

## Oral health outcomes: the association of clinical and socio-dental indicators to evaluate dental caries in preschool children

Desfechos em saúde bucal: associação de indicadores clínicos e sociodontais para avaliar cárie dentária em pré-escolares

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**Abstract** Dental caries is a public health problem that impacts oral health related to quality of life (OHRQoL). This study aimed to evaluate the outcome of dental caries in children by associating clinical and socio-dental indicators. A cross-sectional study was carried out with 2 to 6-year-old children who attended public day care centers in a city in the Southeast Region of Brazil. After sample calculation, 446 children were randomly selected by eligibility criteria. Two professionals evaluated dental caries using WHO (2013) criteria and classified subjects according to early childhood caries (ECC) severity. Parents/caregivers answered a characterization questionnaire and self-reported socio-dental indicator (B-ECOHIS). The prevalence of dental caries was 33.7%. The children with high severity of ECC had 5 times higher chance of suffering an impact on OHRQoL. The one way ANOVA test showed that the impact on OHRQoL (ECOHIS scores) was associated with ECC. The outcome dental caries in oral health presented high prevalence as clinical indicator and high impact on OHRQoL as socio-dental indicator. Clinical and socio-dental indicators should be evaluated together.

**Key words** Children, Dental caries, Quality of life, Oral health

**Resumo** A cárie dentária é um problema de saúde pública com impacto na qualidade de vida relacionada à saúde bucal (QVRSB). Este estudo teve como objetivo avaliar a cárie dentária como desfecho em saúde bucal em pré-escolares, por meio da associação de indicadores clínicos e sociodontais que avaliam a QVRSB. Um estudo transversal foi realizado com crianças de 2 a 6 anos de idade que frequentavam creches públicas de um município do sudeste do Brasil. Após o cálculo da amostra, 446 crianças foram selecionadas aleatoriamente por critérios de elegibilidade. A avaliação foi feita por dois profissionais, usando critérios da OMS, que classificaram os sujeitos de acordo com a gravidade de cárie precoce na infância (CPI). Os pais/cuidadores responderam um questionário auto-aplicado de caracterização da amostra e um indicador sociodental (B-ECOHIS). A prevalência de cárie dentária foi de 33,7%. As crianças com alta gravidade de CPI tinha cinco vezes mais chance de sofrer impacto sobre QVRSB. O teste one way ANOVA apresentou associação entre impacto na QVRSB (ECOHIS escores) e CPI. O desfecho cárie em saúde bucal apresentou alta prevalência como indicador clínico e alto impacto sobre a QVRSB como o indicador sociodental. Indicadores clínicos e sociodontais devem ser avaliados em conjunto.

**Palavras-chave** Crianças, Cárie dentária, Qualidade de vida, Saúde bucal

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## Introduction

Quality of life (QoL) is considered as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns<sup>1</sup>. This is a subjective concept, which complements clinical health to evaluate the state of complete physical well-being by including mental and social well-being and not merely the absence of disease<sup>2</sup>.

In dentistry, clinical indicators are used, such as dmft/DMFT (decayed, missing and filled) or CPI (Community Periodontal Index) scores, to evaluate the state of oral health by the presence or absence and severity of caries and periodontal diseases. However, these indicators do not have the ability to measure how much the disease affects the individual's life<sup>3</sup>. With the need to evaluate oral health-related quality of life (OHRQoL), the use of socio-dental indicators has been postulated to supplement the information obtained by traditional clinical indicators. Socio-dental indicators are instruments that are able to measure, explicitly and systematically, social and psychological dimensions of oral health<sup>4</sup>.

Quality of life studies are generally focused more on adults and seniors. Even though it is difficult to estimate the negative influence of oral disorders on children, the early childhood impact scale instrument, ECOHIS, was developed to measure the impact of oral conditions on the quality of life of children aged 2 to 5 years old on a numerical scale<sup>5</sup>. The interest in assessing OHRQoL in children is increasing since oral disorders have been found to represent a negative impact on quality of life<sup>6-13</sup>.

