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**ORIGINAL ARTICLE /** *ARTIGO ORIGINAL*

# Factors associated with the impact of oral health conditions on daily activities of adolescents, São Paulo State, 2015

## *Fatores associados ao impacto das condições de saúde bucal nas atividades de vida diária de adolescentes, Estado de São Paulo, 2015*

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**ABSTRACT:** ***Objective***: To assess the association between the impact of oral health on daily life and sociodemographic variables with oral parameters in adolescents living in the State of São Paulo, Brazil. ***Methods***: A cross-sectional study was conducted with data from 5,409 adolescents who participated in the "State Oral Health Survey of São Paulo – OH", 2015. The impact of oral health on daily life was assessed by the oral impacts on daily performances (OIDP) index, prevalence (presence or absence of impact) and severity of impact (OIDP scores). The negative binomial regression model (zeros-inflated) was used, considering the complex sampling and the sample weights. Prevalence ratio (PR), ratio of means (ROM) and confidence intervals (CI) were calculated. ***Results***: The prevalence of impact was 37.4%. After adjusting for the model, the impact was more prevalent (PR = 1.59; 95%CI 1.22 – 1.81) and more severe (RR = 1.49; 95%CI 1.22 – 1.81) among females. Compared to white-skin people, all remaining groups had a higher prevalence of impact. Among socioeconomic characteristics, family income higher than R$ 2,501 (RR = 0.79; 95%CI 0.64 – 0.98) and household crowding (RR = 1.18; 95%CI 1.00 – 1.39) were associated with the severity of impact. In the oral health conditions, untreated caries (PR = 1.46; 95%CI 1.23 – 1.74) and gingival bleeding (PR = 1.35; 95%CI 1.14 – 1.60) were associated with higher prevalence of impact. ***Conclusion***: Females, non-whites, with untreated caries and gingival bleeding were associated with higher impact of oral health on daily life. Family income higher than R$ 2,500 and living in less crowded households were factors associated with less impact.

***Keywords:*** Oral health. Quality of life. Adolescent. Socioeconomic factors.

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**RESUMO:** ***Objetivo:*** Verificar a associação entre impacto nas atividades de vida diária e variáveis sociodemográficas e parâmetros bucais em adolescentes no Estado de São Paulo. ***Métodos:*** Estudo transversal com dados de 5.409 adolescentes que participaram da "Pesquisa Estadual de Saúde Bucal de São Paulo - SB", de 2015. O impacto nas atividades de vida diária foi avaliado pelo índice de impacto das condições de saúde bucal nas atividades de vida diária (em inglês: *oral impacts on daily performances* [OIDP]), pela prevalência (presença ou ausência de impacto) e pela severidade do impacto (escores do OIDP). Utilizou-se o modelo de regressão binomial negativa inflado de zeros, considerando os pesos amostrais. Foram calculados as razões de prevalências (RP), as razões de médias (RM) e os intervalos de confiança (IC). ***Resultados:*** A prevalência de impacto nas atividades de vida diária foi de 37,4%. Após o ajuste, pôde-se observar que o sexo feminino permaneceu com maior prevalência (RP = 1,59; IC95% 1,36 – 1,81) e severidade do impacto (RM = 1,49; IC95% 1,22 – 1,81). Na comparação com brancos, os demais grupos tiveram maior prevalência de impacto. A renda familiar maior que R$ 2.501 (RM = 0,79; IC95% 0,64 – 0,98) e a aglomeração domiciliar (RM = 1,18; IC95% 1,00 – 1,39) foram associadas com a severidade do impacto. Nas condições de saúde bucal, verificou-se que a cárie não tratada (RP = 1,46; IC95% 1,23 – 1,74) e o sangramento gengival (RP = 1,35; IC95% 1,14 – 1,60) permaneceram associados com maior prevalência de impacto. ***Conclusão:*** Sexo feminino, ter cor não branca, ter cárie não tratada e sangramento gengival foram associados ao maior impacto nas atividades de vida diária. Ter renda maior que R$ 2.500 e residir em domicílios menos aglomerados associaram-se com menor impacto.

