







ORIGINAL ARTICLE

Evaluation of the oral health of schoolchildren in Monte Formoso, Minas Gerais: Cross-sectional study

Análisis de la salud bucal de escolares en Monte Formoso, Minas Gerais: Estudio transversal

Brunno Emanuel Gomes Luiz¹  | Edwin Cardoso Neves¹  | Priscila Seixas Mourão¹  | José Cristiano Ramos Glória¹  | Yure Gonçalves Gusmão¹  | Dhelfeson Willya Douglas de Oliveira¹ 



Institutional Affiliation

¹ Federal University of Jequitinhonha and Mucuri Valleys, School of Biological and Health Sciences, Department of Dentistry, Diamantina, Brazil.

Citation:

Gomes Luiz B.E., Cardoso Neves E., Seixas Mourão P., Ramos Glória J.C., Gonçalves Gusmão Y., Douglas de Oliveira D.W. Evaluation of the oral health of schoolchildren in Monte Formoso, Minas Gerais: Cross-sectional study. 2026; 34(1):e15664 DOI: 10.25100/re.v34i1.15664

Received: February 23th 2026

Evaluated: April 04th 2026

Accepted: April 27th 2026

Published: June 12th 2026

Correspondence author: Edwin Cardoso Neves. Rua da Glória, 187, Diamantina, Brasil. Email: edwin.cardoso@ufvjm.edu.br

Keywords: DMF Index; Pediatric Dentistry; Dental Caries; Oral Health; Cross-Sectional Studies.

Copyright:

© Universidad del Valle.



ABSTRACT

Background: Dental caries in childhood remains an important public health issue, strongly influenced by socioeconomic conditions and access to health services. Local epidemiological studies are essential to guide preventive strategies and oral health public policies.

Objective: To analyze the oral health of schoolchildren in Monte Formoso, Minas Gerais, Brazil, and evaluate the correlation between dental caries and socioeconomic factors, comparing urban and rural areas, as well as 5- and 12-year-old children.

Materials and methods: A cross-sectional study was conducted with 132 children (aged 5 and 12) enrolled in public schools. The DMFT and deft indices were assessed, and guardians completed questionnaires on socioeconomic and health-related data. Data were analyzed using the Mann-Whitney test for group comparisons and Spearman's correlation for associations between variables. A significance level of $p < 0.05$ was adopted.

Results: The deft index was 2.17 for 5-year-olds and 1.76 for 12-year-olds. The decayed component was 7.8% in younger children and 4.1% in 12-year-olds. A significant negative correlation was found between income and the deft index. Children who had visited a dentist had a higher deft/DMFT index (2.03). No significant differences in caries indices were observed between age groups or between urban and rural areas.

Conclusion: Monte Formoso presents low deft and DMFT indices in both 5- and 12-year-old children, with no significant variations by age or area of residence.

CLINICAL RELEVANCE

This study supports dental practitioners by showing that, even in diverse socioeconomic contexts, well-structured preventive strategies can maintain low levels of dental caries among schoolchildren. The findings reinforce the importance of oral health promotion and continuous monitoring in children aged 5 and 12 years. These data can help clinicians prioritize preventive measures, perform risk stratification, and work in an integrated manner with schools and primary health care services.

INTRODUCTION

Caries, the most common oral disease in children, is caused by factors such as a carbohydrate-rich diet, poor oral hygiene, and limited access to health care services, significantly affecting quality of life.^{1,2,3}

The Decayed, Missing, and Filled Teeth (DMFT) index and the Decayed, Indicated for Extraction, and Filled Teeth (deft) index are recommended by the World Health Organization (WHO) to assess the prevalence of caries in permanent and primary teeth, respectively. These indices represent the average number of decayed, missing, and filled teeth in a group of individuals. According to WHO methods (2013)⁴ deft index values correspond to the following levels of severity: very low (0 to 1.1), low (1.2 to 2.6), moderate (2.7 to 4.4), high (4.5 to 6.5), and very high (6.6 or higher).

