

The Oral Health of Preschool Children of Refugee and Immigrant Families in Manitoba

Mohamed El Azrak; Alice Huang; Khalida Hai-Santiago, DMD; Mary Bertone, BSc(DH), MPH; Daniella DeMaré; Robert J. Schroth, DMD, MSc, PhD



Published September 20, 2017

Cite this as: *J Can Dent Assoc* 2017;83:h9

Abstract

Introduction: Children of newcomers to Canada have been identified as at moderately high risk for developing early childhood caries (ECC). The purpose of this study was to investigate the oral health of preschool children of refugee and immigrant families in Winnipeg.

Methods: Children < 72 months of age and their parent or primary caregiver were recruited through several newcomer settlement agencies, dental clinics and community programs. Parents and caregivers completed a short questionnaire with the assistance of a research team member. Children underwent a dental examination. Results of the questionnaire were combined with those of the clinical examination and subjected to statistical analysis.

Results: We recruited 211 children. Their mean age was 40.2 ± 15.4 months, and 54.0% were boys. Overall, 45.5% of the children had ECC and 31.8% had severe ECC (S-ECC). The mean decayed, missing and filled teeth (dmft) score was 2.2 ± 3.8 (range 0–19), while the mean decayed, missing, filled surfaces (dmfs) score was 4.8 ± 11.0 (range 0–63). Infant dental enucleation was observed in 6 children. Logistic regression analyses showed that increasing age, the presence of debris on teeth, parents believing their child has dental problems and the presence of enamel hypoplasia were significantly and independently associated with ECC and S-ECC ($p \leq 0.05$).

Conclusions: ECC is prevalent in children of newcomer families in Manitoba. These data will inform advocacy efforts to improve access to dental care and tailor early childhood oral health promotion and ECC prevention activities for refugees and recent immigrants.

Early childhood caries (ECC) is a particularly damaging form of tooth decay observed in the toddler and preschool population.¹ Preventing early caries development is important, as those with ECC are at increased risk of developing future decay during childhood and adolescence.² Over the last 20 years, North American trends show a significant increase in the prevalence of ECC.³ Several groups in Canada are at high risk, including Indigenous children, refugees and other newcomers, those experiencing poverty and those living in rural regions of the country where there is reduced access to care.^{4,8} The term “newcomer” encompasses both refugees and immigrants.⁹ In fact, there are 3 categories of newcomers to Canada: family (to reunify families), economic and refugee class immigrants.¹⁰

Newcomers face unique challenges, including maintaining health and accessing health services,⁶ as a result of many factors, such as language barriers, cultural differences, lack of awareness, limited family finances and restrictive government policy.^{6,9,11,12} Because of these barriers, newcomer children, especially refugees, are considered to be at higher risk of dental caries.⁶ In recent revisions of the American Academy of Pediatric Dentistry's Caries-Risk Assessment tool,¹³ a question about recent immigrant status has been included, confirming that children from these groups are considered to be at moderate to high risk for caries.

Studies suggest that awareness of the importance of early childhood oral health among some new immigrant parents to Canada is low and that they are less likely to seek preventive dental care.^{14,15} In addition, Canadian surveys report that children from disadvantaged groups, including newcomers, have higher rates of caries and lower rates of dental visits than Canadian-born children.^{11,15}

In 2014, 16 222 newcomers arrived in Manitoba, the highest number in a single year.¹⁰ That same year, the province also witnessed its greatest influx of refugees (1439) along with the largest number of refugees per capita in Canada.¹⁰ Nearly 6 out of every 10 government-sponsored refugees came from Somalia, Iraq, Democratic Republic of Congo (DRC) and Eritrea, whereas 92% of privately sponsored refugees came from Eritrea, Somalia, Ethiopia and the DRC.¹⁰ Over 80% of newcomers to Manitoba settled in Winnipeg.¹⁰

No current evidence has been published on the prevalence and burden of ECC among preschool children from newcomer groups to Manitoba, although the province has one of the highest rates of immigration in Canada. In addition, the greatest proportion of newcomers are women in their childbearing years followed by young children, including those under 5 years of age.^{16,17} Previous newcomers to Winnipeg have identified that oral health is a significant health concern and that barriers to care affecting their oral health include not only the cost, but also lack of knowledge.¹⁶⁻¹⁸

The purpose of this study was to investigate the oral health of preschool children from newcomer families in Winnipeg, Canada. Discovering the oral health status of these children can provide important information that can help inform early childhood oral health and preventive dental services for newcomer families.

