Factors Associated With Dental Care Utilization in Early Childhood

WHAT'S KNOWN ON THIS SUBJECT: Early preventive dental care is cost-effective and can reduce subsequent restorative or emergency visits. Little is known about the factors distinguishing families who receive dental care in early childhood and those who do not.

WHAT THIS STUDY ADDS: Our results suggest that among healthy children seen by primary care providers, those most in need of dental care are least likely to receive it. This highlights the importance of promoting early preventive dental care in the primary care setting.

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KEY WORDS

dental care, oral health, children, prevention, dental caries

ABBREVIATIONS

AAP—American Academy of Pediatrics
CI—95% confidence interval
ECC—early childhood caries
OR—odds ratio

abstract

OBJECTIVES: To identify sociodemographic, dietary, and biological factors associated with families who do not receive dental care in early childhood and to identify risk factors associated with having cavities among children who receive early dental care.

METHODS: A cross-sectional study of healthy Canadian children seen for primary health care between September 2011 and January 2013 was conducted through the TARGet Kids! practice-based research network in Toronto, Canada. Adjusted logistic regression was used to determine factors associated with children who were not seen by a dentist in early childhood and to determine risk factors associated with having dental cavities among children who received early dental care.

RESULTS: Of the 2505 children included in the analysis, <1% were seen by a dentist by 1 year of age. Older children were less likely to have never been to the dentist (odds ratio [OR], 0.88; 95% confidence interval [CI], 0.87–0.90). Low family income (OR, 2.73; 95% CI, 1.47–5.06), prolonged bottle use (OR, 1.43; 95% CI, 1.03–2.00), and higher intakes of sweetened drinks (OR, 1.20; 95% CI, 1.01–1.42) were associated with increased risk for never having been to the dentist. Among those who had been to the dentist, older children (OR, 1.04; 95% CI, 1.03–1.05), children of low income families (OR, 1.90; 95% CI, 1.17–3.10), and those of East Asian maternal ethnicity (OR, 1.91; 95% CI, 1.10–3.29) were more likely to have dental cavities.

CONCLUSIONS: Among healthy urban children seen by a primary care provider, those most susceptible to cavities were least likely to receive early dental care. These findings support the need for publicly funded universal early preventive dental care and underscore the importance for primary care physicians to promote dental care in early childhood.
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(Continued on last page)

Dental health is an integral component of overall health and affects both physical and psychosocial aspects of child well-being.[1,2] Dental caries can result in various detrimental effects on children, including pain, failure to thrive, poor nutritional status, and behavioral problems.[2–6]

Early preventive dental care has been demonstrated to prevent dental disease when administered within the first year of life.[7] Evidence also indicates that children who receive early preventive dental care are less likely to require subsequent restorative or emergency treatment[7] and have lower dental-related health care costs, particularly among high-risk populations.[8]

The American Academy of Pediatrics (AAP), the American Academy of Pediatric Dentistry, and the American Dental Association all recommend a routine oral health assessment by a qualified health care professional by 6 months of age with a "dental home" established by the first birthday.[9,10] Little is known about the factors that distinguish families who receive dental care in early childhood from those who do not. This information would assist primary health care providers in targeting preventive care recommendations to families most at risk for not following these recommendations.

Given the importance of early preventive dental care, the primary objective of this study was to identify demographic, social, dietary, and biological factors associated with families who do not seek dental care in early childhood in a population of healthy urban North American children seen for routine primary health care. Our secondary objective was to determine risk factors associated with having cavities in the primary dentition among children who received early dental care.

METHODS

Study Design

This was a cross-sectional study involving healthy urban children receiving primary health care at a TARGet Kids! participating family medicine or pediatrician's office between September 2011 and January 2013.

