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Equity in the use of dental services provided by the Brazilian Unified Health System (SUS) among the elderly: a population-based study

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Abstract *The scope of this study is to establish the profile of elderly users of dental services provided by the Brazilian Unified Health System(SUS) and associated factors from the standpoint of equity. It involves an analytical cross-sectional study with hierarchical modeling conducted on the basis of a complex probabilistic sample of groups of the elderly (65-74 years of age) living in a densely populated Brazilian city. Independent variables were included relating to: socio-demographic characteristics, access to information on health, behaviors/health-care system and health outcomes. Descriptive, bivariate and multiple hierarchical analysis was performed. Of the 480 elderly persons included, 138 (31.2%) used dental services from the SUS. Use of these services was greater as per capita income and level of schooling decreased. It was lower among those who had not conducted exams of their own mouths (oral self-examinations) and higher among those individuals who used dental services for non-routine procedures. In addition, people whose relationship had been affected by oral health issues and a negative perception of their appearance used the SUS more frequently. The conclusion drawn is that the use of dental services of the SUS was most prevalent among the elderly living in precarious conditions.*

Key words *Elderly, Use of services, Oral health*

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Introduction

The social inequalities still prevailing in Brazil are steeped in the nation's history, with a fragmented and unequal social protection system. At the end of the 1980s, social movements brought on the creation of the country's Unified Health System (SUS). The SUS's doctrine-based principles and challenges to be overcome are as follows: equity, universality and full coverage. As the system celebrates its 27th anniversary, investments in infrastructure and organization in terms of the supply of services, with priority on primary care, have brought on improvements in the public's access to health-care assistance[1]. Encouragement of social participation and the supply of activities for promotion and prevention have worked together to raise the population's consciousness as to their right to health-care[2]. In this context, in order to guarantee access to public health services, there is the need to overcome the problems brought on by the aging of the population, epidemiological accumulation and transition, and also a need for changes in the health-care model[3]. The increase in Brazil's elderly population, arising from social, demographic and economic transformations, as well as changes in habits[4], have combined to generate a rise in the demand for health-care services[5]. Consideration should further be given to the different realities and health needs of the elderly population[6,7], including the oral health of this age bracket.

The existence of oral problems in elderly people may compromise aspects relating to their communication, chewing ability and self-image[8], as well as their quality of life (QoL)[9,10]. Elderly Brazilians, in particular, have been the victims of a dental assistance model that excludes and mutilates them[11,12], generating a high prevalence of edentulism[13,14]. Contrary to what happens with other types of medical services, most elderly people in Brazil have not sought out the SUS when it comes to oral health[15]. According to data obtained from population-based inquiries conducted in the country, it was found that in 2002/2003[13], a mere 5.83% of the elderly had used dental services, while in 2010, the ratio rose to 14.7%[14].

This scenario reveals the ineffectiveness of the SUS and public oral health policies with respect to the principle of universality, namely guaranteed universal access to and use of dental services. Moreover, the causes of the rise in the proportion of elderly people who have never used dental services cannot be identified, since the research adopted a cross-sectional approach. It is further noted that the use of dental services is predominantly private and that economic inequities can also be impacted in this reduction of access in recent years[13,14]. The concept of "use" of health services is understood as all direct (appointments, hospitalization) or indirect (preventive and diagnostic exams) contact with health services[16]. The concept of "access," on the other hand, refers to the need for health services and actually getting them, which can bring about improved health outcomes[16,17]. When it comes down to it, the use of health services does not necessarily express improvements in access to such services.

For decades, access to dental services in Brazil was characterized by the orientation towards school-aged children[18], subsequently by private practice and services assured to city workers with full benefits under the nation's consolidated work laws (CLT), which include their work and social security booklets (CTPS) being signed by their employers. There was an assistance void in terms of access to dental services for Brazilians not fitting into these categories[11]. Expansion in the access to public/governmental dental care occurred as from the year 2000 by means of oral health teams being included in the family health strategy[19], in order to guarantee such access, overcome social inequalities and meet repressed demand, including the elderly. It should be pointed out that the use of such services, the result of improvement in guaranteeing access, have been appraised in both the international[20-22] and Brazilian[12,23-24] context. Studies[23-26] conducted prior to the 2010 survey analyzed the use of dental services in Brazil and evidenced a rise in the proportion of people using public/governmental services in recent years[27], though this rise was not evidenced in the last two epidemiological surveys conducted at a national level[13,14]. Among the theoretical grounds used to appraise the determinants related to the use of services, the theoretical model proposed by Andersen & Davison in 1997[28], adopted in previous studies[23,24], stands out.