Methods

In keeping with the recognized case definition of ECC, eligibility for this cross-sectional study was restricted to children 12–71 months of age and their parent(s) or primary caregiver(s).^{1,19} The study team visited newcomer settlement agency sites, community dental clinics and Healthy Start for Mom & Me locations in the Winnipeg region. All eligible

children and their parent or primary caregiver were invited to participate.

All parents and primary caregivers provided written informed consent and completed a short questionnaire with the assistance of a team member. Each participating child received a small honorarium. Interpreters were used when available. However, as trained interpreters were not always present during study visits, we ensured that the questions were simple enough so that participants could respond.

The questionnaire posed simple questions related to the child and parent: e.g., country of origin, language spoken, type of dental insurance (e.g., Interim Federal Health [IFH], Employment and Income Assistance, private insurance, no insurance) and whether the child had already received dental care in Winnipeg. For our statistical analyses, "recent newcomers" were defined as people living in Manitoba for ≤ 24 months. Government-sponsored refugees were those with IFH dental benefits. Countries of origin were categorized into World Health Organization regions (Americas, Africa, Eastern Mediterranean, Europe, Southeast Asia and Western Pacific).

Two experienced dentists served as the examiners and reviewed the examination criteria together to ensure that each was recording oral health conditions consistently (e.g., plaque levels, gingivitis, caries and enamel hypoplasia). Examinations were performed at the participating site using a mirror and explorer. When possible, examinations were performed in a knee-to-knee position. No additional light sources were used during the dental screening examinations and no radiographs were obtained.

Caries was diagnosed beginning with cavitated enamel. Both caries prevalence and scores involving the primary dentition were determined. ECC and severe-ECC (S-ECC) were defined according to established case definitions.^{1,19} Dental caries scores were determined via decayed, missing and filled teeth (dmft) and decayed, filled surfaces (dmfs) indices, which indicate the child's current and past caries experience. The significant caries (SIC) index was also reported, i.e., the average score among the third of the study population with the highest dmft and dmfs scores. The simplified oral hygiene index²⁰ was used to assess the amount of debris on primary teeth. Developmental defects of enamel (DDE), which include enamel hypoplasia and opacities, were assessed using the DDE index.²¹

Children's dental screening results were combined with questionnaire responses. Data were entered into a spreadsheet and analyzed using Number Cruncher Statistical Software version 9 (NCSS, Kaysville, Utah). Descriptive statistics included frequencies and means \pm standard deviation (SD). Bivariate analyses included χ^2 analysis, *t* tests, Mann-Whitney-Wilcoxon test, analysis of variance (ANOVA) and correlation. Multiple logistic regression for ECC and S-ECC was performed and included those variables that

Table 1: Demographic and dental characteristics of our study group of newcomer children and parents in Winnipeg (n = 211).

Variable	No. (%)*
Sex of child	
Male	114 (54.0)
Female	97 (46.0)
Child's mean age, months ± SD	40.2 ± 15.4
Region of origin	
Africa	92 (43.6)
Americas	4 (1.9)
Eastern Mediterranean	66 (31.3)
Europe	4 (1.9)
South East Asia	30 (14.2)
Western Pacific	15 (7.1)
Recent newcomer (≤ 24 months)	
Yes	109 (51.7)
No	102 (48.3)
Child born in Canada	
Yes	78 (37.0)
No	133 (63.0)
Government sponsored refugee	
Yes	24 (11.4)
No	187 (88.6)
Dental insurance	
Yes	105 (49.8)
No/unsure	106 (50.2)
Type of dental insurance	
Interim federal health	24 (11.4)
Employment and income assistance	43 (20.4)
Work sponsored	38 (18.0)
Private insurance	0
None	106 (50.2)
Child ever visited dentist in Winnipeg	
Yes	57 (27.3)
No	152 (72.7)
Parent thinks child has dental problem	
Yes	74 (35.1)
No	137 (64.9)

Note: SD = standard deviation.

