

# Use of dental services by schoolchildren in southern Brazil and associated factors: a population-based study

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## ABSTRACT

The aim of this cross-sectional study was to assess the prevalence of and factors associated with the use of dental services by 12-year-old schoolchildren in the municipality of Santa Cruz do Sul (RS), in southern Brazil, in an action combining teaching and service. Previously trained and calibrated investigators conducted the clinical examinations, and the schoolchildren answered a questionnaire on demographic, socioeconomic, and behavioral characteristics. Multilevel Poisson regression models were used to evaluate the association between the independent variables and dental service utilization. Data are presented as prevalence ratio (PR) and 95% confidence interval (95% CI). A total of 712 schoolchildren participated in the survey. Eighty percent of participants had used dental services in the past 12 months and 4.9% reported never having seen a dentist. Schoolchildren who lived in homes with greater family cohesion (PR 2.76; 95% CI 1.41-5.41) and who brushed their teeth less frequently (PR 2.61; 95% CI 1.30-5.22) visited the dentist less frequently, while school children with caries experience visited the dentist more often in the past 12 months (PR 0.45; 95% CI 0.23-0.87). It can be concluded that the use of dental services is related to socioeconomic, behavioral, and caries experience-related factors.

**Descriptors:** Public Health. Dental Caries. Dental Services. Epidemiology. Schoolchildren.

## 1 INTRODUCTION

Universal health systems aim to improve the quality of health of the population. In Brazil, the 1988 Constitution proposed a universal, comprehensive, and equitable system through the Unified Health System (SUS)<sup>1</sup>. In order to

reorganize Primary Health Care in the country, the Family Health Strategy (Estratégia de Saúde da Família - ESF) was introduced in 1994 to improve public health in Brazil<sup>2</sup>.

In 2000, the Ministry of Health decrees 1.444 and 267/2001 provided a financial

incentive to reorganize oral health care by including the dentist in the Family Health Program (PSF)<sup>3</sup>. Starting in 2004, the National Oral Health Policy – Smiling Brazil program – also contributed to improving access and quality of oral health care for Brazilians, demonstrating that it is possible to provide comprehensive and quality dental care in SUS<sup>4</sup>.

According to the Ministry of Health, children should be assisted from birth, with a focus on preventing oral changes<sup>4</sup>. Multidisciplinary prevention activities should also target pregnant women, parents, and caregivers<sup>2</sup>. In this sense, the Brazilian Association of Pediatric Dentistry (ABO) recommends that the first visit to the dentist should be at the age of six months, to provide preventive advice on breastfeeding, bottle feeding, nutritional habits and oral hygiene, and to point out the importance of regular consultations<sup>5</sup>.

In this context, access to quality services can improve the health conditions of the population and thus the quality of life of individuals, even if their needs vary in complexity<sup>6</sup>. However, there are few studies that simultaneously evaluate dental caries and health service utilization and their associations in the 12-year-old age group<sup>7-8</sup>. Therefore, the aim of this study was to assess the prevalence of dental service utilization by 12-year-old schoolchildren in the municipality of Santa Cruz do Sul (RS) and its associated factors through an action that integrates teaching and service.

## 2 METHODS

This cross-sectional population-based study was conducted in the municipality of Santa Cruz do Sul (RS), which had 118,374 inhabitants in 2010, of whom 1,788 were 12 years old. The population projection for 2018 was 129,427 inhabitants<sup>9</sup>.

This research is part of the "Epidemiological survey of schoolchildren aged 5 and 12 in the Municipality of Santa Cruz do Sul - RS", in which every three years, dentists of the Primary Care Network assess the oral health of schoolchildren. In the last survey, conducted in 2018, this action was supported by teachers and undergraduate dental students from the University of Santa Cruz do Sul (UNISC). The age of 12 years was chosen because of its importance for global dental caries surveillance, international comparisons, and monitoring of disease trends<sup>10</sup>. Oral health assessment is provided for in the School Health Program (PSE), developed by the Ministries of Health and Education and implemented by Presidential Decree No. 6286 of December 5, 2007, and is considered a priority measure for schoolchildren from an epidemiological point of view<sup>11</sup>.