The reduction in caries in Brazil in recent decades is attributed to increased fluoride use, oral health education, changes in dietary habits, and better access to dental services.^{5,6} However, populations with lower socioeconomic status continue to show higher caries rates.⁷ Two age groups are particularly important when assessing caries prevalence: 5 and 12 years old. The age of 5 is critical for evaluating caries prevalence because children have all their primary teeth and are likely beginning primary school. By age 12, most permanent teeth, except for the third molars, have erupted, making it a global reference point.⁴

Caries in primary teeth is a predictor of problems in permanent teeth, highlighting the importance of early prevention.⁸ According to the SB Brazil 2023 survey,⁹ Brazilian children at age 12 have an average of 1.67 decayed teeth, while at age 5, this number rises to 2.14, with a more severe impact on primary teeth, affecting the stomatognathic system. In the southeast region, the average number of decayed teeth is 1.67 at age 5 and 1.25 at age 12, while in Belo Horizonte, the averages are 1.56 and 0.94, respectively.⁹

Epidemiological studies are essential for investigating the current health status of a population and can serve as a basis for formulating health policies and effective prevention and promotion actions. Only through such surveys is it possible to compare and observe changes in prevalence.¹⁰ According to 2010 data from the Brazilian Institute of Geography and Statistics (IBGE), Monte Formoso, Minas Gerais, is the fifth-lowest city in the state in terms of Human Development Index (HDI), with a score of 0.541, and lacks dental health surveys.¹¹ Therefore, the objective of this study was to assess the DMFT and deft indices of schoolchildren in the city of Monte Formoso, state of Minas Gerais, Brazil.

MATERIALS AND METHODS

This is a cross-sectional study with a cluster sample of children and adolescents in the city of Monte Formoso, Minas Gerais. The research project was submitted for review by the Human Research Ethics Committee (CEP) of the Federal University of Vales do Jequitinhonha and Mucuri (UFVJM) and was approved under protocol number 4.739.101. The Informed Consent Form (ICF) was provided to the parents or guardians of each child and signed accordingly. The 12-year-old adolescents also signed the consent form before the study began.

To determine the sample size, the proportion estimation calculation was used, with the following parameters: 95% confidence level, 96% proportion of caries-free population at 5 years of age,¹² a margin of error of 3.5%, and an additional 10% to account for potential losses. This resulted in a total sample of 134 children.

Children aged 5 and 12 years who were enrolled in daycares, preschools, and schools in Monte Formoso and had parental consent were included. Children with conditions, dysfunctions, or pathologies that prevented oral cavity inspection or those with cognitive or motor impairments did not participate in this research.

The team was prepared and trained following the guidelines of SB Brazil (National Oral Health Survey) conducted in 2010,¹³ through a 16-hour workshop aimed at discussing the operational steps of the study, assigning tasks to each participant, and ensuring an acceptable level of uniformity in procedures. This was followed by a calibration phase, which involved six 4-hour sessions covering the theoretical and practical aspects of the indices used and their criteria. Additionally, a test-retest method was applied with a 14-day interval to ensure intra- and inter-examiner agreement. Photos of teeth were used to simulate the conditions expected during the study, particularly concerning different population groups. The intra-examiner agreement was $K > 0.80$.

In Monte Formoso, only one school offers elementary education for 12-year-old children, and this school was selected for data collection in that age group. For the 5-year-old group, the pedagogical coordination of the city selected four rural schools and one urban school, where the clinical exams were also conducted in a separate room.

The research team consisted of an examiner (B.E.G.L.), who conducted the clinical evaluations, and a recorder, responsible for filling out the identification forms, clinical exam forms, and distributing questionnaires. The clinical exam was conducted in a designated room at the school, during the day, using natural light. The oral cavity was cleaned beforehand through supervised brushing, and the exam was conducted using wooden spatulas, gauze, a clinical mirror, an explorer probe, and clinical tweezers. All necessary personal protective equipment (PPE) was used, following current biosafety standards.

