

**Oral health status in infants and toddlers enrolled in Early Head Start in Seattle and
factors related to their oral health**

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Abstract

Oral health status in infants and toddlers enrolled in Early Head Start in Seattle and factors related to their oral health

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Purpose: To assess dental caries by the level (prevalence) and the degree (mean dmfs) of the disease, as well as to investigate which factors regarding parents' behaviors related to oral health, oral hygiene and diet may be associated with dental caries among low-income urban preschoolers in Seattle.

Methods: Children (n=155) aged 6 to 36 months and their parents from State assistance programs for low-income families participated in this cross-sectional study in Seattle, USA. The presence of dental caries was measured by one examiner using the World Health Organization diagnostic criteria. Information on knowledge, attitudes and behaviors towards oral health, oral diet and oral hygiene included breast/bottle feeding, frequency of sweet and sugary drink intake, frequency of between-meals sweet intake, frequency of bedtime food intake. Other variables also evaluated were demographics, such as children's age, gender and race/ethnicity; parents' age,

education and marital status; number of children per household, history of dental examination, and history of dental pain. Caries prevalence and mean dmfs were calculated. Associations among predictors and oral health status (dental caries Y/N) were estimated using unadjusted and adjusted logistic regression. Differences in dmfs distribution and predictors were evaluated using multiple linear regression. All regression models took clustering within sites into account.

Results: The prevalence of dental caries was 20.65% and the mean dmfs was 1.22(SD: 4.95). After adjusting for age ($p < 0.001$), number of teeth, and sites of origin, we found that the use of exclusive bottle feeding (OR: 0.12, 95% CI: 0.02, 0.59) was associated with a reduced likelihood of having dental caries compared to exclusive breastfeeding. The mean dmfs were found to be higher among children with frequent consumption of sugary drinks (mean difference: 1.68, 95% CI: -2.90, 6.27), frequent food intake in bed (mean difference: 2.40, 95% CI: -5.15, 9.95), and frequent sugary food consumption between meals (mean difference: 0.79, 95% CI: -4.98, 6.57) when compared to children reported not having these habits.

Conclusions: During the first years of life, the type of milk feeding may play a role in the development of dental caries. In young children, diet can impact the extent of dental caries measured by the mean dmfs.

INTRODUCTION

Dental caries is the consequence of unbalanced metabolic activities of oral bacteria in microbial communities, referred as dental biofilms or dental plaque (1). Constant exposure to low pH in plaque following either recurrent sugar consumption, or reduced sugar clearance due to low salivary secretion, will favor the growth of oral cariogenic bacteria and thereby the production of acids in quantity enough to create caries lesions in the tooth (2). Features of oral cariogenic microflora include 1) an efficient internal and external transportation systems of sugars within the dental plaque allowing the access to these nutrients even when its concentration is limited, 2) the ability to produce and transform sugars to acid and to maintain its environment under low pH, 3) the production of extracellular and intracellular polysaccharides that is used to build up a biofilm matrix concentrating acids within different areas in the dental plaque and , 4) in the presence of carbohydrate deprived periods, the potential of consuming these polysaccharides generating acids and maintaining a low pH oral environment (3).

High sucrose content food and beverages in high frequency are associated with dental caries (4). Among infants and toddlers, prolonged breast and bottle feeding has been associated with dental caries (5) (6) (7) (8). This association increases when additional sweet beverages are available in feeding bottles at bedtime or during the night (9) (10) (11) (12). Among older children, high intake of carbonated soft drinks, as well as candy and sweet snacking consumed on regular basis, increases the prevalence of dental caries (13) (14) (15).

Social factors are found to impact the risk of having dental caries. Children from low-income and ethnic minorities are found to have a higher prevalence of dental caries (16) (17). Project Head Start is the largest preschool program in the United States, serving primarily children from low-income families and children with disabilities (18). Children enrolled in Head Start traditionally

have been 3 to 5 years of age but in 1994 the Head Start Reauthorization established “Early Head Start”, targeting low-income pregnant women and families with infants and toddlers. At the Smile Survey 2005 –a state level survey conducted by the Washington Department of Oral Health-, children enrolled at Head Start and Early Head Start (EHS) showed a prevalence of dental caries of 45.1% and 20.8% had untreated decay (19).

The aims of this study were to assess dental caries by the level (prevalence) and the degree (mean dmfs) of this disease as well as to investigate which factors regarding parents’ attitudes and behaviors related to oral health, oral hygiene and diet may be associated with dental caries among low income infants and toddlers in Seattle.

