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Inequalities in self-rated oral health in adults

ABSTRACT

OBJECTIVE: To investigate the link between self-rated oral health and socio-demographic inequalities.

METHODS: Cross-sectional study, carried out with 2,016 adults between 20 and 59 years of age in 2009, in Florianopolis, SC, Southern Brazil. We adopted a two-stage sampling design (census tracts and households). Data were collected through face-to-face interviews, conducted in the participants' households. The outcome was self-rated oral health. The exploratory variables were demographic characteristics, indicators of socioeconomic position, dental service utilization and adverse self-reported oral health conditions. Analysis was performed using multivariable poisson regression, which allowed the estimation of prevalence ratios and 95% confidence intervals.

RESULTS: The prevalence of negative self-rated oral health was 33.2% (95%CI 29.8;36.6). In the adjusted analysis, being of an older age, self-classifying as light-skinned black, lower education, the most recent dental appointment being three years or more ago, attending public dental surgeries, having less than 10 natural teeth in at least one arch, self-reporting need for dental treatment, reporting dry mouth, and difficulty eating due to tooth problems were associated with negative self-rated oral health.

CONCLUSIONS: Self-rated oral health reflects social inequalities in health, and it is associated with low socioeconomic status, less frequent use of dental services and poorer self-reported oral health conditions.

DESCRIPTORS: Adult. Diagnostic Self Evaluation. Oral Health. Health Inequalities. Dental Health Surveys. Cross-Sectional Studies.

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INTRODUCTION

Oral health problems, such as tooth decay, periodontal disease and tooth loss are determined by demographic and socioeconomic factors and use of health care services.[24] These health problems have a negative impact on the daily life of the individual, as they create functional difficulties, problems chewing and talking, and problems with sociability, such as being unhappy with appearance, difficulties being accepted socially and limiting access to the job market.[25]

Oral health problems are measured using clinical indices. However, they tend not to measure the impact of oral health conditions on the individual's daily life. A study with adults observed that aspects linked to oral health which were assessed using non-clinical parameters affected the daily life of 20.7% of participants, with 11.4% of respondents greatly affected. There have been significant advances in the development of measures that consider the impact of non-lethal health problems and subjective aspects associated with the concepts of health, well-being and satisfaction.

Using subjective measures to assess general and oral health is becoming increasingly important. Studies show that assessing oral health as one single item constitutes a summary measure of the individual's oral health.[9] This use means the individual's and society's status of oral health can be diagnosed.[7] Self-rated oral health is linked to the general state of health and to functional capacity and contributes independently to long term well-being and satisfaction.[12]

Individuals who report more oral health symptoms, impairment and disabilities have worse self-reported oral health,[9] whereas individuals who assess their oral health as negative have worse clinical conditions compared with those who rate their oral health positively.[12] The prevalence of negatively self-rated oral health was 40% higher in those who had periodontal disease in a study which assessed the link between periodontal disease and self-rated oral health.[7] Using self-rated oral health in population surveys, an easier measure than carrying out examinations, quickly identifies the state of the population's oral health and associated factors,[20] contributing to health care planning according to the population's needs.[7]

Obtaining information from adults on their oral health and its impact on their lives could contribute to reducing the social and physical consequences of oral health problems, with the goal of preventing tooth loss and improving health and quality of life in this age group. This will be reflected in the population's future health, considering the increase in life expectancy.[23]

In research conducted in December 2011 using the Medline-PubMed database, the search terms ("Oral health"[mesh] AND ("self-concept"[mesh] OR "self-assessment"[mesh]), were found in 391 studies carried out with a variety of populations and age groups. Only one Brazilian epidemiological population based study was found using self-rated oral health as the objective of the investigation in adults.[16] This study aims to analyze the link between self-rated oral health in adults and socio-demographic inequalities.

METHODS

This study is part of the population based, base line cohort study *Epi*Floripa – Epidemiologic Study of the Health of the Adult Population of Florianópolis, SC, Southern Brazil, which took place between September 2009 and January 2010. Florianópolis, the state capital of Santa Catarina, has a population of 404,224 and a Human Development Index of 0.875,[a] placing it fourth among Brazilian municipalities. The population studied was made up of adults aged between 20 and 59 at the time of the study, of both sexes, living in the community and resident in the urban area of the municipality.

