

Use of dental services and associated factors among elderly in southern Brazil

Utilização dos serviços odontológicos e fatores associados em idosos do Sul do Brasil

Abstract

Objective: To analyze the use of dental services and associated factors among elderly treated at Family Health Units in southern Brazil. **Methods:** This cross-sectional study evaluated 438 elderly attending Family Health Units in Pelotas, southern Brazil. Data were collected using a standardized questionnaire covering demographic and socioeconomic variables, in addition to information on time elapsed since their last dental visit. Explanatory variables were classified according to Andersen and Davidson's model. Clinical variables were obtained by a trained dentist. Multivariable Poisson regression models with robust variance were used to identify factors associated with the outcome. **Results:** The prevalence of use of dental services in the last 3 years was 41.1% (95%CI 36.5 - 45.7). Multivariable analysis revealed that the probability of not using dental services was higher among individuals who self-assessed their general health as poor or very poor (Prevalence Ratio [PR] = 1.36; 95%CI 1.05 - 1.78), with less than 8 years of education (< 4 years: PR = 1.43; 95%CI 1.01 - 2.02; 4 to 7 years: PR = 1.43; 95%CI 1.00 - 2.04), users of alcohol (PR = 1.31; 95%CI 1.08 - 1.59), and those with no teeth (PR = 1.73; 95%CI 1.29 - 2.32). **Conclusions:** The low prevalence of use of dental services among elderly attending Family Health Units in Pelotas, especially among those with poor self-assessed general health, lower education level, and without teeth, indicate the need for public policies to improve social indicators and general health.

Keywords: Elderly. Oral health. Dental care. Epidemiology. Cross-sectional studies. Family Health.

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Conflict of interests: nothing to declare.

Resumo

Objetivo: Analisar o uso de serviços odontológicos e fatores associados entre idosos atendidos em Unidades de Saúde da Família no sul do Brasil. **Métodos:** Este estudo transversal avaliou 438 idosos que frequentam unidades de saúde da família em Pelotas, sul do Brasil. Os dados foram coletados por meio de um questionário padronizado sobre aspectos demográficos e socioeconômicos, além de informações sobre o tempo decorrido desde a sua última visita ao dentista. As variáveis explicativas foram classificadas de acordo com modelo de Andersen e Davidson. As variáveis clínicas foram obtidas por um dentista treinado. Regressão de Poisson com variância robusta foi usada para identificar fatores associados com o desfecho. **Resultados:** A prevalência do uso dos serviços odontológicos há menos de três anos foi de 41,1% (IC95% 36,5 - 45,7). Análise multivariável demonstrou que a probabilidade de não ter usado serviços odontológicos foi maior em indivíduos que autopercebiam a saúde geral como ruim ou muito ruim (Razão de Prevalências [RP] = 1,36; IC95% 1,05 - 1,78), tinham menos de 8 anos de escolaridade (< 4 anos: RP = 1,43; IC95% 1,01 - 2,02; 4 a 7 anos: RP = 1,43; IC95% 1,00 - 2,04), fizeram uso de álcool (RP = 1,31; IC95% 1,08 - 1,59) e não apresentavam dentes (RP = 1,73; IC95% 1,29 - 2,32). **Conclusões:** A baixa prevalência de uso de serviços odontológicos entre idosos que frequentam Unidades de Saúde da Família de Pelotas, especialmente entre aqueles com autopercepção da saúde geral pobre, baixo nível de escolaridade e sem dentes, indica a necessidade de políticas públicas para melhorar os indicadores sociais e gerais de saúde.

Palavras-chave: Idoso. Saúde bucal. Assistência odontológica. Epidemiologia. Estudos Transversais. Saúde da família.

Introduction

Health services in Brazil have not appropriately met the needs of the elderly population¹. Specifically in the field of oral health, attention and assistance to the elderly require specialized and expensive treatments for oral health rehabilitation, especially considering the high rates of edentulism in this age range². The last national oral health survey conducted in Brazil (SB Brasil 2010) found that 30.4% of the participants aged 65 - 74 years had visited the dentist in the past year and 59.4% had been treated in the private sector; tooth extraction was the second most frequent treatment, and only 7.3% of the elderly did not require any type of dental prosthesis³.