METHODS

This is a cross-sectional study of the oral health status of infants and toddlers attending EHS in Seattle and their parents/caregivers’ behaviors towards oral health, oral hygiene and diet. This project was approved by the University of Washington Human Subjects Board and funded by the University of Washington Faculty Grant (number 75-5825). Data were collected from July 2009 to June 2010. To be eligible to participate in this study, children had to attend EHS at the time of the investigation, have at least one tooth erupted, and their parents needed to speak either English or Spanish. One hundred and fifty-five children aged 36 months or younger and their parents/caregivers participated in our study. This number represented 62.5% of the total number of EHS children enrolled during the time of our study in Seattle. All parents signed an informed consent form for the study in either English or Spanish.

Questionnaire

Parents/caregivers of the enrolled children were asked to complete a questionnaire on demographics and oral health-related behaviors. The questionnaire is a simplified version of the one developed by the World Health Organization and 44 consortium members from 18 countries and funded by the National Institute of Dental and Craniofacial Research in 2006 (20). The questionnaire seeks to investigate how parental attitudes may impact their children's behaviors with respect to twice-daily toothbrushing and sugar snacking and includes questions regarding dental pain and dental attendance. The survey was translated into Spanish and reverse translated by a bilingual person to guarantee the accuracy of the original document. Information regarding the construction, reliability and validity of this survey has been published earlier (20).

Clinical procedures

All children were examined for the presence of dental caries using the World Health Organization diagnostic criteria (21). Presence of incipient but not cavitated caries lesions (white spots), dental sealants and urgent need for dental care was also recorded (22). One examiner performed all oral examinations using a headlight and disposable mirrors. No dental explorers or x-rays were used. Before recording dental caries, teeth were dried with gauze to clean plaque from the teeth. Each tooth's surface was classified as decayed (d), filled (f) or missing (m) due to caries (dmfs). After the examination, children received a report card indicating whether there was a need for dental treatment and providing contact information for referrals. For children whose parents could not come to the site on the examination date but were interested in participating in the study, at-home dental screening was provided with the coordination of EHS staff by the same provider.

Data analysis

Descriptive statistics were calculated to describe the participants according to demographics, parents' behaviors related to oral health, oral hygiene and diet variables. Outcomes of interest were dental caries (Y/N) and the mean dmfs (cavitated lesions), as well as dental caries and the mean dmfs when including the presence of white spots. Collinearity between frequency of sugary drinks, frequency of food intake in bed, and frequency of sugary food between meals was evaluated using the variance inflation factor (VIF). Bivariate associations between the predictors of interest (parents' behavior related to oral health, oral hygiene and diet variables) and dental caries (Y/N) were assessed by age-adjusted logistic regression with robust variance estimates.

In order to assess the impact of the predictors of interest on the *presence of dental caries (Y/N)*, multivariate associations were assessed using logistic regression after adjusting for age, number of teeth, and site of origin (Odds Ratio). To estimate the impact of the predictors of interest on the *degree of dental caries (mean dmfs)*, multivariate associations were assessed using multiple linear regression after adjusting for age, number of teeth, and site of origin. Statistical analysis was performed using STATA 10.0 software (Stata Corp, College Station, Tx.).

RESULTS

Study participants

Our study population consisted of 155 mother-child dyads. Missing data varied from 0 to 3.2%, depending on the variable. Children's mean age was 24.2 months (SD: 10.4) with the majority of the children being 24-36 months of age (52.2%). Girls accounted for 51.6% , and the two largest race/ethnic groups were Hispanic/Latino (43.2%) and Black/African (20.6%). Most parents were 20-30 years old (52.3%) and were married (52.3%). More than half of the mothers had high

school as the highest achieved education level (51.1%), and the average number of children per household was 2-3 (54.8%). Detailed information is summarized in Table 1.

Caries status

Dental caries was present in 20.7% (32) of the children, with a mean dmfs of 1.22 (SD: 4.95). When white spots were included, the prevalence of caries increased to 26.4% with a mean dmfs of 1.39 (SD: 4.99). Caries prevalence and mean dmfs increased as age increased ($p < 0.001$); 8% of children aged 12-24 months had caries with a mean dmfs of 0.2 (SD: 0.8), while 34.6% of children aged 24-36 months had caries with a dmfs of 2.2 (SD: 6.7). Girls had a slightly higher prevalence than boys (21.3% vs. 19.2%) ($p = 0.694$). Race/ethnicity, maternal age and educational levels were not appreciably associated with the prevalence of dental caries.

