

ORAL HEALTH AND SOCIOECONOMIC INDICATORS OF ADOLESCENTS LIVING IN A REGION OF EXTREME POVERTY

MÁRCIA CANÇADO FIGUEIREDO¹, FERNANDA WISNIEWSKI², TAIANE CORREA FURTADO³, JÉSSICA VAZ SILVA⁴, EDUARDA MARIA PEREIRA SILVESTRE⁵, XIMENA CONCHA MELGAR⁶

ABSTRACT. Introduction: Adolescence is a stage of life in which future hygiene habits are consolidated and is also a period of multiple discoveries and changes in human beings' life. As teenagers go through so many different new emotions, they often leave their health unattended, and thus are at greater risk of suffering oral diseases, which often affect this population early and are treated in late stages, resulting in tooth loss. The aim of this study was to evaluate the oral health profile of adolescents living in a region of extreme poverty. **Methods:** a cross-sectional analytical study assessing data from 205 adolescents living in the Augusta Meneguine district in the city of Viamão, Rio Grande do Sul, Brazil. **Results:** The average tooth loss was one tooth per teenager. The Student *t*-test ($p \leq 0.05$) showed no significant differences by sex ($p = 0.158$). Adolescents whose families had a monthly income of up to one minimum wage had a higher average score of tooth loss, compared to those from families of higher monthly income, but this difference was not significant ($p = 0.341$). No significant differences were observed between lost teeth and sugar consumption ($p = 0.869$), nor in relation to the average number of cavities among adolescents with oral hygiene supervision ($p = 0.631$). **Conclusions:** This study helped identify poor oral health conditions and low socioeconomic levels among adolescents with low income and education levels, leading them to have high rates of visible plaque, gingival bleeding, caries, and tooth loss.

Key words: oral health, adolescents, dental extraction, social class, primary health care, poverty

Figueiredo MC, Wisniewski F, Correa-Furtado T, Silva JV, Pereira-Silvestre EM, Concha-Melgar X. Oral health and socioeconomic indicators of adolescents living in a region of extreme poverty. *Rev Fac Odontol Univ Antioq.* 2018; 29 (2): pp.-pp. DOI: <http://dx.doi.org/10.17533/udea.rfo.v29n2a4>

SUBMITTED: MAY 23/2017-ACCEPTED: NOVEMBER 7/2017

¹ School of Dentistry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

² School of Dentistry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

³ School of Dentistry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

⁴ School of Dentistry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

⁵ School of Dentistry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

⁶ School of Dentistry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

INTRODUCTION

Adolescence is a period of substantial emotional and physical changes, with many internal conflicts and an intense search for one's own personal and social identity. The World Health Organization defines an adolescent as any person between ages 10 and 19. According to Colli² in 1999, from the physical or biological point of view, adolescence encompasses the phase of anatomical and physiological modifications that transform the child into an adult. The term 'puberty' is used to refer to this whole process. From the psychological point of view, adolescence can be considered a period of changes mainly related to a search for identity and to the acceleration of intellectual development, as well as an evolution of sexuality.

In 1996, Fernandes and Marinho³ verified that, at the beginning of the 1980s, the Brazilian population consisted of 24% of adolescents, and by the year 2010 the authors estimated that nearly 36 million inhabitants were in this age group. According to the United Nations Children's Fund (UNICEF),⁴ there are approximately 21 million adolescents in Brazil, representing 11% of the country's population; as such, they are a significant segment of the population, with specific health care needs.

For Figueiredo et al⁵ in 2012, oral conditions represent one of the greatest health problems during adolescence. In spite of this, from the dental point of view, attention to the needs of adolescents is still lacking, especially in the behavioral aspect. Emotional and biological changes affect oral health not generally but in a specific way. Many lessons related to future behaviors and habits are learnt in this stage of life, and therefore it's a crucial period for health care. This stage is the ideal time to develop a healthy lifestyle, consolidating the concept of self-care permanently. Because of the numerous transformations and discoveries taking place during adolescence, health care and hygiene habits are often neglected and considered of a minor importance.

