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Authors

Feldens, Carlos Alberto
Fortuna, Mixianni Justo
Kramer, Paulo Floriani
et al.

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Family Health Strategy associated with increased dental visitation among preschool children in Brazil

Carlos Alberto Feldens, DDS, PhD [Associate Professor],
Department of Pediatric Dentistry, Universidade Luterana do Brasil, Canoas, Brazil

Mixianni Justo Fortuna, DDS [MSc Student],
Post-Graduate Program in Dentistry, Universidade Luterana do Brasil, Canoas, Brazil

Paulo Floriani Kramer, DDS, PhD [Associate Professor],
Department of Pediatric Dentistry, Universidade Luterana do Brasil, Canoas, Brazil

Thiago Machado Ardenghi, DDS, PhD [Associate Professor],
Department of Stomatology, Universidade Federal de Santa Maria, Santa Maria, Brazil.

Márcia Regina Vítolo, PhD [Associate Professor], and
Department of Nutrition, Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, Brazil

Benjamin W. Chaffee, DDS, MPH, PhD [Assistant Professor]
Department of Preventive and Restorative Dental Sciences, University of California San Francisco, 3333 California St. Suite 495, San Francisco, CA, USA 94118, benjamin.chaffee@ucsf.edu, Phone: (1) 415 - 476 - 9226, Fax: (1) 415 - 502 - 8447

Summary

Background: Early-life dental service utilization could improve child dental health.

Aim: Identify contextual, socioeconomic, and child characteristics associated with dental visitation by age 3 years.

Design: Within a Brazilian birth cohort (N=435), multivariable regression models were fitted to identify independent predictors of having made a dental visit at age 3 years. Contextual variables considered included health center type (Traditional vs. Family Health Strategy, which perform home visits) and composition of oral health teams at the heath center where mothers accessed prenatal care.

Results: Dental visitation was positively associated with Family Health Strategy health centers (36% vs. 23%) and with higher maternal education and family social class. Visitation was lowest among families served by a health center without a dentist, but number of dentists and oral health

team composition were not associated with visitation among facilities with 1 dentists. Dental visitation was not statistically significantly associated with caries experience but was higher if parents reported worse oral health-related quality of life. The vast majority of dental decay remained untreated.

Conclusions: Dental visits were underutilized, and socioeconomic inequalities were evident. Dental visitation was more common when mothers received prenatal care at Family Health Strategy health centers, suggesting a possible oral health benefit.

Introduction

An early-life dental visit can play a fundamental role in maintaining good oral health throughout childhood, as it represents an opportunity to respond to several highly prevalent diseases that impact quality of life, including dental caries, dental trauma, and malocclusion[1–3]. Preventive care, early diagnosis, and prompt treatment can address these diseases less invasively and at lower cost[4,5]. The World Health Organization promotes health actions early in childhood to mitigate detrimental impacts on child development and growth[5].

Although dental service use has increased in some age groups and communities[2,6,7], utilization remains low even in many middle and upper income countries, especially among preschool children[8,9]. Identifying factors that influence dental visitation stands to inform cost-effective strategies to enhance early access and utilization. Contextual factors, such as health policies and service availability, as well as family-level characteristics, such as social-economic position, are frequently observed determinants of dental utilization[8,10,11].

In Brazil, a universal health care system (SUS, Sistema Único de Saúde) began development in 1988 to provide health care as a fundamental right, following implementation recommendations from the Pan American Health Organization[12]. While significant challenges persist, this approach has been credited with substantial advances, including health workforce expansion and 100% coverage of vaccination and prenatal care[12,13]. Oral health was named one of four federal SUS priorities in 2004, leading to the Smiling Brazil initiative ("Brasil Sorridente") that aimed to integrate oral health care into SUS. This program greatly increased federal investment in oral health and expanded the number of dental professionals affiliated with SUS[12]. One component of Smiling Brazil has been to integrate oral health teams into Basic Health Unit (UBS, Unidade Básica de Saúde) public primary care health centers throughout the country[12,14]. While large-scale surveys following Smiling Brazil implementation showed oral health indicators improve among older children and adults[15], relatively little information is available related to dental service use among preschool children.