An increased access to health care services, represented by the relationship between number of users and number of health system facilities, is paramount to improve oral health indicators⁴. The use of dental services is a right of Brazilian citizens. Dental care should aim to relieve pain and suffering and also to restore the individuals' oral health⁵. Appropriate, regular use of dental services at all ages is known to contribute to the prevention and treatment of major oral health problems⁶.

Studies have used the model proposed by Andersen and Davidson⁷ to assess determinant factors of the use of oral health services. According to that model, access to and use of health care services require the combination of several factors: external environmental factors (general health factors); individual characteristics, divided into predisposing factors (sociocultural characteristics), availability factors, or factors that facilitate the use of services (income, health insurance, regular access to health services), and factors related to need for treatment (self-assessment about the need for dental treatment); factors related to the oral health care system (oral health policies and resources); personal practices (oral hygiene and poor oral health behaviors); and both clinically evaluated oral health status and self-assessed oral health.

Few studies have investigated oral health data in elderly populations served by

public Family Health Units of the Brazilian Unified Health System, whose health care services excel in multidisciplinary work, comprehensive care, and improved health indicators. Therefore, the present study was conducted to estimate the prevalence of use of dental services among elderly treated at Family Health Units in the urban area of Pelotas, southern Brazil, as well as to investigate factors associated with the outcome according to the model proposed by Andersen and Davidson⁷.

Methodology

Study Design and Participants

This cross-sectional study included all Family Health Units located in the urban area of Pelotas, state of Rio Grande do Sul, southern Brazil. The municipality has a population

of 327,778 inhabitants⁸, and approximately 37,715 are aged 60 years or more.

The study was conducted between May 2009 and September 2010. Participants included individuals aged 60 years or older, randomly selected from a list of 3,744 eligible elderly enrolled in 23 Family Health Units. Inclusion criteria were being independent, being able to perform activities of daily living (bathing, feeding, etc.) without assistance of a relative or caregiver, walking without assistance, and having cognitive conditions to answer the questionnaire.

Sample

The following parameters were considered during sample size calculation: $\alpha = 5\%$, 80% power, a prevalence of less frequent use of dental services of 68% in the unexposed group (individuals with natural teeth)⁹, a prevalence