Dental caries, more specifically early childhood caries (ECC, caries affecting children 2 to 6 years old), have a high prevalence<sup>14,15</sup> and are related to impact on OHRQoL<sup>10,11,13</sup> in the Brazilian population. The use of socio-dental indicators to complement information obtained from clinical indicators is a great challenge to determining the individual's full condition of oral health. So, this study aimed to evaluate dental caries in preschool children by associating clinical and socio-dental indicators. It was hypothesized that there are no differentials in oral health outcomes as measured by clinical and socio-dental indicators of dental caries. In the present study, oral health outcomes and OHRQoL are reported and possible explanations for the use of clinical and socio-dental indicators together are discussed.

## Material and methods

### Ethical Considerations

Ethical approval was obtained from the local human ethics committee. Letters explaining the purpose of the survey were sent to the parents. Informed and written consent was obtained from the parents before their children were recruited to the study.

### Study design and sampling

This cross-sectional study was composed of children, aged from 2 to 6 years old, who attended public preschools in the city of Nova Friburgo, 136 Km from downtown Rio de Janeiro, RJ, Brazil. The city of Nova Friburgo has 182,082 inhabitants and occupies an area of 933,414 km<sup>2</sup> divided into 8 districts. Its population is predominantly urban (87%).

The sampling frame for this study was calculated by estimating the prevalence of dental caries in children age from 2 to 6 years old as 53.6%<sup>16</sup>, with 5% error, and 95% confidence interval. In order to compensate for a possible cluster effect, the sample was increased by 20% (design effect = 1.2), thus totaling 393 preschoolers. A ten percent increase in subjects was added in order to compensate any loss. Thus, the sample reached a minimum of 432 subjects. All of the 33 public preschool in Nova Friburgo were invited to participate in this study. However, two preschool (rural area) were inactive and four (urban area) declined to participate. In the remaining 27 kindergarten children were randomly selected and grouped depending on their age and the location of their preschools (18 in urban areas and 9 in rural areas) to ensure representativeness regarding the original population base.

The subjects were invited to participate in the study according to the following inclusion criteria: children aged from 2 to 6 years old, of either gender, and parents who speak fluent Brazilian Portuguese. Preschoolers undergoing orthodontic treatment children with special needs (i.e. motor and mental disabilities or some type of syndrome) or with systemic disease were excluded.

### Data Collection

### Sample Characterization

A questionnaire containing questions on socio-demographic characteristics was sent to

parents/legal guardians of each selected child. The questionnaire gathered the following information on sample characteristics: i) child's gender, age, ethnicity; ii) mother and father's age, ethnicity (self reported), and education (years of study). iii) child's area of residence/school (urban or rural).

#### **Application of socio-dental indicator**

Initially, a pretest study was conducted using the questionnaire for QoL evaluation. A new convenience sample (not part of the study population) of parents/caregivers and their children was recruited from local preschools ( $n = 44$ , 10% of a minimum sample reached). The test-retest reliability analysis requires individuals' conditions remain stable between the two administrations of the questionnaire. The second questionnaire application, two weeks later, was done after asking parents/caregivers if the child's condition had no change since recruitment. All parents were asked to self-complete the questionnaire.

The socio-dental indicator used in our study was the Early Childhood Impact Scale (ECO-HIS), initially developed by Pahel et al.<sup>5</sup> and later validated in the Brazilian study by Martins-Junior et al.<sup>17</sup>. The ECOHIS consists of 13 items corresponding to four descriptive domains in the child impact section: child symptoms domain (1 item), child function domain (4 items), child psychological domain (2 items), child self-image/social interaction domain (2 items), and two domains for the family impact section: parent distress domain (2 items) and family function domain (2 items). This instrument evaluates the parents' perception of their child's OHRQoL. The response categories of ECOHIS were coded on a five-point scale: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = often; 4 = very often. All "don't know" responses were recoded to "never." The total ECOHIS scores and scores for individual domains were calculated as a simple sum of the response codes. This instrument ranges from 0 to 52. A higher ECOHIS score indicates greater impact and/or more problems, that is, a poorer OHRQoL. For statistical analyses, the sample was dichotomized in two groups: two absence (ECO-HIS scores = 0) or presence of impact (ECO-HIS scores  $\geq 1$ ).