*Except where other units are given.

were significantly associated with these main outcomes of interest or had a p value < 0.10 at the bivariate level; p ≤ 0.05 was considered significant.

This study was approved by the University of Manitoba's Health Research Ethics Board (H2014:190).

Results

We recruited 211 children and their parent or primary caregiver (**Table 1**). The average age was 40.2 ± 15.4 months and more than half the participants (51.7%) were recent newcomers to Canada. The largest proportion were

Table 2: Caries and oral health status of our study group of newcomer children in Winnipeg (n = 211).

Variable	No. (%)*
Early childhood caries	
Yes	96 (45.5)
No	115 (54.5)
Severe early childhood caries	
Yes	67 (31.8)
No	144 (68.2)
dmft scores, mean ± SD (range)	
dt	1.7 ± 3.0 (0–16)
mt	0.2 ± 0.8 (0–6)
ft	0.3 ± 1.6 (0–15)
dmft	2.2 ± 3.8 (0–19)
dmfs scores, mean ± SD (range)	
ds	3.0 ± 6.7 (0–48)
ms	0.7 ± 3.5 (0–26)
fs	1.1 ± 6.2 (0–62)
dmfs	4.8 ± 11.0 (0–63)
Enamel hypoplasia (n = 198)	
Yes	13 (6.6)
No	185 (94.4)
Enamel opacity (n = 197)	
Yes	15 (7.6)
No	182 (92.4)
Developmental defects of enamel (n = 198)	
Yes	23 (11.6)
No	175 (88.4)
Infant dental mutilation (dental enucleation)	
Yes	6 (2.8)
No	205 (97.2)
Dental needs (as assessed by dentist)	
Prevention only	116 (55.7)
Non-urgent treatment	60 (28.9)
Urgent treatment	32 (15.4)

Note: dmft = decayed, missing and filled teeth, dmfs = decayed, missing, filled surfaces, SD = standard deviation.

*Except for dmft and dmfs scores.

from Africa (43.6%). Few parents reported that their child had visited a dentist in Winnipeg (27.3%); however, 35.1% believed that their child had a dental problem.

ECC was identified in 96 children (45.5%), while the prevalence of S-ECC was 31.8% (67 of the 211 children). Overall, this revealed that 69.8% (67) of children with ECC had this more rampant subtype of caries (**Table 2**). The mean dmft score was 2.2 ± 3.8 while the mean dmfs score was 4.8 ± 11.0. In addition, the SIC indexes of the third of children with the highest dmft and dmfs scores were 6.2 and 13.8, respectively. Most of the children had untreated caries, as shown by the dt score, which was 78.6% of the dmft score, and the ds score, which was 62.5% of the dmfs score.

The prevalence of developmental defects of enamel (DDE) was 11.6% (23 of 198 children); 6.6% had enamel hypoplasia

Table 3: Associations between early childhood caries (ECC) and covariables of interest in our study group of newcomer children in Winnipeg ($n = 211$).