Four national epidemiological oral health surveys have been conducted in Brazil, revealing the real health conditions of this population. Data from the Brazilian epidemiological survey SB Brazil 2003⁶ exposed a dire landscape of adolescent oral health: about 14% of Brazilian adolescents have never been to the dentist. Alarmingly, the reason for seeing the dentist is usually the experience of dental pain, reported by almost one third of adolescents. The last epidemiological survey SB Brasil 2010⁷ shows that advances have been slow and that the most common oral alterations in adolescents are caries, dental calculus, gingival bleeding, trauma, occlusal discrepancies, and fluorosis. Similarly, socioeconomic status was estimated, evaluating family income and schooling. This analysis confirmed the regional and social inequalities: the northern and northeastern states have lower

socioeconomic status and schooling, as well as higher rates of oral alterations than the southern and southwestern states.⁴

Brazil has 16,27 million people in extreme poverty, and of these 53.3% reside in urban areas, representing 8.5% of the population. To establish the number of Brazilians living in extreme poverty, the government used preliminary data from the 2010 demographic census.⁸ The poverty line was established at US\$50 per capita, considering the households' monthly nominal yield. Therefore, any person living in a household with an income less than or equal to that value is considered extremely poor. In order to calculate the number of people with no income who are actually included in the poverty line, the Instituto Brasileiro de Geografia e Estatística (IBGE) also traced a line considering the following criteria: residence without a bathroom or with a collective bathroom, with no connection to the water distribution network, with no electric power, with at least one illiterate resident 15 years of age or older, with at least three residents up to 14 years of age, and at least one resident of 65 years of age or older.

According to Gambhir et al,⁹ oral diseases are among the most prevalent worldwide, and poor oral health conditions can have a significant impact on the quality of life of children and adolescents and harm the overall health of the individuals. In Brazil, caries is still an important public health problem, as stated in the latest epidemiological survey carried out by the Ministry of Health in 2010.⁷ This is because caries and periodontal disease are associated with social, economic, educational, and political conditions, beyond the conditions of the oral environment.¹⁰

Poorer people have worse dental and gingival conditions. The existing inequities, characterized by the higher prevalence of caries in poorer population groups, are persistent and reflect the deep social disparities in Brazil and their implications on the health of the population. It is then necessary to take steps to reduce the inequalities between and within countries, as proposed by the Commission on Social Determinants of Health.¹¹

Dentistry has made great strides in recent decades; however, caries continues to affect the population early in life. Treatments often start in late stages, leading to the extraction of affected teeth. Today, early dental loss is known to be one of the main risk indicators for edentulism. This reality is a public health problem, evidencing the extreme importance of a medical specialty focused on the adolescent. Socioeconomic circumstances and family and individual conditions are known to interfere with the individual's oral health status. According to the study conducted by Baldani et al¹² in 2004, there is a significant correlation between income, housing, and schooling with dental caries.

In consequence, this study aimed to identify the socioeconomic level and the oral health profile (visible plaque, gingival bleeding, caries, and loss teeth) of adolescents living in an area of extreme poverty in the city of Viamão, Rio Grande do Sul, Brazil.

METHODS

This was an analytical transversal study in a sample of 205 adolescents living in Vila Augusta Meneghini, Viamão, Rio Grande do Sul. The city of Viamão is 23 km from the state capital and has a population of 239,000 inhabitants, while Vila Augusta has 2,000 people. The family heads are mostly garbage collectors. The locality has basic sanitation, lacks electric power, and suffers constant flooding due to the overflows of the Feijó creek, which crosses Vila Augusta. Violence and increased levels of drug use among young people are cited by locals as the biggest problems of this district.