#### **Application of clinical indicator**

The children's oral examinations were performed according to the World Health Organi-

zation's<sup>18</sup> criteria for the diagnosis of decayed, missing, and filled teeth (dmft) in deciduous teeth since the evaluated sample presented only primary dentition. The dmft in this group of children was categorized according to the severity of ECC<sup>19</sup>: caries free, dmft = 0; low severity, dmft = 1-5; or high severity, dmft  $\geq 6$ .

The child's oral examination was carried out by two previously calibrated examiners (LAA and LSA). The training exercise for dental caries was performed using images of different clinical situations and the calibration was carried out with an oral examination of 44 children (10% of a minimum sample reached and not part of the study population) on two separate occasions, with a 2-week interval between sessions. Intra- and inter-examiner reliability was assessed by kappa statistics. Inter-examiner reliability for dental caries ranged from 0.90 (95% CI 0.71-0.95) to 1.00, and intra-examiner reliability was Kappa = 1.00.

The examination was performed in the school using a spatula, gauze, disposable gloves, and natural illumination, with the child and the examiner seated on a chair.

#### **Data Analysis**

Statistical analysis was performed using the Statistical Package for Social Sciences (version 16.0; SPSS Inc., Chicago, IL, USA). The level of statistical significance was set at  $p < 0.05$ .

The socio-dental indicator psychometric properties were assessed through internal consistency and test-retest reliability. Internal consistency reliability was assessed by means of Cronbach's Alpha and test-retest reliability by means of the intraclass correlation coefficient (ICC).

The Kolmogorov-Smirnov test was used in order to check distribution of the values. It was observed that the values had normal distribution and parametric statistical procedures were used.

Means were obtained for age and for the socio-dental items (scales and subscale). ECC severity, child's age group (24 to 36 months/37 to 60 months), gender and ethnicity, parents'/caregivers' years of education, and preschool location were evaluated by frequency.

Chi-square test, odds ratio, One-way ANOVA test and Tukey Post Hoc test were used to evaluate association of social demographic data, presence and absence of impact, and ECC severity.

## Results

Six hundred and six patients were invited to participate in this study. However, the final sample consisted of 446 children and their family representative (positive response rate of 74%). The reasons for loss of sample were: parents who had signed the informed consent and not returned the quality of life questionnaire, or children who did not allow the completely exams.

The psychometric properties of the socio-dental indicator (B-ECOHIS instrument) in this sample were evaluated and presented a satisfactory reliability with 0.80 for Cronbach's alpha and 0.94 in test-retest.

The prevalence of dental caries was 33.7%. The sample characteristics are presented in Table 1. According to the variables analyzed, mean age and children older than 37 months were related with ECC severity ( $p < 0.001$ ).

When we evaluated the relationship between each item of the socio-dental indicator (B-ECOHIS) with the clinical indicator according to ECC classification, statistical significance was observed for some questions (Table 2). In the children subscale, the questions "Had pain in the teeth, mouth or jaws?", "Had difficulty drinking hot or cold beverage?", and "Had difficulty eating some foods?" were associated with ECC severity.

In the family subscale, the following questions were associated with ECC severity: "Felt guilty?" and "Had a financial impact on your family?". For these questions, the frequency of impact increased as the child's ECC became more severe.

The ANOVA statistic showed that the impact on quality of life (ECOHIS scores) was associated with ECC (Table 3). The domains were evaluated, and only the psychological domain and self-image/social interaction domain did not present statistical significance. Tukey test for ANOVA was applied and the difference among the groups is represented in Table 3.

The children with low severity of ECC had a 71% higher chance of suffering impact on OHQoL than children who were caries free ( $p = 0.03$ ; OR = 1.71, 95% CI 1.01-2.91). This chance increased 5 times when the children presented high severity of ECC ( $p = 0.001$ ; OR = 5.78, 95% CI 1.65-24.22) (Table 4).