Variable	Caries free, no. (% by variable)*	ECC, no. (% by variable)*	p
Sex			
Female	55 (56.7)	42 (43.3)	0.55
Male	60 (52.6)	54 (47.4)	
Responding parent			
Father	13 (50.0)	12 (50.0)	0.62
Mother	102 (55.1)	83 (44.9)	
Child's mean age, months \pm SD	37.1 \pm 14.9	49.0 \pm 14.0	< 0.001
Region of origin			
Africa	58 (63.0)	34 (37.0)	0.11
Americas	3 (75.0)	1 (25.0)	
Eastern Mediterranean	30 (45.5)	36 (54.5)	
Europe	3 (75.0)	1 (25.0)	
Southeast Asia	16 (53.3)	14 (46.7)	
Western Pacific	5 (33.3)	10 (66.7)	
Recent newcomer (≤ 24 months)			
Yes	56 (51.4)	53 (48.6)	0.35
No	59 (57.8)	43 (42.2)	
Government-sponsored refugee			
Yes	12 (50.0)	12 (50.0)	0.64
No	103 (55.1)	84 (44.9)	
Recent refugee			
Yes	44 (51.2)	42 (48.8)	0.32
No	68 (58.1)	49 (41.2)	
Child ever visited dentist in Winnipeg			
Yes	19 (33.3)	38 (66.7)	< 0.001
No	95 (62.5)	57 (37.5)	
Dental insurance			
Yes	53 (50.5)	52 (49.5)	0.24
No/unsure	62 (58.5)	44 (41.5)	
Parent thinks child has dental problem			
Yes	18 (24.3)	56 (75.7)	< 0.001
No	97 (70.8)	40 (29.2)	
Child born in Canada			
Yes	47 (60.3)	31 (39.7)	0.20
No	68 (51.1)	65 (48.9)	
Mean time child in Manitoba, months \pm SD	21.5 \pm 13.2	22.7 \pm 15.4	0.55
Enamel hypoplasia			
Yes	2 (15.4)	11 (84.6)	0.007†
No	104 (56.2)	81 (43.8)	
Enamel opacity			
Yes	8 (53.3)	7 (46.7)	0.97
No	98 (53.9)	84 (46.1)	
Developmental defects of enamel			
Yes	8 (34.8)	15 (65.2)	0.055
No	98 (56.0)	77 (44.0)	
Debris score, mean \pm SD	0.49 \pm 0.40	0.78 \pm 0.34	< 0.001

Note: SD = standard deviation.
*Except where other units given.
†Fisher's exact test.

(13 children) and 7.6% had enamel opacities (15 children). Of interest, 6 children (2.8%) had been affected by infant dental mutilation (i.e., enucleation). The mean debris score was 0.67 ± 0.71 (range 0–6).

Children affected by ECC were significantly older than caries-free children (49 ± 14.0 months vs. 37.1 ± 14.9 months) (**Table 3**). Significantly more children who visited a dentist in Winnipeg had ECC than children who had not yet done so (66.7% vs. 37.5%) and more children of parents who reported that their child had a dental problem had ECC than those who reported their child was free from dental problems. The presence of enamel hypoplasia was significantly associated with ECC ($p = 0.007$). Children with ECC also had significantly higher debris scores than caries-free children ($p < 0.001$).

There was no significant difference in the proportion of boys and girls with S-ECC and, unlike the findings for ECC, there was no difference in the mean age between children with and without S-ECC (**Table 4**). Children with enamel hypoplasia were significantly more likely to have S-ECC than those without (61.5% vs. 29.7%). Those with S-ECC were also found to have significantly higher debris scores. The prevalence of S-ECC was significantly higher among children whose parents reported that their child had a dental problem than those who reported their child did not have any dental problems.

Canadian-born children had significantly lower dmft scores than those born outside Canada ($p = 0.040$) (**Table 5**). A statistically significant association was

Table 4: Association between severe early childhood caries (S-ECC) and covariables of interest in our study group of newcomer children in Winnipeg (n = 211).