Study Population

TARGet Kids! is a collaboration between University of Toronto child health outcomes researchers and primary care physicians from the Department of Pediatrics and the Department of Family and Community Medicine to collect longitudinal data on common health problems affecting urban Canadian children. Children 0 through 5 years of age were recruited by trained research personnel embedded in 7 participating pediatric and family medicine practices. Sociodemographic, nutritional, lifestyle, and dental care use information was collected during a scheduled primary health care physician visit through a standardized parent-completed survey instrument based on the Canadian Community Health Survey.[11]

Children who had health conditions affecting growth (eg, cystic fibrosis), those who had chronic condition(s) (except for asthma), those who had severe developmental delay, and children whose families were not able to complete questionnaires in English were excluded from the study.

Outcome and Predictor Variables

The primary outcome variable was never having been to a dentist. This was determined through parental response to the following question: "When was the last time your child was seen by a dental professional?" A response of "my child has never seen a dentist" was classified as never having been to a dentist.

Our secondary outcome variable was having 1 or more teeth affected by cavities, among those children who had been to the dentist. This was determined through parental response to the following question: "How many dental cavities has your child had?" We chose to include dental cavities only among children who had been to the dentist, because parents of children who had not been to the dentist may not know that their child had a cavity.

Covariates chosen as potential predictors of dental care-seeking behavior and oral health were identified through a review of the literature and included age (in months), gender, maternal ethnicity (categorized into European, East Asian, South and Southeast Asian, and Other, which included Arab, African, Latin American, mixed ethnicity, North American aboriginal, and Oceania), self-reported before-tax family income, mother's employment status, father's employment status, prolonged bottle use (defined as using a bottle during the day or night beyond 15 months of age[12]), daily number of servings of snacks (defined as sweets, candy, chips, or fried snacks), daily milk volume (defined as daily number of 250-mL cups of cow's milk, soy milk, or other milk) and daily volume of sweetened drinks (defined as daily number of 250-mL cups of 100% juice, soda, pop, or other sweetened beverages). The total daily consumption of milk was dichotomized into <2 cups and ≥ 2 cups per day, consistent with recommendations from the AAP[13] and Canada's Food Guide.[14]

Statistical Analysis

Descriptive statistics were generated for the main outcome and covariates. For our primary analysis, a multivariable logistic regression model was developed to examine the relationship between never having been to a dentist and clinically relevant socioeconomic, cultural, dietary, and biological variables specified above. All potential predictor variables were included in the final model regardless of their associated *P* values to avoid potential bias of the R-squared and standard errors.[15]

For our secondary analysis, we repeated the primary analysis using multivariable logistic regression to explore risk factors

associated with 1 or more dental cavities among children who had visited a dentist.

All statistical tests were 2-tailed and significance was considered at the 0.05 level. Statistical analyses were performed by using SAS 9.3 (SAS Institute, Inc, Cary, NC) for Windows (Microsoft Corporation, USA).

Research ethics approval was granted through the Research Ethics Board of the Hospital for Sick Children and of St Michael's Hospital. All parents of participating children consented to participation in the study.

RESULTS

Population

Of the 2771 children who participated in TARGet Kids! between September 2011 and January 2013, 2505 (90%) had information on dental visits and were included in the analysis (Fig 1). The mean age was 48.8 ± 26.2 months and 1309 (52%) children were male. A total of 949 (38%) children had not been to a dentist. Only 1.9% reported seeing a dentist by 2 years of age and <1% by the recommended age of 1 year of age (Fig 2). Of those children who had been to the dentist, 374 (24%) were reported to have had at least 1 dental cavity. Population characteristics are presented in Table 1.

