Oral diseases in 12-year-old schoolchildren in a capital city in northeast Brazil: rise or decline?

Doenças bucais em escolares de 12 anos de uma capital do nordeste do Brasil: ascensão ou declínio?

Katia de Gois Holanda Saldanha
Doctor in Dentistry from Universidade Federal do Ceará
Institution: Centro Universitário Christus, Fortaleza, Brazil
Address: Rua João Adolfo Gurgel, 133, Cocó, Fortaleza - CE, CEP: 60190-180
E-mail: katiasaldanha@terra.com.br

Janaina Rocha de Sousa Almeida
Doctor in Dentistry from Universidade Federal do Ceará
Institution: Centro Universitário Christus, Fortaleza, Brazil
Address: Rua João Adolfo Gurgel, 133, Cocó, Fortaleza - CE, CEP: 60190-180
E-mail: drajanainaricha@hotmail.com

Maria Eneide Leitão de Almeida
Doctor in Preventive and Social Dentistry
Institution: Universidade Federal do Ceará, Fortaleza, Brazil
Address: Av. da Universidade, 2853, Benfica, Fortaleza - CE, CEP: 60020-181
E-mail: eneideufc@hotmail.com

Iana Aragão Magalhães
Master in Dental Clinics - Concentration Area in Stomatopathology
Institution: Centro Universitário Christus, Fortaleza, Brazil.
Address: Rua João Adolfo Gurgel, 133, Cocó, Fortaleza - CE, CEP: 60190-180
E-mail: iana.aragao.magalhaes@gmail.com

Paulo Goberlânio de Barros Silva
Doctor in Dentistry from Universidade Federal do Ceará
Institution: Centro Universitário Christus, Fortaleza, Brazil.
Address: Rua João Adolfo Gurgel, 133, Cocó, Fortaleza - CE, CEP: 60190-180
E-mail: paulo_goberlanio@yahoo.com.br

ABSTRACT
This cross-sectional study aimed to analyze the distribution of oral diseases in 12-year-old schoolchildren in Fortaleza, Northeast, Brazil. Based on the SB Brasil 2010, 30 calibrated dentists evaluated 1,509 children. Data were submitted to Pearson's Chi-square or Fisher's Exact tests, considering $p<0.05$. It was observed that 67.3% of the children were caries free and the mean DMFT-D was 0.86, with a predominance of the carious component (69.8%) in its composition. Main needs found: restorations (33.5%), pulp treatment (4.8%) and extractions (4.1%). The prevalence of fluorosis was 32.5%. As for periodontal disease, 56.6% of the students did not present bleeding and the presence of

calculus in the examined sextants. The prevalence of malocclusion was 40.3%. It is concluded that the Municipality of Fortaleza has low caries severity and low prevalence of periodontal disease. Fluorosis is more prevalent in the very mild form. The total number of children with normal occlusion was greater than those with malocclusion. Regarding the severity of malocclusion detected, defined malocclusion prevailed. A decline in caries disease was observed, however, fluorosis and malocclusion showed an increase when compared to previous epidemiological surveys.

Keywords: epidemiology, oral health, adolescent.

RESUMO
Este estudo transversal teve como objetivo analisar a distribuição de doenças bucais em alunos de 12 anos de idade em Fortaleza, Nordeste, Brasil. Com base na SB Brasil 2010, 30 dentistas calibrados avaliaram 1.509 crianças. Os dados foram submetidos aos testes Qui-quadrado de Pearson ou Exato de Fisher, considerando p<0,05. Observou-se que 67,3% das crianças estavam livres de cáries e a média do DMFT-D foi de 0,86, com predominância do componente cariado (69,8%) em sua composição. Principais necessidades encontradas: restaurações (33,5%), tratamento de polpa (4,8%) e extrações (4,1%). A prevalência de fluorose foi de 32,5%. Quanto à doença periodontal, 56,6% dos alunos não apresentaram sangramento e presença de cálculo nos sextantes examinados. A prevalência de má oclusão foi de 40,3%. Conclui-se que o Município de Fortaleza tem baixa gravidade de cárie e baixa prevalência de doença periodontal. A fluorose é mais prevalente na forma muito leve. O número total de crianças com oclusão normal foi maior do que aquelas com má oclusão. Em relação à gravidade da má oclusão detectada, prevaleceu a má oclusão definida. Observou-se um declínio na doença da cárie, no entanto, a fluorose e a má oclusão mostraram um aumento quando comparadas com estudos epidemiológicos anteriores.

Palavras-chave: epidemiologia, saúde bucal, adolescente.

1 INTRODUCTION

The appropriation by dentistry of knowledge related to epidemiology has led health system managers to organize themselves in the search for instruments that inform, evaluate and monitor the main oral diseases considered of relevance to public health[1,2]. The first national oral health survey took place in 1986, while countries such as Canada and the United States had databases since 1940[3].