Variable	No S-ECC, no. (% by variable)*	S-ECC, no. (% by variable)*	p
Sex			
Female	72 (74.2)	25 (25.8)	0.085
Male	72 (63.2)	42 (36.8)	
Responding parent			
Father	17 (65.4)	9 (34.6)	0.74
Mother	127 (68.7)	58 (31.3)	
Child's mean age, months ± SD	39.5 ± 15.4	41.8 ± 15.5	0.30
Region			
Africa	69 (75.0)	23 (25.0)	0.14
Americas	3 (75.0)	1 (25.0)	
Eastern Mediterranean	43 (65.1)	23 (34.9)	
Europe	4 (100.0)	0 (0.0)	
Southeast Asia	18 (60.0)	12 (40.0)	
Western Pacific	7 (46.7)	8 (53.3)	
Recent newcomer (≤ 24 months)			
Yes	71 (65.1)	29 (34.9)	0.32
No	73 (71.6)	38 (28.4)	
Government-sponsored refugee			
Yes	15 (62.5)	9 (37.5)	0.52
No	129 (69.0)	58 (31.0)	
Recent refugee			
Yes	55 (64.0)	31 (36.0)	0.19
No	85 (72.7)	32 (27.3)	
Child ever visited dentist in Winnipeg			
Yes	30 (52.6)	27 (47.4)	0.003
No	113 (74.3)	39 (25.7)	
Dental Insurance			
Yes	65 (61.9)	40 (38.1)	0.049
No/unsure	79 (74.5)	27 (25.5)	
Parent thinks child has dental problem			
Yes	31 (41.9)	43 (58.1)	< 0.001
No	113 (82.5)	24 (17.5)	
Child born in Canada			
Yes	55 (70.5)	23 (29.5)	0.59
No	89 (66.9)	44 (33.1)	
Mean time child in Manitoba, months ± SD	22.6 ± 14.2	20.8 ± 14.3	0.40
Enamel hypoplasia			
Yes	5 (38.5)	8 (61.5)	0.017
No	130 (70.3)	55 (29.7)	
Enamel opacity			
Yes	8 (53.3)	7 (46.7)	0.19
No	127 (69.8)	55 (30.2)	
Developmental defects of enamel			
Yes	10 (43.5)	13 (56.5)	0.007
No	125 (71.4)	50 (28.6)	
Debris score, mean ± SD	0.51 ± 0.38	0.87 ± 0.30	< 0.001

Note: SD = standard deviation.
*Except where other units given.

found between mean dmft scores and region of origin of families. Tukey's analysis revealed that children from the Western Pacific had scores significantly higher than children from Africa (5.1 ± 6.5 vs. 1.6 ± 3.0). Children who were reported to have visited a dentist in Winnipeg had significantly higher dmft scores than those who did not (3.8 ± 4.9 vs. 1.6 ± 3.1, p = 0.003). Significantly higher scores were found among children whose parents reported that their child had a dental problem compared with those who did not (4.6 ± 4.8 vs. 0.9 ± 2.2, p < 0.001).

It was surprising that boys had significantly higher dmfs scores than girls (p = 0.031) (Table 5). ANOVA revealed that mean dmfs scores significantly differed by region of origin. Tukey's analysis indicated that children from the Western Pacific had significantly greater dmfs scores than those from Africa (13.2 ± 19.7 vs. 2.8 ± 7.5). Findings of significant associations between dmfs score and the history of dental visits in Winnipeg and parents' beliefs that their child had dental problems mirrored those reported for mean dmft scores.

Logistic regression analyses showed that increasing age, the presence of debris on teeth, parents believing their child had dental problems and the presence of enamel hypoplasia were significantly and independently associated with ECC (Table 6). Those with enamel hypoplasia were 6.1 times more likely to have ECC, and those whose parents thought they had a dental problem were 5.5 times more likely to have ECC. Similarly, the presence of debris on teeth, parental reporting that their child had a dental problem and enamel hypoplasia were significantly and independently associated with S-ECC (Table 7).

Discussion

This study provides important insight into the oral health status of newcomer children in Manitoba, Canada. Other Canadian data exist, but are generally limited to small populations in specific large urban centres.^{11,12,15,22} Previous studies suggest that there is considerable variation in the prevalence of ECC among newcomers and refugees, but it frequently exceeds 50%.^{11,15,23-25} Our study revealed that ECC is also prevalent in newcomer preschool children in Winnipeg, affecting 45.5% of our study participants. Further, nearly 70% (67/96) of those children had advanced decay that

Table 5: Association between decayed, missing and filled teeth (dmft) and decayed, missing, filled surfaces (dmfs) scores and covariables of interest in our study group of newcomer children in Winnipeg (n = 211).