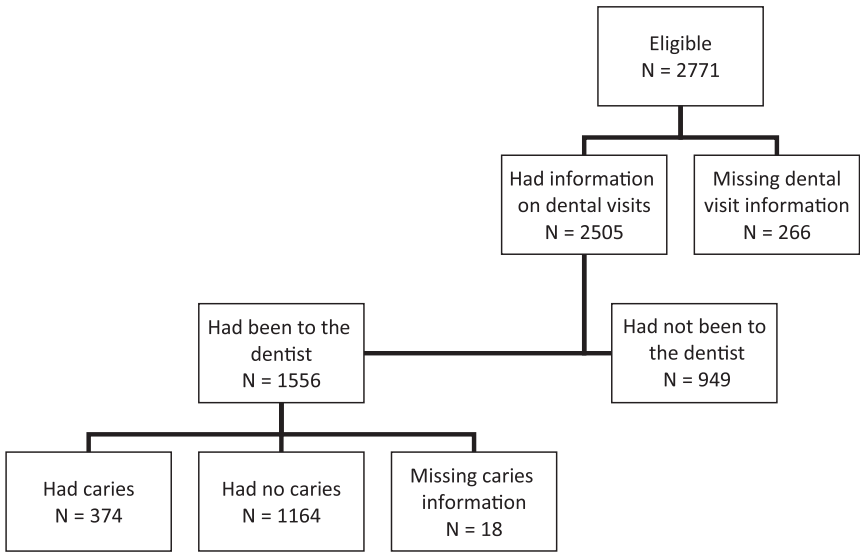

FIGURE 1
Patient flowchart.

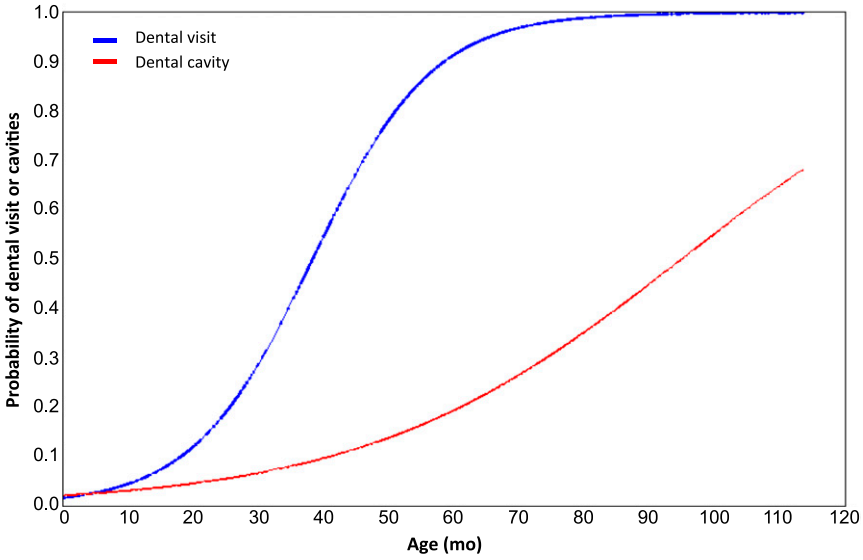

FIGURE 2
Probability of dental visit or cavities by age. The blue line represents the probability of having at least 1 dental visit as a function of age. The red line represents the probability of having at least 1 dental cavity as a function of age.

Factors Associated With Dental Care

For our primary analysis, multivariable logistic regression identified that the likelihood of never having been to a dentist was associated with younger age, lower self-reported family income, prolonged bottle use, and higher total daily intake of sweetened drinks (Table 2). With every 1-month increase in age, the odds of never having visited the dentist decreased by 12% (OR, 0.88; 95% CI, 0.87–0.90). The relationship between age and the probability of visiting the dentist appeared to be nonlinear (Fig 2). Children of the lowest self-reported income families had the highest odds of never having been to the dentist (OR, 2.73; 95% CI, 1.47–5.06 for income group $0–$59 999 compared with the highest self-reported family income level). Prolonged bottle use was associated with increased odds of never having been to the dentist (OR, 1.43; 95% CI, 1.03–2.00). With each cup increase in the amount of sweetened drinks consumed daily, the odds of never having been to the dentist increased by 20% (OR, 1.20; 95% CI, 1.01–1.42).