Prevalence of dental caries increased as the number of children per family increased. About 4 percent of children belonging to a one-child family had caries while 29% of the children belonging to families with 4 or more kids were found to have decay ($p = 0.188$).

There was little association between the presence of dental caries and receipt of previous oral health advice from a family member or health professional ($p = 0.632$). Detailed information can be seen in Table 1.

Dental exam and pain-related variables

One hundred and one (65.2%) children had a dental exam prior to our study (Table 2). Of those, 26.7% were found to have caries. Of the 54 children without dental exam, 9.3% were found to have caries ($p = 0.418$ for the age-adjusted difference). Mean dmfs varied from 1.4 (SD: 5.1) for

the children with a previous dental exam to 0.9 (SD: 0.8) for those without a previous dental exam.

History of dental pain was evaluated in two ways, by presence (yes/no) and frequency of these dental pain episodes. Among children who experienced dental pain, 50% were found to have caries with a mean dmfs of 8.0 (SD: 2.5). Caries prevalence increased as the number of dental pain episodes increased. For children with no episodes of dental pain, the prevalence of caries was 18.2%, for 1-2 episodes it increased to 37.5% and for children with 3 or more episodes it was 75%. Mean dmfs also increased from 0.7 (SD: 2.0), 1.4 (SD: 2.2) to 21.3 (SD: 4.9). After adjusting for age, the p values relating the presence of pain and the frequency of dental pain episodes and caries were 0.086 and 0.151, respectively.

Parents' behaviors related to oral health, oral hygiene and diet

Feeding during the first years of age was recorded based on the type of milk consumption: breastfeeding only, bottle only, and breastfeeding and bottle.

Children who were only breastfed had the highest prevalence of dental caries (29.3%) and also the highest mean dmfs (2.6, SD: 8.8). Children who breastfed and used bottle feeding had a slight lower different dental caries prevalence (22.8%) than breastfed children while children who only used bottle feeding had the lowest prevalence (6.3%) (p=0.011 for the age-adjusted difference). Differences in the distribution of the dmfs were also noticeable between the groups where children who only breastfed had the highest dmfs (2.6 (SD: 8.8)) whereas children who only used bottle feeding had the lowest (0.9 (SD: 3.5)).

Age-adjusted associations of food intake and caries were evaluated by the frequency of sugary drinks, frequency of food consumption in bed, and frequency of sugary foods between meals.

There were no correlations among these variables (VIF: 1.23, 1.25, and 1.10 respectively).

Thirty percent of children who consumed sugary drinks every day or most of the days had caries with a mean dmfs of 1.8 (SD: 5.4) ($p=0.295$). Twenty-three percent of children whose parents reported having food in bed every day or most days had caries with a dmfs of 0.7 (SD: 1.6) ($p=0.678$). Eighteen percent of children reported having sugary foods between meals every day or most days had dental with a dmfs of 1.8 (SD: 7.9) ($p=0.582$).

Oral hygiene habits were evaluated by the frequency and by the type of person performing the child's toothbrushing. Children of families where the toothbrushing was performed by the child alone had the highest prevalence of dental caries (25%) with a dmfs of 1.1 (SD: 2.1) ($p=0.101$ for age-adjusted difference). Thirty percent of children who occasionally/never brushed their teeth had dental caries and a mean dmfs of 3.6 (SD: 9.3) ($p=0.207$ for age-adjusted difference).

Regression analysis

Adjusted odds ratios (OR) estimates for dental caries from logistic regression and adjusted differences in the mean dmfs from Linear regression are presented for parents' behaviors towards oral health, diet and oral hygiene (Table 4). The model was adjusted for age, number of teeth present in mouth by the time of the examination, and daycare site of origin. Children fed only by bottle had a lower probability of having dental caries (OR= 0.12, 95% CI: 0.02-0.59). The combination of bottle and breast feeding also was associated with a reduced likelihood of dental caries (OR= 0.48, 95% CI: 0.05-5.00), though to a lesser extent. The mean dmfs in children who exclusively breastfed was 3.03; children who only used bottle feeding had a dmfs of 1.08 (difference adjusted for other variables = -2.36, 95% CI -8.67 to 3.94) whereas children

who combined bottle and breast feeding had a dmfs of 0.61 (difference adjusted for other variables = -2.84, 95% CI -9.47 to 3.80).

