Factors associated with dental cavity in children aged six to 36 months old, in Salvador-BA

Maria Lizzia Moura Ferreira dos Santos [1]
https://orcid.org/0000-0003-1298-7423

Maria Cristina Teixeira Cangussu [2]
https://orcid.org/0000-0001-9295-9486

David José Casimiro de Andrade [3]
https://orcid.org/0000-0002-2454-2467

[1,2] Departamento de Saúde Coletiva. Universidade Federal da Bahia. Rua Augusto Viana, s.n. Canela. Salvador, BA, Brazil. CEP: 40.110-909. Email: lizziaferreira@gmail.com
[3] Departamento de Odontopediatria. Universidade do Porto. Porto, Portugal.

Abstract

Objectives: to analyze the factors associatedwith dental cavity in early childhood.

Methods: this is a cross-sectional study on oral health condition of 535 children aged between six and 36 months old, at Family Health Units, in Salvador-BA. Information was collected on socioeconomic conditions, mother and child's health, eating and oral hygiene habits, and oral examination.

Results: the prevalence of dental cavity was 13.64% (CI95%=11.44 -15.84) and the factors associated were: child's age, number of rooms in the house, "Bolsa Família" (Family Welfare) benefit, prenatal consultations, birth weight and exclusive breastfeeding.

Conclusions: socioeconomic conditions strongly influenced oral health, as well as prenatal care and breastfeeding. To prevent childhood cavities, it is pertinent to invest in intersectoral actions and systematized programs, including the medical and nursing staff, as these actions are essential for integral care for the child's health and quality of life

Key words *Public health, Dental cavities, Oral health, Pediatric dentistry*

Introduction

Dental cavity is a worldwide disease and its prevalence and severity are considered high in the age group up to 36 months old and have several factors associated, according to Majorana *et al.*[1] study. The prevalence of dental cavity for the age group 18 to 36 months old in Brazil, from the index of decayed, missing, and filled teeth (dmf-t) was almost 27% of the examined children, according to the epidemiological study, *SB Brasil (Saúde Bucal Brasil)* (Oral Health Brazil) in 2003.[2] In the last epidemiological survey, in 2010, at the age of five years old a Brazilian child has, on average, 2.43 teeth with cavity, with a predominance of the decayed component, which is responsible for more than 80% of the index.[3]

In 2019, results by Chen *et al.*,[4] cavity in five-year-old children was found to be unevenly distributed, however, it is decreasing over time and its factors associated include behaviors related to oral hygiene practice, sugar consumption, parents' knowledge in oral health, and sociodemographic conditions. Dental cavity in this age group can significantly affect the child's quality of life, and oral health education shows potential in prevention.[5] Cabral's[6] study on 640 children aged up to 36 months old showed a high incidence of cavity (22.6%), observing a polarization of the disease, in other words, children with very poor oral health conditions and children with good oral health conditions.

Many studies state that the socioeconomic conditions of families of children in early childhood have a strong association with the prevalence of cavities.[7-9] Health promotion and disease prevention are inserted in the Brazilian health context through the principles and guidelines that govern the *Sistema Único de Saúde* (SUS) (Brazilian Public Health System), acting in the field of the *Estratégia de Saúde da Família* (ESF) (Family Health Strategy), through the *Política Nacional da Atenção Básica* (National Primary Health Care Policy).[3]

Considering that cavity is the most prevalent oral disease in Brazil and that it can be prevented effectively with low costs, it is essential to expand and systematize preventive dental care for children. It is noteworthy that the link between the professional and the family, educational activities, longitudinal monitoring of oral health and treatment will contribute to the development of a cavity-free generation.

Therefore, the aim of this study was to analyze the factors associated with dental cavity in children aged six to 36 months old, in the *Estratégia de Saúde da Família* (ESF) (Family Health Strategy), in Salvador-BA.

Methods

This is a cross-sectional study involving children aged between six and 36 months old, with a quantitative approach, developed in 2019 in the city of Salvador-BA, which has 2,900,319 inhabitants and is located in the Northeast region according to *Instituto Brasileiro de Geografia e Estatistica* (IBGE)(Brazilian Institute of Geography and Statistics) in 2021. The city of Salvador has 12 Sanitary Districts (DS), the study was conducted in 11 *Unidades de Saúde da Família* (USF) (Family Health Units) one per DS, according to the availability and interest of the dental surgeon in participating in this research.

