

# Dental Caries: A Schoolchildren Epidemiological profile in a Seaside Town, Brazil, 2017

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**Abstract** —The objective of this study was to perform an analysis of the dental caries profile in preschool, kindergarten and first to fifth grade elementary school students in Balneário Pinhal, Rio Grande do Sul, Brazil. The experience of caries was described by the prevalence of caries, and the deft and DMFT scores, as described by the World Health Organization, and by the number of students requiring dental treatment. The mean deft at 5-years-old children was 1.54. The DMFT at 12 years-old was 0.53. Taking into account the diagnostic criteria recommended by the WHO, in which only the diagnosis of carious cavities is counted, the students of Balneário Pinhal presented a very low DMFT at 12 years-old. The most relevant components for determining the prevalence of dental caries were: teeth with caries, followed by filled and extracted teeth. The WHO target for the year 2000, that 50% of children between five and six years of age should be free of caries has been met. However, still in 2019, oral health care for Balneário Pinhal schoolchildren needs improvement in order to reach the WHO goal for the year 2010, and to meet students who need some kind of dental treatment for the consequences of caries disease.

**Keywords** —Dental caries, Epidemiology, Health Management, Public Health.

## I. INTRODUCTION

At the end of the 20th century, there was a decrease in the prevalence of dental caries among industrialized countries and in some developing countries. Despite this decline, tooth decay persists as a public health problem, affecting 60% to 90% of school-age children and most adults [1], impacted on pain and tooth loss, restriction of school and work activities and the quality of life of those affected.

Factors associated with reducing the prevalence of caries are fluoridation of public water supplies, fluoridated toothpaste and preventive programs [2]. However, dental caries is influenced by several factors, whether behavioral, demographic and sociocultural, such as hygiene and dietary habits, age, sex, and the degree of development of the country and its investments in the health and education sectors [3].

In epidemiological studies, the most used indicator to measure the severity or intensity of this disease is the Index of Decayed, Lost and Missing Teeth in permanent dentition - DMFT [4]. The goals proposed by the World Health Organization (WHO) for the year 2010 were: DMFT index at age 12 less than 1 and 90% of 5-year-old

children free of caries [2,5,6].

In Brazil, four epidemiological studies of oral health of national scope (1986, 1996, 2003, 2010) were carried out, of relevance for the construction of a consistent database related to the epidemiological profile of oral health of the Brazilian population. In 1986, the DMFT index was 6.7 at 12 years of age, with a prevalence of 96.3%. Ten years later, in 1996, there was a significant decrease in the severity of caries at age 12 with an average DMFT of 3.1 and a prevalence of 75% [7], approaching that recommended by the World Health Organization for the year 2000 (DMFT at 12 years of age less than or equal to 3.0).

In 2003, the Ministry of Health launched the National Oral Health Policy - Smiling Brazil Program [8]. The Smiling Brazil Program is a series of measures aimed at guaranteeing actions to promote, prevent and recover oral health among Brazilians, which is fundamental for the general health and quality of life of the population. Its main objective is to reorganize the practice and qualify the actions and services offered, bringing together a series of oral health actions aimed at citizens of all ages, with expanding access to free dental treatment for Brazilians

through the Unified Health System, the Brazilian public national health system (SUS, *in Portuguese*) [8].

The Unified Health System (SUS) offers universal coverage to more than 200 million inhabitants in Brazil, based on the principles of universal access, integrality of actions and equity, being free to the end user at all levels of a regionalized and hierarchical network health services. However, in most Brazilian municipalities, oral health is still a major challenge to these principles, especially with regard to universal access and equity of care. Within this context, dental caries is still one of the main problems to be addressed. Even so, significant reductions have been found in the prevalence and severity of dental caries [5,9]. In 2010, the prevalence reached 56%, a reduction of 41.8% in three decades [10].

In the municipality of BalneárioPinhal there is a Public-Private Partnership (PPP) with the Social Service of Commerce - Unit of the state of Rio Grande do Sul (SESC / RS), the program Smiling for the Future. This Program works to prevent risk factors common to chronic diseases, encouraging the adoption of lifestyles that promote health and well-being. In the sphere of oral health, it is proposed to carry out actions to strengthen primary care in oral health, with the monitoring of schoolchildren up to the 6th year of public elementary education [11].

In the oral health approach, the Smiling for the Future Program presents the following activities: training of teachers for oral hygiene instruction; educational activities in the classroom; presentation, meeting with parents and guardians explaining activities. Schools are visited by oral health teams when the oral health exam is carried out, on which the deft indicators for deciduous and DFMT for permanent dentition (predictive indicators of oral health) are used, and referral of students in need of clinical treatment. The collected data were the basis, in a second moment, for the epidemiological surveys of oral health of the students.

