

ORIGINAL ARTICLE

Factors associated with tooth decay in children in the first grade of primary school in public schools in the municipality of Suarez Cauca from the perspective of legal guardians

Sherick Nathalia Villegas Mina ¹  | Daniela Andrea Ortiz Gómez ¹  | Jairo Corchuelo Ojeda ¹ 

OPEN ACCESS

Institutional affiliation

¹ Universidad del Valle, Faculty of Health, School of Dentistry, Department of Public Health, Cali, Colombia.

Citation:

Villegas Mina S.N., Ortiz Gómez D.A., Corchuelo Ojeda J. Factors associated with tooth decay in children in the first grade of primary school in public schools in the municipality of Suarez Cauca from the perspective of legal guardians. *Rev Estomatol.* 2025; 33(2):e13489. DOI:10.25100/re.v33i2.13489.

Received: 27th August 2025

Evaluated: 30th August 2025

Accepted: 31th August 2025

Published: 03th September 2025

Correspondence author: Sherick

Nathalia Villegas Mina. Calle 3a #36B - 00, Universidad del Valle, Cali, Colombia. Contact: + 57 3001581649. Email: Sherick.villegas@correounivalle.edu.co

Keywords: Caries; prevalence; legal guardians; oral hygiene; factors.

Copyright:

© Universidad del Valle.



ABSTRACT

Objective: To identify the factors associated with caries, based on existing caries factors, with the participation of the legal guardian or caregiver of first-grade children attending the María Inmaculada and Francisco de Paula Santander schools in Suárez Cauca.

Materials and methods: Research was conducted in Suárez, Cauca, considering sociodemographic aspects. Surveys were conducted for legal guardians and intraoral examinations were performed on first-grade students at these institutions.

Results: 81.8% of the guardians surveyed lived with the child and 45.5% were mothers. The mestizo (39.4%) and Afro-descendant (33.3%) groups predominated, with a majority (69.7%) affiliated with the subsidized health care system. The most common educational level of guardians was primary school (33.3%), and the child's place of residence was mainly the home (63.6%). 84.8% had visited the dentist, mainly for preventive care. Oral hygiene began for most at 6 months of age, and currently 66.7% of children brush their teeth on their own. 93.9% brush before bedtime and 42.4% do so three times a day. Ninety-seven point zero percent use toothpaste, of which 81.8% contains fluoride.

Frequent consumption of cariogenic foods was observed in the diet. The plaque index was good in 66.7%, and the ICDAS diagnosis yielded 24.2% in both codes 3-7-4 and 1-2.

Conclusions: A relationship was found between oral hygiene habits, diet, and the prevalence of dental caries in the children evaluated, as most of them brush their teeth at least three times a day using fluoride toothpaste. In addition, it was observed that they tend to visit the dentist regularly. It was also found that the intake of sugary foods in the selected population was very low, as they are consumed between one and three times a week, which contributes to oral health care.

INTRODUCTION

The municipality of Suárez is located in the northwest of the department of Cauca. It borders the municipality of Morales to the south and southeast, Buenos Aires to the north and part of the east, and López de Micay to the west, where, according to the 2018 DANE census, it has a population of 19,690.¹ This municipality faces significant challenges due to the armed conflict between the army and subversive groups such as the FARC and Águilas Negras. This situation has led to clashes and left the municipality in a state of neglect by the Colombian State, highlighting marked social inequality.

Its economy depends mainly on agriculture (coffee, cassava, sugar cane, corn, fruit trees, among others) and mining is its most predisposing factor in some areas of the municipality. Agricultural production is the main activity of the economy to such an extent that agriculture accounts for 52% of the municipality's production, followed by mining production, which accounts for 27%, trade accounts for 3%, and the remaining 18% belongs to activities such as livestock and poultry farming, among others. It also has the Salvajina reservoir, a municipal water system that includes major rivers.²

In terms of health, Suárez has only one level 1 health center located in the La Esperanza neighborhood. However, this center does not have professionals specialized in dentistry, which limits care in this area. Furthermore, the lack of statistics makes it difficult to research the population. Mining in rural areas, together with the presence of mercury in the environment, raises health concerns, as exposure to mercury can have harmful effects, such as damage to the nerves, brain, kidneys, and respiratory problems.³

For a lesion to be considered carious, it must be related to enamel, microbiota, and the production of certain acids over a limited period of time, which depends on the chemical structure of the enamel, as this determines its resistance to demineralization by bacterial acids.⁴