The theoretical model proposed by Andersen & Davidson[28] was previously translated into Brazilian Portuguese and described in another work[12], and it is the one most employed in analyzing determinants of use. In this model, it is understood that the characteristics of the context, the oral health system and the personal characteristics of distinct populations influence oral health behaviors[28]. After all, such characteristics restrict or predispose people in terms of

using dental services[29]. Variables related to the context have been associated with greater or lesser use of services among the elderly, especially those in lower income brackets, which suggest inequities[12,24,30]. Previous studies have further investigated the association between the use of these services and socio-demographic aspects; objective health conditions (race, income bracket, educational level)[24,31-33]; and subjective health conditions, such as self-perception of health[12,23,26]. On the other hand, no epidemiological studies were encountered that identified factors associated with the use of dental services offered by the SUS to the elderly population.

Respect for the SUS's principles, such as universal and even-handed access to services and health promotion, protection and recovery, constitute the system's guiding proposals[1]. The principle of equity, dealt with in this article, recognizes that individuals are different from each other and thus merit different treatments that eliminate or reduce inequalities. That is, unequal treatment is fair when it benefits the neediest individual[34]. Hence, analyzing the profile for use of health services is important, as it allows us to characterize the user population, identify their health conditions and explain their reasons for seeking out services, which are fundamental elements for planning and organizing health-care activities[34]. By considering the various dimensions that interfere in the use of services[24], this study aims to evaluate whether one of the principles of the SUS, equity, has been achieved within the scope of providing dental services to the elderly.

Methodology

This study involves an analytical cross-section conducted among the elderly population (i.e. people in the 65-74 age bracket) of a densely populated Brazilian city [Montes Claros, the leading city in the North of Minas Gerais (MG) and the state's third most populous city]. The appraisal criteria used were the oral health conditions proposed by the World Health Organizations (WHO) in 1997[35] and adopted in Brazil for its oral health policy in 2002/2003[13]. The study's hierarchical modeling was carried out based on a complex probabilistic sample of groups of the elderly in two stages (census and age brackets) representative of the population. The sample calculation estimated the occurrence of events or diseases in 50%of the population, a sampling error of 5.5%, level of confidence of 95%, deff (design effect) equal to 2.0, and non-response rate of 20%, to offset possible losses. It is estimated that the sample consisted of 740 elderly persons.

The data was gathered at households belonging to the sectors and age brackets chosen, conducted by 24 dental surgeons trained and calibrated (Kappa inter/intra-examiners and interclass correlation coefficient) to perform the interviews and intra-oral exams. All the interviews and exams were carried out in a broad setting, under natural light, employing previously sterilized clinical oral mirrors and Community Periodontal Index (CPI) probes. The examiners who participated in gathering data showed a concordance of ≥ 0.60, as per the scale proposed by Fleiss[36], as modified by Cicchetti et al.[37] (ICC $\geq$ 0.61 and Kappa ≥ 0.61).The data was recorded on a hand computer software program, employing the Health Data Gathering Program developed for this research work.

Participating in the study were only elderly persons who did not have cognitive problems, reported having used dental services and answered the question relating to the place where the service was used. The elderly chosen underwent cognitive appraisals employing the version validated in Brazil of the Mini Mental State Examination (MEEM)[38]. Different cut-off points were adopted for analysis of the MEEM, according to the educational levels of the elderly person, 21 for illiterate elderly people, 22 in the low level of schooling group (just 1st to 5th grades), 23 in the middle level (6 to 11 years of schooling) and 24 in the higher educational level (12 or more years of studies)[39]. Elderly persons with point scores on the MEEM below that defined as the cut-off point were identified as elderly people with compromised cognitive abilities and were not considered in our investigation. At the end of the employment of such inclusion and exclusion criteria, the study population was reduced.

The dependent variable was the use of the SUS's services, which was constructed based on the following question: *Where did you use dental services?(public services, private services provided by independent 'liberal' professionals, private services through health coverage plans and arrangements, philanthropic services or other types of services?)*. The variable involves consulting dental services on the part of the interviewee throughout his or her entire life, and not just in the past few months or years, as has been gauged in certain works[26,40]. There upon, the variable was transformed into a dichotomy: "SUS" (public services) and "other services" (private liberal

services, private services through health coverage plans and arrangements, philanthropic services or other types of services).