The study sample was established by convenience, through sample calculation made according to the E-sus, a health information system data, used by the city, considering the total population, 15% of prevalence of dental cavity, 80% of power, 5% of significance level and an OR=1.5 for the main association. A design error of 1.5 was added because it is considered as a cluster sample. 634 children was the number obtained. The inclusion criteria adopted were children aged six months to 36 months old, residents of covered areas selected by *Unidades de Saúde da Família* (USF) (Family Health Units) in the city of Salvador-BA, whose parents agreed to participate in the research.

The data collection instrument was a validated questionnaire by Cabral,[6] which contains epidemiological indicators for monitoring the children'sgeneral health conditions, their living and eating habits, and their oral health condition. To start the data collection, the team of examiners was duly selected and calibrated, measuring the Kappa index, to identify the intra and inter-examiner agreement. This calibration was performed by the consensus, from two workshops, including the discussion of the entire research methodology, the examination criteria, the data collection instrument, its indicators, and a moment to discuss in the field about three to four cases, to achieve the consensus and standardization in oral examinations.

The application of the questionnaire was carried out through an interview in a reserved place, which it could be at home or at the *Estratégia de Saúde da Família* (ESF) (Family Health Strategy) office, respecting the privacy of the participantsin this study. A pilot study was carried out with ten children, being possible to identify flaws and make the necessary adjustments as to the clarity of the questions in the form and adapt it to the reality of the location.

The oral exam was performed using natural light or flashlight, wooden spatula, gauze, gloves, cap, mask, apron, and goggles, following the biosafety rules. The oral exam considered the number of decayed surfaces, white

stain, filled teeth, teeth indicaed for extraction, missing teeth, and excluded teeth, represented in an odontogram.

The International Caries Detection and Assessment System (ICDAS) was used, which is intended for the use in epidemiological research and to detect cavitated and non-cavitated stage lesions with acceptable reliability. A code was used for each tooth and then the dmf-t and dmf-s index of the children examined in the study were calculated. Soft tissue, hard tissue, eruption disorders, developmental changes, anomalies and trauma were also evaluated. Upon identifying oral change in the children, the professionals arranged for care at their own health care facility.

All data were entered into a database in the Minitab program and the descriptive analysis of the variables of interest was performed, observing the absolute and relative frequencies and measures of central tendency and dispersion. Next, stratified analysis was performed for an assessment of potential associations. Effect prevalences were observed according to co-variates, and differences between categories were analyzed using Pearson's chi-square test. In conjunction with elements from the theoretical model and literature, this statistical procedure contributed to the selection of the co-variates used in the modeling ($p<0.20$).

In the multivariate analysis, the method used was unconditional regression. For statistical inference, the 95% Confidence Interval was used. The modeling procedures allowed the construction of the final model to estimate the association of measurement. Poisson Regression was used as an analytical strategy to obtain the Prevalence Ratios. The adjustmentof goodness of the model was verified using Hosmer and Lemeshow's chi-square test.

The research project was submitted and approved by the Research Ethics Committee of at the *Universidade Federal da Bahia* (UFBA), under the number 2.857.836.

Results

The study population was consisted of 535 children out of a total of 634, since 99 were still starting the eruptive process. Of the total number of children (n=535), 50.28% were female, and as for ethnicity, there was a predominance of black and mixed colored skin (83.93%) (Table 1).

Most of the sample was children living in the covered area by the *Unidades de Saúde da Família* (USF) (Family Health Units). The descriptive analysis in relation to the socioeconomic profile showed that the mother's schooling up to elementary level was 44.92% and, of the interviewed guardians, 75.88% were married, in a stable union or living together. As for housing, 42.05% live in a home up to 4 rooms, and 27.1% live with more than 5 people in a home.

As for family income, most families did not receive *Bolsa Família* (Family Welfare), 83% (Table 1).

