



Scientific Article

Determining the Prevalence and Risk Factors for Early Childhood Caries in a Community Dental Health Clinic

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Abstract: ***Purpose:** The purposes of this study were to: (1) determine the prevalence of early childhood caries (ECC) among young children accessing dental services at a community dental clinic; (2) identify factors associated with the presence of ECC; and (3) determine the percentage of children who received treatment for ECC in this setting and the number who required referral to specialists. **Methods:** The study population comprised children younger than 72 months attending the clinic between 1991 and 2004. A chart review was conducted. **Results:** Eight hundred thirty-four charts met inclusion criteria; 71% had ECC, while the mean deft was 3.7 ± 3.9 (SD). The average age at the first visit was 50.0 ± 12.7 (SD) months. Those with ECC were significantly older at the first visit ($P < .001$), and the prevalence increased with family size ($P = .011$) and number of siblings ($P = .019$). ECC children were significantly more likely to come from households with lower monthly incomes ($P = .033$). The prevalence of ECC did not vary according to specific areas in Winnipeg where children resided ($P = .20$). **Conclusions:** Key risk factors for ECC included: (1) the child's sex; (2) low monthly income; (3) whether the child resided with both parents; and (4) a history of failed dental visits. These data may assist in identifying children at greatest risk for ECC and may help public health agencies develop appropriate prevention strategies, including promoting early dental visits for infants. (Pediatr Dent 2007;29:387-96) Received August 21, 2006 / Revision Accepted January 2, 2007.*

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Young children from low-income households are at increased risk for early childhood caries (ECC). Infants and preschoolers are particularly vulnerable to caries because they rely on parents and caregivers for regular oral hygiene and dietary intakes. Additionally, many dental professionals refuse to see this population in their practices. This risk is further enhanced for those with limited discretionary resources, including families accessing care in publicly funded dental programs and community health centers in Canada.

ECC is a form of decay affecting very young children under the age of 6 years.^{1,2} This broad case definition runs the gamut of decay manifestations from minor to rampant and encompasses all antecedent terms, including "baby bottle tooth decay" and "nursing caries." Severe manifestations can often result in: (1) pain; (2) infections; (3) malnutrition; and (4) a significantly poorer oral health-related quality of life (QOL).³⁻⁵

Oral health QOL, however, often improves once dental treatment is provided.^{6,7} While ECC can have serious and immediate consequences for the child, one often forgotten reality is that decay exhibited during preschool life is also a predictor for future decay in both primary and permanent dentitions.⁸⁻¹⁰

The prevalence of ECC among Canadian children varies considerably, which may be attributed to several factors¹¹⁻¹³:

1. The prevalence may be dependent on the population being studied, as investigations focusing on disadvantaged and low socioeconomic status (SES) populations may naturally report higher prevalences (28%-98%) and rates.^{2,11,12}
2. Reports involving younger preschoolers often report a lower prevalence, since the chance of having decay in the primary dentition increases with age.¹⁴
3. Case definitions may differ.^{11,15,16} Previous attempts to clinically define forms of primary tooth decay have included specific decayed surfaces of teeth and specific presentation patterns of caries.^{11,15} As these definitions frequently vary, proper comparison of identified risk factors between studies have not always been possible. Only recently has a standardized case definition been published.^{1,2}

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The etiology underlying ECC was originally ascribed to inappropriate bottle-feeding behaviors (eg, bottle at bedtime or prolonged bottle-feeding) and prolonged breast-feeding.¹⁷⁻²¹ More recently, studies have found other important risk factors while others have found the practice of breast-feeding itself to be protective.²² Numerous contributing risk factors include:

1. host factors;
2. cariogenic micro-organisms;
3. diet;
4. individual, familial, and cultural traits such as:
 - a. age;
 - b. ethnicity;
 - c. low SES;
 - d. parental education; and
 - e. mothers with poor oral health and oral health behaviors.²²⁻²⁸
5. limited access to care;
6. lack of water fluoridation;
7. psychosocial issues;
8. microbiological factors (*Streptococcus mutans*, lactobacilli);
9. oral hygiene behaviors;
10. the presence of debris, and
11. the use of sugar containing products in bottles.^{11,29-32}

In addition, evidence also indicates that delayed first dental visits may result in greater dental treatment needs.³³⁻³⁴

Many of these contributory factors seem to be more pronounced in areas of low SES, influencing the high degree of caries experienced by inner city residents and those from minority groups. Access to dental care for children from these populations is inadequate. Consequently, one of the few options is to attend publicly funded dental programs, by which time they are often diagnosed with ECC.

