Household Expenditure in Dental Health Care: National Estimations in Mexico for 2000, 2002, and 2004

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Abstract

Objective: *To estimate the expenditure on dental care of Mexican households, analyze their trends, and determine the factors associated with the decision to spend and the amount of money spent in 2000, 2002, and 2004.* ***Material and Methods:*** *Using the National Survey of Household Income and Expenditure for 2000, 2002, and 2004, the national dental health care expenditure was calculated. To facilitate comparability across years, all expenditure was converted to pesos of 2004, using the National Consumer Price Index (11.201 pesos per USD). Proportion of households incurring catastrophic expenditures was also estimated. To evaluate the association between environmental, household, and individual characteristics with the amount of dental health care expenditure, the Heckman regression model was used to control for self-selection bias.* ***Results:*** *More than 6,467 million pesos (MP) were spent in 2000 (8.5 percent of all households had some expenditure), over 3,925 MP in 2002 (4 percent households), and above 5,136 MP in 2004 (5 percent households), with an average expenditure of $806, $1,000, and $987 pesos, respectively. Prevalence of catastrophic expenditure because of dental health care was 0.8 percent in 2000 compared to 0.01 and 1.8 percent in 2002 and 2004, respectively. The Heckman model showed that municipal development, stratum, and age of the head of household significantly influenced the amount spent on dental care in all 3 years. Household capacity to pay and wealth index had a positive and statistically significant association in the 3 years with the preceding decision to spend.* ***Conclusions:*** *Variables associated with the amount of expenditure and the decision of spending support the existence of inequities in health care financing in the Mexican population.*

Key Words: dental health care, out-of-pocket expenditures, catastrophic expenditure, Mexico

Introduction

Oral illnesses, such as dental caries, periodontal disease, lesions of mucosal cavities, oropharyngeal cancers, oral trauma, and edentulism are major public health problems throughout the world, and Mexico is not an exception. According to the World Health Organization (WHO) (1,2), Mexico is placed among countries in the moderate level of decay, missing and filling teeth (DMFT) index at age 12. Recent reports place Mexico among countries with high prevalence of edentulism for those over 65 – higher than in Gambia, Egypt, Slovenia, Indonesia, Thailand, and Singapore (1-3). Case studies carried out in Mexico have documented a high prevalence of dental caries in 5- and 6-year-old children, fluctuating between 48 and 75 percent (4-7), while for 12-year-olds, the reported prevalence has been reported to be between 54 and 88 percent (7-8). Periodontal diseases also represent a public oral health problem in Mexico (9-10).

The treatment of oral illnesses is usually expensive, representing in the majority of industrialized countries as the fourth most expensive illness to treat (1). The minimal public financing of dental care in countries like Mexico, as well as the limited availability of public services of this type, forces households to finance dental care through out-of-pocket payments – usually seeking care in the private sector.

This situation has considerable implications, mainly because it is recognized that out-of-pocket payments are less efficient and equitable. It has been reported that individuals tend to postpone medical care – sometimes indefinitely – because of their inability to pay (11-14). Reduction of dental services utilization because of the precarious economic situation has been also widely documented in the national context (15-17). In this sense, a representative national study recently carried out in Mexico concluded that national coverage of dental health care responds to variables such as sex, age, schooling, medical insurance, and level of household wealth (18). Therefore, the use of dental services may not be a function of population health needs, but rather the individual household's ability to pay for those services. Such a scenario is translated, in practical terms,

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as inequalities in access to dental health care, because of affordability barriers.

Achieving fairness in financing and offering financial risk protection for households is one of the three intrinsic objectives of health systems, along with enhancing the responsiveness of the health system to the nonhealth legitimate expectations of the population and improving the health of the population. Fairness in household financial contributions is usually measured by two indicators: the fairness in financial contribution index and the percentage of household with catastrophic spending because of out-of-pocket payments (11-13). WHO defines catastrophic health expenditures as those that exceed 30 percent of what the household can pay – that is, of family income available after removing expenditure on food (11-14). In a health system in which more than 50 percent of total spending is out-of-pocket and more than half of the population does not have health insurance (19,20), there is often a substantial risk of incurring in catastrophic spending.