The independent variables were grouped together in four blocks according to the theoretical model drawn up by Andersen & Davidson[28]: demographic and socio-economic (age, sex, ethnicity or self-declared race, marital status, years of education, per capita income); access to oral health information (information about how to avoid oral health problems; about oral hygiene and mouth cancer); oral health behaviors/health-care systems (conducting auto-exam of mouth; frequency of daily cleaning of the oral cavity; reason for use, time frame of use of dental services, evaluation of services); and health outcomes, with the latter being divided into objective health conditions (edentulism, use of dental prostheses and need for same) and subjective ones (self-perception of the need for treatment, oral health, chewing, appearance, relationship affected by oral health, sensitivity to pain in teeth and gums in the past six months and discomfort in the head and neck). The gathering of data as regards access to oral health information was carried out by means of the following set of questions: *Have you received information as to how to avoid oral problems? Have you received guidelines regarding oral hygiene in the dental services you have consulted over the course of your life? Have you received guidelines as to how to avoid oral (mouth) cancer in the dental services you have consulted over the course of your life?* The questions that generated the remaining variables related to behaviors/health-care system were as follows: *Have you ever conducted an exam of your own mouth? How many times per day did you brush your teeth in the past week? Why did you go to the dentist? How long has it been since you last went to the dentist? How would you evaluate the service you received?* The questions that gave rise to the subjective variables regarding health outcomes were as follows: *Do you consider that you need dental treatment every year? How would you rank your oral health? How would you rank your chewing? How would you rank the appearance of your teeth and gums? In what manner does your oral health affect your relationship with other people? How much pain have your teeth and gums caused you in the past 6 months?*

The PASW Statistics 18.0 computer software program was employed to analyze the statistics. Correction for the design effect (deff) was carried out, in that the study was based on a complex sample per conglomerates in two stages. The descriptive analysis included absolute frequency (n), relative frequency (%) and the relative frequency with correction for the design effect (%*), the standard error and the deff for categorical variables. For the discrete variables, age and per capita income, the average and standard variation was included. There upon, bivariate analyses were conducted based on the Chi-square test, adjusted through the correction for the design effect. Only the variables that showed a level of significance (p-value) equal to or lower than 0.20 were included in the multiple hierarchical analyses. Hierarchical logistic regressions were carried out for estimation of the multiple models, inserting each one of the four blocks of variables according to the distal and proximal factors of the theoretical model used and modified by the linking of the primary and exogenous determinants in a single block. The final model presents the adjusted values of the variables that remain associated with the level of $p \leq 0.05$, with intervals of 95% confidence in each one of the steps of the hierarchical analysis.

The ethical principles of this study have been upheld in accordance with Brazilian National Health Council's Resolution No. 196/96, as approved by the Research Ethics Committee of the Montes Claros State University (CEP/Unimontes). All the participants in the study signed the document of consent of their own free and informed will.

Results

Out of the 736 elderly persons evaluated, 480 have been included in this study. This is because 123 had cognitive problems and, among the remainder, 12 had never used dental services.The prevalence of the use of dental services provided by the SUS came to 31.2%. The average age of the sample was 68.6 (± 3.05), with average schooling of 4.3 years (± 4.22). The descriptive analysis revealed a population where most people were in the following categories: female, low income and low schooling, and in most cases were using dental services for more than one year (Table 1).

In the bivariate analyses, the use of SUS services was associated ($p \leq 0.20$) with variables relating to socio-demographic characteristics, access to oral health information, behaviors/oral health-care system and health outcomes, by means of objective and subjective conditions (Table 2). This association was considered in selecting the variables to comprise the hierarchical logistic model.

Table 1. Descriptive analysis of the type of dental service used, demographic and socioeconomic characteristics, oral health-care system, access to health information, behaviors and health outcomes among the elderly in Montes Claros/MG. 2009 (n = 480).