The Mount Carmel Clinic (MCC) is a community health center located in the core area of Winnipeg, Manitoba, Canada, that serves an ethnically heterogeneous population of low-income families that predominantly reside in the urban Winnipeg region of Manitoba. It is a nonprofit community health center with the purpose of creating and promoting healthy

inner city communities. Families must meet established financial eligibility criteria to qualify for the dental program and pay a minor fee for each dental visit.³⁵ The current assumptions are that the majority of preschool children attending MCC have ECC and that the average age at the first visit is considerably higher than current recommendations.

This study's purposes were to: (1) determine the prevalence of ECC among young children accessing dental services at the clinic; (2) identify factors associated with the presence of ECC; and (3) determine the percentage of children who received treatment for ECC in this setting and the number who required referral to pediatric specialists.

Methods

The study population involved infant and preschool-aged patients who attended the MCC Dental Department between 1991 and 2004. This clinic is located in the Point Douglas community of Winnipeg (Figure 1), the fluoridated capital city of Manitoba with a population of 650,000. Eligibility to attend is based upon a sliding scale of household income. A retrospective chart review was conducted to determine the

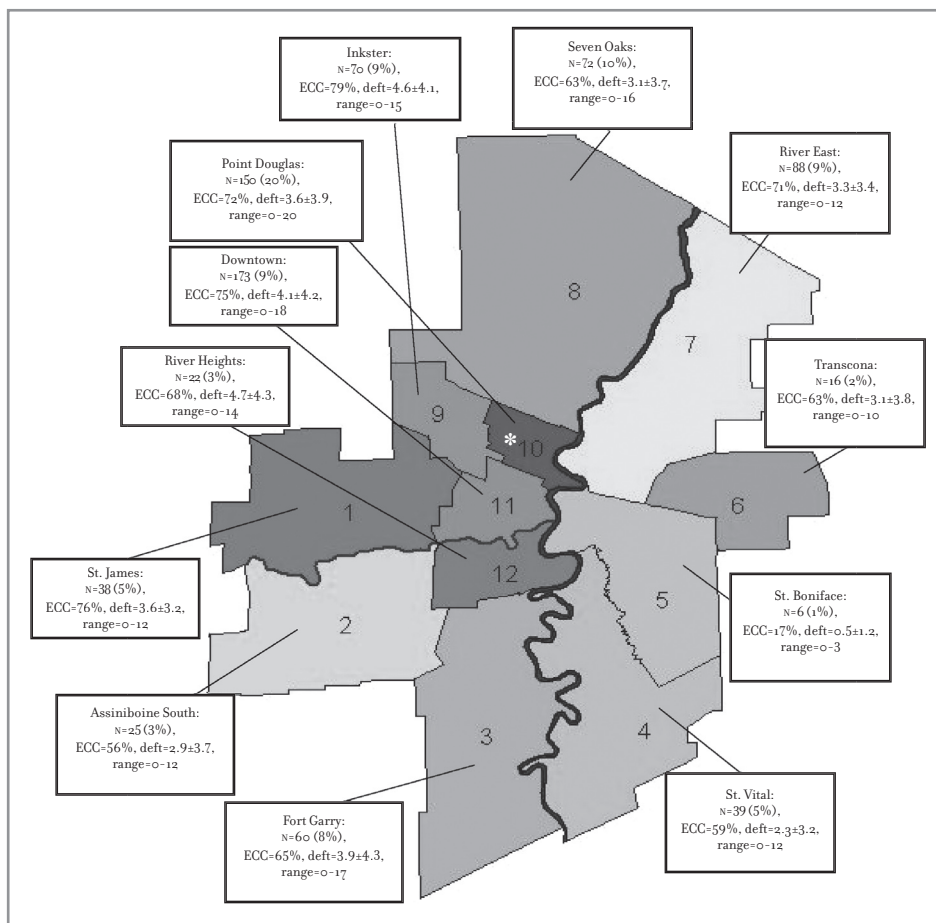


Figure 1. Distribution, prevalence of early childhood caries (ECC), and deft rates of children attending the Mount Carmel Clinic based on their neighborhood of residence in Winnipeg (* denotes location of MCC).