The sample size was calculated using the formula to calculate prevalence for simple causal samples, adding the estimated relative value of design effect (due to it being cluster sampling) in two. As a variety of health outcomes were investigated, an outcome prevalence of 50%, error of four percentage points and 95% confidence level were used, giving a sample of 1,198 individuals. The final sample size was 2,016 individuals, with an added 10% to cover refusals and 20% to control for confounding factors in the multivariate analysis. This sample was deemed adequate to test the link between negative self-rated oral health and the factors in question in this study, with a power of 80% (error type II, $\beta = 20\%$) and error type I equal to 5% in order to estimate the prevalence ratio of 1.3, considering the prevalence of negatively rated oral health among those not exposed to be equal to 24%.

Sampling was conducted in two stages. The first sample units were the 420 urban census tracts which make up the municipality. The census tracts were stratified in ascending order of the head of the household's income, 60 tracts were systematically selected with a sampling share equal to seven, giving six tracts for each income decile. The second sample units were the residences. The number of residences varied from 61 to 754 between the tracts. The tracts were reorganized by merging and splitting these units to reduce the coefficient of variation. The initial coefficient of variation

[a] Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010. Rio de Janeiro; 2010.

was 55% (n = 60 tracts) and the final one was 32% (n = 63 sectors). These 16,755 residences made up the 63 sectors of the sample. The residences were selected with a sample share equal to eight, giving a total of 2,094 selected. Thus, a sample size of 2,016 adults, or 32 adults per census tract, was obtained.

Data were collected by 35 interviewers. The face-to-face interviews took place individually in the residences. The interviewers were trained and a pre-test of the questionnaire was accomplished with 30 adults in the same age group as the population studied. A pilot study, in which each interviewer conducted at least three interviews, was carried out. Approximately 15% (n = 248) of the interviews were selected for quality control and the interviews were repeated using a questionnaire with a smaller number of questions. The reproducibility of the questionnaire was deemed to be satisfactory, with kappa and coefficient of correlation values between 0.6 and 0.9.

The dependent variable was self-rated oral health, obtained by asking "Concerning your teeth, are you: very happy, satisfied, neither satisfied nor dissatisfied, dissatisfied or very dissatisfied". The variable was dichotomized into positive (very happy, satisfied) and negative (neither satisfied nor dissatisfied, dissatisfied or very dissatisfied) self-rated oral health. This form of categorization has been used in various national[14,16,20] and international studies.[8]

The independent variables were divided into blocks.

The first was made up of the demographic variables: sex, age in full years (in groups of ten years, from 20 to 59 years old), self-reported skin color (white, dark, black, yellow and indigenous).

The second block was made up of socioeconomic and education variables: per capita income in terciles (total income, in reais, of all household members in the month preceding the interview, divided by the number of household members; 3rd tercile ≥ R$ 1,314.00, 2nd tercile between R$ 561.00 and R$ 1,300.00, 1st tercile ≤ R$ 560.00) and schooling in full years studied (≥ 12, nine to 11, five to eight and ≤ 4 years).

The third block contained variables concerning use of health care services: length of time since last dentist appointment (< 1 year, one to two years and ≥ 3 years) and type of appointment (private, public or other).

The last block constituted variables concerning self-reported oral health conditions: number of natural teeth (ten or more, fewer than ten or none in both dental arches).

The other variables concerning oral health conditions were: a combination of responses in categories of ≥ 10 teeth in both dental arches, < 10 in at least one arch and no teeth. Perceived need for dental treatment (yes; no), use of complete denture (yes; no), dry mouth (never, sometimes, often, always and unknown, categorized as never or occasionally – sometimes, often and always), difficulty eating due to teeth (never, rarely, sometimes, often, always and unknown, categorized as never or occasionally – sometimes, often, always) and toothache in the last six months (yes; no).