In a national study of 5-year-old Brazilian children, higher parental income and dental pain were associated with ever having visited a dentist[16]. To our knowledge, the only existing longitudinal study of dental service use among children was conducted in Belgium and showed slightly more than one third of children had visited a dentist by age 3 years and that low maternal educational attainment was associated with service non-use[17].

Prospective evaluations of contextual characteristics, including type of dental services available at local health centers, could inform strategies to enhance dental service use early in life, potentially reducing the burden of oral health problems in later childhood [18]. Therefore, the objective of the present study was to examine dental visitation up to age 3 years and the contextual, family, and child factors that potentially facilitate this outcome. We hypothesized that dental visitation would be greater among children whose mothers received services at Family Health Strategy health clinics or clinics with more dental personnel.

Methods

This observational prospective study was nested within a randomized clinical trial in Porto Alegre, in southern Brazil: a city of 1.4 million inhabitants with fluoridated community water. The trial intervention was a training program on healthy infant feeding for health professionals at UBS health centers. Control health centers received no training. Health and nutrition outcomes were evaluated prospectively among children whose mothers were recruited from participating health centers during pregnancy. To meet the sample size requirements for the intervention study, 20 health centers were selected from the 31 eligible citywide, and 715 mothers attending these health centers enrolled in 2008. Further information on trial methodology was published previously[19].

Data collection

Maternal and family-level variables were collected via questionnaire prior to infant delivery: infant gender, maternal age (later categorized as <20, 20–30, >30 years), maternal educational attainment (later categorized as <8, 8–10, >10 years), family composition (nuclear and non-nuclear), number of people living in the household (later categorized as <3, 3–5, >5), per capita income from all sources (later categorized in tertiles), and social class, based on Brazilian Association of Economic Research Institutes (ABIPEME) classification from highest (B) to intermediate (C) to lowest (D).

Information about health centers were collected from the municipal health department, including UBS type (Traditional or Family Health Strategy), type of oral health team (none, Type I, or Type I & II), and number of dentists employed at the UBS (later categorized as none, 1, 2, >2). Family Health Strategy (Unidade de Saúde da Família) health centers feature inter-professional primary care teams that make proactive home visits to families within the UBS catchment area, particularly for priority individuals, such as pregnant women and young children. Teams may include physicians, nurse practitioners, community health workers, and may or may not include dental personnel. Traditional facilities rely on the patients to solicit care at the health center. For health centers that feature an integrated oral health team, Type I teams consist of a dentist and dental assistant. Type II teams additionally include a dental technician, who can perform limited preventive and restorative procedures.

Mother-child dyads enrolled in the study were revisited when the child reached 1 and 3 years of age (mean 3-year visit age: 38 months). The 3-year visit included both a maternal questionnaire and a child dental examination. Trained field workers administered questionnaires verbally. The primary outcome of the present study, dental visitation, was assessed via the question: "Has your child ever visited a dentist?"

The Brazilian Portuguese version of the Early Childhood Health Impact Scale (B-ECOHIS) was used to assess parents' perceived impact of their preschool children's oral health on child and family quality of life[20]. The scale included 13 items related to the frequency of potential child and family impacts (e.g., child psychological and physical symptoms and parent distress). Total score was summed across all items, with higher scores indicating worse quality of life (later categorized as 0, 1–2, >2).

Two trained, calibrated dentists completed child dental examinations following modified World Health Organization protocols[21]. Teeth were brushed, dried with gauze, and each tooth surface examined under artificial light. Caries experience was later categorized according to the numbered of decayed (visually cavitated), missing (extracted), or filled teeth (dmft: 0, 1–4, >4). Clinical signs of dentoalveolar trauma were based on the Andreasen index[22] and categorized as present or absent. For dental caries, inter-examiner (kappa=0.75) and intra-examiner (kappa=0.83 for both examiners) agreement were assessed in an independent calibration sample. For dental trauma, the inter-examiner kappa coefficient was 0.70, and intra-examiner coefficients were 0.77 and 0.85.

Statistical analysis

This analysis was restricted to the 435 children with a 38-month dental examination and no missing data for the dental visitation item (92% of the 475 children with a 38-month visit). Descriptive and bivariate analyses were performed to evaluate associations between health center, family, and child variables with reported dental visitation (chi-square).