Even late, from a global perspective, the 1986 epidemiological survey on oral health brought to Brazilian and global knowledge a high prevalence of dental caries in schoolchildren and a high rate of edentulism in adults and the elderly[3]. It was then that, from these results, relevant changes in health prompted the emergence of an awareness in health system managers about the importance of research and actions in oral health.

In this way, three other national-based surveys developed by the Ministry of Health were carried out in 1996, 2003 and 2010. The latter showed the worldwide trend of decline in dental caries in the 12-year age group. A caries prevalence of 6.7 was found in 1986, considered high, rising to 3.6 in 1996, 2.78 in 2003, and reaching 2.1 in 2010, considered a low prevalence, according to World Organization criteria. of Health (WHO)[4,5].

However, the national epidemiological surveys available so far provide important regional data, however, they are not representative to analyze the local situation in the municipalities, in addition, after the implementation of the Unified Health System, decentralization reinforced the role of Municipalities, requiring creativity both for the diagnosis of problems and for interventions. Therefore, adopting the methodology of national surveys, several cities and capitals in Brazil, including Fortaleza, have been carrying out their own epidemiological surveys in oral health to optimize the use of available resources based on a consensus, which health programs need. epidemiological basis for the promotion of equity[6-11].

The municipality of Fortaleza, the fifth largest capital in the country, participated in all national base surveys, having carried out its own epidemiological survey in 2006/2007[12]. It is important to emphasize that, in 2005, Fortaleza held a public tender for which 250 dentists were hired to compose the oral health teams [13].

The incorporation of oral health teams for the restructuring of oral health in the Municipality, through the implementation of new work processes, based on the Guidelines of the National Oral Health Policy (2004), which guided oral health actions throughout the Brazil, led to the pioneering epidemiological survey[14]. The purpose of this survey was to provide representative data for the Municipality as a whole and for each of the six Regional Health Coordinations that make up the municipality of Fortaleza.

In the last 10 years, and after carrying out the epidemiological survey in 2007, the Municipal Health Department of Fortaleza implemented new services and oral health teams. In 2020, Fortaleza had 306 dentists in the Family Health Strategy, providing 46% coverage of oral health teams for the Family Health Teams[15]. In 2019, a new epidemiological survey was carried out in order to investigate the impact of these actions on the population of the Municipality.

Therefore, this study aims to describe the epidemiological profile in oral health of 12-year-old schoolchildren, age of global caries monitoring, from public and private

schools in Fortaleza, providing the incorporation of continuous evaluation and monitoring practices, as well as production of valid indicators for use in services and planning of actions.

2 MATERIALS AND METHODS

2.1 STUDY DESING

Descriptive, observational and cross-sectional study carried out with 12-year-old children living in the Municipality of Fortaleza-CE, from April to November 2019, through partnerships between the Federal University of Ceará and the Municipal Health Department of Fortaleza.

2.2 STUDY SCENARIO

The municipality of Fortaleza, in 2019, had a total population estimated at 2,669,342 inhabitants with a population density of 8,373 inhabitants per km², which is considered the highest population density among Brazilian capitals.[16,17].

The population is distributed in six Regional Health Coordinations (CORES) with different socioeconomic profiles. Historically to the West (part of CORES I, III and V), the city is predominantly occupied by neighborhoods with low-income population and to the East by neighborhoods with a higher concentration of upper class (CORES II and part of VI). However, the neighborhoods of this territory do not constitute a homogeneous area, with a low-income population close to the upper-class population. The population distribution and human development index is shown in Table 1.

2.3 SAMPLE CALCULATION

Following the methodology adopted in the SB Brasil 2010 to estimate the sample size, each of the six CORES was considered as a Municipality with more than 100,000 inhabitants in the Northeast region, given that each CORES has more than 300,000 inhabitants. Therefore, the sample size for each CORES was the same considered in the SB Brasil 2010 for municipalities with more than 100,000 inhabitants, that is, 233 children per CORES, totaling a sample of 1,398 children for the Municipality of Fortaleza.

For the basis of the sample size calculation, the variable dental caries attack was taken into account, which is the reference standard because it is among the most prevalent

diseases of the oral cavity, measured by the DMFT index (average number of teeth affected per individual) to age 12 years. The minimum sample size for carrying out the research was stipulated a standard error of 5%, level of 95% for the confidence interval.