***Palavras-chave:*** Saúde bucal. Qualidade de vida. Adolescente. Fatores socioeconômicos.

## INTRODUCTION

In 1948, the World Health Organization (WHO) defined health as "complete physical, mental and social well-being, and not just the absence of disease" and, since then, has emphasized oral health conditions as an important and inseparable part of people's general health and quality of life[1].

Oral health problems have been increasingly recognized as important causes of negative impact on the daily performance and quality of life of individuals and the society[2]. That said, the focus of epidemiological studies has shifted to analyzing the impact of oral diseases on the population's quality of life.

Studies addressing the relationship between quality of life and oral health have used socio-dental indicators, based on self-perceived oral health and dental impacts, and the main innovation is the shift in emphasis from purely biological aspects of clinical practice to psychological and social aspects[2,3]. According to Sheiham[3], these quality of life indicators should be seen not as substitutes for normative criteria, but as an important complement to them.

The tool oral impacts on daily performances (OIDP) is a socio-dental indicator based on the conceptual model International Classification of Impairments, Disabilities and Handicaps, by the WHO[4], and which was modified by Locker[5] to be used in the field of dentistry. It has been used to assess the frequency and severity of the impact on individuals' daily performance[6].

As a result, the literature has reported a strong association between oral problems and negative impact on the quality of life of individuals. Diseases such as dental caries and toothache have caused adverse functional, social, and psychological effects[7-9].

In addition to the association with oral problems, studies have shown that aspects such as sex, income, ethnicity, and education are also associated with the impact of oral health conditions on activities of daily living[10-12].

By means of epidemiological surveys, one may obtain information on the prevalence and severity of oral diseases, as well as measure the impact of such diseases on the quality of life of individuals. The understanding of the reality and hierarchy of oral problems among adolescents becomes more comprehensive, enabling the planning and organization of oral health care services and programs aimed at adolescents.

Therefore, the aim of this study was to assess the association of demographic, socioeconomic, behavioral and oral health conditions with the impact of oral health conditions on daily activities of adolescents aged 15 to 19 years old in the State of São Paulo.

## METHODS

This was a cross-sectional study based on the results of the epidemiological survey on oral health entitled "São Paulo State Oral Health Survey – OH", carried out in 2015[13]. The sampling was probabilistic by clusters in two stages, taking into account sampling weight and the effect of drawings in respective draw stages. The sampling plan is detailed in the final report of the state epidemiological survey[13].

Across the State of São Paulo, 17,560 individuals (including adolescents, adults, and the elderly) were assessed in an interview and epidemiological examination of the oral cavity, as suggested by the WHO guidelines for surveys in oral health[14] and the methodology of the OH Brazil Project 2010[15]. This study gathered and analyzed data from 5,409 adolescents aged between 15 and 19 years old.

Our study was approved by the Research Ethics Committee of the Public Health School, Universidade de São Paulo.

### TRAINING OF EXAMINERS

The examinations were carried out by 250 work teams formed by dental surgeons and oral health assistants, totaling 550 professionals. The teams were trained in workshops that lasted 16 hours in total, where one was able to discuss the operations of the study stages and duties of each participant, as well as ensure an acceptable degree of uniformity in procedures. The consensus technique was applied by means of the Kappa coefficient in the final round, weighted for each examiner, age group and condition studied, with a value of 0.65 as minimum acceptable limit[14].

## STUDY VARIABLES

The outcome of this study was the OIDP variable, analyzed in two ways: dichotomized in presence and absence (OIDP prevalence) and in a parametric way, represented by the total score of the impact indicator (OIDP severity).

The tool OIDP consists of nine daily performance questions – eating, talking, oral hygiene, relaxation, sports, smiling, studying and working, social contact and sleep. Each item was preceded by the question "Some people have problems that may have been caused by their teeth. Of the situations below, which ones apply to you over the last six months?". The answer options were: "no" (code 0), "yes" (code 1) and "do not know or did not want to answer" (code 9). Code 9 was treated as missing information for each OIDP question. For OIDP prevalence, the variable was sorted as with and without impact, the presence of impact on daily activities being characterized by the answer "yes" (code 1) in at least one question. OIDP severity was checked by the sum of questions answered with "yes".