The mother's health and the child'sgeneral health showed that most mothers had more than 8 prenatal consultations (59.06%), most children were of a normal childbirth (56.26%), at adequate weight (>2500g) at birth (90.46%), and exclusive breastfeeding (82.80%). As for the children'seating habits in the research, 91.08% had already access to sugar, 93.19% were fed at night, 73.08% slept in a shared bed, 55.51% performed oral cavity cleaning, and 84.33% did not share toothbrushes (Table 1).

In the descriptive analysis of the children's oral health regarding mucosal alteration, 95.9% did not present it, 39.12% presented candidiasis, 31.06% presented fraenum of the lip altered, only 4.83%, presented short lingual frenulum and 24.34% presented clean malocclusion (Figure 1).

As for the prevalence of dental cavity was found 13.64% and the dmf-t index=0.21 (SD=1.25), minimum value=0 and maximum value-16, with a predominance of the decayed component (100%) (data not listed).

In the bivariate analysis between dental cavity occurrence (ICDAS) were found as statistically significant associated variables, exclusive breastfeeding (six months) ($p=0.042$) and "*Bolsa Família*" (Family Welfare) benefit ($p=0.047$), protective factors for cavity prevention.

Considering the bivariate association between dental caries occurrence (ICDAS) and associated variables, the following were selected for the multivariate model: child's age, number of rooms at home, "*Bolsa Família*" (Family Welfare) benefit, number of prenatal consultations, birth weight, and exclusive breastfeeding (Table 1).

In the exploratory multivariate Poisson analysis, the variables associated with the presence of dental cavity were - the child's oldest age (PR=1.90; CI95%=1.04-3.45), lowestnumber of rooms at home (PR=1.78; CI95%=1.01-3.17); families of children receiving *Bolsa Família* (Family Welfare) benefit had lower disease prevalence (PR=0.54; CI95%=0.30-0.97) as well as na adequate number of prenatal consultations (PR=0.50; CI95%=0.26-0.94) and exclusive breastfeeding (PR=2.88; CI95%=1.07-7.70), had statistically significant associations (Table 2).

Discussion

Of the 535 children in this study, there was a slight predominance of females, predominantly black and mixed colored skin, with the majority of the sample consisting of children living in the covered area by the *Unidades de Saúde da Família* (USF) (Family Health Units). As for the socioeconomic profile, more than half of the mothers had completed elementary school level, and most of them were married, in a stable union or living together. As for housing, almost half of the children live in homes with up

Table 1

Bivariate association between dental cavity occurrence (ICDAS) and associated variables in pre-schoolers, Salvador- BA, 2019 (N=535).

Variables	Without Cavity (N=462)		With cavity (N=73)		Total		p
	n	%	n	%	n	%	
Child's age (months)							0.028*
<17	222	89.88	25	10.12	247	46.16	
≥17	240	83.33	48	16.67	288	53.13	
Sex							0.941
Male	230	86.47	36	13.53	266	49.71	
Female	232	86.25	37	13.75	269	50.28	
Ethnicity*							0.353
White/ others	70	89.74	8	10.26	78	16.01	
Mixed/ Black	351	85.82	58	14.18	409	83.93	
Mother's schooling*							0.120*
≤Elementary schooling complete	194	84.35	36	15.65	230	44.92	
≥High School	251	89.01	31	10.99	282	55.07	
Father's schooling*							0.750
≤Elementary schooling complete	239	69.33	35	30.67	274	51.21	
≥High School	223	67.65	38	32.85	261	48.78	
Mother's age (years)							0.108*
>25	255	88.65	33	11.35	288	53.13	
≤ 25	207	83.92	40	16.18	247	46.16	
Family income*							0.159*
>1 minimum wage	157	89.20	19	10.80	176	38.17	
≤1 minimum wage	241	84.56	44	15.44	285	61.82	
Maternal Marital status							0.746
Married/ Stable Union	351	87.15	55	12.85	406	75.88	
Others	111	86.05	18	13.95	129	24.11	
Number of siblings							0.153*
0-1	323	85.00	57	15.00	380	71.02	
≥2	139	89.63	16	10.32	155	28.98	
Number of household							0.866
≤ 4	337	86.51	53	13.49	390	72.89	
>4	125	85.93	20	14.07	145	27.10	
Type of home							0.082*
Own	280	84.5	52	15.50	332	62.17	
Rented/ others	181	89.85	21	10.15	202	37.82	
Number of rooms at home							0.107*
>4	274	88.56	36	11.44	310	57.94	
≤4	188	83.71	37	16.29	225	42.05	
Receiving *Bolsa Familia* (Family Welfare)							0.047*
No	245	83.80	48	16.20	293	83.00	
Yes	217	89.79	25	10.21	242	17.00	
Use of shared bed							0.439
No	122	84.67	22	15.33	144	26.91	
Yes	340	87.30	51	12.70	391	73.08	
Open demand							0.145*
No	390	87.44	56	12.56	446	83.36	
Yes	72	81.61	17	18.39	89	16.63	
Mother's prenatal consultations							0.123**
>7	266	84.54	50	15.46	316	59.06	
≤7	196	89.39	23	10.61	219	40.93	