2.4 SELECTION OF THE SAMPLING UNIT AND SAMPLING ELEMENTO

The choice of schools followed the reference system of the Municipal Department of Education (SME). In this way, after the approval of the SME, and with the list of educational establishments in hand, the schools were randomly drawn, resulting in 33 schools that contemplated, with margin, the total number of students aged 12 years desired for the research. Public and private special education schools were excluded from the draw, in which all classes are intended for the disabled population, and private schools that, previously contacted, refused to participate in the research.

Students enrolled in the day shift, carrying the free and informed consent form signed by their parents, and who did not refuse to take the exam, are included in the random drawing. Students who, on the day of the exam, were using orthodontic appliances with bands/brackets or who had any other condition that could jeopardize the proper clinical examination, such as viruses or other conditions reported by teachers, are excluded from the exam.

2.5 DATA COLLECT

For comparison purposes, the same indices from the SB Brasil 2010 epidemiological survey were used for 12-year-olds: Dental Caries Index - DMFT (number of decayed, Restored and Missing Teeth due to caries) and need for treatment; Periodontal Disease - Community Periodontal Index; Dental Fluorosis - Dean's Index and Occlusal Diseases - Dental Aesthetics Index[4].

The research was conducted by the oral health technical team of the Municipal Health Department in partnership with the Federal University of Ceará. Each of the six CORES worked with five field teams composed of a dental surgeon (examiner) and an oral health assistant (annotator). The research had a technical team of 76 professionals.

In order to minimize the variations between the examiners, the calibration process was carried out in 4 stages: a) Preparation of the process that consisted of organizing the entire infrastructure; b) Theoretical discussion of the variables used, codes and examination criteria using a manual prepared by the general coordination of the research;

c) Practical Discussion and finally; d) Calibration where 15 children of each age group were selected and examined by all dental surgeons. The Kappa result in the Inter-examiner calibration had an average of 0.87.

The clinical examination of the conditions: dental caries, periodontal disease and malocclusion was performed under natural light, using a flat mouth mirror, a WHO periodontal probe, in addition to gauze to dry the teeth and the adapted clinical form from SB Brasil. All biosecurity precautions were followed with the use of personal protective equipment and sterilized material. Each student examined received a hygiene kit containing a toothbrush and toothpaste and, to ensure the reliability of the data, the present research proposed that, in each work shift, a maximum of 20 exams were performed.

2.6 STATISTICAL ANALYSIS

Data were tabulated in Microsoft Excel and exported to the Statistical Packcage for the Social Sciences (SPSS) software, version 20.0 for Windows, in which the analyzes were performed using a confidence level of 95%.

The variables were categorized as follows: sex (male or female); race (yellow, white, black, brown); schools (public or private); need for treatment (yes or no); dental caries (mean DMFT=0, mean DMFT>1); proportion of DMFT components (Decayed, Restored Decayed, Restored, Missing Teeth); type of treatment need (1 surface restoration, two or more surfaces, crown, venner or veneer need, pulp treatment and restoration, extraction, white spot remineralization and sealant); fluorosis (without fluorosis, with fluorosis), (very mild, mild, moderate and severe fluorosis); occlusion (without malocclusion, with malocclusion); periodontal condition (all healthy sextants, at least one stone sextant, at least one bleeding sextant). After categorization, analyzes were performed using Pearson's Chi-square or Fisher's Exact tests and expressed as absolute and percentage frequencies.

2.7 ETHICAL CONSIDERATIONS

In accordance with resolutions No. 466 of December 12, 2012 and No. 510 of April 7, 2016, both of the National Health Council on ethical standards in research with human beings. The research was approved by the Research Ethics Committee of the Federal University of Ceará through opinion nº 3,092,816. The parents or guardians of the child signed the Free and Informed Consent Form. Both the Coordination of Oral

Health and the Department of Education of the Municipality of Fortaleza authorized this research, respectively, through the Term of Consent and the Term of Authorization for Academic Research.

3 RESULTS

A total of 1,509 children were examined, among which 52.7% were female and 47% were male, 77.9% were considered brown, while 15.5% were white. Among the schools selected, 7.5% of the students examined were from private schools and 90.9% from public schools and, among these, 42.8% had the Programa Saúde na Escola (School Health Program) inserted.

Table 2 presents the prevalence and severity of dental caries in Fortaleza represented by the DMFT index (average of decayed, missing and Restored teeth in the permanent dentition). With regard to the severity of dental caries, CORES I, V and VI exhibited mean values of DMF-D respectively, of 1.03 (0.97±1.47), 1.09 (1.06±1.78) and 1.02 (1.02±1.92), higher than the average DMFT for Fortaleza, which was 0.86 (0.83±1.52). The lowest values were found, respectively, in CORES II – 0.46 (0.43±0.99), III – 0.79 (0.75±1.40) and IV – 0.81 (0.78±1.38).