Variables	n	%	%*	ε	*Deff*
Dependent Variable					
Type of dental services					
Other services	342	71.2	68.8		
SUS	138	28.8	31.2	3.7	3.48
Type of dental services					
Public services (SUS)	138	28.8	31.2	3.7	3.48
Private services (Liberal)	304	63.3	60.9	3.2	2.27
Private services (Plans and Arrangements)	32	6.7	7.0	1.8	2.64
Philanthropic services	4	0.8	0.5	0.3	0.74
Other services	2	0.4	0.4	0.3	1.12
Demographic and Socioeconomic					
Age bracket					
65-66 years of age	166	34.6	34.3	2.1	1.07
67-70 years of age	165	34.4	34.7	2.8	1.81
71-75 years of age	149	31.0	31.0	2.4	1.46
Sex					
Female	273	56.9	56.6		
Male	207	43.1	43.4	2.7	1.61
Race/Ethnicity**					
White (Caucasian)	157	32.8	33.2	3.7	3.34
Yellow (East Asian)	5	1.0	1.2	0.6	1.84
Red (Native Amerindian)	2	0.4	0.5	0.4	1.58
Black (Afro-American)	87	18.2	20.8	2.6	2.21
Brown (Mulatto, Mixed, etc.)	227	47.5	44.2	3.3	2.40
Marital status					
Married/Stable relationship	295	61.5	63.3	3.1	2.18
Widowed/Divorced	157	32.7	31.5	2.7	1.76
Single	28	5.8	5.1	1.1	1.42
Educational level					
More than 5 years of schooling	167	34.8	32.0	4.0	3.95
From 1 to 4 years of schooling	214	44.6	48.0	3.6	2.73
No schooling	99	20.6	20.0	2.3	1.83
Per capita monthly income**					
Above average (> R$276.60 per month)	231	49.8	48.7		
Below average (< R$276.60 per month)	233	50.2	51.3	3.8	3.02
Access to Health Information					
Access to information about oral problems**					
Yes	238	49.7	49.3		
No	241	50.3	50.7	3.8	3.16
Access to oral hygiene guidelines**					
Always/Frequently	134	28.0	26.9		
Occasionally/Rarely/Never	345	72.0	73.1	3.5	3.34
Access to guidelines regarding oral (mouth) cancer**					
Always/Frequently	40	8.4	8.6		
Occasionally/Rarely/Never	439	91.6	91.4	2.2	3.30

it continues

Table 1. continuation

Variables	n	%	%*	ε	*Deff*
Behaviors/Oral Health-care System					
Have you ever examined your own mouth?					
Yes	81	16.9	18.4		
No	399	83.1	81.6	2.4	2.07
Frequency of daily cleaning**					
More than twice a day	220	46.4	44.8	4.3	3.98
Twice a day	183	38.6	38.5	3.8	3.25
Once a day	56	11.8	1.5	1.5	1.12
Not even once a day	15	3.2	2.1	2.1	5.67
Reasons for use of dental services					
Routine/Reparative/Maintenance	165	34.4	32.9	3.5	2.93
Tooth cavities	56	11.7	10.9	2.1	2.33
Bleeding gums	8	1.7	1.7	0.6	1.20
Wounds/Lumps/Blemishes	2	0.4	0.4	0.3	1.02
Swollen Cheeks	3	0.6	0.7	0.5	2.14
Pain	98	20.4	21.8	3.1	3.07
Other reasons	148	30.8	31.7	3.8	3.49
Time dental services were used**					
Less than 1 year ago	112	23.6	24.0		
More than 1 year ago	363	76.4	76.0	3.0	2.53
Evaluation of service**					
Excellent / Good	429	89.9	90.8		
Average / Poor / Bad	48	10.1	9.2	1.7	1.77
Health Outcomes					
Objective conditions					
Edentulism					
No	215	44.8	42.3		
Yes	265	55.2	57.7	3.7	2.92
Use of dental prosthesis					
Yes	380	79.2	79.4		
No	100	20.8	20.6	3.1	3.09
Need for dental prosthesis**					
No	148	30.9	31.2		
Yes	331	69.1	68.8	2.5	1.60
Subjective conditions					
Self-perception of need for treatment**					
No	209	43.7	40.6		
Yes	269	56.3	59.4	3.1	2.16
Self-perception of oral health					
Excellent / Good	329	68.5	69.8		
Average / Poor / Bad	151	31.5	30.2	2.5	1.64
Self-perception of chewing					
Excellent / Good	277	57.7	58.9		
Average / Poor / Bad	203	42.3	41.1	3.0	1.96
Self-perception of appearance**					
Excellent / Good	285	59.5	62.6		
Average / Poor / Bad	194	40.5	37.4	2.8	1.72
Relationship affected by oral health					
No	353	73.5	72.2		
Yes	127	26.5	27.8	4.0	4.37
Pain felt in teeth and gums					
No	363	75.6	77.4		
Yes	117	24.4	22.6	2.8	2.45
Discomfort in mouth, head or neck					
No	392	81.7	81.6		
Yes	88	18.3	18.4	2.9	3.10

ε Standard error. Deff = Design effect. * With correction for design effect. ** Variation in n.

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Table 2. Bivariate analysis of the factors associated with the use of dental services provided by the SUS among elderly people in Montes Claros/MG. 2009.