Apgar Score*							0.395
>8	298	88.32	39	11.68	334	95.42	
≤8	13	81.25	3	18.75	16	4.57	
Birth weight (g)							0.186*
>2499.99	421	87.39	63	12.61	484	90.46	
≤ 2499.99	41	80.43	10	19.57	51	9.53	
Type of childbirth							0.075*
Normal	253	83.96	48	16.04	301	56.26	
Cesarean	209	89.38	25	10.62	234	43.73	
Intervention after childbirth*							0.418
No	345	85.65	61	14.35	406	81.85	
Yes	80	88.89	10	11.11	90	18.14	
Difficulty in sucking at birth							0.099**
No	316	84.33	57	15.67	373	69.71	
Yes	146	89.93	16	10.07	162	30.28	
Immunization*							0.507
Complete	369	86.01	60	13.99	429	88.09	
Incomplete	48	82.76	10	17.24	58	11.90	
Exclusive breastfeeding (6 months)							0.042*
Yes	377	85.19	66	14.81	443	82.80	
No	85	93.26	7	6.74	92	17.19	
Night time breastfeeding*							0.431
No	29	90.63	3	9.38	32	6.80	
Yes	375	85.62	63	14.38	438	93.19	
Use of sugar*							0.572
No	21	91.30	2	8.70	23	8.91	
Yes	205	87.23	30	12.77	235	91.08	
Mouth hygiene/ brushing							0.708
Yes	258	87.15	39	12.85	297	55.51	
No	204	86.03	34	13.97	238	44.48	
Use of shared toothbrush*							0.746
No	339	86.26	54	13.74	393	84.33	
Yes	64	87.67	9	12.33	73	15.66	

ICDAS = International Caries Detection and Assessment System; *variables with lost or uncollected data were not accounted for; **variables selected for the multivariate model.

to 4 rooms, and most of the families did not receive *Bolsa Família* (Family Welfare). Most children had already access to sugar, ate at night and more than half did not perform oral cavity cleaning. The prevalence of dental cavity was 13.64% and the factors associated with the presence of dental cavity were the older children, living in homes with fewer rooms, families of children receiving *Bolsa Família* (Family Welfare) benefit, adequate number of prenatal consultations, and exclusive breastfeeding.

The prevalence of cavity in early childhood children has been studied in many countries, with diverse epidemiological, cultural, and socioeconomic situations, and verifying a wide variation.[5,10] In this study, the prevalence was 13.64%, and there is a statistically significant association of increasing prevalence of cavity with the child's age, given the cumulative nature of the disease, in agreement with the results of similar studies.[5,9,11]

It is unanimous among the most recent studies that age is strongly associated with increased prevalence of cavity.[7,9,10-13] Given the variations in prevalence of cavity in several countries, as well as in several Brazilian States, it becomes pertinent to prioritize strategies for prevention and promote oral health in early childhood in the Primary Care, through the *Estratégia de Saúde da Família* (ESF) (Family Health Strategy).

