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ORIGINAL ARTICLE

Socioeconomic inequalities in oral health service utilization any time in their lives for Mexican schoolchildren 6 to 12 years old

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Abstract

Objective: *To determine the prevalence and existence of socioeconomic inequalities in dental health services utilization (DHSU) any time in life in schoolchildren aged 6 to 12 years from Pachuca, Hidalgo, Mexico.* **Material and methods:** *A cross-sectional study was conducted in 1,404 schoolchildren aged 6 to 12 years from 14 public schools of the city of Pachuca, Hidalgo, Mexico. Questionnaires were distributed in order to determine socioeconomic position (SEP) variables. The dependent variable was DHSU any time in life (0 = No and 1 = Yes). The analysis was performed in the Stata 9 software using the chi-square test.* **Results:** *Mean age was 8.97 ± 1.99 years and 50.1% were boys. The prevalence of DHSU any time in life was 71.4%. The percentage of DHSU increased with age ($p < 0.05$). Significant differences ($p < 0.05$) in DHSU percentages were observed across the SEP variables: health insurance, owning a car at home, housing and household goods characteristics; the better the SEP level, the higher the prevalence of DHSU. Although no differences were observed in mothers' education ($p < 0.05$), fathers' education was inversely associated ($p < 0.05$) to what was expected.* **Conclusions:** *The findings of this study demonstrate that DHSU prevalence was not 100%. 28.6% of the children have never had any contact with a dentist. Certain SEP-indicating variables were identified to be associated with DHSU, thus suggesting the existence of inequalities in this oral health indicator.* (Gac Med Mex. 2015;151:25-30)

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Introduction

One of the objectives of healthcare systems is to provide the type of service the population needs in order to improve health levels. However, heterogeneous environments coexist in Mexico in terms healthcare services provision and oral health needs in the population. As for dental health services, on one side, the public ones offer only a limited range of services (fillings, extractions, preventive care), and on the other, funding and patient access to dental services are also restricted by excluding most specialized services (such as endodontics, periodontics, prostheses, etc.) from public coverage, which forces patients to pay for this type of care directly in odontologic private services resulting in out-of-the-pocket expenses and, ocasionally, catastrophic expenses[1-4]. Furthermore, a study demonstrated that coverage of this kind of service in Mexico reaches only 46% of the population[1]. With

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regard to health care needs, the most important oral health problem in children and adolescents is dental caries which, measured through the decayed, missing and filled teeth index (DMFT and deft indeces, according to the assessed dentition period), consistently shows high levels of caries and low restoring treatment experience, in addition to being concentrated among low socio-economic level subjects[5-11].

Healthcare services utilization results from the interaction of biological determinants with family and community-associated sociocultural factors. Some authors mention that access to healthcare depends on persons (their individual characteristics) and on the place where they live (characteristics of the community). This way, dental health services utilization (DHSU) is a function of the individual's predisposition to use them (a type of individual behavior), which is influenced by socio-demographic characteristics, social and cultural determinants, preferences and expectations with regard to oral health and knowledge of the dental care system, as well as the perceived need by health status, disease severity, limitation in activities and presence of factors that facilitate the utilization of services, such as income, social network and acess to a regular source of care[12-14].

Although there is no purely scientific consensus on the periodicity of DHSU, the American Academy of Pediatrics and The American Academy of Pediatric Dentistry recommend that the age to start with oral health examinations should be the first year of life, with subsequent periodical examinations at least twice yearly. With this, the chances of minimally invasive both preventive and curative actions are increased[15,16]. Some studies have found socioeconomic variables to be associated both with morbidity and mortality[17-20], which results in the so-called social gradient in health. This can also be observed with regard to the status of oral health[21]. In this sense, a number of studies conducted in children and adolescents have associated SEP with DHSU: the better the SEP, the higher the DHSU percentage, regardless of the used indicator. For example, in Greece[22], the socioeconomic level was used; in the USA[22] the military rank of the father was used; in Spain[24,25], social class, mother's education and income were used, and in Nicaragua[26], education and occupation of the parents were used. On the other hand, in Mexico, some works have been carried out in preschool and school-aged chidren and adolescents where similar conclusions have also been reached[2,3,27-29]. In spite of the clear importance of the subject, few studies have been conducted to document socioeconomic inequalities in oral health services utilization in Mexico; therefore, in this study we tried to determine the prevalence and the existence of socioeconomic inequalities in oral health services utilization any time in life in schoolchildren aged 6 to 12 years from the city of Pachuca, Hidalgo, Mexico.