In multivariable analyses, generalized estimating equations were used to estimate three separate log-linear models (one for each health center variable) for the outcome dental visitation, while accounting for clustering by health center (exchangeable working correlation structure). Separate models were estimated because some health center characteristics overlapped (e.g., having no oral health team and having no dentists). All models included all child and family covariates, except for household income, due to colinearity concerns with other socioeconomic variables. Intervention or control group assignment in the trial was included as a possible confounder. Missing covariate data (0.1% of all possible values) were addressed using multiple imputation. Two robustness checks were conducted to handle the single health center with no oral health team: 1) repeating analyses with this health center excluded; and 2) reclassifying the categories for number of dentists as 0–1, 2, >2. Analyses were completed using SPSS version 20 and Stata version 14.

Ethical review

The study protocol received ethical review and approval from internal review boards at the Universidade Federal de Ciências da Saúde de Porto Alegre and the University of California Berkeley. Mothers provided written informed consent for themselves and their children.

Results

Of the 435 children included in this analysis, only 26% had ever visited a dentist by age 3 years, but 40% had 1 teeth affected by dental caries, and 31% presented with dental trauma (Table 1). Restorative dental treatment was extremely uncommon: cavitated decay

comprised 98% of the dmft index. Families in this population tended to be of lower socioeconomic position: 78% were social class C or below; 67% of mothers had 10 years or fewer of formal education (Table 1). Traditional health centers served most families (75%), but the municipal health department listed all but one health center as having oral health personnel, covering 92% of families (Table 1).

In pair-wise analyses, child dental visitation was positively associated with attendance at a Family Health Strategy health center (36% vs. 23%) and with higher levels of maternal education and family social class (Table 2). Visitation was higher, but not statistically significantly different, among children with >4 caries-affected teeth or with dental trauma. However, higher B-ECHOSIS score, indicating more severe impact of caries on quality of life, was positively and statistically significantly associated with having visited a dentist (Table 2).

In multivariable models (Table 3), attendance at a Family Health Strategy health center remained a positive correlate of having visited a dentist (relative risk, RR: 1.54; 95% confidence interval, CI: 1.05, 2.25). Dental visitation was least likely if the health center featured no dentist and no oral health team; however, after excluding the lone health center with no dental personnel (or combing into the next category), there was no statistically significant association with dental visitation by size or composition of the oral health team. The association between dental visitation and care at a Family Health Strategy health center remained when the facility with no dental staff was excluded from analysis (RR: 1.47; 95% CI: 1.00, 2.16) and if number of health center dentists was added as a possible confounding variable (RR: 1.48; 95% CI: 1.01, 2.19).

Children of mothers of <8 years of formal education were about half as likely to have visited a dentist as children of mothers with >10 years of education, and children from families from social class   D were about two-thirds as likely to have visited a dentist as children from the most advantageous social class (Table 3). Dental caries experience and dental trauma were not associated with dental visitation, but higher perceived impact on quality of life was positively associated with having a dental visit (Table 3). Unexpectedly, visiting a health center assigned to the intervention group in the nesting trial was also positively associated with dental visitation (Table 3).

Discussion

Among the main findings of the present study was that three-fours of children had not visited a dentist within the first 3 years of life, missing an opportunity to utilize dental services. Additionally, there were marked inequalities in dental visitation, as only one in six children of mothers with low educational attainment or from low socioeconomic class families had visited a dentist. On the other hand, children whose mothers received prenatal care at Family Health Strategy health centers were more likely to have seen a dentist than children whose mothers received care from a traditional health center, suggesting that this mode of service delivery may encourage early use of dental services. Importantly, even among children with a reported dental visit, receiving restorative treatment was extraordinarily uncommon. This indicates substantial barriers and deficiencies in dental care

delivery, despite the fact that the vast majority of health centers were ostensibly equipped with dental providers.