According to Chiego DJ (2014), clinically, caries is evidenced by the loss of inorganic ions from hard dental tissues, and without the proper remineralization process, this results in the loss of dental structure on any of its surfaces.⁵ The first clinical manifestation of caries is a white lesion without cavitation, where the color change may be more noticeable on the smooth surfaces of the teeth, such as the vestibular, lingual, or palatal surfaces, interproximal surfaces, and occlusal surfaces. However, in order to better and more reliably detect it, it is best to remove the biofilm from the plaque and mineralized deposits, as well as using compressed air for a few seconds on the surface in question.⁶ On the other hand, when the lesion progresses, which can be caused by the consumption of sugary drinks, the type and amount of cariogenic microbiota present in the mouth,⁷ among other factors, clinically brown spots appear that can be seen even when covered with saliva (ICDAS 2005).⁸

When talking about prevalent diseases, one of the most common is dental caries. The World Health Organization (WHO) reports that the average number of decayed, missing, or filled teeth in the population is reported from the age of 5, this being the earliest age at which cases are found. In addition, cases have also been seen in people between the ages of 65 and 74 who suffer from the same disease, suggesting that it affects both children and adults.^{9 10}

When talking about the prevalence of caries, reference is made to a specific population of people who, when undergoing an oral examination, present one or more untreated carious lesions. According to ENSAB IV, 66.16% of children between the ages of 1 and 5 show no signs of caries in their deciduous teeth, while 33.84% show one or more carious lesions. However, it has been shown that the prevalence in terms of proportion increases in children aged 3 and 5 years, reaching 43.77% and 52.20%, respectively.^{8 9 10}

According to the National Health and Nutrition Examination Survey (2011-2016), approximately 23% of children aged 2 to 5 years have caries in their primary teeth.¹¹

Dental caries remains a major challenge for global public health.¹¹ As evidenced, dental caries is a multifactorial determinant, influenced by various sociodemographic aspects.⁸ Therefore, it was decided to conduct a study on the prevalence of caries in the municipality of Suárez Cauca, as this would allow for the analysis of certain social determinants such as low socioeconomic status, difficult access to dental care, personal and family history related to oral health, as well as eating habits and oral hygiene care.¹²

As is well known, caries is an agent that negatively influences oral health. Therefore, it should be noted that caries is a multifactorial disease that is influenced by risk factors such as ethnicity, family income, and the educational level of parents or legal guardians, as well as family socioeconomic status, guardians' knowledge of oral health, as well as beliefs and eating habits have been associated with ECC (early childhood caries). It is also important to note that factors such as low birth weight, the presence of enamel defects, and inappropriate bottle use also play an important role in the etiology and severity of ECC.

It is important to be aware of the risk factors, as this can help identify shortcomings in oral hygiene, since many of these factors are part of a public health issue of promotion and prevention. Taking these factors into account, strategies can be developed to help reduce the risk of caries.

MATERIALS AND METHODS

The study was conducted using a quantitative, cross-sectional design in August 2023 to observe the factors related to the onset and progression of caries in first-grade students in schools in Suárez, Cauca. Informed consent was obtained based on the “Informed consent for oral examination IV National Oral Health Study ENSAB IV” - page 212. Module 2; people aged 12-79 years and module 3; mother or caregiver (A) of children aged 1, 3, and 5 years - page 233 9 for parents and/or guardians of the selected students.

The research focused on variables such as the prevalence of caries, IPC, and sociodemographic surveys, taking into account age, socioeconomic status, parental education, how often the child brushes their teeth, whether they do so alone or need help from their guardian, whether the toothpaste they use contains fluoride, the type of diet provided to the child on a weekly basis, whether or not the child is taken to the dentist frequently, as well as information from the first time the child was taken to the dentist until the last visit, including the reason for the visit.^{9 14}

At the start of the research, there was a universe of 141 participants, including the first two grades of the María Inmaculada school and the first two grades of the Francisco de Paula Santander school. However, during the course of the research, the armed conflict in the municipality caused one of the schools to be caught in the crossfire, resulting in serious damage to the infrastructure of the María Inmaculada school. That institution had information from the collection of student data, such as informed consent forms, dental charts, and some of the surveys conducted with parents or legal guardians, leaving 84 participants (respondents) exposed. In addition, 16 participants did not correctly complete the consent form and 8 did not agree to participate in the research, giving a total of 33 participants who met the inclusion criteria.

A space was set up in the schools to carry out the sample, where an “International Dental Chart” was performed using a portable dental unit. Subsequently, an intraoral examination was performed to analyze the ICDAS diagnosis, which was standardized through self-learning theoretical sessions in order to understand the codes and classifications used in the diagnosis. Subsequently, online reliability tests were conducted among the evaluators to ensure that the interpretation of caries lesions was consistent among the examiners. The data obtained was entered into a printed odontogram form, which has four rows: two to represent the deciduous dentition and two to represent the temporary dentition. This ensured that patients with mixed dentition were monitored. It should be noted that this examination takes approximately 15 minutes per individual.