## Discussion

The evaluation of early childhood dental caries is relevant not only because of possible reoccurrence in the affected teeth, but also due to resulting future problems, such as lack of space in the dental arch, development of malocclusions,

**Table 1.** Social demographic data and relationship clinical condition according to ECC severity.

Independent Variable	Clinical indicator				P-value
	ECC Severity				
	Total N = 446	Caries-free N = 296	Low severity N = 113	High severity N = 37	
Mean age (SD)*	3.63 (1.27)	3.18 (1.45)	4.21 (0.99)	4.40 (0.95)	<b>&lt;0.001</b>
Age (%)**					
24 to 36 months	212 (47.5)	175 (59.1)	31 (27.4)	6 (16.2)	<b>&lt;0.001</b>
37 to 60 months	234 (52.5)	121 (40.9)	82 (72.6)	31 (83.8)	
Gender (%)**					
Male	224 (50.2)	143 (48.3)	59 (52.2)	22 (59.5)	0.39
Female	222 (49.8)	153 (51.7)	54 (47.8)	15 (40.5)	
Nursery location (%)**					
Urban	307 (68.8)	205 (69.3)	80 (70.8)	22 (59.5)	0.41
Rural	139 (31.2)	91 (30.7)	33 (29.2)	15 (40.5)	
Ethnicity (%)**, ***					
Caucasian	296 (69.0)	203 (70.5)	74 (68.5)	19 (57.6)	0.31
Afro-descendent	133 (31.0)	85 (29.5)	34 (31.5)	14 (42.4)	
Parents'/caregivers' Years of study (%)**, ****					
≤ 8	143 (33.9)	97 (34.5)	34 (31.2)	12 (37.5)	0.75
≥ 9	279 (66.1)	184 (65.5)	75 (68.8)	20 (62.5)	

\* One-way-ANOVA test; \*\* chi-square test; bold indicates statistical significance; \*\*\* no answer (n = 17); \*\*\*\* no answer (n = 24).

**Table 2.** Frequency according to each item evaluated in socio-dental indicator (B-ECOHis) and association with clinical indicator (ECC severity).

Impacts	ECC Severity			
	Total (N = 446)		Caries-free (N = 296)	
	B-ECOHis = 0 (%)	B-ECOHis ≥ 1 (%)	B-ECOHis = 0	B-ECOHis ≥ 1 (%)
<b>Child impacts section</b>				
How often has your child... because of dental problems or dental treatments?				
Child symptoms domain				
1) Had pain in the teeth, mouth or jaws?	335 (75.1)	111 (24.9)	253 (85.5)	43 (14.5)
Child function domain				
2) Had difficulty drinking hot or cold beverages?	372 (83.4)	74 (16.6)	262 (88.5)	34 (11.5)
3) Had difficulty eating some foods?	360 (80.7)	86 (19.3)	255 (86.1)	41 (13.9)
4) Had difficulty pronouncing any words?	299 (67.0)	147 (33.0)	201 (67.9)	95 (32.1)
5) Missed preschool, daycare or school?	307 (68.8)	139 (31.2)	205 (69.3)	91 (30.7)
Child psychological domain				
6) Had trouble sleeping?	344 (77.1)	102 (22.9)	226 (76.4)	70 (23.6)
7) Been irritable?	285 (63.9)	161 (36.1)	192 (64.9)	104 (35.1)
Child self-image/social interaction domain				
8) Avoided smiling or laughing?	403 (94.4)	43 (5.6)	271 (91.6)	25 (8.4)
9) Avoided talking?	418 (93.7)	28 (6.3)	280 (94.6)	16 (5.4)
<b>Family impacts section</b>				
How often have you or another family member... because of your child's dental problems or treatments?				
Parent distress domain				
10) Been upset?	340 (76.2)	106 (23.8)	233 (78.7)	63 (21.3)
11) Felt guilty?	349 (78.3)	57 (21.7)	248 (83.8)	48 (16.2)
Family function domain				
12) Taken time off from work?	369 (87.2)	77 (22.8)	248 (83.8)	48 (16.2)
13) Had a financial impact on your family?	331 (74.2)	115 (25.8)	234 (79.1)	62 (20.9)

it continues

and impaction of permanent teeth. In general, the treatment of deciduous teeth is sought only when a child complains of discomfort or pain, since lay people expect the replacement of temporary teeth by the permanent teeth to be a solution<sup>20</sup>. Thus, studies on caries detection in preschoolers are important for demystifying myths, beliefs, and even cultural habits regarding this oral disease.

In our study, we found a high prevalence of caries, as did other studies using the Brazilian population<sup>13,17</sup>. However, this prevalence varies. It has been suggested that this is because these studies have been conducted in different cities and states.