Social and structural factors complicate parents' ability to seek dental services for their children. Harris and colleagues[18] proposed a model of preventive dental service utilization that incorporates barriers and facilitating factors at three levels: individual and psychological characteristics (micro-level); social and community norms and structures (meso-level); and broad societal policies (macro-level). In their model, factors interact at different levels, contributing to inequalities in utilization[18]. Previous studies documented socioeconomic inequalities in early childhood use of dental services similar to the present study[11], including in Brazil[8,16,23]. In the present study, child dental visitation decreased in a step-wise fashion across categories of lessening maternal educational attainment and family social class. Greater maternal education creates opportunities for employment and material goods, but also has been directly associated with more favorable child care practices,[24] potentially related to micro-level factors, such as facing fewer external stressors, greater perceived self-efficacy, or avoiding fatalistic beliefs in disease prevention[25].

Perceived importance of obtaining care and self-evaluation of oral health also stand out as micro-level influences of dental care seeking[18]. In the present study, higher B-ECOHIS score, indicating greater perceived impact of dental disease on quality of life, was associated with having ever gone to a dentist, but clinical dental status (dmft or trauma) was not. Plausibly, families who perceived their child's dental condition as more impactful were more likely to seek dental care, independent of clinical severity. Reduced oral health-related quality of life was associated with dental visitation in other Brazilian studies[16,23]. Thus, the interplay between clinical disease, social status, and how disease sequelae are perceived deserves exploration in additional settings.

One health center in this study had no oral health team, and children of the families served there were, unsurprisingly, unlikely to have seen a dentist. However, among the remaining health centers, there was no meaningful difference in child dental visitation by type of oral health team or number of dentists employed. While having dental providers was associated with dental visitation, virtually all caries experience identified in this study was untreated, indicating widespread treatment barriers. It is possible the municipal listings of dental service availability did not reflect reality in the health centers themselves. It may be that the available dental providers lacked training to treat very young children. The apparent disconnect between dental visitation and restorative treatment deserves further attention in comprehensively evaluating the Smiling Brazil initiative. Unmet treatment needs are not uncommon, even after reaching a dental provider, a complex issue involving barriers on the sides of provider and patient[26].

Harris and colleagues describe how positive interactions with the health care system can enhance further care utilization as a recursive, meso-level social process[18]. Brazilian municipal health centers were central to a separate program intended specifically to increase dental visitation in early childhood[27]. That dedicated program achieved levels of visitation higher than those observed in the present study (35% in the first year of life), but fell short of

the targeted 100% utilization, highlighting the need for further policies and strategies to achieve universal access[27].

The present study did not record Family Health Strategy home visits directly, but did observe greater dental visitation among children whose mothers had been seen at these facilities. Pregnant mothers and young children in Family Health Strategy catchment areas are followed actively, and evidence suggests a positive influence on infant mortality[28]. We hypothesize that active outreach to families with young children, the specific training of Family Health Strategy professionals to encourage families to visit to the dentist within a child's first year, and the presence of Family Health Strategy community health workers, who support and facilitate healthy behaviors and healthcare access[29], all play roles in enhancing dental visitation in Family Health Strategy catchment areas. The Family Health Strategy model has not been completely or evenly implemented throughout Brazil, and health providers themselves have expressed some concerns about quality and access[29]. Nonetheless, the Family Health Strategy approach could improve oral health, potentially through anticipatory guidance or early identification of dental problems with referrals[12,13,15]. In the present study, assignment to the intervention group was also associated with having had a dental visit. This unexpected finding could be due to chance, or, we speculate, that when health care providers gave sound nutritional counseling, families were more inclined to seek other services at the health center.

Among study limitations, the questionnaire lacked detailed items on dental service utilization, as this was not a focus of the nesting study. Self-reports could lack accuracy: for example, caregivers may have provided what they considered socially desirable or may have recalled as dental visits any oral screenings conducted in preschools or during Family Health Strategy home visits. Families may have moved from catchment area of the health center from which they were initially enrolled; however, the resulting misclassification would likely be non-differential, biasing estimates toward the null. In terms of external validity, the families in this cohort were of lower socio-economic position than the municipal population overall, and thus, cannot be used to estimate child dental visitation in Porto Alegre or Brazil, generally. However, such families carry a disproportionate burden of poor health and deserve targeted policies for general and oral health improvement. Broad public policies, such as water fluoridation and sanitation, may benefit all socioeconomic groups but lack explicit focus on disadvantaged communities[30]. The 3-year visits took place in 2011–2012; efforts under the Smiling Brazil initiative since that time might have improved access to dental services, such expanding the availability of dental specialty centers and care provided in dental university clinics[12]. Study strengths included the longitudinal design, multiple measures of child, family, and contextual (health center) variables, and statistical approaches to account for confounding and missing data, with sensitivity checks.