In addition, the “Community Plaque Index” was taken into account to assess the oral hygiene of each participant, and an awareness session was held, in which two children aged 6 and 7 participated. The process of examining the surfaces stained with plaque disclosing solution was carried out, starting with the patient rinsing their mouth with a solution prepared with the disclosing substance and water for 30 seconds. Subsequently, with the help of a tongue depressor, the stained areas were clinically analyzed. The lingual/vestibular surfaces were taken into account and recorded on the community plaque index standardization form,¹⁶ following at all times the guidelines given by the person in charge of standardization in the Community Area - Grupo Pacifico XXI. The procedure was repeated until the margin of error was minimal. When carrying out the fieldwork, one of the researchers performed the intraoral

examination while another filled out the data on the printed forms. This CPI required approximately 5 minutes of work time and allowed for a complete evaluation of the mouth, leading to a reliable result.

The inclusion criteria were parents, legal guardians, and students enrolled in the first grade of the Francisco de Paula Santander and María Inmaculada public schools who agreed to participate in the preliminary study by signing the informed consent form and fully understanding the information being provided. Exclusion criteria included those who did not complete the entire survey, parents, legal guardians, and/or students who were not interested in participating or who did not sign the informed consent form.

For statistical analysis, a database was created in Microsoft Excel and transferred to SPSS software, which helped identify the variables studied and thus determine the most common factors and find ways to reduce them.

The database was designed as a comprehensive set of information addressing various aspects relevant to sociodemographic analysis, providing a detailed overview of the demographic composition of the participants, including important data such as age, ethnic group, legal guardian information, and other aspects relevant to social analysis. This type of information provided a fundamental context for understanding the dynamics and characteristics of the study population. The dental plaque index is a crucial tool for assessing the oral health of participants. This indicator helped to reveal plaque accumulation on the teeth, which is essential for understanding and addressing problems related to oral hygiene care. The ICDAS diagnosis, which is based on the International Caries Detection and Assessment System, provides detailed information on the presence and severity of dental caries in participants. This component is also highly relevant when discussing oral health and contributes to the formulation of preventive and treatment strategies.

Additionally, the inclusion of data on the weekly diet of participating children adds a significant layer of information. These records detail eating habits, allowing for the exploration of possible correlations between diet and oral health. Furthermore, the presentation of results in the form of percentage values facilitates the interpretation and comparison of dietary patterns among participants.

RESULTS

It can be seen that 81.82% of respondents live with the child; in terms of kinship, it was found that 51.52% were the child's father or mother, with the lowest participation being that of domestic workers, at 6.06%. It was also found that 69.70% of the child's biological mothers live with the child, while 63.64% of fathers live with the child.

The most common legal guardian of the child is the mother, accounting for 45.45%. In terms of ethnic group, 39.39% are mestizo and the second highest percentage is Afro-descendant with 33.33%. In terms of SGSS affiliation of the breadwinner, 69.70% are subsidized.

Regarding the educational level of the child's guardian, the most prevalent is primary school, accounting for 33.3%. The place where the child spends most of their time is at home, accounting for a total of 63.6%; the person with whom the child stays is an adult relative, accounting for 57.6%.

84.8% of children have been taken to the dentist, with 24.2% visiting the dentist for the first time at 36 months, while the last visit was most prevalent between the ages of 3 and 4, with 21.21%, for the purpose of check-up/prevention, accounting for 60.6%. It is evident that oral hygiene for children began at 6 months of age in 33.3% of cases, while currently 66.7% of children are responsible for their own oral hygiene.

With regard to brushing, 63.6% brush their teeth when they wake up, 69.7% brush their teeth after breakfast, while only 18.2% brush their teeth after lunch and 66.7% brush them after dinner. 93.9% brush their teeth before going to bed. It was found that 42.4% of children brush their teeth three times a day.

97.0% of children use toothpaste when brushing their teeth, 81.8% of which contains fluoride. The age at which they began using it was 3 years old, accounting for 48.5% [No. 16].

Regarding the habit of eating or swallowing toothpaste while brushing, only 24.2% do so sometimes, while 57.6% never do so. Currently, 97.0% of children do not drink from a bottle, with the remaining 3.0% being those whose respondents do not know or cannot remember.

An analysis of children's weekly diet showed that 66.7% consume cereals, roots, tubers/bananas five times a week; while vegetables, legumes, and green legumes are consumed 66.7% of the time, 4 times a week, and fruits are consumed 57.6% of the time, 3 times a week.

In terms of protein, meat, eggs, legumes, dried legumes, and mixed vegetables were consumed 18.2% of the time, 5 times a week, while dairy products were consumed 51.5% of the time, 3 times a week. Fats were consumed 63.6% of the time, 2 times a week. Finally, highly cariogenic foods have an equivalence in sugars and sweets: 42.4% belonging to twice a week, soft drinks: 27.3% belonging to once a week, and some soft drinks with sugar: 75.8% belonging to three times a week (Table 1).