Funding for public health services is derived from tax contributions, third-party payment contributions from employees and employers (in public social security), and payment of premiums and fees at point of service. Without including households that had to postpone care because of financial constraints, some studies documented that 4 percent of Mexican households incurred catastrophic health care payments in 2002; this proportion represents 900,000 households, the majority of which were poor, uninsured, and located in rural areas (12) with marked variation between states and across populations served by different subsystems.

The search for equity in health financing led in 2003 to the reform of the Mexican health sector and the formation of the Social and Health Protection System (SPSS, Sistema de Protección Social de Salud), the executive arm of which is called "*Seguro Popular*" (13,14,21). While these measures have, in theory, started to address the pervasive problem of inequalities in health status and in access to health care, data estimates of out-of-pocket spending on dental care do not exist for Mexico, nor is the magnitude or impact of this expenditure on family finances known (22-27). The objectives of the present study were to estimate the expenditure on dental care by Mexican households, to analyze their time trends, and to determine the factors associated with the decision to spend money in dental care, as well as the amount of money spent in these services in 2000, 2002, and 2004.

Methods

Design, Population, and Study Sample. This study is a secondary analysis of the National Survey of Household Income and Expenditure for years 2000, 2002, and 2004, with the goal of quantifying private household expenditure on dental health care. The objective of the survey is to evaluate, over time, population changes in "quality of life" through quantification of the distribution of household income and expenditure, both monetary and nonmonetary. It captures the sociodemographic characteristics of household members, the activities and occupation of household individuals ages 12 years and older, public services available in the residence household, as well as ownership of consumable goods.[1]

This survey is representative of households at the national level and of urban and rural strata. It was designed to be undertaken during a 4-month period (September to December), capturing information on household income and expenditure during the past 3 months. The selection of sample was done independently for each state and stratum, with a probabilistic, stratified, multistaged, and cluster design. The house represented one sampling unit, and the household was the unit of observation and analysis. In 2000, there were 10,108 households, while the 2002 and 2004 surveys included 19,856 and 25,115 households, respectively.

Variables Included in the Study. The survey comprised household face-to-face interviews, incorporating the following variables.

Environment variables. The residence strata – either urban or rural – and the municipal marginalization index[2] were assigned to each household according to the official reports prepared by the National Council on Population (CONAPO).

Household variable. The surveys included physical characteristics of the household, ownership of consumable goods, and household consumption behavior, from which a wealth index using the polychoric correlation of the principal components analysis (PCA) was constructed, given that some of the variables were categorical (28). The first component explained 40, 37, and 33 percent of the wealth index variability in 2004, 2002, and 2000, respectively. Once divided in quintiles, the first quintile represented the poorest households of the distribution.

[1] For more details on the contents and methodology utilized in the National Survey of Household Income and Expenditure for different years, please consult the webpage of the National Institute of Statistics Geographic and Informatics (INEGI, Instituto Nacional de Estadística Geografía e Informática): http://www.inegi.gob.mx/est/default.asp?c=4204

[2] The Consejo Nacional de Población (National Council on Population, CONAPO) classifies the degree of marginalization of a municipality using an index that includes the following variables: percentage of illiterate population over 15 years of age, percentage of population without complete elementary school over 15 years of age, percentage of houses without sewage or restroom, percentage of dwellers in houses without drinking water, percentage of houses with overcrowding, percentage of occupants in houses with dirt floor, percentage of population in areas with fewer than 5,000 inhabitants, and percentage of employed population with an income below two federally mandated minimum wages. A rural location was defined when a locale had fewer than 2,500 inhabitants.

Total effective income. This is the sum of monetary and nonmonetary entities ("goods") that household members received during the questionnaire reference period for their participation in the process of economic production, as salary or any form of compensation and by any money transfer. Net income was registered after accounting for spending on necessities, that is, after discounting taxes, dues to labor and social security organizations, and similar deductions. Net income is further divided as monetary income and nonmonetary income.

Total effective expenditures. This refers to the portion of income that household members spent on acquiring goods and services that are considered necessities, by transferring money or goods to a third party as payment or donation. As with income, total expenditures can be in money or in goods, so is thus classified as monetary expenditures and nonmonetary expenditures.

Household expenditure on dental health care. Out-of-pocket is defined as self-reported quantity paid directly (in money or goods) to health professionals and providers of goods and services, whose primary goal was to reestablish or improve oral health.