By using an oral health examination form adapted from the WHO, the indices recommended by the organization were assessed, specifically the DMFT (permanent dentition) and deft (primary dentition) indices, which reflect the total number of decayed, missing, and filled teeth. The components are D (for decayed teeth), M (for missing teeth), E (for teeth indicated for extraction), and F (for filled teeth). The “D” component represents the current caries status, while the “F” and “M” components represent the individual’s past caries history. The “extracted” condition is not evaluated in the deft index because it cannot be clinically determined whether the tooth was lost due to caries or naturally exfoliated to make way for the permanent tooth.¹⁴ Only cavitated caries were counted in this study.

Additionally, a socioeconomic questionnaire was distributed to the children’s guardians to collect information about the child’s gender, family income, guardian’s education level, residence location (urban or rural), use of medications, frequency and supervision of tooth brushing, use of a bottle, and whether the child had ever visited a dentist.

Data were organized into a database and analyzed using SPSS® software, version 26. Descriptive analysis was performed to calculate mean, standard deviation, and absolute and relative frequencies. The Kolmogorov-Smirnov test was used to assess the normality of the data. Intergroup comparisons were performed by using the Mann-Whitney test, and Spearman correlation analysis was conducted. A significance level of 5% ($p < 0,05$) was adopted.

RESULTS

The sociodemographic characteristics of the 132 participants are presented in Table 1 and the Overall Index is the simple average of all 132 participants, regardless of their origin. The average age of the guardians of the children in this study was 37.22 years (SD = 10.41), with most respondents being mothers (78.6%). The income of 55.5% of the families was less than one minimum wage, and 40.7% of the guardians had higher education.

Table 1. Sociodemographic characteristics of participants

| Variable | Mean | SD |
|-----------------|----------|----------|
| Age of guardian | 37.22 | 10.41 |
| deft/5 years | 2.17 | 3.31 |
| DMFT/12 years | 1.58 | 1.79 |
| Overall index | 1.76 | 2.36 |
| | n | % |
| Age | | |
| 5 years | 40 | 30.3 |
| 12 years | 92 | 69.7 |
| Location | | |
| Urban area | 69 | 52.3 |
| Rural area | 63 | 47.7 |

| | | |
|---------------------------|-----|------|
| Gender | | |
| Male | 72 | 54.5 |
| Female | 60 | 45.5 |
| Guardian | | |
| Mother | 88 | 78.6 |
| Father | 13 | 11.6 |
| Grandmother | 11 | 9.8 |
| Marital status | | |
| Single | 58 | 45.0 |
| Married | 51 | 39.5 |
| Divorced | 5 | 3.9 |
| Others | 15 | 11.6 |
| Income | | |
| Less than 1 minimum | 71 | 55.5 |
| 1 to less than 2 minimum | 41 | 32.0 |
| 2 to less than 5 minimum | 13 | 10.2 |
| 5 to less than 10 minimum | 3 | 2.3 |
| Education level | | |
| Basic education | 33 | 30.6 |
| Secondary education | 31 | 28.7 |
| Higher education | 44 | 40.7 |
| Housing | | |
| Own house | 108 | 82.4 |
| Rented house | 17 | 13.0 |
| Provided/others | 6 | 4.6 |
| Visit the dentist? | | |

| | | |
|---------------------------|-----|------|
| Yes | 90 | 68.7 |
| No | 41 | 31.3 |
| Brushing | | |
| Brushes alone | 107 | 83.6 |
| Mother help with brushing | 21 | 16.4 |
| Frequency of brushing | | |
| Once a day | 12 | 9.2 |
| Twice a day | 56 | 42.7 |
| Three times a day | 63 | 48.1 |
| Use of baby bottle | | |
| No | 129 | 98.5 |
| Yes | 2 | 1.5 |

There was no statistically significant association between the deft/DMFT index and rural or urban areas ($p = 0,612$; $p = 0,736$) (Table 2). The deft index was higher in children who had previously visited a dentist compared to those who had not ($p = 0,036$), and the same was observed for the overall index ($p = 0,024$) (Table 3). Additionally, a significant ($p = 0,013$) and negative ($r = -0,343$) correlation was found between the deft index and income (Table 4).