In this study population, the prevalence of dental caries was not significantly associated with diet-related variables. Though there was a tendency for dmfs to be higher in children who consumed sweet beverages, ate in bed, and regularly ate sugary foods between meals, the data were statistically compatible with there being no true association (Table 4).

DISCUSSION

The prevalence of dental caries among children 3 years old or younger enrolled at EHS in Seattle was found to be 20.7% and it increased as age increased. While children 1 year old or younger did not have caries, 34% of children age 2-3 years was found to have this condition. National data on similar age group shows a prevalence of 28% among children 2 to 5 years old (23) reports from Smile Survey 2010 (19) show that 40% of preschoolers in the state of Washington have dental caries. The difference between our study population and regional/national data may be influenced by our smaller sample size, the relatively different age range and the different socio economic backgrounds. Yet, the dramatic rise in the presence (prevalence) and the degree (mean dmfs) of dental pathology as the child grows is a common finding. As the child develops, more teeth in the mouth are present and therefore exposed to an aggressive environment for longer time when cariogenic oral microflora are allowed to grow and mature, increasing the risk of dental caries (24) (25) (26). The substantial rise in the level of disease at such a young age and in a relatively short period of time supports the need for preventive and therapeutic interventions among infants and toddlers.

Exclusive breastfeeding, especially prolonged breastfeeding, has been found to be associated with dental caries (27) (28) (7). In our study we found that exclusive bottle feeding was associated with a reduced risk of dental caries, and that the mean dmfs significantly decreased when compared with exclusive breastfeeding. These associations were present in both of our regression analyses -- the age-adjusted bivariate and the multivariate one (table 4).

In our adjusted regression model, the combination of bottle and breastfeeding was also found to be associated with a reduced risk relative to exclusive breastfeeding, though not as strongly as exclusive bottle feeding. Similarly to our findings on dental caries and feeding habits, the mean dmfs were relatively lower among children with exclusive bottle feeding or mixed feeding (Table 4). The frequency and access of milk intake may play a key role in the difference of the prevalence and the degree of dental caries between breastfeeding and bottle feeding.

Breastfeeding can be achieved at any time anywhere while bottle feeding may be associated with a more planned scheduled and limited to the availability of formula.

Our data collection did not include feeding schedule. Time of the milk feeding, specifically nocturnal feeding, has been suggested to play an important role in the development of dental caries (29) (30). Since milk is left in the mouth while the infant is sleeping, the buffer effect of the saliva and the swallowing reflex are minimized, allowing cariogenic bacteria to nurture and grow.

Sugary drinks consumption has been associated with dental caries (4). Lee & Messer investigated the intake of sweet drinks and sweet treats of primary school children and their caries risk. They observed caries experienced in the last 12 months to be associated with evening sweet drinks while caries observed in the past 24 months to be associated with intake sweet

beverages and treats (31). Our study did not find a significant association with frequency of sweet drinks, frequency of evening food or frequency of sugary food between meals and the presence of dental caries per se. However, our sample size was small, leading to a diminished ability to identify an association that was small or moderate in magnitude. Also, each diet-related variable was categorized as “everyday/most of the days,” “sometimes” and “never.” Parents’ awareness of the possible negative impact of sugary food and beverages on a child’s health may have influenced the response to this section, in which the majority of mothers’ responses were in the middle (“sometimes” category). However, we did observe differences in the distribution of the mean dmfs of at least one category within each diet variable (Table 4), suggesting that a diet rich in sucrose may impact the children who already have dental caries more severely by increasing the extent of this disease.

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Table 1: Study population demographics and dental caries distribution according to mother-child dyads' characteristics