All 12-year-old students who attended a public school (state or municipal) in the city of Santa Cruz do Sul (RS) in 2018 and had permission from their guardians were eligible to participate in the survey. Students who did not consented to participate, who were absent on the day of the oral assessment and application of the questionnaire (after two attempts), who transferred to another during the study period, and students with cognitive disabilities were excluded.

Data collection took place between October and December 2018, and data on demographic, socioeconomic, behavioral, and oral health perceptions were collected using self-administered questionnaires under the supervision of previously trained undergraduate students. The questions used in the questionnaire were similar to those recommended by the World Health Organization (WHO)<sup>12</sup> and SB Brazil<sup>10</sup>.

Contextual variables included school location (urban or rural) and the Index of Basic Education Development (IDEB). The portal of

the National Institute for Educational Studies and Research Anísio Teixeira (INEP)<sup>13</sup> reviewed the IDEB of the most recent year in which each school was assessed, recording whether or not the school met the target within the specified time period. For the analysis, the variable was dichotomized into within target/above target and outside target/below target.

The demographic variable was sex (female or male) and the socioeconomic variable was family agglomeration, assessed by the number of people living in the house and categorized as < 5 people or ≥ 5 people.

Behavioral variables included frequency of tooth brushing and utilization of dental services. Frequency of tooth brushing was assessed by the number of times adolescents brushed their teeth during the day and was categorized as ≥ 2 times a day and < 2 times a day. Dental service utilization, the outcome of the study, was assessed using the following question: "In the last 12 months, how often did you visit the dentist?", with possible response options: 1= never been to the dentist; 2= not been to the dentist in the last 12 months; 3= once; 4= twice; 5= three times; 6= four times; 7= more than four times. In the analysis, the use of dental services in the last 12 months was dichotomized into 0= used (options 3, 4, 5, 6, 7) and 1= did not use (options 1 and 2).

Self-perceived oral health variables included perceptions of health of teeth, gingiva, and gingival bleeding. Perceived health of teeth and gingiva was measured using the following questions: "How do you rate the health of your teeth?" and "How do you rate the health of your gingiva?" with response options 1=excellent; 2=very good; 3=good; 4=moderate; 5=poor; and 6=very poor. For analysis, responses were dichotomized into 1=excellent/good (options 1, 2, and 3) and 2=regular/bad (options 4, 5, and 6). Gingival bleeding was assessed by adolescents'

self-perception using the following question: "Have you noticed any gingival bleeding?" (1=no and 2=yes).

The clinical variables considered were dental caries and fluorosis. Dental caries was assessed using the WHO index CPO-D (number of decayed, missing and filled teeth)<sup>12</sup>. The presence (CPO-D > 1) or absence (CPO-D = 0) of caries experience was considered for the analysis. Fluorosis was assessed using the Dean Index. The presence (0) or absence (1) of fluorosis was considered in the analysis. Oral examinations were conducted in schools, with the examiner sitting in front of the child and using a WHO probe ("ball point") and a mouth mirror. All examiners were trained and calibrated for caries assessment. Six dentists from the city health network participated in the training and calibration for the clinical variables, as well as a UNISC teacher who conducted the activities and acted as the standard examiner. The inter-examiner kappa coefficient obtained during calibration ranged from 0.81 to 0.90 and the intra-examiner coefficient ranged from 0.86 to 0.94.

The project was approved by the UNISC Ethics and Research Committee (CAAE 98420918.0.0000.5343) in compliance with ethical regulations. Only students who gave informed consent and whose parents or guardians agreed to participate answered the questionnaire and were evaluated.

Data analysis was conducted using STATA 14 (StataCorp. 2014. Stata Statistical Software: 14.1. College Station, Texas, USA). A descriptive analysis of the demographic, socioeconomic, behavioral, and oral health characteristics of the students was performed. Utilization of dental services in the past 12 months was considered as the endpoint of the study (0=used and 1=not used). In addition, the prevalence of service utilization was checked

according to the characteristics of the sample.

