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ORIGINAL ARTICLE

Nonuse of dental service by schoolchildren in Southern Brazil: impact of socioeconomics, behavioral and clinical factors

Vanessa Polina Pereira da Costa[1] · Marília Leão Goettems[1] · Luísa Jardim Corrêa de Oliveira[1] · Sandra Beatriz Chaves Tarquinio[1] · Dione Dias Torriani[1] · Marcos Britto Correa[1] · Flávio Fernando Demarco[1,2]

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Abstract
Objectives To assess clinical, behavioral and socioeconomic factors associated with nonuse of dental services by schoolchildren.
Methods A cross-sectional school-based study with 1211 children aged 8–12 years was carried out in Pelotas, Brazil. The outcome (never having had a dental appointment) and independent variables were collected through interview with parents and children, including sex, age, parent's schooling, family income, self-perception about oral health, and dental fear. Dental caries was assessed by clinical examination performed at schools.
Results 291 (24.3 %; 95 % CI 22.0–26.9) of the children had never visited a dentist. Multivariate Poisson regression analysis showed that the outcome was associated with children from mothers with little education (≤0.001), from public schools (≤0.001), from crowded households (≤0.001), who had no caries (≤0.001), who had dental fear (≤0.001), and who started oral hygiene later (0.04).
Conclusions Despite the extensive increase in oral health coverage, especially in the public system in the last years in Brazil, there is still an unassisted portion of the population of schoolchildren. It was observed that socioeconomic, behavioral, and clinical factors influenced the nonuse of dental services.

✉ Flávio Fernando Demarco
ffdemarco@gmail.com

[1] Post-Graduate Program in Dentistry, Federal University of Pelotas, Pelotas, RS, Brazil

[2] Post-Graduate Program in Epidemiology, Federal University of Pelotas, Pelotas, RS, Brazil

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Introduction

The Brazilian Oral Health Policy recommends that children visit dentists in the first year of life (AAPD 2008), to establish preventive actions and maintain oral health (Pucca et al. 2009). Visits to dental professionals for preventive care can save money and help avoid complex procedures that can induce negative experiences (Moeller et al. 2010), compromising oral health in later stages of life (Wogelius and Poulsen 2005). It has been shown that regular dental attendance during life provides a better oral health in adulthood (Thomson et al. 2010).

Health care providers and health care policy makers must understand the factors associated with dental care service use to design interventions to promote its regular use and oral health (Burr and Lee 2013). It is also crucial to quantify inequalities in such service's access and use. Universal access to oral health services is the guiding principle of the Brazilian health policy (Paim et al. 2011). Despite the extension in oral health services in public system, inequality in dental care in Brazil is still large when compared to the standards of developed countries. Recent data from Brazil showed that 12.8 % of individuals between 7 and 19 years had never visited a dentist and social groups differed remarkably in use (Peres et al. 2012).

Dental services use may be influenced by many factors, including socioeconomic (Peres et al. 2012; Piovesan et al. 2011a) and psychosocial variables (Piovesan et al. 2011a). The harm socioeconomic disadvantages do to dental attendance has been demonstrated (Donaldson et al. 2008)

and extensively studied (Baldani et al. 2011; Medina-Solis et al. 2009; Peres et al. 2003).

Other individual and familiar characteristics may affect children's use of dental services. Social and psychosocial inequalities on the use pattern of dental services in children have been demonstrated (Baldani et al. 2011). Data about the interaction among the different predictors of dental care service use in representative samples have been rarely assessed for Brazilian schoolchildren (Piovesan et al. 2011a). This study aimed to evaluate the nonuse of dental services by schoolchildren in Southern Brazil and the influence of demographics, socioeconomic, and clinical variables and self-perception of oral health in dental attendance.

Methods

A cross-sectional school-based study was conducted in 2010 with a sample of individuals aged 8–12 years from schools of the urban zone of Pelotas, Southern Brazil. This study is part of a large study that aimed to estimate the prevalence of oral diseases, nutritional status and physical activity in schoolchildren (Goettems et al. 2013). Pelotas has approximately 330,000 inhabitants and 25 private and 91 public schools. Out of 50,467 children enrolled in schools in 2010, 25,628 were eligible for the study.

The following parameters and estimates were employed for sample calculation: 95 % confidence level, acceptable error of three percentage points, and the prevalence of the main outcomes included in the study. The higher number ($n = 922$) was achieved for a prevalence of 10 % (dental trauma) and adding 20 % for losses and refusals and a design effect of 2.0. The sample was selected from 20 randomly chosen private and public schools, considering the number of children in each school and the proportion of public and private schools in the city. In each school selected, children aged between 8 and 12, enrolled in grades 2–6 of primary education, were invited to participate.