Fortaleza has 67.3% of children with DMFT equal to zero. CORES II and VI stand out with the best percentages, 78.4% and 72%, above what was found for Fortaleza. However, CORES I, IV and V present the highest percentages of children with DMFT above 1, respectively, with 38.8%, 34.6% and 41.4% (Table 3).

Table 4 presents the results regarding the composition of the DMFT and treatment needs of the children examined according to the CORES. Regarding the composition of the DMFT in the city of Fortaleza, 69.8% is composed of the decayed component. However, it is worth noting the differences between the CORES: the decayed component showed a significant difference between CORES V (85.3%), II (52.1%) and III (54.4%).

Regarding the restored component, CORES II again stood out with the highest percentage (39.25%), while CORES V (6.4%) and VI (10.8%) had the worst percentages of the restored component.

The missing tooth component showed no significant difference between the CORES, however, it followed the same pattern of best results for CORES II (2.15%), although IV stood out for presenting the second best result in relation to missing teeth. , only 3.3% of your total DMFT.

Surface restorations were the treatment needs with the highest percentage, 34.5%, with significant differences between CORES. There was no significant difference between the CORES in relation to the need for extraction, however, CORES III stood out as the regional health coordinator with the greatest need for pulp treatment (9%) and crown (1.4%).

Table 5 presents the results in relation to fluorosis, dentofacial anomalies and periodontal status. Regarding the prevalence of fluorosis, 67.5% of the children examined did not have fluorosis. The best results were found in CORES V and VI, presenting, respectively, 73.4% and 72.4% of the children examined without fluorosis. With regard to disease severity, CORES V (91.8%) and VI (83.9%) had the highest percentages of very mild fluorosis in relation to the others. CORES II presented the highest percentages of mild (29.6%) and moderate (9.3%) fluorosis among the other CORES.

The Dental Aesthetics Index is a numerical index that evaluates selected occlusal features according to their potential to cause the distribution of dentofacial anomalies. The results showed that 59.7% of the children did not have malocclusion, and CORES III and V showed the best results, that is, more than 60% of their students had no defined anomaly. However, CORES VI presented one of the worst rates in relation to malocclusion, 11.7% of the examined students had severe malocclusion and 9% had disabling malocclusion (Table 5).

In the analysis of the periodontal condition, through the Community Periodontal Index, the codes related to the periodontal pocket were discarded to avoid confusion with the period of eruption of the teeth. It was observed that CORES III had the highest percentage of children with a healthy sextant (70.5%), while CORES I had the lowest percentage (36.5%). Regarding the presence of stone, CORES I and II exhibited the highest prevalence, respectively, 52.1% and 45.2% of their children with at least 01 sextant with stone. CORES IV and V showed the lowest percentages, 18.6% and 12.2%, respectively, of children with stones in one of the sextants.

4 DISCUSSION

In the local context, Fortaleza, in 2007, presented an average caries attack of 1.54 (SD 2.16) for the age group of 12 years, reaching the goal set by the World Health Organization considered for the year 2000, which was a DMFT less than 3.0[18,19,20]. Although the results for this age group seem encouraging, it is important to emphasize

that the DMFT index, which measures the attack of caries, is an average that represents a variability in the distribution of values, with the consequent existence of children with both smaller than the average presented as with high values of caries and that are subjacent in the context of the analysis.

In the present research, it was observed the continuity of the decay of caries through the DMFT of 0.86 when compared to the values of the SB Brasil 2010 (1.44) to the survey in Fortaleza, in 2007 (1.54), and to the results of the study by Almeida (2017) carried out in Fortaleza in the year 2011-2012 (1.21)[4,12,20]. Regarding the composition of the DMFT in the city of Fortaleza, 69.8% is composed of the decayed component, an increase of 15.6% in relation to that found in 2007 (58.85%). The same pattern of increase was observed in relation to the Missing Teeth component (5.8%), while the 2007 survey was 3.9%[12].

However, in the comparative analysis between the CORES, significant differences were observed in relation to the prevalence of caries, which can be attributed to local characteristics restricted to the target population of the study. The highest percentage of DMFT equal to zero was found in CORES II, which has the highest concentration of neighborhoods with the best Human Development Index (HDI) in the city, above 0.7, while CORES I, V and VI, made up of the population with the worst life situations, including high house density, low rate of basic sanitation and high proportion of low-income people, were the ones with the highest number of children with DMFT above 1[21]. This fact warns that, despite the decline in dental caries in Fortaleza, it occurs unevenly, suggesting that social and economic inequities in oral health in the city generate the need to analyze the main issues related to this field.