Adult equivalents. The adult equivalents index takes into account the demographic composition of the household to standardize the number of household dwellers and make comparisons. We used the Amsterdam method, which is a scale in which men between 16 and 98 years are assigned a value of 1, women of the same ages are assigned a value 0.92, and children between 0 and 15 years of age are assigned a value of 0.52 (29).

Individual variable. Variables describing the head of the household such as age, sex, occupation, and marital status, having medical insurance, and schooling were also included in the analysis.

Data Analysis. Initially, the total amount of expenditures on dental care and the average expenditure for each of the 3 years were calculated. In order to make comparisons between years, the reported expenditure was adjusted to the 2004 Mexican pesos by utilizing the consumer price index calculated by the Bank of Mexico.[3] In this way, we assumed the same expenditure distribution for the entire year and that the annual amount could be obtained by multiplying the reported 3-month expenditure by 4. After this, we calculated the proportion of households that made some expenditure by quintiles of income and socioeconomic level. We also calculated the household financial contribution to the health system[4] to estimate the proportion of households that incurred catastrophic spending because of dental health care in the 3 months prior to the survey.

Finally, to analyze the environmental variables and household characteristics – more specifically the sociodemographic factors of the head of household – that are associated with the amount of financial resources that a house allocates to dental health care – we had to consider self-selection bias in the analysis. That is, prior to actually spending money on dental care, a household must decide whether or not it is capable of making this expenditure. This decision is influenced by sociodemographic and socioeconomic characteristics of the household, and on the other hand, it is possible that a household decided to spend the money but the amount allocated could not be identified through the survey. Therefore, a simple linear regression analysis would not allow us to estimate the factors included in the decision to spend or not to spend. Furthermore, it would exclude those households that, regardless of their decision to spend or not to spend, reported no expenditure. The omission of this decision can produce an important specification bias, and therefore should be considered in the analysis. Hence, we employed a Heckman regression model. Throughout a system of equations, this approach allowed us to model the amount of expenditure on dental care after considering the decision to spend or not (30).

The Heckman model uses the estimated values of the variables that influence the decision to spend or not to spend (selection equation) as regressors to allow an adequate estimation of the amount of expenditure, considering the factors that determine the decision of spending. This allows a simple and consistent method of estimation that eliminates specification and selection error in the case of censored subjects (30). The final model incorporated variables that were statistically associated in the simple bivariate analysis (with a P-value < 0.25 in order to avoid confusion) and other variables that were particularly important because of theoretical reasons underlying the construction of the model. Finally, we evaluated the correlation coefficient between the decision to spend or not with the amount spent by households in the Heckman model as well as the global goodness of fit.

Results

Results of 2000. In Table 1, the characteristics of the study population are presented. In this table, it can also be seen that in the year 2000, the average age of heads of households was 46.4 years, and 81 percent were male. Thirty-six percent of the heads of household did not finish high school, 36 percent finished high school, and less than 10 percent had a college degree or attained higher education. The vast majority of heads of households was married or lived with their partners (96 percent). Only 34 percent of the

[3] The list of prices in the consumer price index can be found on the Bank of Mexico webpage: http://www.banxico.org.mx/eInfoFinanciera/FSinfoFinanciera.html

[4] A household financial contribution to the health system is defined as the share of household health expenditure in relation to its capacity to pay. A household health expenditure comprise out-of-pocket payments, private health insurance premiums, social security contributions to health, and the share of total household tax revenues that is used in health care through government spending. In this study, only out-of-pocket health expenditure was used as household health expenditure.

Table 1
Characteristics of Population Study and Comparison between People with Dental Care Expenditure versus People with No Expenditure on Dental Health Care*

