Factors Influencing the Use of Dental Health Services by Preschool Children in Mexico

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Abstract

Purpose: The purpose of this study was to identify the factors associated with dental health services utilization (DHSU) within a publicly funded oral health program for preschool children in Campeche, México.

Methods: A cross-sectional study in 1,303 preschoolers (3 to 6 years old) enrolled in 10 public schools was conducted. The independent variables were: (1) sex; (2) age; (3) tooth-brushing frequency; (4) caries severity; (5) enamel defects; (6) mother's maximum education level; (7) mother's attitude toward oral health; (8) health services availability; and (9) family's socioeconomic status. The mothers completed a questionnaire, and their children were clinically examined. The DHSU (none vs any) in the previous 12 months was the dependent variable. Data were analyzed using binary logistic regression (BLR).

Results: Average age was 4.3±0.8 years, and 52% of participants were boys. The prevalence of DHSU any was 31%. The variables associated with DHSU were: (1) moderate and high oral health needs; (2) access to private health services; and (3) older age. The authors' model supported an interaction between tooth-brushing frequency and the importance that the mother ascribed to her child's oral health.

Conclusions: A low prevalence of DHSU was observed. The source of health services and oral health needs determined DHSU in this population, with some attitudes and behaviours modifying utilization. These findings have implications for designing oral health care policies to improve the supply of services to children. (Pediatr Dent 2006;28:285-292)

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Oral diseases are a public health problem in Mexico and other parts of the world because of their high prevalence and incidence.[1-7] The National Health Survey II in Mexico found that 10% of all participants reported any health problem, discomfort, or accident within the 15 days prior to the survey. Oral conditions were among the 11 most frequent causes of morbidity, particularly among women.[8] Oral health care is particularly important in preschoolers because of the close association between dental primary teeth diseases and present and future permanent teeth illness.[6,9,10] In contrast, mothers commonly give low importance to the health of their children's primary teeth because of their temporary nature.[2]

In contrast to the outcomes that could be expected as a result of these patterns, many health systems fail to support access to dental care services by partially or totally excluding dental treatment from basic health insurance. In Mexico, no health policy or program exists to stimulate general oral heath services utilization in children. A large range of dental health interventions supplied by public health services are restricted to restorative or emergency care. In addition, the fact that the majority of dental health care must be financed by out-of-pocket payments plays an important restriction role on its use, and leads to individual financial burden, which is considered the worst alternative to finance health.[11] Such dental care characteristics have undoubtedly contributed to make oral health programs one of the least developed, most understudied, and poorly understood components of health service provision function in health systems.[12]

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In Mexico, there is an extended belief that public health services need to be expanded, because only scarce information is available on the characteristics of health services utilization. Despite this fact, progress in this specific area is difficult to measure. Moreover, some evidence suggests that there are substantial discrepancies between supply and demand throughout health services.13

Although most dental health services utilization studies have been conducted in adult populations, some studies conducted in the United States and Mexico have evidenced that the prevalence of utilization in children and adolescents is about 50%.[14-18] In this sense, the factors that are positively associated with dental health services utilization are:

1. higher education level[15, 19-21];
2. being in the younger or older age groups[22];
3. having a positive attitude, behavior, and opinion towards oral health[15,21,23];
4. having health insurance[14, 21,22];
5. higher income[16]; and
6. presence of either normative or self-perceived oral health care needs.[14,18,19,23,24]

No comprehensive assessment of the factors contributing to the utilization of dental health services has been undertaken in Mexico—despite the fact that preventive and curative care interventions are fundamental to maintain functional oral health in the population at large. The purpose of the present study was to identify the factors associated with the utilization of oral health care services within a publicly funded oral health program for preschool children in Campeche, Mexico.

Methods

Design and population study

The study's design and undertaking followed ethical guidelines for studies at the Autonomous University of Campeche, Campeche, Mexico, and the Mexican Institute of Social Security (IMSS). This is a secondary analysis of an epidemiologic study on oral health carried out by the IMSS and the Autonomous University of Campeche.[25] A cross-sectional study was conducted on all children enrolled during the 1997-1998 school year (total enrolled=1,580) in 10 public preschools included in a preventive dentistry program managed by a publicly funded medical insurance institution in Campeche City (IMSS).