Variáveis	Type of dental service				p value
	Other	SUS	OR	CI 95%	
Primary and exogenous determinants					
Demographic and Socioeconomic					
Age			1.03	0.967-1.113	0.28
Sex					
Female	68.7	31.3	1.00		
Male	69.1	30.9	0.97	0.688-1.378	0.87
Race/Ethnicity					
White	81.2	18.8			
Yellow/Black/Brown/Red	48.0	52.0	2.57	1.282-5.183	**0.00**
Marital status					
Married/Stable relationship	68.6	31.4	1.00		
Widowed/Divorced	76.6	23.4	1.03	0.568-1.877	
Single	68.2	31.8	0.67	0.264-1.701	0.73
Educational level			0.87	0.812-0.943	**0.00**
Per capita income			0.99	0.997-0.998	**0.00**
Access to Oral Health Information					
Access to oral health information?					
Yes	68.0	32.0	1.00		
No	69.7	30.3	0.93	0.557-1.553	0.77
Access to oral hygiene guidelines					
Always/Frequently	74.9	25.1	1.00		
Occasionally/Rarely/Never	66.9	33.1	1.48	0.895-2.473	**0.11**
Access to guidelines regarding oral (mouth) cancer					
Always/Frequently	71.0	29.0	1.00		
Occasionally/Rarely/Never	68.6	31.4	1.12	0.520-2.438	0.75
Behaviors					
Behaviors/Oral Health-care System					
Have you ever examined your own mouth?					
Yes	58.6	41.1	1.00		
No	71.3	28.7	0.56	0.305-1.028	**0.05**
Frequency of daily cleaning					
≥ Twice a day	69.5	30.5	1.00		
Once a day	72.4	27.6	0.86	0.390-1.910	
Not even once a day	61.0	39.0	1.44	0.565-3.709	0.67
Reasons for use of dental services					
Routine	73.6	26.4	1.00		
Bleeding/Cavities/Pain	57.9	42.1	2.02	1.01-4.07	
Other reasons	75.7	24.3	0.89	0.48-1.66	**0.02**
Time dental services were used					
Less than 1 year ago	70.0	30.0	1.00		
More than 1 year ago	68.2	31.8	1.09	0.62-1.90	0.75
Evaluation of service					
Excellent / Good	67.0	33.0	1.00		
Average / Poor / Bad	86.2	13.8	0.32	0.127-0.834	**0.01**

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In the hierarchical multiple analysis ($p \leq 0.05$), it was identified that the use of SUS dental services increased as income and educational levels decreased, and also that the elderly persons who used the dental services for other than routine/maintenance procedures did so because of bleeding, cavities and pain, and further that their relationships were affected by their oral prob-

Table 2. continuation

Variables	Type of dental service				
	Other	SUS	OR	CI 95%	p value
Health Outcomes					
Objective conditions					
Edentulism					
No	71.4	28.6	1.00		
Yes	67.1	32.9	1.23	0.702-2.169	0.45
Use of dental prosthesis					
Yes	72.4	27.6	1.00		
No	55.4	44.6	2.14	1.126-4.087	**0.01**
Need for dental prosthesis					
No	79.2	20.8	1.00		
Yes	64.4	35.6	2.11	1.235-3.632	**0.00**
Subjective conditions					
Self-perception of need for treatment					
No	65.9	34.1	1.00		
Yes	71.4	28.6	0.77	0.442-1.370	0.37
Self-perception of oral health					
Excellent / Good	71.4	28.6	1.00		
Average / Poor / Bad	65.9	34.1	1.28	0.730-2.62	0.37
Self-perception of chewing					
Excellent / Good	72.4	27.6	1.00		
Average / Poor / Bad	63.9	36.1	1.47	0.808-2.678	**0.19**
Self-perception of appearance					
Excellent / Good	72.4	27.6	1.00		
Average / Poor / Bad	63.0	37.0	1.55	1.045-2.311	**0.02**
Relationship affected by oral health					
No	75.3	24.7	1.00		
Yes	52.4	47.6	2.74	1.612-4.669	**0.00**
Pain felt in teeth and gums					
No	72.2	27.8	1.00		
Yes	57.9	42.1	1.87	1.119-3.144	**0.01**
Discomfort in mouth, head or neck					
No	68.7	31.3	1.00		
Yes	70.1	29.9	0.93	0.423-2.048	0.85

lems. Moreover, it was found that such use was lower among those who did not conduct exams of their own mouths and that they considered the service average, poor or bad (Table 3).

Table 4 shows the final model, as adjusted, and the respective R^2.

Discussion

Three health-care systems coexist in Brazil: one that is public and universal (SUS); the second one, which is supplementary, based on insurance and health coverage plans (to be signed onto either voluntarily by employees and/or covered by employers); and the third, which involves direct payment by individuals when they use such services. This study revealed that the elderly used health coverage plans less (7.0%) than the overall proportion of Brazilians who had health coverage plans (17.9% in 2008). Furthermore, the use of private dental services by the elderly (60.9%) was higher than the prevalence encountered among the Brazilian population in general (51.6%)[41]. The prevalence among elderly persons who used public services in this work was similar to that encountered among Brazilian elderly persons[14] in the national survey, but higher than other previous studies also conducted among the elderly in Brazil, which studied convenience samples[12,42], and lower than among the elderly in Europe, who attain rates of 80% in terms of using public dental services[43].

