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Oral health-related quality of life among 12-year-olds: results from SB-Minas Gerais

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Aim: To assess oral health-related quality of life (OHRQoL) and associated factors among the 12-year-old population of the state of Minas Gerais, Brazil. **Methods:** Cross-sectional data from the *SB-Minas Gerais* 2012 study were used. The presence of poor OHRQoL was assessed using the Oral Impact on Daily Performance (OIDP) and its dimensions (physical, psychological and social domains). Independent variables included sociodemographic factors and variables related to the use of dental care and oral health conditions. The association between the outcomes and the independent variables were tested using logistic regression and the results reported as odds ratio with 95% confidence interval. **Results:** Prevalence of poor OHRQoL was 31.4%; the psychological domain was the most affected (22.6%). Pain and dissatisfaction with oral health were associated with poor OHRQoL on overall OIDP and all its domains. Non-whites had greater poor OHRQoL than whites on overall OIDP and physical domain. **Conclusion:** Self-perceived oral health and social inequalities were associated with poor OHRQoL.

Keywords: Dental health surveys. Oral health. Quality of life. Socioeconomic factors.

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Introduction

Poor oral health-related quality of life (OHRQoL) is reported by one-third of 12-year-olds[1] and two-fifths of the 15–19-year olds in Brazil[2]. Its main determinants are socioeconomic characteristics, access to dental services[2,3] and oral health impairments, such as untreated caries, malocclusion and tooth loss[1,4-5].

The negative impact of oral health on quality of life can be understood as the burden that oral disorders play in daily life, the system of values, and perception of life as a whole within a cultural context and in relation to personal objectives, standards and concerns[6]. These impairments occur hierarchically[7]; speech and chewing functions are the first dimensions to be affected[1,8], next are psychological losses, such as restrictions on smiling[9], sleep disorders and anxiety or irritability[1]. Finally, there may be disadvantages to social life, including association with bullying[10,11], disruption of study and restrictions on leisure among children and adolescents[1].

In the last decades, important advances have been made in the control of oral diseases in Brazil, mainly among schoolchildren[12,13]. These advances may be attributed to the fluoridation of the public water supply[14], dissemination of fluoride toothpaste, decrease in sugar consumption[12], as well as improvements in living conditions, and the implementation of public policies featured by expansion in health promotion actions[13]. However, dental caries and incidence of other oral diseases have increased due to the weakening of successful programs and policies[15], with those most harmed being the most socially vulnerable[16]. Similarly, there are inequalities in distribution of poor OHRQoL in Brazil[1-3,8,9] and worldwide[17]. Thus, non-whites[2], those in lower levels of income[1] and schooling[2], and people facing barriers to access dental services[1] have been the most affected in their quality of life.

Although several studies have identified the determinants of OHRQoL[1-5], continuous monitoring of trends and patterns in different contexts shows they are relevant in addressing oral impairments. Studies are lacking that describe OHRQoL determinants among 12-year-olds in Brazilian states[3]. We performed this study because we recognized the importance of these studies in identifying regional variations for planning and setting public health priorities. This study aimed to assess oral health-related quality of life and associated factors in a representative sample of 12-year olds from Minas Gerais state, Brazil.

Materials and methods

Design, setting and participants

A study analyzing observational, secondary data was conducted using data from the last Oral Health Survey performed in Minas Gerais, Brazil (*SB-Minas Gerais 2012*), including in its capital (Belo Horizonte) and in 60 cities within the state. In 2012, Minas Gerais was the second most populous state in Brazil[18]. *SB-Minas Gerais* was conducted using probabilistic sampling by multi-stage conglomerates, with proportional probability of participation by size. The sample plan considered the participants' region of residence, according to factors used for allocating financial resources pro-