Dentistry in early childhood has been producing potentialities in oral health prevention and promoting actions. Many studies corroborate the findings of this research, affirming the importance of preventive oral health actions in early childhood.[4,11,14-16]

Most studies show that early childhood cavity is also strongly associated with social factors, such as family income, schooling, number of children, and even the mother's need for dental treatment, confirming the findings of this study, which identified social factors

Figure 1

Oral health conditions in the 6 to 36 months old age group in Salvador, BA, in 2019.
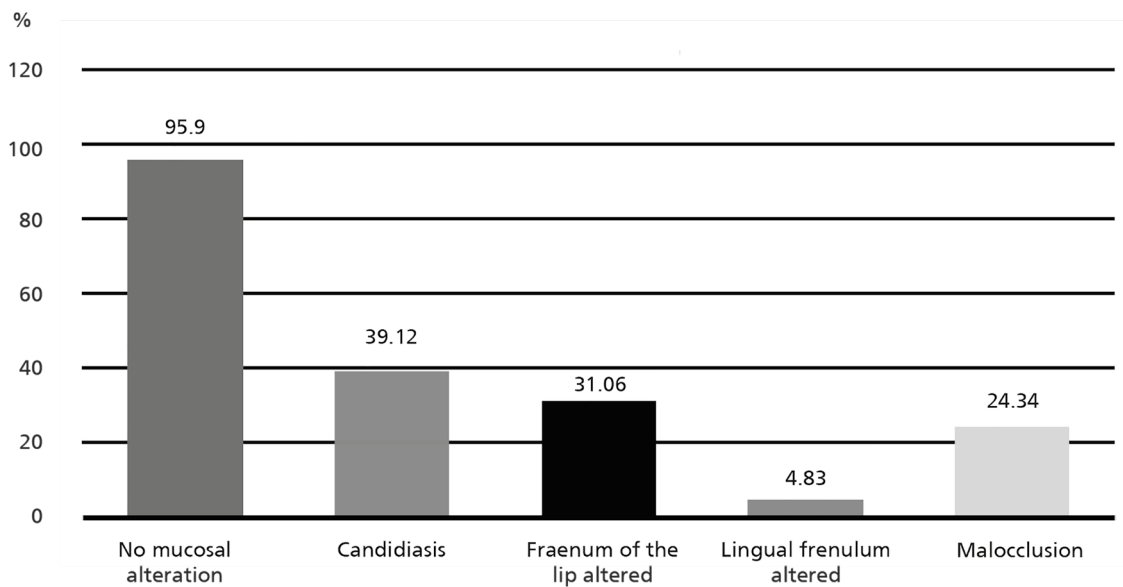
Table 2

Final model of the exploratory Poisson regression analysis of variables associated with the presence of dental cavity (ICDAS) in pre-schoolers, Salvador-BA, 2019 (N=535).

Variable	PR	CI95%	p
Age (months)			0.037
<17	1.00	-	
≥17	1.90	1.04- 3.45	
Number of rooms at home			0.049
>4	1.00	-	
≤ 4	1.78	1.01- 3.17	
Receiving Bolsa Familia (Family Welfare)			0.045
No	1.00	-	
Yes	0.54	0.30- 0.97	
Number of prenatal consultations			0.031
≤7	1.00	-	
>7	0.50	0.26- 0.94	
Birth weight (g)			0.064
>2499.99	1.00	-	
≤ 2499.99	2.25	1.05- 5.33	
Exclusive breastfeeding (up to 6 moths)			0.035
Yes	1.00	-	
No	2.88	1.07- 7.70	

ICDAS = International Caries Detection and Assessment System; *Maximumaverage likelihood *p*=0.57; PR = prevalence ratio.

associated with early cavityries.[12,17] Alkhtib *et al.*[18] completment that the low socioeconomic level produces a lack of awareness in families regarding prevention and treatment of oral diseases in early childhood, with a generalized negligence. Baggio *et al.*[19] identified early childhood cavity as a marker of social inequalities, stating that socioeconomic level is associated with increased prevalence ofcavity.

According to Stephen *et al.*,[9] the parents' schooling is also related to early childhood cavity, according to Chaffee *et al.*[20] studies, the mothers' precarious socioeconomic conditions are reflected in the access to information; the lower the mothers' schooling, the greater the chances of cavity, since these mothers do not receive sufficient guidance on oral hygiene and nutrition for the child's oral health care. In this study, 89.01% of the children whose mothers had schooling higher than high school were cavity-free, but it was not statistically significant, agreeing with Fan *et al.*,[21] study who also found no association between parents' schooling level with the increased cavity in children in early childhood.