Table 1. Risk of cariogenic diet in first-grade children in Suárez, Cauca.

Food	During the last week, how many times did you eat the following foods?						
	Never	Once a week	Between 2 and 3 times a week	Between 4 and 5 times a week	One portion a day	2 or more portions a day	Don't know
Cereals, roots, tubers, bananas	0%	0%	0%	15.2%	15.2%	66.7%	3.0%
Vegetables and green legumes	0%	6.1%	0%	15.2%	66.7%	12.1%	0%
Fruits	0%	3.0%	12.1%	57.6%	9.1%	12.1%	6.1%

Meat, eggs, dried legumes, and vegetable mixes	0%	3.0%	9.1%	12.1%	57.6%	18.2%	0%
Milk products	0%	6.1%	15.2%	51.5%	12.1%	15.2%	0%
Fats	0%	9.1%	63.6%	6.1%	9.1%	6.1%	6.1%
Sugars and sweets	0%	15.2%	42.4%	27.3%	9.1%	6.1%	0%
Juices from cartons or bottles, sweetened natural fruit juices, and panela water	0%	27.3%	21.2%	18.2%	9.1%	9.1%	15.2%
Juices from cartons or bottles, sweetened natural fruit juices, and panela water	0%	3.0%	3,00%	75.8%	9.1%	6.1%	3.0%

When analyzing oral hygiene using the dental plaque index, 66.7% of participants were rated as good, 15.2% as fair, and 18.2% as poor (Figure 1).

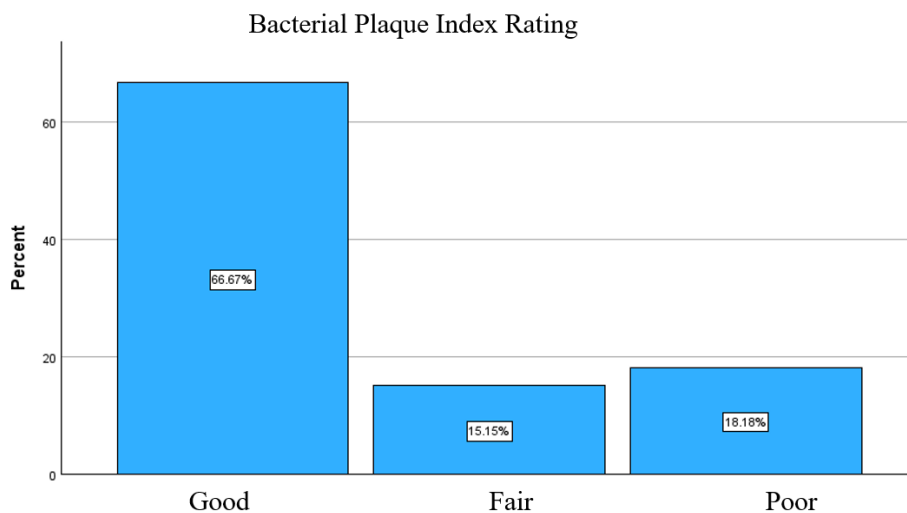


Figure 1. Assessment of dental plaque index and community plaque index.

Finally, the results of ICDAS 3 7 4 and ICDAS 1 and 2 were equal, with 24.2% in both diagnoses (Figures 2, 3, 4, and 5).

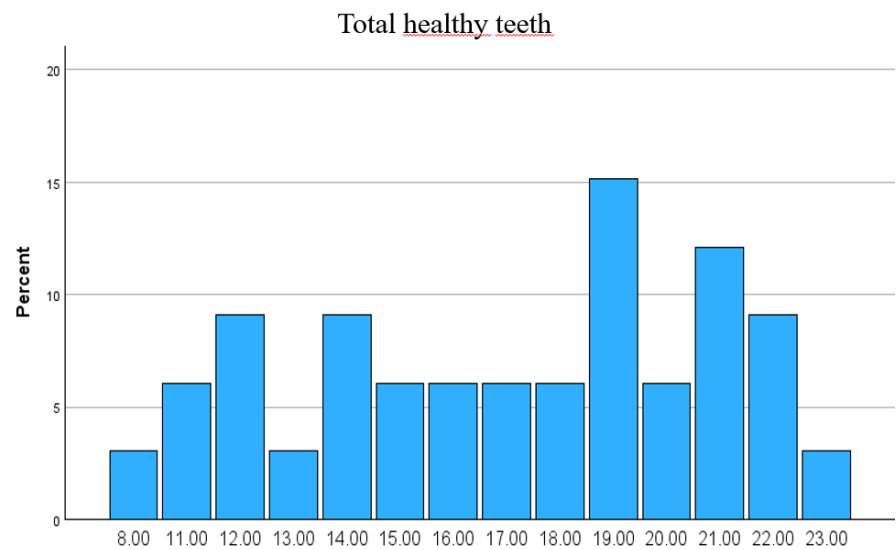


Figure 2. ICDAS caries diagnosis assessment (healthy teeth).