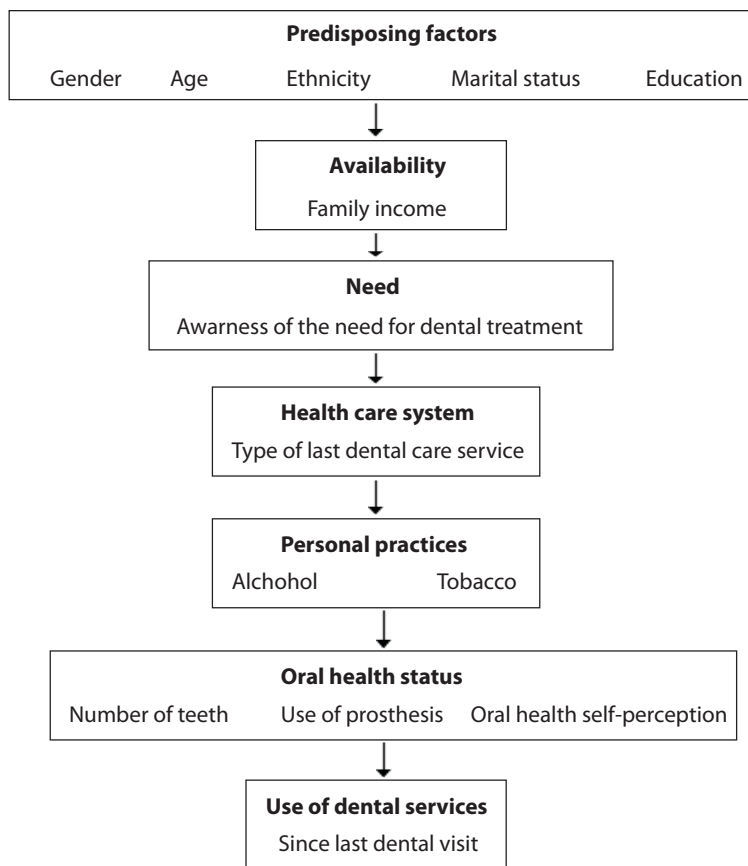


Figure 1 - Hierarchical model for determination of the use of dental services (adapted from Andersen and Davidson), 2010.
Figura 1 - Modelo hierárquico de determinação da utilização dos serviços odontológicos (adaptado do modelo de Andersen e Davidson), 2010.

ratio of 1.2 in the exposed group (edentulous patients) and a 1:1 ratio of exposed to unexposed, requiring a minimum sample size of 346 individuals. This number was increased by 25% for multivariate analysis, resulting in a sample size of 432 individuals. Moreover, we estimated that 10% of the individuals would not present all inclusion criteria and that we would have a 30% loss rate (including refusals). As a result, the names of 700 elderly were drawn.

Sampling was performed using the stratified simple random method and a table of random numbers. The number of individuals selected at each Family Health Unit was proportional to the number of people aged 60 years or older and to the number of men and women served by the unit.

Data Collection

A standardized questionnaire was used to obtain demographic and socioeconomic variables and data related to the use of dental services (self-assessed need for treatment and self-assessed oral health). This data collection tool has closed-ended questions that have demonstrated satisfactory reliability in previous studies of good methodological quality¹⁰⁻¹⁴. The questionnaire was tested in a pilot study conducted at a health care facility, with elderly that were not selected for the sample, in order to assess whether all elders would understand the terms and questions contained in the instrument, as well as to train the research team. Following implementation of changes resulting from instrument application in the pilot study, interviews were conducted at the participants' homes by trained interviewers. Questionnaire application was repeated via phone calls in 10% of the population sampled to assess instrument reproducibility and participant satisfaction, and also to identify potential mistakes made by the interviewers. The elderly were invited for an appointment at the Family Health Unit to assess the number of natural teeth and the need for a dental prosthesis. Physical examination was conducted by a dentist with theoretical and practical training using personal

protective equipment (gloves, mask, hat, and apron), tweezers, and a CPI periodontal probe, with participants sitting, under natural light. The World Health Organization criteria for epidemiological surveys on oral health¹⁵ were used to determine the need of prosthesis.

Outcome: Last Dental Visit

The outcome variable was defined by the time elapsed since the participant's last dental visit, obtained with the following question: "How many months ago did you last visit the dentist?" For purposes of analysis, this variable was categorized as having last visited the dentist in the previous three years or more than three years.

Explanatory Variables

Variables were classified according to the model proposed by Andersen and Davidson⁷ as follows: 1) external environmental factors: depression (yes or no), chronic disease (yes or no), self-perceived general health (very good, good and proper, or very poor and poor); individual characteristics: 2) predisposing factors: gender (male or female), age (60 to 69, 70 to 79, or 80 years or older), marital status (single, married or living with a partner/spouse, divorced or widowed; subsequently classified as without partner or with partner), self-reported ethnicity according to the classification of the Brazilian Institute of Geography and Statistics (IBGE) (white, yellow, brown, indigenous, or not declared; subsequently classified as white or non-white), years of education (< 4, 4 - 7, or ≥ 8); 3) availability variables: family income, collected in Brazilian currency (BRL) and then divided by the reference minimum wage in Brazil (later categorized in <1.0, 1.0 to 1.5, or 1.5 or more minimum wages per capita); 4) need: awareness of the need for dental treatment (yes or no); 5) health care system: type of service last used (public or private); 6) personal practices: tobacco consumption (yes, no, or former smoker) and alcohol consumption, regardless of the amount of alcohol consumed (yes, no, or

former user); and 7) oral health status: number of natural teeth in the oral cavity (no teeth, 1-9 teeth, or 10 teeth or more), use of any type of prosthesis (yes or no), and self-assessed oral health compared to other people in the same age group (very good, good, adequate, or very poor and poor).