Material and methods

Design, population and study sample

The conduction of this study met the general health law specifications for research. This study was considered not to entail any risk because it does not compromise the physical, moral or emotional integrity of the participants. The protocol was approved at the Odontology Academic Area of the Universidad Autónoma del Estado de Hidalgo.

Pachuca de Soto is the capital city of the State of Hidalgo. It is located at the center-eastern part of Mexico, 96 km north of Mexico City and has an altitude of 2,400-2,800 m above sea-level. It has a population of 256,584 inhabitants in the city and 267,862 in the complete municipality; it has a human development index of 0.9022 and contributes with 13.6% of the state gross domestic product of Hidalgo[30]. The state participates in the National Salt Fluoridation Plan and, according to the Mexican Association of the Salt Industry, two types of salt are distributed: iodized salt and iodized-fluoridated salt. The latter is distributed in Pachuca[31].

This is a cross-sectional design study that initially included a target population of 1,554 schoolchildren aged from 6 to 12 years. It is part of a larger study where several oral health markers were measured[32]. In the first stage, 14 of the 93 public elementary schools from the city of Pachuca, Hidalgo, were randomly selected, with an estimated inclusion of 112 children per school, evenly distributed by age and sex. Subsequently, using the schools' attendance lists and through simple random sampling, the study subjects were selected. In a first moment, a questionnaire return of 73.8% (n = 1,158) was achieved; in a second reminder, 87.8% (n = 1,376) was reached and, finally, in a third moment, 93.8% (n = 1,470) was achieved. Inclusion criteria were: a) being enrolled in any of the selected scools; b) both sexes and c) 6 to 12 years of age. Exclusion criteria were: a) having any condition that compromised oral health; b) being out of the age range and c) failure to sign the informed consent letter. After applying the inclusion criteria, 98 questionnaires were excluded, leaving a final sample of 1,404 subjects (90.3% of the original sample).

Table 1. Univariate analysis distribution

Variable	Mean ± SD
Sex:	
Males	703 (50.1)
Females	701 (49.9)
Age:	
6-7 years	409 (29.1)
8-10 years	609 (43.4)
11-12 years	386 (27.5)
Father education:	
Up to junior high-school	428 (31.3)
Higher than junior high-school	941 (68.7)
Mother education:	
Up to junior high-school	452 (32.2)
Higher than junior high-school	952 (67.8)
Health insurance of the child:	
No insurance	433 (30.8)
IMSS/ISSSTE	727 (51.8)
PEMEX, Army, Navy	68 (4.8)
Private	49 (3.5)
Seguro Popular	127 (9.1)
Automobile ownership	
No	504 (36.7)
Yes	871 (63.4)
Housing characteristics:	
1st quartile	356 (25.4)
2nd quartile	354 (25.2)
3rd quartile	345 (24.6)
4th quartile	349 (24.9)
Ownership of household appliances:	
1st quartile	351 (25.0)
2nd quartile	352 (25.1)
3rd quartile	351 (25.0)
4th quartile	350 (24.9)
DHSU:	
Yes	1,002 (71.4)
No	402 (28.6)

SD: standard deviation

Data collection and configuration of variables

The collection of information was carried out by means of a questionnaire directed to the parents/legal guardiands of the study subjects, which was distrbuted through the schools and retrieved by the same route. With the questionnaires, a series of socioeconomic and sociodemographic variables were collected, as well as the DHSU patterns.

