# IMPACT OF ORAL HEALTH ON THE QUALITY OF LIFE AND PERSONAL SATISFACTION OF ADOLESCENTS FROM URBAN AND RURAL AREAS FROM A CITY IN BRAZIL: A CROSS-SECTIONAL STUDY

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**Palavras-chave**: Cárie Dentária. Qualidade de Vida. Saúde Pública. Índices de Cárie.

**RESUMO**

**Objetivo**: Avaliar o impacto do estado de saúde bucal na qualidade de vida e na satisfação pessoal de adolescentes das áreas urbana e rural de Nova Friburgo, Brasil. **Métodos**: Adolescentes entre 11 e 14 anos, matriculados nas escolas participantes do Programa Saúde na Escola (PSE) da zona rural e urbana desta cidade (n = 509), receberam o Termo de Consentimento Livre e Esclarecido para a participação neste estudo, juntamente ao questionário econômico a ser entregue para o responsável. O estado de saúde bucal do adolescente foi avaliado clinicamente, por meio dos índices Cariados, Perdidos e Obturados (CPOD); critérios de envolvimento pulpar, ulceração, fístula e abscesso (PUFA); e Índice de Necessidades de Tratamento Odontológico (INTO). A qualidade de vida foi mensurada por meio do *Child Perception Questionnaire* (CPQ11-14), enquanto a avaliação da satisfação pessoal, por meio da *Subjective Happiness Scale* (SHS), ambos na forma de entrevista. Foram realizados testes estatísticos (Qui-Quadrado; Exato de Fisher; Mann-Whitney) com nível de significância de 5%. **Resultados**: A amostra final foi de 161 adolescentes. O impacto do estado de saúde bucal na qualidade de vida dos adolescentes de ambas as áreas não foi significativamente diferente, embora o agravamento da condição bucal tenha apresentado tendência a piorar a qualidade de vida. Da mesma forma, não houve relação da condição oral com a satisfação pessoal, sem diferenças entre os grupos. Observou-se que os adolescentes rurais apresentaram melhor qualidade de vida ($p$<0,010), enquanto os urbanos apresentaram maior grau de satisfação pessoal ($p$ <0,001). **Conclusão**: O estado de saúde bucal teve impacto negativo na qualidade de vida, mas não teve relação com a satisfação pessoal, independente da área demográfica.

**Keywords**: Dental Caries. Quality of Life. Public Health. Caries Index.

**ABSTRACT**

**Objective**: Evaluate the impact of oral health status on the quality of life and personal satisfaction among adolescents from urban and rural areas, in Nova Friburgo, Brazil. **Methods**: Adolescents between 11 and 14 years, enrolled in the schools participating in the Health in School Program (HSP) of rural and urban of this city (n = 509), received the consent form for the participation in this study, along with the economic questionnaire to be handed to the responsible. Adolescent´s oral health status was evaluated clinically, through the Decayed, Missing and Filled Teeth (DMFT); pulpal involvement, ulceration, fistula and abscess criteria (PUFA); and Dental Treatment Needs Index (DTNI). The quality of life was measured through the Child Perception Questionnaire (CPQ11-14), while personal satisfaction´s evaluation, through the Subjective Happiness Scale (SHS), both as interview. Statistical tests were performed (Chi-Square; Fisher's exact; Mann-Whitney) with level of significance of 5%. **Results**: The final sample comprised 161 adolescents. The impact of oral health status on the quality of life of adolescents from both areas was not significantly different, although the aggravation of the oral condition showed a tendency to worse the quality of life. Similarly, there was no relation of the oral status with personal satisfaction, without differences between the groups. It was observed that rural adolescents presented better quality of life ($p$<0.010), while the urban ones had higher degree of personal satisfaction ($p$<0.001). **Conclusion**: Oral health status had a negative impact on the quality of life, but had no relation to personal satisfaction, regardless of the demographic area.