Still in relation to the social inequities that are also reflected in the provision of health services, in the Municipality of Fortaleza, the differences in oral health coverage by Regional Health Coordination stand out: (CORES V and I presented the worst coverage of teams of oral health (ESB), respectively, 37.1% and 38.5%, and CORES II, III and IV showed, respectively, 43%, 45.2% and 48.7% of ESB coverage, while CORES VI stood out for the greater coverage, 57.65%[16].

This polarization of the disease in economically disadvantaged groups was observed in studies carried out in several countries, as well as in the last epidemiological survey carried out in 2010 in Brazil[5,22,23,24]. In the most recent record of the oral health conditions of the Brazilian population, it was observed that, while the municipalities in

the interior of the Northeast region had a DMFT of 3.84, the municipalities in the interior of the Southeast region had a DMFT of 1.815. Other studies such as Freire et al. (2010), when studying schoolchildren from educational institutions in Goiânia, reported a statistically significant difference between children from public and private schools[6].

These results corroborate the definition of caries by social epidemiology, which defines caries as a disease determined from the micro level, in which individual biological factors operate, to the macro level, which express the social conditions that populations live, such as access to income, access to health services, housing, food, among others[2,19].

Understanding that the DMFT estimates the present and past experience of the attack of dental caries of the permanent dentition, it was observed that the prevalence of the carious component was close to 75%, reflecting the current history of dental caries that can be considered high, demonstrating that health services cannot satisfactorily meet this demand, and that there is a need to better organize access to dental care. On the other hand, adding the restored and Missing Teeth components, which express the past caries experience, approximately 25% of the treatment performed was reached, corroborating the lack of assistance in this population. As for the need for restoration, it was observed in this study that there are needs to be met, mainly of low complexity, such as restorations with one and two surfaces, however, almost 5% need a more invasive intervention such as pulp treatment, and a smaller portion needs extractions (4%).

These results lead to a reflection on the local epidemiological and social reality, and on the best form of care and assistance, since it is clear that, despite the decrease in dental caries in the municipality, when it is identified, the intervention and cure process does not able to interfere adequately in the course of dental caries, promoting rehabilitation of the affected teeth. Therefore, it is suggested that the planning, management and evaluation of policies aimed at improving oral health be permanently discussed among managers, health professionals, educational institutions and society.

It is known, however, that there are low-cost preventive measures that have a wide reach if adopted in population strategies such as the incorporation of fluoride in public water supply and the development of oral health care models that provide the promotion of oral health. more suitable[26,26,27]. It is noteworthy that fluoride, in adequate concentrations and administered correctly, has benefits for human health, however, when used improperly, this halogen can cause severe problems in humans, such as dental fluorosis[26,26,27].

Dental fluorosis is understood to be a defect in enamel, caused by excessive intake of fluoride during the period of tooth formation and enamel maturation, thus causing deformation of the enamel[28,29]. In recent national surveys, a trend towards an increase in the disease was observed, as can be seen in the 2010 national survey in which fluorosis reached 16.7% of adolescents aged 12 years, an increase of 50% when compared to those 2003 data, which was 8.56%[5,30].

In the city of Fortaleza, however, based on the percentage of schoolchildren who presented normal enamel, according to the Dean Index score, there was an increase of 8.9% between the local surveys of 2007 and 2019, both showed, respectively, a percentage of 63.5% and 67.5% of children without fluorosis[12]. However, these results are well below the 2010 results for the Northeast region (85.5%)[5]. It is noteworthy that severe fluorosis, which was not observed in the previous survey (2007), was detected in this research (2019), even if in a small percentage[12].

These results point to a considerable gap in the surveillance and monitoring of fluoride levels in public water supply in the city of Fortaleza. In studies carried out on the fluoride levels in the public water supply of Fortaleza, Camurça (2008), it was found that Fortaleza presented 50% of the water samples collected with fluoride above the recommended standard for the State of Ceará, which is 0 .6 to 0.8ppm of fluoride[31,31,33]. Another study on the fluorine content of the water supply in Fortaleza, conducted by Almeida (2017), showed differences between the CORES, where CORES V and VI presented levels, respectively, of 0.86 and 0.97 ppm of fluoride, being, therefore, above the recommended.

Currently, Fortaleza monitors fluoride levels in public water supplies through the Environmental Surveillance and Biological Risk Cell. Sample collection is carried out in schools and Health Units and sent to the Central Public Health Laboratory (LACEN). According to the results of the February/2021 samples, the average fluoride levels in Fortaleza were 0.8ppm, however, following the pattern of previous studies, with large variations between the collection points. While in CORES IV there are several collection points with levels of 0.5 ppm, in other points, as in CORES II and VI, fluoride levels of 0.9 ppm are found.[17].

Aspects related to water fluoridation reflect on the "halo effect" of fluoride, in which water fluoridation indirectly benefits communities with non-fluoridated waters, since fluoride is also conveyed in foods and beverages produced in fluoridated locations.