The sample was obtained through home visits to 389 families (906 people), in which the youths' parents or guardians signed a free and informed consent, responding to a questionnaire with socioeconomic information on the family head and general health data, such as daily sugar intake, number of daily meals, schooling, and home characteristics.

The oral health status of participating youths was assessed using the World Health Organization's epidemiological survey codes and criteria.¹³ The oral examinations were performed by two trained examiners, using artificial light (common lamps of no specific trademark) and in the clearest area of the residences. The two examiners reached to an agreement on the diagnosis of each assessed adolescent (Figure 1). In calibrating the examiners, a percentage of disagreement of 15% was considered adequate, with a precision of 5% ($\pm 5\%$) and a confidence level of 95%. This estimation of an 85% concordance index (Kappa) is considered almost perfect in the Landis and Koch classification.¹⁴

The visible plaque index (VPI) was measured, dental brushing was monitored (only by looking, without teaching specific brushing techniques), and gingival bleeding index (GBI) was observed, according to the Simplified Oral Hygiene Index (OHI-S) described by Greene and Vermillion¹⁵ in 1964, checking for bleeding points on the gingiva after brushing, at first sight. After dental prophylaxis and drying of the teeth with a gauze, the number of decayed, filled, and missing teeth was counted. Catheters and mouth mirrors No. 5 (SSWhite/Duflex) were used to perform the clinical examination.



Figure 1. Oral examination performed by two examiners in the clearest area of the residence, verifying the presence of visible plaque (VPI) and gingival bleeding (GBI) after dental brushing (photo by the author, 2017).

Home visits were scheduled for Saturdays, carried out by Community Health Workers (CHW) affiliated to the Augusta Meneghini Family Health Strategy (Estrategia de Salud de la Familia - ESF). The data collected were entered in a Microsoft Excel 2010 worksheet. Descriptive analyses were carried out for the demographic characterization of the population, by means of measures of central tendency (mode, median, and mean frequencies) and dispersion (standard deviation). The statistical analysis was carried out using Student's *t*-test, considering a significance level of $p \leq 0.05$, using the method of generalized linear models.

The project was approved by the Ethics Committee in Research of Porto Alegre's Municipal Health Secretariat, with registration number 669 in the CEP and process No. 001.032690.11.8.

RESULTS

Of the 205 assessed adolescents, 83 were male (40.5%). The mean age of the sample was 13.8 years (standard deviation = 2.82), being individuals aged 10 to 19 years. Concerning socioeconomic variables, Table 1 shows that most adolescents come from families with an income of up to 1 minimum wage (53.2% of the sample). None belonged to families with an income of more than 5 minimum wages.

Table 1. Sociodemographic characteristics of 205 adolescents in conditions of extreme poverty living in Vila Augusta Meneghini, Viamão, Rio Grande do Sul, Brazil

Variable	Category	Frequency	Percentage
Household residents	Up to 2	31	15.1
	3 to 5	96	46.8
	More than 5	78	38
Type of housing	Brickwork	79	38.5
	Wood	70	34.1
	Mixed	52	25.4
	Other	4	2
Rooms in the household	Up to 2	54	26.3
	3 to 5	111	54.1
	More than 5	40	19.5
Bathroom	Inside the house	149	72.7
	Outside the House	53	25.9
	Does not have	3	1.5
Waste	Directly on the street	129	63.5
	Septic tank	43	21.2
	Sewer network	19	9.4
	Dry pit	12	5.9
	Lost	2	-
Schooling	Illiterate	20	10.1
	Complete 1st grade	146	73.7
	Incomplete 2nd grade	16	8.1
	Complete 2nd grade	8	4
	Lost	7	-
Daily meals	Once a day	1	0.5
	2 to 3 times a day	84	41
	More than 3 times a day	120	58.5
Sugar consumption	No consumption	1	0.5
	Once a day	30	14.6
	2 times a day	52	25.4
	3 times a day	65	31.7
	More than 3 times a day	57	27.8
Income of adolescents' families	Up to 1 MW	109	54.8
	1 to 2 MW	84	36.2
	3 to 5 MW	12	8.0