Sample weighting and design effect were considered in all of the analyses, using the *svy* command. Bivariate analysis, when appropriate, was carried out using the Rao Scott test.[21] Variables which showed a statistical link ($p < 0.20$ with the outcome were then subject to Poisson multivariate regression analysis, and prevalence ratios (PR) and 95% confidence intervals were estimated.[3]

The variables were inputted for the multivariate analysis, according to a hypothetical theoretical model for determining the self-assessment of oral health.[26] The model used (Figure) considers that the way in which an individual evaluates their oral health is influenced by demographic and socioeconomic factors, by use of dental health care services and their oral health conditions.

The demographic conditions (ski color, sex and age) occupy a distal position in determining oral health problems, influencing socioeconomic conditions (income and schooling).[2] Males and females, indigenous populations, blacks and whites occupy distinct positions in social hierarchies and also bring with them different

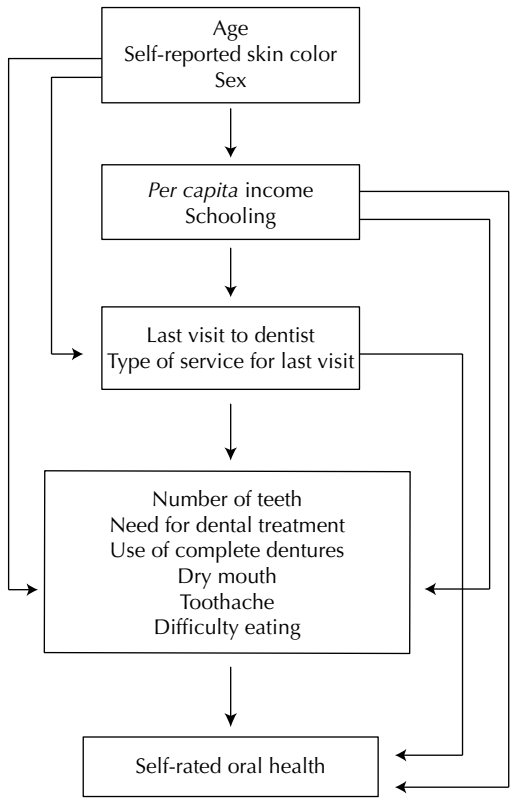

Figure. Hypothetical model applied to the multivariate analysis. Florianópolis, SC, Southern Brazil, 2009 to 2010.

experiences of being born, living, falling ill and dying.[13] Skin color and sex can lead to discrimination and job and wage segregation, causing income disparities and affecting the population's socioeconomic conditions.[13]

Income affects eating and living patterns, access to knowledge and health care, which have a direct effect on exposure to risk factors for various diseases, including oral health problems.[5] Poor socioeconomic status and precarious living conditions make it difficult to prioritize oral health and lead to difficulties accessing orthodontic services, with the consequence of poor quality dental care and tooth loss.[17] The connection between the social structure and oral health could be due to material, behavioral and psychosocial bias.[4] Although, in health outcomes, causal relationships are not immediate, schooling plays an important role in understanding inequalities in the population's levels of health,[5] schooling is one of the main barriers affecting the use of dental services.[15]

Using dental health care services influences the population's state of health, as the risk of disease is reduced through care and prevention. Using these services reduces unfavorable health conditions, by controlling and treating oral health problems, and access to health care services is strongly influenced by social conditions, income and schooling.[17] Oral health problems such as tooth decay, periodontal disease and tooth loss are determined by demographic and socioeconomic factors and using dental health care services[24] which, in turn, negatively affect self-rated oral health.[7,12]

The data were analyzed using the Stata 9.0 program (Stata Corp, College Station, TX, USA).

The project was submitted to and approved by the Human Research Ethics Committee of the *Universidade Federal de Santa Catarina* (Process nº 351/08, on 15th December 2008). Participants signed an informed consent form.

RESULTS

Among the 1,720 interviewees (response rate of 85.3%), 33.2% rated their oral health negatively. This condition was significantly more prevalent in those with lower levels of income and schooling. Having fewer than ten teeth in at least one dental arch and perceived need for dental treatment were strongly associated with negatively self-rated oral health.

The interviewees were predominantly female (55.6%), with self-reported skin color white (83.9%), aged between 20 and 29 years old, in the upper income tercile ≥ R$ 1,314.00 and 12 or more years of schooling.