The independent variables taken into consideration to assess associated factors were chosen in four conceptually organized blocks. In the first one, demographic characteristics (age, sex and self-declared skin color) were included; in the second one, socioeconomic conditions (number of people living in household, family income, and number of goods in the household); in the third one, educational level (school delay); in the fourth one, oral health conditions (untreated caries, gingival bleeding on probing, and dental calculus).

Number of people living in the household was measured in terms of residents per room. Family income was assessed in categories of value ranges, expressed in Brazilian reais (in the reference period for data collection, each US dollar corresponded to 3.10 BRL). The number of household goods was informed in a standard questionnaire and included items such as refrigerators, radio, television, and others.

The variable "school delay" was constructed in a dichotomous way so as to differ adolescents who were at least one year behind the expected for their corresponding age (11 years of study for those aged 18 and 19 years; 10 for the aged 17 years); 9 for those aged 16 years; and 8 for those aged 15 years). Adolescents who, for whatever reason, interrupted formal school education before completing high school were also included in school delay. This variable was also incorporated in the general assessment of the human development index (HDI) in Brazil[16].

The measures of prevalence of untreated caries, gingival bleeding on probing and dental calculus were obtained by oral examination peon participants.

## STATISTICAL ANALYSIS

To characterize the sample, we performed a descriptive statistical analysis of the prevalence and severity of OIDP, as well as all other independent variables. After descriptive statistical analysis of the studied variables, the prevalence ratios (PR) and the ratios of means (ROM) were estimated, with gross values and respective confidence intervals (CI).

To study the association between the OIDP and the exposure variables of interest, the zero-inflated negative binomial regression model was used. This model makes it possible to calculate the PR, identifying the variables associated with the presence of impact of oral health conditions on activities of daily living, and the ROM, indicating the factors associated with severity of impact, that is, the number of impacts of such oral health conditions in activities of daily living. Following the methodological indications by Victora et al.[17], the multiple factor regression analysis was adjusted for association between the outcome and the proximal factors by the most distal variables of the conceptual model. That is, demographic characteristics were adjusted only for each other; socioeconomic conditions were adjusted for each other and for demographic characteristics; the behavioral conditions were adjusted for demographic characteristics and socioeconomic conditions; and the oral health condition was adjusted for demographic characteristics, socioeconomic conditions and behavioral conditions.

Statistical analyses were made on the Stata software, version 15.0 (College Station, Texas, 2017), in survey mode, considering the complex structure of the survey (sample by clusters) and respective sample weights. The level of significance adopted was 5%.

## RESULTS

The mean OIDP found among adolescents aged 15 to 19 years old was 0.93 (0.88–0.98) and the prevalence of impact on activities of daily living was 37.4%.

The analysis of unadjusted associations of OIDP prevalence and severity is shown in Table 1. Females were found to have a higher prevalence (PR = 1.57; 95%CI 1.35 – 1.87) and severity (ROM = 1.50; 95%CI 1.19 – 1.88) of impact compared to males. For the variable age, in general, there were no statistically significant differences. Regarding skin color, a higher prevalence of OIDP was found among participants with brown skin (PR = 1.17; 95%CI 1.00 – 1.38), black skin (PR = 1.29; 95%CI 1.05 – 1.57) and yellow skin (PR = 1.58; 95%CI 1.25 – 1.99). The latter group also had a greater severity of impact (ROM = 2.84; 95%CI 1.42 – 5.67).

With regard to differing factor according to socioeconomic characteristics, adolescents who had a greater number of goods at home were found to have lower OIDP severity (ROM = 0.76; 95%CI 0.61 – 0.94).

Regarding educational level, adolescents with school delay had more severe OIDP (ROM = 1.48; 95%CI 1.14 – 1.93).