Factors Associated With Dental Cavities

For our secondary analysis, results of our multivariable logistic regression model for dental cavities among children who had been to a dentist are shown in Table 3. Older age, East Asian maternal

TABLE 1 Baseline Characteristics of Study Participants

Characteristics	Total Cohort (*N* = 2505)		Has Been to the Dentist (*N* = 1556)		Has Not Been to the Dentist (*N* = 949)		*P* Value*
	N	%	*N*	%	*N*	%	
Age (mo)							
0–12	218	8.7	4	0.3	214	22.6	
12–24	300	12.0	26	1.7	274	28.9	<.0001
>24	1983	79.2	1524	97.9	459	48.4	
Mean	48.8	—	63.5	—	24.6	—	
SD	26.2	—	19.2	—	16.2	—	<.0001
Missing	4	0.2	2	0.1	2	0.2	
Gender							
Male	1309	52.3	787	50.6	522	55.0	
Female	1193	47.6	768	49.4	425	44.8	.0285
Missing	3	0.1	1	0.1	2	0.2	
Maternal ethnicity							
European	1763	70.4	1142	73.4	621	65.4	
East Asian	185	7.4	125	8.0	60	6.3	
South or Southeast Asian	185	7.4	103	6.6	82	8.6	<.0001
Other[a]	348	13.9	174	11.2	174	18.3	
Missing	24	1.0	12	0.8	12	1.3	
Self-reported income							
$0 to $59 999	284	11.3	137	8.8	147	15.5	
$60 000 to $99 999	403	16.1	245	15.8	158	16.7	
$100 000 to $149 999	524	20.9	320	20.6	204	21.5	<.0001
$150 000 or more	1140	45.5	771	49.6	369	38.9	
Missing	154	6.2	83	5.3	71	7.5	
Mother employed							
Yes	1901	75.9	1187	76.3	714	75.2	
No	471	18.8	312	20.1	159	16.8	.1257
Missing	133	5.3	57	3.7	76	8.0	
Father employed							
Yes	2203	87.9	1386	89.1	817	86.1	
No	100	4.0	64	4.1	36	3.8	.8259
Missing	202	8.1	106	6.8	96	10.1	
Prolonged bottle use							
Yes	658	26.3	344	22.1	314	33.1	
No	1834	73.2	1204	77.4	630	66.4	<.0001
Missing	13	0.5	8	0.5	5	0.5	
Milk vol (cups)							
Mean	2.0	—	1.9	—	2.1	—	
SD	1.2	—	1.1	—	1.4	—	.0039
Missing	288	11.5	167	10.7	121	12.8	
Vol of sweetened drinks (cups)							
Mean	0.8	—	0.9	—	0.6	—	
SD	1.0	—	1.0	—	1.0	—	<.0001
Missing	270	10.8	155	10.0	115	12.1	
Servings of snacks							
Mean	0.6	—	0.78	—	0.4	—	
SD	0.8	—	0.80	—	0.7	—	<.0001
Missing	114	4.6	77	5.0	37	3.9	

* *P* value for the difference between means (*t* test) or proportions (χ^2 test).

[a] Other includes Arab, African, Latin American, mixed ethnicity, North American Aboriginal, and Oceania.

ethnicity, and low self-reported family income were significantly associated with having 1 or more dental cavities (see Table 3). Every 1-month increase in age was associated with increased odds of having dental cavities (OR, 1.04; 95% CI, 1.03–1.05). Figure 2 shows the predicted probability of having dental cavities by age. East Asian maternal ethnicity was associated with higher odds of having cavities compared with European maternal ethnicity (OR, 1.90; 95% CI, 1.17–3.10). Children of the lowest self-reported family income group were shown to have the highest odds of having experienced cavities (OR, 1.91; 95% CI, 1.10–3.29 for income group $0–$59 999 compared with the highest self-reported family income level).