Depressive symptoms were assessed using the Geriatric Depression Scale (GDS), comprised of 15 questions, validated for use in Brazil by Almeida and Almeida in 1999¹¹. Individuals scoring 5 or higher were considered to have symptoms of depression according to the criteria of the International Classification of Diseases, 10th edition (ICD-10)¹⁶.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 16.0 (SPSS Inc., Chicago, Ill). First, a descriptive analysis was performed, and results were expressed as relative and absolute frequencies. Subsequently, a bivariate analysis was performed using Pearson's χ^2 test and the trend test to check for associated factors. Finally, non-adjusted and adjusted Poisson regression models with robust variance were used.

All variables showing $p < 0.20$ in the bivariate analysis were considered potential confounders and therefore included in the multivariate analysis for the calculation of Prevalence Ratios (PR) and 95% Confidence Intervals (95%CI). A hierarchical approach, based on the theoretical model of Andersen and Davidson⁷, was used in the analysis (Figure 1). External environmental variables were considered in the first (most distal) level of the model. Predisposing variables were included in the second (intermediate) level, availability variables in the third, and need variables in the fourth level. Health care system variables were included in the fifth level, personal practices in the sixth, and oral status variables in the most proximal level. Variables were adjusted for the same level and levels above. Variables showing $p < 0.05$ in at least one category were included in the final model.

Collinearity analysis for independent variables was performed using the variance

inflation factor (VIF). Values near or above 10 were considered to indicate strong collinearity. The following adjustment measures were calculated to assess the quality of the final model: adjusted and unadjusted pseudo R-squared, Akaike information criterion (AIC), and mean square error (MSE).

Ethical Aspects

Authors declared no conflicts of interest. The project was approved by the Research Ethics Committee of Universidade Luterana do Brasil (protocol no. 2009-193H). Informed consent forms were signed by all participants before their inclusion in the study.

Results

Overall response rate was 70% (489/700). The main reasons for losses were refusal to participate ($n = 111$; 16%) and change of address ($n = 84$; 12%). No differences were found between the selected individuals and the source population regarding gender ($p = 0.130$) or age ($p = 0.109$). In 51 of 489 individuals, dependence status or cognitive conditions prevented inclusion in the study. As a result, the final study sample comprised 438 elderly, predominantly women (68.3%), aged 60 – 69 years (57.4%), Caucasian (71.2%), with a family income of 0 to 1.5 minimum wages per capita (59.6%), 4 to 7 years of education (54.1%), without depressive symptoms (71.0%), with no natural teeth (51.2%), and using prosthesis (84.7%).

The prevalence of use of dental services during the previous three years was 41.1% (95%CI 36.5 – 45.7). Variables associated with last dental visit in the previous three years, according to the χ^2 test, were self-assessed general health ($p = 0.019$), level of education ($p = 0.035$), minimum wages per capita ($p = 0.042$), and number of teeth ($p < 0.001$). Other variables included in the multivariate model were depressive symptoms, alcohol consumption, type of service last used, and marital status (all $p < 0.20$) (Table 1). The unadjusted model showed that a poor or very poor self-assessed general health (PR = 1.36; 95%CI

Table 1 - Sample characteristics, bivariate analysis (χ^2 test) and Poisson regression results (crude prevalence ratio, crude PR) for variables associated with use of dental services > 3 years among elderly enrolled in Family Health Units of Pelotas, RS, 2010.

Tabella 1 - Descrição da amostra, da análise bivariada (teste χ^2) e da regressão de Poisson (Razão de Prevalência Bruta) das características associadas ao uso de serviços odontológicos de idosos há mais de 3 anos pertencentes às unidades Saúde da Família da área urbana de Pelotas - RS, Pelotas - RS, 2010.

