CSP CADERNOS DE SAÚDE PÚBLICA
REPORTS IN PUBLIC HEALTH

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ARTICLE

Social and racial inequity in self-rated oral health in adults in Southern Brazil

Desigualdades sociais e raciais na autoavaliação da saúde bucal em adultos no Sul do Brasil

Inequidades sociales y raciales en salud oral autoinformada de adultos del Sur de Brasil

Sarah Arangurem Karam [1]
Helena Silveira Schuch [1]
Flávio Fernando Demarco [1]
Fernando C. Barros [2]
Bernardo L. Horta [1]
Marcos Britto Correa [1]

doi: 10.1590/0102-311X00136921

Abstract

This study aimed to estimate social and racial inequalities in self-rated oral health in adults from the Brazilian birth cohort study. This study belongs to 1982 Pelotas (Brazil) birth cohort study. Data from this study was collected for oral health conditions 31 years old (Oral Health Study). *The outcome was self-rated oral health, dichotomized into positive (good/very good) and negative (regular/bad/very bad). Analyses were stratified by gender, racial/skin color groups, schooling level and income. For statistical analysis, the slope index of inequality (SII) and the concentration index (CIX) were used. The prevalence of negative self-rated oral health was 36.1%. Social inequalities were observed in self-rated oral health in both absolute and relative terms. A SII of -30.0 (95%CI: -43.6; -16.4) was observed for income, and -27.7 (95%CI: -41.9; -13.4) for schooling level. Both the individuals' income and the schooling level had negative CIX (CIXincome -14.6 [95%CI: -21.2; -8.0] and CIX-schooling level -14.1 [95%CI: -20.7; -7.5]). Furthermore, the prevalence of negative self-rated oral health in black/brown/indigenous individuals from the highest income/schooling level was comparable to prevalence of the outcome in the white individuals belonging to the lowest income/schooling levels. This study results demonstrate racial disparities in oral health regardless of income and schooling levels. Furthermore, a higher concentration of negative self-rated oral health was identified among the most socioeconomically vulnerable individuals. Our findings reinforce the presence of racial and socioeconomic inequalities in oral health.*

Oral Health; Racism; Ethnic Groups; Socioeconomic Factors

Correspondence
S. A. Karam
Rua Gonçalves Chaves 457, Pelotas, RS 96015-560, Brasil.
sarahkaram_7@hotmail.com

[1] *Universidade Federal de Pelotas, Pelotas, Brasil.*
[2] *Universidade Católica de Pelotas, Pelotas, Brasil.*

Introduction

Despite being preventable, oral diseases are highly prevalent [1]. Approximately half of the world's population suffers from some oral disease, and the number of people affected by such conditions decreased by only 5.5% between 1990 and 2017 [2]. Oral health problems – such as caries and other oral diseases – affect individuals' quality of life and, consequently, their self-perception of oral health [3,4,5]. In Brazil, four out of five adults aged 35-44 years have untreated dental caries and 38% are dissatisfied with their oral health [6].

Self-rated oral health is a measurement widely used in epidemiological studies. It is a subjective assessment related to personal perception of oral health, assessing broad dimensions such as teeth and gums sensibility, need for dental treatment, the appearance of the teeth, chewing, and speech abilities [4,7]. It also correlates with objective conditions clinically evaluated, such as number of missing, decayed, and filled teeth and use of dental prosthesis [3,4,8]. In recent years, oral health patient-reported outcomes have gained more attention.

Most risk factors for dental caries are influenced by social conditions [9]. Social determinants of health include social and economic experiences throughout life, such as income, schooling level, employment opportunities and work environment [10,11,12]. Health inequity is a specific type of inequality that denotes an unfair difference in health under a moral judgment that this inequality is wrong [10]. Inequality in the social determinants of health reflects an unfair distribution of health risks and resources, so that to guarantee equity in health, equality in health rights is necessary [10,13]. Socioeconomic inequalities are decisive to oral health problems, as they influence eating habits, oral hygiene, and use of dental services [1,9,14]. Furthermore, racial disparities can affect health and disease patterns in the population, playing an important role in the development of socioeconomic inequalities in oral health due to structural racism embedded in society as well as individual discriminatory experiences [15,16,17]. The worst oral health conditions most often affect black and brown-skinned individuals, who have little access to education, and who belong to lower-income families [9,18,19]. A similar situation happens with indigenous population, since indigenous also show few records of dental care, high prevalence of dental caries and considerable tooth loss [20]. Therefore, poor oral health self-perception is associated with unfavorable socioeconomic and demographic factors [4,8,21,22].