DISCUSSION

In this study we have identified that <2% of healthy urban children younger than 2 years of age seen for primary health care received dental care, and <1% by the recommended age of 1 year.[10,16,17] Older child age was associated with decreased odds of not having been to a dentist. Lower self-reported family income, prolonged bottle use, and higher total daily consumption of sweetened drinks were associated with increased odds of not having been to a dentist. Among children who had been to a dentist, older child age, lower self-reported family income, and East Asian maternal ethnicity were associated with increased odds of having 1 or more dental cavities.

The provision and funding of dental care in the United States and Canada is remarkably similar. Dental care is not part of Canada's universal health care system and, as in the United States, dental care is primarily provided in private practice settings on a fee-for-service basis.[18] Like their American counterparts, many Canadian children have dental insurance through their parents' employment benefits packages. Many other families pay out of pocket for dental care. Similar to Medicaid in the United States, which provides some dental benefits to poor and disadvantaged children, Canadian provinces provide limited dental benefits to poor children whose families receive Employment and Income Assistance (Social Assistance).[18,19] Also similar between the 2 countries are dental benefits for First Nations and Inuit children through the Non-Insured Health Benefits program of Health Canada, which is comparable to the Indian Health Service that American Indian and Alaska Natives receive.[20,21]

TABLE 2 Adjusted Odds Ratios for Never Having Been to the Dentist

Variables	Adjusted (N = 1657)	
	OR	95% CI
Age (mo)	0.88*	0.87–0.90
Gender		
Male	1.16	0.84–1.60
Maternal ethnicity		
European	1.00	—
East Asian	1.30	0.68–2.50
South or Southeast Asian	1.61	0.81–3.19
Other	0.99	0.60–1.66
Self-reported family income		
$0 to $59 999	2.73*	1.47–5.06
$60 000 to $99 999	1.66*	1.04–2.65
$100 000 to $149 999	1.21	0.81–1.81
$150 000 or more	1.00	—
Mother employed		
Yes	1.25	0.80–1.94
Father employed		
Yes	0.98	0.43–2.22
Prolonged bottle use		
Yes	1.43*	1.03–2.00
Milk vol (cups)		
≥2 cups/d	1.00	—
<2 cups/d	0.76	0.54–1.07
Vol of sweetened drinks (cups)	1.20*	1.01–1.42
Servings of snacks	1.10	0.88–1.38

* $P < .05$; —, indicates referent category.

There is good evidence to support that early preventive dental care is cost-effective[7,8] and can improve dental health-related quality of life, particularly among high-risk populations. Our finding that children from low-income families were less likely to visit a dentist and more likely to have dental cavities complements the existing literature.[22–24] Barriers to dental care among low-income families may include financial cost, access to transportation, school absence policies, and a belief that dental health may not be important to overall well-being.[25,26] Recently the Canadian Pediatric Society issued a position statement recommending all levels of government to hold dental care to the same standards of accessibility, universality, and comprehensiveness as other services under the Canadian Health Act.[27] Our findings support this recommendation.

We have also identified that prolonged bottle use and greater consumption of sweetened drinks are associated with increased odds of not having been seen by a dentist. Prolonged bottle use, particularly bottle use at night, is a suspected risk factor for early childhood caries (ECC).[28] The mechanism behind this is thought to involve the proliferation of cariogenic bacteria owing to increased availability of growth-promoting carbohydrates.[29] Although controversy exists with regard to the cariogenicity of various bottle contents, several studies have identified that sweetened liquids, whether in a bottle or not, are associated with an increased risk for ECC.[30–32] We did not identify an independent association between prolonged bottle use and dental cavities, possibly owing to insufficient power. Nevertheless, our findings suggest that children who are at increased risk for developing dental cavities are less likely to have visited the dentist.

