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RELATIONSHIP BETWEEN DENTAL CARIES AND SOCIO-ECONOMIC FACTORS IN ADOLESCENTS

CÁRIE DENTÁRIA ENTRE OS ADOLESCENTES E SUA RELAÇÃO COM AS VARIÁVEIS SÓCIO-ECONÔMICAS

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ABSTRACT

Dental caries has a multifactorial etiology, including socio-economic variables and access to dental care, which were discussed in the national survey conducted in 2002. The aim of this study was to investigate the socio-economic aspects and access to dental care, associated with caries prevalence and severity in adolescents from the State of São Paulo. The study design was cross-sectional, on which data on 1,825 adolescents aged 15 to 19 years achieved from the data of an epidemiological survey conducted in the State of São Paulo in 2002 were analyzed. Epidemiological exams and interviews with previously formulated questions were used in the survey. The Significant Caries Index (SiC Index) was utilized to determine the group with higher caries experience. Frequency distribution and chi-square association tests were carried out in order to evaluate the relationship between independent variables and the dependent variable (DMFT). Confidence intervals and odds ratio (OR) were estimated. The risk factors pointed as indicators of presence of dental caries were as follows: not being a student, studying at public schools, family income lower than 5 Brazilian minimum wages. Moreover, not having an own house or a car seemed to contribute to caries experience. With regard to the access to public dental care, the adolescents assisted at public centers and looking for emergency dental care had the higher caries experience. Thus, the results showed that social deprivation is associated with caries experience in adolescents from the State of São Paulo.
Uniterms: Dental caries; Adolescence; Epidemiology; Socio-economic factors; Dental care.

RESUMO

A cárie dentária tem origem multifatorial e dentro desta multifatoriedade estão as variáveis sócio-econômicas e as de acesso a serviços odontológicos que foram abordadas no levantamento nacional realizado em 2002. O objetivo deste estudo foi conhecer os fatores sócio-econômicos e de acesso aos serviços odontológicos associados com a prevalência e severidade da cárie dentária entre adolescentes no Estado de São Paulo. O delineamento do estudo foi do tipo transversal, onde foram analisados os dados de 1825 adolescentes entre 15 e 19 anos de idade, obtidos a partir do levantamento epidemiológico em saúde bucal, realizado no Estado de São Paulo, em 2002, que incluiu exames epidemiológicos e entrevistas com questões previamente formuladas. O Significant Caries Index (SiC Index) foi empregado para definir o grupo com maior experiência de cárie. Foram realizados cálculos da distribuição de freqüência, testes de associação do Qui-quadrado (c^2) para avaliar o relacionamento entre a variável dependente (CPOD) e as variáveis independentes, estimando-se as razões de chance (Odds Ratio - OR) e respectivos intervalos de confiança. Não ser estudante, estudar em escolas públicas e renda familiar menor que 5 salários-mínimos foram indicadores para a presença de cárie dentária. Além destes fatores citados, não possuir automóvel e residir em casa cedida pareceram contribuir para a experiência de cárie. Quanto ao acesso aos serviços odontológicos, os adolescentes atendidos em serviço público e os que procuraram atendimento por motivo de urgência tiveram maior experiência de cárie. Portanto, concluiu-se que os resultados indicaram que a privação social parece estar relacionada a experiência de cárie dentária em adolescentes no Estado de São Paulo.
Unitermos: Cárie dentária; Adolescência; Epidemiologia; Fatores sócio-econômicos; Serviços odontológicos.

INTRODUCTION

Oral health conditions have improved during the last decades[17,21] however, dental caries is still a major public health problem, both in Brazil[12,13] and many areas of the world[14,21].

Even though dental caries is the most widely investigated disease in the world, most studies address schoolchildren, with a lack of studies on the caries status of young adults[20].

With regard to the multifactorial etiology of dental caries, several studies have associated the social background and caries[1,9,11,15,16].

It has been observed that small population groups keep a high prevalence of dental caries, and some authors discuss the vulnerability to the disease, which may be related to a more intense exposure to the risk factors and to social deprivation[11].

In addition to the difficult access to dental care, people with remarkable differences in income are also in disadvantage as to the occurrence of oral health problems. Such finding was recorded in the survey conducted by the Ministry of Health in 1986, which indicated that people of high socio-economic background presented lower caries prevalence than people of low socio-economic status[17].

Thus, the aim of this study was to investigate the socio-economic factors and access to dental care, associated with caries prevalence and severity in adolescents from the State of São Paulo.