Most individuals had seen a dentist within the last year (76.3% privately); 82.0% of individuals had ten or more teeth in both dental arches and a little over half report needing dental treatment. A small proportion of the sample used dentures, had difficulty eating and had had toothache in the last six months (Table 1).

Negatively self-rated oral health was significantly higher in those with lower incomes, lower schooling, who had not seen a dentist for three or more years, and used a public dental service.

Most interviewees perceived the need for dental treatment; and almost half of these reported toothache within

Table 1. Description of the sample according to the characteristics evaluated. Florianópolis, SC, Southern Brazil, 2009 to 2010.

Variable	n	%	95%CI
Self-rated oral health (N = 1,719)			
Positive (very good and good)	1,137	66.8	63.4;70.2
Negative (regular, bad and very bad)	582	33.2	29.8;36.6
Self-rated health (N = 1,720)			
Positive (very good and good)	1,373	81.2	78.3;84.1
Negative (regular, bad and very bad)	347	18.8	15.9;21.7
Sex (N = 1,720)			
Male	761	44.4	42.2;46.6
Female	959	55.6	53.4;57.7
Self-reported skin color (N = 1,715)			
White	1,444	83.9	80.3;87.4
Dark	147	8.9	6.5;11.2
Black	87	5.0	3.3;6.7
Yellow	17	1.0	0.5;1.5
Indigenous	20	1.2	0.6;1.7

Continue

Continuation

Age (years) (N = 1,720)			
20 to 29	540	32.7	28.2;37.17
30 to 39	392	22.9	20.3;25.5
40 to 49	438	25.0	21.8;28.1
50 to 59	350	19.4	16.9;21.9
Income in terciles (N = 1,685)			
3rd tercile (≥ R$ 1,314.00)	559	34.1	27.8;40.4
2nd tercile (R$ 561,00 to R$ 1,300.00)	562	33.3	29.6;36.9
1st tercile (≤ R$ 560.00)	564	32.6	26.1;39.0
Schooling (years) (N = 1,716)			
12 or more	737	43.8	37.0;50.8
9 to 11	568	33.4	28.1;38.0
5 to 8	253	14.0	11.2;16.7
Up to 4	158	8.8	6.4;11.1
Last visit to the dentist (years) (N = 1,705)			
Less than one	1,136	66.9	63.0;70.7
1 to 2	381	22.4	19.1;25.7
3 or more	188	10.7	8.6;12.8
Type of service used (N = 1,707)			
Private	1,293	76.3	72.4;80.3
Public	331	19.0	14.9;23.0
Other	83	4.7	3.1;6.3
Number of teeth (N = 1,717)			
≥ 10 teeth in both dental arches	1,394	82.0	79.1;84.9
< 10 teeth in at least one dental arch	279	15.6	12.9;18.2
No teeth	44	2.4	1.6;3.3
Perceived need for dental treatment (N = 1,715)			
No	726	42. 7	38.9;46.4
Yes	989	57.3	53.5;61.0
Use complete dentures (N = 1,698)			
No	1,575	92.9	91.1;94.7
Yes	123	7.1	5.2;8.9
Dry mouth (N = 1,716)			
Never	888	52.5	47.8;57.1
Sometimes	676	47.5	42.8;52.2
Difficulty eating (N = 1,712)			
Never or rarely	1,573	92.1	90.1;93.8
Sometimes	139	7.9	6.1;9.6
Toothache (N = 1,674)			
No	1,422	85.2	83.2;86.7
Yes	252	14.8	13.3;16.8

the last six months. Those who reported having a dry mouth and difficulty eating showed a higher prevalence of negative self-rated oral health (Table 2).

Being female (PR = 1.2; 95%CI 1.0;1.3), being aged between 30 and 39 (PR = 1.3, 95%CI 1.1;1.6) and 50 and 59 (PR = 1.3, 95%CI 1.0;1.7), having self-reported dark skin (PR = 1.2, 95%CI 1.0;1.4),having up to four years schooling (PR = 1.6, 95%CI 1.2;2.0), between five and eight years of schooling (PR = 1.6, 95%CI 1.2;2.0) and from nine to 11 years of schooling (PR = 1.4, 95%CI 1.1;1.7) remained linked to negatively

Table 2. Prevalence of negative self-rated oral health, according to demographic, socioeconomic and behavioral variables and self-rated oral health in adults aged 20 to 59. Florianópolis, SC, Southern Brazil, 2009 to 2010.