Variables (n)	n (%)	Use of dental services		Use of dental services > 3 years	
		≤ 3 years before	> 3 years before	Crude PR (95%CI)	p-value***
External environment					
Depressive symptoms (n = 438)		p = 0.124*			
No	311 (71.0)	135 (43.4)	176 (56.6)	1.0	0.110
Yes	127 (29.0)	45 (35.4)	82 (64.6)	1.14 (0.97 – 1.34)	
Chronic disease (n = 436)		p = 0.648*			
No	97 (22.2)	42 (43.3)	55 (56.7)	1.0	0.654
Yes	339 (77.8)	138 (40.7)	201 (59.3)	1.05 (0.86 – 1.27)	
General health self-assessment (n = 438)		p = 0.019*			
Very good	61 (13.9)	26 (42.6)	35 (57.4)	1.0	0.001
Good and proper	331 (75.6)	144 (43.5)	187 (56.5)	0.98 (0.78 – 1.25)	
Very poor and poor	46 (10.5)	10 (21.7)	36 (78.3)	1.36 (1.05 – 1.78)	
Predisposing					
Gender (n = 438)		p = 0.695*			
Female	299 (68.3)	121 (40.1)	178 (59.9)	1.0	0.698
Male	139 (31.7)	59 (42.4)	80 (57.6)	0.97 (0.81 – 1.15)	
Age (n = 437)		p = 0.429**			
60 – 69	251 (57.4)	110 (43.8)	141 (56.2)	1.0	0.424
70 – 79	138 (31.6)	52 (37.7)	86 (62.3)	1.11 (0.94 – 1.31)	
≥ 80	48 (11.0)	18 (37.5)	30 (62.5)	1.11 (0.87 – 1.42)	
Marital status (n = 437)		p = 0.132*			
With partner	230 (52.6)	87 (37.8)	143 (62.2)	1.0	0.135
Without partner	207 (47.4)	93 (44.9)	114 (55.1)	0.89 (0.76 – 1.04)	
Ethnicity (n = 438)		p = 0.417*			
White	312 (71.2)	132 (42.2)	180 (57.8)	1.0	0.408
Non-white	126 (28.8)	48 (38.7)	78 (61.3)	1.07 (0.91 – 1.27)	
Education (years) (n = 438)		p = 0.035**			
< 4	153 (34.9)	61 (40.0)	92 (60.0)	1.44 (1.01 – 2.07)	0.090
4 – 7	237 (54.1)	91 (38.4)	146 (61.6)	1.48 (1.04 – 2.10)	
≥ 8	48 (11.0)	28 (58.3)	20 (41.7)	1.0	
Availability					
Family income (minimum wages) per capita (n = 438)		p = 0.042**			
< 1	78 (17.9)	29 (37.2)	49 (62.8)	1.0	0.074
1 – 1.5	260 (59.6)	99 (38.1)	161 (61.9)	0.99 (0.81 – 1.20)	
> 1.5	98 (22.5)	51 (52.0)	47 (48.0)	0.76 (0.58 – 0.99)	

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Table 1 - Continuation.

Tabela 1 - Continuação.