Variable	dmft (mean ± SD)*	p	dmfs (mean ± SD)*	p
Sex				
Male	2.6 ± 4.4	0.077	6.2 ± 13.8	0.031
Female	1.7 ± 2.8		3.1 ± 5.8	
Responding parent				
Father	2.5 ± 3.9	0.73	6.4 ± 11.3	0.43
Mother	2.2 ± 3.7		4.6 ± 11.0	
Child's mean age in months	Correlation 0.26		Correlation 0.22	
Region of origin†				
Africa	1.6 ± 3.0		2.8 ± 7.5	
Americas	0.3 ± 0.5		0.3 ± 0.5	
Eastern Mediterranean	2.7 ± 3.8	0.001‡	6.4 ± 12.6	0.01‡
Europe	0.25 ± 0.5		0.3 ± 0.5	
South East Asia	2.2 ± 4.0		4.6 ± 9.8	
Western Pacific	5.1 ± 6.5		13.2 ± 19.7	
Recent newcomer (≤ 24 months)				
Yes	2.7 ± 4.3	0.077	5.4 ± 11.3	0.38
No	1.7 ± 3.1		4.1 ± 10.7	
Government-sponsored refugee				
Yes	2.7 ± 3.6	0.54	4.6 ± 8.0	0.92
No	2.2 ± 3.8		4.8 ± 11.3	
Recent Refugee				
Yes	2.6 ± 4.0	0.21	5.0 ± 9.6	0.80
No	1.9 ± 3.6		4.6 ± 12.1	
Child ever visited dentist in Winnipeg				
Yes	3.8 ± 4.9	0.003	10.3 ± 17.2	0.002
No	1.6 ± 3.1		2.8 ± 6.5	
Dental insurance				
Yes	2.3 ± 3.9	0.65	5.3 ± 11.4	0.48
No/unsure	2.1 ± 3.6		4.3 ± 10.6	
Parent thinks child has dental problem				
Yes	4.6 ± 4.8	< 0.001	10.4 ± 14.9	< 0.001
No	0.9 ± 2.2		1.8 ± 6.4	
Child born in Canada				
Yes	1.6 ± 2.9	0.040	3.8 ± 10.3	0.30
No	2.6 ± 4.2		5.4 ± 11.4	
Time child in Manitoba in months	Correlation -0.054		Correlation 0.005	
Enamel hypoplasia				
Yes	4.8 ± 5.3	0.084	9.5 ± 14.2	0.092
No	2.1 ± 3.5		4.5 ± 10.2	
Enamel opacity				
Yes	2.3 ± 3.1	0.89	5.5 ± 8.7	0.76
No	2.2 ± 3.7		4.7 ± 10.7	
Developmental defects of enamel				
Yes	3.5 ± 4.5	0.078	7.3 ± 12.0	0.22
No	2.1 ± 3.5		4.5 ± 10.3	
Debris score	Correlation 0.42		Correlation 0.32	

Note: SD = standard deviation.

*Except for correlations.

†Analysis of variance.

‡Africa differs from Western Pacific.

fulfilled the criteria and were classified with S-ECC.

Overall, more than 75% of teeth affected by caries were untreated, indicating that there may be considerable barriers impeding access to regular dental care. Despite this level of unmet dental needs, few parents believed that their child had dental problems. This finding is similar to reports on African immigrants to another region of Canada where parental assessments also did not correlate with clinical assessments.¹¹

Dental attendance among newcomer children may be a result of parental beliefs and perceptions.¹² Parents who cannot easily recognize caries, view dental visits as painful encounters, lack time and face barriers to accessing care may be less likely to seek dental care for their child.¹² In addition, studies suggest that parents from certain ethnic and cultural groups may seek dental care only after their children start to experience pain.^{4,26} Unfortunately, fewer than 30% of the children participating in our study had been to a dentist — fewer than the 43% reported in a sample of new immigrants in Edmonton, but consistent with other Canadian data reporting low rates of early dental visits.^{12,27} It also appears that children who had visited a dentist in Winnipeg did so because they had dental issues, as the prevalence of ECC and S-ECC were higher among those who had already connected with a dental office in the city.

In Canada, the dental care system is outside the universal health care system, which means that many families cannot afford care (at the time of our study, only federal-government-sponsored refugees had IFH dental benefits). This is reflected in the fact that so few of our study participants had dental insurance, which might explain why most had not been to a dentist.

Table 6: Logistic regression analysis of factors affecting early childhood caries among our study group of newcomer children in Winnipeg (n = 211).