Although literature widely documented the association between socioeconomic conditions and oral health, few researchers are interested in and have available data to assess and to describe the magnitude of social and racial inequalities in oral health. Our study aimed to quantify inequities according to social determinants of health, such as gender, racial/skin color groups, schooling level, and income in the self-rated oral health of 31-year-old adults from the 1982 Pelotas (Brazil) birth cohort study. We hypothesized that there would be a polarization of social and racial inequities in the distribution of self-rated oral health in the most disadvantaged groups participating in the birth cohort.

Methods

Study population

This study used data from the 1982 Pelotas (Brazil) birth cohort. In 1982, the maternity hospitals located in Pelotas, a Southern Brazilian municipality, were daily visited and the births were regularly identified. Live births whose families lived in the urban area of the municipality were examined, and their mothers were interviewed (n = 5,914). This population has been prospectively followed several times, and further methodological details have been published elsewhere [23,24].

In 2012, a follow-up of the whole cohort was conducted (mean age 30.2 years), and 3,701 participants were evaluated. Socioeconomic and health-related conditions were assessed, such as anthropometric measures, physical activity, and blood and DNA samples were collected from the participants [25].

Oral Health Study (OHS) in the 1982 birth cohort started in 1997 (OHS-97), and subjects were aged 15 years. In 1997, a systematic sample of 70 (27%) of the 259 census tracts in the municipality was selected, and 1,076 adolescents from the original birth cohort were interviewed. Out of these, a random sample of 900 individuals was selected and invited to participate in the OHS-97.

The OHS-97 evaluated oral health conditions, such as dental caries, malocclusion, and use of dental services in 888 (98.7% of the 900 invited) adolescents [26]. The OHS sample was contacted again in 2006, when subjects were aged 24 years, and 720 subjects were evaluated. In 2013, the 888 OHS-97 participants were contacted again for a new oral health follow-up, the OHS-13. The OHS-13 comprised a health interview and a clinical dental examination [27], and 541 out of the 888 participants were interviewed and examined (61% of the targeted sample).

Eligibility criteria

Individuals from the 1982 Pelotas (Brazil) birth cohort study who were interviewed in the general follow-up at the age 30 of the 1982 cohort in 2012, and later in the OHS-13 in 2013 were comprised in this study. A total of 537 individuals with valid data on all variables of interest were included. Participants who did not respond to the outcome of interest were excluded.

Variables

This study outcome was self-rated oral health, measured in subjects aged 31 years using the question "Compared to people your age, how do you consider your teeth, mouth and gums health?" with answer options "very good", "good", "regular", "bad", or "very bad", which were later dichotomized into positive (good/very good) and negative rating (regular/bad/very bad). This self-rated oral health question is derived from Locker's original global oral health item, which has been validated for Brazilian Portuguese [28].

Analyses were stratified for the variables assessed in the 1982 cohort follow-up, when subjects were aged 30 years: gender (men and women), self-reported racial/skin color groups (dichotomized into white group and black/brown-skinned/indigenous group), completed years of formal education (0-4 years, 5-8 years, 9-11 years, 12 or more years) and monthly household income categorized in quartiles.

Statistical analysis

Statistical analysis used Stata 15.0 software (https://www.stata.com). In this study, a descriptive analysis was performed. The frequencies of the outcome according to gender, racial/skin color groups, schooling level, and income were showed using equiplots (http://www.equidade.org/equiplot) and Fisher's exact test. Furthermore, two inequality indicators were used: slope index of inequality (SII) and the concentration index (CIX).