prevalence of ECC among young children presenting for dental care. All existing clinical records for preschool-aged children served as the available study sample from 1991-2004. As ECC is age specific, we limited the chart review to those younger than <72 months, based on the definition endorsed by the American Academy of Pediatric Dentistry.^{1,2}

In this institutionally-approved study, a data collection form was developed by the authors to glean information from charts for numerous variables, including: (1) household and family characteristics; (2) dental visitation status; (3) childhood issues; and (4) demographics. The specific community of residence in Winnipeg was determined by reported postal codes. The presence of ECC and primary caries rates (deft), where possible, were determined for each child. The deft score only involved teeth that were extracted, thereby excluding those that had naturally exfoliated. The form was pilot tested prior to the actual data collection. For the majority of charts, information was available and recorded. Data were collected by a single individual (VC).

After the initial data collection period, a random sample of 10% of all charts was re-reviewed to check for reliability of variables collected. Mean values of the 2 data samples were compared using paired *t* tests to confirm the original data's validity. Data from collection forms were analyzed using the Number Cruncher Statistical System (NCSS, v. 2001; Kaysville, Utah). Statistical analyses included: descriptive tests; and bivariate tests. Descriptive statistics included: (1) mean; (2) standard deviation (\pm SD); (3) frequencies; and (4) valid percent. Bivariate tests included: (1) analysis of variance (ANOVA); (2) *t* tests; and (3) chi-square tests. Backwards logistic regression was also employed for ECC. The threshold of significance was $P \leq .05$.

Results

Overview of charts. A total of 834 charts met the inclusion criteria. The greatest number was from active patient charts from 2004 (N=85), while the lowest number was from children of the target ages last seen in 1999 (N=42). Ten percent of the charts belonged to children participating in a University of Manitoba dental outreach program that occurred during 1995 and 1996, while 8% (N=64) were derived from charts of children attending the Anne Ross Day Nursery program at MCC, a new outreach initiative at the clinic that began in 2004.

Descriptive statistics. Geographical. Seven hundred sixty-two children resided in Winnipeg (92%), while 70 lived outside the city. Of those from Winnipeg, the majority resided in northern sections of the city, including the following communities (Figure 1): (1) Downtown (23%); (2) Point Douglas (20%); (3) Inkster (9%); (4) River East (12%); and (5) Seven Oaks (10%). This distribution was based upon 759 available

observations. Children from outside Winnipeg came from 38 different towns within a 1½-hour driving distance.

Child and family characteristics. Fifty-three percent of the subjects were male (Table 1). Most children (70%) belonged to families consisting of 4 or more persons, and 80% of children had at least 1 or more siblings. The average total family size was 4.2 ± 1.4 persons and the average number of siblings was 1.5 ± 1.2 . On average, total family monthly income was \$1,481.88 \pm 673.14 (all dollar amounts are Canadian [Cdn]). Few children had documented medical conditions (13%, N=111). Among those with medical issues, allergies (42%) and asthma (41%) were the most prevalent.

Caries experience and dental visitation status. Overall, 71% of children were found to have at least 1 primary tooth affected by decay (ECC prevalence), while the estimated mean deft for the sample was 3.7 ± 3.9 (range=0-20). Mean scores for d, e, and f components and overall deft appear in Table 2.

The average age at the first dental visit was 50.0 ± 12.7 months (4 years of age), and the average age at the time of first diagnosis of caries was 52.4 ± 12.3 months, with both ranging between 11 and 71 months. Only 5 children came in by age 1 for their first dental visit (1%), while 15 were under 2 years of age (2%; Table 1). In total, 19% of children (N=154) attending MCC were referred for further care. Of those referred, 94% were referred to a pediatric dentist. The majority of preschool children (84%) referred outside the clinic were referred by dental therapists employed at MCC. Twenty-six percent were documented to have failed at least 1 dental appointment.