Table 3. Hierarchical multiple logistic regression analysis of the factors associated with the use of dental services provided by the SUS among elderly people in Montes Claros/MG. 2009.

Variables	Block 1			Block 2		
	OR (EP)	CI (95%)	p value	OR (EP)	CI (95%)	p value
Block 1 - Demographic and Socioeconomic						
Educational level	0.905(0.04)	0.830-0.986	0.019*	0.904(0.04)	0.825-0.989	0.024*
Per capita income	0.998(0.00)	0.997-1.000	0.019*	0.998(0.04)	0.997-1.000	0.017*
Race/Ethnicity						
White / Yellow	Ref			-	-	-
Black / Brown / Red	1.849(0.33)	0.939-3.643	0.067	-	-	-
Block 2 - Access to Oral Health Information						
Access to oral health guidelines						
Always /Frequently				Ref		
Occasionally /Rarely /Never				1.066(030)	0.579-1.061	0.832
Block 3 - Behaviors/ Oral Health-care System						
Do you examine your own mouth?						
Yes						
No						
Reasons for use						
Routine						
Bleeding / Cavities / Pain						
Other reasons						
Evaluation of service						
Excellent / Good						
Average / Poor / Bad						
Block 4 – Health Outcomes						
Objective conditions						
Use of dental prosthesis						
Yes						
No						
Need for dental prosthesis						
No						
Yes						
Subjective conditions						
Self-perception of chewing						
Excellent / Good						
Average / Poor / Bad						
Self-perception of appearance						
Excellent / Good						
Average / Poor / Bad						
Relationship affected by oral health						
No						
Yes						
Pain felt in teeth and gums						
No						
Yes						
R^2	0.080			0.083		

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For the process of working with oral health in the public service, the directives adopted by the Brazilian Ministry of Health are intended to orient professionals undertaking scheduled activities for promoting health, disease prevention and health-care, with special focus on controlling chronic diseases and helping the most vulnerable portion of the nation's populace[41]. The oral health teams that work on basic health-care are to adopt family and individual risk classification methods that guide the use of public dental services, especially for the neediest segments. These

Table 3. continuation

Variables	Block 3			Block 4		
	OR (EP)	CI (95%)	p value	OR (EP)	CI (95%)	p value
Block 1 - Demographic and Socioeconomic						
Educational level	0.895(0.04)	0.818-0.980	0.013*	0.873(0.04)	0.794-0.961	0.004*
Per capita income	0.998(0.00)	0.997-1.000	0.010*	0.998(0.00)	0.997-1.000	0.018*
Race/Ethnicity						
White / Yellow	-	-	-	-	-	-
Black / Brown / Red	-	-	-	-	-	-
Block 2 - Access to Oral Health Information						
Access to oral health guidelines						
Always /Frequently	-	-	-	-	-	-
Occasionally /Rarely /Never	-	-	-	-	-	-
Block 3 - Behaviors/ Oral Health-care System						
Do you examine your own mouth?						
Yes	Ref			Ref		
No	0.398(0.31)	0.212-0.748	0.003*	0.439(0.30)	0.237-0.815	0.007*
Reasons for use						
Routine	Ref.					
Bleeding / Cavities / Pain	1.552(0.32)	0.803-3.002		1.039 (0.38)	0.480-2.249	
Other reasons	0.592(0.34)	0.297-1.179	0.018*	0.484 (0.38)	0.221-1.062	0.090
Evaluation of service						
Excellent / Good	Ref			Ref		
Average / Poor / Bad	0.277(0.49)	0.102-0.753	0.009*	0.197 (0.52)	0.068-0.565	0.002*
Block 4 – Health Outcomes						
Objective conditions						
Use of dental prosthesis						
Yes				Ref.		
No				1.383(0.43)	0.580-3.297	0.451
Need for dental prosthesis						
No				Ref		
Yes				1.473(0.33)	0.751-2.889	0.246
Subjective conditions						
Self-perception of chewing						
Excellent / Good				Ref		
Average / Poor / Bad				1.032(0.33)	0.525-2.030	0.925
Self-perception of appearance						
Excellent / Good				Ref		
Average / Poor / Bad				1.527(0.20)	1.005-2.320	0.041*
Relationship affected by oral health						
No				Ref		
Yes				2.359 (0.23)	1.469-3.787	0.000*
Pain felt in teeth and gums						
No				Ref		
Yes				1.614(0.27)	0.926-2.814	0.081
R^2	0.173				0.258	

Ref.: benchmark category. * $p \leq 0,05$.

criteria would include families chosen based on analysis of their social risk factor, in order to carry out surveys of dental needs and to define such priority groups as pregnant and nursing mothers, patients with special needs, people suffering from hypertension, and the elderly, among others.