Table 2. DMFT and deft according to independent variables.

| Variable | deft | | | DFMT | | |
|----------------------------|---------|------|--------------|----------|------|---------|
| | 5 years | | | 12 years | | |
| | Mean | SD | P-value | Mean | SD | P-value |
| Location | | | | | | |
| Urban area | 1.90 | 3.09 | | 1.55 | 1.79 | |
| Rural area | 2.91 | 3.91 | 0.612 | 1.62 | 1.80 | 0.736 |
| Gender | | | | | | |
| Male | 1.63 | 2.61 | | 1.46 | 3.40 | |
| Female | 3.00 | 4.00 | 0.404 | 1.73 | 3.04 | 0.298 |
| Guardian | | | | | | |
| Mother | 2.13 | 3.51 | | 1.66 | 1.79 | |
| Father | 0.75 | 0.95 | 0.326 | 1.22 | 1.39 | 0.147 |
| Visit the dentist? | | | | | | |
| Yes | 4.42 | 1.28 | | 1.67 | 1.81 | |
| No | 1.26 | 0.63 | 0.036 | 1.14 | 1.65 | 0.215 |
| Brushing | | | | | | |
| Brushes alone | 2.65 | 3.74 | | 1.57 | 3.12 | |
| Mother helps with brushing | 1.37 | 2.47 | 0.531 | 2.50 | 3.53 | 0.823 |

Table 3. Overall index according to variables

| Variable | Overall index | | |
|----------------------------|---------------|------|--------------|
| | Mean | SD | P-value |
| Location | | | |
| Urban area | 1.69 | 2.41 | |
| Rural area | 1.84 | 2.32 | 0.379 |
| Gender | | | |
| Male | 1.51 | 2.12 | |
| Female | 2.06 | 2.60 | 0.162 |
| Age | | | |
| 5 years | 2.17 | 3.31 | |
| 12 years | 1.58 | 1.79 | 0.415 |
| Visit the dentist? | | | |
| Yes | 2.03 | 2.48 | |
| No | 1.21 | 1.31 | 0.024 |
| Brushing | | | |
| Brushes alone | 1.73 | 2.21 | |
| Mother helps with brushing | 1.47 | 2.50 | 0.231 |

Table 4. Correlation between caries index, income, education level, and brushing frequency

| | deft | | DMFT | | Overall index | |
|--------------------|----------------|--------------|----------------|-------|----------------|-------|
| | 5 years | | 12 years | | | |
| | r _s | p | r _s | p | r _s | p |
| Income | -0.343 | 0.013 | -0.030 | 0.745 | -0.101 | 0.186 |
| Education level | -0.129 | 0.389 | -0.025 | 0.803 | -0.063 | 0.444 |
| Brushing frequency | -0.184 | 0.194 | -0.159 | 0.081 | -0.037 | 0.627 |

The decayed component was the most prevalent in 5-year-olds (7.8%), 12-year-olds (4.1%), and across both age groups (5.0%). Furthermore, the highest prevalence of all components was observed in the primary dentition (5-year-olds), particularly for extracted teeth (2.0%), which were much less common in the permanent dentition (Figure 1).