Variables	n (%)	Use of dental services		Use of dental services > 3 years	
		≤ 3 years before	> 3 years before	Crude PR (95%CI)	p-value***
Need					
Awareness of the need for dental treatment (n = 438)					
p = 0.278*					
No	218 (49.80)	84 (38.5)	134 (61.5)	1.0	0.279
Yes	220 (50.20)	96 (43.6)	124 (56.4)	0.92 (0.78 – 1.07)	
Health care system					
Type of last dental service used (n = 433)					
p = 0.072*					
Public	188 (43.4)	69 (36.7)	119 (63.3)	1.0	0.070
Private	245 (56.6)	111 (45.3)	134 (54.7)	0.86 (0.74 – 1.01)	
Personal practices					
Tobacco consumption (n = 438)					
p = 0.806*					
No	294 (67.1)	124 (42.2)	170 (57.8)	1.0	0.801
Former smoker	85 (19.4)	33 (38.8)	52 (61.2)	1.06 (0.87 – 1.29)	
Yes	59 (13.5)	23 (39.0)	36 (61.0)	1.06 (0.84 – 1.32)	
Alcohol consumption (n = 438)					
p = 0.056*					
No	351 (80.1)	150 (42.7)	201 (57.3)	1.0	0.001
Former consumer	39 (8.9)	9 (23.1)	30 (76.9)	1.34 (1.11 – 1.63)	
Yes	48 (11.0)	21 (43.7)	27 (56.3)	0.98 (0.75 – 1.28)	
Oral health status					
Number of teeth (n = 438)					
p = 0.000*					
No teeth	224 (51.2)	70 (31.3)	154 (68.7)	1.66 (1.22 – 2.24)	0.000
1–9 teeth	149 (34.0)	72 (48.3)	77 (51.3)	1.24 (0.90 – .73)	
10 teeth or more	65 (14.8)	38 (58.5)	27 (41.5)	1.0	
Use of prosthesis (n = 438)					
p = 0.693*					
Yes	371 (84.7)	151 (40.7)	220 (59.3)	1.0	0.700
No	67 (15.3)	29 (43.3)	38 (56.7)	0.96 (0.76 – 1.20)	
Oral health self-perception (n = 438)					
p = 0.241*					
Very good	68 (15.5)	31 (45.6)	37 (54.4)	1.0	0.177
Good/adequate	321 (73.3)	134 (41.7)	187 (58.3)	1.07 (0.84 – 1.36)	
Very poor/poor	49 (11.2)	15 (30.6)	34 (69.4)	1.28 (0.96 – 1.70)	

*Pearson's χ^2 test; ** χ^2 test for linear trend; ***SWald's test.

Teste χ^2 de Pearson*; *teste χ^2 de tendência linear*; ****teste de wald*.

1.05 – 1.78), less than 8 years of education (less than 4 years of study, PR = 1.44, 95%CI 1.01 – 2.07; 4 to 7 years of study, PR = 1.48, 95%CI 1.04 – 2.10), previous consumption of alcohol (PR = 1.34, 95%CI 1.11 – 1.63), and absence of natural teeth (PR = 1.66, 95%CI 1.22 – 2.24) were associated with an increased time elapsed since the last dental visit. In the final

model (Table 2), the probability of not having used dental services in the past three years was higher in individuals who self-assessed their general health as poor or very poor (PR = 1.36, 95%CI 1.05 – 1.78), who had less than 8 years of education (less than 4 years of study, PR = 1.43, 95%CI 1.01 – 2.02; 4 to 7 years of study, PR = 1.43, 95%CI 1.00 – 2.04), who

Table 2 - Adjusted prevalence ratios for independent variables associated with use of dental services > 3 years among elderly enrolled in Family Health Units of Pelotas – RS, 2010.

Tabela 2 - Razões de Prevalência ajustadas das variáveis independentes associadas ao uso de serviços odontológicos há mais de 3 anos por idosos pertencentes às unidades Saúde da Família da área urbana de Pelotas – RS, 2010.

Variables	Use of dental services > 3 years	
	Adjusted PR (95%CI)	p-value*
External environment		
General health self-assessment		
Very good	1.0	
Good and proper	0.98 (0.78 – 1.25)	0.898
Very poor and poor	1.36 (1.05 – 1.78)	0.022
Predisposing		
Education (years)		
< 4	1.43 (1.01 – 2.02)	0.043
4 – 7	1.43 (1.00 – 2.04)	0.047
≥ 8	1.0	
Personal practices		
Alcohol consumption		
No	1.0	
Former consumer	1.31 (1.08 – 1.60)	0.007
Yes	1.07 (0.82 – 1.40)	0.628
Oral health status		
Number of teeth		
No teeth	1.73 (1.29 – 2.32)	0.000
1 – 9 teeth	1.27 (0.92 – 1.73)	0.135
10 teeth or more	1.0	

* Variables adjusted for the same level and levels above.