	2000			2002			2004		
Variables	Total population	PWDE	*P*-value	Total population	PWDE	*P*-value	Total population	PWDE	*P*-value
Age of household head	46.44	44.22	0.00	47.15	45.22	0.02	46.92	46.75	0.82
Sex of household head									
Women	4,303,965	263,457	0.01	4,924,266	185,096	0.80	6,018,465	286,557	0.55
Men	18,669,659	1,700,936		19,228,534	776,896		19,826,616	1,014,729	
Schooling of household head									
Elementary	8,275,238	341,978	0.00	8,754,064	19,463	0.00	8,994,664	224,481	0.00
Elementary	5,602,066	440,674		5,609,247	180,291		5,744,336	254,180	
Secondary	4,551,910	457,329		4,996,626	230,176		4,804,479	245,434	
High school	2,276,045	300,323		2,721,429	189,653		2,338,652	123,655	
University	1,984,557	363,479		1,757,837	130,389		3,549,795	396,415	
Postgraduate	283,808	60,610		313,597	36,852		413,155	57,121	
Marital status of household head									
Married	15,197,236	1,525,685	0.00	15,266,596	654,962	0.03	15,658,876	853,679	0.05
Living together	2,233,662	124,702		2,807,178	96,304		3,364,999	118,396	
Single	9,324	1,284,333		1,438,622	46,874		1,732,311	81,625	
Widow	95,000	2,445,025		2,412,076	66,505		2,664,237	118,845	
Divorced	490,293	66,132		564,112	69,862		553,021	64,633	
Separated	59,631	1,323,075		1,664,216	27,485		1,871,637	64,108	
Household head insurance status									
Noninsured	15,470,687	998,249	0.00	16,267,864	544,573	0.00	17,181,508	719,078	0.00
Insured	7,988,345	1,007,193		7,884,936	417,419		8,663,573	582,208	
Laboral situation of head									
Employed	3,720,424	236,674	0.02	3,926,378	117,591	0.07	5,019,511	190,513	0.01
Unemployed	19,253,200	1,727,719		20,226,422	844,401		20,825,570	1,110,773	
Adult equivalents	3.37	3.54	0.03	3.36	3.49	0.13	3.27	3.40	0.06
Socioeconomic quintiles									
I Quintile	3,998,059	77,627	0.00	3,889,985	46,876	0.00	5,193,304	69,920	0.00
II Quintile	4,153,749	124,852		4,964,290	107,583		5,847,898	159,002	
III Quintile	4,730,188	364,820		4,739,984	188,507		5,437,176	211,199	
IV Quintile	4,801,258	468,146		5,115,998	183,765		4,717,298	297,983	
V Quintile	5,801,498	970,703		5,908,449	454,477		4,649,405	563,182	
Income quintiles									
I Quintile	4,224,416	53,153	0.00	4,240,256	40,475	0.00	5,384,800	53,819	0.00
II Quintile	4,358,601	162,320		4,715,340	80,591		5,437,901	127,364	
III Quintile	4,613,219	275,042		4,821,332	140,277		5,366,729	241,487	
IV Quintile	4,760,109	549,567		5,169,944	234,372		4,870,050	261,307	
V Quintile	5,528,407	966,066		5,671,834	485,493		4,785,601	617,309	
Total income reported†	$24,494	$41,978	0.00	$24,376	$40,256	0.00	$20,504	$36,443	0.00
Total expenditure reported†	$19,859	$34,289	0.00	$24,646	$50,650	0.00	$25,132	$45,785	0.00
Household capacity to pay†	$14,069	$26,221	0.00	$18,730	$42,322	0.00	$20,099	$38,885	0.00
Municipal marginalization index	−1.12	−1.39	0.00	−1.05	−1.30	0.00	−1.09	−1.36	0.00
Strata									
Rural	5,382,993	213,529	0.00	18,811,788	866,014	0.00	5,924,067	17,455	0.00
Urban	18,101,759	1,792,619		5,806,918	115,194		19,921,014	1,126,732	

* In categorical variables, *P*-value reported is the chi-square test for comparing proportions (people who spent versus people who did not spend). For continuous variables, *P*-value represents the comparison of means (people who spent versus people who did not spend).
† Amounts converted to pesos of 2004 using the consumer price index.
PWDE, people with some dental health care expenditure.