In oral health conditions, untreated caries was associated with a higher prevalence of impact (PR = 1.59; 95%CI 1.36 – 1.86); gingival bleeding was associated with both higher prevalence (PR = 1.52; 95%CI 1.28 – 1.80) and severity of impact (ROM = 1.35; 95%CI 1.08 – 1.67), and dental calculus was also associated with both higher prevalence (PR = 1.34; 95%CI 1.13 – 1.58) and severity of impact (ROM = 1.22; 95% CI 1.01 - 1.47).

After adjusting the model (Table 2), females remained associated with a higher prevalence and severity of impact on activities of daily living. When adjusted for the prevalence of

Table 1. Estimates of prevalence ratios, ratio of means and confidence intervals for oral impacts on daily performances in the non-adjusted negative binomial regression analysis model (zero-inflated model) of adolescents, São Paulo, 2015.

| Demographic characteristics | | n | PR | 95%CI | ROM | 95%CI |
|---|---|---|---|---|---|---|
| Sex | Male | 2,346 | 1.00 | | 1.00 | |
| | Female | 3,063 | **1.57** | **1.35 – 1.87** | **1.50** | **1.19 – 1.88** |
| Age | 15 | 1,514 | 1.00 | | 1.00 | |
| | 16 | 1,033 | 0.94 | 0.79 – 1.12 | 0.94 | 0.69 – 1.29 |
| | 17 | 865 | 1.13 | 0.96 – 1.33 | 1.02 | 0.74 – 1.39 |
| | 18 | 909 | 0.95 | 0.79 – 1.15 | 1.05 | 0.74 – 1.50 |
| | 19 | 1,088 | 1.30 | 1.06 – 1.58 | 1.19 | 0.87 – 1.63 |
| Ethnicity | White | 3,227 | 1.00 | | 1.00 | |
| | Black | 441 | **1.29** | **1.05 – 1.57** | 1.01 | 0.68 – 1.49 |
| | Yellow | 54 | **1.58** | **1.25 – 1.99** | **2.84** | **1.42 – 5.67** |
| | Brown | 1,677 | **1.17** | **1.00 – 1.38** | 0.97 | 0.80 – 1.17 |
| | Indigenous | 10 | 1.70 | 0.84 – 3.41 | 1.61 | 0.61 – 4.30 |
| **Socioeconomic conditions** | | **n** | **PR** | **95%CI** | **ROM** | **95%CI** |
| Number of people in household | up to 2 | 3,894 | 1.00 | | 1.00 | |
| | 2 or more | 1,515 | 1.09 | 0.89 – 1.35 | 1.13 | 0.90 – 1.43 |
| Family income | up to R$ 1,500 | 1,909 | 1.00 | | 1.00 | |
| | 1,501 a 2,500 | 1,444 | 0.86 | 0.69 – 1.06 | 0.83 | 0.64 – 1.09 |
| | 2,501 or more | 2,056 | 0.89 | 0.73 – 1.09 | 0.81 | 0.61 – 1.07 |
| Number of goods | up to 8 | 3,148 | 1.00 | | 1.00 | |
| | 9 or more | 2,261 | 0.94 | 0.82 – 1.07 | **0.76** | **0.61 – 0.94** |
| **Behavioral conditions** | | **n** | **PR** | **95%CI** | **ROM** | **95%CI** |
| School delay | No | 4,165 | 1.00 | | 1.00 | |
| | Yes | 1,244 | 1.04 | 0.89 – 1.22 | **1.48** | **1.14 – 1.93** |
| **Oral health conditions** | | **n** | **PR** | **95%CI** | **ROM** | **95%CI** |
| Untreated caries | No | 3,316 | 1.00 | | 1.00 | |
| | Yes | 2,093 | **1.59** | **1.36 – 1.86** | 1.26 | 1.00 – 1.58 |
| Gingival bleeding | No | 3,640 | 1.00 | | 1.00 | |
| | Yes | 1,769 | **1.52** | **1.28 – 1.80** | **1.35** | **1.08 – 1.67** |
| Dental calculus | No | 3,727 | 1.00 | | 1.00 | |
| | Yes | 1,682 | **1.34** | **1.13 – 1.58** | **1.22** | **1.01 – 1.47** |

PR: prevalence ratio; ROM: ratio of means; 95%CI: 95% confidence intervals.