In this context, this study aims to describe the epidemiological profile of dental caries of students from early childhood education to the 5th year of elementary school in BalneárioPinhal schools, in 2017.

## II. METHODS

The municipality of BalneárioPinhal belongs to the 18th Regional Health Coordination of Rio Grande do Sul, with an estimated population of 12,493 inhabitants in 2017 (20.2% up to 12 years old), demographic density of 120 inhabitants / km<sup>2</sup>, GDP per capita of R \$ 11,425.17 (US \$ 3,578.19) and a percentage of the population in extreme

poverty of 6.3%.

In the municipality of BalneárioPinhal, the Smiling for the Future Program operated in 2017 with children enrolled in four early childhood schools and five elementary schools belonging to the municipal network, and a state school. There is no private school in the municipality.

The coordination of the Program in the municipality chose to make this program the model of Oral Health Policy for children in the municipality. Thus, the oral health teams of primary care carried out an epidemiological survey based on the deft and DFMT indicators, in students from public schools in BalneárioPinhal, from early childhood education to the 5th year of elementary school. The data obtained were delivered to the municipal health department and the municipal education department.

Thus, this study consists of an epidemiological survey of the target population of the Oral Health Program "Smiling for the Future", carried out in the municipality of BalneárioPinhal in 2017 [12].

For dental examinations, the combined method of the World Health Organization was used, referring to dental health conditions and the need for treatment in primary and permanent dentition [13]. Cavitation teeth were diagnosed as decayed. The examinations were carried out in the schools' classrooms, under indirect or direct natural light, using the visual evaluation method. The data collection team consisted of two dental surgeons (examiners) and two oral health assistants (note-takers), who previously participated in training and calibration. The calibration process took place in a daily session, at the annual event of SESC-Smiling for the future, and the methodology was explained to the examiners and note takers.

The data were organized in an electronic spreadsheet, using descriptive statistics to consolidate the findings. The following variables were inserted in the worksheet: gender, age, activity or not of caries, number of caries lesions (DMFT and deft indexes presented in the forms) and need for dental treatment.

The DFMT index is defined as the average number of permanent decayed, missing and filled teeth, at 12 years of age, in a given geographical space, in the year considered. The tooth decay corresponds to the ICD-10 code K02. This index estimates the present and past experience from the attack of dental caries to permanent dentition. The age of 12 is adopted internationally as a basic parameter for the use of the indicator. The index values correspond to the following degrees of severity:

very low (0.0 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 and more). High values indicate poor oral health conditions in the population, often associated with unfavorable socioeconomic conditions, difficulty in accessing services and harmful habits, such as high sugar consumption. It can also indicate limited access to fluoride [14].

The data were available in the participating schools and also filed with the education and health departments of the municipality of BalneárioPinhal. As they are publicly available data, there was no need for referral to an ethics committee.

### III. RESULTS AND DISCUSSION

From a total of 1208 enrolled in early childhood education to the 5th year of elementary education in the public school system in the municipality, 983 (81.4%) students gave informed consent with parental authorization to participate in the Smiling for the Future project in 2017.

Table 1. Sample distribution, student without caries and prevalence of caries

	Students without caries experience n (%)	Caries prevalence, students deft $\geq$ 1 and DMFT $\geq$ 1	
		n (%)	n (%)
Sex			
Female	152 (25,29)	131 (21,80)	283 (47,09)
Male	150 (24,96)	168 (27,95)	318 (52,91)
Total	302 (50,25)	299 (49,75)	601 (100,0)

The most relevant components for determining the prevalence of dental caries were: decayed teeth (83.1%), followed by filled (9.1%) and extracted (7.8%). At 5 years of age, decayed teeth represented 92.9% and at 12 years of age they were responsible for 100% of the prevalence of caries. A study carried out in several municipalities in the state of São Paulo pointed out that the most relevant components for determining the prevalence of dental caries were: decayed teeth (73.4%), followed by filled (23.4%) and extracted (3, 25%). In permanent dentition, the most relevant components for determining the prevalence of the index were: filled teeth (60.8%), followed by decayed teeth (37.8%) and missing teeth (1.4%) [15].

Of the 601 students in the sample, 331 (55.1%) did not need treatment for caries, with 270 (44.9%) lacking this type of care, with no difference between genders ( $p = 0.06$ ).

Students, at 5 years of age, have deft = 0.61, caries prevalence is 42.3% and 54% of students do not have any need for treatment. Considering the ages of 5 and

Of these, 93 were transferred to another school during the project, 140 were not present on the dates of the pre-scheduled exams with the schools, 147 students had problems filling in their data in the clinical records and two students refused to participate in the exams. Thus, the total sample was composed of 601 (49.7%) students.

Of the 601 students participating in the study, 318 (52.9%) were male and 283 female (47.1%); the ages varied between 4 and 18 years of age, with 26 students with 5 years of age, 75 with 6 years of age and 15 students with 12 years of age, ages used for calculating caries injury rates.