	N (%)	Caries including white spots N (%)	Caries N (%)	dmfs including white spots Mean (SD)	dmfs Mean (SD)	p-value *
Total	155 (100)	41 (26.45)	32 (20.65)	1.39 (4.99)	1.22 (4.95)	
Age						<0.001
- ≤12mos	24 (15.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
- >12 - ≤24mos	50 (32.3)	6 (12.0)	4 (8.0)	0.3 (1.1)	0.2 (0.8)	
- >24 - ≤36mos	81 (52.2)	35 (43.2)	28 (34.6)	2.5 (6.7)	2.2 (6.7)	
Gender						0.694
- Male	73 (47.1)	18 (24.7)	14 (19.2)	1.0 (2.7)	0.8 (2.5)	
- Female	80 (51.6)	22 (27.5)	17 (21.3)	1.7 (6.5)	1.6 (6.4)	
- Missing	2 (1.3)	1 (50.0)	1 (50.0)	1 (1.4)	1 (1.4)	
Child Race/Ethnicity						0.769
- Hispanic/Latino	67 (43.2)	19 (28.4)	17 (25.4)	1.1 (2.4)	1.0 (2.2)	
- White	18 (11.6)	7 (38.9)	3 (16.7)	2.8 (8.0)	2.4 (8.0)	
- Black/African	32 (20.6)	5 (15.6)	3 (9.4)	0.5 (1.2)	0.3(0.9)	
- Asian	22 (14.2)	7 (31.8)	6 (27.3)	3.1 (10.2)	3.1 (10.2)	
- Multiracial	15 (9.7)	3 (20.0)	3 (20.0)	0.5 (1.4)	0.3 (0.6)	
- Missing	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Mothers' age						0.835
- ≤ 20 years	13 (8.4)	2 (15.4)	2 (15.4)	0.7 (2.0)	0.7 (2.0)	
- >20 - ≤30 years	81 (52.3)	20 (24.7)	16 (19.8)	0.9 (2.4)	0.8 (2.2)	
- >30 years	58 (37.4)	18 (31.0)	13(22.4)	2.3 (7.6)	2.0 (7.6)	
- Missing	3 (1.9)	1 (33.3)	1 (33.3)	0.7 (1.2)	0.7 (1.2)	
Mothers' education						0.520
- Primary school	34 (21.9)	10 (29.4)	9 (26.5)	0.9 (2.3)	0.8 (2.2)	
- High school	79 (51.0)	21 (26.6)	15 (19)	1.4 (5.4)	1.1 (5.3)	
- College	39 (25.2)	9 (23.1)	7 (17.9)	1.9 (6.1)	1.8 (6.0)	
- Missing	3 (1.9)	1 (33.3)	1 (33.3)	0.7 (1.2)	0.7 (1.2)	
Parents' marital status						0.679
- Married	81 (52.3)	20 (24.7)	17 (21.0)	1.4 (5.5)	1.3 (5.5)	
- Single	58 (37.4)	13 (22.4)	10 (17.2)	1.5 (4.9)	1.2 (4.8)	
- Widow/divorce	14 (9.0)	7 (50.0)	4 (28.6)	1.3 (2.2)	0.9 (0.8)	
- Missing	2 (1.3)	1 (50.0)	1 (50.0)	1 (1.4)	1 (1.4)	
Number of children per family						0.188
- 1 child	26 (18.7)	2 (7.7)	1 (3.8)	0.7 (3.1)	0.6 (3.1)	
- 2-3 children	85 (54.8)	23 (27.1)	18 (21.2)	1.8 (6.4)	1.6 (6.3)	
- ≥ 4 children	38 (24.5)	13 (34.2)	11 (28.9)	1.0 (1.7)	0.9 (1.7)	
- Missing	6 (3.9)	3 (50.0)	2 (33.3)	0.7 (0.8)	0.5 (0.8)	
Ever received oral health advice from family/health professional						0.632
- Yes	120 (77.4)	36 (30)	27 (22.5)	1.65 (0.5)	1.4 (0.5)	
- No	30 (19.4)	5 (16.7)	5 (16.7)	0.6 (0.3)	0.5 (0.2)	
- Missing	5 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	

*P-values from age-adjusted logistic regression between each variable and dental caries using robust standard errors

Table 2: Children with dental caries and decayed, filled and missed surfaces (dmfs) by history of pain variables

	N (%)	Caries N (%)	Mean dmfs (SD)	p-value*
Total	155 (100)	32 (20.65)	1.22 (4.95)	
Dental exam				0.418
- Yes	101 (65.2)	27 (26.7)	1.4 (5.1)	
- No	54 (34.8)	5 (9.3)	0.9 (0.8)	
Pain				0.151
- Yes	12 (7.4)	6 (50.0)	8.0 (2.5)	
- No	143 (92.3)	26 (18.2)	0.7 (2.0)	
Frequency of pain experienced				0.086
- None	143 (92.3)	26 (18.2)	0.7 (2.0)	
- 1-2 times	8 (5.1)	3 (37.5)	1.4 (2.2)	
- ≥ 3 times	4 (2.6)	3 (75.0)	21.3(4.9)	