The SII measures absolute inequality in percentage points (p.p.). It shows the absolute difference, in predicted values, of a health indicator between the most favored and least favored individuals regarding socioeconomic indicators. The SII considers the entire distribution by using an appropriate regression model. The CIX identifies the relative inequality. This indicator is based on a concept similar to the Gini index for the concentration of income. It expresses how far a distribution is from total equality [29,30]. Statistical significance was defined as $p < 0.05$, in which p-value reflects the probability that the index is different from zero (no inequality), and 95% confidence intervals (95%CI).

The study was approved by the Human Ethics Research Committee of the Faculty of Medicine, Federal University of Pelotas (UFPel; protocol n. 384,332). All participants signed an informed consent form, and anonymity was guaranteed.

Results

This study evaluated 537 individuals where 50.6% were men, 79.6% self-identified as White skin group and 45.4% have completed 12 years or more of formal education. The average monthly household income was BRL 3,109.34 (USD 1,414 according to the exchange rate in the year of data collection, 2013). The prevalence of negative self-rated oral health was 36.1% (Table 1).

Table 1

Socioeconomic and oral health characteristics of individuals followed at 31 years old of the 1982 Pelotas (Brazil) birth cohort.

Characteristics *	n (%)	Mean (SD)
Gender [n = 537]		
Men	272 (50.6)	-
Women	265 (49.4)	-
Racial/Skin color groups [n = 509]		
White	405 (79.6)	-
Black/brown	94 (18.5)	-
Indigenous	10 (1.9)	
Income ** [n = 469]		
1st (poorest quartile)	118 (25.3)	937.38 (375.21)
2nd	117 (24.9)	1,847.76 (222.92)
3rd	117 (24.9)	2,901.98 (371.75)
4th (richest quartile)	117 (24.9)	6,768.81 (3,425.67)
Schooling level (years) [n = 491]		
≤ 4	26 (5.3)	-
5-8	86 (17.5)	-
9-11	156 (31.8)	-
≥ 12	223 (45.4)	-
Self-rated oral health [n = 537]		
Positive	343 (63.9)	-
Negative	194 (36.1)	-

* Different sample due to missing data at the time of collection;

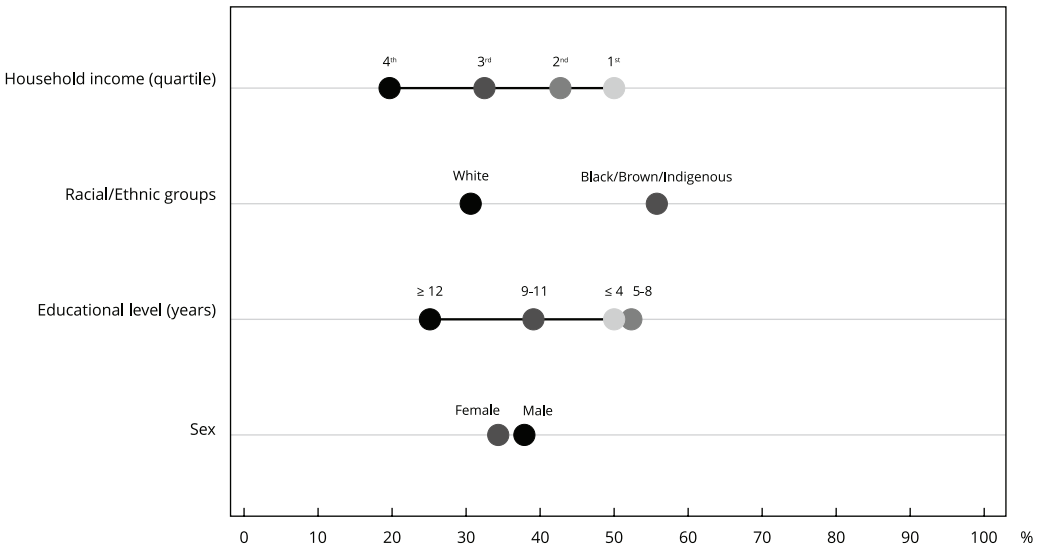
** Brazilian Real – BRL (2013 USD quotation: USD 1.00 = BRL 2.20/2021 USD quotation: USD 1.00 = BRL 5.20).