Multilevel Poisson regression models were used to assess the influence of different sample characteristics on dental service utilization in the past 12 months. The multilevel analysis structure considered students (level 1) nested within the 38 schools (level 2). Unadjusted multilevel analysis was conducted to examine the association between different variables and utilization of dental services. Variables with a p-value < 0.20 in the unadjusted analysis were considered for the adjusted analysis. The multilevel model used a fixed effects and random intercept scheme. Quality of fit was measured using the deviance (-2 likelihood). Results are presented as prevalence ratio (PR) and 95% confidence interval (95% CI).

### 3 RESULTS

A total of 712 students from 38 schools participated in the study (figure 1). The characteristics of the sample are described in table 1. The results showed that 84.1% of the

children attended schools in urban areas of the city, while 15.9% attended schools in rural areas. In terms of IDEB, 36.3% of the children attended a public school that met the proposed target, and 63.7% attended a school that was below the IDEB target. In terms of gender, 49.2% of the students were female and 50.8% were male. Most students (87.6%) lived in houses with less than 5 people. Regarding oral hygiene, most (88.8%) brushed their teeth twice or more a day.

In relation to self-perception of oral health, the majority rated the health of teeth (73.2%) and gingiva (80.3%) as excellent or good, and 50.4% had not experienced bleeding gingiva in the past six months. On clinical assessment, 62.5% of the children had CPO-D of zero, i.e., free from caries experience, and 93.7% had no fluorosis. The prevalence of students who had visited a dentist in the last 12 months was 80.4% and 4.9% of them had never used the dental service. The results showed that 77.4% of the children with CPO-D of zero had used dental services in the last 12 months.

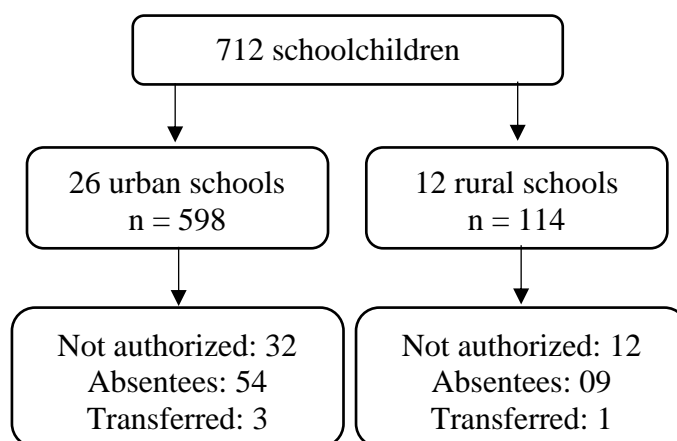


Figure 1. Flowchart of participant selection.

Table 1. Sample characteristics according to the independent variables (n=712).

Variables	n	%
<i>Contextual variables (school)</i>		
School location		
Urban	598	84.1
Rural	114	15.9
School IDEB		
On target/above target	198	36.3
Off target/below target	347	63.7
<i>Demographic and socioeconomic variables</i>		
Sex		
Female	350	49.2
Male	362	50.8
N° of people in the house		
<5 people	530	87.6
≥5 people	75	12.4
<i>Behavioral and self-reported variables</i>		
Tooth-brushing frequency		
≥2 times /day	539	88.8
<2 times /day	68	11.2
Perception of teeth health		
Excellent/Good	420	73.2
Regular/Bad	154	26.8
Perception of gingiva health		
Excellent/Good	449	80.3
Regular/Bad	110	19.7
Perception of bleeding		
No	287	50.4
Yes	282	49.6
<i>Clinical Variables</i>		
Caries		
CPO-D = 0	410	62.5
CPO-D ≥ 1	246	37.5
Presence of fluorosis		
No	606	93.7
Yes	41	6.3

Values lower than 712 due to missing data. IDEB, Basic Education Development Index. CPO-D, number of decayed, missing, and filled teeth.