Bivariate associations. Geographical. The prevalence of ECC among Winnipeg children did not significantly differ from rural Manitoba children (70% vs 78%; chi-square=1.5; df=1; $P = .21$), but the mean deft score did differ between rural children and those from Winnipeg (4.7 ± 4.1 vs 3.6 ± 3.9 [range=0-20]; $P = .047$), suggesting that children outside the capital city have increased caries rates.

The proportion of children affected with decay differed according to their distinct Winnipeg communities. Overall, children attending MCC who lived in the Inkster area had the highest prevalence of ECC (79%) while those living in St. Boniface had the lowest (17%; chi-square=21.5; df=11; $P = .03$). ANOVA, however, revealed that there was no significant association between the mean deft score and the community of residence ($P = .06$; Figure 1). A post hoc chi-square analysis excluding the St. Boniface neighborhood revealed no statistical difference in ECC prevalence ($P = .14$), indicating that the original significant difference observed between the distinct Winnipeg communities was entirely due to this one neighborhood.

Table 1. CHILD AND FAMILY CHARACTERISTICS AND DENTAL VISITATION CHARACTERISTICS

Variable	N	Valid %	Variable	N	Valid %
Sex			Maternal employment status		
Male	441	53	Employed	286	35
Female	391	47	Unemployed	479	58
Age (ys)			Unsure	55	7
1	7	1	Paternal employment status		
2	28	3	Employed	434	52
3	85	10	Unemployed	136	17
4	157	19	Unusre	260	31
5	555	67	Documented medical conditions		
Family Size			Yes	111	13
2	74	10	No	721	87
3	157	20	Early childhood caries		
4	251	32	Yes	588	71
5	165	21	No	244	29
6	84	11	Age at first dental visit (mos)		
7	31	4	≤ 23	15	2
≥ 8	18	2	24-25	91	11
No. of siblings			36-47	260	31
0	157	20	48-59	235	28
1	281	36	60-71	231	28
2	188	24	Form of Payment		
3	99	13	Self	705	84
4	37	5	Insurance	29	4
≥ 5	18	2	Employment and income assistance (social assistance)	90	11
Monthly household income (Cdn)			Non-Insured Health Benefits (treaty status First Nations)	7	1
\$ 0-1,000	199	28	Failed dental appointment		
\$ 1,001-2,000	360	51	Yes	220	26
\$ 2,001-4,000	152	21	No	612	74
No. of Parents			Treatment completed at Mount Carmel Clinic		
1	228	27	Yes	542	65
2	603	73	No	280	34
Space Maintainer			Unsure	10	1
Yes	29	4	Child referred to another provider		
No	803	96	Yes	154	19
Age at first diagnosis of caries (mos)			No	678	81
≤ 23	6	1			
24-25	46	8			
36-47	156	27			
48-59	182	31			
60-7	193	33			

Child and family characteristics. There were no significant relationships between both the prevalence of ECC or rates of primary caries and the sex of the child (73% males vs 69% females, $P=.2$; 3.9 ± 4.0 [range=0-20] males vs 3.5 ± 3.9 [range=0-17] females, $P=.13$). The prevalence of ECC, however, was significantly associated with: (1) family size (chi-square=16.6; df=6; $P=.01$); (2) the number of siblings in the family unit (chi-square=13.5; df=5; $P=.02$); and (3) the child's age (chi-square=41.4; df=4; $P<.001$).

Generally, as the number of family members, number of siblings, and age increased so did the prevalence of ECC. On the other hand, ANOVA results indicated that only the number of siblings and age, but not total family size, were significantly associated with increased deft scores ($P=.03$, $P<.001$, and $P=.14$ respectively). ANOVA also revealed that the mean family size (4.3 ± 1.4 vs 4.2 ± 1.4) and the mean number of siblings (1.5 ± 1.2 siblings vs 1.5 ± 1.2) was not significantly associated with the presence of ECC ($P=.40$ and $P=.80$, respectively).

