

Factors Affecting Dental Attendance of Children of New Immigrant Parents: A Cross-Sectional Study

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Abstract To explore factors affecting children's dental attendance among new immigrants. Participants in this cross-sectional study were 314 new immigrant child-parent pairs. Parents' demographics, oral health knowledge, perceptions, child's caries status, and oral health behaviours were analysed as determinants for dental attendance. Only 43 % of children had a dental visit within the year. Parents believing in the effectiveness of parental checking were four times more likely to seek dental care for their child [adjusted OR (adOR) 4.48, 95 % CI 1.79–11.13]. Parents perceiving dental check-up as a painful experience were 67 % less likely to visit the dentist (adOR 0.33, 95 % CI 0.17–0.63). Lack of insurance and time reduced the odds of a dental visit by 65 and 59 %, respectively (adOR 0.35, 95 % CI 0.16–0.68; adOR 0.41, 95 % CI 0.12–0.99). The care-seeking behaviour of new immigrant children was determined by parents' perceived ability to detect caries, availability of time and dental insurance, and their perceived dental experience.

Keywords Immigrants · Dental care utilization · Health services accessibility · Healthcare disparities · Oral health perceptions

Introduction

Worldwide, dental caries is the most prevalent chronic childhood disease with more than 40 % of children having caries by the time they reach kindergarten [1]. Poor oral health influences children's school attendance and increases the number of days with restricted activity. It also affects children's smiling patterns and, thus, their social interactions [2]. In Canada, the prevalence of early childhood caries (ECC) in general population is 5 %; however, there are known high-risk groups, such as new immigrants and Aboriginals, who have ECC rates between 50 and 80 % [3–5].

Recent immigrants and refugees form a sub-segment of the community that requires a special attention due to their unique challenges like financial insecurity, unemployment, language barrier, and cultural diversity [3, 5]. Such differences can also predispose them to suboptimal oral health and oral health-related habits including care-seeking behaviour [6]. Dental attendance is a habit that can optimise children's oral health and help restore children's oral health integrity. Such habit has to be established early after immigration to prevent oral health deterioration until families are more settled. However, lower rates of dental visits have been repeatedly reported among recent immigrants [5, 7].

In a recent systematic review, factors affecting children's dental attendance were identified and grouped under three different levels [8]. Factors reported at the patient level included parents' education, socioeconomic status, behavioural beliefs, perceived power, and subjective norms [8]. At the provider level, communication and professional skills and at the system level, collaborations between communities and health care professionals as well as a formal policy of referring patients from family physicians

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and pediatricians to dentists were the major influences [8]. These identified factors were mainly for general population and may not be the same for new immigrants. Beliefs and perceptions that new immigrants bring with them as well as their acculturation and the way they adapt to their new surroundings may also influence their care-seeking behaviour.

Factors determining dental attendance in immigrants have been explored in previous studies [5, 9–11]. However, suggested determinants were mainly related to the cost and access to dental care. A more comprehensive investigation is required to shed light on not only the systemic barriers, but also perception barriers that impede the care-seeking behaviour for young children among new immigrant. Therefore, the aim of the present study was to comprehensively explore factors affecting dental attendance of children among new immigrant communities.

Methods

Setting and Sampling

A convenience sample of new immigrant parents with a pre-schooler was invited to participate in this cross-sectional study. New immigrant was defined as those who have lived in Canada for 10 years or less with a citizenship or permanent resident status [12]. Participants were recruited through programs run by the community settlement agencies serving newcomers in Edmonton between March 2012 and July 2014. The study protocol was approved by the University of Alberta Research Ethics Board and Alberta Health Services and presented following STROBE guidelines.

Data Collection

Data collection was done in different community locations that were convenient for the participants. Bilingual trained community workers obtained parents' consents and helped with administration of the questionnaire, which were in English. Almost all parents who were approached accepted the invitation. The questionnaire, developed based on the previous studies, was first tested in a small focus group of 20 mothers with young children for comprehensiveness, understandability, and neutrality of the questions and required modifications were made. It comprised of 6 major sections. The first section asked about participants' demographics including child's and mother's age, number of children in the family, child's live-in parent status, county of origin, child's place of birth, immigration class (category under which the person/family gained their immigration status), years in Canada, mother's level of

education, and household monthly income. In the second section, parents' oral health knowledge and perceptions about caries were examined. The questions were about causes of dental caries in children, the importance of primary teeth and overall oral health for general health, how cavities look like, and the effectiveness of parental checking in caries detection.