Variable	n	%	95%CI	p
Sex				0.017[a]
Male	234	30.2	26.3;34.2	
Female	348	35.5	31.7;39.3	
Self-reported skin color				0.003[a]
White	461	31.2	27.6;34.7	
Dark	68	45.8	37.5;54.1	
Black	35	39.7	28.6;50.8	
Yellow	8	52.8	27.7;77.9	
Indigenous	8	31.9	8.8;55.2	
Age (years)				< 0.001[a]
20 to 29	132	23.7	18.9;28.6	
30 to 39	136	35.9	29.4;42.5	
40 to 49	163	37.5	31.0;39.9	
50 to 59	151	42.8	36.9;48.7	
Income in terciles				< 0.001[b]
3rd tercile (≥ R$ 1,314.00)	115	19.9	15.8;24.1	
2nd tercile (R$ 561,00 to R$ 1,300.00)	202	35.7	31.7;39.7	
1st tercile (≤ R$ 560.00)	255	44.7	40.4;49.0	
Schooling (years)				< 0.001[b]
12 or more	149	19.5	16.5;22.6	
9 to 11	211	36.9	31.9;41.8	
5 to 8	133	53.2	46.3;60.1	
Up to 4	87	54.9	47.4;62.4	
Last visit to the dentist (year)				< 0.001[b]
Less than one	347	29.8	26.2;33.4	
1 to 2	133	34.7	27.1;42.2	
3 or more	99	52.5	46.0;59.1	
Type of service used				< 0.001[a]
Private	391	29.9	26.4;33.3	
Public	166	48.7	42.2;55.2	
Other	23	28.3	18.9;37.8	
Number of teeth				< 0.001[b]
≥ 10 teeth in both dental arches	399	28.2	24.5;31.9	
< 10 teeth in at least one dental arch	167	59.1	53.1;65.1	
No teeth	16	36.0	22.8;49.1	
Perceived need for dental treatment				< 0.001[a]
No	66	9.0	6.6;11.4	
Yes	515	52.1	47.2;55.3	
Use complete dentures				< 0.001[a]
No	519	32.5	28.9;36.0	
Yes	63	49.0	39.3;58.9	
Dry mouth				< 0.001[a]
Never	260	28.4	24.7;32.1	
Sometimes	322	38.6	34.3;42.9	

Continue

Continuation

Difficulty eating				< 0.001
Never or rarely	476	29.6	26.5;32.8	
Sometimes	103	73.8	66.3;81.3	
Toothache (N = 1,674)				< 0.001
No	447	30.7	27.1;34.3	
Yes	119	47.2	39.2;55.1	

[a] Rao Scot test[21]
[b] Chi-square test for linear trend

self-rated oral health in the adjusted analysis. Not having seen a dentist for three or more year (PR = 1.3, 95%CI 1.1;1.5), using a public dental service for the most recent dental appointment (PR = 1.1, 95%CI 1.0;1.2) and having fewer than ten teeth in at least one dental arch (PR = 1.3, 95%CI 1.1;1.6) remained associated with poor self-rated oral health. Reporting the need for dental treatment (PR = 4.4, 95%CI 3.3;6.0), having a dry mouth (PR = 1.2, 95%CI 1.1;1.5) and difficulty eating (PR = 1.3, 95%CI 1.2;1.5) remained associated with negative self-rated oral health after adjustment (Table 3).

DISCUSSION

A third of those questioned reported their self-rated oral health to be negative. Those who were older, dark skinned and had fewer years of schooling, who had gone a longer time without visiting the dentist, with teeth, perceiving themselves as needing dental treatment, those who reported experiencing dry mouth and difficulty chewing were associated with negative self-rated oral health in the adjusted analysis.

The study had a higher response rate than other studies on the subject with similar methodology.[7] The response rate was similar for all income groups. Demographic characteristics; income and schooling were similar throughout the population of the municipality, suggesting that there was no selection bias. Possible confounding factors were able to be controlled using multivariate analysis, contributing to pinpointing the effects of different factors on self-rated oral health in the adult population.