duced by the João Pinheiro Foundation. The cities within the state were classified into quartiles according to economic size and health needs, and the two lower quartiles were grouped in the Interior I domain, representing the municipalities with the lowest relative need for financial resources. The upper quartiles were grouped in Interior II—municipalities with the greatest relative need for financial resources. SB-Minas Gerais was designed to be representative of the State, its capital and the two interior domains at five age groups: 5, 12, 15–19, 35–44, and 65–74 years. Clinical and self-perceived oral health measures, demographic and socioeconomic characteristics, access and use of dental services and OHRQoL were investigated[19]. Data were collected by trained and calibrated dentists, according to World Health Organization criteria[20]. The minimum level of agreement accepted intra and inter examiners was established with kappa equal to 0.65. More details about the design and sampling have been published elsewhere[19,21,22]. Of the 1,217 participants aged 12 years, 996 presented complete data for the variables of interest and were included in the analysis, representing 208,763 adolescents from Minas Gerais, Brazil.

Variables

The dependent variable OHRQoL was evaluated using the Oral Impacts on Daily Performances (OIDP) survey. OIDP has three dimensions with a total of nine questions related to daily activities that may be affected by oral conditions in the previous six months. The response options were "no" or "yes" for each of the following activities: 1) physical domain: eat and enjoy food, speak and pronounce clearly, brush teeth, and play sports; 2) psychological domain: sleep and relaxation, smile without embarrassment, and maintain the usual emotional state without anxiety or irritability; 3) social domain: study and attend school, and enjoy contact with people (going out, having fun, going to parties, outings)[23]. Poor OHRQoL was considered for participants who reported difficulty in performing one or more activities for overall OIDP as well as the physical, psychological and social domains.

The independent variables included in the analysis were divided into the following blocks: 1) demographic and socioeconomic characteristics: gender; self-declared race / skin color evaluated according to the Brazilian Institute of Geography and Statistics *(Instituto Brasileiro de Geografia e Estatística–IBGE)* and categorized as white / non-white (black, brown, yellow [Asian]), and indigenous; family income (≤R$500 / R$501–2500 / > R$2500); 2) dental services—time since the last dental appointment (≤1 year / >1 year); type of service used (public / private–including health insurance and covenants); reason for last dental appointment (prevention / other–including pain, extraction, treatment); 3) oral health: presence of untreated caries; dental pain in the last six months; satisfaction with oral health (satisfied–'very satisfied' and 'satisfied') / dissatisfied ('neither satisfied nor dissatisfied', 'dissatisfied' and 'very unsatisfied').

Statistical analysis

Descriptive analysis was used to estimate relative frequencies, next were bivariate and multiple analyses. In the bivariate analysis, associations between the independent variables and the outcomes (overall OIDP and its domains–physical, psychological and social) were tested using the chi-square test with Rao and Scott correction[24].

The association between the outcomes and the independent variables was tested by means of a logistic regression, and the results reported as odds ratio with 95% confidence interval (95% CI). All the variables with a p<0.2 in the bivariate analysis were included in the multiple logistic regression analyses, according to a hierarchical approach[25], following the theoretical framework proposed in Figure 1. First, demographic and socioeconomic characteristics (Block 1) were included in the model and adjusted by themselves. The use of dental services (Block 2) was adjusted for demographic and socioeconomic characteristics and for themselves. Finally, the oral health variables (Block 3) were adjusted for demographic and socioeconomic characteristics, for the use of dental services and for themselves.