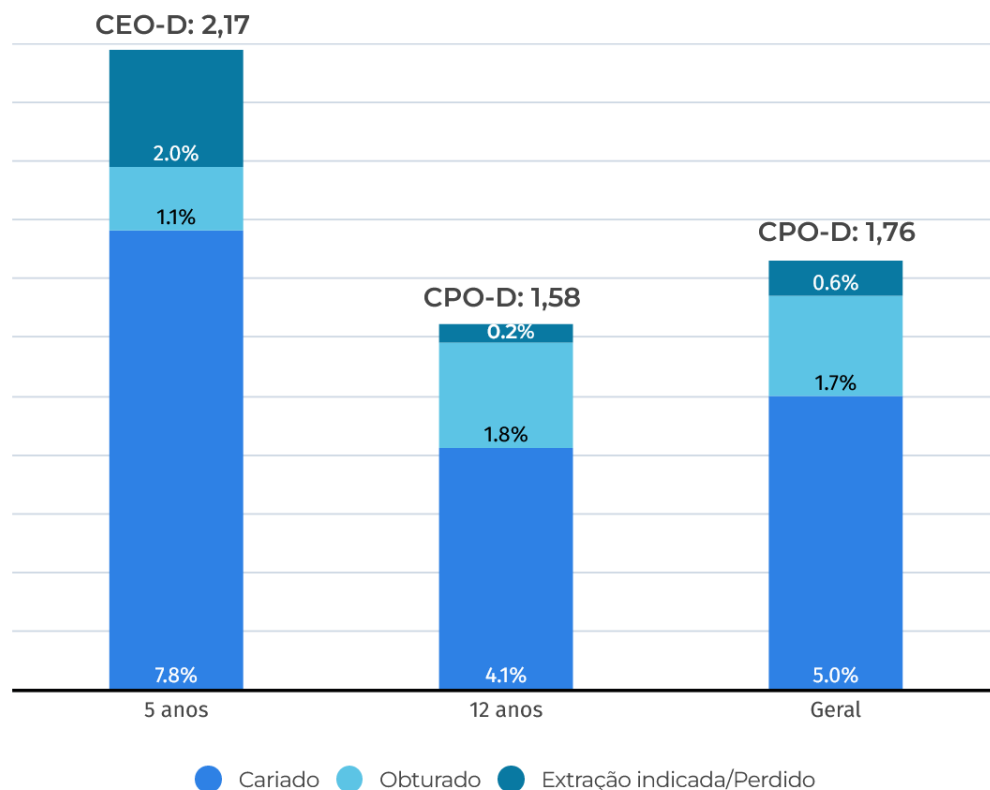


Figure 1. Proportion of caries index components according to age.

DISCUSSION

In the present study, the DMFT index for 12-year-old children was found to be 1.76, which is considered low by the World Health Organization (2013),⁴ and the deft index was 2.17. It is worth noting that, in the latest SB Brazil survey, the national average DMFT (1.67) and the southeastern region (1.25) were also classified as low,⁹ demonstrating continuity between the data found in Monte Formoso and national findings. However, this has not always been the case in Brazil. In 1980, Brazil’s DMFT was 7.3 (very high), dropping to 2.8 (moderate) by 2003, and now, as mentioned, Brazil is among countries with a low caries index.

Currently, Monte Formoso has two basic health units, with two dental offices in total, and two-family health teams, which include dentists and oral health assistants serving the entire population. Additionally, the city has access to fluoridated water and runs regular prevention

programs, such as the “saúde na escola” initiative. The reduction in the DMFT/deft index is mainly due to several factors, namely: the implementation of the Programa Saúde da Família (PSF), access to fluoridated water, the use of fluoridated toothpaste, improved access to dental services, and increased oral health promotion and prevention efforts.¹⁵

Regarding the children’s guardians, most questionnaire respondents were mothers, indicating their strong involvement in their children's activities. Mothers play a fundamental role in preventing oral diseases in children, and thus, they should be a key focus of prevention efforts.^{16,17,18}

When the proportions of the DMFT/deft index components were analyzed, a higher number of decayed teeth were found in the primary dentition. A previous study attributed this finding to children’s difficulty in adopting new hygiene habits¹⁹ and parents’ tendency to undervalue primary teeth, given their eventual replacement by permanent teeth.²⁰ However, untreated caries is known to have a direct impact on the child’s quality of life and may lead to progression of caries to the permanent dentition or premature loss of primary teeth, which may result in malocclusion.^{21,22} In contrast, the number of filled teeth was higher at age 12, which may indicate better access to dental services and a greater emphasis on maintaining permanent teeth.

In addition, this study found that most children who sought dental care had higher levels of tooth decay. This suggests that dental visits are primarily stating that this likely indicates "symptom-driven" or curative care rather than preventive attendance. This finding is consistent with previous studies indicating that most parents do not perceive the need for dental care for their children until after the onset of oral problems or symptoms such as pain,^{23,24,25,26} which explains the significant association found in this study.