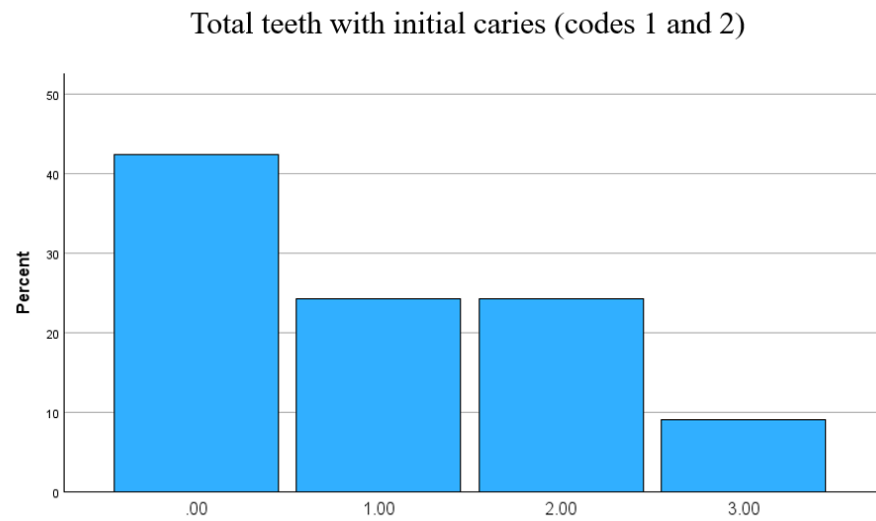


Figure 3. ICDAS caries diagnosis assessment (teeth with initial caries 1 and 2).

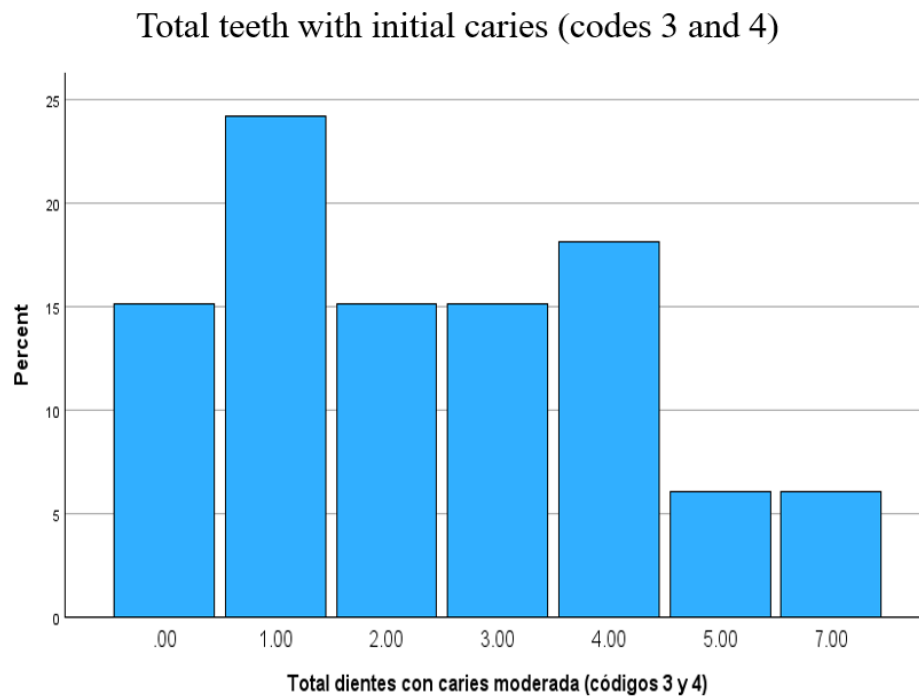


Figure 4. ICDAS caries diagnosis assessment (teeth with moderate caries 3 and 4).