Variables

Through binary logistic regression (BLR), the utilization or not of dental health services in the previous 12 months was analyzed, considering independent variables such as: (1) sex; (2) age; (3) tooth-brushing frequency; (4) father's occupation; (5) mother's education level; (6) the importance that the mother or caregiver ascribed to their child's oral health[26]; (7) availability of health services; (8) family structure[27]; and (9) oral health needs.

Socioeconomic status (SES) was calculated, taking into account the actuarial tables used in the IMSS to estimate socioeconomic level across insured people, which assigns people in 3 categories (high, medium, and low) according to the father's occupation and the mother's education level. These are 2 of the 3 crucial variables commonly employed to determine SES.[28] When the father's information was missing, only the mother's data were used (82 cases).

The importance ascribed by the mother or caregiver to their child's oral health was reduced to a simple positive attitude (1) if "yes" was answered to both questions or reduced to a negative attitude (0) if "no" was answered to any of the following questions:

1. Is it important that your child keeps his/her teeth in good condition?
2. Have you ever examined his/her teeth to ascertain if they are healthy?[25,26]

Four examiners were calibrated (intraexaminers: K=0.93; interexaminers: K=0.89) in the measurement of clinical variables. Exams were conducted in a fully equipped dental chair using a dental mirror and natural light, after the teeth were dried with sterilized gauze. To determine oral health needs, 2 measures were combined:

1. caries detection based on the size of carious lesions (operationalized as carious lesion criteria)[29]; and
2. the presence of enamel defects (specifically enamel opacities either demarcated or diffuse and enamel hypoplasia).[30]

The caries criteria classify subjects into low-caries severity and high-caries severity groups according to the number and magnitude of the clinically observable lesions in primary teeth. A determination of dental need was established by combining the dental caries severity and the presence of enamel defects and classified in the following 3 groups[18,31]:

1. low needs (0): subjects with low caries severity and without structural enamel defects;
2. moderate needs (1): subjects with high caries severity or with structural enamel defects;
3. high needs (2): subjects with high caries severity and with structural enamel defects.

Information collection

A standardized questionnaire was distributed in the schools participating in the study and collected in the same way. The questionnaire was filled out by mothers or caregivers who agreed to participate in the study and who signed the informed consent letter after a detailed explanation of the study was given to them. The questionnaire was targeted to capture some behavioral, sociodemographic, and socioeconomic variables to better analyze the utilization patterns.

Statistical analysis

Exploratory analyses were conducted to evaluate the quality of the information and to describe the study population. For the continuous variables, measures of central tendency and dispersion were calculated. In the case of categorical variables, frequencies and percentages for each category were used. For the bivariate analysis, calculation of chi-square

tests and nonparametric tests for trends tried to examine the association between utilization of dental health services and its potential predictors as well as the respective bivariate logistic regression.

To identify the variables associated with the utilization of dental health services, a multivariate logistic regression model was performed. In the final adjusted model, only the variables from the bivariate analysis (where $P<.25$) were included. In addition, all possible interactions were tested and included if their statistical significance was less than 0.15. To avoid multicolinearity between independent variables, a variance inflation factor (VIF) test was conducted. Finally, adjustment of the final model was verified with the goodness of fit test (using $P>.10$ as a cutoff point) to ascertain whether the adjustment was adequate or not.[32,33] Data analyses were performed using STATA 7 (Stata Corporation, College Station, Tex).

Results

The overall response rate of the questionnaire was 83% (N=1,303). The average age was 4.3±0.8 years, and 52% were boys. Mothers averaged 11.1±3.9 years of schooling, and 33% had "at least some university education." About two thirds of mothers or caregivers (66%) had a positive attitude towards the children's oral health. The largest proportion of families was classified in the middle SES group (47%). Respondents reported that 72% of children brushed their teeth at least once a day. The clinical examination revealed that nearly 10% of the children had structural enamel defects and that only 18% were considered to be in the high-risk group (Table 1).

Approximately 4 out of 10 (40%; N=520) children had at least one dental visit in their life for any reason. Utilization prevalence of at least 1 visit to dental health services in the past year was 31%. From these people, 55%, 31%, and 15% utilized services 1, 2, and more than 2 times, respectively.