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# INTRODUCTION

Dental caries is a relevant public health problem worldwide.[1-5] Although some studies showed a significant reduction of the disease, even among adolescents,[6,7] in Brazil, the last national survey showed that caries index continued to be high in this age group.[8,9] In addition, the rate of caries lesions progression was reported as higher at adolescents, when compared to young adults participants.[10] It is also worth noting that dental caries in advanced stages can have a negative impact on the quality of life, due to pain, discomfort and infection.[11-16]

Regarding the oral-health-related quality of life (OHRQoL), it is defined as a multidimensional concept, which is a subjective about all the individual domains complementing clinical health, in the assessment of physical well-being and not just the absence of diseases.[17,18] It reflects among other issues, the comfort of the individual when feeding, during sleep, engaging in social interaction, self-esteem and satisfaction with his/her oral health.[19] Aiming to measure the self-perception of adolescents regarding their OHRQoL, the Child Perceptions Questionnaire (CPQ11-14) is widely used,[20,21] which short version was validated.[22,23] As a complement to the quality of life, the evaluation of personal satisfaction, through the Subjective Scale of Happiness (SHS),[24] characterizes the individual both in absolute and relative forms, according to specific domains, as more or less happy / unhappy.[24,25]

Although studies have reported an association between quality of life and oral health condition[26-30], the correlation of the oral health status with the impact on personal satisfaction was scarcely investigated.[30] Considering that in Brazil, some studies showed rural residents presented worse oral health conditions compared to urban residents,[31,32] the present study aimed to evaluate the impact of oral health status on the quality of life and personal satisfaction among adolescents from urban and rural areas, in Nova Friburgo, Brazil.

# MATERIAL AND METHODS

This cross-sectional study was reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement.[33]

## Ethical issues

Ethical approval was granted (2.015.179). Parents/guardians and the adolescents were informed about the research. Signed Informed consents were obtained from all individual participants included in the study.

## Study design, setting and participants

This cross-sectional study was done as a census, with all the adolescents, between 11 and 14 years, enrolled in the schools participating in the HSP (Health in School Program) of Nova Friburgo, Rio de Janeiro, Brazil, at the year 2018. In addition to the informed consent to allow the participation of the adolescents in the study, guardians also received social economical questionnaires (ABEP and IBGE). The inclusion criteria corresponded to healthy adolescents, with complete permanent dentition, with or without the permanent third molars. Adolescents in orthodontic treatment using a fixed appliance or with special needs or in the mixed dentition period or whose clinical examination could not be performed were excluded. Moreover, adolescents that did not sign the informed consent form or whose guardians did not signed it, were also excluded.

Nova Friburgo is a Brazilian city in the state of Rio de Janeiro, Southeastern Brazil. Its estimated population in 2018 was 190,084 inhabitants. It is located in the north-central part of the state, 136 km from the capital.[34] In this municipality the Health in School Program (HSP) aims to contribute to the integral formation of students through actions of promotion, prevention and health care, addressing the vulnerabilities that compromise the full development of children and adolescents. At the present study, the rural schools were located far from downtown Nova Friburgo, in rural areas; in contrast, the urban schools, were at the center. According to the HSP coordination, a total of six schools presented schoolchildren with the focused age range, from 11 to 14 years old. Four schools were located in the urban area, and two in the rural area. The included schools represented all schools in the city for this age group.

## Variables, measurements

### *First phase: epidemiological survey of oral health*

The DMFT index is recommended to record the experience of caries in each population[35] and is the most used index for epidemiological surveys.[36] However it does not allow the detection of the clinical consequences of untreated carious lesions.[35-39] Thus, the PUFA index,[40] which evaluates the presence of pulpal involvement (P), ulceration caused by dislocation fragments (U), fistula (F), and abscess (A), was also used at the present study with the objective of determining the prevalence and recording the severity of the consequences of untreated caries lesions, as a complement to the DMFT.