Children from single-parent homes did not experience significantly more decay (chi-square=2.5; df=1; $P=.11$), but did appear to have lower caries rates than those from 2-parent homes (t test, $P=.057$). The family's monthly income bracket (\$500 Cdn increments) was not found to be associated with the presence of decay (chi-square=7.2; df=5; $P=.20$) or rates of decay ($P=.56$). A post hoc decision was made to divide monthly income by the number of family members in the household to create a new variable of monthly income per family member, since all families were considered to be low-income and fell into similar income brackets. The average was \$359.82 Cdn/member/month ± 152.90 . Children with decay were more likely to come from families with lower monthly income per family member compared with those who were caries free (\$351.95/month/member ± 147.09 vs \$378.98/month/member ± 164.99 , $P=.03$).

Chi-square analysis revealed that the presence of decay was not associated with the employment status of either the mother (chi-square=0.41, df=1, $P=.50$; 73% employed vs 71% unemployed) or the father (chi-square=0.002, df=1, $P=.96$; 73% employed vs 73% unemployed). ANOVA also revealed there was no significant relationship between the employment status of each parent and mean deft ($P=.054$ and $P=.11$, respectively, for mothers and fathers). Two-tailed t tests were used to compare deft rates for the employed and unemployed mothers and fathers, as the unsure category was likely influencing the analyses. Results revealed that there were no differences between maternal and paternal employment status and deft scores ($P=.08$ and $P=.8$, respectively).

While 104 children had documented underlying medical conditions, there were no significant differences in prevalence (67% vs 71%) or rates of decay (3.4 ± 3.7 [range=0-15] vs 3.8 ± 4.0 [range=0-20]) between healthy children and those with medical issues.

Dental visitation status. The prevalence of ECC and the mean deft scores remained relatively unchanged from 1991 and 2004 (chi-square=15.2, df=13, $P=.40$; ANOVA $P=.17$). The prevalence of ECC ranged from its lowest of 57% in 2003 to its highest of 80% in 1994. Interestingly, children who had failed scheduled dental appointments were significantly more likely to have ECC (80% vs 68%; odds ratio=1.9) and had an increased mean deft score (Table 3).

There were also significant associations between ECC and the extent of decay based on the child's age at the time of their first visit (Table 4). ANOVA also revealed that ECC children were significantly older at the first visit (51.4 ± 12.3 months vs 46.6 ± 13.2 months; $P<.001$). No significant difference existed between the mean deft scores and the age when children were first diagnosed with caries ($P=.10$).

Finally, statistical analyses revealed that, over the years, there was a significant association between the mean age at

Table 2. MEAN NUMBER (\pm SD) OF DECAYED (d), EXTRACTED (e), AND FILLED (f) PRIMARY TEETH AND DEFT

	N	Mean \pm SD	Range
d score	753	1.6\pm2.9	0-16
Age 1		1.4 \pm 1.9	0-4
Age 2		0.05 \pm 0.2	0-1
Age 3		2.1 \pm 3.7	0-14
Age 4		1.9 \pm 3.2	0-16
Age 5		1.6 \pm 2.7	0-15
e score	753	0.4\pm1.0	0-8
Age 1		0	0
Age 2		0	0
Age 3		0.03 \pm 0.2	0-2
Age 4		0.2 \pm 0.8	0-6
Age 5		0.4 \pm 1.0	0-8
f score	753	1.7\pm2.6	0-16
Age 1		0	0
Age 2		0.05 \pm 0.2	0-1
Age 3		0.4 \pm 1.5	0-11
Age 4		0.8 \pm 1.7	0-9
Age 5		2.2 \pm 2.8	0-16
deft score	753	3.7\pm3.9	0-20
Age 1		1.4 \pm 1.9	0-4
Age 2		0.1 \pm 0.3	0-1
Age 3		2.5 \pm 3.8	0-14
Age 4		2.9 \pm 4.0	0-20
Age 5		4.2 \pm 3.8	0-16

Table 3. PREVALENCE OF EARLY CHILDHOOD CARIES (ECC) AND MEAN DEFT BY TOTAL MONTHLY INCOME (CDN), FAILED DENTAL APPOINTMENTS, AND AGE UPON FIRST DENTAL VISIT*