The dependent variable for this study was the DHSU, operationally defined as having or not having used some type of oral health service any time in life. Additionally, independent variables included were: age, (0) 6-7 years, (1) 8-10 years, (2) 11-12 years; sex (0) males and (1) females, as well as a series of SEP indicators such as parental level of education, (0) up to junior high school and (1) higher than junior high school; health insurance, (0) no health insurance (1) Instituto Mexicano del Seguro Social/Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (IMSS/ISSSTE), (2) Petróleos Mexicanos (PEMEX)/ Army/Navy, (3) private insurance, (4) Seguro Popular; owning an automobile at home, (0) No, (1) Yes. Finally, two more socioeconomic variables were created and, for that purpose, the analisis of the main components was used; specifically, the methodology known as polychoric correlation was applied[33]. In this analysis, a series of variables correlated with each other were combined: housing characteristics (floor, walls, roof materials, etc.) and household appliances (refrigerator, stove, computer, etc.), by means of which, 33.4% (housing) and 63.1% (appliances) of the variability could be accounted for. The resulting variables were divided into quartiles, with the first quartile representing the lowest SEP, and the fourth quartile the highest SEP.

Statistical analysis

The statistical pack Stata 9.0 was used to carry out the data analysis. Since variables were categorical, frequencies and percentages were reported in the univariate analysis. In order to look for differences in the DHSU across the different included indicators, a bivariate analysis was performed, where the chi-square test was used. A p-value 0.05 was considered to be statistically significant.

Results

This study had the participation of 1,404 schoolchildren, out of which 50.1% were males and mean age was 8.97 ± 1.99 years. The descriptive results can be found in table 1. On the survey applied to the parents/ legal guardians of the children, the following results were obtained: 68.7% of the fathers had an education higher than junior high school, whereas the percentage of mothers with the same level of education was 67.8%. As for health insurance, 51.8% had access to the IMSS/ISSSTE, while 3.5% had a private health

Table 2. Bivariate analysis between DHSU any time in life and the independent variables included in the study

Variable	DHSU: No n (%)	DHSU: Yes n (%)	p-value
Sex:			
Males	199 (28.3)	504 (71.7)	
Females	203 (29.0)	498 (71.0)	0.787
Age:			nptrend
6-7 years	136 (33.2)	273 (66.8)	z = 2.26; p = 0.026
8-10 years	165 (27.1)	444 (72.9)	
11-12 years	101 (30.4)	285 (73.8)	0.047
Father education:			
Up to junior high school	98 (23.0)	330 (77.1)	
Higher than junior high school	286 (30.4)	655 (70.0)	0.004
Mother education:			
Up to junior high school	123 (27.2)	329 (73.0)	
Higher than junior high school	279 (29.3)	673 (71.0)	0.417
Health insurance of the child:			
No insurance	115 (26.6)	318 (73.4)	
IMSS/ISSSTE	230 (31.6)	497 (68.4)	
Pemex/Army/Navy	18 (26.5)	50 (73.5)	
Private	17 (34.7)	32 (65.3)	
Seguro Popular	22 (17.3)	105 (83.0)	0.011
Automobile ownership:			
No	133 (26.4)	371 (73.6)	
Yes	255 (29.3)	616 (71.0)	0.252
Housing characteristics:			
1st quartile	89 (25.0)	267 (75.0)	
2nd quartile	107 (30.2)	247 (70.0)	
3rd quartile	129 (37.4)	216 (63.0)	
4th quartile	77 (22.1)	272 (78.0)	0.000
Household appliances:			
1st quartile	183 (52.1)	168 (48.0)	
2nd quartile	73 (21.0)	279 (79.3)	
3rd quartile	85 (24.2)	266 (76.0)	
4th quartile	61 (17.4)	289 (83.0)	0.000

insurance. Of the surveyed sample, 63.4% owned an automobile at home. With regard to the SEP indicators, these were divided into quartiles. The prevalence of DHSU any time in life was 71.4%.

Table 2 shows the bivariate results of DHSU prevalence for each category of variables included in the study. With regard to sex, the rates of DHSU between males and females were found to be very similar ($p > 0.05$). Lower DHSU was observed among younger children (66.8%) and higher DHSU among the older ones ($p> 0.05$). As for the parents' level of education, no differences were observed in the prevalence of DHSU by education of the mother; however, a higher proportion of DHSU was observed in the children of fathers with lower education than in those with fathers with higher education ($p > 0.01$). The highest prevalence of DHSU was detected among those affiliated to the Seguro Popular and the lowest among those who had a private health insurance ($p > 0.05$). The possession of an automobile at home did not make any differences in DHSU frequency in these children ($p > 0.05$). Among the housing characteristics and household appliances, the prevalence of DHSU in both was found to be higher in those with better levels of SEP ($p < 0.001$).