Table 1 also shows the characteristics of the homes where the adolescents live. As for the number of residents in the household, 46.8% live with 3 to 5 people. The types of housing most commonly informed by the adolescents were brickwork and wood, with 38.5% and 34.1%, respectively. 72.7% said that they have a bathroom inside the house, 25.9% outside of it and 1.5% do not have one. Similarly, more than 60% said that their homes' waste goes directly to the street, while less than 10% indicated that the waste goes to the sewer network.

The study population of adolescents was characterized by living below the poverty line because their families survive with less than one minimum wage a month and most households have 3 to 5 residents in precarious situations. 10% of the sample was illiterate and more than 70% did not complete secondary school (Table 1).

Table 1 also shows that one of the teenagers has just one meal a day, while 84 have two to three meals a day (41%) and 58.5% feed more than three times a day. In terms of sugar consumption, Table 1 shows that just 1 teenager said not to eat sugar. The highest percentage of sugar consumption was 3 times a day (31.7%), while 27.8% reported consuming sugar more than 3 times a day.

Table 2 shows the oral health characteristics in terms of caries and periodontal disease. About 70% had visible plaque and almost 60% had gingivitis. The number of caries lesions ranged from 0 to 13, with an average of 1.9 per individual and a standard deviation of 2.82. In addition, there was an average of 0.52 restorations per teenager.

Table 2. Indicators of caries and periodontal disease of adolescents

Descriptive statistics	Minimum	Maximum	Mean	Standard deviation
Caries lesions	0	13	1.90	2.28
Restorations	0	9	0.52	1.35
Extractions indicated	0	19	0.77	1.77
Missing teeth	0	12	1.74	3.78
Lost teeth	0	15	0.99	2.53
Visible plaque	0	18	1.20	2.87
Gingival bleeding	0	15	1.30	1.89

Table 3 shows that there were no significant differences in average number of caries lesions among adolescents who received oral hygiene guidance or supervision and those who did not receive it. There was also no relationship between sugar consumption and family income.

Table 3. Comparison of the average number of caries lesions of adolescents

Caries lesions		Mean*	Standard Error*	Standard Deviation*	p value*
Guidance	No	1.95	0.20	2.13	0.631
	Yes	1.77	0.29	2.63	
Supervision	No	1.85	0.18	2.12	0.555
	Yes	2.11	0.42	2.90	
Sugar consumption	Once a day	1.37	0.33	2.47	0.158
	2 times a day	2.44	0.40	2.64	
	3 times a day	1.63	0.26	1.56	

	More than 3 times a day	1.96	0.32	2.46	
Income	Up to 1 MW	1.509	0.208	1.8448	0.075
	1 to 2 MW	2.298	0.3202	2.5354	
	3 to 5 MW	2.667	0.9472	3.2287	

* Student t-Test - Generalized linear models

Concerning tooth loss, table 4 shows that there were no significant differences by sex. It was found that those who had a monthly income of up to one minimum wage had average loss values relatively higher than those of other groups, although this difference was not significant ($p = 0.341$). In addition, there was no significant difference in the average number of lost teeth in relation to sugar consumption ($p = 0.158$).

Table 4. Relationship of dental loss with sex, monthly income, and sugar consumption

		Dental loss			
		Mean*	Standard Error*	Standard Deviation*	p value*
Sex	Female	0.967	0.089	1.683	0.158
	Male	0.711	0.093	2.015	
Income	Up to 1 MW	0.963	0.132	2.170	0.341
	1 to 2 MW	0.786	0.129	1.406	
	3 to 5 MW	0.500	0.250	0.674	
Consumption of sugar	Once a day	0.867	0.232	1.167	0.869
	2 times a day	0.980	0.195	2.627	
	3 times a day	0.862	0.157	1.609	
	More than 3 times a day	0.772	0.155	1.488	