Figure 1 shows the prevalence of individuals who negatively rated their oral health by each stratum. Both genders had a prevalence of negative self-rated oral health around 35%. We observed negative self-rated oral health in 55.8% (95%CI: 46.1; 65.0) of the black/brown-skinned/indigenous group. We also observed the same result in 50% (95%CI: 41.1; 58.9) of those individuals who belonged to the lowest quartile of income as well as among half of those who completed up to four years of schooling (95%CI: 31.6; 68.4). The analysis stratified by both racial/skin color group and socioeconomic status (income or schooling level) showed that regardless of socioeconomic status, participants of the black/brown-skinned/indigenous group showed a higher prevalence of negative self-rated oral health (Figures 2 and 3). Figures 2 and 3 also illustrate that the prevalence of negative self-rated oral health in the black/brown-skinned/indigenous group from the highest socioeconomic status groups was comparable with the prevalence of the outcome in the white group with the lowest income/schooling level. Moreover, considering schooling level, the gap between white and black/brown-skinned/indigenous groups increased in the group of individuals with ≥ 12 years of schooling, compared to the gap showed in individuals with ≤ four years of schooling. In both strata, the p-value for the difference in the prevalence of negative self-rated oral health was < 0.05.

The absolute difference in the prevalence of negative self-rated oral health between those belonging to the poorest income quartile and those from the richest quartile was 30% (SIIincome -30.0 [95%CI: -43.6; -16.4]). Regarding schooling level, the absolute difference was 27.7% (SIIschooling level -27.7 [95%CI: -41.9; -13.4]) between individuals with less schooling and those with 12 or more years of study. Both the individuals' income and the schooling level had negative CIX (CIXincome -14.6 [95%CI: -21.2; -8.0] and CIXschooling level -14.1 [95%CI: -20.7; -7.5]), showing that the negative perception is concentrated among individuals belonging to the lowest income quartile and with the lowest schooling level. These CIX values showed a distribution of worse oral health self-perception pro-poverty (Table 2).

Figure 1

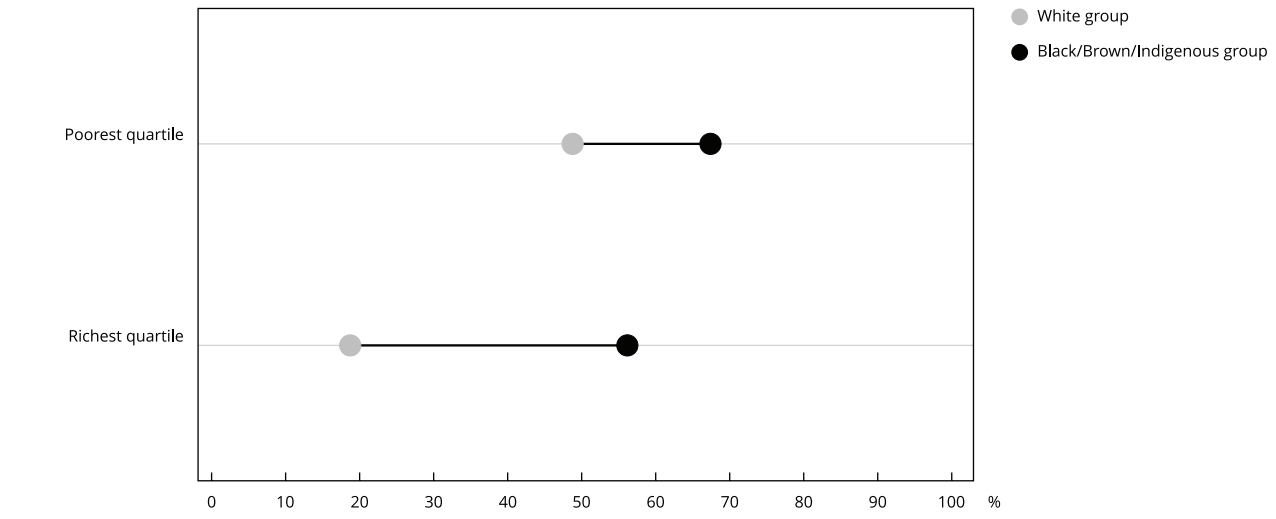
Equiplot of prevalence negative self-rated oral health by different stratifiers.