Discussion

The purpose of this study was to determine the prevalence of DHSU and at the same time to identify the existence of socioeconomic inequalities in the use of oral health services any time in life in schoolchildren from Pachuca, Hidalgo. The results showed that the percentage of DHSU among the studied schoolchildren was 71.4% (n = 1,002) (from 66.8 to 73.8% according to age), indicating that there are school-aged children that have not yet had any contact at all with a dentist. This is worrying considering that in Mexico oral health of children and adolescents is still poor[5-11], and DHSU is an important opportunity to improve children's health through preventative and curative actions. Studies conducted on DHSU any time in life are few, but certain comparisons and inferences can be made. For example, Mantonanaki et al.[22], in a study carried out in Greek children aged 5 years, an age lower than ours, found the prevalence of DHSU any time in life to be 84%, a higher percentage than that observed in the present study. However, in Brazil, in preschool-aged children, the majority (79%) had not had a dental visit in their lives[34]. Studies in Mexico have demonstrated that the prevalences of DHSU within the previous 12 months for children and adolescents range from 31 to 35%[2,3,27-29]. Clearly, the percentages are variable, and this variability could result from the social and economic development of each site where the studies were conducted.

With the epidemiologic evidence generated around the world, the existence of socioeconomic position-related oral health inequalities is undeniable, which represents a huge challenge for both health policies and public health[35]. Mexico is located in a region where the highest social inequalities occur, with concrete expressions in social health determinants that configure disparities in social healthcare indicators, acess to services and general health conditions. Currently, these inequalities are further deepening, resulting in a polarized society where poverty persists and income distribution worsens, which emphasizes the differences between rich and poor[36]. This situation has a strong impact on the inequalities observed both in oral health and access to dental treatment to satisfy these needs. On the other hand, barriers created by parents and healthcare providers and systems are also found, which result of a lack of basic infrastructure and dysfunctional health insurance programs[37].The importance of social determinants in health has been recognized for many years, with evidence that the impact of social phenomena and context affect, in a dose-response manner, several health outcomes[38-41]. The exact mechanism by which the socioeconomic position of individuals or of the context they live in are associated is not very clear, since the SEP is a multidimensional construct[42]; however, some authors (for a more in-depth analysis, see Borrell, 2010[39], Braveman, 2011[40], Adler et al., 2012[41]) mention several hypotheses for a plausible explanation of this association. For example, the physiological explanation of stress, which can produce deterioration in multiple organs over time (for example, through neuroendocrine and immune/inflammatory processes); in turn, people with more resources are able to cope with daily and special challenges. In the case of oral health services utilization, lack of economic resources is an important barrier to access them, even more so in a system such as the Mexican, with limited coverage of this kind of services. In this sense, the results of the SEP variables in the present study are consistent (except for the father's education) with investigations conducted around the world: people with higer levels of poverty have the lowest prevalence of DHSU as well, regardless of the SEP indicators employed. Low DHSU may be due to the priorities families have, which leave oral health until the end. In this sense, our results are consistent with several studies. In Greece, Mantonanaki et al.[22] found that lower socioeconomic children used dental services less. These same results were observed in Spain by Barriuso et al.[24,25]: low class children, sons of mothers with education levels lower than college and with lower income showed less DHSU. In Brazil, the use of dental services was lower among children of mothers with low education level[34,43] and better income[43], the same as in the USA with the military rank of the father[23]. These results have been corroborated with similar conclusions in Mexico[2,3,27-29], which furher supports the findings of this work.

The study has certain limitations that have to be considered for its interpretation. First, every cross-sectional design study has the problem of temporal ambiguity, where cause and effect are measured simultaneously and, therefore, conclusions can not be causal. On the other hand, the use of questionnaires may be introdicing some bias, since some persons may not remember exactly every detail related to DHSU. Taking into account the obtained results, we can conclude that the prevalence of DHSU was not 100%; 28.6% of the children have never had any contact with a dentist. Certain SEP-indicating variables associated with the DHSU were identified, which suggests the existence of disparities in this oral health indicator, even though the

education level of the father was not consistent. Strategies are required to increase oral health services access, and thereby reduce the gaps existing between the different SEP groups.

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