Table 2. Estimates of prevalence ratios, ratio of means and confidence intervals for oral impacts on daily performances, in the adjusted negative binomial regression analysis model (zero-inflated model) in adolescents, São Paulo, 2015.

| Demographic characteristics [a] | | PR | 95%CI | ROM | 95%CI |
|---|---|---|---|---|---|
| Sex | Male | 1.00 | | 1.00 | |
| | Female | 1.59 | 1.36 – 1.86 | 1.49 | 1.22 – 1.81 |
| Age | 15 | 1.00 | | 1.00 | |
| | 16 | 0.96 | 0.82 – 1.13 | 0.90 | 0.65 – 1.23 |
| | 17 | 1.08 | 0.90 – 1.29 | 0.81 | 0.58 – 1.11 |
| | 18 | 0.90 | 0.75 – 1.09 | 0.86 | 0.62 – 1.20 |
| | 19 | 1.17 | 0.95 – 1.44 | 0.92 | 0.68 – 1.23 |
| Ethnicity | White | 1.00 | | 1.00 | |
| | Black | **1.28** | **1.05 – 1.57** | 1.00 | 0.70 – 1.44 |
| | Yellow | 1.46 | 1.07 – 1.97 | 2.70 | 1.46 – 5.02 |
| | Brown | **1.20** | **1.03 – 1.40** | 0.99 | 0.83 – 1.19 |
| | Indigenous | **1.84** | **1.04 – 3.27** | 1.60 | 0.54 – 1.15 |
| **Socioeconomic conditions [b]** | | **PR** | **95%CI** | **ROM** | **95%CI** |
| Number of people in household | up to 2 | 1.00 | | 1.00 | |
| | 2 or more | 1.08 | 0.87 – 1.34 | **1.18** | **1.00 – 1.39** |
| Family income | up to R$ 1.500 | 1.00 | | 1.00 | |
| | 1.501 a 2.500 | 0.85 | 0.70 – 1.05 | 0.83 | 0.63 – 1.08 |
| | 2.501 or more | 0.92 | 0.76 – 1.12 | **0.79** | **0.64 – 0.98** |
| Number of goods | up to 8 | 1.00 | | 1.00 | |
| | 9 or more | 0.99 | 0.87 – 1.34 | 0.81 | 0.68 – 1.41 |
| **Behavioral conditions [c]** | | **PR** | **95%CI** | **ROM** | **95%CI** |
| School delay | No | 1.00 | | 1.00 | |
| | Yes | 0.98 | 0.84 – 1.14 | **1.29** | **1.02 – 1.63** |
| **Oral health conditions [d]** | | **PR** | **95%CI** | **ROM** | **95%CI** |
| Untreated caries | No | 1.00 | | | |
| | Yes | **1.46** | **1.23 – 1.74** | 1.15 | 0.94 – 1.39 |
| Gingival bleeding | No | 1.00 | | | |
| | Yes | **1.35** | **1.14 – 1.60** | 1.24 | 0.97 – 1.58 |
| Dental calculus | No | 1.00 | | 1.00 | |
| | Yes | 1.07 | 0.88 – 1.29 | 1.04 | 0.88 – 1.21 |

PR: prevalence ratio; ROM: ratio of means; 95%CI: 95% confidence intervals;
[a]adjusted among themselves; [b]adjusted among themselves and by demographic characteristics; [c]adjusted for demographic and socioeconomic characteristics; [d]adjusted by demographic, socioeconomic and behavioral characteristics.

untreated caries and the other sociodemographic and behavioral characteristics, gingival bleeding was still associated with the outcome, while dental calculus was not significantly associated.

Black, brown and yellow skin color remained significantly associated with a higher prevalence of impact when compared to white skin. Yellow-skinned adolescents also maintained a higher severity of impact (ROM = 2.70; 95%CI 1.46 – 5.02).