* Student t-Test - Generalized linear models

DISCUSSION

The population of participating adolescents was characterized by living below the poverty line because their families survive with less than one minimum wage per month and most have 3 to 5 residents per household in precarious conditions. This reflects the reality of 16,27 million people living in extreme poverty, according to the latest census of the Brazilian Institute of Geography and Statistics.⁸ In their study, Rigo et al in 2011¹⁶ found that the number of rooms in a house is a factor associated with tooth decay, i.e. living in better, larger residences with 6 rooms or more was considered a protective factor for tooth decay in schoolkids.

In consonance, Moreira et al in 2007¹⁷ claim that the residence of individuals reflects their socioeconomic condition, and that along with the territory where one lives, it can influence both general and oral health. Thus, to characterize a population and its health problems, it is necessary to take this space into account.¹⁸ The present study showed a slight similarity among the residences, most of which are of brickwork (38.5%) and wood (34.1%). Most of the residences had bathrooms inside the house, and 63.5% of families throw the waste directly to the street. It can then be said that most surveyed adolescents live in precarious conditions, with high household density and in residences lacking basic sanitation. According to the latest census of the Brazilian Institute of Geography and Statistics,⁸ Vila Augusta had a high rate of violence, linked to drug trafficking and various crimes (such as thefts and robberies), committed mainly by adolescents and youths from the community. Other vulnerabilities include a large number of precarious houses, squatting, and constant rotation of the population as families often leave the area due to imminent risks.

The conditions found in the studied community reflect some findings of the literature; for instance, an inadequate diet and physical inactivity are important causes limiting the health of a population. Less than 50% of the surveyed adolescents practice some kind of physical activity, and nearly 60% have more than three daily meals associated with sugar consumption. These data corroborate those of Levy-Costa et al¹⁹ in 2005, who investigated family budgets, finding out that sugar consumption in families with lower income was 50% higher than that observed in families with higher income. Tomita et al,²⁰ in 1999, claimed that the socioeconomic level influences the preference for sugar, and this in turn is associated with prevalence of dental caries in deciduous dentition.

On the other hand, there are high levels of dental caries among the study population, with nearly 2 decayed teeth per adolescent in average. Some studies have shown a direct relationship between the level of caries prevalence and social indicators in populations with low income and low schooling levels. Viana et al,²¹ in 2009, analyzed schooling levels and family income in relation to dental caries, finding out that individuals with incomplete primary school and monthly family budgets lower than 5 minimum wages had worse oral conditions in relation to caries. For Granville-Garcia et al,²² the socioeconomic conditions have a big influence on variables such as time for tooth brushing, number of daily brushings, latest dental visit, and reason for consultation.

With regard to unhealthy gingival conditions, 70% of participating adolescents have visible plaque and 60% suffer from gingivitis. Although Chambrone et al²³ in 2010 observed that the prevalence of gingival diseases does not depend on socioeconomic status and is directly associated with poor oral

hygiene, some other studies claim that the prevalence of gingival bleeding is associated with socioeconomic conditions.²⁴

In order to provide healthcare to adolescent patients, surgeon dentists should not consider the clinical procedures alone, as this is not sufficient to modify the youths' habits and to restore their biopsychosocial well-being.²⁵ Compostella,²⁶ in 1984, claimed that dentists should not treat adolescents like adults nor as children; the dental professional must be aware of their dependence and independence crises, and thus show proper behavior when adverse behaviors arise. The author suggests that dentists must show firmness to demonstrate authority, but never authoritarianism in dealing with any situation. The interpersonal relationship between the adolescent patient and the professional must be established through dialogue and respect.