Monthly income (Cdn)	No. with ECC (%)	No. caries free (%)	Mean deft±SD
\$ 0-500	33 (72) †	13 (28)	3.6±3.9 (range=0-15) †
\$ 501-1,000	113 (72)	45 (28)	3.5±3.6 (range=0-15)
\$ 1,001-1,500	168 (73)	61 (27)	3.9±4.0 (range=0-17)
\$ 1,501-2,000	98 (75)	33 (25)	4.2±4.0 (range=0-18)
\$ 2,001-2,500	68 (69)	31 (31)	3.5±3.7 (range=0-15)
\$ 2,501-3,000	30 (57)	23 (43)	3.5±4.7 (range=0-20)
Failed appointments	No. with ECC (%)	No. caries free (%)	Mean deft±SD
Yes	175 (80) ‡	45 (20)	4.4±3.7 (range=0-18) §
No	413 (68)	199 (32)	3.5±4.0 (range=0-20)
Age at the first visit (mos)	No. with ECC (%)	No. caries free (%)	Mean deft±SD
< 23	7 (47) ‡	8 (53)	1.4±1.9 (range=0-5) ‡
24-35	51 (56)	40 (44)	2.2±3.5 (range=0-17)
36-47	174 (67)	86 (33)	3.5±4.2 (range=0-20)
48-59	177 (75)	58 (25)	4.4±4.0 (range=0-16)
60-71	179 (78)	52 (22)	4.0±3.6 (range=0-14)

* Chi-square for ECC; ANOVA for deft. † $P > .05$. ‡ $P < .001$. § $P < .01$.

the time of the first clinic visit and the year archived ($P < .001$). A Tukey's post hoc test showed that there was a significant difference in age at the first visit during 2003 and 2004 compared to every year except 1999 and 2001. During 2003 and 2004, the children visiting the clinic for a first visit were significantly younger (45.1±14.4 and 42.1±14.0 months) than the other years (range=49.2±11.3 [1995]-55.0±14.1 [2002]).

Logistic regression. Backwards logistic regression was performed, with the final model appearing in Table 4. Variables removed from the model during the backward variable iteration included: (1) single child ($P = .89$); (2) father's employment ($P = .62$); (3) medical condition ($P = .34$); and (4) family size ($P = .34$).

Discussion

Relatively few chart reviews have been conducted to determine the prevalence of preschool dental decay in clinical environments.³⁶⁻³⁸ To date, there have been no published chart reviews in Canada examining the prevalence and risk factors for ECC among children attending dental public health programs.

Overall, 71% of the eligible children in this retrospective chart review had ECC. Of those with ECC, 5.5±3.6 teeth were affected by decay. The prevalence of ECC in this population is cause for concern, but not unexpected, since all were from low-income households. In fact, children from lower-income families were more likely to suffer from ECC. Decay is prominent in disadvantaged populations, including those with limited access to care. Two previous retrospective studies in the United States involving clinical records reported similar prevalence rates (67% and 76%), while a third reported a much lower prevalence (34%).³⁶⁻³⁸ The deft in this study's sample also approximates recent published rates of primary tooth decay among disadvantaged preschool children in the Point Douglas community of Winnipeg, where MCC is located.¹¹

Undoubtedly, age is a significant predictor of ECC. Not surprisingly, both the prevalence of ECC and the rate of decay increased as the age at the first visit increased. Children

who visit the dentist at later ages have more teeth for longer lengths of time, increasing their odds of developing decay. Therefore, primary health centers such as MCC must become dental homes for high-risk infants and preschoolers.