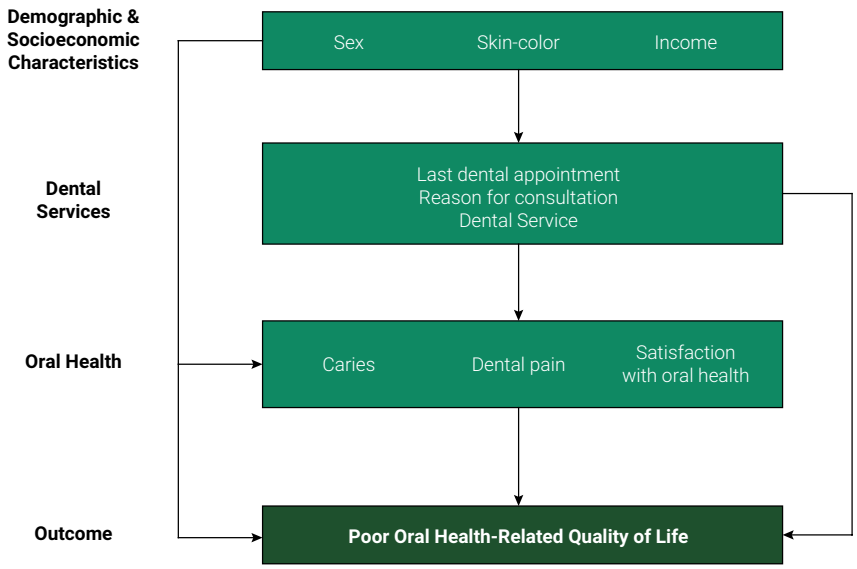

Figure 1. Conceptual model used in hierarchical analysis.

All analyses were performed in Stata v. 14.0 software using the survey command, which allows to analyze data from complex samples, incorporating sample weights, stratification processes, conglomeration and study design[26].

Ethics statement

SB- Minas Gerais was ethically conducted based on the Helsinki Declaration. This survey received approval from the Ethics in Research Committee of the Pontifical Catholic University of Minas Gerais under protocol number 9,173.

Results

The 12-year-old children from Minas Gerais were characterized by a predominance of non-whites (59%), and family income ranging from R$501 to R$2,500 (77%). Most participants had their last dental appointment for reasons other than prevention (63.1%). The prevalence of untreated caries, dental pain in the last six months, and dissatis-

faction with oral health were 35.3%, 18.1%, and 32.9%, respectively. About 31.4% of participants had at least one negative impact of oral health on quality of life, 22.6% had impacts on psychological domain, and 6.2% on the social domain. In the bivariate analysis, dental services and oral health were associated with poor OHRQoL in overall OIDP and all its domains. Demographic and socioeconomic characteristics were associated with overall OIDP, physical and psychological domains (Table 1).

Table 1. Sample characteristics and bivariate analysis of factors associated with poor oral-related quality of life (OHRQoL) at 12 years. *SB-Minas Gerais*, 2012 (weighted estimates).

	Total	OIDP							
		Overall		Physical		Psychological		Social	
	%	%	ORc	%	ORc	%	ORc	%	ORc
Total	100	31.4		19.8		22.6		6.2	
Demographic and socioeconomic characteristics									
Sex									
Men	53.4	28.1	1	18.8	1	20.2	1	5.0	1
Women	46.6	35.1	1.38	20.9	1.14	25.4	1.35	7.6	1.55
Skin-color									
White	41.0	22.9	1	12.8	1	17.0	1	3.6	1
Non-white	59.0	37.3	2.00**	24.6	2.23**	26.6	1.77*	8.0	2.30
Income									
≤R$500	8.4	44.5	1	32.3	1	32.2	1	9.1	1
R$501–R$2,500	77.0	32.0	0.59*	19.1	0.49*	23.5	0.65	7.1	0.76
>R$2,500	14.5	20.8	0.33**	16.3	0.41	12.4	0.30**	0.0	1.00
Dental services									
Last dental appointment									
≤1 year	65.0	29.2	1	18.3	1	21.9	1	5.3	1
>1 year	35.0	35.2	1.33*	22.5	1.29	24.0	1.13	8.0	1.56
Reason for consultation									
Prevention	36.9	23.4	1	12.0	1	16.2	1	2.0	1
Other	63.1	36.1	1.85**	24.3	2.35**	26.4	1.85**	8.7	4.75**
Dental service									
Public	52.5	32.0	1	20.2	1	23.3	1	7.7	1
Private	47.5	30.7	0.94	19.2	0.93	21.9	0.92	4.6	0.58
Oral health									
Caries									
No	64.7	28.3	1	15.8	1	19.8	1	3.5	1
Yes	35.3	37.1	1.49**	27.0	1.97**	27.9	1.57*	11.2	3.46**
Dental pain									
No	81.9	22.1	1	11.4	1	15.3	1	1.3	1
Yes	18.1	73.4	9.71**	58.0	10.80**	55.6	6.92**	28.3	29.52**
Satisfaction with oral health									
Satisfied	67.1	18.9	1	12.3	1	10.9	1	3.0	1
Dissatisfied	32.9	56.8	5.62**	35.1	3.86**	46.6	7.17**	12.7	4.66**