Conclusions

The present study demonstrated limited dental visitation among preschoolers, as well as socioeconomic inequalities in visitation. Family Health Strategy health centers were associated with greater dental visitation, and expansion of this program could be a promising path toward improving oral (and general) health while reducing inequalities. More generally,

observed disparities by maternal education reinforce that investments in education and social development yield potential gains in health. Finally, further efforts are needed not only to enhance access to dental visits but also to connect children with more effective preventive and restorative care.

Acknowledgments

References

1. Feldens CA, Giugliani ER, Vigo A, Vitolo MR. Early feeding practices and severe early childhood caries in four-year-old children from southern Brazil: a birth cohort study. Caries Res. 2010; 44: 445–452. [PubMed: 20838043]

2. da Costa VP, Goettems ML, de Oliveira LJ, et al. Nonuse of dental service by schoolchildren in Southern Brazil: impact of socioeconomics, behavioral and clinical factors. Int J Public Health. 2015; 60: 411–416. [PubMed: 25759100]

3. Moeller JF, Chen H, Manski RJ. Investing in preventive dental care for the Medicare population: a preliminary analysis. Am J Public Health. 2010; 100: 2262–2269. [PubMed: 20864712]

4. Darmawikarta D, Chen Y, Carsley S, et al. Factors associated with dental care utilization in early childhood. Pediatrics. 2014; 133: e1594–1600. [PubMed: 24799544]

5. Britto PR, Lye SJ, Proulx K, et al. Nurturing care: promoting early childhood development. Lancet. 2017; 389: 91–102. [PubMed: 27717615]

6. Peres KG, Peres MA, Boing AF, Bertoldi AD, Bastos JL, Barros AJ. Reduction of social inequalities in utilization of dental care in Brazil from 1998 to 2008. Rev Saude Publica. 2012; 46: 250–258. [PubMed: 22437856]

7. Pinilla J, Negrin-Hernandez MA, Abasolo I. Time trends in socio-economic inequalities in the lack of access to dental services among children in Spain 1987–2011. Int J Equity Health. 2015; 14: 9. [PubMed: 25636711]

8. Machry RV, Tuchtenhagen S, Agostini BA, et al. Socioeconomic and psychosocial predictors of dental healthcare use among Brazilian preschool children. BMC Oral Health. 2013; 13: 60. [PubMed: 24171711]

9. Granville-Garcia AF, Clementino MA, Gomes MC, Costa EM, Pinto-Sarmento TC, Paiva SM. Influence of Oral Problems and Biopsychosocial Factors on the Utilization of Dental Services by Preschool Children. J Dent Child (Chic). 2015; 82: 76–83. [PubMed: 26349794]

10. Barriuso Lapresa L, Sanz-Barbero B. Variables asociadas al uso de los servicios de salud bucodental por la población preescolar en España: un análisis de la Encuesta Nacional de Salud. Revista Española de Salud Pública. 2012; 86: 115–124. [PubMed: 22991034]

11. Roberts-Thomson K, Luzzi L, Stewart J. Families and their use of dental services. Aust Dent J. 2012; 57: 103–108.

12. Pucca GA, Jr., Gabriel M, de Araujo ME, de Almeida FC. Ten Years of a National Oral Health Policy in Brazil: Innovation, Boldness, and Numerous Challenges. J Dent Res. 2015; 94: 1333–1337. [PubMed: 26316461]

13. Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. Lancet. 2011; 377: 1778–1797. [PubMed: 21561655]

14. Navarro MF, Modena KC, Bresciani E. Social disparity and oral health. Braz Oral Res. 2012; 26 Suppl 1: 17–24. [PubMed: 23318740]

15. Nascimento AC, Moyses ST, Werneck RI, Moyses SJ. Oral health in the context of primary care in Brazil. Int Dent J. 2013; 63: 237–243. [PubMed: 24074017]

16. Souza JGS, Sampaio AA, Costa Oliveira BE, Jones KM, Martins A. Socioeconomic inequalities in the use of dental care services during early childhood: an epidemiological survey. Int J Paediatr Dent. 2018.