TABLE 3 Adjusted Odds Ratios for ECC Among Children Who Have Been to the Dentist

Variables	Adjusted (N = 1150)	
	OR	95% CI
Age (mo)	1.04*	1.03–1.05
Gender		
Male	0.96	0.72–1.29
Maternal ethnicity		
European	1.00	
East Asian	1.90*	1.17–3.10
South or Southeast Asian	1.65	0.92–2.95
Other	1.12	0.67–1.85
Self-reported family income		
$0 to $59 999	1.91*	1.10–3.29
$60 000 to $99 999	1.43	0.95–2.14
$100 000 to $149 999	1.01	0.69–1.49
$150 000 or more	1.00	
Mother employed		
Yes	1.08	0.75–1.57
Father employed		
Yes	0.86	0.41–1.81
Prolonged bottle use		
Yes	0.68	0.43–1.07
Milk vol (cups)		
≥2 cups/d	1.00	—
<2 cups/d	1.32	0.99–1.79
Vol of sweetened drinks (cups)	1.05	0.90–1.24
Servings of snacks	1.10	0.91–1.33

* $P < .05$; —, indicates referent category.

As most North American children receive preventive primary medical care in early childhood, primary care providers are in an ideal position to promote early preventive dental care,[33] particularly among children at increased risk for not going to a dentist and those who are most likely to develop dental cavities. The recent United States Preventive Services Task Force concluded that there is insufficient evidence to recommend for or against routine screening of preschool children by primary care providers for the prevention of dental disease (Grade 1 recommendation).[34] Nevertheless, both the AAP and the American Academy of Pediatric Dentistry provide resources and assessment instruments for use by non-dental care providers.[35,36] It has been suggested that although family physicians and pediatricians hold positive attitudes toward dental care, many feel they are not sufficiently trained to conduct routine dental screening.[37–39] Similarly, many dental professionals may not be comfortable providing care for infants and toddlers or may not be aware of current recommendations for early preventive dental care.[40] Two recent American surveys reported that less than half of general dentists routinely care for infants and toddlers.[41,42] Data from Canada is similar.[43]

Increased exposure to dental health in medical education and to early childhood in dental education may be helpful. In the meantime, we suggest that primary care providers can play an important role in encouraging early preventive visits to a dental professional.

Strengths of our study include a relatively large sample size with detailed clinical data, which allowed adjustment for numerous social, demographic, biological, and nutritional variables. We also used family-level reported income as a measure of socioeconomic position. Furthermore, our primary care venue allowed for the assessment of dental care use among children who

routinely receive primary health care, which is a venue well suited to promote early preventive dental care.

Limitations of our study include the inability to distinguish between preventive and restorative dental visits. We also were unable to obtain information on dental cavities among children who had never been to the dentist because dental screening is currently not part of routine primary health care. Therefore, our secondary analysis may have had insufficient power to detect weaker associations. Furthermore, we were not able to control for the effects of dental hygiene or the effects of unmeasured components of dietary intake such as carbohydrates. Finally, we used questionnaire data, which may be subject to recall bias.

CONCLUSIONS

In this study, only a minority of children who received primary preventive health care also received early dental care, representing an opportunity for prevention. Furthermore, children who were most susceptible to developing cavities in the primary dentition, and therefore most in need of early preventive dental care, appeared least likely to receive it. Our findings support recommendations for publicly funded routine preventive dental care in early childhood. Although evidence for the role of screening by primary care providers in the prevention of dental cavities remains controversial,[34] family physicians and pediatricians are well positioned to place particular emphasis on the importance of early preventive dental care, particularly among those children who are most at risk for not receiving dental care and those who are most susceptible to dental cavities.