In the assessment of socioeconomic characteristics, the severity of impact was positively associated with larger number of people living in a household (ROM = 1.18; 95%CI 1.00 – 1.39) and negatively with family income greater than R$ 2,501.00 (ROM = 0.79 and 95%CI 0.64 – 0.98). School delay remained associated with the impact on activities of daily living. Untreated caries (PR = 1.46; 95%CI 1.23 – 1.74) and gingival bleeding (PR = 1.35; 95%CI 1.14 – 1.60) remained associated with the prevalence of impact, while dental calculus was not associated with impact.

## DISCUSSION

The prevalence of impact of oral health conditions on activities of daily living found was similar to that of other studies conducted with the same age group[8,18]. In the SBBrasil 2010 survey, 39.4% of adolescents aged 15 to 19 years had had at least one negative impact on their quality of life due to oral conditions. The distribution of the OIDP index justifies the choice of the analysis model (zero-inflated negative binomial regression), since the excessive concentration of zero values (almost two thirds of the sample) makes the OIDP index not compatible with the normal distribution nor with the Poisson distribution[19].

Results point a higher prevalence and severity of impact on activities of daily living in females, corroborating the results of several other studies[7,8,10,18,20]. A possible justification for these results would be girls' greater concern with oral health[21]; other authors also cite the fact that girls have greater self-criticism regarding their dental esthetics[22].

Regarding skin color, the results showed a higher prevalence of impact among black (brown and black) and yellow people, when compared to white people. Racial inequalities related to oral health in Brazil have been reported, with the non-white population being more vulnerable to oral health problems as a result of contextual factors related to human development, income distribution and access to health policies[9]. Rebouças et al.[20] also found a relationship between dissatisfaction with oral health, ethnicity and the presence of caries in adolescents who participated in a national epidemiological survey on oral health conducted in 2010, highlighting that these can be important indicators of social inequities in oral health.

Our study found that adolescents with worse socioeconomic status (lower family income and greater household crowding) had a greater severity of impact on activities of daily living. Corroborating these results, Peres et al.[8] used family income and schooling as a proxy measure of socioeconomic status and reported that adolescents with worse socioeconomic status were more impacted, even in the presence of oral conditions such as dental caries, periodontal disease and tooth loss.

School delay was associated with a greater severity of impact of oral health conditions in daily life, and epidemiological studies on adolescents in Brazil have used the variable school delay as a proxy measure for socioeconomic status in the assessment of factors associated with the perception of oral health[23,24].

The same association between untreated caries and impact on activities of daily living found in this study was also reported by da Cunha et al.[18], Peres et al.[8] and Krisdapong et al.[25]. When investigating associations of oral impacts and dental caries, the study by Krisdapong et al.[25] reported a significant increase in impacts when there were a greater number of untreated caries and also found a statistically significant association between the impacts and severity of caries. These results place untreated caries as an important indicator of impact on activities of daily living and, therefore, related to quality of life in adolescents.

Gingival bleeding was associated with the prevalence of impact in the adjusted model, while dental calculus was not associated with impact. In a study with Thai children and adolescents aged 12 and 15 years old, a high prevalence of calculus and/or gingivitis was found (80% of the studied adolescents); however, of these adolescents, only 30% reported an impact on their quality of life related to gingivitis and calculus. In another study, the same authors found that caries impacted several daily life activities, while gingivitis and calculus were related to psychosocial aspects[26]. These results are also justified by the fact that these diseases, in initial stages, are not serious, so individuals tend to consider them as normal or irrelevant[27].

Due to its cross-sectional nature, the study was limited by the impossibility of making considerations about causality; however, the external validation of the study is guaranteed by the representativeness of sample for the studied age group.

In our study, the factors associated with the impact on activities of daily living in a representative sample of adolescents from the State of São Paulo were evaluated. Other studies also addressed this sample, such as the study by Cunha et al.[18] and Bulgareli et al.[7], but there are important differences between them: Bulgareli et al.[7] analyzed the variables associated with the impact not only in the sample of adolescents, but also in adults and the elderly examined in the same state survey. The main objective of Cunha et al.[18], on the other hand, was to investigate how social vulnerability and oral health factors affect the quality of life of adolescents.