17. Leroy R, Bogaerts K, Hoppenbrouwers K, Martens LC, Declerck D. Dental attendance in preschool children - a prospective study. Int J Paediatr Dent. 2013; 23: 84–93. [PubMed: 22356279]

18. Harris RV, Pennington A, Whitehead M. Preventive dental visiting: a critical interpretive synthesis of theory explaining how inequalities arise. Community Dent Oral Epidemiol. 2017; 45: 120–134. [PubMed: 27921329]

19. Chaffee BW, Feldens CA, Vitolo MR. Cluster-randomized trial of infant nutrition training for caries prevention. J Dent Res. 2013; 92: 29s–36s. [PubMed: 23690364]

20. Scarpelli AC, Oliveira BH, Tesch FC, Leao AT, Pordeus IA, Paiva SM. Psychometric properties of the Brazilian version of the Early Childhood Oral Health Impact Scale (B-ECOHIS). BMC Oral Health. 2011; 11: 19. [PubMed: 21668959]

21. World Health Organization. Oral health surveys. Basic methods. 1997.

22. Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth: John Wiley & Sons 2013.

23. Goettems ML, Ardenghi TM, Demarco FF, Romano AR, Torriani DD. Children's use of dental services: influence of maternal dental anxiety, attendance pattern, and perception of children's quality of life. Community Dent Oral Epidemiol. 2012; 40: 451–458. [PubMed: 22537392]

24. Feldens CA, Kramer PF, Sequeira MC, Rodrigues PH, Vitolo MR. Maternal education is an independent determinant of cariogenic feeding practices in the first year of life. Eur Arch Paediatr Dent. 2012; 13: 70–75. [PubMed: 22449805]

25. Finlayson TL, Siefert K, Ismail AI, Sohn W. Psychosocial factors and early childhood caries among low-income African-American children in Detroit. Community Dent Oral Epidemiol. 2007; 35: 439–448. [PubMed: 18039285]

26. Robles ACC, Grosseman S, Bosco VL. Práticas e significados de saúde bucal: um estudo qualitativo com mães de crianças atendidas na Universidade Federal de Santa Catarina. Ciência & Saúde Coletiva. 2010; 15: 3271–3281. [PubMed: 21049169]

27. Schwendler A, Faustino-Silva DD, Rocha CF. Oral Health in the Children's Preventive Health Care Initiative: indicators and goals in a Primary Health Care Service. Cien Saude Colet. 2017; 22: 201–207. [PubMed: 28076543]

28. Macinko J, Guanais FC, de Fatima M, de Souza M. Evaluation of the impact of the Family Health Program on infant mortality in Brazil, 1990–2002. J Epidemiol Community Health. 2006; 60: 13–19.

29. Flor CR, Oliveira CDL, Cardoso CS, et al. Primary health care as assessed by health professionals: comparison of the traditional model versus the Family Health Strategy. Rev Bras Epidemiol. 2017; 20: 714–726. [PubMed: 29267755]

30. Aguiar VR, Pattussi MP, Celeste RK. The role of municipal public policies in oral health socioeconomic inequalities in Brazil: A multilevel study. Community Dent Oral Epidemiol. 2018; 46: 245–250. [PubMed: 29215153]

Bullet Points

- Dental visitation by age 3 years was relatively uncommon and restorative treatment was rare, despite the apparent availability of dental personnel in municipal health centers; greater effort is needed to overcome barriers in connecting young children with appropriate preventive and restorative care.

- Family Health Strategy health centers were associated with greater dental visitation; expansion of this program, which includes active home visits to families with young children, may encourage use of dental services in early life.

- Persistent inequalities in dental visitation suggest that further action is needed for the dental service delivery system to reach families of low socioeconomic standing.

Table 1.