This study has revealed that the use of the SUS's dental services was greater among the elderly who live in precarious conditions, which suggests that efforts to follow the equity principle have been successful. Use increased as income and educational levels decreased.

Table 4. Comparison between the final model and the adjusted model of the hierarchical multiple logistic regression analysis of the factors associated with the use of dental services provided by the SUS among elderly people in Montes Claros/MG. 2009.

Variables	OR (EP)	CI (95%)	p value	OR (EP)	CI (95%)	p value
Block 1 - Demographic and Socioeconomic						
Educational level	0.905(0.04)	0.830-0.986	0.019*	0.878(0.04)	0.802-0.961	0.003*
Per capita income	0.998(0.00)	0.997-1.000	0.019*	0.998(0.00)	0.996-1.000	0.010*
Race/Ethnicity						
White / Yellow	-	-	-	-	-	-
Black / Brown / Red	-	-	-	-	-	-
Block 2 - Access to Oral Health Information						
Access to oral health guidelines						
Always /Frequently	-	-	-	-	-	-
Occasionally /Rarely /Never	-	-	-	-	-	-
Block 3 - Behaviors/ Oral Health-care System						
Do you examine your own mouth?						
Yes	Ref			Ref		
No	0.398(0.31)	0.212-0.748	0.003*	0.425(0.27)	0.242-0.746	0.002*
Reasons for use						
Routine	Ref.			Ref		
Bleeding / Cavities / Pain	1.552(0.32)	0.803-3.002		1.287(0.31)	0.678-2.442	
Other reasons	0.592(0.34)	0.297-1.179	0.018*	0.546(0.34)	0.271-1100	0.034*
Evaluation of service						
Excellent / Good	Ref			Ref		
Average / Poor / Bad	0.277(0.4)	0.102-0.753	0.009*	0.211(0.53)	0.072-0.615	0.003*
Block 4 – Health Outcomes						
Objective conditions						
Use of dental prosthesis						
Yes						
No	-	-	-	-	-	-
Need for dental prosthesis						
No						
Yes	-	-	-	-	-	-
Subjective conditions						
Self-perception of chewing						
Excellent / Good						
Average / Poor / Bad	-	-	-	-	-	-
Self-perception of appearance						
Excellent / Good	Ref			Ref		
Average / Poor / Bad	1.527(0.20)	1.005-2.320	0.041*	1.842(0.22)	1.172-2.893	0.006*
Relationship affected by oral health						
No	Ref			Ref		
Yes	2.359(0.23)	1.469-3.787	0.000*	2.394(0.23)	1.505-3.806	0.000*
Pain felt in teeth and gums						
No	-	-	-	-	-	-
Yes	-	-	-	-	-	-
R^2		0.258			0.237	

Ref.: benchmark category. * $p \leq 0,05$.

Such association between lower income levels and greater usage rates of public dental services has been identified previously[15,40,42]. Higher household income can contribute to the possibility of access to private services[44,45], although low income is a factor that influences access inequity. It should be pointed out that access to private services can be an effective alternative when one considers certain barriers to accessing public services, such as the length of the waiting time

for access to certain public services, with this alternative being hampered by the low income of the individuals involved. Another study[46], which analyzed the inequalities in the use of health services, noted that the characteristics which lead to unequal usage are not related to health needs as such, but rather to income, geographic location and the presence of a private health coverage plan among people who are better off.

It was identified that the use of the SUS's dental services was greater among elderly people with less schooling. Brazil's elderly population already suffers with the hurdles in accessing health services, resulting from their low educational levels, a fact previously identified in studies conducted both in our country[23,45] as well as in Northern European nations (Denmark, Sweden, Germany and the United Kingdom)[43]. People with higher educational levels can have greater access to information regarding the importance of the regular use of dental services[44], which encourages the seeking out of services, either public or private. Despite the low level of schooling of the elderly age brackets, it is noted that older people with less education posted greater chances of using the SUS's dental services, which should be recognized. The services should contribute to the principle of equity and bestow learning opportunities on the clinical environment, seeking to assure everyone with access to the required resources, so that dental care is effectively a human right[47].