Number of people living in the home, frequency of tooth brushing, perception of gingiva health and bleeding, and dental caries were associated ( $p < 0.05$ ) with visits to the dentist in the

past 12 months. Data on IDEB, school location (urban or rural), sex, and perception of dental health showed no significant association with visit to the dentist in the past 12 months (table 2).

Table 2. Frequency of dental service use in the past 12 months.

Variables	Service Usage			p
		≥1 in the past 12 months	< 1 in the past 12 months	
	Total	N (%)	n (%)	
<i>Contextual variables (school)</i>				
School Location				0.196
Urban	402	319 (79.3)	83 (20.7)	
Rural	83	71 (85.5)	12 (14.5)	
School IDEB				0.106
On target/above target	141	121 (85.8)	20 (14.2)	
Off target/below target	235	186 (79.1)	49 (20.9)	
<i>Demographic and Socioeconomic Variables</i>				
Sex				0.336
Female	244	192 (78.7)	52 (21.3)	
Male	241	198 (82.2)	43 (17.8)	
Nº of people in the house				0.010
<5 people	423	347 (82.0)	76 (18.0)	
≥5 people	59	40 (67.8)	19 (32.2)	
<i>Behavioral and self-reported variables</i>				
Tooth-brushing frequency				0.000
≥2 times /day	433	359 (82.9)	74 (17.1)	
<2 times /day	51	30 (58.8)	21 (41.2)	
Perception of teeth health				0.070
Excellent/Good	346	289 (83.5)	57 (16.5)	
Regular/Bad	112	85 (75.9)	27 (24.1)	
Perception of gingiva health				0.005
Excellent/Good	357	300 (84.0)	57 (16.0)	
Regular/Bad	90	64 (71.1)	26 (28.9)	
Perception of bleeding				0.001
No	223	194 (87.0)	29 (13.0)	
Yes	237	178 (75.1)	59 (24.9)	
<i>Clinical Variables</i>				
Caries				0.021
CPO-D = 0	270	209 (77.4)	61 (22.6)	
CPO-D ≥ 1	168	145 (86.3)	23 (13.7)	
Presence of fluorosis				0.132
No	398	317 (79.6)	81 (20.4)	
Yes	32	29 (90.6)	3 (9.4)	

IDEB. Basic Education Development Index. CPO-D: number of decayed, missing, and filled teeth.

Table 3 shows the unadjusted and adjusted analysis of predictor variables for the prevalence of dental service utilization in the past 12 months. The prevalence of use of dental

services in the past 12 months was lower among children who lived in homes with greater family crowding (PR 2.76; 95% CI 1.41-5.41) and who brushed their teeth less (PR

2.61; 95% CI 1.30-5.22). On the other hand, children with caries experience (CPO-D > 1) used dental services more frequently (PR 0.45; 95% CI 0.23-0.87).

Table 3. Adjusted and unadjusted analysis of predictor variables in the prevalence of use of dental services in the past 12 months, determined through the multilevel Poisson Regression analysis.

Variables	Not Adjusted PR (CI 95%)	Adjusted PR (CI 95%)
<i>Contextual variables (school)</i>		
School location		-
Urban	1.0	
Rural	0.70 (0.38-1.28)	
School IDEB		
On target/above target	1.0	1.0
Off target/below target	1.47 (0.87-2.47)	1.33 (0.70-2.50)
<i>Demographic and Socioeconomic Variables</i>		
Sex		-
Female	1.0	
Male	0.83 (0.55-1.25)	
Nº of people in the house		
<5 people	1.0	1.0
≥5 people	1.79 (1.08-2.96)	2.76 (1.41-5.41) *
<i>Behavioral and self-reported variables</i>		
Tooth-brushing frequency		
≥2 times /day	1.0	1.0
<2 times /day	2.40 (1.48-3.91)	2.61 (1.30-5.22) *
Perception of teeth health		
Excellent/Good	1.0	1.0
Regular/Bad	1.46 (0.92-2.31)	1.18 (0.61-2.29)
Perception of gingiva health		
Excellent/Good	1.0	1.0
Regular/Bad	1.80 (1.13-2.87)	1.51 (0.72-3.15)
Perception of bleeding		
No	1.0	1.0
Yes	1.91 (1.22-2.98)	1.21 (0.68-2.15)
<i>Clinical Variables</i>		
Caries		
CPO-D = 0	1.0	1.0
CPO-D ≥ 1	0.60 (0.37-0.98)	0.45 (0.23-0.87) *
Presence of fluorosis		
No	1.0	1.0
Yes	0.46 (0.14-1.47)	0.18 (0.02-1.34)