Sample Characteristics (N=435 mother-child pairs, Porto Alegre, Brazil)

Variables	n	(%)
Child sex		
Male	218	(50.1)
Female	217	(49.9)
Child age		
< 36 months	62	(14.3)
36 months	373	(85.7)
Maternal age (baseline)		
< 20 years	77	(17.7)
20 – 30 years	251	(57.7)
> 30 years	107	(24.6)
Maternal education		
< 8 years	130	(29.9)
8 – 10 years	163	(37.5)
> 10 years	142	(32.6)
Family composition		
Nuclear	222	(51.0)
Non-nuclear	213	(49.0)
Number of people in household		
< 3	88	(20.2)
3 – 5	254	(58.4)
> 5	93	(21.4)
Household income (per capita)		
1st tertile (highest)	136	(32.2)
2nd tertile	144	(34.1)
3rd tertile (lowest)	142	(33.6)
Social Class		
B (highest)	95	(21.9)
C	258	(59.4)
D (lowest)	81	(18.7)
dmft		
0	261	(60.0)
1 – 4	115	(26.4)
> 4	59	(13.6)
Dental trauma		
none	302	(69.4)
any	133	(30.6)
ECOHIS score		
0	238	(55.0)
1 – 2	85	(19.6)

Variables	n	(%)
> 2	110	(25.4)
Type of health center		
Traditional UBS	328	(75.4)
Family Health Center	107	(24.6)
Health center oral health team(s)		
None	31	(7.2)
Type I	279	(64.1)
Type I and II	125	(28.7)
Number of health center dentists		
0	31	(7.2)
1	122	(28.0)
2	151	(34.7)
> 2	131	(30.1)
Child ever visited a dentist		
yes	115	(26.4)
no	320	(73.6)

Abbreviations: dmft = decayed (cavitated) missing filled primary tooth index; ECOHIS = Brazilian early childhood oral health impact scale; UBS = Unidade Básica da Saúde (basic health unit)

Table 2.

Dental service use: association with health center, child/family characteristics, and dental health

	Child ever visited a dentist			
	N	**n**	**(%)**	**p-value**
Health Center Variables				
Type of health center				
Traditional UBS	328	77	(23.5)	0.014
Family Health Center	107	38	(35.5)	
Health center oral health team(s)				
None	31	4	(12.9)	0.139
Type I	279	73	(26.2)	
Type I and II	125	38	(30.4)	
Number of health center dentists				
0	31	4	(12.9)	0.283
1	122	35	(28.7)	
2	151	38	(25.2)	
> 2	131	38	(29.0)	
Child and Family Variables				
Child sex				
Male	218	58	(26.6)	0.936
Female	217	57	(26.3)	
Child age				
< 36 months	62	15	(24.2)	0.665
36 months	373	100	(26.8)	
Maternal age (baseline)				
< 20 years	77	21	(27.3)	0.956
20 – 30 years	251	65	(25.9)	
> 30 years	107	29	(27.1)	
Maternal education				
< 8 years	130	22	(16.9)	<0.001
8 – 10 years	163	39	(23.9)	
> 10 years	142	54	(38.0)	
Family composition				
Nuclear	222	55	(24.8)	0.422
Non-nuclear	213	60	(28.2)	
Number of people in household				
< 3	88	24	(27.3)	0.967
3 – 5	254	66	(26.0)	
> 5	93	25	(26.9)	
Household income (per capita)				
1st tertile (highest)	136	41	(30.1)	0.529
2nd tertile	144	35	(24.3)	

	Child ever visited a dentist			
	N	n	(%)	p-value
3rd tertile (lowest)	142	37	(26.1)	
Social Class				
B (highest)	95	38	(40.0)	0.002
C	258	63	(24.4)	
D (lowest)	81	14	(17.3)	
Original trial assignment				
control	208	43	(20.7)	0.009
intervention	227	72	(31.7)	
Child Dental Status				
dmft				
0	261	69	(26.4)	0.466
1 – 4	115	27	(23.5)	
> 4	59	19	(32.2)	
Dental trauma				
none	302	76	(25.2)	0.365
any	133	39	(29.3)	
ECOHIS score				
0	238	47	(19.7)	0.001
1 – 2	85	26	(30.6)	
> 2	110	42	(38.2)	

*1.*Chi-square test

Abbreviations: dmft = decayed (cavitated) missing filled primary tooth index; ECOHIS = Brazilian early childhood oral health impact scale; UBS = Unidade Básica da Saúde (basic health unit)

Table 3.