The percentage of caries-free children was 50.25% (302 cases). The prevalence of caries was defined as the percentage of individuals with at least one tooth decayed, lost due to caries or restored (def $\geq$ 1 and DMFT $\geq$ 1), being 49.75% (299 cases) (Table 1). There was no statistically significant difference between the distribution of students according to caries experience and sex ( $p = 0.054$ ).

6 years, the prevalence of caries is 47.5%. At 12 years of age, they have DMFT = 0.53, a prevalence of caries of 33.3% and 93.3% of students with a maximum of three decayed, missing or filled teeth.

The deft / DMFT ratio was 1.54 at 5 years of age, decreasing to 0.53 at 12 years of age. In other words, the population of schoolchildren studied had a low caries experience at 5 years of age with an average deft of 1.54, which is less than the national average of 2.43 and the average for the South Region of Brazil, of 2.49 [16].

The studied student population had a low caries experience at 12 years of age, with an average DMFT index of 0.53, which corresponds to the population's level of caries severity as being very low (0.0 to 1.1). This value is less than the national average of 2.1 and the South Region average of 2.06 [16]. When compared to world data, this index is lower than that observed in several developed countries and than the world average of 1.67 at 12 years (data grouped from 189 countries) [17].

The WHO target for the year 2000, that 50% of children between five and six years of age should be free of caries has been met (52.47%). However, the target for 2010, of 75% of children free of caries in this age group [18] has not been reached. In addition, the goal that at 12 years of age each child should have a maximum of three decayed, missing or filled teeth - DMFT [19] has not been fully achieved, reaching 93.3%.

This study found 50.2% of schoolchildren free of caries and DMFT at 12 years of age 0.53, very different from that found in 9 municipalities in the interior of the state of Goiás two decades ago, of 4.4% and 5.19, respectively [20]. And, as expected, better values than those observed in a series of studies carried out in municipalities in several Brazilian states in the first decade of the 2000s [2,5,7,9,15,16,21-25].

The polarization of caries disease has been observed in many countries, where the decline in caries experience is found to be uneven and more evident in privileged groups in society. The World Health Organization has set a target for the year 2000 of a 50% prevalence of caries-free children aged 5-6 years old. The implementation of early care programs is a viable alternative since its positive results, in relation to the reduction of dental caries, have been clearly demonstrated in the literature [26], characterizing that oral health care has been effective in BalneárioPinhal in the strip age between 5 and 6 years old with 52.47% of the caries-free participating students.

Other more recent studies in the South Region also show that the data from BalneárioPinhal represents a low prevalence of caries and good performance of oral health care for its students [27,28,29].

In addition, comparing Brazil with countries with the same degree of development in Europe and America, the Brazilian average is at an intermediate value. Within South America, only Venezuela has an average DMFT at age 12 similar to that of Brazil (2.1). The other countries have higher averages, such as Argentina (3.4), Colombia (2.3), Paraguay (2.8), Bolivia (4.7) and Peru (3.7). The results of the SB Brasil 2010 Project indicate that, according to the classification adopted by the WHO, Brazil moved from a condition of average prevalence of caries in 2003 (CPO between 2.7 and 4.4) to a condition of low prevalence in 2010 ( DMFT between 1.2 and 2.6) [16].

Similar indexes were also found for the deft at 5 years old, in the cities of the interior of Rio Grande do Sul (2.56), in Porto Alegre (1.71), in the South region (2.49) and in the country ( 2.43). The same occurred with the indexes at 12 years for the DFMT, in the interior cities of

Rio Grande do Sul (2.17), in Porto Alegre (1.49), in the South region (2.06) and in the country ( 2.07) [16].

As for the SESC Smiling for the Future Program throughout Rio Grande do Sul, in 2017 205 partner municipalities participated and over 175 thousand children from 1,764 schools were assisted; 86 thousand students were evaluated. The data indicated a 1.86 reduction in the number of decayed primary teeth with an average DFMT in 2017. In 2018, it decreased to 1.59, with a total of 184,546 thousand students, from 206 municipalities and 1,746 schools [11].

#### IV. CONCLUSION

The WHO target for the year 2000, that 50% of children between five and six years of age should be free of caries has been met (52.47%). However, in 2019, attention to the oral health of schoolchildren from BalneárioPinhal needs improvements in order to reach the goal for 2010, of 75% of children free of caries in this age group.

The students from BalneárioPinhal have a better average of the deft index at 5 years old when compared to the average of these indexes in schoolchildren in the municipalities of Rio Grande do Sul, in the South region and in Brazil, and it is similar to the averages of the state capital, Porto Alegre. The same with the DFMT index at age 12.

The study showed that 44.92% of students in early childhood education in the 5th year of elementary school need some type of dental treatment for the consequences of caries disease.

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