The literature shows that children with higher levels of caries had a relatively lower house-

hold income compared to children of higher-income families<sup>21,22</sup>. However, we sought to control this variable by studying the prevalence of caries in children of the same social-economic level. Our sample was purposely obtained from public nursery schools. We aimed for individuals of the low social-economic level, who are the best targets for development of public policies based on the results found in our study.

Of the social-demographic variables assessed in the present study, only "age" had a relationship with caries severity. It was found that older children have a greater amount of cavities and more severe cavities when compared to younger ones. This may be associated with a longer exposure time to factors that lead to caries disease and its progression. According to Martins Júnior et al.<sup>13</sup>,

Table 2. continuation

Impacts	ECC Severity				P-value
	Low severity (N = 113)		High severity (N = 37)		
	B-ECOHIS = 0 (%)	B-ECOHIS ≥ 1 (%)	B-ECOHIS = 0 (%)	B-ECOHIS ≥ 1 (%)	
<b>Child impacts section</b>					
How often has your child... because of dental problems or dental treatments?					
Child symptoms domain					
1) Had pain in the teeth, mouth or jaws?	68 (60.2)	45 (39.8)	14 (37.8)	23 (62.2)	<b>&lt;0.001</b>
Child function domain					
2) Had difficulty drinking hot or cold beverages?	88 (77.9)	25 (22.1)	22 (59.5)	15 (40.5)	<b>&lt;0.001</b>
3) Had difficulty eating some foods?	88 (77.9)	25 (22.1)	17 (45.9)	20 (54.1)	<b>&lt;0.001</b>
4) Had difficulty pronouncing any words?	72 (63.7)	41 (36.3)	26 (70.3)	11 (29.7)	0.65
5) Missed preschool, daycare or school?	80 (70.8)	33 (29.2)	22 (59.5)	15 (40.5)	0.41
Child psychological domain					
6) Had trouble sleeping?	90 (79.6)	23 (20.4)	28 (75.7)	9 (24.3)	0.75
7) Been irritable?	72 (63.7)	41 (36.3)	21 (56.8)	16 (43.2)	0.62
Child self-image/ social interaction domain					
8) Avoided smiling or laughing?	101 (89.4)	12 (10.6)	31 (83.8)	6 (16.2)	0.29
9) Avoided talking?	103 (91.2)	10 (8.8)	35 (94.6)	2 (5.4)	0.42
<b>Family impacts section</b>					
How often have you or another family member... because of your child's dental problems or treatments?					
Parent distress domain					
10) Been upset?	83 (73.5)	30 (26.5)	24 (64.9)	13 (35.1)	0.12
11) Felt guilty?	82 (72.6)	31 (24.7)	19 (51.4)	18 (48.6)	<b>&lt;0.001</b>
Family function domain					
12) Taken time off from work?	91 (80.5)	22 (19.5)	30 (81.1)	7 (18.9)	0.71
13) Had a financial impact on your family?	80 (70.8)	33 (29.2)	17 (45.9)	20 (54.1)	<b>&lt;0.001</b>

Chi-square test; bold indicated statistical significance.

the increase in the age of child subjects results in a negative impact on their oral health-related quality of life. However, because we used very young children (2 to 6 years old) in our study, this perception of increased impact with age was not observed.

Based on the results of the clinical indicators found in our study, it is possible to plan and create oral health strategies for the target population. More information on the importance of preventing caries in deciduous dentition should be given to the parents. In order to plan oral health strategies, knowledge regarding the prevalence of the disease and also its outcome is needed. The planning of public oral health policies should be guided by the knowledge of the population's needs by correlating causes and

physical, emotional, and social effects, as well as possible solutions to the problems. Therefore, the social-dental outcomes involving psychosocial aspects of the population should also be evaluated. The aim is to shift the focus of attention from medical-dental treatment to a more holistic approach by assessing the impact of oral conditions on quality of life and thus highlighting trans-disciplinary approaches for both children and families.

It is extremely important to conduct research to evaluate the use of social-dental indicators to complement the information obtained from clinical indicators. There is evidence of the limitation of using only clinical indices to estimate treatment needs<sup>23</sup>. As shown in the literature, there is no specific instrument for assessing the

**Table 3.** Mean, standard deviation, and median of B-ECOHIS socio-dental indicator scores according to clinical indicator (ECC severity).