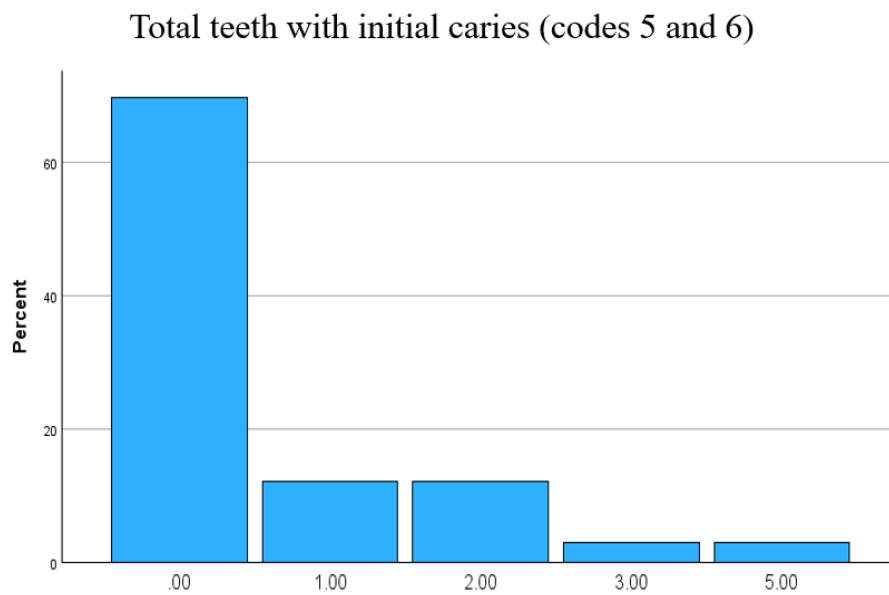


Figure 5. ICDAS caries diagnosis assessment (teeth with severe caries 5 and 6).

DISCUSSION

Taking into account factors that contribute to the occurrence of caries in Suárez Cauca, such as lack of drinking water, economic hardship, high social inequality, lack of oral health personnel, high levels of mercury, etc. It can be seen that, compared to the world population, ENSAB IV reported that 3-year-old children have a caries prevalence of 43.77%, while at age 5 it is 52.2%. On the other hand, in Suárez Cauca, children between the ages of 3 and 5 showed a caries prevalence of 24.4%.

According to the article “Prevalence of early childhood caries and associated risk factors in children aged 1 to 5 years in the city of Santiago de Cali,” a hypothesis was put forward based on the responses given by the students' parents and/or legal guardians. where the prevalence of caries was 29.28% in the children in the study. Comparing this result with that found in Suárez Cauca, which was a prevalence of caries in children aged 3-5 years of 24.4%, shows a difference of 4.88%, with a higher prevalence in the Santiago de Cali area.

A comparison of the educational level of the legal guardians evaluated showed that the maximum educational level is primary and secondary school. When the two studies mentioned above and the study by Zapata (2015) were analyzed, the same result was found, demonstrating that the prevalence of caries is associated with the low level of education of the parents or legal guardians.

The importance of taking infants to the dentist at an early age is very relevant, as this helps prevent IBC,¹⁹ and it was shown that this is lacking in the population in question, as 24% attended the dentist for the first time at 36 months, when in fact dental check-ups should be carried out from the moment the mother becomes pregnant and when the child is between 6 and 8 months old, which is when the first tooth is estimated to erupt.²⁰ In addition to this, with regard to brushing, there is an association between DMC and the use of fluoride toothpaste. 48.5% began using fluoride toothpaste at age 3, but a study analyzed that it is important to use fluoride toothpaste to protect teeth from cariogenic bacteria from an early age, where it should be used with some caution, placing a pea-sized amount of toothpaste on the toothbrush.

The child's diet was also taken into account, revealing a diet high in carbohydrates and low in vegetables, fruits, and proteins, which may reflect poor nutrition. This can lead to malnutrition, which in turn can lead to systemic and oral diseases.

One of the limitations of this study was the failure to obtain the planned sample due to the public order situation in the municipality. However, the sample corresponding to one of the schools evaluated can be characterized for the purpose of exploring the oral health situation in areas of armed conflict.

Dental caries is a significant public health problem that mainly affects children, but it can be prevented from an early age if proper care habits are established and parents and/or legal guardians of children are made aware of the issue.

In the municipality of Suarez Cauca, surveys were conducted among parents or legal guardians of children attending the María Inmaculada and Francisco de Paula public schools, with the aim of identifying the factors associated with the prevalence of caries in children. This allowed us to find a relationship between children's habits and diet and dental caries. It was found that most children implement oral hygiene and the use of fluoride toothpaste in their brushing routine, not to mention that they brush at least three times a day. Furthermore, their diets do not

include much consumption of soft drinks, sugars, or sweets. When consumed regularly, these foods can affect pH changes, inducing rapid demineralization of the enamel. However, it is known that sucrose is the most cariogenic sugar, which is important to mention as it forms a substance called glucan, which allows greater bacterial adhesion to the teeth and conditions the diffusion of acid and buffers in plaque. Frequent and high consumption of sugar-sweetened beverages and lack of tooth brushing are considered the factors most associated with the development of dental caries. However, it has been shown that consumption of artificially or naturally sweetened beverages is 3 to 1 times per week, thus contributing to oral health care. It should be noted that they tend to visit the dentist frequently, either for prevention or treatment, thus helping to detect any oral disease in time and at the same time prevent its development in children.