The obtained data suggest that most adolescents did not receive any type of dental care, although the Augusta Meneghini Basic Health Unit in Vila Augusta has two dentists. It has been observed that, in dealing with adolescents from less privileged social classes, the public health system fails to provide universal dental care. This has been advocated by the General Coordinator for the Health of the Adolescent and Youth, of the Ministry of Health, which deals with issues related to youth and adolescents aged 10 to 24 years, in terms of health promotion, protection, and recovery.²⁷

The situation becomes even more serious when overall tooth loss is considered, not reaching the extreme situation of edentulism. In this study, the average was 1 tooth per adolescent, the same proportion found in the 2004 National Epidemiological Survey.⁶ The present study included 205 adolescents aged 13 years in average, most of them female. In relation to tooth loss, there was no significant difference between genders, suggesting that the difficulty in keeping oral health in adolescence does not depend on gender. It could be then perceived that personal appearance does not seem to be a concern for the studied adolescents, since teeth were not considered as a resource to look more beautiful, for social acceptance, or self-esteem. This contradicts all the literature; Baldwin²⁸ pointed out in 1980 that a large number of studies have documented the health effects of attractiveness in interpersonal relationships and that appearance is key to success in relationships. The author cites several works that clearly show the concern of adolescents with appearance and its relationship with self-image and self-esteem.

Caries distribution is heterogeneous; there are differences among regions and social groups, and the experience of this disease is more severe in population groups subjected to social marginalization.²⁹ This study found that the socioeconomic conditions of these adolescents are related to dental losses, in addition to biological processes. Losing dental units is perhaps the worst consequence of this

disease, due to its functional or aesthetic consequences. The high level of tooth loss affects not only the functionality of dentition, which can create masticatory and speech problems, but also the quality of life and the individual's self-esteem and socialization.³⁰

Capra,³¹ in 1982, calls to mind that health is a multidimensional phenomenon involving physical, psychological and social aspects in an interdependent manner. Based on this concept, the importance of oral health for the studied adolescents should involve all these dimensions: the physical aspect, because they express "pain" and the need to be able to "chew well"; the psychological aspect, evident in the importance of personal appearance: "to be more attractive for girls", "not to be called a toothy", "to have beautiful teeth to kiss"; and the social aspect, as they put it: "because of bad breath, they need to keep personal distance". Therefore, we believe that the knowledge acquired and accumulated by dental surgeons for so many years should be transmitted through health education and interdisciplinary work.

The present study also showed the great need to adapt public health policies in the studied region, as the needs of young people are not being met, and this population groups is being neglected. Because of the precariousness of the system, it should be noted that the effective participation of young people in the formulation of public policies is critical for a real commitment of all those involved in guaranteeing the right to health.

It is important to mention that the work in the community has been fruitful, as it has helped us have a picture of the real needs of adolescents and to understand the real motivations that drive them to seek dental care. This knowledge may lead to effective health education programs to achieve the long-desired goals in oral health, regardless of the youths' socioeconomic status.

Finally, the present study had strengths and limitations related to working in a context of social vulnerability that produces passive, dependent adolescents and families, with low self-esteem levels. These young people and their families referred to the shortcomings in their historical-social condition as negative aspects. This cycle has installed itself in a circular and almost inevitable way, reinforcing the condition of misery, not only in the material but also the affective dimension. Also, the care provided to these young people was gratifying to the professionals in charge of the study because we know that for them it is extremely difficult to overcome the situation of abandonment.

CONCLUSION

The present study helped identify the poor oral health and socioeconomic profile of adolescents with low income and low educational level, leading them to have high levels of visible plaque, gingival bleeding, caries, and tooth loss.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

CORRESPONDING AUTHOR

Marcia Cançado Figueiredo
Rua Cananéia, 255/310
Vila Jardim
Porto Alegre, Rio Grande do Sul, Brasil
CEP: 91 310 580