Studies with a similar methodology indicate rates of prevalence of negative self-rated oral health of between 44.6%[19] and 53.3%,[18] higher than those in this study (33.3%). This may occur because the sample was composed of a population with higher income and levels of schooling. A limitation of the study is that self-rated measures vary according to cultural aspects and individual expectations, and thus do not totally correspond with clinical assessments of the conditions investigated.

Problems related to oral health, such as difficulty chewing, talking or pain are more commonly reported by women,[11] with a prevalence of negatively self-rating their oral health 20.0% higher than among men. However, there is no consensus in the literature regarding this result and studies have reported no difference between the sexes.[14,22]

Older individuals have a positive perception of their oral health conditions.[14,21,23] However, in this study, they showed a higher prevalence of negatively self-rating their oral health, indicating greater perception of oral health problems compared to younger individuals.

Research carried out in the United States show that whites report their oral health more positively than non-whites[8] and than blacks.[6] The stress experienced daily by blacks and dissatisfaction with their situations lead to changes in the quality of life, as well as increasing vulnerability to disease.[13] Those who reported themselves to be dark skinned had a prevalence rate of negatively self-rating their oral health 20.0% higher than white individuals, irrespective of gender. This association remained after adjusting for socioeconomic variables (income and schooling) and other possible factors linking skin color and perceived oral health.

Individuals who report more oral health symptoms, impairment and disabilities assess their oral health more negatively.[12] Experiencing dry mouth and difficulty eating were linked to higher prevalence of negative self-rated oral health. Both difficulty eating[11] and experiencing dry mouth may reflect oral health problems. Unfavorable clinical oral health conditions, like tooth decay[17] and periodontal disease,[7] are associated with negatively self-rated oral health. Having fewer teeth increased the prevalence of negative self-rated oral health by 30.0%; reporting the need for dental treatment was strongly linked to a negative perception of oral health, reflecting the negative impact perceived by those who suffer from tooth loss and dental problems.

The percentage of negative self-rated oral health among individuals with levels of income and schooling reflects the link between oral health and social inequalities. Economically disadvantaged adults tend to perceive greater negative impact of problems with their teeth, mouth or dentures, report greater tooth loss and assess oral health less favorably than adults in better

Table 3. Association between negative self-rated oral health according to socioeconomic and demographic variables, use of service self-reported oral health conditions. Poisson raw and multivariate analysis. Florianópolis, SC, Southern Brazil, 2009 to 2010.