Note: negative self-rated oral health by different stratifiers in 31 years-old adults from the 1982 Pelotas (Brazil) birth cohort.

Figure 2

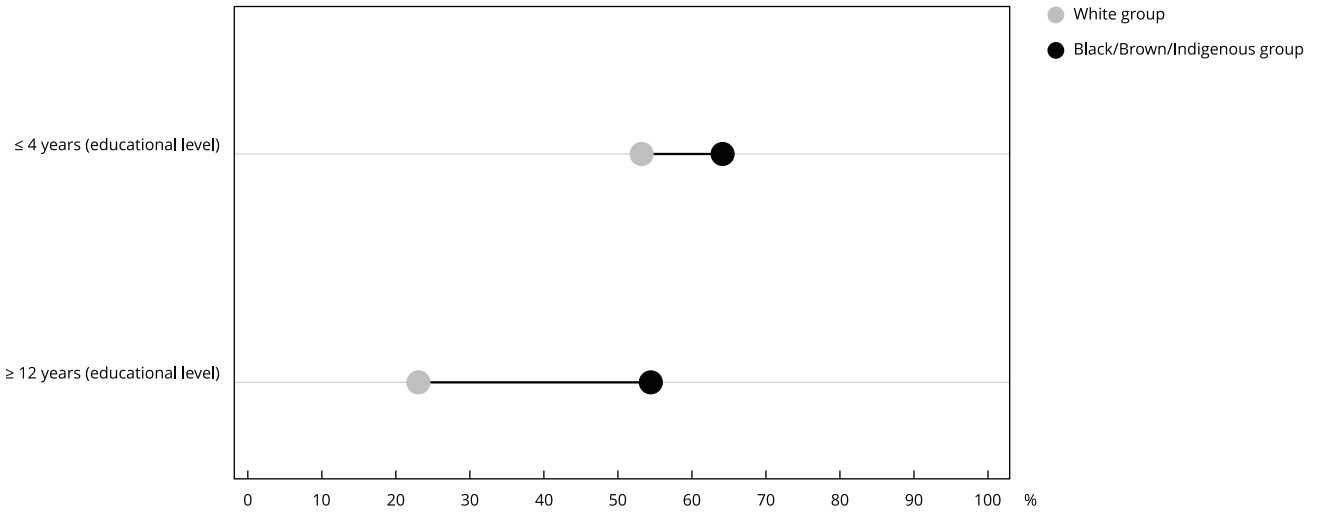
Equiplot of prevalence negative self-rated oral health in racial/skin color groups by first- and fourth-income quartiles.



Note: negative self-rated oral health in racial/ethnic groups by first- and fourth-income quartiles in 31 years-old adults from the 1982 Pelotas (Brazil) birth cohort.

Figure 3

Equiplot of prevalence negative self-rated oral health in racial/skin color groups by less and greater education.



Note: negative self-rated oral health in racial/ethnic group by less and greater education in 31 years-old adults from the 1982 Pelotas (Brazil) birth cohort.

Table 2

Distribution of health inequality indices (SII/CIX) for self-rated oral health in income and educational level of individuals followed at 31 years old of the 1982 Pelotas (Brazil) birth cohort.

	SII *		CIX **	
	β	95%CI	β	95%CI
Income	-30.0	-43.6; -16.4	-14.6	-21.2; -8.0
Schooling level	-27.7	-41.9; -13.4	-14.1	-20.7; -7.5

95%CI: 95% confidence interval; β: regression coefficient multiplied by 100; CIX: concentration index;
SII: slope index of inequality.
* Variables operationalization: quartile/categorical;
** Variables operationalization: continuous.