The occurrence of dental caries has been linked to several factors, such as difficulties in accessing fluoridated water and toothpaste, the socioeconomic situation of a family, education level, quality of life, hygiene conditions, living environment and, most importantly, access to health services.^{27,28} In this study, lower individual income was associated with a higher deft index. This finding is consistent with previous studies that found higher caries rates in children from less favorable socioeconomic conditions.^{25,29} In addition, higher consumption of sugary foods and poorer oral hygiene habits are also associated with lower family income.^{19,30}

Public oral health services face high demand and limited supply, often requiring families to turn to private services, which is not feasible for low-income families. In this context, parents with higher accumulated cultural, social, and economic capital tend to have a better understanding of their children’s oral health, engage in better care practices, and use health services in a planned and preventive manner.^{31,32}

Levels of development in Brazil and other countries are unevenly distributed, generally reaching urban areas before rural areas, resulting in a greater concentration of health services in

urban areas.^{33,34} However, no association was found between the DMFT/deft index and rural or urban residence, indicating that place of residence did not affect oral health conditions. This also suggests that rural students received treatment, preventive measures, and oral health promotion activities.^{33,34} In addition, the prevalence of caries was similar in both age groups, suggesting continuity in oral hygiene and dietary habits from age 5 to 12 in the population studied.

Monte Formoso has only 4,381 inhabitants,¹¹ which limited the number of children available for the study and required considerable effort from the researchers to ensure their participation. In addition, there was a low return rate of questionnaires from parents and children, highlighting the need to raise awareness in this population of the importance of epidemiologic surveys to improve local public health. We suggest that future studies collect information on children's diets, reasons for dental visits, guardians' views on the importance of primary teeth, and access to oral health supplies (toothbrushes, dental floss, toothpaste). These variables could further help to guide public policy and improve dental caries rates among children in Monte Formoso.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

SOURCES OF FUNDING

This study was funded, in part, by the Coordination for the improvement of Higher Education Personnel (CAPES) – Brazil – Funding Code 001 and by the Federal University of the Jequitinhonha and Mucuri Valleys (UFVJM).

REFERENCES

1. Corrêa LLG, Sousa MLR, Frias AC, Antunes JLF. Factors associated with dental caries in adolescents: a cross-sectional study, São Paulo State, 2015. *Epidemiol Serv Saude*. 2020;29(5). Doi: <https://doi.org/10.1590/s1679-49742020000500007>
2. Batista TR, Vasconcelos MG, Vasconcelos RG. Pathophysiology of dental caries: understanding the caries process. *Salusvita*. 2020;39(1):169-187.
3. Monteiro ACC, Gomes BRA, Carvalho FS, Silva IL, Nicácio LS. Prevalence of dental caries in children. *Rev Delos*. 2024;17(62). Doi: <https://doi.org/10.55905/rdelosv17.n62-097>
4. World Health Organization. *Oral health surveys: basic methods*. 5th ed. Geneva: WHO; 2013.
5. Nóbrega AV, Moura LF, Andrade NS, Lima CC, Dourado DG, Lima MD. Impact of dental caries on preschool children's quality of life measured by PedsQL. *Cien Saude Colet*. 2019;24(11):4031-4042. Doi: <https://doi.org/10.1590/1413-812320182411.04712018>