Table 2
Dental Health Care Expenditure*

Information	Year		
	2000	2002	2004
Total number of households	23,484,752	24,618,706	25,845,081
Households with some expenditure in dental health care	2,006,148	981,208	1,301,286
Dental expenditure (millions of pesos)	$6,467	$3,925	$5,136
Dental expenditure as % of household total health expenditure	6.3%	3.8%	4.0%
Average of dental expenditure			
I Quintile	$223	$168	$310
II Quintile	$261	$213	$617
III Quintile	$316	$245	$693
IV Quintile	$495	$868	$768
V Quintile	$1,246	$1,482	$1,330
Insured	$882	$991	$1,120
Noninsured	$729	$1,032	$879
Total	$806	$1,000	$987
Dental expenditure as % of household capacity to pay			
I Quintile	10.1%	6.2%	68.4%
II Quintile	4.9%	3.2%	7.1%
III Quintile	4.2%	2.1%	4.2%
IV Quintile	4.0%	4.3%	3.1%
V Quintile	2.9%	2.2%	1.8%
Insured	3.0%	2.2%	2.4%
Noninsured	4.4%	3.5%	8.5%
Total	3.7%	2.9%	5.8%
Number of households with catastrophic expenditure	15,876	83	17,039
Households with catastrophic expenditure if households with no expenditure were spent 50 pesos	129,897	45,530	45,962
Households with catastrophic expenditure if households with no expenditure were spent the average dental expenditure	3,781,936	2,178,680	1,892,754

* All information presented is weighted using the weight factor calculated from the survey strategies used.

heads of household were insured, for the most part through public insurance programs. On average, the number of adult equivalents per household was 3.4, with a reported income of 24,494 Mexican pesos[5] compared to a total reported expenditure of 19,859 pesos.

Once the sample was weighted using the weight factor calculated from the sample strategies used in the national survey, approximately 8.5 percent (95 percent confidence interval (CI) = 7.6 to 9.4) of all households had some expenditure on dental care, varying significantly from 1.3 percent in the poorest quintile to 17.5 percent in the richest quintile. In those households in which the head of household had medical insurance, 12.6 percent reported dental care expenditures, as opposed to 6.4 percent of those in which the head of household had no insurance (Table 1).

In 2000, more than 6,467 million pesos were spent by households on dental health care, representing 6.3 percent of all out-of-pocket expenditures (Table 2). The average expenditure on dental care was 806 pesos, with a positive trend from 223 pesos in the poorest quintile to 1,246 pesos in the richest quintile (an average of 3.7 percent of the household capacity to pay, with a range of 10.11 percent in the lowest quintile to 2.9 percent in the richest quintile). In insured households, dental expenditures represented 3 percent of the household capacity to pay, while in uninsured households these expenditures represented 4.4 percent.

The probability that a household would have had catastrophic expenditures in 2000 was 0.8 percent (15,876 households). However, if we assigned an expenditure of 50 pesos to households that did not spend any money on dental care, 129,897 additional households would have incurred in catastrophic expenditures, while 3,781,936 of these households would have had catastrophic expenditures if we would have assigned the average expenditure during this year (Table 2).

Results of 2002. Characteristics of the heads of households were similar in 2002 and 2000. However, fewer heads of households reported having finished high school (23 percent) and the percentage of heads of households married or living with their partners decreased to 75 percent. While reported income was also similar to 2000, total reported

[5] According to reports from the Bank of Mexico, the exchange rate in December 2004 was 11.201 pesos per US dollar.

expenditure increased to 24,646 pesos in 2002 (Table 1).

Once the sample was weighted, only 4 percent (95 percent CI = 3.4 to 4.6) of all households had some expenditure on dental care, also varying significantly from the poorest to the richest quintile (1 to 8.6 percent, respectively). Similarly, in the households in which the head of household was insured, approximately 5.3 percent reported expenditure on dental care versus 3.4 percent of households in which the head was not insured.

In 2002, households spent considerably less money than in 2000, although the average expenditure on dental care increased to 1,000 pesos, with a positive trend from 168 pesos in the poorest quintile to 1,482 pesos in the richest quintile. This represented an average of 2.9 percent of the household capacity to pay, with a range of 6.2 percent for the poorest quintile to 2.2 percent in the richest quintile. In insured households, dental expenditures represented 2.2 percent of their household capacity to pay whereas those of uninsured households represented 3.5 percent (Table 2).

The probability that a household incurred catastrophic expenditures decreased in 2002 to 0.01 percent (83 households). However, if we assigned an expenditure of 50 pesos to households that did not spend any money on dental care, 45,530 additional households would have incurred catastrophic expenditures and 2,178,680 households would have had catastrophic expenditures if they had spent the average expenditure during this year (Table 2).