Discussion

Our study contributed with significant results to the literature due to their originality in quantified social and racial inequalities in self-rated oral health using indicators of health inequality. A 30% difference was found in the prevalence of negative self-rated oral health between the lowest income and schooling level and the richest and most educated individuals. Furthermore, it was possible to isolate differences regarding racial/skin color groups that were not related to individual income or schooling levels. Moreover, the gap between racial/skin color groups increased in individuals with a high schooling level. Our findings corroborate with the literature, where worse self-rated oral health is observed among people of black or brown skin colors [8,22].

Our sample size is relatively small, which is a limitation, but the selection process of the participants guaranteed a representative sample of the population. Also, the same individuals have had follow-ups for over 30 years, and our response rate is comparable with other longitudinal studies with such long follow-ups. The possibility of attrition bias due to lost-to-follow-up should also be discussed. Although the response rate of 60% considering the original sample, an attrition level analysis was recently published in this sample, revealing that no differences were found in the distribution of socioeconomic variables compared to the original sample [31]. The only difference observed was regarding gender, where men drop-outs were higher in the assessment of 31 years old. We found no differences regarding subjects' gender in this study outcome.

Self-report is a subjective measure and will not necessarily reflect the clinical oral health condition [3]. However, self-perception complements clinical data, assessing not only an individual's physical and psychological health, but also their social well-being and influences of oral health in their quality of life [4,32]. This is an important evaluation because an oral problem only affects the individual's daily life if it is perceived.

In our study, we grouped individuals who self-identified as black, brown-skinned or indigenous together because these are structurally underprivileged populations in the Brazilian society. The impacts of such disadvantage are showed in several areas, for example healthcare [15,33]. A very relevant finding of our study is the racial disparities in the negative self-rated oral health, showing large differences between white and black/brown/indigenous groups within the same income/schooling level strata. Note that, regardless of the income category to which the individual belongs or their schooling level, negative self-rated oral health was more prevalent among participants belonging to racial/skin color minorities. We also observed that the prevalence of negative self-rated oral health in the black/brown-skinned/indigenous group belonging to the richest quartile is similar to the prevalence of negative self-rated oral health in the white group in the poorest quartile. Considering that in our study the black/brown/indigenous group is predominantly composed of self-declared people of black/brown skin color, this difference reflects structural racism embedded in Brazil, similarly found in other countries. Racial discrimination originates from practices that culminate in disadvantages or privileges for individuals depending on the racial group to which they belong [34,35]. Racism is a systemic process in which privileged conditions are reproduced in politics, economics, and everyday actions [34,35]. However, structural racism transcends individual behaviors and institutions, it derives from the structure established in society. That means structural racism is observed in the spatial and social organization, history, and culture [36].

Structural racism can be expressed in the reports that individuals make due to adverse experiences they encounter, probably shaped by their understanding of the social context in which they live [37]. A negative self-rated oral health can reflect the individual's feelings in society, whether it is prejudice, exclusion, or not having the right to health care because systems of oppression affect one's self-perceived health [38]. Furthermore, when we evaluate self-rated oral health of individuals in the same income and schooling level groups and we observe a large gap between black/brown/indigenous and white groups, it can be assumed that a negative perception of their oral health, as a subjective indicator, may be a consequence of experiences of discrimination generated from structural racism, lack of acceptance and belonging to that socioeconomic stratum on the part of black/brown/indigenous group [34]. These aspects reinforces the theory that racism is a barrier to health equity, whether general or oral [37,39]. In Brazil – via structural racism – we can observe racial inequalities in access to health services and procedures, higher rates of morbidity and mortality in the black/brown skin color people compared to whites, and little efforts on treating this as a public health problem [40]. Thus, some studies have analyzed racial issues associated with socioeconomic issues, but it is increasingly necessary to disaggregate these issues to address how the higher prevalence of health problems in blacks and browns is a consequence of the susceptibility and social vulnerability of the historical context of Brazil for that population [41].