\*p<0.05; PR: prevalence ratio; CI: confidence interval; IDEB: Basic Education Development Index; CPO-D: number of decayed, missing and filled teeth.



#### 4 DISCUSSION

In the present study, a high prevalence of dental service utilization in the last year by 12-year-old schoolchildren was found. Moreover, the results showed an association between utilization of dental services and socioeconomic, behavioral, and clinical variables. Schoolchildren who lived in households with fewer than five people, who brushed their teeth at least twice daily, and who had previous caries experience were more likely to use dental services.

The results of this research showed that 80.4% of the students had visited a dentist in the past 12 months, with no significant difference between girls and boys. Other studies showed lower prevalence, such as Teixeira *et al.* (2018)<sup>14</sup> and da Silva *et al.* (2018)<sup>15</sup>, in which 40.50% and 65%, respectively, had visited a dentist in the last year. Compared with our rate of children that never visited a dentist (4.9%), higher results were found in the studies of Cypriano *et al.* (2011)<sup>16</sup> and da Costa *et al.* (2015)<sup>17</sup>, in which 12% and 24.3%, respectively, have never visited a dentist. According to data from the last National Survey on Oral Health - SB Brazil 2010 - about 18% of 12-year-olds in Brazil have never visited a dentist, with a slightly better situation in the Southern region, with a prevalence of 9.8% of adolescents who have never visited a dentist<sup>10</sup>. The prevalence obtained in this study show that the mean prevalence of non-use of dental services by schoolchildren in the city of Santa Cruz do Sul (RS) is lower than the mean value obtained for the South region in the last SB Brazil, indicating that the search for services by the population in question has improved. The National Oral Health Policy - Smiling Brazil - can be considered a decisive factor in expanding access to oral health services, as it has progressively increased coverage in primary care<sup>18</sup>.

Assessment of family agglomeration showed that children living in homes with five or more people were two times less likely to use dental services than children living in homes with fewer than five people, which is consistent with other studies<sup>14,17</sup>. Family size can be considered a risk factor because it implies basic health care and is associated with oral problems and school performance<sup>14,19</sup>. For Andersen and Newman (2005)<sup>20</sup>, social structure, which also includes family size and reflects the social status of individuals, is considered a predisposing factor for the use of services, as it can be seen as a proxy for socioeconomic status. It is believed that these results are also due to family size and lifestyle. The more members, the more responsibility and attention to the individual is shared, which may affect health care.

Improving oral health status is done through prevention, especially good tooth brushing habits and regular visits to dental services<sup>21</sup>. Menegaz *et al.* (2018)<sup>22</sup> observed an improvement in the use of dental services through interventions that linked strategies to facilitate access to the dentist, demonstrating the importance of these interventions for individuals. Perception of oral health status is an important health indicator as it summarizes objective and subjective health status, values, and cultural expectations, and positive self-perception of oral health is a factor associated with greater utilization of services<sup>8,23,24</sup>. The habit of brushing teeth depends on internal factors such as self-esteem and self-care<sup>25</sup>, which is consistent with the results of this study, in which students who reported better oral hygiene habits with more frequent daily brushing used services more frequently.