In this study, a statistically significant association was found with cavity, the few number of rooms at home where the child lives, and as a protective factor, receiving the *Bolsa Família* (Family Welfare) benefit. Stephen *et al.*[9] and Moimaz *et al.*[17] reinforce this finding by stating that social assistance improves the economic conditions of the family, influencing better oral health care. In contrast, Lee *et al.*[22] study did not find similar results.

Children'soral health conditions in early childhood are related to eating habits, especially the intake of sucrose, which increases the likelihood of cavity in socially vulnerable children.[23] It was identified in this study that 91.08% had already access to sugar, but no statistically significant association was found, disagreeing with the results of several studies,[8,20,24,25] perhaps because of the children'sage. Ghazal *et al.*[10] state that the consumption of sugary food more than once a day increases 9.2% of chances of a child to have cavity; Chaffee *et al.*[20] also found relevant data, in which 95% of the children who have a cariogenic diet have cavity.

In this study, breastfeeding had a statistically significant association as a protective factor against cavity, confirming the findings of Majorana *et al.*[1] and Cidro *et al.*[26] who identified the association of breastfeeding with the reduction of early cavity in this age group, and that pregnant women and mothers' need to be oriented to maintain breastfeeding and promote the child'shealth. However, some studies have identified the opposite, such as that of Kato *et al.*[27] in a population-based study with more than 43,000 six-months-old children, observed that exclusive and mixed breastfeeding at this age group contribute to increased prevalence of cavity.

Nakayama and Mori[25] showed that there is evidence of an association between nighttime breastfeeding and early prevalence of cavity. In this study, 93.19% of children had nighttime feeding, but there was no statistically significant association. These contradictions are important to analyze that cavity problem is complex and involves socioeconomic and cultural context in which the child is inserted.

As for oral hygiene habits, the results of this study showed that 44.48% of the children in the study did not clean their oral cavity, and this indicator did not show a statistically significant association with the increase of cavity. Gomes *et al.*[28] in a study with 165 children also found no significant association between cavity and hygiene habits, confirming the findings of this study, but contradicting the results of another study.[24] This reality found in this study may be related to the use of fluoridated toothpastes, as well as genetic factors, among others, since this is a multifactorial disease. It is important to include oral hygiene issues in health promotion and disease prevention, themesrelated to oral hygiene as educational activities, and preventive programs are essential for the inclusion of oral hygiene habits in early childhood.[13,18,19,21]

Kuriakose *et al.*[13] showed that 76.1% of the children with brushing habits astwice daily,were free of cavity, and that these habits are modeled in the family environment. Nunes *et al.*[23] identified tooth brushing as a protective factor in a group of low cavity risk, while in this study no statistically significant association was found. Aljarallah *et al.*[8] and Gopal *et al.*[12] added the importance of fluoride use in toothpastes as a protective factor.

Many studies state that the improvement of oral hygiene habits as well as the decrease in the prevalence of cavity in this age group are enhanced by access to a dentist, and the greater the follow-up of the child's oral health with a dentist, the lower the possibility of having cavity.[12,13,18,21,23]

Considering that cavity is a multifactorial chronic disease, some limitations and challenges were identified in this study, such as the type of a cross-sectional study, which only observes the population at a given time, the information about the child's oral health and pregnancy based on family members' memory. The sample size was smaller than previously calculated, limited to locations according to the *Unidades de Saúde da Família* (USF) (Family Health Units), which may have restricted the results of the analyses. We suggest a longitudinal study to further investigate the factors associated with cavity, as well as intervention studies at the local level. Studies with qualitative analyses and with larger samples would also complement the results of this study.

In agreement with the results of this study, Abanto *et al.*[16] state that the first thousand days of a child are like a "window of opportunity," a special time for the adoption of habits and lifestyle choices that will influence oral health in early childhood. The earlier a child starts oral health care, the better their health indicators will be. Moimaz *et al.*[29] state that maternal and child health actions need to be equally monitored, ensuring access to prenatal and childcare services, as well as dental prenatal care. The *Estratégia de Saúde da Família* (ESF) (Family Health Strategy) teams have the responsibility to develop educational actions focused on raising the families' awareness about prevention of the diseases and health promotion.