Table 2 presents the chi-square bivariate analyses across levels of utilization of dental health services. The utilization of dental health services did not vary by sex and family structure ($P>.05$). Children 5 to 6 years old had a higher frequency of dental visits than children 3 to 4 years old (although the difference was not significant; $P=.052$). Children more commonly used private health services than public services or both ($P<.05$). Children who reported higher tooth-brushing frequency also more frequently used dental health services than children with lower rates of tooth-brushing ($P<.05$). Children with mothers or caregivers having a positive attitude toward their oral health ($P<.05$) or from households with higher SES were more likely to use dental services—compared to those whose mothers or caregivers had a negative attitude, or from families of middle and low SES background (Tables 1 and 2). As shown in Table 2, children with higher oral health needs used dental health services more often than those with moderate and lower oral health care needs.

Table 3 shows that, in the BLR, the utilization of dental health services (yes or not) was associated with older age. Also, children in single-parent families were less likely to have used dental health services than children in 2-parent families. A highly significant relationship was found between utilization of dental health services and moderate and higher oral health needs. Other variables showing significant association ($P<.05$) with utilization of dental health services were: (1) frequency of tooth-brushing; (2) usual source of health services; and (3) SES.

Table 1. Frequency Distribution of the Preschoolers According to Independent Variables

	N	%
Age (ys)		
3	187	14
4	528	41
5	514	39
6	74	6
Sex		
Boys	673	52
Girls	630	48
Tooth-brushing frequency		
Never/occasionally	371	28
Daily (at least 1x/day)	932	72
Attitude toward oral health		
Negative	446	34
Positive	857	66
Source of health services		
Public	804	62
Private	317	24
Both	182	14
Socioeconomic status		
Low	198	15
Middle	611	47
High	494	38
Family structure		
2 parents	1,221	94
Single parent	82	6
Caries risk		
Low	1,069	82
High	234	18
Enamel defects		
Without	1,178	90
With	125	10

Table 2. Bivariate Analyses Incorporating Dental Health Services Utilization

	n	Use of dental services in the last year			Chi-square *P* value
		Never/no	1	≥2	
Sex					
Boys	673	464	114	95	*P*=.959
Girls	630	439	104	87	
Age (ys)					
3-4	715	515	112	88	*P*=.052
5-6	494	388	106	94	
Tooth-brushing					
Never/occasionally	371	284	48	39	*P*=.002
Daily	932	619	170	143	
Attitude toward oral health					
Negative	446	356	49	41	*P*=.000
Positive	857	547	169	141	
Source of health services					
Public	804	585	123	96	*P*=.014
Private	317	200	61	56	
Both	182	118	34	30	
Socioeconomic status					
Low	494	353	72	69	*P*=.065
Middle	611	429	101	81	
High	198	121	45	32	
Family structure					
2 parents	1,221	838	209	174	*P*=.129
Single parent	82	65	9	8	
Oral health needs					
Low	979	705	156	118	*P*=.000
Moderate	289	180	58	51	
High	35	18	4	13	

Multivariate logistic regression

Multiple BLR identified 5 principal effects and 1 interaction (Table 4). Older children (5-6 years old) were more likely to use dental services in the past year than children 3 to 4 years old (odds ratio [OR]=1.32). The odds of utilizing dental health services in children endowed with private health services was 1.47, compared with the odds of utilization in children relying on publicly funded health services. The multivariate model showed that children with moderate (OR=1.86) and higher oral health needs (OR= 3.29) were more likely to visit the dentist than children with low oral health needs.

The effect of the importance ascribed by the caregiver to the child's oral health had on the utilization of dental health services was modified by the reported frequency of tooth-brushing (interaction). In this sense, a positive importance attributed by the mother or caregiver to the child's oral health within the group of children of "never/occasional" tooth-brushing frequency carreid an OR of 1.46. A positive importance ascribed by the caregiver to the child's oral health within the group of children of "daily tooth-brushing" frequency produced an OR of 2.89.

Results from the VIF test suggested that multicolinearity between independent variables did not unduly affect the model, since the highest observed VIF was 1.08 (mean range=1.04-10). The goodness of fit test showed an associated value of *P*>.10, suggesting that the observed probabilities are similar to the probabilities predicted by the logistic regression model.

Discussion

This study documents the utilization of dental health services in Mexico among preschool children, taking into account numerous variables directly related to dental practice. The results offered an interesting mosaic of the diverse factors

involved in the level of dental health services utilization in this specific age group. The low prevalence of dental health services utilization in the year prior to the study (31%) was especially notable. The young age of the children included in the study must be considered. This young age is likely an important variable in the prediction of dental health services utilization, as younger children have fewer oral health needs compared to older children.