Another difference between the studies was the statistical analysis, since, with the large concentration of individuals with zero OIDP values (without impact), the choice of the zero-inflated negative binomial regression model was justifiable for more precision in the statistical analysis and accuracy of knowledge generated.

The results of this study pointed a greater impact of oral health conditions on activities of daily living in adolescents in the State of São Paulo for those who are female, non-white, have worse socioeconomic condition, untreated caries in at least one tooth and presence of gingival bleeding. Based on this information, the planning of actions and services aimed at the age group can be directed to the control of oral diseases and, consequently, provide better quality of life for adolescents.

## CONCLUSION

The results of this study point out that being a female, non-white, having untreated caries and gingival bleeding were conditions associated with the greatest oral health impact. More favorable socioeconomic conditions, such as a family income higher than R$ 2,500 and less people living in a household, were found to be significantly associated with a lower impact of oral health conditions in activities of daily living.

## REFERENCES


1. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century-the approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol 2003; 31(Supl. 1): 3-24. http://doi.org/10.1046/j..2003.com122.x
2. Gomes AS, Abegg C. O impacto odontológico no desempenho diário dos trabalhadores do Departamento Municipal de Limpeza Urbana de Porto Alegre, Rio Grande do Sul, Brasil. Cad Saúde Pública 2007; 23(7): 1707-14. https://doi.org/10.1590/S0102-311X2007000700023
3. Sheiham A. A determinação de necessidades de tratamento odontológico: uma abordagem social. In: Pinto VG, editor. Saúde bucal coletiva. São Paulo: Santos; 2000. p. 223-50.
4. World Health Organization. International classification of impairments, disabilities and handicaps. Genebra: World Health Organization; 1980.
5. Locker D. Measuring oral health: socio-dental indicators. In: Locker D, editor. An introduction to behavioral science & dentistry. New York/London: Routledge; 1989. p. 73-101.
6. Adulyanon S, Vourapukjaru J, Sheiham A. Oral impacts affecting daily performance in a low dental disease Thai population. Community Dent Oral Epidemiol 1996; 24(6): 385-9. https://doi.org/10.1111/j.1600-0528.1996.tb00884.x
7. Bulgareli JV, Faria ET de, Cortellazzi KL, Guerra LM, Meneghim MC, Ambrosano GMB, et al. Fatores que influenciam o impacto da saúde bucal nas atividades diárias de adolescentes, adultos e idosos. Rev Saúde Pública 2018; 52: 44-53. https://doi.org/10.11606/s1518-8787.2018052000042
8. Peres KG, Cascaes AM, Leão ATT, Côrtes MIS, Vettore MV. Aspectos sociodemográficos e clínicos da qualidade de vida relacionada à saúde bucal em adolescentes. Rev Saúde Pública 2013; 47(Supl. 3): 19-28. https://doi.org/10.1590/S0034-8910.2013047004361
9. Guiotoku SK, Moysés ST, Moysés SJ, França BHS, Bisinelli JC. Iniquidades raciais em saúde bucal no Brasil. Rev Panam Salud Publica 2012; 31(2): 135-41. https://doi.org/10.1590/S1020-49892012000200007
10. Gouvêa GR, Bulgareli JV, David LL, Ambrosano GMB, Cortellazzi KL, Guerra LM, et al. Variables associated with the oral impact on daily performance of adults in the state of São Paulo: A population-population-based study. PloS One 2018; 13(9): e0203777. https://doi.org/10.1371/journal.pone.0203777
11. Chaffee BW, Rodrigues PH, Kramer PF, Vítolo MR, Feldens CA. Oral health-related quality-of-life scores differ by socioeconomic status and caries experience. Community Dent Oral Epidemiol 2017; 45(3): 216-24. https://doi.org/10.1111/cdoe.12279
12. Sanders AE, Slade GD, Lim S, Reisine ST. Impact of oral disease on quality of life in the US and Australian populations. Community Dent Oral Epidemiol 2009; 37(2): 171-81. https://doi.org/10.1111/j.1600-0528.2008.00457.x
13. Universidade Estadual de Campinas. Pesquisa Estadual de Saúde Bucal – SB São Paulo 2015. Relatório final. Universidade Estadual de Campinas; 2016.
14. Word Health Organization. Oral health surveys: basic methods [Internet]. 4ª ed. Genebra: WHO; 1997 [accessed on Mar 15, 2019]. Available from: http://apps.who.int/iris/bitstream/10665/41905/1/9241544937.pdf
15. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Secretaria de Vigilância em Saúde. SB Brasil 2010: Pesquisa Nacional de Saúde Bucal: resultados principais [Internet]. Brasília: Ministério da Saúde; 2012 [accessed on Mar. 27, 2016]. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/pesquisa_nacional_saude_bucal.pdf