The reality of the children'soral health in early childhood is worrisome, because there is a polarization of the disease, so children in situation of social vulnerability are the most affected and, when this happens, it is in the most severe form of the disease. In the context of Primary Care through the *Estratégia de Saúde da Família* (ESF) (Family Health Strategy), it is possible to advance with the implementation of early oral health care programs, beginning in the prenatal period, in order to provide as

much guidance and clarification as possible regarding oral health care in early childhood.

The results of this study showed factors associated such as the child's age, the number of rooms in the homes, families receiving the *Bolsa Família* (Family Welfare) benefit, the number of prenatal consultations, and exclusive breastfeeding. These findings reinforce the need for greater investment in intersectoral educational actions in the public health field, with the involvement of the entire family health team, collaborating with the improvement of oral health conditions in early childhood.

Authors' contribution

Santos MLMF and Cangussu MCT: conceptualization, data curation, formal analysis, funding acquisition, research, methodology, project management, resources, software, supervision, validation, visualization, writing - original draft, review and editing.

Andrade DJC: conceptualization, visualization, writing - original draft, review and editing.

The authors have approved the final version of the article and declare no conflict of interest.

References

1. Majorana A, Cagetti MG, Bardellini E, Amadori F, Conti G, Strohmenger L, *et al*. Feeding and smoking habits as cumulative risk factors for early childhood caries in toddlers, after adjustment for several behavioral determinants: a retrospective study. BMC Pediatr. 2014 Feb; 14 (1): 45.

2. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Oral. Condições de Saúde Oral da População Brasileira 2002-2003. Resultados Principais. Brasília (DF): Ministério da Saúde; 2004. [access in 2019 Fev 3]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/condicoes_saude_bucal.pdf

3. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Oral. SB Brasil 2010. Pesquisa Nacional de Saúde Oral. Resultados Principais. Brasília (DF): Ministério da Saúde; 2012. [access in 2019 Fev 3]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/pesquisa_nacional_saude_bucal.pdf

4. Chen KJ, Gao SS, Duangthip D, Lo EC, Chu CH. Early childhood caries and oral health care of Hong Kong preschool children. Clin Cosmet Investig Dent. 2019 Jan; 11: 27-35.

5. Percival T, Edwards J, Barclay S, Sa B, Majumder MA. Early Childhood Caries in 3 to 5 Year Old Children in Trinidad and Tobago. Dent J (Basel). 2019 Feb; 7 (1): 16.

6. Cabral MB. Cárie dental na primeira infância: um estudo longitudinal em área urbana [Tese]. Salvador: Instituto de Saúde Coletiva/Universidade Federal da Bahia; 2005.

7. Hoffmeister L, Moya P, Vidal C, Benadof D. Factors associated with early childhood caries in Chile. Gac Sanit. 2016; 30 (1): 59-62.

8. Aljarallah FA, Alghanim HZ, Alanazi AB, Alrafie KA, Jammaz AI, Alhakami AH, *et al*. Prevalence of Early Childhood Caries. Egyptian J Hosp Med. 2018; 70 (8): 1259-65.

9. Stephen A, Krishnan R, Ramesh M, Kumar VS. Prevalence of early childhood caries and its risk factors in 18-72 month old children in Salem, Tamil Nadu. J Int Soc Prev Community Dent. 2015; 5 (2): 95-102.

10. Ghazal T, Levy SMM, Childers NK, Broffitt B, Cutter GR, Wiener HW, *et al*. Factors associated with early childhood caries incidence among high caries-risk children. Community Dent Oral Epidemiol. 2015; 43 (4): 366-74.

11. Assunção LRS, Vilella KD, Rocha DL, Menezes SL, Pinheiro RDPS, Nascimento LS, Pinheiro HHC. Epidemiologia da cárie dentária em crianças da primeira infância no município de Belém, PA. Rev Assoc Paul Cir Dent. 2015; 69 (1): 74-9.