In their studies on the analysis of fluoride concentration in commercial bottled water, Bizerril et al. (2015), observed that, of the nine brands consumed in Fortaleza, three had a concentration of fluoride above the allowed level[32].

In a case-control study with 124 children, carried out in Fortaleza, Teixeira (2009), it was observed that children who were not breastfed had a 6.66 times greater chance of having fluorosis than children who were breastfed for more than six months[33]. The fact that breastfeeding for more than six months has been shown to be a protective factor for fluorosis in permanent incisors may be related to the explanatory hypothesis of the increase in the consumption of infant formula reconstituted with fluoridated water.

In the case of malocclusions, although present in most epidemiological surveys, in the field of oral health, it is a problem historically devalued as a public health problem and, in Fortaleza, it has been no different. However, it is known that occlusal characteristics have the potential to cause aesthetic influence and disability in functional and systemic aspects, which can compromise quality of life [34,35].

Although the 2003 and 2010 SB Brasil epidemiological surveys showed a reduction of 19.2% throughout Brazil, and of 11.6% in the Northeast region, in the percentage of malocclusion in 12-year-old children, the results of the present study showed a slight upward trend in malocclusions, from a percentage of 39% in 2007 to 40.3% in 2020[5,14].

The prevalence of malocclusion was different in the CORES, and CORES VI, IV and I had a higher percentage of disabling malocclusion with values of 9.8%, 10.9% and 8.2%, respectively. Among these, CORES IV presented an increase of 75% in relation to 2007[12].

Considering, therefore, the dimension of Fortaleza in territorial terms and the existence of differences between the CORES, a variation in the profile of involvement of malocclusion was observed, which emphasizes the understanding of the sociodemographic aspects associated with the different severity of malocclusion. The need for orthodontic treatment was found in 31% of the children in the study, making intervention measures on this public health problem urgent. It is noteworthy that the Municipality of Fortaleza has only one Dental Specialty Center (CEO) offering the specialty of Orthodontics, although, since 2011, CEOs can include orthodontic treatment in the list of specialties[34]. Therefore, it is suggested that the access and use of dental services, regarding the treatment and prevention of malocclusions, need to be expanded

in the city of Fortaleza and the implementation of public policies aimed at reducing these inequalities between CORES.

In this way, the prevalence of malocclusion in schoolchildren demonstrates that the public system still has to meet its goals of providing equitable, universal and inclusive care to meet the oral health needs of all citizens[34,4].

With regard to periodontal conditions evaluated in this study by the Community Periodontal Index, children aged 12 years in Fortaleza had a prevalence of sextants without periodontal disease of 56.5%, lower than that found in 2010 for the Northeast region (59 .4%)[4]. Regarding the presence of stone, the prevalence was 29.3%, higher than in 2010 (26.1%)[4]. The inequalities between the CORES are also reflected with periodontal disease, and CORES I was the one that presented the worst results for the presence of dental calculus (52.5%), and for the prevalence of healthy sextants (36.5%).

Regarding the presence of gingival bleeding, children aged 12 years, examined in Fortaleza, had a prevalence of 14.2%, also higher than in 2010 for the Northeast region (12.1%)[9]. In a study with schoolchildren in Quito-Ecuador on oral health in 12-year-old children, Vega (2018) observed a prevalence of calculus of 69.9% and of healthy sextants of only 33.3% in the children surveyed[36]. The study by Vega (2018), SB Brasil and Fortaleza portray the inequalities between capitals and countries with different HDI, as well as within the capitals themselves, researching in different conglomerates[4,12,36].

When observing the distribution of oral health problems in the population studied in this research, aspects such as education and socioeconomic status of the CORES must be taken into account, which play a role in modifying the epidemiological profile of oral diseases in the city. In this way, changing the epidemiological profile, based on the principle of equality, but with equity, is an arduous task, however, extremely necessary for future changes.

Among the limitations of the present study, the non-investigation of out-of-school children and the highest percentage of public schools. Among the strengths, we highlight the representative sample, validated instruments, training of examiners and diagnostic indices recommended by the WHO.

5 FINAL CONSIDERATIONS

It was observed that the tendency of caries disease at 12 years of age, in the city of Fortaleza, has been decreasing, and can be classified as very low prevalence, however, with a smaller reduction in CORES V.

The most felt treatment needs were restorations with one and two surfaces followed by pulp treatment, which suggests an expansion and qualification of these procedures in primary care.

Regarding fluorosis, 32% of the children had fluorosis, the very mild form being the one with the highest prevalence among the other degrees. These data instigate the need for greater surveillance of fluoride levels in the city of Fortaleza.