Because only few studies on dental health services utilization focus on preschool children, the comparisons between these results and other reports are limited, although some speculations can explain the features encountered in this study. Differences, such as the percentage of children that effectively used dental health services in the previous year, can be observed from other reports. While this study reported a utilization prevalence of 31%, Milgrom et al[14] reported higher levels of utilization in 5- to11-year-old children (63% utilization of dental health services in the previous 6 months). Medina et al,[18] meanwhile, found a utilization prevalence of 46% in 6- to 13-year-old children. On the contrary, other studies[15,17] using similar age groups reported even lower utilization rates.

Other authors have documented the positive association between: (1) age and utilization of health services in general; and (2) age and dental services in particular.[15,17,18] This study's results also support the positive relationship between age and higher likelihood of utilization of dental health services. In this sense, the VIF test concluded that there is no association between age and oral health needs. Age was left in the model on account of the existing reports in the literature[15,17,18]

The relationship between greater oral health needs and utilization of dental health services has been reported both in studies among populations of children and adolescents and in studies on adults[14,18,19,23,24,31] Greater oral health needs (perceived or normative) are an important predictor of utilization of dental health services. Given that utilization is associated with a greater oral health need, the authors expect that such utilization would be geared toward rehabilitative and curative services rather than preventive services. An explanation of this result might be the parents' beliefs about the value of primary teeth, if they agree to the common point of view that the teeth of children of this age are not important due to their temporary nature.[2]

Some authors[21] contradict these interpretations by highlighting the fact that those who have the perception of having better oral health and those that have fewer needs are the people who visit the dentist more often, arguments that do not apply in this study. These contradictory results may be explained by the approaches implemented to measure health care needs (either by patients or by health care workers).

Achieving and maintaining good oral health depends not only on the utilization of dental health services, but also on adopting adequate self-care measures such as regular and effective tooth-brushing with fluoridated toothpaste.[34] The effect of attitude toward the importance of the child's oral health on the utilization of dental health services was modified by the child's tooth-brushing frequency. Utilization rates increased with higher tooth-brushing frequency. This characteristic's implications become clear when one considers the behavioral factors implicated, as the brushing of teeth is considered to be a behavior supporting good oral health.

Murtomaa and Metsäniitty[35] observed the same relationship over time between visits to the dentist and tooth-brushing frequency. Likewise, Medina et al[18] showed that this behavior was related to dental health services utilization among children. In terms of attitudes, it has been shown that subjects with positive attitudes about health have a higher frequency of utilization of dental health services, compared with negative attitudes.[14,20,36] Grembowki et al[37] argued that poverty and ignorance were associated with

Table 3. Results of Bivariate Binary Logistic Regression Between Dental Health Services Utilization and Independents Variables

	Odds ratio (CI=95%)	*P*
Sex		
Boys	0.97	
Girls	(0.76–1.22)	.773
Age (ys)		
3-4	1*	
5-6	1.32 (1.05–1.68)	.019
Tooth-brushing		
Never/occasionally	1*	
Daily	1.65 (1.25–2.17)	.000
Attitude toward oral health		
Negative	1*	
Positive	2.24 (1.71–2.93)	.000
Source of health services		
Public	1*	
Private	1.56 (1.19–2.06)	.002
Both	1.45 (1.03–2.04)	.033
Socioeconomic status		
Middle and low	1*	
High	1.54 (1.13–2.11)	
Family structure		
2 parents	1*	
Single parent	0.76 (0.58–0.99)	.046
Oral health needs		
Low	1*	
Moderate	1.56 (1.18–2.05)	.002
High	2.43 (1.23–4.78)	.010

*Reference category.