METHODOLOGY

The study design was cross-sectional, based on the results of the epidemiological oral health survey "Oral Health Status in the State of São Paulo in 2002"[18], a study conducted by the Oral Health Brazil 2003 Project, of the Ministry of Health, and was approved by the Ethics Committee (Process CONEP n. 581/2000). In the State of São Paulo, the survey was carried out by the Health Secretariat of the State of São Paulo (SES-SP), in collaboration with the Public Health School – University of São Paulo (FSP-USP).

A total of 35 cities and 16,708 individuals were examined throughout the State of São Paulo. This study analyzed the data of the age range 15 to 19 years old, adding up to 1,825 examinations. This sample was representative of the state, according to the parameters established for the survey[18].

For sample selection, the number of urban blocks and rural villages existing in the cities was verified, followed by calculation of the mean number of homes per block or village. Then, the number of blocks to be visited was calculated on the basis of the number of homes investigated, which ranged according to the size of the city. All individuals aged 15 to 19 years old were examined at their own homes. Return to the visited homes was recommended for control of the non-response rate.

The calibration process was planned considering a maximum number of five examiners per city. The entire process of calibration of the staff was designed to include at least 24 hours of work.

The examinations were conducted by 132 examiners, who followed the methodology suggested by the World Health Organization[22], employing an oral mirror and CPI probe, under natural light, with both the examiner and examinee sitting in chairs.

The examiners interviewed the adolescents by means of scored questions addressing the variables of interest in 3 distinct groups: 1) socio-economic level; 2) access to dental care; and 3) self-perception on oral health. This study comprised only the answers of the two first groups. Thus, the independent variables were: number of residents per room, educational level (years of study); student, type of school, house, family income, car, dentist, last visit to the dentist, type of care and reason for going to dentist.

The DMFT index was employed for evaluation of dental caries experience (DMFT=6.44 for the total sample) and the group at higher risk of dental caries was defined by the mean of the *Significant Caries Index* (*SiC Index*) for the total sample (11.68), thus this group comprised subjects with DMFT>11. The *SiC Index* was employed to establish the severity of caries in the third of the group presenting the highest caries experience. This index may be employed as a counterpart for the DMFT values[2].

The data were initially entered in the SB2000 software, and then converted to the Excel software and exported to the *Epi-Info* version 5.01 software.

Calculations of distribution of frequency and chi-square association tests (c^2) were performed for evaluation of the relationship between the dependent variable and the independent variables, with estimate of the odds ratio (OR) and respective confidence intervals.

The DMFT index was compared with the other variables by two distinct ways. The first addressed the occurrence of caries, considering the absence (DMFT=0) or presence of dental caries (DMFT>0). The second analysis assessed the severity of dental caries, measured by the *Significant Caries Index*, and included subjects with DMFT>11.

The group DMFT=0 included 175 subjects (9.6% for total sample) and the group DMFT>11 included 271 subjects (14.9% for total sample).

The dependent variable was considered as DMFT index equal to zero (Y=0) and DMFT above zero (Y=1), whereas the other group considered DMFT equal to zero (Y=0) and DMFT>11 (Y=1).

The Epi Info (version 6.04) software was employed for accomplishment of the chi-square association tests (c^2), and the MULTLR software was used for calculation of the odds ratio (OR) and 95% confidence intervals.

RESULTS

The response rate was 97.9%, inter-examiner agreement was 98.5%, and intra-examiner agreement was 99.0%, all within the acceptable limits for epidemiological studies[8].

Testing of statistical significance by the chi-square test was performed between the dichotomic dependent variable

(DMFT) and the independent variables. The results on the presence or not of dental caries (DMFT=0 or DMFT>0) may be observed in Table 1.

The chi-square association test demonstrated that the variables "student", "type of school", "family income", "has been to the dentist ", "last visit to the dentist", "type of care" and "reason for going to dentist" were statistically significant in relation to the presence or not of dental caries.

The results of the chi-square test in relation to the high severity of dental caries (DMFT=0 or DMFT>11) may be observed in Table 2.

The chi-square association test revealed that the variables "student", "type of school ", "house", "family income", "car", "has been to the dentist", "last visit to the dentist", "type of care" and "reason for going to dentist" were statistically significant in relation to the high severity of dental caries.

Tables 3 and 4 present the univariate analyses of all variables investigated.

Table 3 demonstrates that adolescents that were not students or attending public schools, as well as those with lower family income, were at a higher risk of having dental caries.

With regard to the access to dental care, among the adolescents that have already been to the dentist, those assisted at public centers and those looking for emergency dental care were also at a higher risk of having dental caries.