Children's oral hygiene and diet habits were collected in the third section. Questions were related to the cleaning of child's teeth (method, onset, frequency, and parental involvement), bottle and breast-feeding habits, and sugar consumptions frequency. The fourth section was about children's dental attendance. Questions explored parent's beliefs about the effectiveness of dental check-ups, dentists performing unnecessary treatments, dental check-up as a painful experience, and contracting other diseases from the dental office.

Barriers to dental visits were examined in the fifth section through questions about child's temperament, finding a dentist, difficulty of making a dental appointment, communicating with the dentist, lack of time, lack of knowledge, lack of insurance, lack of transportation, lack of support care for other children, and weather. Parent's awareness about their child's caries status was examined in the last section by one question: "Does your child have cavities?"

Completion of the questionnaire took about 10–15 min. Questionnaires were assessed for completeness on-site and any missing or incomplete information was immediately collected from the participants.

Clinical Examination

A portable dental chair, headlamp, sterilized mirror and explorer were used for dental examination of children in the community. Caries status of each child was recorded according to WHO criteria by the first author (MA). Caries was defined at the level of cavitation of enamel or dentin. The caries measurements used were untreated decayed, filled, and missing teeth/surfaces due to caries. Awareness of untreated caries was determined by comparing perceived with clinically diagnosed caries (d component of the dmfs index). Parents were considered as aware when there was no difference in perceived and normative presence or absence of untreated caries.

Statistical Analysis

Data were managed and analyzed using SPSS 21.0 software (IBM Corp., Armonk, NY, USA). Means (SD) and frequencies were used for data description. The main outcome in the analysis was visiting the dentist during last year and was evaluated as binary response (No = 0,

Yes = 1). Associations between demographics, OH knowledge and perceptions and children dental visit were evaluated by Chi square for categorical variables and *t* test for continuous variables. Factors with significant association ($p < 0.05$) were further analyzed as predictors for dental attendance using logistic regression analysis. A *p* value of <0.05 was considered statistically significant.

Results

Demographics

A total of 314 child-parent pairs participated in this study with almost equal gender distribution (Table 1). Mean (SD) age of children was 62.7 (17.2) months, about 60 % were born outside Canada, and 89 % lived with both parents. The mean age of mothers was 34.1 (5.3) years old and more than half of them had a college degree or more. Two thirds of participants had less than three children, were family or economic class immigrants, and had an average household income of 1000–4000 CAD monthly. The mean duration of living in Canada was 4.6 (4.4) years. Majority of participants were from India, Nepal, Somalia, Ethiopia, Eritrea and Sudan. About half of the children had dental insurance and almost 43 % had a dental visit within the previous year. Among the collected demographics, only dental insurance and duration in Canada were significantly associated with child's dental attendance. Children of families who had dental insurance and lived longer in Canada were more likely to visit the dentist in the year before ($p < 0.001$, $p = 0.019$, respectively). Participants' demographics and dental visits are summarised in Table 1.

Parents' Knowledge and Perceptions of Caries

Sixty-four percent of parents associated cavities with black spots, 18.2 % with brown spots, and 43.3 % with holes in teeth (Table 2). About 28.3 % associated tooth decay with the presence of pain, 7.3 % with the presence of infection, 6.4 % with having eating problems, and 3.2 % with having sleeping problems. Among the signs associated with dental decay, only presence of brown spots and eating problems were significantly associated with children's dental attendance ($p = 0.025$, 0.01 , respectively).

Regarding parental perceived causes of caries, sweets consumption was the most identified cause (82.2 %) followed by poor oral hygiene (61.8 %). The majority of parents (79.3 %) believed that cavities in baby teeth progress very slowly, and 23 % thought that dental decay does not affect child's overall health. About 60 % believed that parents can easily find cavities in children but only 10 % indicated that professional check-up is not necessary if

parents check their child's teeth. Parents' knowledge and perceptions about caries are summarised in Table 2.

Oral Health Habits

Tooth brushing with toothpaste was the most common method of cleaning for the majority of children (92.6 %). About 46 % of children were in charge of cleaning their own teeth. One third of participants consumed foods or drinks high in sugar more than 3 times between meals. Only 13.7 % of children were still bottle- or breast-fed. Out of the studied habits only current breast/bottle feeding habit was significantly associated with child's dental attendance ($p = 0.005$). However, this association was not significant when evaluated in less than 2 years old children ($p = 0.961$). OH habits and dental attendance are shown in Table 3.