Variable	Adjusted odds ratio	95% confidence interval for odds ratio	p
Child's age (months)	0.98	0.95, 0.99	0.034
Debris score	0.17	0.06, 0.45	< 0.001
Parent thinks child has dental problem (reference = no)	5.51	2.63, 11.53	< 0.001
Child has visited dentist in Winnipeg (reference = no)	1.80	0.83, 3.91	0.14
Presence of enamel hypoplasia (reference = no)	6.10	1.18, 31.73	0.031

R² (coefficient of determination) = 27.2%.

Table 7: Logistic regression analysis of factors affecting severe early childhood caries among our study group of newcomer children in Winnipeg (n = 211).

Variable	Adjusted odds ratio	95% confidence interval for odds ratio	p
Sex (reference = female)	1.80	0.83, 3.95	0.14
Debris score	0.04	0.01, 0.15	< 0.001
Parent has dental insurance (reference = no)	1.12	0.51, 2.45	0.77
Parent thinks child has dental problem (reference = no)	4.44	2.04, 9.66	< 0.001
Child has visited dentist in Winnipeg (reference = no)	1.32	0.59, 2.98	0.5
Presence of enamel hypoplasia (reference = no)	3.93	1.01, 15.24	0.048

R² (coefficient of determination) = 36.5%.

Surprisingly, children with dental insurance in our study were significantly more likely to have S-ECC. However, this relation did not persist after logistic regression analysis. Parental awareness of available dental public health options may also be an access-to-care issue, as many of the families in our study were eligible for publicly funded programs that provide assistance to low-income families, but did not avail themselves of them.

The use of trained interpreters at scheduled dental visits may improve overall family experience and dental attendance. In Winnipeg, community-based dental clinics can request interpreters for dental appointments through the Language Access Program of the Winnipeg Regional Health Authority. This program has helped to improve access to dental care and minimize language barriers for refugees and new immigrants. Last year, there were over 1500 requests for

interpreters for newcomer dental visits in the region.

We did not find any significant association between newcomers' region of origin and prevalence of ECC and S-ECC. However, ANOVA revealed that children from Western Pacific countries (e.g., Philippines, China, Vietnam) had significantly higher dmft and dmfs caries scores than children from Africa. A high caries burden has also been reported among immigrant children to Canada from these Western Pacific and Southeast Asian countries.²⁸⁻³⁰ As ECC occurs in many different groups of newcomers, oral health promotion activities must be tailored to each group to ensure they are culturally appropriate and effective.^{4,31,32}

Similar to other studies, our investigation revealed that older children were more likely to have ECC.^{5,33-35} This finding is logical and commonly observed, as older children have had more teeth exposed to cariogenic microorganisms and caries-promoting sugars over time, thus increasing the risk of decay.³⁵ Tooth debris was also found to be significantly associated with ECC and S-ECC. Although this association does not indicate cause and effect, it does allow one to speculate that children with increased plaque at the time of examination likely had debris on their teeth at the time caries activity began.³⁶ It also indicates that children with ECC continue to suffer from less than ideal oral hygiene.³⁶ These children may not be brushing their teeth with parental supervision, which also contributes to increased risk of decay.³⁷ Regular brushing of teeth is important in reducing the level of plaque. A recent report on the oral health status of immigrant and refugee children in North America stated that newcomer children were less likely to brush and floss than non-newcomers.⁹ This might explain the high mean debris score reported for the children in our study, and this is a risk factor that must be addressed.

Parents' belief that their child has dental problems was found to be significantly and independently associated with ECC. Even though only 74 parents thought their child had dental problems, 56 (75%) of them were correct. This high sensitivity shows that it is possible for parents to correctly assess their child's oral health. With knowledge and guidance, more parents can be trained to properly assess their child's dental condition and identify major problems.

