender differences in the number of visits after the initial contact.

The rest of the variables capture socioeconomic and family structure factors related to health care utilization. Individuals living in the northern region are more likely to choose to visit a doctor; yet, this regional difference does not arise when we evaluate the number of visits to the doctor. Health care coverage with government-sponsored insurance also increases both the likelihood of an individual visiting a doctor and the number of visits. Interestingly, coverage with private insurance does not appear to have an effect on either initial visits or the number of visits to a physician. Moreover, while the decision to visit a doctor is not responsive to whether an individual is employed, being employed lowers the number of subsequent visits. This is likely to be related to the fact that there is penalty—in terms of lost earnings/wages—to visiting physicians more than once [18].

Table 3
Days hospitalized

Variable	None		One day		More than 1 day	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age	37.439	14.836	36.228	15.374	50.089	19.260
Female	0.525.	0.500	0.676	0.478	0.671	0.472
Excellent health	0.106	0.308	0.000	0.000	0.042	0.202
Good health	0.813	0.390	0.457	0.509	0.202	0.404
Fair health	0.069	0.253	0.522	0.511	0.554	0.499
Poor health	0.012	0.110	0.021	0.146	0.201	0.403
Disabled	0.021	0.142	0.160	0.375	0.409	0.494
Adults	3.769	2.296	3.529	1.729	3.482	1.980
Children	2.001	1.847	1.752	1.441	2.036	2.114
Small locality	0.213	0.409	0.250	0.443	0.225	0.419
Medium locality	0.565	0.496	0.664	0.483	0.488	0.502
Large locality	0.222	0.416	0.087	0.288	0.287	0.454
North	0.190	0.392	0.057	0.236	0.190	0.394
Central	0.226	0.419	0.295	0.466	0.224	0.419
South	0.335	0.472	0.256	0.446	0.338	0.475
Mexico City Metropolitan Area	0.248	0.432	0.393	0.499	0.248	0.434
Education	8.151	4.779	8.739	4.678	6.586	4.324
Employed	0.566	0.496	0.488	0.511	0.267	0.444
Income (0–1136 pesos)	0.324	0.468	0.447	0.508	0.392	0.490
Income (1137–3400 pesos)	0.324	0.468	0.311	0.473	0.358	0.481
Income (3401–5684 pesos)	0.190	0.392	0.155	0.370	0.145	0.353
Income (5685–7958 pesos)	0.080	0.271	0.000	0.000	0.068	0.252
Income (7959–11369 pesos)	0.060	0.238	0.048	0.219	0.025	0.157
Income (11370+ pesos)	0.022	0.148	0.039	0.198	0.013	0.113
Government insurance	0.431	0.496	0.624	0.495	0.575	0.496
Private insurance	0.071	0.256	0.039	0.198	0.124	0.331
Health-induced financial difficulties	0.311	0.463	0.453	0.509	0.460	0.501
Hospital waiting			0.361	0.491	0.264	0.443
Hospital quality index			8.016	1.165	8.466	1.304
N	917		23		116	

The coefficients in two of the middle household income categories are statistically significant in the probit model but are insignificant in the negbin model. Given that the household income categories capture ability to pay, these results suggest that respondents with relatively low (and high) household income levels being less likely to initially visit a doctor than those with middle income levels. This finding is consistent with those of Gerdtham [12] who finds that in Sweden, income is an important predictor in the initial physician visit, but it is statistically insignificant in the frequency decision.

There is no statistical evidence of differences in health care utilization (physician visits) when one looks at city size, education and private insurance. However, besides household income-related differences in utilization, there are also slight differences by region (north), being employed, having government provided insurance and having health-induced financial difficulties.