Table 4 demonstrates that adolescents that were not

TABLE 1- Chi-square test and p values for the socio-economic variables and access to dental care in adolescents aged 15 to 19 years, according to DMFT=0 and DMFT>0. State of São Paulo, 2002

Variable	Category	DMFT= 0		DMFT>0		χ^2	p value
		N	%	N	%		
Number of residents per room	< 0.25	8	4.6	99	6.1	4.42	0.110
	0.25 - 1.25	158	90.3	1395	84.5		
	> 1.25	9	5.1	156	9.4		
Educational level (years of study)	> 8 years	104	59.4	1005	60.9	0.09	0.764
	≤ 8 years	71	40.6	645	39.1		
	Yes	146	83.4	1239	75.1	5.56	0.018
	No	29	16.6	411	24.9		
Student	Private	17	9.7	83	5.0	8.00	0.046
	Public	132	75.4	1254	76.0		
Type of school	Others	1	0.6	7	0.5		
	Not student	25	14.3	306	18.5		
House	Own	131	78.5	1190	72.1	3.81	0.148
	Rented	30	17.1	246	14.9		
	Borrowed/Others	14	4.4	214	13.0		
Family income	≥ 5 minimum wages	33	18.8	200	12.1	5.86	0.015
	< 5 minimum wages	142	81.2	1450	87.9		
Car	Yes	85	48.6	689	41.8	2.74	0.098
	No	90	51.4	961	58.2		
Has been to the dentist	Yes	157	89.7	1576	95.1	9.94	0.0008
	No	18	10.3	74	4.9		
Last visit to the dentist	Less than 1 year	90	51.4	1006	60.9	19.81	0.0002
	1 to 2 years	33	18.9	358	21.7		
	3 years or more	37	21.1	231	14.0		
	Has never been to the dentist	15	7.4	55	3.4		
Type of dental care	Private	70	40.0	489	29.6	25.19	0.000
	Health Insurance	22	12.6	149	9.0		
	Public	68	38.9	946	57.3		
	Philanthropic/Others	2	1.2	12	0.7		
	Has never been to the dentist	13	7.4	54	3.4		
Reason for going to dentist	Control	104	59.4	919	55.7	20.06	0.0004
	Treatment	13	7.4	174	10.5		
	Emergency	31	17.79	437	26.5		
	Others	14	8.1	68	4.1		
	Has never been to the dentist	13	7.4	52	3.2		

student, attended public schools, had lower family income, had no cars or own houses presented the highest dental caries experience.

Concerning the access to dental care, among the adolescents that have already been to the dentist, those assisted at public health centers and for emergency dental care presented highest caries experience.

DISCUSSION

This study attempted to associate socio-economic variables and access to dental services to the prevalence and severity of dental caries, on the basis of an epidemiological oral health survey conducted in the State of São Paulo in 2002. Thus, it was a cross-sectional study, and therefore the exposure and status of the disease were observed at a single moment; longitudinal investigations would be important to elucidate further aspects.

The results demonstrated that the unfavorable socio-economic status was related to the higher caries experience.

Not being a student, attending public schools and belonging to a family with income below 5 minimum wages were indicators for the presence of dental caries. These indicators, combined to not having a car or an own house, also influenced the higher caries experience.

TABLE 2- Chi-square test and p values for the socio-economic variables and access to dental care in adolescents aged 15 to 19 years, according to DMFT=0 and DMFT>11. State of São Paulo, 2002

Variable	Category	DMFT= 0		DMFT>11		χ^2	p value
		N	%	N	%		
Number of residents per room	< 0.25	8	4.6	13	4.8	0.66	0.720
	0.25 - 1.25	158	90.3	239	88.2		
	> 1.25	9	5.1	19	7.0		
Educational level (years of study)	> 8 years	104	59.4	176	64.9	1.16	0.282
	≤ 8 years	71	40.6	95	35.1		
	Yes	146	83.4	188	67.5	10.44	0.001
	No	29	16.6	83	32.5		
Student	Private	17	9.7	12	4.4	8.50	0.036
	Public	132	75.4	197	72.7		
Type of school	Others	1	0.6	1	0.4		
	Not student	25	14.3	61	22.5		
House	Own	131	74.8	190	70.1	6.16	0.046
	Rented	30	17.1	38	14.0		
	Borrowed/Others	14	8.1	43	15.9		
Family income	≥ 5 minimum wages	33	81.1	28	10.3	5.84	0.015
	< 5 minimum wages	142	18.9	243	89.7		
Car	Yes	85	48.6	102	37.6	4.78	0.028
	No	90	51.4	169	62.4		
Has been to the dentist	Yes	157	89.7	259	98.1	13.29	0.0002
	No	18	10.3	5	1.9		
Last visit to the dentist	Less than 1 year	90	51.4	188	69.4	18.87	0.0003
	1 to 2 years	33	18.8	42	15.5		
	3 years or more	37	21.1	34	12.5		
	Has never been to the dentist	15	8.7	7	2.6		
Type of dental care	Private	70	40.0	85	31.4	14.80	0.005
	Health Insurance	22	12.6	29	10.7		
	Public	68	38.8	149	54.9		
	Philanthropic/Others	2	1.1	1	0.4		
	Has never been to the dentist	13	7.5	7	2.6		
Reason for going to dentist	Control	104	59.4	140	51.7	21.84	0.0002
	Treatment	13	7.4	20	7.4		
	Emergency	31	17.8	94	34.7		
	Others	14	8.0	11	4.0		
	Has never been to the dentist	13	7.4	6	2.2		