Source: *SB-Minas Gerais*.
OIDP: oral impacts on daily performance; OR_c: crude odds ratio.
* p<0.05; ** p<0,01.

Table 2 shows the analysis of factors associated with overall OIDP and its domains, after adjustment for demographic and socioeconomic characteristics, dental services and oral health. For overall OIDP and physical domain, the following groups were more likely to have poor OHRQoL: non-white, those with dental pain, and those dissatisfied with their oral health, independently of socioeconomic conditions, dental services and dental care. For the psychological and social domains, after adjustment for multiple variables, subjects with dental pain and dissatisfied with their oral health were more likely to have poor OHRQoL.

Table 2. Multiple analysis of factors associated with poor OHRQoL at 12 years. *SB-Minas Gerais*, 2012 (weighted estimates).

	OIDP			
	Overall	**Physical**	**Psycological**	**Social**
	OR_a (95%CI)	**OR_a (95%CI)**	**OR_a (95%CI)**	**OR_a (95%CI)**
Demographic and socioeconomic characteristics				
Sex				
Men	1	-	1	1
Women	1.32 (0.92-1.89)	-	1.25 (0.79-1.96)	1.35 (0.70-2.61)
Skin-color				
White	1	1	1	1
Non-white	**1.58 (1.06-2.37)**	**1.72 (1.04-2.84)**	1.30 (0.85-1.99)	1.46 0.56-3.85)
Income				
≤R$500	1	1	1	-
R$501–R$2,500	0.71 (0.38-1.32)	0.64 (0.30-1.34)	0.71 (0.44-1.16)	-
>R$2,500	0.44 (0.18-1.07)	0.73 (0.28-1.94)	0.32 (0.10-1.01)	-
Dental services				
Last dental appointment				
≤1 year	1	-	-	1
>1 year	1.14 (0.81-1.59)	-	-	1.36 (0.70-2.64)
Reason for consultation				
Prevention	1	1	1	1
Other	1.14 (0.77-1.67)	1.39 (0.91-2.12)	1.09 (0.68-1.75)	2.30 (0.71-7.47)
Dental service				
Public	-	-	-	1
Private	-	-	-	0.88 (0.46-1.67)

continue...

continuation...

Oral health				
Caries				
No	1	1	1	1
Yes	0.72 (0.48-1.06)	1.01 (0.69-1.46)	0.77 (0.48-1.25)	1.42 (0.67-3.02)
Dental pain				
No	1	1	1	1
Yes	**7.68 (4.97-11.86)**	**7.81 (4.77-12.79)**	**5.15 (3.15-8.39)**	**17.85 (7.99-39.91)**
Satisfaction with oral health				
Satisfied	1	1	1	1
Dissatisfied	**4.98 (3.16-7.85)**	**2.74 (1.66-4.52)**	**6.39 (4.14-9.86)**	**2.20 (1.04-4.67)**

Source: *SB-Minas Gerais*.
OIDP: *oral impacts on daily performance*; OR_a: adjusted odds ratio; 95%CI: 95% confidence interval.