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REFERENCES

1. Barbosa TS, Gavião MB. Oral health-related quality of life in children: part II. Effects of clinical oral health status. A systematic review. *Int J Dent Hyg.* 2008;6(2):100–107
2. Finucane D. Rationale for restoration of carious primary teeth: a review. *J Ir Dent Assoc.* 2012;58(1):31–42
3. Clarke M, Locker D, Berall G, Pencharz P, Kenny DJ, Judd P. Malnourishment in a population of young children with severe early childhood caries. *Pediatr Dent.* 2006;28(3):254–259
4. Schroth RJ, Harrison RL, Moffatt ME. Oral health of indigenous children and the influence of early childhood caries on childhood health and well-being. *Pediatr Clin North Am.* 2009;56(6):1481–1499
5. Jackson SL, Vann WF Jr, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. *Am J Public Health.* 2011;101(10):1900–1906
6. Schroth RJ, Levi J, Kliewer E, Friel J, Moffatt ME. Association between iron status, iron deficiency anaemia, and severe early childhood caries: a case-control study. *BMC Pediatr.* 2013;13:22
7. Lee JY, Bouwens TJ, Savage MF, Vann WF Jr. Examining the cost-effectiveness of early dental visits. *Pediatr Dent.* 2006;28(2):102–105, discussion 192–198
8. Savage MF, Lee JY, Kotch JB, Vann WF Jr. Early preventive dental visits: effects on subsequent utilization and costs. *Pediatrics.* 2004;114(4). Available at: www.pediatrics.org/cgi/content/full/114/4/e418
9. Hale KJ; American Academy of Pediatrics Section on Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. *Pediatrics.* 2003;111(5 pt 1):1113–1116
10. American Academy of Pediatric Dentistry. Clinical Affairs Committee–Infant Oral Health Subcommittee. Guideline on infant oral health care. *Pediatr Dent.* 2012;34(5):148–152
11. Statistics Canada. Canadian Community Health Survey 2010. Available at: www.statcan. gc.ca/access_acces/alternative_alternatif. action?l=eng&loc=/imdb-bmdi/instrument/ 3226_Q1_V1-eng.pdf
12. Korsch M, Nelson K, Reinhart J. Feeding behaviors in infancy and early childhood. In: Committee on Psychosocial Aspects of Child and Family Health, eds. *Guidelines for Health Supervision III.* Elk Grove Village, IL: American Academy of Pediatrics; 1997:57–65
13. Gidding SS, Dennison BA, Birch LL, et al; American Heart Association. Dietary recommendations for children and adolescents: a guide for practitioners. *Pediatrics.* 2006;117(2):544–559
14. Health Canada. Eating well with Canada's food guide. 2007;4651.