Results of 2004. The percentage of heads of households that were male decreased in 2004 to 77 percent. Also, the proportion of them who did not finish high school (22 percent) decreased; slightly more than 15 percent attended college or reported higher education. Proportion of heads of household married or living with their partners decreased to 73 percent. The average reported income decreased to 20,504 pesos although the average reported expenditure increased to 25,132 pesos.

Once the sample was weighted, only 5 percent (95 percent CI = 4.5 to 5.6) of all households spent any money on dental care, varying considerably from 1 percent in the poorest quintile to 12.9 percent in the richest quintile. Similarly, in households in which the head was insured, approximately 6.7 percent reported spending money on dental care, whereas 4.2 percent of households where the head was uninsured did so (Table 1).

More than 5,136 million pesos were spent in 2004 on dental care, representing the 4 percent of all out-of-pocket spending during this year. The average expenditure on dental care was 987 pesos, with a positive trend of 310 pesos in the poorest quintile to 1,330 in the richest. This represented an average of 5.8 percent of the household capacity to pay, with a range of 68.4 percent in the poorest quintile to 1.8 percent in the richest quintile. In insured households, dental spending represented 2.4 percent of the household capacity to pay, whereas in uninsured households, it represented 8.5 percent.

The probability that a household would have incurred in catastrophic expenditures increased during 2004 to 1.3 percent (17,039 households). However, if households that did not spend any money in dental care had spent 50 pesos, 45,962 additional households would have incurred in catastrophic expenditures, while 1,892,754 of these households would have had catastrophic expenditures if they had allocated the average expenditure during this year (Table 2).

Multivariate Analysis. Table 3 shows the results of the Heckman multivariate analysis. After controlling for the effects of sex and education of the heads of households, the margination index, and strata (rural versus urban), the age of the head of household significantly influenced the amount spent on dental health care in all 3 years. The number of adult equivalents influenced negatively the amount of resources allocated to dental care, although this was statistically significant only during 2002 and 2004. The household capacity to pay was positively associated with the amount spent on dental care, being statistically significant in 2000 and 2004.

With regard to the preceding decision to spend or not to spend, one can appreciate the positive and statistically significant association – across all 3 years – of spending with both household capacity to pay and wealth index, once other variables (age, sex and marital status of the head of household, the margination index, and strata) were controlled (Table 3).

Evaluating the model allows us to see that, in these 3 years, there was a statistically significant correlation between the probability of spending any money on dental care and the amount of money actually spent on dental care. The chi-square test for correlation between the expenditure on health and the decision to spend or not in the Heckman model was significant in the three models (2000, 2002, and 2004) with a P-value < 0.01.

Discussion

Because this is the first study to estimate individual households' expenditure on dental health care at the national level in Mexico, it is unfeasible to make comparisons. However, this study allows us to say that private spending on oral health has represented an important facet of total private health care spending during the 3 years of evaluation. In addition, by taking into account the fact that those with the greatest needs for oral health care are of lower socioeconomic status (SES), and having demonstrated that these are the individuals who spend a greater percentage of their income than their counterparts of higher SES, we conclude that implications for social and health policy are unavoidable. A review of the basic assumptions underlying the structure and organization of oral health services is needed.

Table 3
Heckman Multivariate Model

	Year		
	2000	2002	2004
Amount of expenditure†			
Age of household head	7.69**	15.87***	34.10***
With partner/without partner	48.98	144.00	349.07*
Adult equivalents	−14.23	−110.65***	−150.02**
Household capacity to pay	0.02**	0.02***	0.02
	Year		
	2000	2002	2004
Decision to spend			
Adult equivalents	0.02*	0.00	0.02**
Household capacity to pay	0.00***	0.00***	0.00***
Schooling of household head			
Elementary	0.09	0.03	0.10**
Secondary	0.09	−0.01	0.13**
High school	0.14	0.10	0.15***
University/postgraduate	0.12	−0.04	0.29***
Employed	0.02	0.09	0.15***
Insurance (1 = yes)	0.14***	−0.03	−0.08**
Wealth index	0.09***	0.03***	0.06***
/athrho	−0.29***	−0.51***	−0.11**
/lnsigma	7.20***	7.38***	8.30***
Rho	−0.28	−0.47	−0.11
Wald test of independence (rho = 0): chi-square (1)	17.65***	6.94***	6.37**

Amount of expenditure was adjusted for schooling and sex of household head, municipal marginalization index, and stratum. The decision to spend or not was adjusted for age, sex and marital status of household head, municipal marginalization index, and stratum.
* $P < 0.10$; ** $P < 0.05$; *** $P < 0.01$.
† Predicted values of the amount of expenditure model.