Data collection comprised: oral health examination of the children by trained dentists; self-applied questionnaire answered by parents; and interviews with children, using a questionnaire administered by eight adequately trained interviewers.

The outcome "never having had a dental appointment" was collected by the questions answered by parents "Have your child ever visited a dentist (1) No (2) Yes". Time since last consultation was also collected: "When was the last time your child visited the dentist? (1) Less than one year ago or (2) more than one year ago?"

The evaluated exposure variables were collected with children: sex; age (complete years) and self-perception about oral health. Socioeconomic information was obtained from parents, including parent's schooling in years, and family income in Brazilian reals, categorized in quartiles.

Dental fear was collected by question "Are you afraid of going to the dentist? (1) No (2) Yes". Family structure was considered nuclear when the child lived with married parents. Time of tooth-brushing starting was collected by the following question to the parents: "How old was the child when started brushing with toothpaste? With 2 years of age or less; More than 2 years?" The variable was categorized in 2 years of age or less and more than 2 years.

Self-perceived oral health was obtained by question "Compared to the children of your age, do you think your teeth and your mouth are: Excellent, Good, Fair or Poor?" and then categorized in excellent/good and fair/poor.

The presence of dental caries was assessed using WHO criteria (DMFT; Inter-examiner Weighted Kappa was 0.74 (0.62–0.79). The data were collected by ten trained dentists and calibrated. The agreement was measured against the standards of an associate professor with a PhD in Pediatric Dentistry and experience in epidemiological investigations. All examiners presented suitable agreement in the examination criteria. Data were double-typed in an EpiData database with automatic checks for consistency and range. Data analyses were carried out using the Stata 9.0 statistical software package. After applying descriptive statistics, the analytical statistics were performed using Poisson regression with robust variance in the crude and adjusted analysis, for the evaluation of possible associations between the independent variables and dental service use. All variables with a p value ≥ 0.25 were included in model fitting and retained in final model regardless their p value.

The Human Research Ethics Committee from Federal University of Pelotas (#160/2010) gave the approval for the study. Parents of all children signed an informed consent form. Children were referred to Dental School to receive treatment.

Results

A total of 1744 questionnaires were sent to parents through children, and 1325 were answered and returned by parents. However, 114 children were absent from the school during data collection. Thus, the final sample was 1211. Information on oral health services use was available for 1196 of these children. This sample size was great enough to detect with 80 % of power associations between groups considering the found prevalence of outcome (24 %), an exposed/non-exposed ratio of 1:1 and a prevalence ratio of 1.2. Table 1 shows demographic, socioeconomic, behavioral, and clinical characteristics of the sample. A total of 291 children (24.3 %; CI 95 % 22.0–26.9) had never had a dental appointment. By the time of data collection, 614 (68.2 %) children had visited a dentist in the last year and 287 (31.8 %) more than one year ago.

Table 1 Characteristics of the studied sample. Pelotas, Brazil, 2010 ($n = 1195$)

Variable	Categories	Total	
		n	%
Sex	Male	564	47.15
	Female	631	52.85
Age (years)	8	180	15.08
	9	309	25.88
	10	291	24.37
	11	253	21.19
	12	161	13.48
Family monthly income (quartiles)	1	245	23.67
	2	271	26.18
	3	240	23.19
	4	279	26.96
Maternal schooling	≥8 years	748	63.67
	<8 years	425	36.23
Type of school	Private	252	21.11
	Public	942	78.89
DMFT	≥1	810	67.90
	0	383	32.10
Dental fear	No	893	75.36
	Yes	292	24.64
Family structure	Nuclear	728	61.13
	Non-nuclear	463	38.87
Household crowding	0–4	735	61.71
	5	231	19.40
	≥6	225	18.89
Started tooth-brushing	2 years or less	416	35.62
	More than 2 years	752	64.38
Self-perceived oral health	Excellent–good	404	33.42
	Fair–poor	805	66.58

Table 2 shows the results of crude and adjusted analysis of associated factors for a child having never visited a dentist. In the crude analysis, the outcome was associated with lower family income, lower maternal schooling, household overcrowding, poor perception of oral health, enrollment in public school, presenting DMFT = 0, presence of dental fear and later starting of tooth-brushing. After adjustments, children with lower maternal schooling, those enrolled in public schools, those with DMFT = 0, those with dental fear, those living in more crowded households, and those initiating tooth-brushing in later ages were associated with the lack of use of dental service.