The epidemiological survey of adolescent´s oral health, was performed by a single trained and calibrated examiner (HMC) with excellent values (Kappa intra and inter equal 1) for both DMFT and PUFA indexes. Initially, the examiner (HMC) participated in a training and discussion

session with an experienced researcher (MMA) and the calibration process was carried out with three adolescents presenting several scores for DMFT index. Then, the calibration process was conducted with five adolescents also presenting several scores for DMFT index, in two distinct periods with a week interval. After the signature of the consent terms of adolescents and collection of personal data, the visual clinical examination was performed in school desks, using only natural light, with tongue depressor and following the recommendation of the indexes: DMFT[35] and PUFA[40], and the biosafety standards. Based on the evaluation of the DMTF and PUFA indexes, the following categorization of the sample was done in relation to the oral health condition of each individual, so the groups were denominated: Group 1 (G1) – DMFT and PUFA with score 0 for both, Group 2 (G2) – score e" 1 of the DMTF index and PUFA = 0 and Group 3 (G3) – DMTF and PUFA with score e" 1 for both. Besides this, the Dental Treatment Needs Index (DTNI)[41], was also applied in the same conditions, allowing an evaluation of the oral status. The codes were grouped, forming 2 groups: without need for treatment (WNT) and need for treatment (NT).

### *Second phase: Quality of life and personal satisfaction assessments*

Short and validated version CPQ[11-14] questionnaire[22,23] was applied as an interview to all participants. This instrument contains 16 questions corresponding to four domains: oral symptoms (04 questions), function limitation (04 questions); emotion well being (04 questions) and social well being (04 questions). Each question has five alternatives of answer; each presented a certain score, ranging from 0 to 4 points. In the overall sum the score of the instrument could vary from 0 to 64. Higher scores revealing higher negative impact of the oral conditions in the adolescent's quality of life. The instrument also contains global classifications of the oral health and how this condition can affect her/his general well being.

For the personal satisfaction evaluation, the instrument adopted was the Subjective Happiness Scale (SHS) Lyubomirsky, Lepper (1999)[24], translated by Rodrigues, Silva (2010)[25], which can globally measure the subjective happiness by the two components: affective (degree in which pleasant affective experiences weigh more than unpleasant, in a general way) and cognitive (degree in which the individual realizes the understanding of their needs). The count can range from 1 to 7, with higher values corresponding to better personal satisfaction. Both instruments were applied by a single examiner (HMC) in the form of an interview, directly to the adolescents, in a reserved room in the school environment.

## Data analysis, statistical methods

The data were categorized and evaluated using the statistical software SPSS® (Statistical Package for the Social Sciences®, Version 21.0, Chicago, USA). Statistical tests were performed to compare nominal variables (Chi-Square and Fisher's exact test), to compare independent samples and their numerical variables (Mann-Whitney) and to compare two or more independent samples with the same or different sizes (Kruskal Wallis). The level of significance adopted was 5% ($p$<0.05).

# RESULTS

## Participants

At all the six schools of the HSP program of the city, 509 informed consent terms and social economical questionnaires, corresponding to the eligible participants considering the universe of students of the required age group, were sent to those guardians, by the schools. During a period of 30 days, 194 (38%) signed and filled terms and questionnaires were obtained. Thirty-three adolescents were excluded because they were in the mixed dentition period. The final sample comprised 161 adolescents, 104 from urban area and 57 from rural area that fitted the inclusion criteria. The distribution and characterization of the sample was described in table 1.

## Outcome data and main results

Comparing oral health status and economic condition it was observed that the majority of the families were in the medium economical class (levels C and D) and the majority in the G1 (with score 0 for both DMFT and PUFA), but without significant statistical difference ($p$<0.151). When the adolescents were divided in relation to their oral health condition, and comparing them by rural and urban areas, it was observed that the majority were in the G1, in both areas: 57 (54.8%) in urban and 39 (68.4%) in rural area (Table 2), without statistical significant differences between the distribution by areas and the oral health condition ($p$<0.233).