Several studies make use of dichotomy between students from public and private schools as the main approach in relation to socio-economic variables and dental caries[4,7,10,19]. Even though the results in the literature are controversial, some authors have observed worst indicators of dental caries in students from public schools[7,10,19], which was also observed in the present study, on which students from public schools presented higher caries experience.

Other investigations have reported the relationship between family income and dental caries[9,16], being higher incomes often related to lower means of DMFT[1], corroborating the data achieved in the present study.

It was observed that having a car may be significantly associated to lower DMFT values. This indicator has already been mentioned in other studies and has been highly correlated to health indexes and disease morbidity[5]. However, relying only on this indicator may be troublesome, since some people may not have a car by their own will[3].

Thus, all these indicators may be employed for identification of groups at risk for high severity of dental caries; however, the utilization of a single criterion seems to be inadequate, according to the present results.

With regard to the variables of access to dental care, the results demonstrated that subjects who have never been or do not regularly go to the dentist presented the lower DMFT values. It has been reported that the larger access to general dental care does not seem to be directly related to better oral health conditions[23]. A study conducted in industrialized

TABLE 3- Analysis of the socio-economic variables and access to dental care. Number, percentages, OR, confidence intervals and p values, in adolescents aged 15 to 19 years, according to DMFT=0 and DMFT>0. State of São Paulo, 2002

Variable	Category	DMFT= 0		DMFT>0		OR	CI 95%	p value
		N	%	N	%			
Number of residents per room	< 0.25	8	4.6	99	6.1	1.00	0.34 - 1.39	0.305
	0.25 - 1.25	158	90.3	1395	84.5	0.69	0.53 - 3.56	0.511
	> 1.25	9	5.1	156	9.4	1.37		
Educational level (years of study)	> 8 years	104	59.4	1005	60.9	1.00	0.68 - 1.29	0.703
	≤ 8 years	71	40.6	645	39.1	0.94		
	Yes	146	83.4	1239	75.1	1.00	1.10 - 2.53	0.015
	No	29	16.6	411	24.9	1.67		
Student	Private	17	9.7	83	5.0	1.00	1.12 - 3.38	0.018
	Public	132	75.4	1254	76.0	1.95	0.17 - 12.42	0.744
Type of school	Others	1	0.6	7	0.5	1.43	1.29 - 4.86	0.006
	Not student	25	14.3	306	18.5	2.51		
House	Own	131	78.5	1190	72.1	1.00	0.59 - 1.37	0.633
	Rented	30	17.1	246	14.9	0.90	0.95 - 2.97	0.073
	Borrowed/Others	14	4.4	214	13.0	1.68		
Family income	≥ 5 minimum wages	33	81.2	200	87.9	1.00	1.16 - 2.75	0.008
	< 5 minimum wages	142	18.8	1450	12.1	1.79		
Car	Yes	85	48.6	689	41.8	1.00	0.96 - 1.80	0.083
	No	90	51.4	961	58.2	1.32		
Has been to the dentist	Yes	157	89.7	1576	95.1	1.00	0.24 - 0.70	0.001
	No	18	10.3	74	4.9	0.41		
Last visit to the dentist	Less than 1 year	90	51.4	1006	60.9	1.00	0.64 - 1.47	0.888
	1 to 2 years	33	18.9	358	21.7	0.97	0.37 - 0.84	0.005
	3 years or more	37	21.1	231	14.0	0.56	0.18 - 0.60	0.000
	Has never been to the dentist	15	7.4	55	3.4	0.33		
Type of dental care	Private	70	40.0	489	29.6	1.00	0.58 - 1.62	0.906
	Health Insurance	22	12.6	149	9.0	0.97	1.40 - 2.83	0.0001
	Public	68	38.9	946	57.3	1.99		
	Philanthropic/Others	2	1.2	12	0.7	0.86	0.20 - 3.92	0.844
	Has never been to the dentist	13	7.4	54	3.4	0.59	0.31 - 1.14	0.120
Reason for going to dentist	Control	104	59.4	919	55.7	1.00		
	Treatment	13	7.4	174	10.5	1.51	0.83 - 2.76	0.174
	Emergency	31	17.79	437	26.5	1.59	1.05 - 2.42	0.028
	Others	14	8.1	68	4.1	0.55	0.30 - 1.01	0.054
	Has never been to the dentist	13	7.4	52	3.2	0.45	0.24 - 0.86	0.015

countries in the period from 1970 to 1980 revealed that the access to dental care accounted for only 3% of the decrease in dental caries at 12 years old[14].