Although less than 2% of our sample declared themselves to be Indigenous, we must discuss the specifications in oral health for this population. Changes in their dietary patterns, such as the increased consumption of industrialized products with high cariogenic potential – that were not consumed before – can influence the distribution of oral diseases [20]. Furthermore, culturally-competent dental care must be provided aligned with the indigenous sociocultural context. Thus, professionals

need to be trained to work with the knowledge of these communities and be less ethnocentric at the oral health promotion, prevention, and rehabilitation [20].

We also address the socioeconomic differences in negative self-rated oral health. The inequality indices showed a distribution of negative self-rated oral health, with a concentration in the strata of poorer individuals with lower schooling level, pro-poverty. The same pattern of inequality index is perceived concerning toothache in Brazilian adolescents, with the outcome polarized on individuals of black skin color and whose mothers have lower schooling levels [42]. A higher prevalence of negative self-rated oral health was observed in the lowest income quartile and in the group with the lowest schooling level. Socioeconomic factors are associated with oral health problems such as dental caries, periodontal disease, as well as their consequences, including pain and tooth loss [9,18,19,43]. Fewer years of formal education and worse financial conditions can be a barrier to access oral health counseling, healthy dietary habits with lower consumption of sugars, and information on dental services [10,14]. Furthermore, people in socioeconomic vulnerability report a greater negative impact on the oral health-related quality of life [5,14,43]. However, the question of socioeconomic inequality must be evaluated along with racial disparity. As most black and brown individuals belong to lower socioeconomic levels they are often the most affected by oral diseases [8,15,18].

In this intersectional perspective in Dentistry, studies have shown that racial discrimination is associated with oral health problems and that this relationship is stronger among groups with low socioeconomic status [44]. Intersectionality is a multiple system composed of different elements such as race/skin color, gender, socioeconomic status, and sexuality that structure the interaction in social hierarchies. Thus, two or more interactions of these elements result in power, oppression, social exclusion, and health inequality [37,39,45]. Notably, our study did not adequately measure intersectionality in oral health [45] as it would require a qualitative measurement to analyze the simultaneous impact that multiple social factors predispose a population to oral health problems [45]. However, we tried to explore and to describe the elements that compose social identity and thus contribute to the monitoring and questioning of inequalities in oral health.

Indicators of health inequality produce evidence to support the development of public policies [30]. Identifying and describing inequities in oral health allow for the reorganization of dental services to cover minority groups that are feeling the impact of their oral health on their daily life. Our findings suggest that the racial inequalities related to oral health observed are the result of structural racism, as we observed different prevalence of negative self-rated oral health for whites and blacks/browns within the same socioeconomic strata. We must broaden the discussion to combat structural racism in society, including institutions and the whole system, and not only individual attitudes. Even in a country where oral health is part of the universal health system, there is still a huge gap between relative and absolute terms in self-rated oral health. This goes beyond socioeconomic indicators – it is also surrounded by racial disparities, showing how far we are from racial equity in health.

Contributors

S. A. Karam contributed to conception, design, analysis and interpretation of the data and drafted the manuscript. H. S. Schuch and M. B. Correa contributed to conception, design, and critically reviewed the manuscript. F. F. Demarco, F. C. Barros and B. L. Horta contributed to critically reviewed the manuscript. All authors approved the final version of the article.

Additional informations

ORCID: Sarah Arangurem Karam (0000-0002-3921-0182); Helena Silveira Schuch (0000-0001-9932-9698); Flávio Fernando Demarco (0000-0003-2276-491X); Fernando C. Barros (0000-0001-5973-1746); Bernardo L. Horta (0000-0001-9843-412X); Marcos Britto Correa (0000-0002-1797-3541).

Acknowledgments

This study was conducted with the collaboration of the Brazilian Public Health Association (ABRASCO). From 2004 to 2013, the Wellcome Trust supported the 1982 Pelotas (Brazil) birth cohort study. The International Development Research Center, World Health Organization, Overseas Development Administration, European Union, National Support Program for Centers of Excellence (PRONEX), the Brazilian National Research Council (CNPq), and the Brazilian Ministry of Health supported previous phases of the study.