Comparing quality of life and personal satisfaction between areas, both evaluations obtained significant results. The mean value of quality of life in relation to oral health conditions disclosed for the urban adolescents (11.88) were higher than those from the rural (8.91), indicating a lower impact of the oral conditions on the quality of life for the last population (p<0,010). On the other hand, in relation to personal satisfaction, the urban adolescents had more personal satisfaction (mean = 4.58), compared to rural adolescents (mean = 4.14) ($p$<0.001), considering that higher values mean better personal satisfaction. Crossing quality of life with and oral health status (G1, G2, G3) between demographic areas, there was no statistically significant difference, regardless of the area. However, it was observed

***Table 1**: Distribution and characterization of the sample.*

| Variables | | Urban area n=104 (%) | Rural area n=57 (%) | Total n=161 (%) |
|---|---|---|---|---|
| Sex | Male | 38 (36.5%) | 26 (45.6%) | 64 (39.8%) |
| | Female | 66 (63.5%) | 31 (54.4%) | 97 (60.2%) |
| Age (years) | 11 | 9 (8.7%) | 8 (14.0%) | 17 (10.6%) |
| | 12 | 32 (30.8%) | 17 (29.8%) | 49 (30.4%) |
| | 13 | 38 (36.5%) | 17 (29.8%) | 55 (34.2%) |
| | 14 | 25 (24.0%) | 15 (26.3%) | 40 (24.8%) |
| Skin color | White | 54 (51.9%) | 42 (73.7%) | 96 (59.6%) |
| | Black | 20 (19.2%) | 5 (19.2%) | 25 (15.5%) |
| | Brown | 21 (20.2%) | 7 (12.3%) | 28 (17.4%) |
| | Others | 9 (8.7%) | 3 (5.3%) | 12 (7.5%) |
| Economic class | A | – | – | – |
| | B | 9 (8.7%) | 2 (3.5%) | 11 (6.8%) |
| | C | 81 (77.9%) | 36 (63.2%) | 117 (72.7%) |
| | D | 12 (11.5%) | 18 (31.6%) | 30 (18.6%) |
| | E | 2 (1.9%) | 1 (1.8%) | 3 (1.9%) |

***Table 2**: Adolescent's distribution in relation to the oral health condition and areas of Nova Friburgo city (RJ).*

| Oral health condition | | G1 | G2 | G3 | *P value* |
|---|---|---|---|---|---|
| Area | Urban (n=104) | 57(54.8%) | 33(31.7%) | 14(13.5%) | <0.233* |
| | Rural (n=57) | 39(68.4%) | 12(21.1%) | 6(10.5%) | |
| Total (N=161) | | 96(59.6%) | 45(28.0%) | 20(12.4%) | |

*Note: (G1) – DMFT and PUFA with score 0 for both, (G2) – score ≥ 1 of the DMTF index and PUFA = 0, (G3) – DMTF and PUFA with score ≥ 1 for both *Chi-square test.*

***Table 3**: Mean values of quality of life in relation to oral health condition between urban and rural areas of Nova Friburgo city (RJ).*

| Instrument | Gravity | Urban | Rural |
|---|---|---|---|
| **CPQ [11-14]** | G1 | 10.19 | 7.82 |
| | G2 | 13.64 | 7.25 |
| | G3 | 14.64 | 19.33 |
| | *P value* | <0.110* | <0.113* |

*Note: (G1) – DMFT and PUFA with score 0 for both, (G2) – score ≥ 1 of the DMTF index and PUFA = 0, (G3) – DMTF and PUFA with score ≥ 1 for both * Kruskal Wallis test.*

***Table 4**: Mean values of personal satisfaction in relation to oral health condition between areas of Nova Friburgo city (RJ).*

| Instrument | Gravity | Urban | Rural |
|---|---|---|---|
| **SHS** | G1 | 4.55 | 4.13 |
| | G2 | 4.53 | 3.85 |
| | G3 | 4.85 | 4.79 |
| | *P value* | <0.151* | <0.070* |

*Note: (G1) – DMFT and PUFA with score 0 for both, (G2) – score ≥ 1 of the DMTF index and PUFA = 0, (G3) – DMTF and PUFA with score ≥ 1 for both * Kruskal Wallis test.*

a trend for worsening the quality of life as an effect of unfavorable oral health conditions, in both areas, especially in rural (Table 3).