15. Harrell FE. *Regression Modeling Strategies: With Applications to Linear Models, Logistic Regression, and Survival Analysis*, 1st ed. New York: Springer; 2001
16. American Academy on Pediatric Dentistry Council on Clinical Affairs. Policy on early childhood caries (ECC): unique challenges and treatment option. *Pediatr Dent*. 2008–2009;30(7 suppl):44–46
17. Canadian Dental Association. CDA position on first visit to the dentist. 2012
18. Canadian Association of Public Health Dentistry. Government Dental Programs. Available at: www.caphd.ca/programs-and-resources/government-dental-programs. Updated 2014. Accessed January 26, 2014
19. Centers for Medicare and Medicaid Services. Dental Care. Available at: www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Benefits/Dental-Care.html. Updated 2014. Accessed January 28, 2014
20. Health Canada. Non-Insured Health Benefits for First Nations and Inuits. Available at: www.hc-sc.gc.ca/fniah-spnia/nihb-ssna/index-eng.php. Updated 2013. Accessed January 28, 2014
21. US Department of Health and Human Services. About IHS. Available at: www.ihs.gov/aboutihs/. Updated 2014. Accessed January 26, 2014
22. Watson MR, Manski RJ, Macek MD. The impact of income on children's and adolescents' preventive dental visits. *J Am Dent Assoc*. 2001;132(11):1580–1587, quiz 1597
23. Psoter WJ, Pendrys DG, Morse DE, Zhang H, Mayne ST. Associations of ethnicity/race and socioeconomic status with early childhood caries patterns. *J Public Health Dent*. 2006;66(1):23–29
24. Kim Seow W. Environmental, maternal, and child factors which contribute to early childhood caries: a unifying conceptual model. *Int J Paediatr Dent*. 2012;22(3):157–168
25. Kelly SE, Binkley CJ, Neace WP, Gale BS. Barriers to care-seeking for children's oral health among low-income caregivers. *Am J Public Health*. 2005;95(8):1345–1351
26. Milgrom P, Mancl L, King B, Weinstein P, Wells N, Jeffcott E. An explanatory model of the dental care utilization of low-income children. *Med Care*. 1998;36(4):554–566
27. Rowan-Legg A; Canadian Paediatric Society, Community Paediatrics Committee. Oral health care for children - a call for action. *Paediatr Child Health (Oxford)*. 2013;18(1):37–50
28. Gaffney KE, Farrar-Simpson MA, Claure D, Davilla G. Prolonged baby bottle feeding: a health risk factor. *Pediatr Nurs*. 2004;30(3):242–245
29. Tinanoff N, O'Sullivan DM. Early childhood caries: overview and recent findings. *Pediatr Dent*. 1997;19(1):12–16
30. Marshall TA, Levy SM, Broffitt B, et al. Dental caries and beverage consumption in young children. *Pediatrics*. 2003;112(3 pt 1). Available at: www.pediatrics.org/cgi/content/full/112/3pt1/e184
31. Evans EW, Hayes C, Palmer CA, Bermudez OI, Cohen SA, Must A. Dietary intake and severe early childhood caries in low-income, young children. *J Acad Nutr Diet*. 2013;113(8):1057–1061
32. Uribe S. Early childhood caries—risk factors. *Evid Based Dent*. 2009;10(2):37–38
33. Beil HA, Rozier RG. Primary health care providers' advice for a dental checkup and dental use in children. *Pediatrics*. 2010;126(2). Available at: www.pediatrics.org/cgi/content/full/126/2/e435
34. Chou R, Cantor A, Zakher B, Mitchell JP, Pappas M. Preventing dental caries in children <5 years: systematic review updating USPSTF recommendation. *Pediatrics*. 2013;132(2):332–350
35. Bright Futures/AAP. Oral Health Risk Assessment Tool. Available at: http://www2.aap.org/oralhealth/docs/RiskAssessmentTool.pdf. Updated 2011
36. American Academy of Pediatric Dentistry. Clinical Affairs Committee. Guideline on caries—risk assessment and management for infants, children, and adolescents. 2013
37. dela Cruz GG, Rozier RG, Slade G. Dental screening and referral of young children by pediatric primary care providers. *Pediatrics*. 2004;114(5). Available at: www.pediatrics.org/cgi/content/full/114/5/e642
38. Ismail AI, Nainar SM, Sohn W. Children's first dental visit: attitudes and practices of US pediatricans and family physicians. *Pediatr Dent*. 2003;25(5):425–430
39. Balaban R, Aguiar CM, da Silva Araújo AC, Dias Filho EB. Knowledge of paediatricians regarding child oral health. *Int J Paediatr Dent*. 2012;22(4):286–291
40. Stijacic T, Schroth RJ, Lawrence HP. Are Manitoba dentists aware of the recommendation for a first visit to the dentist by age 1 year? *J Can Dent Assoc*. 2008;74(10):903
41. Brickhouse TH, Unkel JH, Kancitis I, Best AM, Davis RD. Infant oral health care: a survey of general dentists, pediatric dentists, and pediatricians in Virginia. *Pediatr Dent*. 2008;30(2):147–153
42. Garg S, Rubin T, Jasek J, Weinstein J, Helburn L, Kaye K. How willing are dentists to treat young children?: a survey of dentists affiliated with Medicaid managed care in New York City, 2010. *J Am Dent Assoc*. 2013;144(4):416–425
43. Schroth RJ, Yaffe AB, Edwards JM, Hai-Santiago K, Ellis M, Moffatt ME; Manitoba Dental Association. Dentists&Rsquo; views on a province-wide campaign promoting early dental visits for young children. *J Can Dent Assoc*. 2014;79:d138

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