6. Lopes LM, Sarracini KLM, Cavalcante DB, Pereira AC. Dental caries at 12 years of age in São Paulo State: a temporal comparison. *Braz J Develop.* 2023;9(9):25769-25777. Doi: <https://doi.org/10.34117/bjdv9n9-013>
7. Queiroz FS, Costa LED, Silvestre TLA. Oral health, socioeconomic factors and quality of life of 12-year-old children in Patos, PB, Brazil. *Arch Health Invest.* 2018;7(8):316-322. Doi: <https://doi.org/10.21270/archi.v7i8.3118>
8. Feldens CA, Braga VS, Kramer PF, Vítolo MR, Rodrigues PH, Coelho EB, et al. Primary dentition caries patterns as predictors of permanent dentition caries: a prospective cohort study. *Caries Res.* 2023;57(2):167-176. Doi: <https://doi.org/10.1159/000529620>
9. Ministry of Health (BR), Secretariat of Primary Health Care, Department of Strategies and Policies for Community Health. *SB Brasil 2023: National Oral Health Survey: final report.* 1st rev ed. Brasília: Ministry of Health (BR); 2025. 537 p. Available from: http://bvsmms.saude.gov.br/bvs/publicacoes/sb_brasil_2023_relatorio_final_1edrev.pdf
10. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol.* 2003;31 Suppl 1:3-23. Doi: <https://doi.org/10.1046/j.2003.comdent.2003.00161.x>
11. Brazilian Institute of Geography and Statistics (IBGE). 2010 Demographic Census. Rio de Janeiro: IBGE (BR)2012. Available from: https://biblioteca.ibge.gov.br/visualizacao/periodicos/93/cd_2010_caracteristicas_populacao_dom%cilios.pdf
12. Domingos PAS, Ribeiro DG, Dinelli W, Staufacker CA, Campos JADB. Epidemiological aspects of children’s oral health in a Brazilian municipality. *Arq Odontol [Internet].* 2016;46(2):82-87. Available from: <https://periodicos.ufmg.br/index.php/arquivosemodontologia/article/view/3531>
13. Ministry of Health (BR), Secretariat of Health Care, Secretariat of Health Surveillance. *SB Brasil 2010: National Oral Health Survey: main results.* 1st rev ed. Brasília: Ministry of Health (BR);2012. 116 p. Available from: https://bvsmms.saude.gov.br/bvs/publicacoes/pesquisa_nacional_saude_bucal.pdf
14. Moraes SNS, Arsenian MB, Tucci R. Clinical evaluation and use of DMFT/“deft” index in children. *J Health Sci Inst.* 2014;32(3):235-240.
15. Agnelli PB. Variation of DMFT index in Brazil from 1980 to 2010. *Rev Bras Odontol.* 2015;72(1-2):10-15. Doi: <http://dx.doi.org/10.18363/rbo.v72i1/2.549>
16. Wigen TI, Wang NJ. Maternal health and child oral health: a longitudinal study of mother–child pairs in Norway. *Community Dent Oral Epidemiol.* 2011;39(4):296-303. Doi: <https://doi.org/10.1111/j.1600-0528.2010.00596.x>
17. Erckmann MC, Guanabara VO, Santos VV, Rosa CG, Masiero AV. Maternal knowledge, attitudes and practices regarding child oral health. *Cuad Ed Desar.* 2024;16(13). Doi: <https://doi.org/10.55905/cuadv16n13-049>