Previous studies have reported an association between enamel hypoplasia and dental caries.³⁸⁻⁴⁰ Children in our study with enamel hypoplasia were 6.1 and 3.9 times more likely to have ECC and S-ECC, respectively. Some have suggested that cases of S-ECC exhibited in some at-risk groups in North America may be the result of preceding enamel hypoplastic defects and, thus, coined the term "hypoplasia-associated S-ECC" or "HAS-ECC."⁴¹

A unique finding among our group of newcomer children was the observation of infant dental mutilation, which has been reported in children from East Africa.^{42,43} Six children were identified (2.8%), most of whom were from Somali

families. The prevalence of infant dental enucleation in our sample is similar to that reported among newcomers in Sweden.⁴³ This practice by traditional healers is often performed to alleviate childhood illness.^{42,43} Primary tooth germs are often crudely removed from infants as the gingival swelling with unerupted primary canines is believed to be “tooth worms.”⁴² In addition to missing teeth in the primary dentition, this cultural practice can also result in damage to future permanent teeth.⁴²

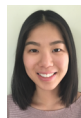
In response to growing awareness of the unmet dental needs of refugee and newcomer young children in Manitoba, the Healthy Smile Happy Child initiative developed a pictorial-based oral health promotion resource to raise awareness of the importance of oral health among newcomers and service providers caring for them.⁴⁴ Key messages include the need to look in your child's mouth to spot signs of caries, brush children's teeth twice daily, provide food good for teeth and take your child to the dentist. Oral health presentations to immigrant and refugee groups also emphasize these important messages. Refugee oral health has become an important health issue for the Winnipeg Regional Health Authority, and its BridgeCare primary care clinical program for refugees established a formal referral process to connect families with 2 existing community-based dental clinics in the region.

This study had some limitations. Most examinations were not conducted in a dental clinic; thus, only visual examination was carried out and ideal lighting conditions were not always present. Fortunately, all dental examinations were conducted by 2 dental examiners following set criteria for assessing caries. Another challenge was the fact that we did not have access to trained interpreters during every study visit because of lack of availability and funding. Thus, we had to simplify questions in our basic survey tool and limit their number, so that those with limited English language proficiency could provide responses. Another limitation was the small size and convenience nature of our population. Although this may pose statistical challenges and hinder the generalizability of our findings, our study still provides insight into the burden of caries among children of refugee and immigrant families.

THE AUTHORS



Mr. El Azrak is a dental student and research assistant, Children's Hospital Research Institute of Manitoba.



Ms. Huang is a dental student and research assistant, Children's Hospital Research Institute of Manitoba.



Dr. Hai-Santiago is provincial oral health consultant, Department of Manitoba Health, Seniors and Active Living.



Ms. Bertone is assistant professor and director, School of Dental Hygiene, and director, Centre for Community Oral Health, College of Dentistry, Rady faculty of health sciences, University of Manitoba.



Ms. DeMaré is project coordinator, Healthy Smile Happy Child initiative, College of Dentistry, Rady faculty of health sciences, University of Manitoba.



Dr. Schroth is associate professor and clinician scientist, College of Dentistry and Max Rady College of Medicine, Rady faculty of health sciences, University of Manitoba; research scientist, Children's Hospital Research Institute of Manitoba; and Section Head, Pediatric Dentistry, Winnipeg Regional Health Authority.

Correspondence to: Dr. Robert J. Schroth, College of Dentistry & Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, 507—715 McDermot Ave, Winnipeg MB R3E 3P4. Email: robert.schroth@umanitoba.ca

Acknowledgements: Operating funds were provided by Manitoba Health, Seniors, and Active Living and the University of Manitoba. Mohamed El Azrak received a summer studentship from the Children's Hospital Research Institute of Manitoba and Alice Huang received a summer research award from the University of Manitoba. Dr. Schroth holds a CIHR Embedded Clinician Researcher Salary Award in improving access to oral health care and oral health care delivery for at-risk young children in Manitoba. We thank the following people for their assistance in the recruitment process: members of the Healthy Smile Happy Child team, Eleonore Kliewer, Betty-Anne Mittermuller, and Bernardo Vilhena. We also thank the following students: Manisha Bansal, Jena Froese, Joseph Grauer, Katie Guenther, Alyssa Malenki, Jesse Marques, Stephanie Ndayisenga, Andrew Pierce, Shelley Tang and David Truong. We thank Access Downtown, Healthy Start for Mom and Me, Hospitality House, the Immigrant and Refugee Community Organization of Manitoba, Mosaic Bethel, Mount Carmel Clinic and Welcome Place for allowing us to recruit study participants at their sites.

The authors have no declared financial interests.

This article has been peer reviewed.

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