*P-values from age-adjusted logistic regression between each variable and dental caries using robust standard errors

Table 3: Parents' behaviors related to oral health, oral hygiene and diet and dental caries

Exposure Measure	N (%)	Caries N (%)	dmfs Mean (SD)	p-value *
Total	155 (100)	32 (20.65)	1.22 (4.95)	
Type of feeding				0.011
- Breastfeeding	41 (26.5)	12 (29.3)	2.6 (8.8)	
- Breastfeeding & bottle	79 (51.0)	18 (22.8)	0.7 (1.6)	
- Bottle	32 (20.6)	2 (6.3)	0.9 (3.5)	
- Missing	3 (1.9)	0 (0.0)	0 (0.0)	
Frequency sugary drinks				0.292
- Everyday/most days	50 (32.3)	15 (30.0)	1.8 (5.4)	
- Sometimes	63 (40.6)	11 (17.5)	1.4 (6.0)	
- Never	37 (23.9)	6 (31.0)	0.3 (0.8)	
- Missing	5 (3.2)	0 (0.0)	0 (0.0)	
Frequency of food intake in bed				0.678
- Everyday/most days	22 (14.2)	5 (22.7)	0.7 (1.6)	
- Sometimes	123 (79.4)	24 (18.2))	1.3 (5.5)	
- Never	5 (3.2)	2 (40.0)	0.4 (0.5)	
- Missing	5 (3.2)	1 (20.0)	1.4 (3.1)	
Frequency sugary food between meals				0.582
- Everyday/most days	34 (21.9)	6 (17.6)	1.8 (7.9)	
- Sometimes	102 (65.8)	25 (24.5)	1.2 (4.0)	
- Never	15 (9.7)	1 (6.7)	0.2 (0.8)	
- Missing	4 (2.6)	0 (0.0)	0 (0.0)	
Who brushes child's teeth				0.101
- Child	8 (5.2)	2 (25.0)	1.1 (2.1)	
- Parent	58 (37.4)	12 (20.7)	0.7 (2.0)	
- Child & parent	89 (57.4)	18 (20.2)	1.6 (6.3)	
Toothbrushing frequency				0.207
- Twice/once a day	140 (90.3)	28 (20.0)	1.0 (4.4)	
- Occasionally/Never	13 (8.4)	4 (30.8)	3.6 (9.3)	
- Missing	2 (1.3)	0 (0.0)	0 (0.0)	

*P-values from age-adjusted logistic regression between each variable and dental caries using robust standard errors

Table 4: Regression analysis of parents' behaviors related to oral health, oral hygiene and diet and dental caries

EXPOSURE MEASURE	Risk of having dental caries Adjusted Model Results* Odds Ratio (95% CIs)	Differences in mean dmfs Adjusted Model Results** Mean difference (95% CIs)
Type of feeding		
- Breastfeeding	Ref	Ref
- Bottle	<u>0.12 (0.02, 0.59)</u>	-2.36 (-8.67, 3.94)
- Breastfeeding & bottle	0.48 (0.05, 5.00)	-2.84 (-9.47, 3.80)
Frequency sugary drinks		
- Never	Ref	Ref
- Sometimes	1.00 (0.36, 2.79)	0.91 (-1.10, 2.92)
- Everyday/most days	3.19 (0.62, 16.40)	1.68 (-2.90, 6.27)
Frequency of food intake in bed		
- Never	Ref	Ref
- Sometimes	0.08 (0.00, 1.33)	0.89 (-4.97, 6.75)
- Everyday/most days	0.16 (0.00, 5.80)	2.40 (-5.15, 9.95)
Frequency sugary food between meals		
- Never	Ref	Ref
- Sometimes	3.61 (0.64, 20.49)	0.79 (-4.98, 6.57)
- Everyday/most days	1.71 (0.20, 14.97)	-0.49 (-2.63, 1.64)
Who brushes child's teeth		
- Parent	Ref	Ref
- Child & parent	0.67 (0.35, 1.29)	0.71 (-1.77, 3.19)
- Child	1.99 (0.61, 6.55)	1.17 (-2.85, 3.20)
Toothbrushing frequency		
- Twice/once a day	Ref	Ref
- Occasionally/Never	2.28 (0.43, 11.98)	2.53 (-5.82, 10.87)

*Logistic regression model adjusted by age, number of teeth and site of origin

**Multivariate Linear regression model adjusted by age, number of teeth and site of origin