Dental service use: multivariable models for association with health center, child/family characteristics, and dental health

Health Center Variables	Model 1: Health Center Type				Model 2: Team Type				Model 3: Dentists			
	Type of health center	RR	95% CI	p-value	Oral health teams	RR	95% CI	p-value	Number of dentists	RR	95% CI	p-value
	Traditional	1	reference		None	1	reference		0	1	reference	
	Family	1.54	(1.05, 2.25)	0.027	Type I	1.89	(1.28, 2.78)	0.001	1	1.86	(1.19, 2.91)	0.007
					Type I & II	2.40	(1.64, 3.51)	<0.001	2	2.30	(1.45, 3.64)	<0.001
									>2	2.08	(1.35, 3.22)	0.001
Child and Family Variables												
Child sex (ref: male)												
Female		1.05	(0.83, 1.32)	0.693		1.04	(0.83, 1.32)	0.717		1.04	(0.82, 1.30)	0.757
Child age (ref: < 36 months)												
36 months		1.17	(0.87, 1.56)	0.301		1.16	(0.83, 1.61)	0.379		1.16	(0.87, 1.56)	0.310
Maternal age (ref: <20 years)												
20 – 30 years		0.73	(0.54, 1.00)	0.050		0.71	(0.52, 0.97)	0.034		0.72	(0.53, 0.98)	0.036
> 30 years		0.81	(0.53, 1.23)	0.320		0.80	(0.52, 1.21)	0.285		0.79	(0.51, 1.21)	0.279
Maternal education (ref: > 10 years)												
8 – 10 years		0.67	(0.46, 0.95)	0.026		0.67	(0.47, 0.95)	0.026		0.66	(0.46, 0.94)	0.021
< 8 years		0.56	(0.34, 0.91)	0.020		0.55	(0.33, 0.92)	0.022		0.55	(0.33, 0.92)	0.023
Family composition (ref: nuclear)												
Non-nuclear		1.25	(0.81, 1.95)	0.313		1.24	(0.81, 1.91)	0.314		1.24	(0.81, 1.90)	0.330
People in household (ref: < 3)												
3 – 5		1.00	(0.72, 1.39)	0.997		1.00	(0.71, 1.41)	0.983		1.00	(0.71, 1.40)	0.983
> 5		0.99	(0.63, 1.56)	0.978		0.97	(0.61, 1.52)	0.883		0.96	(0.61, 1.51)	0.870
Social Class (ref: B)												
C		0.77	(0.52, 1.14)	0.196		0.79	(0.54, 1.15)	0.221		0.79	(0.54, 1.16)	0.238
D (lowest)		0.61	(0.36, 1.04)	0.068		0.67	(0.40, 1.12)	0.129		0.68	(0.41, 1.12)	0.132
Trial assignment (ref: control)												
intervention		1.48	(0.99, 2.23)	0.058		1.57	(1.03, 2.38)	0.035		1.65	(1.09, 2.51)	0.019
Child Dental Status												
dmft (ref: 0)												

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	Type of health center			Oral health teams			Number of dentists		
	RR	95% CI	p-value	RR	95% CI	p-value	RR	95% CI	p-value
1 – 4	0.96	(0.58, 1.58)	0.863	0.97	(0.59, 1.60)	0.902	0.96	(0.57, 1.62)	0.885
> 4	1.16	(0.80, 1.70)	0.426	1.23	(0.84, 1.78)	0.287	1.23	(0.85, 1.78)	0.271
Dental trauma (ref: none)									
any	1.06	(0.82, 1.39)	0.646	1.10	(0.84, 1.43)	0.496	1.09	(0.82, 1.44)	0.552
ECOHIS score (ref: 0)									
1 – 2	1.38	(1.05, 1.82)	0.020	1.44	(1.09, 1.91)	0.011	1.44	(1.08, 1.92)	0.014
> 2	1.75	(1.33, 2.31)	<0.001	1.77	(1.33, 2.34)	<0.001	1.78	(1.33, 2.39)	<0.001

Abbreviations: CI = confidence interval; dmft = decayed (cavitated) missing filled primary tooth index; ECOHIS = Brazilian early childhood oral health impact scale; ref = reference category; RR = relative risk