Variable	Raw analyse		Model 1[a]		Model 2[b]		Model 3[c]		Model 4[d]	
	PR	95%CI	PR	95%CI	PR	95%CI	PR	95%CI	PR	95%CI
Age (year)										
20 to 29	1		1		1		1		1	
30 to 39	1.5	1.2;1.9	1.5	1.2;1.9	1.5	1.2;1.8	1.5	1.2;1.8	1.3	1.1;1.6
40 to 49	1.5	1.2;1.9	1.5	1.2;1.9	1.4	1.2;1.8	1.4	1.1;1.7	1.1	0.9;1.4
50 to 59	1.8	1.4;2.3	1.8	1.4;2.3	1.7	1.3;2.1	1.6	1.3;2.1	1.3	1.0;1.7
Self-reported skin color										
White	1		1		1		1		1	
Dark	1.5	1.2;1.8	1.5	1.2;1.9	1.3	1.1;1.6	1.3	1.1;1.6	1.2	1.0;1.4
Black	1.3	1.0;1.7	1.4	1.0;1.8	1.0	0.8;1.4	1.1	0.8;1.5	1.0	0.8;1.3
Yellow	1.7	1.1;2.6	1.6	1.0;2.4	1.3	0.8;2.1	1.4	0.8;2.1	1.3	0.8;2.1
Indigenous	1.0	0.5;2.0	1.0	0.5;2.0	0.8	0.4;1.6	1.0	0.5;1.8	0.8	0.4;2.1
Sex										
Male	1		1		1		1		1	
Female	1.2	1.0;1.3	1.1	1.0;1.3	1.1	1.0;1.3	1.2	1.0;1.3	1.2	1.0;1.3
Income in terciles										
3rd tercile (≥ R$ 1,314.00)	1				1		1		1	
2nd tercile (R$ 561.00 to R$ 1,300.00)	1.8	1.4;2.2	–		1.5	1.2;2.0	1.5	1.2;2.0	1.3	1.0;1.6
1st tercile (≤ R$ 560.00)	2.2	1.8;2.8	–		1.6	1.2;2.1	1.5	1.1;2.1	1.2	0.9;1.5
Schooling (years)										
12 or more	1				1		1		1	
9 to 11	1.9	1.6;2.3	–		1.6	1.3;2.0	1.6	1.3;1.9	1.4	1.1;1.7
5 to 8	2.7	2.2;3.4	–		2.0	1.6;2.6	1.9	1.4;2.4	1.6	1.2;2.0
Up to 4	2.8	2.3;3.5	–		1.9	1.5;2.5	1.8	1.4;2.3	1.6	1.2;2.0
Last visit to the dentist (years)										
Less than one	1		–		–		1		1	
1 to 2	1.2	1.0;1.5	–		–		1.1	0.9;1.3	1.0	0.9;1.2
3 or more	1.8	1.5;2.1	–		–		1.2	1.0;1.5	1.3	1.1;1.5
Type of service used										
Private	1		–		–		1		1	
Public	1.6	1.4;1.9	–		–		1.1	1.0;1.3	1.1	1.0;1.2
Other	1.0	0.7;1.3	–		–		1.0	0.7;1.3	1.0	0.8;1.4
Number of teeth										
≥ 10 teeth in both dental arches	1		–		–		–		1	
< 10 teeth in at least one dental arch	2.1	1.8;2.4	–		–		–		1.3	1.1;1.6
No teeth	1.3	0.9;1.9	–		–		–		1.1	0.6;1.6
Perceived need for dental treatment										
No	1		–		–		–		1	
Yes	5.7	4.3;7.5	–		–		–		4.4	3.3;6.0
Use complete dentures										
No	1		–		–		–		1	
Yes	1.5	1.2;1.9	–		–		–		0.9	0.7;1.2

Continue

Continuation

Dry mouth							
Never	1		–	–	–	1	
Sometimes	1.4	1.2;1.6	–	–	–	1.2	1.1;1.5
Difficulty eating							
Never or rarely	1		–	–	–	1	
Sometimes	2.5	2.1;2.9	–	–	–	1.3	1.2;1.5
Toothache							
No	1					1	
Yes	1.5	1.2;1.9				1.1	0.9;1.3

[a] Adjusted for demographic variables (sex, skin color and age)
[b] Adjusted for socioeconomic variables (income and schooling)
[c] Adjusted for variables of dental service use (last visit and type of service used)
[d] Adjusted for variables of self-reported oral health (number of teeth, need for dental treatment, use of complete denture, dry mouth and difficulty eating)

economic conditions.[11] Likewise, a higher level of education is associated with better health, suggesting a direct relationship between years of schooling and good self-rated oral health.[12]

The use of dental services, and the frequency of their use affects oral health conditions. Individuals who had visited the dentist within the last year or once every two years perceived their oral health more positively compared with those who had not seen a dentist in a longer time. Not visiting the dentist for routine check-ups[1] or waiting more than three years between visits increases the prevalence of negative self-rated oral health,[14] as oral health problems may progress without professional care, causing pain, discomfort and irreversible damage to teeth.[1] Using a public dental service for the most recent appointment increased the prevalence of negative self-rated oral health by 10.0%, even after adjusting for socioeconomic and demographic variables. The public dental services' greater burden of oral health problems and limited ability to resolve them may partially explain these findings.

By identifying factors associated with self-rated oral health, those groups whose oral health care should be prioritized can be identified and, consequently, public resources can be better allocated. Distal (age, skin color, schooling, frequency of visiting the dentist and type of service used) and proximal factors (number of teeth in the dental arches, reported need for dental treatment, experiencing dry mouth and difficulty eating) were linked to negative self-rated oral health. Negative self-rated oral health reflects inequalities in the population's oral health and is linked to worse socioeconomic conditions, lower use of health care services and worse oral health conditions. More studies using self-rated oral health are needed so that it becomes better understood and so it can be more widely used in assessing health.

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