According to Albert (2016), the presence of caries in infants is closely related to the intake of foods high in sugars and carbohydrates, since the fermentation of the latter and the frequency of their intake favor pH changes and increase the likelihood of enamel demineralization. As for sugary foods, high consumption of these foods increases the risk of children developing caries, which was confirmed by the results of this study, where the intake of sugary foods was very low.

When analyzing the problems that prevail in Suárez Cauca, it is found that it is a municipality in which there are several factors that affect the general health of the population, such as: pollution in the Cauca River due to mercury waste from illegal mining, shortage of drinking water, social inequality affecting the state of the roads, and poor education. These factors affect general health, but we were more interested in the factors that affect children's oral health. We took first graders from the María Inmaculada and Francisco de Paula Santander schools as our study population to ensure sample variety, taking into account that to reach the target audience, we had to include their parents and/or legal guardians in order to reach a final conclusion.

STUDY LIMITATIONS

At the start of the research, there was a universe of 141 participants, including the first two grades of the María Inmaculada school and the first two grades of the Francisco de Paula Santander school. However, during the course of the research, the armed conflict between the army and subversive groups such as the FARC and Águilas Negras in the municipality meant that one of the schools was caught in the crossfire, resulting in serious damage to the infrastructure of the María Inmaculada school. This institution had information on the collection of data from students, such as informed consent forms, odontograms, and some of the surveys conducted with parents or legal guardians. As a result, 84 participants (respondents) were left in the study. In addition, 25 participants did not correctly complete the consent form and 16 did not agree to participate in the research, giving a total of 33 participants who met the inclusion criteria.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that there is no conflict of interest related to the companies mentioned in this editorial.

REFERENCES

1. DANE - Censo Nacional de Población y Vivienda 2018 [Internet]. Gov.co. [citado el 10 de enero de 2024]. Disponible en: <https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/censo-nacional-de-poblacion-y-vivienda-2018>
2. Gov.co. [citado el 10 de enero de 2024]. Disponible en: http://anterior.cauca.gov.co/sites/default/files/informes/final_suarez.pdf
3. Núñez DP, García Bacallao L. Bioquímica de la caries dental. Rev habanera cienc médicas [Internet]. 2010 [citado el 10 de enero de 2024];9(2):156–66. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-519X2010000200004
4. Berri.es. [citado el 10 de enero de 2024]. Disponible en: <https://www.berri.es/pdf/PRINCIPIOS%20DE%20HISTOLOGIA%20Y%20EMBRIOLOGIA%20BUCAL/9788413820231>
5. Contaminación con mercurio por la actividad minera. Biomedica [Internet]. 2012 [citado el 10 de enero de 2024];32(3):309–12. Disponible en: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-41572012000300001
6. Guíñez-Coelho M, Letelier-Sepúlveda G. Especificidad y Sensibilidad de Sistema ICDAS TM versus Índice COPD en la Detección de Caries. Int J Odontostomatol [Internet]. 2020 [citado el 10 de enero de 2024];14(1):12–8. Disponible en: https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-381X2020000100012
7. Nutricionhospitalaria.org. [citado el 11 de enero de 2024]. Disponible en: <https://www.nutricionhospitalaria.org/articles/03729/show>
8. Vélez-León E, Albaladejo A, Cuenca-León K, Jiménez-Romero M, Armas-Vega A, Melo M. Prevalence of caries according to the ICDAS II in children from 6 and 12 years of age from southern Ecuadorian regions. Int J Environ Res Public Health [Internet]. 2022;19(12):7266. Disponible en: <https://www.proquest.com/docview/2679750832?accountid=174776&forcedol=true&sourcetype=Scholarly%20Journals>
9. Iv E, de salud-enfermedad-atención es UI del M de S y. PSQBE las C. IV ESTUDIO NACIONAL DE SALUD BUCAL [Internet]. Gov.co. [citado el 11 de enero de 2024]. Disponible en: <https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/VS/PP/ENSAB-IV-Situacion-Bucal-Actual.pdf>
10. Uribe SE, Innes N, Maldupa I. The global prevalence of early childhood caries: A systematic review with meta-analysis using the WHO diagnostic criteria. Int J Paediatr Dent [Internet]. 2021;31(6):817–30. Disponible en: <http://dx.doi.org/10.1111/ipd.12783>
11. Wen PYF, Chen MX, Zhong YJ, Dong QQ, Wong HM. Global Burden and inequality of dental caries, 1990 to 2019. J Dent Res [Internet]. 2022;101(4):392–9. Disponible en: <http://dx.doi.org/10.1177/00220345211056247>
12. Chou R, Pappas M, Dana T, Selph S, Hart E, Fu RF, et al. Screening and interventions to prevent dental caries in children younger than 5 years: Updated evidence report and systematic review for the US preventive services task force. JAMA [Internet]. 2021 [citado el 11 de enero de 2024];326(21):2179. Disponible en: <https://jamanetwork.com/journals/jama/fullarticle/2786824>
13. Echeverría-López S, Henríquez-D'Aquino E, Werlinger-Cruces F, Villarroel-Díaz T, Lanas-Soza M. Determinantes de caries temprana de la infancia en niños en riesgo social. Int j interdiscip dent [Internet]. 2020 [citado el 11 de enero de 2024];13(1):26–9. Disponible en: https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S2452-55882020000100026
14. Arango De La Cruz MC, Jaramillo Echeverry A, Cruz Valderrama CA. PREVALENCIA DE CARIES DE LA INFANCIA TEMPRANA Y FACTORES DE RIESGO ASOCIADOS EN NIÑOS DE 1 A 5 AÑOS EN LA CIUDAD DE SANTIAGO DE CALI. Ustasalud [Internet]. 2013 [citado el 11 de enero de 2024];12(2):108. Disponible en: http://revistas.ustabuca.edu.co/index.php/USTASALUD_ODONTOLOGIA/article/view/1214
15. Cajahuanca Y, Kelly E. Uso del registro de odontograma convencional y la calidad de servicio de consultorios