Discussion

This was the first study to assess oral health-related quality of life and associated factors in a representative sample of the 12-year-old population of Minas Gerais state, Brazil. One-third of participants at this age had poor OHRQoL, being the psychological domain the most affected. Pain and dissatisfaction with oral health were associated with poor OHRQoL on overall OIDP and all its domains. Non-whites had greater odds of poor OHRQoL for overall OIDP and physical domain.

The prevalence of poor OHRQoL at 12 years in Minas Gerais is similar to that presented by other studies conducted with children and adolescents in Brazil[1,27] and worldwide[28]. However, unlike 12-year-old Brazilians (for whom negative impacts on the physical domain prevail)[1,8], the psychological domain was the most affected in Minas Gerais. According to Locker and Allen[7], OHRQoL is gradually and hierarchically impaired, with physical being the first and social being the last domains to be affected. There is also a gradient of severity ranging from discomfort, pain, disability, impairment and social disadvantage[7]. Thus, the deterioration of OHRQoL at 12 years in Minas Gerais would be at a more advanced stage than in Brazil. Furthermore, in Brazil[1,27], worldwide[29,30], and for the State of Minas Gerais, social impacts are the least prevalent, as they represent the final and most severe stage of losses in OHRQoL.

In the adjusted models, pain and dissatisfaction with oral health were independently associated with the overall OIDP and all its domains. Similar associations have been reported in other studies for 12-years-olds[1] as well as for other age groups[2,3,5,6,31,32]. Besides being associated with physical losses (such as eating, brushing, speaking and playing sports), pain and dissatisfaction with oral health may trigger psychological problems such as sleep disorders, irritation and restrictions on smiling. This process may also be associated with bullying and restrict social life, reaching leisure activities and resulting in school absenteeism[11].

This study showed no independent association between untreated caries and overall OIDP as well as its domains. Given the effects of dental pain and dissatisfaction with oral health on OHRQoL[1,3], one can state that not the cavity itself, but its severity (expressed by pain) and location (which may affect satisfaction, mostly in anterior tooth decay) would result in greater impacts on OHRQoL. However, a study with the 12-year-old Brazilians found an independent association of caries with OIDP in psychological and social domains. Cultural, socioeconomic aspects, provision of dental services, distribution and severity of oral diseases in different regions[33] may influence the perception of OHRQoL and, hence, the associations found. This reinforces the importance of regional representative studies in detecting different disease patterns and related inequalities.

The association between satisfaction with oral health and OHRQoL reported here was also observed for other authors[6,31], especially regarding the psychosocial component[33]. Indeed, even the prevalence of poor OHRQoL and dissatisfaction with oral health were similar in the population studied. Thus, dissatisfaction with oral health could partially represent poor OHRQoL.

On the demographic and socioeconomic characteristics, only skin color was associated with the overall OIDP and physical domain. This means that non-whites had greater odds of poor OHRQoL, as observed by Colussi et al.[27]. On the other hand, in the studies performed by Souza et al.[1] and Scapini et al.[34], socioeconomic inequalities in OHRQoL among adolescents were associated with family income, but not skin color. In another study conducted with adolescents, adults and elderly from the State of São Paulo, Brazil, skin color and income remained associated with poor OHRQoL[3]. In some scenarios, skin color is able to identify vulnerable social contexts, as non-white individuals are in lower levels of schooling and income as well as have restricted access to dental services in Brazil[35]. As a consequence, they also present worse oral[35] and overall health[32].

This study has limitations as its cross-sectional design does not allow causal inferences. It also has some strengths: this is one of the few representative data of OHRQoL for a Brazilian state[3], corroborating the understanding of its determinants and distribution in different regions.

In conclusion, the prevalence of poor OHRQoL at the age of 12 years in Minas Gerais is significant. Recent dental pain and dissatisfaction with oral health were associated with overall OIDP and all its domains, and there are inequalities regarding skin color for the physical domain and overall OIDP. Future studies should explore the origins of these inequalities. Strengthening equity in access to dental services, taking into account socioeconomic conditions and the self-perception of individuals may contribute to improved OHRQoL.

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