REFERENCES

1. World Health Organization. Young people health - a challenge for society: report of a WHO Study Group on Young People and Health for All by the year 2000. Geneva; WHO: 1986. (WHO technical report series; no. 731).
2. Colli AS. Conceito de adolescência. In: Marcondes E. *Pediatria básica*. 8 ed. São Paulo: Sarvier; 1999.
3. Fernandes EC, Marinho TMS. Problemas de saúde na adolescência. En: Figueira F, Ferreira OS, Alves JGB. *Pediatria – Instituto Materno Infantil de Pernambuco*. 2 ed. Rio de Janeiro: Médice; 1996. p. 873-877.
4. Unicef Brasil. Projeto SB Brasil: resultados principais SB Brasil 2010 [Internet]. Brasília; Unicef: 2011. En: http://www.unicef.org/brazil/pt/activities_9418.htm.

5. Figueiredo MC, Severo IF, Pires MSN. Agora que eles cresceram. En: Sucesso no atendimento odontopediátrico: aspectos psicológicos. São Paulo: Santos; 2002. p. 271-287.
6. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Projeto SB Brasil 2003: condições de saúde bucal da população brasileira 2002-2003: resultados principais. Brasília; 2004.
7. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Programa SB Brasil 2010: resultados principais [Internet]. Brasília; 2011. En: <http://189.28.128.100/dab/docs/geral/projeto_sb2010_relatorio_final.pdf>.
8. Instituto Brasileiro de Geografia e Estatística. Indicadores sociais municipais: uma análise dos resultados do universo do censo demográfico, análise preliminar da distribuição e diferenciais de rendimento [Internet]. Rio de Janeiro; 2011. En: <http://www.ibge.gov.br/home/presidencia/noticias/imprensa/ppts/0000000647571114201157416899473.pdf>.
9. Gambhir RS, Sohi RK, Nanda T, Sawhney GS, Setia S. Impact of school based oral health education programmes in India: a systematic review. J Clin Diagn Res. 2013; 7(12): 3107-3110. <https://doi.org/10.7860/JCDR/2013/6212.3718>
10. Campos L, Silveira EG, Birolo JB, Bottan ER, Schmitt BHE. Conhecimento de mães de diferentes classes sociais sobre saúde bucal no município de Cocal do Sul (SC). Rev Sul-Bras Odontol. 2010; 7(3): 2872-2895.
11. World Health Organization. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health [Internet]. Geneva; 2008. En: http://www.who.int/social_determinants/thecommission/finalreport/en/index.html.
12. Baldani MH, Vasconcelos AGG, Antunes JLF. Associação do índice CPO-D com indicadores socioeconômicos e de provisão de serviços odontológicos no Estado do Paraná, Brasil. Cad. Saúde Pública 2004; 20(1): 143-152. DOI: <http://dx.doi.org/10.1590/S0102-311X2004000100030>
13. World Health Organization. Oral health surveys: basic methods [Internet]. Geneva; WHO: 1997. En: <http://apps.who.int/iris/bitstream/10665/41905/1/9241544937.pdf>.