The malocclusions present a slight tendency to increase, suggesting a better planning of actions to reduce this problem with the expansion of access to Dental Specialty Centers.

The schoolchildren in the study had a low prevalence of periodontal disease, however, CORES I had more than half of their children investigated with a sextant with calculus. These results indicate an increase in periodontal disease in this age group in a polarized way.

It should be emphasized that the results by CORES, in this study, highlight the inequalities and inequities observed in the territory of Fortaleza. These results motivate the discussion of the constant maintenance of the qualification of oral health in all levels of health care, and in all territories, in a uniform way in this municipality.

Table 1 - Population distribution and human development index of the Municipality of Fortaleza, according to the Regional Health Coordination, Fortaleza-CE, 2019

CORES	POPULATION	HDI
CORES I	396.135	0.299
CORES II	395.593	0.450
CORES II	392.480	0.298
CORES IV	306.584	0.411
CORES V	589.470	0.237
CORES VI	589.080	0.275

Source: Fortaleza (2019) and Vieira-Myer et al. (2021).

Table 2 - Mean DMF teeth, standard deviation and 95% confidence intervals in 12-year-old schoolchildren, according to the Regional Health Coordinations- Fortaleza-CE 2019.

CORES	n	Mean	DP	LI	LS	Median	Minimum	Maximum
I	255	1.03	1.47	0.79	1.15	0	0	6
II	260	0.46	0.99	0.31	0.56	0	0	8
III	288	0.79	1.40	0.59	0.92	0	0	9
IV	231	0.81	1.38	0.60	0.96	0	0	7
V	230	1.09	1.78	0.83	1.29	0	0	11
VI	246	1.02	1.92	0.78	1.27	0	0	11

Source: Author's elaboration

DP = standard deviation; LI = lower 95% confidence interval of the mean; LS = upper 95% confidence interval of the mean.

Table 3 - Prevalence and severity of caries in percentage and absolute numbers in 12-year-old schoolchildren, according to Regional Health Coordinations (CORES) Fortaleza-Ceará, 2019.

REGIONAL HEALTH COORDINATORS

	Total	I	II	III	IV	V	VI	p-Value
		255	259	288	231	230	246	
DMFT	0.86	1.03	0.46	0.79	0.81	1.09	1.02	*<0.001*
	0.83±1.52	0.97±1.47	0.43±0.99	0.75±1.40	0.78±1.38	1.06±1.78*	1.02±1.92*	
DMFT = 0								*<0.001*
n	1.016	156	203	194	151	135	177	
%	(67.4)	(61.2)	(78.4*)	(67.4)	(65.4)	(58.6)	(72.0)	
DMFT >1								
n	493	99	56	94	80	95	69	*<0.001*
%	(32.6)	(38.8)	(21.6)	(32.6)	(34.6)	(41.4)	(28.0)	

Source: Author's elaboration
*p<0.05, Pearson's chi-square test (n, %).

Table 4 - Percentage composition, mean and standard deviation of the components of the DMFT index and treatment needs in 12-year-old schoolchildren, according to the Regional Health Coordination, Fortaleza - Ceará, 2019.

REGIONAL HEALTH COORDINATION

DMFT component		Fortaleza	I	II	III	IV	V	VI	p-value
Decayed	m	0.60	0.73	0.24	0.43	0.56	0.93	0.73	*<0.001*
	DP	1.28	1.25	0.67	0.95	1.21	1.69	1.60	
	%	(69.8)	(70.9)	(52.1)*	(54.4)*	(69.1)	(85.3)*	(71.6)	
Restored and Decayed	m	0.04	0.04	0.03	0.03	0.03	0.02	0.11	
	DP	0.23	0.21	0.22	0.18	0.16	0.15	0.37	
	%	(4.6)	(3.9)	(6.6)	(3.8)	(3.3)	(1.9)	(10.8)	
Restored	m	0.17	0.22	0.18	0.28	0.19	0.07	0.11	*<0.001*
	DP	0.66	0.70	0.75	0.78	0.62	0.33	0.58	
	%	(19.8)	(21.3)	(39.2)*	(35.5)	(23.5)	(6.4)*	(10.8)	
Missing	m	0.05	0.04	0.01	0.05	0.03	0.07	0.07	*0.014*
	DP	0.22	0.24	0.14	0.24	0.18	0.36	0.01	
	%	(5.8)	(3.9)	(2.1)	(6.3)	(3.3)	(6.4)	(6.8)	
Restoration Needs									
1 Surface	n	351	70	33	52	66	75	55	*<0.001*
	%	(23.2)	(27.5)	(12.7)	(18.1)	(28.6)	(32.6)*	(22.4)	
2 Surfaces	n	170	27	17	25	31	36	34	*0.010*