Nevertheless, subjects often look for dental care after the appearance of problems, indicating the lack of preventive awareness of the population. This is demonstrated by the significant association between the cases of emergency dental care and high DMFT values, also observed by Carvalho, et al[6]. (2001).

The fact that adolescents assisted at public centers presented highest caries experience suggests the need to emphasize the prevention and control of the disease, in order to modify the epidemiological status of dental caries in adolescents, especially the groups at higher risk, besides keeping the positive outcomes achieved so far.

CONCLUSION

The results indicated an association between the socio-economic factors and caries experience in adolescents from the State of São Paulo. Moreover, there is an unsatisfactory preventive awareness among adolescents, since they look for dental care only after the appearance of problems.

TABLE 4- Analysis of the socio-economic variables and access to dental care. Number, percentages, OR, confidence intervals and p values, in adolescents aged 15 to 19 years, according to DMFT=0 and DMFT>11. State of São Paulo, 2002

Variable	Category	DMFT= 0		DMFT>11		OR	CI 95%	p value
		N	%	N	%			
Number of residents per room	< 0.25	8	4.6	13	4.8	1.00	0.32 - 1.70	0.485
	0.25 - 1.25	158	90.3	239	88.2	0.74	0.34 - 3.26	0.925
	> 1.25	9	5.1	19	7.0	1.05		
Educational level (years of study)	> 8 years	104	59.4	176	64.9	1.00	0.53 - 1.16	0.239
	≤ 8 years	71	40.6	95	35.1	0.79		
	Yes	146	83.4	188	67.5	1.00	1.38 - 3.57	0.0010
	No	29	16.6	83	32.5	2.22		
Student	Private	17	9.7	12	4.4	1.00		
	Public	132	75.4	197	72.7	2.11	0.98 - 4.57	0.057
Type of school	Others	1	0.6	1	0.4	1.42	0.08 - 24.95	0.812
	Not student	25	14.3	61	22.5	3.46	1.44 - 8.28	0.005
House	Own	131	74.8	190	70.1	1.00		
	Rented	30	17.1	38	14.0	0.87	0.51 - 1.48	0.615
	Borrowed/Others	14	8.1	43	15.9	2.12	1.11 - 4.03	0.022
Family income	≥ 5 minimum wages	33	81.1	28	10.3	1.00		
	< 5 minimum wages	142	18.9	243	89.7	2.14	1.19 - 3.84	0.010
Car	Yes	85	48.6	102	37.6	1.00		
	No	90	51.4	169	62.4	1.56	1.06 - 2.30	0.023
Has been to the dentist	Yes	157	89.7	259	98.1	1.00		
	No	18	10.3	5	1.9	1.00	1.00 - 1.00	0.050
Last visit to the dentist	Less than 1 year	90	51.4	188	69.4	1.00		
	1 to 2 years	33	18.8	42	15.5	0.61	0.36 - 1.02	0.062
	3 years or more	37	21.1	34	12.5	0.44	0.26 - 0.75	0.002
	Has never been to the dentist	15	8.7	7	2.6	0.22	0.08 - 0.57	0.001
Type of dental care	Private	70	40.0	85	31.4	1.00		
	Health Insurance	22	12.6	29	10.7	1.08	0.57 - 2.05	0.801
	Public	68	38.8	149	54.9	1.80	1.17 - 2.76	0.007
	Philanthropic/Others	2	1.1	1	0.4	0.41	0.03 - 4.63	0.472
	Has never been to the dentist	13	7.5	7	2.6	0.44	0.17 - 1.17	0.101
Reason for going to dentist	Control	104	59.4	140	51.7	1.00		
	Treatment	13	7.4	20	7.4	1.14	0.54 - 2.40	0.724
	Emergency	31	17.8	94	34.7	2.25	1.39 - 3.63	0.001
	Others	14	8.0	11	4.0	0.58	0.25 - 1.34	0.203
	Has never been to the dentist	13	7.4	6	2.2	0.34	0.12 - 0.93	0.036

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