Discussion

This study showed that almost one-quarter of the schoolchildren from Pelotas had never visited a dentist. Socioeconomic, behavioral, and clinical variables were strongly associated with children's use of dental services (Telleen et al. 2012). The findings cause concerns, considering the age group included in the survey and the increased chance that oral diseases progress without any intervention, causing painful and/or irreversible damages to dentition. Poorer access to professional preventive care and poorer option-taking in the receipt of dental treatment are considered adverse exposures which increase risk of oral diseases (Thomson et al. 2010) and may reflect in the status of the dentition in their adult life. Irregular or infrequent users of dental services have more untreated caries and more carious teeth than regular users (Afonso-Souza et al. 2007). Also, poorer oral health in adulthood has been linked to systemic health problems (Sabbah et al. 2013).

Several studies have shown a positive relationship between income and maternal schooling with use of services (Atkins et al. 2012; Camargo et al. 2009; Peres et al. 2007). The crude analysis found association between these variables and the outcome. However, after adjustments, only maternal schooling remained associated, probably due to co-variation between the parameters. Our findings show that children from mothers with lower schooling use dental services 46 % less often than children from more educated mothers. Probably this relationship is because mothers with high level of education respond more quickly to the perceived need for treatment in children. While income reflects the ability to purchase services, maternal education leads to awareness, the understanding that to prevent further dental problems you need to consult a dentist (Camargo et al. 2009).

Type of school is a variable sensible to discriminate different oral health conditions (Piovesan et al. 2011a). In the present study, the differences according to type of school are wide. In private schools, nearly 96 % of the children had visited a dentist; in public schools, only 70 % had a dental appointment, meaning that after adjustments, the prevalence of nonuse of dental services was more than eight times higher in children from public schools. A study conducted in Mexico showed similar differences, with children from private schools having a 59 % higher chance of receiving preventive care (Medina-Solis et al. 2009). This could be because children with lower socioeconomic status generally study in public schools (Piovesan et al. 2011a), presenting lower conditions to access the services. An investigation into the oral health of schoolchildren receiving cash transfer scholarship from the Brazilian government, observed that children with fewer economic resources (recipients of cash transfer programs) were more likely to have disease and less likely to have access to the dental services (Oliveira et al. 2013).

Another socioeconomic indicator used in epidemiological studies was household crowding. Children living in homes with over six habitants had 55 % greater

Table 2 Description, crude and adjusted analysis of children who had never used dental services. Pelotas, Brazil, 2010 ($n = 291$)

Variable	Never visited a dentist		RP crude (95 % CI)	*P*	RP adjusted (95 % CI)	*P*
	n	%				
Sex						
Male	127	22.56	1.00		1.00	0.295
Female	164	25.99	1.15 (0.94-1.41)	0.169	1.12 (0.91–1.38)	
Age (years)						
8	48	26.67	1.00	0.151	1.00	0.092
9	79	25.57	0.96 (0.70-1.30)		0.94 (0.67–1.33)	
10	77	26.46	0.99 (0.73-1.35)		1.06 (0.76–1.47)	
11	49	19.37	0.73 (0.51-1.03)		0.78 (0.54–1.13)	
12	38	23.60	0.89 (0.61-1.28)		0.77 (0.51–1.56)	
Family monthly income (quartiles)						
4	20	8.16	1.00	<0.001	1.00	0.004
3	58	21.40	2.62 (1.63–4.23)		1.39 (0.85–2.29)	
2	77	32.08	3.93 (2.48–6.22)		1.76 (1.08–2.85)	
1	102	36.56	4.48 (2.86–7.00)		1.81 (1.12–2.93)	
Maternal schooling						
>8 years	127	16.98	1.00	≤0.001	1.00	0.001
≤8 years	159	37.41	2.20 (1.80–2.69)		1.46 (1.17–1.82)	
Type of school						
Private	10	3.97	1.00	≤0.001	1.00	≤0.001
Public	281	29.83	7.52 (4.06–13.91)		8.32 (3.10–22.32)	
DMFT						
≥1	75	19.58	1.00	0.23	1.00	≤0.001
0	215	26.54	1.35 (0.87–1.03)		1.70 (1.34–2.16)	
Dental fear						
No	176	19.71	1.00	≤0.01	1.00	≤0.01
Yes	114	39.04	1.98 (1.63–2.41)		1.62 (1.30–2.01)	
Family structure						
Nuclear	170	23.35	1.00	0.275		
Non-nuclear	121	26.13	1.12 (0.91–1.37)			
Household crowding						
0–4	141	19.18	1.00	≤0.01	1.00	0.003
5	53	22.94	1.20 (0.90–1.58)	0.34	1.03 (0.76–1.39)	
≥6	96	42.67	2.22 (1.80–2.75)	0.04	1.55 (1.23–1.97)	
Started brushing						
With eruption	62	14.90	1.00	≤0.01	1.00	0.047
With 2 years or more	217	28.86	1.94 (1.50–2.50)		1.30 (1.00–1.67)	
Self-perceived oral health						
Excellent–good	81	20.30	1.00	0.023	1.00	0.438
					0.91 (0.72-1.15)	
Fair–poor	208	26.39	1.30 (1.04–1.63)			