The concept of the "dental home" is a relatively new one and likely not well disseminated among general practitioners.³⁹ Private dental offices and public health clinics can serve as "dental homes" for young children by providing care and prevention services that meet each child's unique needs,^{39,40} including: (1) caries risk assessments; (2) prevention, including fluoride varnish and other chemotherapeutics; (3) anticipatory guidance; and (4) parental education.^{39,40}

Organized dentistry recommends a first dental visit by 12 months of age.^{41,42} The average age at the first visit for MCC children, however, was significantly higher (50.0±12.7 months) than the current recommendation. This study confirms that dental visits before 2 years of age are important to keep young children free of cavities. Screening children within months of eruption of their first tooth is integral to ensuring that they receive early primary prevention, thus setting the foundation for good childhood oral health.⁴³ Fur-

ther, early preventive care can provide parents with much needed dental anticipatory guidance so that they are empowered to practice dental friendly behaviors.³⁹⁻⁴¹

Considering MCC's mandate to serve low SES populations, those drawing on the services are at increased risk for dental disease, including ECC. Public health clinics such as MCC must begin to promote and institute first visits by 1 year of age to curb the problem of ECC. The profession and public health agencies, however, must first ensure that the primary focus applies to those at greatest risk with the

least access before such policies apply to the entire populace.⁴⁴ Without such a strategic approach, it is quite possible that those with limited access may be unable to obtain visits. This is because infants from middle and upper income groups may overwhelm the profession's ability to undertake such a preventive service, given provider shortages and the limited number of those practitioners willing to see infants in their practices. Awareness of this recommendation has grown at MCC, which may account for the significant decline in the mean age of children attending for the first time during 2003 and 2004. This change, however, is more likely due to one dentist conducting a study on ECC during infancy. The high age at the first visit may be due to parents bringing in their children only when dental problems arise. Many other barriers to early and timely care exist, including: (1) parental education; (2) dentists refusing to see preschool-aged children; (3) unreliable transportation; (4) discrimination and delays in seeing a dentist; and (5) a lack of cultural sensitivity on the part of service providers.^{29,45-48}

By not promoting early childhood oral health care, the dental profession continues to propagate the myth that baby teeth are of little value to overall childhood well-being and dental development.⁴⁹

The prevalence of decay did not significantly differ between children residing in Winnipeg and those residing outside the capital city. This finding indicates that the need for dental care among disadvantaged preschoolers from rural

Table 4. BACKWARDS LOGISTIC REGRESSION FOR EARLY CHILDHOOD CARIES

Variable	Regression coefficient \pm (SD)	P-value	Odds ratio	95% confidence interval
Sex (male)	0.324 \pm 0.163	.048	1.38	1.003-1.904
Community of residence (urban)	-0.606 \pm 0.323	.060	0.55	0.290-1.026
Age at the first dental visit (<24 mos)	-1.643 \pm 0.630	.009	0.19	0.056-0.664
Low monthly income (\leq \$2,000/mo)	0.581 \pm 0.236	.014	1.79	1.125-2.841
Low monthly income per family member (<\$325/member/mo)	0.319 \pm 0.189	.092	1.28	0.949-1.993
Maternal employment status (employed)	0.351 \pm 0.182	.054	1.42	0.995-2.030
Failed dental appointments	0.597 \pm 0.196	.002	1.82	1.237-2.667
Single parent	-0.487 \pm 0.192	.011	0.61	0.421-0.896

Manitoba is just as large and should not be neglected. Several studies have reported that children residing in rural locales are more likely to suffer from decay in the primary dentition.⁵⁰⁻⁵² Access to affordable, community-based dental care is severely limited for children in rural Manitoba. In addition, they may not be benefiting from water fluoridation and are dependent on reliable transportation to visit the dentist. Children who attended MCC and lived in the Inkster, Point Douglas, downtown, and River East communities had a higher prevalence of ECC than those from other Winnipeg communities, although the overall prevalence by community was not significant. This comes as little surprise, since these communities surround MCC and are considered to have more high-risk families. The 2004 Community Health Assessment (CHA) report noted that these communities share patterns of poor health, including: (1) chronic health conditions; (2) infant and maternal health; (3) communicable diseases; (4) injury; (5) mental health; and (6) death.⁵³ Not surprisingly, the oral health of children from these areas is also less favorable. Overall, very few children were from the St. Boniface community of Winnipeg, a francophone section of the city. The lack of bilingual oral health services at MCC may account for the very low usage from this neighborhood and the low prevalence of ECC exhibited.