16. Programa das Nações Unidas para o Desenvolvimento. Instituto de Pesquisa Econômica Aplicada. Relatório do Desenvolvimento Humano no Brasil. Brasília: Fundação João Pinheiro; 2003.
17. Victora CG, Huttly SR, Fuchs SC, Olinto MT. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. Int J Epidemiol 1997; 26(1): 224-7. https://doi.org/10.1093/ije/26.1.224
18. da Cunha IP, Pereira AC, Frias AC, Vieira V, Meneguim MC, Batista MJ, et al. Social vulnerability and factors associated with oral impact on daily performance among. Health Qual Life Outcomes 2017; 15: 173. https://doi.org/10.1186/s12955-017-0746-1
19. Tang W, Lu N, Chen T, Wang W, Gunzler DD, Han Y, et al. On performance of parametric and distribution-free models for zero-inflated and over-dispersed count responses. Stat Med 2015; 34(24): 3235-45. https://doi.org/10.1002/sim.6560
20. Rebouças AG, Cavalli AM, Zanin L, Ambrosano GMB, Flório FM. Factors associated with Brazilian adolescents' satisfaction with oral health. Community Dent Health 2018; 35(2): 95-101. https://doi.org/10.1922/CDH_4165Gama07
21. Kawamura M, Takase N, Sasahara H, Okada M. Teenagers' oral health attitudes and behavior in Japan: comparison by sex and age group. J Oral Sci 2008; 50(2): 167-74. https://doi.org/10.2334/josnusd.50.167
22. Marques LS, Ramos-Jorge ML, Paiva SM, Pordeus IA. Malocclusion: esthetic impact and quality of life among Brazilian schoolchildren. Am J Orthod Dentofacial Orthop 2006; 129(3): 424-7. https://doi.org/10.1016/j.ajodo.2005.11.003
23. Antunes JLF, Peres MA, Frias AC, Crosato EM, Biazevic MG. Gingival health of adolescents and the utilization of dental services, state of São Paulo, Brazil. Rev Saúde Pública 2008; 42(2): 191-9. https://doi.org/10.1590/S0034-89102008000200002
24. Borges CM, Peres MA, Peres KG. Associação entre presença de oclusopatias e insatisfação com a aparência dos dentes e gengivas: estudo com adolescentes brasileiros. Rev Bras Epidemiol 2010; 13(4): 713-23. https://doi.org/10.1590/S1415-790X2010000400015
25. Krisdapong S, Prasertsom P, Rattanarangsima K, Sheiham A. Impacts on quality of life related to dental caries in a national representative sample of Thai 12- and 15-year-olds. Caries Res 2013; 47(1): 9-17. http://doi.org/10.1159/000342893
26. Krisdapong S, Prasertsom P, Rattanarangsima K, Sheiham A, Tsakos G. The impacts of gingivitis and calculus on Thai children's quality of life. J Clin Periodontol 2012; 39(9): 834-43. http://doi.org/10.1111/j.1600-051X.2012.01907.x
27. Gift HC, Redford M. Oral health and the quality of life. Clin Geriatr Med 1992; 8(3): 673-83. https://doi.org/10.1016/S0749-0690(18)30471-3

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