Although oral health is a component of overall health and there is significant unmet need for oral health care among those with the least economic resources (3-7), the Mexican health system does not give the attention dental care deserves within its health agenda nor in the processes of reform that is currently taking place. A possible repercussion of this situation is that population itself does not attribute importance to the preservation of oral health. In this way, because the public health care subsystem does not cover all oral health services that population needs (or at least partially cover these services), it places the burden on the private subsystem. Thus, wherein households must incur out-of-pocket expenditures, thus increasing the probability of incurring catastrophic expenditures (15,16).

Beginning in 2004, the Ministry of Health put into practice the Social and Health Protection System as part of the Mexican health system reform. Although it has shown to be a factor reducing catastrophic health care payments among the poorest families (12,13), few interventions related to oral health care are included in the new system, and those included are the interventions of lowest cost. In order to address effectively the various health needs among the non-insured population, the new system ought to encompass a wider range of oral health preventive and treatment interventions that adequately and cost-effectively respond to those needs, therefore effectively reducing the out-of-pocket expenditures of the most vulnerable households. Our findings support the consideration of the inclusion of dental services in the agenda driving the health care reform that is currently taking place in Mexico.

In this sense, it is important to highlight that both, the percentage of households spending in dental health care and the percentage of households in the poorest quintile that spent on dental health care decreased significantly from 2000 to years 2002 and 2004. The fact that statistical difference was not found between 2002 and 2004 supports the apparent tendency to diminish the percentage of households actually spending in dental health care. This could be a positive result from the health system reform in Mexico or the product of programs such as OPORTUNIDADES. However, from the data analyzed in this study we are not able to conclude this with certainty; thus, further studies are

warranted. In addition, from the information available we were not able to explain the fluctuations in the total number of household spending in dental health care from 1 year to another. The minor changes in methodology in each year may not explain this fact, although they should be taken into account.

There are various methodological considerations that we should mention in order to better interpret our findings. In the estimation of expenditures on dental care, spending on medications was not included. This survey did not specify the potential problem that purchasing medication could add to the estimates. Such a feature could be significant because in some states, spending on medications represents 50 percent of all out-of-pocket household spending (12). The cost of medications purchased to address oral problems may only worsen such a trend. In addition, the national survey did not include the costs derived from oral health-related hospitalizations or the cost of medical–dental insurance. Furthermore, based on the National Survey of Household Income and Expenditure, we cannot ascertain who needed but could/did not use oral health care services, or the quantity of services needed or actually used. Finally, even though the findings suggest the existence of financial barriers in access to oral health care in the country [which is in agreement with previous studies (15-18)] as dental health care utilization is not explored individually within the household, and because from the survey it is not possible to know if any household received free dental care, this study should not be considered as a dental health care utilization one. While we could speculate that this scenario may be more relevant to the lower end of the SES spectrum, we cannot offer a more informed perspective at the present stage of our research.

In conclusion, various characteristics of the head of household, as well as of the household itself, are associated with the amount of out-of-pocket spending on dental care – as well as with the decision of spending. There are inequalities in dental health care financing within the various segments of the Mexican population. The results obtained on the multivariate analysis using the Heckman model provided stronger evidence, as the Chi-square test for correlations evidenced that the expenditure on health and the decision to spend or not are correlated statistically. This situation might lead to over- or underestimation of results if analyzed just with the ordinary least square regression model, as specification and selection biases would not have been controlled. The proportion of out-of-pocket spending on overall oral health care spending has yet to be fully established. However, we posit that if private spending on medical care represents 50 percent of overall financing (10,20), the percentage of private spending on dental care is surely much higher, as not many dental interventions – especially the expensive ones – are provided by the public sector. Ideally, future estimates of the cost of dental care, especially as far as private spending is concerned, should allow us to compare between regions/states within Mexico. Such future research would enable us to further refine and confirm, in the case of dental services, the well-established disparities in general health status and medical health care opportunities.

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