**Varáveis ajustadas para o mesmo nível e níveis acima.*

were former consumers of alcohol (PR = 1.31; 95%CI 1.08 – 1.59), and who did not have natural teeth (PR = 1.73; 95%CI 1.29 – 2.32), considering the theoretical model of access and individual use of health services proposed by Andersen and Davidson⁷.

Collinearity analysis showed no significant correlation among the independent variables (all variables showed VIF < 2). Once the final model had been obtained, we performed one additional analysis, removing the alcohol consumption variable, as response options were non-discriminatory. However, this new model proved worse than the final one because it showed lower values for adjusted and unadjusted pseudo R-squared and higher values for AIC and MSE.

Discussion

According to this study's findings, less than half of the elderly assessed had used dental

services in the three years preceding the interview, and this outcome was influenced by general health perception, education level, alcohol consumption, and number of teeth. Other studies designed to assess the use of dental services have tended to focus on the previous year, a methodological difference that hampers comparisons with data observed here^{6,9,17-21}. There is not a universally accepted cutoff point for assessing time since last dental visit among elders, reflecting the absence of a standardized ideal frequency for this population. However, some studies have reported that elders remain long periods without using dental services^{2,22}, and have suggested that 12 months is too short for an adequate analysis of this population²². The high rate of edentulism among the elderly (who supposedly attend dental services less frequently) should also be taken into consideration. These are the reasons why

a cutoff point of three years was chosen in the present study.

The prevalence of use of dental services in the previous three years in Pelotas was higher than that recently described for elderly people from Ponta Grossa, state of Paraná, southern Brazil², and for individuals aged 65 – 74 years in China²². The higher level of education observed in this study, a factor that seems to influence the use of dental services, may have contributed to such difference.

Previous studies have suggested the importance of socioeconomic variables such as income and education as determinants for the use of dental services, regardless of age²³⁻²⁵. In the present study, the level of education proved to be a predictor of the use of dental services by the elderly, corroborating previous findings^{9,17,21,22,26,27}. However, this finding should be interpreted based on the context of the population, which was characterized by a homogeneous, predominantly low socioeconomic status²⁸. It is possible that the strength of the association would be even greater in populations with more heterogeneous characteristics. Even though income and education are widely recognized as having different meanings, where income indicates the purchasing power and education is more related to health care²⁹, the link between both variables is undeniable, and can explain, at least in part, the loss of significance observed for the variable income in the model used in this study²⁴. This reinforces the idea that people with higher levels of education tend to be more informed and aware of prevention measures and of the need for treating problems affecting the oral health than those with lower education levels³⁰.

Of the variables present in Andersen and Davidson's model⁷, self-perceived general health was associated with increased time since the last dental visit. A poor self-assessment of general health seems to reduce the frequency of use of oral health services due to the lesser importance attributed to oral health problems and to these patients' greater difficulty in accessing oral health services because of their general health problems^{17,31}.

The observation that depressive symptoms negatively influence the use of dental services has recently been reported for Mexican elderly people¹⁸. This finding is not exclusive to oral health services. In fact, the literature has identified that elderly with depressive symptoms also attend fewer health services, often due to financial difficulties and because depressive symptoms are not diagnosed in the basic care services³².

Considering that the elderly are the greatest consumers of medical services¹⁸, one possible implication of the results of this study refers to the potential contribution of general health professionals towards a better oral health care. It is possible that medical advice recommending regular dental visits, regardless of the presence or absence of teeth or of the use of prostheses, may contribute to a higher frequency of dental care.

The observation that former consumers of alcohol had a higher probability of taking longer to use dental services when compared with those who never consumed alcohol and with current consumers does not find support in the literature. It is possible that, at least in part, a limitation in the question used to assess alcohol consumption in our research instrument (non-discriminatory answers) can explain the results observed.