14. Jodas CRP, Baccarin LS, Teixeira RG, Souza RP, Rapoport RA. Análise da concordância intra e inter-observadores na detecção das fraturas da face por meio da tomografia computadorizada. *Rev Bras Cir Cabeça Pescoço*. 2009; 38(1): 26-33.
15. Greene JC, Vermillion JR. The simplified oral hygiene index. *J Am Dent Assoc*. 1964; 68(1): 7-13.
16. Rigo L, Caldas Júnior AF, Souza EHA. Experiência de cárie dentária e fatores associados em escolares de um município com fluoretação na água. *Pesqui Bras Odontopediatria Clín Integr*. 2011; 11(3): 407-415. DOI: <http://dx.doi.org/10.4034/PBOCI.2011.113.16>
17. Moreira SR, Nico SL, Tomita NE. A relação entre o espaço e a saúde bucal coletiva: por uma epidemiologia georreferenciada. *Ciênc Saúde Coletiva*. 2007; 12(1): 275-284. DOI: <http://dx.doi.org/10.1590/S1413-81232007000100031>
18. Gondim GMM, Monken M, Rojas LI, Barcellos C, Peiter P. O território da saúde: a organização do sistema de saúde e a territorialização. En: Miranda AC, Barcellos C, Moreira JC, Monken M. Território, ambiente e saúde [Internet]. Rio de Janeiro, Fiocruz; Gondim GMM: 183-203. En: <http://saudepublica.bvs.br/pesquisa/resource/pt/eps-2055>.
19. Levy-Costa RB, Sichieri R, Pontes NS, Monteiro CA. Disponibilidade domiciliar de alimentos no Brasil: distribuição e evolução (1974-2003). *Rev Saúde Pública*. 2005; 3(4): 530-540. DOI: <http://dx.doi.org/10.1590/S0034-89102005000400003>
20. Tomita NE, Nadanovsky ALFV, Lopes ES. Preferências por alimentos doces e cárie dentária em pré-escolares. *Rev Saúde Pública*. 1999; 3(6): 542-546. DOI: <http://dx.doi.org/10.1590/S0034-89101999000600004>
21. Viana ARP, Parente RCP, Borrás MR, Rebelo MAB. Prevalência de cárie dentária e condições socioeconômicas em jovens alistados de Manaus. *Rev Bras Epidemiol*. 2009; 12(4): 680-687. <http://dx.doi.org/10.1590/S1415-790X2009000400017>
22. Granville-Garcia AN, Lorena-Sobrinho JE, Araújo JC, Menezes VA, Costa EMMB. Influência do fator socioeconômico no comportamento dos adolescentes em relação à saúde bucal. *Odonto (São Bernardo do Campo)*. 2008; 16(31): 53-61. DOI: <http://dx.doi.org/10.15603/2176-1000/odonto.v16n31p53-61>

23. Chambrone L, Macedo SB, Ramalho FC, Trevizani Filho E, Chambrone LA. Prevalência e severidade de gengivite em escolares de 7 a 14 anos: condições locais associadas ao sangramento à sondagem. *Ciênc Saúde Coletiva*. 2010; 15(2): 337-343.
24. Antunes JLS, Peres MA, Frias AC, Crosato EM, Biazevic MGH. Saúde gengival de adolescentes e a utilização de serviços odontológicos. *Rev Saúde Pública*. 2008; 42(2): 1-8. DOI: <http://dx.doi.org/10.1590/S0034-89102008000200002>
25. Souza RP. Desenvolvimento psicológico na infância e na adolescência. En: Costa MCO, Souza RP. *Avaliação e cuidados primários da criança e do adolescente*. Porto Alegre: Artmed; 1998.
26. Compostella E. Manejo de la conducta del niño y del adolescente. *Coop Dent*. 1984; 50(1-2): 22-24.
27. Brasil. Ministério da Saúde. Portal da Saúde [Internet]. Brasília; 2016. En: <http://portalsaude.saude.gov.br/index.php/o-ministerio/principal/secretarias/981-sasraiz/dapes/dapes/12-dapes/16096-coordenacao-geral-de-saude-do-adolescente-e-do-jovem>.
28. Baldwin DC. Appearance and aesthetics in oral health. *Community Dent Oral Epidemiol*. 1980; 8(5): 244-256.
29. Narvai PC, Frazão P, Roncalli AG, Antunes JLF. Cárie dentária no Brasil: declínio, iniquidade e exclusão social. *Rev Panam Salud Publica*. 2006; 19(6): 385-393.
30. Hung HC, Colditz G, Joshipura KJ. The association between tooth loss and the selfreported intake of selected CVD-related nutrients and foods among US women. *Community Dent Oral Epidemiol*. 2005; 33(3): 167-173. DOI: <https://doi.org/10.1111/j.1600-0528.2005.00200.x>
31. Capra F. *O ponto de mutação (the turning point)*. São Paulo: Cultrix; 1982.