Socio-dental indicator  Scale/ Subscale/ Domain (variation)	Clinical indicator								One- Way- ANOVA  P-Value	Tukey Pos Hoc  AxBxC (P-Value)
	Total (n = 446)		ECC severity							
	Mean (SD)	Median	Caries-free <sup>A</sup> (N = 296)		Low severity <sup>B</sup> (N = 113)		High severity <sup>C</sup> (N = 37)			
			Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median		
<b>Child subscale (0-36)</b>	3.72 (3.98)	2.50	3.19 (3.60)	2.00	4.42 (4.65)	3.00	5.81 (3.71)	6.00	<b>&lt;0.001</b>	AxB ( <b>p = 0.010</b> ) AxC ( <b>p &lt; 0.001</b> ) BxC (p = 0.148)
Symptoms domain (0-4)	0.45 (0.84)	0.00	0.23 (0.61)	0.00	0.79 (1.05)	0.00	1.16 (1.01)	1.00	<b>&lt;0.001</b>	AxB ( <b>p &lt; 0.001</b> ) AxC ( <b>p &lt; 0.001</b> ) BxC ( <b>p = 0.038</b> )
Function domain (0-16)	1.85 (2.12)	1.00	1.57 (1.93)	1.00	2.15 (2.40)	2.00	3.13 (2.09)	3.00	<b>&lt;0.001</b>	AxB ( <b>p = 0.030</b> ) AxC ( <b>p &lt; 0.001</b> ) BxC ( <b>p = 0.036</b> )
Psychological domain (0-8)	1.15 (1.63)	0.00	1.17 (1.67)	0.00	1.11 (1.57)	0.00	1.16 (1.51)	0.00	0.95	AxB (p = 0.946) AxC (p = 0.999) BxC (p = 0.987)
Self-image/social interaction domain (0-8)	0.26 (0.86)	0.00	0.21 (0.75)	0.00	0.35 (1.09)	0.00	0.35 (0.82)		0.28	AxB (p = 0.318) AxC (p = 0.641) BxC (p = 1.000)
<b>Family subscale (0-16)</b>	1.86 (2.92)	0.00	1.50 (2.71)	0.00	2.32 (3.06)	0.00	3.29 (3.55)	2.00	<b>&lt;0.001</b>	AxB ( <b>p = 0.027</b> ) AxC ( <b>p = 0.001</b> ) BxC (p = 0.179)
Parental distress domain (0-8)	0.93 (1.68)	0.00	0.73 (1.51)	0.00	1.18 (1.83)	0.00	1.81 (2.14)	1.00	<b>&lt;0.001</b>	AxB ( <b>p = 0.039</b> ) AxC ( <b>p = 0.001</b> ) BxC (p = 0.117)
Family function domain (0-8)	0.92 (1.60)	0.00	0.76 (1.51)	0.00	1.14 (1.74)	0.00	1.48 (1.69)	1.00	<b>&lt;0.01</b>	AxB (p = 0.086) AxC ( <b>p = 0.027</b> ) BxC (p = 0.488)
<b>Total ecohis score (0-52)</b>	5.58 (6.03)	4.00	4.70 (5.54)	3.00	6.75 (6.78)	5.00	9.10 (6.04)	8.00	<b>&lt;0.001</b>	AxB ( <b>p = 0.050</b> ) AxC ( <b>p &lt; 0.001</b> ) BxC (p = 0.089)

\* bold indicates statistical significance.

impact of dental caries, and thus we used a Brazilian Portuguese-validated instrument aimed at assessing the OHRQoL in children, namely, the ECOHIS. This instrument is considered valid and reliable for Brazilian children. Despite the existence of studies supporting the reliability of the ECOHIS questionnaire, we analyzed the psychometric properties of the instrument for the population studied. Internal consistency and reliability were assessed by using the Cronbach's alpha, the intra-class correlation coefficient (ICC), and test-retest. As a result, it was possible to ensure that parents or caregivers understood what we were asking. Based on the psychometric properties, we can state that this questionnaire is

valid and reliable for detecting subjective impacts of oral health in this population. Our results also show that ECOHIS scores could distinguish between groups of children according to their caries status (ECC).