18. Oliveira MRC. The role of parents in children's oral health: influence of parental practices on prevention of oral diseases. *Cienc Saude*. 2024;29(140). Doi: <https://doi.org/10.69849/revistaft/ch10202411170704>
19. Palhares ALS, Torres JLM, Sousa MEM, Nobrega RPAM, Correia VRC, Deus WA, et al. Prevalence and predisposing factors of dental caries in children treated at a pediatric clinic of a federal higher education institution. 2024;6(7):2513-2535. Doi: <https://doi.org/10.36557/2674-8169.2024v6n7p2513-2535>
20. Müller IB, Castilhos EDD, Camargo MBJ, Gonçalves H. Caries experience and use of public dental services by schoolchildren: a descriptive study in Arroio do Padre, Rio Grande do Sul, 2013. *Epidemiol Serv Saude*. 2015;24(3):759-770. Doi: <http://dx.doi.org/10.5123/S1679-49742015000400018>
21. Göransson E, Sonesson M, Naimi-Akbar A, Dimberg L. Malocclusions and quality of life among adolescents: a systematic review and meta-analysis. *Eur J Orthod*. 2023;45(3):295-307. Doi: <https://doi.org/10.1093/ejo/cjad009>
22. Alanzi A, Husain F, Husain H, et al. Severity of untreated dental caries and oral health-related quality of life in preschool children. *BMC Oral Health*. 2023;23:552. Doi: <https://doi.org/10.1186/s12903-023-03274-7>
23. Costa Martins CL, Jetelina JC. Parents' knowledge about oral health in childhood and its relationship with the reason for dental visits. *J Oral Investig*. 2016;5(1):27-33. Available from: https://www.researchgate.net/publication/309517509_Conhecimento_dos_Pais_Sobre_Saude_Bucal_na_Infancia_e_a_Relacao_com_o_Motivo_da_Consulta_Odontologica#fullTextFileContent
24. Gomes MC, Clementino MA, Pinto-Sarmento TC, Costa EMMB, Martins CC, Granville-Garcia AF, et al. Parental perceptions of oral health status in preschool children and associated factors. *Braz Dent J*. 2015;26(4):428-434. Doi: <https://doi.org/10.1590/0103-6440201300245>
25. Neves EC, Paiva HN, Paiva PCP, Silva AIV, Souto LAP, Chagas PVF, et al. Prevalence of caries and dental fluorosis in children treated at a dental school clinic in Northern Minas Gerais. *ARE*. 2024;6(4):19000-19014. Doi: <https://doi.org/10.56238/arev6n4-468>
26. Pereira AL, Santana Júnior FD, Castro SS, Santos MMF, Gato TJN, Santos VPS, et al. Evaluation of oral conditions and treatments in children treated at a dental school clinic in Manaus, AM. *Peer Rev*. 2023;5(22):414-428. Available from: <https://repositorio.usp.br/item/003165726>
27. Abreu MHNG, Cruz AJS, Borges-Oliveira AC, Martins RC. Perspectives on social and environmental determinants of oral health. *Int J Environ Res Public Health*. 2021;18(24):13429. Doi: <https://doi.org/10.3390/ijerph182413429>
28. Sengupta K, Bihmann K, Christensen LB, Mortensen LH, Andersen I, [Ersbøll](#) AK. Geographic inequality in dental caries and socioeconomic factors over 18 years in Denmark. *BMC Oral Health*. 2023;23:662. Doi: <https://doi.org/10.1186/s12903-023-03373-5>

29. Zhang T, Hong J, Yu X, Liu Q, Li A, Wu Z, et al. Association between socioeconomic status and dental caries among Chinese preschool children. *BMJ Open*. 2021;11(5). Doi: <https://doi.org/10.1136/bmjopen-2020-042908>
30. Veras VA, Ferreira EMS, Amaral LROG, Silva JFM. Prevalence of dental caries in 5- and 12-year-old schoolchildren in Palmas, TO. *Res Soc Dev*. 2022;11(2). Doi: <https://doi.org/10.33448/rsd-v11i2.25667>
31. Curi DSC, Figueiredo ACL, Jamelli SR. Factors associated with the use of oral health services by the pediatric population: an integrative review. *Cien Saude Colet*. 2018;23(5):1561-1576. Doi: <https://doi.org/10.1590/1413-81232018235.20422016>
32. Barreto MAC, Bottesini VC, Barreto IDC, Duarte DA. Knowledge of parents/caregivers about their children's oral health: a cross-sectional study. *Saude Colet*. 2025;16(102):17840-17863. Doi: <https://doi.org/10.36489/saudecoletiva.2025v16i102p17840-17863>
33. Scherer F, Klein C, Paludo J, Kraemer F, Dal Bosco SM. Dental caries and nutritional status of children and adolescents. *Rev Destaques Acad*. 2014;6(3):89-96. Available from: <https://www.univates.br/revistas/index.php/destaques/article/view/419>
34. Santos RC, Queiroz IQD, Andrade RS, Piovesan ETA. Impact of socioeconomic conditions on oral health of socially vulnerable children and adolescents. *Saude Colet*. 2025;15(94):15367-15380. Doi: <https://doi.org/10.36489/saudecoletiva.2025v15i94p15367-15380>