- odontológicos, Provincia Junín 2017. Universidad César Vallejo; 2018.
16. Corchuelo J. Sensitivity and specificity of an index of oral hygiene community use in relation to three indexes commonly used in measuring dental plaque. *Colomb Med* [Internet]. 2011 [citado el 11 de enero de 2024];42(4):448–57. Disponible en: http://www.scielo.org.co/scielo.php?script=sci_abstract&pid=S1657-95342011000400005&lng=en&nrm=iso&tlng=en
 17. Zapata LMG. PREVALENCIA DE LA CARIES DENTAL EN ESCOLARES DEL SECTOR PUBLICO DE SANTIAGO DE CALI 2010. *Gp* [Internet]. 2015 [citado el 11 de enero de 2024];17(2). Disponible en: <https://revistas.univalle.edu.co/index.php/gastrohnp/article/view/1390>
 18. Cubero Santos A, Lorigo Cano I, González Huéscar A, Ferrer García MÁ, Zapata Carrasco MD, Ambel Sánchez JL. Prevalencia de caries dental en escolares de educación infantil de una zona de salud con nivel socioeconómico bajo. *Pediatr Aten Primaria* [Internet]. 2019 [citado el 11 de enero de 2024];21(82):e47–59. Disponible en: https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1139-76322019000200007
 19. Martínez Moreno A, Calet N. Intervención en Atención Temprana: un enfoque desde el ámbito familiar. *Escr Psicol* [Internet]. 2014 [citado el 11 de enero de 2024];8(2):33–42. Disponible en: https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1989-38092015000200006
 20. Arias Altamirano CA, Orozco F. Conocimientos, actitudes y prácticas de embarazadas en control prenatal relacionadas con salud oral y embarazo, de mujeres que acuden a consulta externa del Hospital Gineco Obstétrico Isidro Ayora. *OdontoInvestigación* [Internet]. 2017 [citado el 11 de enero de 2024];3(1). Disponible en: <https://revistas.usfq.edu.ec/index.php/odontoinvestigacion/article/view/850>
 21. Hernández-Vásquez A, Azañedo D. Cepillado dental y niveles de flúor en pastas dentales usadas por niños peruanos menores de 12 años. *Rev Peru Med Exp Salud Publica* [Internet]. 2019 [citado el 11 de enero de 2024];36(4):646–52. Disponible en: <https://www.scielo.org/article/rpmesp/2019.v36n4/646-652/es/>
 22. Ulaicit.ac.cr. [citado el 11 de enero de 2024]. Disponible en: <https://repositorio.ulacit.ac.cr/handle/20.500.14230/979>
 23. González Sanz ÁM, González Nieto BA, González Nieto E. Salud dental: relación entre la caries dental y el consumo de alimentos. *Nutr Hosp* [Internet]. 2013 [citado el 11 de enero de 2024];28:64–71. Disponible en: https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S0212-16112013001000008
 24. Albert M, Menéndez AML, Llop MR. Caries de infancia temprana. Prevalencia y factores etiológicos de una muestra de niños valencianos: estudio transversal. *spor* [Internet]. 2016 [citado el 11 de enero de 2024];15(2):116–26. Disponible en: <https://op.spo.com.pe/index.php/odontologiapediatrica/article/view/60>