The Dental Treatment Needs Index (DTNI) and the variables of quality of life and personal satisfaction were also crossed, regardless of where they live. In relation to quality of life, the adolescents from the group WNT had better values (9.21) than the other group (15.59), being this difference statistically significant ($p$<0.001). In addition, regarding personal satisfaction, there was no statistically significant difference among adolescents that needed (4.71) or not treatment (4.82), also in both areas ($p$<0.404). When the impact on oral health status (G1, G2, G3) was analyzed on the personal satisfaction between urban and rural areas, the difference was not significant, as well as there was no relation between this variable and the grievance on the oral health condition (Table 4).

## DISCUSSION

The majority of the sample comprised females and with white color, a result different from that found in a systematic review conducted in Brazil, where browns/blacks were the most observed in studies related to oral health[36]. This sample characteristic can be justified by the predominantly European colonization of the Nova Friburgo city, located in the mountain region. About the economic aspects, most families belonged to the medium class, which was also observed when the sample was divided by demographic area. Regarding the oral health condition, most of them did not present dental caries, and in this sense, the phenomenon of dental caries polarization[6] was observed, possibly due to preventive strategies implemented by the Health in School Program. In addition, comparing the two variables, oral health conditions and economic aspects, there was no direct relationship, corroborating with studies that point out a higher occurrence of dental caries among lower income groups, since children from areas lacking financial resources were more likely to have dental caries.[36,42,43]

One of the purposes of the present study was to search for a possible association between demographic area and oral health condition. It was observed that most of the sample was in the G1 group in both regions, showing good oral health conditions. Therefore, dental caries and its consequences were observed in 40.4% of the sample, being lower than the last national survey, which showed that 56.5% of Brazilian adolescents with caries experience. When comparing the areas of the southeast region, where the city is located, those with caries experience were found mostly in the urban area, similarly with this survey.[8]

Interestingly, in other countries, some studies revealed that the overall experience of caries was similar both in rural and urban areas, however higher in rural areas.[44,45,46] According to the aforementioned literature, the greatest involvement by the disease is in rural areas. Conversely, the results in the present study revealed that the urban area had worse oral health status. However, there was no statistical difference between areas, since most of the students did not present dental caries. As the HSP program performs health actions in these schools, it can be assumed that this fact may have influenced the results obtained.

Regarding the focused population, studies are usually conducted on a school environment, which reinforces the need for written authorizations of those responsible, as an ethical prerequisite. Nevertheless, some studies have already pointed the difficulty of obtaining such authorizations in studies conducted on adolescents.[47,48] In this sense, at the present study, a low rate of returning of the terms/questionnaires (38%) was observed, which could be considered a research limitation. Moreover, no studies with the same methodology used, were retrieved in the literature, which hindered a comparison across studies. In any case, more studies with larger samples are needed, especially in relation to personal satisfaction or subjective well being, since it is a new measure of evaluation. Taken together the limitations, the results of the presented study should not be extrapolated to other populations.

Studies have shown a direct relationship between the oral health status and the quality of life.[26-28] Similar results were observed in the present study. On the other hand, a relationship between the oral health status and the personal satisfaction was not disclosed. It is worth mentioning that this issue has still been scarcely reported, although some studies demonstrated that oral conditions and quality of life affect happiness,[30,49] and could be considered important predictors of happiness.[49] Nonetheless, a correlation was disclosed between the scores on the subjective happiness scale and the general CPQ11-14 scores,[30] and a similar association was disclosed by Yoon *et al.*, (2013)[49] with an elderly population, which do not corroborate with the present study results.

Regarding the Dental Treatment Needs Index (DTNI) and the variables of quality of life and personal satisfaction, it was observed that the adolescents from the group without treatment needs showed better quality of life; while, curiously, no difference was disclosed in relation to personal satisfaction. In addition, comparing quality of life and personal satisfaction between areas, rural adolescents showed better quality of life, while urban adolescents showed slightly higher personal satisfaction. Nevertheless, aiming to contribute to the oral health and quality of life of those with treatment needs, the

clinical and epidemiological data collected were presented to the responsible and participants were referred to dental treatment, at the local School of Dentistry.

## CONCLUSION

According to the results of the present study, the adolescent´s oral health condition tended to have a negative impact on the quality of life, while it did not present a relation with the personal satisfaction, independent of the demographic area (urban or rural) of the adolescents of the Nova Friburgo city.

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