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Resumo

O estudo teve como objetivo estimar as desigualdades sociais e raciais na autoavaliação da saúde bucal em adultos de um estudo de coorte de nascimentos no Brasil. O estudo atual faz parte do estudo de coorte de nascimentos de 1982 de Pelotas, Rio Grande do Sul, Brasil. Os dados foram coletados sobre as condições de saúde bucal aos 31 anos (Estudo de Saúde Bucal)*. A variável de desfecho era a autoavaliação da saúde bucal, dicotomizada em positiva (boa/muito boa)* vs. *negativa (regular/ruim/muito ruim). As análises foram estratificadas por sexo, grupo étnico-racial, escolaridade e renda. Para a análise estatística, foram utilizados o índice de desigualdade absoluta (SII) e o índice de concentração (CIX). A prevalência de autoavaliação da saúde bucal negativa foi 36,1%. Foram observadas desigualdades na autoavaliação da saúde bucal, em termos tanto absolutos quanto relativos. Foram observados SII de -30,0 (IC95%: -43,6; -16,4) para renda e -27,7 (IC95%: -41,9; -13,4) para escolaridade. Renda individual e escolaridade tiveram CIX negativos (CIXrenda -14,6 [IC95%: -21,2; -8,0] e CIXescolaridade -14,1 [IC95%: -20,7; -7,5]). Além disso, a prevalência de autoavaliação da saúde bucal negativa em indivíduos pretos, pardos e indígenas nas faixas de renda e escolaridade mais altas era comparável à prevalência desse desfecho entre indivíduos brancos pertencentes ao menor nível de renda e escolaridade. Os resultados desse estudo revelam disparidades raciais na saúde bucal, independente de renda e escolaridade. Além disso, foi identificada maior concentração de autoavaliação da saúde bucal negativa entre indivíduos com maior vulnerabilidade socioeconômica. Os achados reforçam a presença de desigualdades raciais e socioeconômica na saúde bucal no Brasil.*

Saúde Bucal; Racismo; Grupos Étnicos; Fatores Socioeconômicos

Resumen

El objetivo fue estimar las inequidades sociales y raciales en la salud oral autoinformada de adultos, mediante el estudio de una cohorte de nacimientos en Brasil. Este trabajo pertenece al estudio de la cohorte de nacimientos de 1982 en Pelotas (Rio Grande do Sul, Brasil). Los datos que se recogieron en este estudio estaban relacionados con las condiciones de salud oral durante 31 años (Estudio de Salud Oral)*. El resultado fue la salud oral autoinformada, dicotomizada en positiva (buena/muy buena) y negativa (regular/mala/muy mala). Los análisis se estratificaron por sexo, grupos raciales/étnicos, nivel educacional e ingresos. Para el análisis estadístico se usaron el índice de inequidad absoluto (SII) y el índice de concentración (CIX). La prevalencia de salud oral autoinformada negativa fue 36,1%. Se observaron inequidades sociales en salud oral autoinformada tanto en términos absolutos como relativos. Se observó un SII de -30,0 (IC95%: -43,6; -16,4) en ingresos, y de -27,7 (IC95%: -41,9; -13,4) en la escolaridad alcanzada. Tanto los ingresos individuales, como la escolaridad alcanzada, tuvieron un CIX negativo (ingreso CIX -14,6 [IC95%: -21,2; -8,0] y un nivel CIXeducacional -14,1 [IC95%: -20,7; -7,5]). Asimismo, la prevalencia de una salud oral autoinformada negativa en individuos negros/mestizos/indígenas del nivel más alto de ingresos/educación fue comparable a la prevalencia del resultado en los individuos blancos que pertenecen a los niveles más bajos de ingresos/educacionales. Los resultados de este estudio demuestran disparidades raciales en la salud oral, independientemente de los ingresos y educación. Además, se identificó una concentración más alta de salud oral autoinformada negativa entre los individuos más vulnerables socioeconómicamente. Estos hallazgos refuerzan la presencia de inequidades raciales y socioeconómicas en la salud oral.*

Salud Oral; Racismo; Grupos Étnicos; Factores Socieconómicos

Submitted on 07/Jun/2021
Final version resubmitted on 14/Oct/2021
Approved on 12/Nov/2021