Another important factor to be considered in the SUS health activities is the right to information, which impacts the behavior and the adoption of a healthy style of living and preventive habits. It was found that the use of dental services provided by the SUS was less frequent among those that had not performed exams of their own mouths, suggesting that encouraging self-exam practices seems to happen more often with those who use the SUS. The importance of health education as a tool that leads to healthy habits and behaviors has already been established in the literature[18,48], adding to the fact that educational orientation is more frequent in the public service milieu[49,50]. Examining your own mouth is associated with the use of the service, in that perception of the need for professional assistance based on the presence of alterations in the oral cavity generates the demand for assistance[50], which can lead people to seek out the service.

The reason for using the dental services noted at the SUS in this study has been more related to seeking out treatment for bleeding, cavities and pain than to routinely using them for preservation of oral health. Such a finding indicates that the existing demand for oral health care interferes with the motivation for the use of the dental services and evidences that control of oral diseases in the elderly age brackets has not yet been achieved. Nevertheless, when we analyze the nation-wide reality[14], we note that the use of such services for routine checkups has been more positive and in greater proportion than compared to the country. A previous study[24] analyzed the use of routine services among dentulous and edentulous elderly people and perceived inequities in terms of several factors, among them geographical barriers, income disparities and aspects related to the regularity of access over the course of time. Still speaking of time, this revealed a more unfavorable picture, since there was lower usage of the dental services in the past year in comparison with the national reality in 2010[14].

Just as in other investigations, the precarious state of dentition evidences the sad reality for this age bracket in Brazil[13,14]. In this investigation, it was noted that there was a predominance of edentulous elderly persons (57.7%), high usage (79.4%) and need for prostheses (68.8%). It should be pointed out that in Brazil most specialized dental services, such as the preparation of ready-made dental prostheses, are offered as a public service by the Specialized Dental Centers (CEO). In some cases, there is a lack of accessible centers or even the lack of financial resources to seek out private assistance. A study that analyzed the use of dental services by the elderly in European countries defined the state of dentition and the need for treatment as being the major determinants of use[43].

Health outcomes, that is, issues related to the normative[32-34] and subjective[30] conditions of oral health, were associated with the use of dental services in previous studies. In this study, our hierarchical analysis did not reveal that normative outcomes were associated with the use of the SUS's dental services, insofar as the elderly were concerned, but rather evidence the importance of subjective factors in the differentiation of the type of service sought out by the elderly. The subjective conditions were investigated in studies that appraised self-perception of oral health[12,51], yet they have been neglected in analyses of health services among the elderly and the population in general[52-54]. Nonetheless, associations were encountered in this investigation between the type of dental service used and subjective conditions.

The importance of the data relating to self-perception is due to the possibility of veri-

fying when there is a need for making a behavioral change[55] or even seeking out the service to resolve a perceived nuisance. Elderly people who self-perceive their appearance in a negative manner tend to use the SUS more than other services, which gives the public system a greater possibility of being a door of entry that is more accessible and more readily facilitated to oral health-care for such population.

Elderly people whose relationships bear the impact of oral problems used the SUS more than other types of services. No other work appraising this issue has been encountered, though in the epidemiological survey of oral health conducted in 2003[13] it was perceived that there was lower usage of services in the past year for elderly people reporting relationship impact, suggesting access problems. It is important to point out that the subjective variables are closely related to the physical, psychological and contextual state of the individual[56] and, for this reason, change can come about during the course of a day or week. Picking up on the subjectivity linked to well-being or the consequences of getting sick is always a difficult task, since it involves sentiments and values implicit in judgment[56]. Taking into consideration that the design of the study adopted is the cross-sectional type, there is a limitation in the range of interpretation of the results presented herein.

It should be pointed out that the use of the SUS's dental services and the variables investigated involve a dynamic process and reflect the evolution of a system that is constantly perfecting and modifying itself over the course of time. Since our study is a cross-sectional one, it is not possible to measure the time variations or establish cause and effect relations. Moreover, other variables relating to the use and quality of healthcare provided should be considered in subsequent studies. In spite of this, this study has managed to identify that the most unfavorable conditions related to poverty, education, lack of information, impact on personal relations and those related to the disease also entail greater use of the SUS, even though the other services (private, philanthropic and health coverage plans) still represent most dental care provided in Brazil.

The reasons that explain such inequalities are historical and complex and the changes required to face up to them should start with the government, chiefly at the local level, which has the function of putting into practice the existing public policies, especially those having a bearing on health determinants. Hence, it is hoped that this study will contribute to increasing knowledge regarding the factors related to equity in the use of dental services provided to the elderly by the SUS.

Collaborations

RFR Oliveira, JGS Souza, DS Haikal, EF Ferreira and AMEBL Martins participated equally in all stages of preparation of the article.

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