Children from single-parent homes did not experience a greater prevalence or rates of decay than those living with 2 parents. In fact, the former were more likely to be caries free. This result was somewhat surprising, since previous

studies have reported higher rates of ECC in single-parent homes.²²⁻⁵⁴ The mean family size was significantly smaller in single-parent households (3.1±1.1 vs 4.7±1.2; $P < .001$). While this association does not allow us to develop a cause-and-effect relationship, it possibly suggests that children from smaller families might have less ECC because they may have more time to devote to early childhood oral health care and oral hygiene.^{12,55}

SES has been reported as a significant risk factor for ECC in a substantial number of studies.²⁴⁻⁵⁶ The CHA reported that the Point Douglas and downtown areas have the highest percentage of families living below the low-income cutoff. These communities represented nearly 60% of this study's population, with all subjects having high rates of ECC. The relationship between low-income and caries was confirmed in this study.

Logistic regression revealed that boys were more likely to have increased odds of ECC (OR=1.3). Most ECC studies have not found such a relationship to be true, but this does agree with findings from another investigation of high-risk aboriginal preschool children.⁵⁷

Irregular dental attendance was a predictor of caries among young children at MCC. Those who failed scheduled dental appointments were more likely to have ECC and had higher mean deft scores than those who did not miss appointments (OR=1.9). The issue at hand for this population may not entirely be due to parents neglecting childhood oral health, but rather other factors, some of which were previously discussed. Access to care for this population is a huge barrier, since many families attending the clinic lack reliable transportation. The following factors may also lead to broken appointments: (1) a lack of integration of oral health with primary health care; (2) previous bad dental experiences; (3) racial and ethnic barriers; and (4) limited hours of operation.^{47,48}

It is also probable that some parents fail to take their child for scheduled visits because they cannot afford to miss work, as this would result in lost income.

General limitations of retrospective chart reviews include: (1) the fact that important data may not be available (ie, missing data and limited variables); (2) difficulty deciphering providers progress notes; (3) charting errors; (4) difficulty in controlling bias and confounders; and (5) difficulty in establishing a cause-and-effect relationship.

Limitations of this study included:

1. missing information;
2. patient records lacking information on:
 - a. family income;
 - b. total family size;
 - c. parental employment status; and
 - d. medical conditions;
3. the uncertainty of certain variables, such as:
 - a. decayed (d);
 - b. extracted (e);

- c. filled (f); and
- d. deft; and

4. differing chart documentation habits of the providers.

The format of charts themselves also changed during the period under review. The majority of the service providers, however, remained constant over this period.

Although the authors assumed that the child's age at the time of their first visit to MCC was the true age when they first visited the dentist, this study was unable to determine whether children had received care prior to attending MCC. Given the challenges faced by this population in accessing care, the assumption is likely. This limitation, however, potentially changes the average age at the first visit. Recently, MCC has recognized the need to be more responsive to the growing health needs of populations residing in the Point Douglas and Downtown communities bordering the facility, especially those of Aboriginal ancestry. Strategies to achieve such improvements include: (1) focusing on community development; (2) early childhood development and care; (3) primary health for the economically disadvantaged; and (4) integrated programming. Early dental visits should be included in these strategies as a means to improve preschool oral health. Many people residing in the clinic's catchment area may already have existing dental benefits from the Non-Insured Health Benefits Program (NIHB) of the First Nations and Inuit Health Program or social assistance. Considering that MCC dental department has targeted the low-income sector, it has historically focused on the working poor, encouraging those with benefits to access care from other sources.

Unfortunately, the evidence is clear that dental benefits for vulnerable groups do not translate into better utilization or improved dental outcomes.^{58,59} In fact, only 22% of Canadian First Nations preschool children with NIHB for dental care had a dental visit during 2002/03.⁶⁰ Thus, it is imperative that the MCC and other community agencies continue to identify the needs in the community and work towards reducing health disparities and improving access to the underserved.

Conclusions:

Based on this study's results, the following conclusions can be made:

1. The majority of preschool children attending the Mount Carmel Clinic had ECC.
2. Factors significantly associated with ECC on logistic regression analysis included: (a) sex of the child; (b) first dental visit at no earlier than 24 months of age; (c) low monthly household income; (d) residing with both parents; and (e) a history of failed dental visits.
3. Efforts should be made to follow current recommendations for a first dental visit by 12 months of age.

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