Table 4. Multivariate Logistic Regression Model for Dental Health Services Utilization*

	ß	Odds ratio (95% CI)	*P*
Age (ys)			
3-4		1†	
5-6	0.2778	1.32 (1.03-1.69)	.026
Oral health needs			
Low		1†	
Moderate	0.6184	1.86 (1.39-2.48)	.000
High	1.1920	3.29 (1.62-6.69)	.001
Source of health services			
Public		1†	
Private	0.3871	1.47 (1.11-1.96)	.008
Both	0.2549	1.29 (0.90-1.84)	.159
Attitude toward oral health			
Negative		1†‡	
Positive	0.3812	1.46 (0.89-2.41)	.135
Tooth-brushing			
Never/occasionally		1†‡	
Daily	0.0343	0.96 (0.59-1.57)	.890
Attitude toward oral health by tooth-brushing	0.6806	1.97 (1.08-3.61)	.027
Positive attitude in low frequency toothbrush	0.3812	1.46 (0.89-2.41)	.135
Positive attitude in high frequency toothbrush	1.062	2.89 (2.05-4.08)	.000

*Goodness of fit test: chi-square=66.61; *P*=.136.
†Reference category.
‡ The interaction (Attitude toward oral health of child by tooth-brushing

lower levels of patient knowledge, worse attitudes about oral health, and lower levels of adherence to the dentist's recommendations.

Considering that these factors may be related, the links between behaviors and attitudes may also help to explain why oral health status is associated with utilization.[14,20,36]

In general, the households investigated in the present study were not at the lowest end of the SES spectrum, with a considerable proportion having relatively high mother's education level. Barriers to access to care have been shown to be substantially larger for population groups located at the lower end of the SES spectra in Mexico.[4,31,38] Even so, the authors found more frequent dental health services utilization when subjects had private resources to access dental services, or when they had both public and private services available at the same time. This feature strongly indicates that barriers to health care access exist, even when public services are available to the individual user.

This problem becomes more apparent when it is observed that, in general, low-SES children had more oral health needs. While not a situation that would guarantee access to care (as it has been demonstrated that access to care may remain problematic even when financial resources are supplied),[39] use of dental health services should be devoid of barriers. It will be necessary for policy makers to consider the creation of a system for referring children with greater health needs to public dental services of both preventive and curative nature.

Some limitations in the study design call for caution in the interpretation of findings. Because it was a cross-sectional study, there is a problem of temporal ambiguity whereby cause and effect factors were measured at the same time. This database was not specifically designed for health systems research, which means that the authors could not measure variables that might have been better predictors of the utilization of dental health services—such as the identification of barriers in the utilization of services perceived by the mothers, their fear of the dentist, the oral health status of the mothers, and so on. The availability of health services was done using proxy variables.[40] The authors' approach to measuring the importance ascribed by the mother to the oral health of the child was restricted, necessarily, to the variables available in the existing primary dataset. More sophisticated approaches could be found had the data been collected for the specific purpose of the study. This limitation is inherent to secondary database analyses.

Conclusions

Based on this study's results, the following conclusions can be made:

1. The availability of private dental health services and oral health needs drove the utilization of services in this population.
2. Attitudes and behaviors, such as tooth-brushing, modified that utilization.
3. This study's findings offer an important parameter for policy makers to ascertain the availability of dental health services for this segment of the public and to establish a stepping stone to go beyond identifying unmet oral health care needs.
4. Better access to preventive and rehabilitative care could:
   a. provide early intervention for the child population; and
   b. expedite referrals to dental services for children who need more complex care.[41-43]

5. Combined qualitative-quantitative approaches to conduct studies on utilization of dental health services may be the next step toward identifying existing barriers to utilization, as described by Bedos et al.44 Such efforts should differentiate between:
   a. primary and permanent teeth; and
   b. the utilization of curative and preventive services.

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Abstract of the Scientific Literature

Music Therapy in Pediatric Health Care Settings

This comparative analysis examined the cost-effectiveness of music therapy as a procedural support in the pediatric health care setting. Many health care organizations are actively attempting to reduce the amount of sedation for pediatric patients undergoing various procedures. Patients receiving music therapy-assisted computerized tomography scans (n=57), echocardiograms (n=92), and other procedures (n=17) were included in the analysis. Results of music therapy-assisted procedures indicate a successful elimination of patient sedation, a reduction in procedural times, and a decrease in the number of staff members present for procedures. Implications for nurses and music therapists in the health care setting are discussed.

Comments: As an adjunct for child behavior management in the dental setting, music may be valuable, based on this study's results. As a distraction device, music is very effective. Just ask parents of a teen who is plugged into an MP3 player when the dinner bell is rung. Successfully incorporating music into the patient management armamentarium will depend on having a selection of music that appeals to our patients. With the advent of music downloads from the Internet and the relative cheap cost of MP3 players, it has never been easier to utilize this tremendous art form to our advantage. **ARM**

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