Another factor associated with higher frequency of dental service utilization is caries experience. The results of this study confirm the literature<sup>16,26,27</sup> and suggest that the possibility of



visiting a dentist in the last 12 months is greater among those with advanced caries<sup>14,28</sup>. Fear and anxiety about the procedures may be factors that lead adolescents to use dental services less often<sup>29</sup>, which leads to the inability to accurately determine whether the services really help to solve oral diseases. On the other hand, some studies show that the main reason for visiting a dentist is often prevention and check-up<sup>30</sup>, as in the study by Davoglio *et al.* (2009)<sup>25</sup> in which 45% of the study population used dental services for prevention.

Limitations of this study include the cross-sectional design, which made it impossible to establish a temporal relationship between the outcome and the independent variables. In addition, as the questionnaire was administered only to schoolchildren, no information was collected on other socioeconomic conditions such as family income and parental education, making it impossible to assess the impact of these social determinants on children's use of services.

The strengths of this study were the number of students involved and the fact that it was a population-based study that included students from all neighborhoods in the urban and rural areas of the city. Epidemiological surveys are essential for planning health care interventions and policies<sup>1,31</sup>, and population-based studies covering the age covered in this study can contribute to planning strategies aimed at improving the utilization of dental services. Adolescence is a period of high caries activity for many individuals, due to the immaturity of the enamel surfaces of permanent teeth exposed to cariogenic challenges and greater health care independence, particularly when oral hygiene is given a low priority<sup>28</sup>. In addition, we highlight the importance of the integration of teaching and service in this study, as it qualified data collection by relying on professors' support in the process of calibration and training for oral

examinations, while contributing to professional development by involving students in the supervision of the different phases of the epidemiological survey. Involving undergraduate students in a priority action from an epidemiological perspective meets one of the requirements of the National Curriculum Guidelines of the undergraduate Dentistry course, i.e., the situational diagnosis of the epidemiological profile of oral health conditions, and also enables the expansion of knowledge of health determinants<sup>32</sup>.

## 5 CONCLUSION

The prevalence of dental service utilization was higher than in other studies and was associated with socioeconomic and behavioral factors, such as lower family crowding and appropriate oral hygiene habits, as well as clinical conditions, such as caries experience. These results suggest approaches that promote the use of oral health services for preventive appointments to overcome a health care model focused on curative practices and that encourage utilization by adolescents in vulnerable situations. More frequent dental appointments may contribute to appropriate oral hygiene habits and consequently improve oral health conditions in adolescence, with positive implications for adult life.

## RESUMO

### **Uso de serviços odontológicos por escolares do sul do Brasil e fatores associados: estudo de base populacional**

Este estudo transversal teve por objetivo avaliar a prevalência e os fatores associados ao uso de serviços odontológicos pelos escolares de 12 anos no município de Santa Cruz do Sul (RS), sul do Brasil, por meio de uma ação que integrou ensino e serviço. Examinadores previamente treinados e calibrados realizaram os exames clínicos e um questionário referente às

características demográficas, socioeconômicas e comportamentais foi respondido pelos escolares. Modelos em multinível de regressão de Poisson foram utilizados para avaliar a associação entre as variáveis independentes e o uso dos serviços odontológicos. Os dados são apresentados como razão de prevalência (RP) e intervalo de confiança de 95% (95% IC). Participaram da pesquisa 712 escolares. A prevalência de uso dos serviços nos últimos 12 meses foi de 80,4%, e 4,9% dos indivíduos relataram nunca terem consultado um dentista. Escolares que moravam em casas com maior aglomeração familiar (RP 2,76; IC95% 1,41-5,41) e que escovavam seus dentes com menor frequência (RP 2,61; IC95% 1,30-5,22) foram menos ao dentista, enquanto os escolares com experiência de cárie foram mais ao dentista nos últimos 12 meses (RP 0,45; IC 95% 0,23-0,87). Pode-se concluir que o uso de serviços odontológicos está associado a fatores socioeconômicos, comportamentais e relacionados à experiência de cárie.

**Descritores:** Saúde Pública. Cárie Dentária. Serviços Odontológicos. Epidemiologia. Estudantes.

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