Corroborating with Goettems et al.<sup>9</sup> and Wong et al.<sup>11</sup>, our findings showed that the caries disease has a negative impact on both children and their families. The caries disease has already been evaluated by other studies and in conjunction with other oral conditions, such as dental trauma and malocclusions<sup>8,10,24,25</sup>. In these studies, the authors reported that caries is the oral condition having the most negative impact on the OHRQoL of preschool children. These find-

**Table 4.** Association between absence (ECOHis = 0) and presence (ECOHis =  $\geq 1$ ) of impact with social demographic variables and ECC severity.

Variables	Total (n = 446)	B-ECOHis = 0 (n = 129)	B-ECOHis $\geq 1$ (n = 317)	Odds Ratio Brute (95% CI)	P-value
<b>Age (%)*</b>					
24 to 36 months	212 (47.5)	67 (52.0)	145 (45.7)	1.28 (0.83- 1.97)	0.23
37 to 60 months	234 (52.5)	62 (48.0)	172 (54.3)		
<b>Gender*</b>					
Male	224 (50.2)	69 (53.5)	155 (48.9)	1.20 (0.78-1.85)	0.37
Female	222 (49.8)	60 (46.5)	162 (51.1)		
<b>Nursery location*</b>					
Urban	307 (68.8)	85 (65.9)	222 (70.0)	0.83 (0.52-1.31)	0.39
Rural	139 (31.2)	44 (34.1)	95 (30.0)		
<b>Ethnicity% **</b>					
Caucasian	296 (69.0)	82 (65.6)	214(70.4)	0.80 (0.50-1.28)	0.32
Afro-descendent	133 (31.0)	43 (34.4)	90 (29.6)		
<b>Parents'/caregivers' Years of study ***</b>					
$\leq 8$	143 (33.9)	47 (39.2)	96 (31.8)	1.38 (0.87-2.19)	0.14
$\geq 9$	279 (66.1)	73 (60.8)	206 (68.2)		
<b>Dental Caries*</b>					
Caries Free	296 (66.4)	100 (77.5)	196 (61.8)	Reference	
Low severity	113 (25.3)	26 (20.2)	87 (27.5)	1.71 (1.01-2.91)	<b>0.03</b>
High severity	37 (8.3)	3 (2.3)	34 (10.7)	5.78 (1.65-24.22)	<b>0.001</b>

CI = confidence interval; \*Chi-square test; bold indicates statistical significance; \*\* no answer (n = 17); \*\*\*no answer (n = 24)

ings can be related to the fact that dental caries mostly affects children<sup>11</sup>. Dental caries is a condition that frequently causes pain, difficulty with pronunciation, and difficulty in drinking or eating food, this disease was the most relevant condition related to impact corroborating with other studies<sup>10,11,13</sup>. In the family subscale, the question having the most impact in our study, as well as in the study by Wong *et al.*<sup>11</sup>, was "Did I feel guilty?". An item that we can highlight in our study was the financial impact. This was probably due to the fact that we studied a population with low social-economic status, but this information is very important to plan policies of public health.

The null hypothesis of the present study was that there is no difference in the oral health results when caries was measured by both clinical and social-dental indicators. This hypothesis was confirmed. Both indicators were found to be high (prevalence of caries and impact on

OHRQoL). Additionally, it was observed that in some domains the impact on children increased as the caries disease was more severe. The present study found that children with less severe caries were 71% more likely to suffer impact on their OHRQoL compared to caries-free children, with this likelihood being 5 times higher when children had caries rated as highly severe. Therefore, it is necessary that public healthcare policies be implemented to inform and make caregivers aware of the importance of the early childhood caries disease, including future problems that can result from such negligence. These problems do not occur due to the presence or absence of disease alone. Instead, they become oral problems capable of generating social-behavioral disorders, low self-esteem, psychological disorders, and financial impact. Therefore, these results show that clinical and social-dental indicators should be evaluated together.



## Colaborations

LAA Antunes made the first and the final draft of the manuscript. LAA Antunes, G Ornellas, RS Fraga and LS Antunes, designed the study. LAA Antunes and G Ornellas performed the Data collection. LAA Antunes, RS Fraga and LS Antunes analyzed the data. LAA Antunes, G Ornellas, RS Fraga and LS Antunes, reviewed critically the final draft of the paper.

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