The belief that the absence of teeth renders dental visits unnecessary has been reported in the literature as an important determinant of a low prevalence of dental service use in edentulous individuals^{9,33-35}, differently from individuals with teeth^{21,36} or from those using prostheses²⁰. These findings have been confirmed in this study, in which edentulous individuals showed a 73% higher probability of not having visited the dentist in the previous three years when compared with those who had 10 teeth or more. Among the implications of this phenomenon, we can highlight a poor or non-existent monitoring of prostheses, concomitantly to the risk that relevant health problems, such as cancer injuries, may be detected only at an advanced stage, hindering or even preventing appropriate treatment.

Our results did not show any association between self-perceived need for dental treatment and use of dental services in the period assessed, differing from previously reported results^{24,34}. The high rate of edentulism

observed in our population may also have contributed to such different finding. Despite recent efforts made in Brazil to expand access to proper oral health care, with an increase in the number of oral health teams as part of the family health strategy and the Brasil Sorridente program (availability of specialized dental care centers), most of the elderly reported the use of private services, which is consistent with previous studies with other populations^{18,37}.

Among the possible explanations for the infrequent use of public services among elderly people without or with few teeth is the fact that oral health teams working in the family health strategy do not offer prostheses, the most frequent need of this population group. This hypothesis may be investigated in future studies. According to results of the SB Brasil 2010 survey, the Brazilian Ministry of Health has invested heavily in the accreditation of prosthetic laboratories and has been developing actions so as to qualify basic health professionals to produce prostheses³. In this sense, a positive outlook for the next generations of elderly is the fact that international studies have shown a relationship between an increased number of visits to the dentist during childhood and a higher number of teeth in subsequent life stages³⁸. However, the rates of oral health care service use among preschool children in Brazil are still very low, representing another challenge to be faced³⁹.

Unlike other studies, no association was found in the sample between gender¹⁷ and age^{17,19} and time elapsed since the last dental visit. Even though women of all age ranges tend to seek dental services more often than men^{5,40}, elderly of both genders have equal opportunities of access to the health care system. If, in one hand during adult life, the opening hours of health care units may indeed represent a barrier to professionally active individuals (predominantly men), on the other hand this difficulty seems to lessen and even disappear with increasing age⁴⁰.

In this study, the elderly accounted for a large portion of the population served by the Family Health Units in Pelotas. The units had multidisciplinary teams and developed health promotion, disease prevention and health recovery programs at neighborhood associations and at the families' homes. It is therefore possible

that, as oral health teams are increasingly qualified, a more frequent use of dental services will occur. Although two recent studies^{41,42} have observed that the availability of oral health teams did not increase access to oral health services in some age groups, including the elderly, one must take into account that these teams, when compared to basic health care units, still reproduce the traditional model of care, directing most actions to school-aged populations⁴¹.

Some methodological limitations are noteworthy. Firstly, the cross-sectional design of the study does not allow determining temporal relationships between exposures and outcomes. The findings should therefore be interpreted with caution, as some form of reverse causality may have occurred. Secondly, because the outcome was dependent on the participants' memory regarding the last time they had visited a dentist, the possibility of recall bias should not be dismissed and may have affected the prevalence rates obtained. Thirdly, while the questions on self-assessed oral health and general health status have been previously tested and demonstrated satisfactory reliability in different age groups, the reliability may be somewhat lesser in elderly individuals^{13,14}. However, if any misclassifications happened with the variable self-assessment, it would have been probably a non-differential error. As this type of error would bias the study results towards the null hypothesis⁴³, it can be inferred that it did not influence the reported associations.

In conclusion, the results of this study demonstrated low rates of use of oral health services among the elderly, especially those with low education levels, with a poor self-assessed general health, and without or with few teeth, pointing to major inequities to be faced. In addition to improving the health care model and increasing the number of oral and general health services available, the scope of public policies should include improvement of income and education indicators, which have much more positive effects in reducing inequalities. Such improvement would not only increase access to health services, but also the awareness of the fact that, even in the absence of teeth, regular attendance to dental services is extremely important for rehabilitation and oral health maintenance.

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