Table 5 reports the results for the visits to specialists. This model is particularly interesting given the unequal distribution of specialists across both city size and region that characterizes Mexico. The results suggest that women, those in relatively fair/poor health and the disabled are more likely to visit a specialist. Some socioeconomic and family structure factors are also statistically significant; namely, the number of children, residence in a large city, being employed and having government insurance. There is also some evidence of differences in health care access in terms of household income and having visited a specialist. That is, those

Table 4
Negbin hurdle model for visits to doctors/physicians

Variable	Visited doctor (probit), coefficient	Number of visits (truncated negbin), coefficient
Age	0.008** (0.004)	0.013** (0.005)
Female	0.489*** (0.121)	0.080 (0.126)
Good health	0.169 (0.174)	0.104 (0.165)
Fair health	0.969*** (0.208)	0.747** (0.319)
Poor health	1.246*** (0.332)	0.830** (0.394)
Disabled	0.054 (0.205)	0.213 (0.342)
Adults	−0.055** (0.026)	−0.005 (0.035)
Children	0.003 (0.026)	−0.001 (0.049)
Medium locality	0.018 (0.133)	0.131 (0.169)
Large locality	−0.082 (0.144)	−0.058 (0.231)
North	0.424** (0.168)	0.331* (0.205)
Central	−0.137 (0.152)	0.520** (0.231)
South	−0.040 (0.153)	0.307* (0.174)
Education	0.006 (0.015)	−0.003 (0.020)
Employed	0.021 (0.128)	−0.403*** (0.150)
Income (1137–3400 pesos)	0.138 (0.136)	−0.130 (0.186)
Income (3401–5684 pesos)	0.406** (0.166)	0.175 (0.195)
Income (5685–7958 pesos)	0.471** (0.232)	0.397 (0.284)
Income (7959–11369 pesos)	0.411 (0.266)	0.139 (0.271)
Income (11370+ pesos)	0.036 (0.358)	0.203 (0.404)
Government insurance	0.607*** (0.116)	0.353** (0.139)
Private insurance	0.200 (0.223)	−0.094 (0.206)
Health-induced financial difficulties	0.522*** (0.120)	−0.050 (0.133)
Constant	−1.268*** (0.384)	−0.197 (0.690)
N	1056	644
Log-likelihood	−616.127	−1377.120
Pseudo-R^2	0.158	0.047

Robust standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

with relatively high income are more likely to have visited a specialist.

Note that none of the coefficients for the truncated negbin model are statistically significant. This result suggests that differences in the health care utilization of specialists are only related to the initial visit and not to subsequent visits.

Table 6 reports the results for the number of days hospitalized. Again, besides the variables included in the previous two models, we also include the hospital waiting time and a hospital quality index to capture supply effects. Although these variables turn out to be statistically insignificant, they are included because they capture potential unobserved heterogeneity. The morbidity indicators suggest that those in fair/poor health and the disabled are more likely to be hospitalized. The number of children, the years of education and having health-induced financial difficulties are all positively related to being hospitalized at least once. Age and gender are statistically significant in the truncated negbin portion of the number of days hospitalized. Those residing in a medium-sized city, in the central states and with high household income levels are relatively less likely to be hospitalized more than 1 day. Thus, household income does not seem to be related to being hospitalized, but there are some significant differences when it comes to educational levels and having health-induced financial difficulties.

5. Concluding remarks

Using microdata from the 2000 Mexican Survey of Satisfaction with Health Services, we estimate

Table 5
Negbin hurdle model for visits to specialists

Variable	Visited specialist (probit), coefficient	Number of visits (truncated negbin), coefficient
Age	0.003 (0.004)	0.006 (0.036)
Female	0.413*** (0.125)	0.479 (1.304)
Good health	0.409** (0.193)	−1.153 (5.306)
Fair health	0.877*** (0.222)	−0.434 (3.929)
Poor health	0.864*** (0.305)	0.367 (2.459)
Disabled	0.317* (0.176)	0.024 (0.975)
Adults	−0.045 (0.029)	0.035 (0.224)
Children	−0.090*** (0.033)	0.062 (0.283)
Medium locality	−0.150 (0.149)	0.227 (1.176)
Large locality	−0.268* (0.159)	0.320 (0.435)
North	0.172 (0.166)	0.217 (0.704)
Central	−0.164 (0.170)	0.025 (0.741)
South	−0.256 (0.164)	0.173 (0.616)
Education	0.019 (0.015)	−0.028 (0.110)
Employed	−0.232* (0.130)	−0.021 (0.232)
Income (1137–3400 pesos)	0.150 (0.146)	−0.237 (0.943)
Income (3401–5684 pesos)	0.319* (0.190)	−0.214 (2.097)
Income (5685–7958 pesos)	0.364 (0.249)	0.361 (1.084)
Income (7959–11369 pesos)	0.492* (0.274)	0.018 (1.221)
Income (11370+ pesos)	0.724** (0.337)	−0.683 (3.438)
Government insurance	0.536*** (0.123)	0.322 (0.289)
Private insurance	0.308 (0.203)	0.043 (1.235)
Health-induced financial difficulties	0.209* (0.121)	0.225 (0.541)
Constant	−1.622*** (0.393)	−0.474 (14.650)
N	1056	305
Log-likelihood	−471.356	−495.964
Pseudo-R^2	0.158	0.035