		Total	I	II	III	IV	V	VI	p-value
Or more	%	(11.3)	(10.6)	(6.5)	(8.7)	(13.4)*	(15.7)*	(13.8)*	
Crown	n	5	0	0	4	0	0	1	*0.023*
	%	(0.3)	(0.0)	(0.0)	(1.4)*	(0.0)	(0.0)	(0.4)	
Veneer or Facet	n	1	0	0	0	1	0	0	*0.354*
	%	(0.1)	(0.0)	(0.0)	(0.0)	(0.4)	(0.0)	(0.0)	
Pulping and Restoration	n	73	13	6	26	15	4	9	*0.001*
	%	(4.8)	(5.1)	(2.3)	(9.0)*	(6.5)	(1.7)	(3.7)	
Extraction	n	62	17	3	13	8	11	10	*0.059*
	%	(4.1)	(6.7)	(1.2)	(4.5)	(3.5)	(4.8)	(4.1)	
Remineralization White stain tooth	n	5	0	3	0	0	0	2	*0.065*
	%	(0.3)	(0.0)	(1.2)	(0.0)	(0.0)	(0.0)	(0.8)	
Sealant	n	6	0	2	2	0	0	2	*0.360*
	%	(0.4)	(0.0)	(0.8)	(0.7)	(0.0)	(0.0)	(0.8)	

Source: Author's elaboration

*p<0.05, Pearson's chi-square test (n, %)

Table 5 - Absolute number and percentage of dental fluorosis, malocclusion, and periodontal condition in 12-year-old schoolchildren, according to the Regional Health Coordinations Fortaleza-Ceará, 2019.

	REGIONAL HEALTH COORDINATORS							
	Total	I	II	III	IV	V	VI	p-value
	n (%)	255 (100.0)	259 (100.0)	288 (100.0)	231 (100.0)	230 (100.0)	246 (100.0)	
Fluorose 12 years								
No Fluorosis n (%)	1020 (67.5)	156 (61.1)	151 (58.3)	202 (70.1)	164 (71)	169 (73.4)*	178 (72.4)*	*<0.001*
Normal n (%)	879 (86,2)	136 (87.2)	133 (88)	187 (92.6)	136 (82.9)	125 (74)*	162 (91)*	*<0.001*
Questionable n (%)	141 (13,8)	20 (12.8)	18 (12)	15 (7.4)	28 (17.1)	44 (26)*	16 (9)	
With Fluorosis n (%)	489 (32.5)	99 (38.9)	108 (41.7)	86 (29.9)	67 (29)	61 (26.6)	68 (27.6)	
Very light n (%)	374 (76.5)	79 (79.8)	66 (61.1)	70 (81.4)	45 (67.1)	56 (91.8)*	57 (83.9)*	*<0.001*
Light n (%)	99 (20.3)	19 (19.2)	32 (29.6)*	14 (16.3)	21 (31.4)	5 (8.2)	10 (14.8)	*<0.001*
Mild n (%)	14 (2.9)	1 (1)	10 (9.3)*	2 (2.3)	1 (1.5)	0 (0.0)	0 (0.0)	
Severe n (%)	1 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1,4)	
DAI								
No malocclusion n (%)	901 (59.7)	151 (59.2)	147 (56.8)	180 (62.5)*	132 (57.0)	145 (63.0)*	146 (59.4)	*0.028*
With malocclusion n (%)	608 (40.3)	104 (40.8)	112 (43.2)	108 (37.5)	99 (43)	85 (37)	100 (40.6)	
Defined n (%)	351 (23.3)	58 (22.7)	79 (30.5)*	56 (19.4)	58 (25.1)	53 (23.0)	47 (19.1)	*<0.001*
Severe n (%)	147 (9.6)	25 (9.8)	24 (9.2)	32 (11.1)*	16 (7.0)	21 (9.0)	29 (11.7)*	
Disabling n (%)	110 (7.4)	21 (8.2)*	9 (3.5)	20 (6.9)	25 (10.9)*	11 (4.8)	24 (9.8)*	
Periodontal condition								
All sextants								

healthy n (%)	852 (56.5)	93 (36.5)*	119 (45.9)	203 (70,5)*	155 (67.1)	136 (59,1)	146 (59.3)	***<0.001***
At least 1 sextant with bleeding n (%)	213 (14.2)	29 (11.3)	23 (8.9)	22 (7.6)	33 (14.3)	66 (28.7)*	40 (16.3)*	***<0.001***
At least 1 sextant with dental calculus n (%)	444 (29.3)	133 (52.1)*	117 (45.2)*	63 (21.9)	43 (18.6)	28 (12.2)	60 (24.4)	***<0.001***

Source: Author's elaboration
*p<0.05, Pearson's chi-square test (n, %)

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