12. Gopal S, Chandrappa V, Kadidal U, Rayala C, Vegesna M. Prevalence and Predictors of Early Childhood Caries in 3- to 6-year-old South Indian Children: A Cross-sectional Descriptive Study. Oral Health Prev Dent. 2016; 14 (3): 267-73.

13. Kuriakose S, Prasannan M, Remya KC, Kurian J, Sreejith KR. Prevalence of early childhood caries among preschool children in Trivandrum and its association with various risk factors. Contemp Clin Dent. 2015; 6 (1): 69-73.

14. Alves AP, Rank RC, Vilela JE, Rank MS, Ogawa WN, Molina OF. Efficacy of a public promotion program on children's oral health. J Pediatr (Rio J). 2018; 94 (5): 518-24.

15. Laranjo E, Baptista S, Norton AA, Macedo AP, Andrade C, Areias C. A cárie precoce da infância: uma atualização. Rev Port Med Geral Fam. 2017; 33: 426-9.

16. Abanto J, Oliveira EPS, Antunes LF, Cardoso MA. Diretrizes para o estudo das condições nutricionais e agravos bucais dentro dos primeiros 1.000 dias de vida. Rev Assoc Paul Cir Dent. 2018; 72 (3): 496-502.

17. Moimaz SAS, Fadel CB, Lolli LF, Garbin CAS, Garbin AJI, Saliba NA. Social aspects of dental caries in the context of mother-child pairs. J Appl Oral Sci. 2014; 22 (1): 73-8.

18. Alkhtib A, Ghanim A, Temple-Smith M, Messer LB, Pirrota M, Morgan M. Prevalence of early childhood caries and enamel defects in four and five-year old Qatari preschool children. BMC Oral Health. 2016; 16 (1): 73.

19. Baggio S, Abarca M, Bdenmann P, Gehri M, Madrid C. Early childhood caries in Switzerland: a marker of social inequalities. BMC Oral Health. 2015; 15: 82.

20. Chaffee BW, Feldens CA, Vitolo MR. Association of long-duration breastfeeding and dental caries estimated with marginal structural models. Ann Epidemiol. 2014; 24 (6): 448-54.

21. Fan C, Wang W, Xu T, Zheng S. Risk factors of early childhood caries among children in Beijing: a case-control study. BMC Oral Health. 2016 Sep; 16 (1): 98.

22. Lee HJ, Kim JB, Jin BH, Paik DI, Bae KH. Risk factors for dental caries in childhood: a five-year survival analysis. Community Dent Oral Epidemiol. 2015 Apr; 43 (2): 163-71.

23. Nunes AM, Silva AA, Alves CM, Hugo FN, Ribeiro CC. Factors underlying the polarization of early childhood caries within a high-risk population. BMC Public Health. 2014 Sep; 14 (1): 988.

24. Peltzer K, Mongkolchati A. Severe early childhood caries and social determinants in three-year-old children from Northern Thailand: a birth cohort study. BMC Oral Health. 2015 Sep; 15 (108): 108.

25. Nakayama Y, Mori M. Association between nocturnal breastfeeding and snacking habits and the risk of early childhood caries in 18- to 23-month-old Japanese children. J Epidemiol. 2015; 25 (2): 142-7.

26. Cidro J, Zahayko L, Lawrence HP, Folster S, McGregor M, McKay K. Breast feeding practices as cultural interventions for early childhood caries in Cree communities. BMC Oral Health. 2015 Apr; 15 (1): 49.

27. Kato T, Yorifuji T, Yamakawa M, Inoue S, Saito K, Doi H, *et al*. Association of breast feeding with early childhood dental caries: japanese population-based study. BMJ Open. 2015 Mar; 5 (3): e006982.

28. Gomes C, Mendes S, Bernardo M. Prevalência e gravidade de cárie na dentição decídua nas crianças de 6 anos de Mafra. Rev Portuguesa Estomatol Med Dent Cir Maxilofacial. 2015; 56 (2): 103-9.

29. Moimaz SA, Saliba TA, Arcieri RM, Lofego L, Saliba NA. Atenção à saúde maternoinfantil e saúde oral nos ciclos do PMAQ-AB. J Manag Prim Health Care. 2018; 9: e1.