Robust standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

two-part negative binomial hurdle models to analyze the decision-making process in the demand for health care in Mexico. The model assumes that the individual first opts to access care and then the physician decides whether additional care is required. This structure is particularly relevant because multiple contacts with the health care system in Mexico are more likely to be driven by the physician than the patient. Although informed choice and shared decision-making are common practices in many developed countries, it is unlikely that this is the case in Mexico.

When it comes to visits to doctors/physicians, our results show that there are income-related differences in utilization for the first visit. There are also some differences by region, employment status, having insurance and having financial difficulties. Those with relatively high income are also more likely to have visited specialists, but this finding only applies to the first visit. There are no income-related differences when it comes to being hospitalized; nonetheless, there are important differences by education and having health-induced financial difficulties.

Population health can be enhanced significantly by improving health care access and, for instance, Mexico's National Development Plan 2000–2006 posits that there is a need to improve the health care system by increasing its accessibility to the overall population regardless of socioeconomic status. Thus, the results presented here have important health policy implications in terms of identifying which factors are likely to substantially affect health care utilization from the perspectives of both individuals and health care providers. For example, policies that target increases in real income or increasing health insurance cover-

Table 6
Negbin hurdle model for days hospitalized

Variable	Hospitalized (probit), coefficient	Number of days hospitalized (truncated negbin), coefficient
Age	0.005 (0.004)	0.023*** (0.008)
Female	0.191 (0.121)	−0.410* (0.229)
Good health	−0.054 (0.216)	−0.059 (0.468)
Fair health	1.377*** (0.247)	−0.310 (0.473)
Poor health	1.291*** (0.312)	0.661 (0.581)
Disabled	0.870*** (0.167)	−0.049 (0.280)
Adults	−0.030 (0.030)	0.062 (0.064)
Children	0.053* (0.032)	0.012 (0.051)
Medium locality	0.160 (0.142)	−1.096*** (0.373)
Large locality	0.186 (0.144)	−0.131 (0.355)
North	−0.106 (0.174)	1.041** (0.447)
Central	0.051 (0.159)	−0.646** (0.320)
South	0.011 (0.162)	−0.224 (0.277)
Education	0.053*** (0.015)	0.048 (0.031)
Employed	−0.066 (0.124)	−0.323 (0.249)
Income (1137–3400 pesos)	−0.082 (0.147)	0.380 (0.294)
Income (3401–5684 pesos)	−0.073 (0.168)	0.374 (0.318)
Income (5685–7958 pesos)	−0.269 (0.202)	0.223 (0.468)
Income (7959–11369 pesos)	−0.335 (0.252)	−1.735** (0.730)
Income (11370+ pesos)	−0.307 (0.392)	−0.704 (0.991)
Government insurance	0.155 (0.123)	−0.001 (0.244)
Private insurance	−0.042 (0.182)	0.308 (0.338)
Health-induced financial difficulties	0.322*** (0.114)	0.094 (0.209)
Hospital waiting		0.392 (0.239)
Hospital quality index		0.131 (0.081)
Constant	−3.118*** (0.427)	−0.621 (1.146)
N	1056	138
Log-likelihood	−127.221	−331.687
Pseudo-R^2	0.326	0.111

Robust standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

age could prove to be effective in reducing differences in health care utilization across subpopulations. Also, health care utilization in northern Mexico seems to be higher than in all other regions of the country and, as such, policies structured to increase the availability of financial resources of the most disadvantaged regions could be useful in improving access to care and, ultimately, population health.

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