prevalence of nonuse of services than children in homes with fewer than four people. Family size may affect health outcomes in individuals and family members as a result of family lifestyle and also because, in larger families, getting material resources needed for the family may disrupt everyday health practices (Moeller et al. 2010).

The perception about oral health may be associated with clinical and socioeconomic conditions and may influence oral health decisions and healthcare use patterns (Wogelius and Poulsen 2005). This may suggest that lack of use of services affect a child's quality of life. Piovesan et al. also identified that children that had never visited dentists

classified their oral health as poor (Piovesan et al. 2011b). Nevertheless, a study showed that Spanish children and adolescents of lower socioeconomic status and reporting poorer health declared more visits to the dentist than their counterparts of higher socioeconomic status, but the social inequalities still affect the use of the specialist and the dentist (Palacio Vieira et al. 2013). In the present study, those children that considered their oral condition poor were the ones that had never visited a dentist, but this association lost statistical significance after adjusted analysis.

Children with dental anxiety or fear can inhibit their visits to the dentist or initiate behavioral problems, which negatively influence their oral health and well-being (Klingberg and Broberg 2007; Lee et al. 2008). Regular dental visits can reduce anxiety of parents and children in relation to dental treatment, helping normalize dental care as part of general health care (Hull et al. 2014). In the present study, those children who never visited a dentist reported dental fear in a higher frequency than children that visited; the prevalence of nonuse was 62 % higher in children who were afraid. Regular visits to the dentist might provide an optimal climate for the emotional processing of aversive events associated with invasive dental procedures and reduce the anxiogenic effects of a problematic dental visit (Thomson et al. 2010).

A higher proportion of children who had never had a dental visit were found among those that started brushing later. Baldani et al. (2011) demonstrated that children who never had a dental visit presented poor oral hygiene habits. Similarly, Medina-Solis et al. (2009) showed that children brushing their teeth more than once a day and starting oral hygiene at 2 years of age had a higher frequency of dental visits, especially for prevention. Owning a toothbrush was associated with use of dental services in another study (Noro et al. 2008). It may be connected to health behaviors in general but also to socioeconomic characteristics: compared to their peers, children living in deprived families are more likely to begin brushing later in life and less frequently and also attending the dentist only symptomatically (Eckersley and Blinkhorn 2001).

One of the main findings of this study is that, regardless of socioeconomic level, children with any caries experience are those that use more dental services. In a recent study conducted in the 2004 Pelotas birth cohort at the age five, it was identified that pain reported in the last 6 months and the high number of teeth affected by caries, independent of other factors, were associated with dental visits for specific problems (Camargo et al. 2012). Even though our study has not assessed the frequency or the reasons for dental visiting, it is believed that the identification of an objective problem may be a potential reason to look for dental care.

One of the limitations in our study is the cross-sectional design, which impairs evaluation of the causality between the outcome (nonuse of dental services) and the investigated variables. However, it is plausible to assume that dental fear leads to avoidance of oral health services, therefore these children do not receive prevention guidelines, starting tooth-brushing late. This leads to development of more caries lesions, and as a consequence the search for dental services to solve specific problems. The support for this assumption relies on the observation of pattern of dental visits throughout the life and adult oral health of a New Zealand birth cohort, where it was observed that individuals with regular use of dental services during life presented better oral health at adulthood, less tooth loss, and less dental caries (Thomson et al. 2010).

In our study, the reasons for dental visits were not assessed, but it is known that children from low-income families tend to receive episodic or emergency dental care, while those from higher-income households visit dentists more often for preventive checkups (Edelstein 2002). Also, barriers to access were not investigated. In recent years, the Brazilian National Health System (SUS) has undergone important extension, and access to oral health services has increased, minimizing disparities (Pucca et al. 2009). Nevertheless, inequalities persist, especially for children in preschool and school age, and barriers should be investigated to create new strategies to extend the access to public dental services.

As observed in our study, there is still a highly unassisted proportion of the schoolchildren population. Our results show that social and behavioral determinants affected the use of dental services. The promotion of regular dental visits in the population may help to improve use of oral health services, especially in poorer groups.

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