Parents' Perceptions About Dental Attendance

More than 75 % of parents believed that parental checking of children's teeth is effective for detecting cavities but only 22.6 % described it as a very easy task (Table 4). Majority believed that dentist check-up is somewhat effective or very effective for detecting caries. However, 20 % thought dentists may perform unnecessary treatments and 27.1 % said that dental checkup can be a painful experience. Out of the studied perceptions, both effectiveness of parental checking and that dental check-up can be a painful experience were associated with dental attendance ($p = 0.018$, 0.003 , respectively). Parental perceptions and dental attendance are summarised in Table 4.

Perceived Barriers to Dental Attendance

Less than 15 % of participants considered children's resistance, lack of time, or lack of knowledge as strong barriers to checking their child's teeth (Table 5). The most common perceived barrier to taking children to the dentist was lack of insurance (51.2 %), followed by weather (42.6 %), lack of childcare for other children (34 %), lack of transportation (27 %), and lack of time (22 %). Barriers that were significantly associated with dental attendance were lack of insurance ($p < 0.001$), lack of time ($p = 0.001$), lack of transportation ($p = 0.03$), and difficulty finding a dentist ($p = 0.003$) (Table 5).

Normative Caries Status and Parental Awareness

Children's mean DMFT/dmft was 3.1 (3.5) and it was significantly higher in patients who visited the dentist during the last year ($p < 0.001$) with no significant difference in the DT/dt component between both groups

Table 1 Participants' demographics stratified according to utilization of dental attendance during last year

Subjects demographics	N (%)	Visited dentist last year		<i>p</i> value*	Unadjusted odds ratio (95 % CI)
		Yes	No		
Gender					
Boy	158 (50.3)	69 (43.7)	89 (56.3)	0.808	–
Girl	156 (49.7)	65 (42.3)	91 (57.7)		
Child age [mean (SD), months]	62.7 (17.2)	65.9 (14.0)	60.3 (19.3)	0.072**	–
Mother's age [mean (SD), years]	34.1 (5.3)	34.1 (5.3)	34.1 (5.2)	0.924**	–
Number of children*					
One	105 (33.4)	42 (40.0)	63 (60.0)	0.231	–
Two	121 (38.5)	56 (47.1)	65 (52.9)		
Three	46 (14.6)	15 (32.6)	31 (67.4)		
Four or more	41 (13.4)	20 (47.6)	21 (52.4)		
Child living with					
Single parents	35 (11.1)	17 (48.6)	18 (51.4)	0.596	–
Both parent	279 (88.9)	117 (42.3)	162 (57.7)		
Country of birth					
Canada	127 (40.4)	61 (48.0)	66 (52.0)	0.158	–
Outside Canada	187 (59.6)	73 (39.6)	114 (60.4)		
Immigration class					
Refugee	86 (27.4)	35 (40.7)	51 (59.3)	0.702	–
Family class	103 (32.8)	48 (46.6)	55 (53.4)		
Economic class	125 (39.8)	51 (41.6)	74 (58.4)		
Years in Canada [mean (SD)]	4.6 (4.4)	5.2 (4.4)	4.1 (4.3)	0.019**	1.06 (1.01–1.12)
Mothers' level of education					
Grade 9 and under	58 (18.5)	24 (39.7)	34 (60.3)	0.699	–
High school	80 (25.5)	31 (38.8)	49 (61.3)		
College or trade	50 (15.9)	22 (44.0)	28 (56.0)		
University degree	126 (40.1)	57 (46.0)	69 (54.0)		
Country of origin					
India	106 (33.8)	50 (48.1)	56 (51.9)	0.358	–
Nepal	60 (19.1)	27 (45.0)	33 (55.0)		
Somalia	38 (12.1)	19 (50.0)	19 (50.0)		
Ethiopia	29 (9.2)	8 (27.6)	21 (72.4)		
Eritrea	26 (8.3)	11 (42.3)	15 (57.7)		
Sudan	18 (5.7)	9 (50.0)	9 (50.0)		
Nigeria	7 (2.2)	2 (28.6)	5 (71.4)		
Pakistan	4 (1.3)	3 (75.0)	1 (25.0)		
Philippines	2 (0.6)	2 (100.0)	0 (0.0)		
Rwanda	2 (0.6)	1 (50.0)	1 (50.0)		
Others	22 (7.0)	2 (9.1)	20 (90.9)		
Monthly income ^a					
Under 1000	25 (8.0)	6 (24.0)	19 (76.0)	0.152	–
1000–1999	74 (23.6)	31 (41.9)	43 (58.1)		
2000–2999	76 (24.2)	34 (44.7)	42 (55.3)		
3000–3999	51 (16.2)	24 (47.1)	27 (52.9)		
4000–5000	39 (12.4)	21 (53.8)	18 (46.2)		
Over 5000	30 (9.6)	9 (30.0)	21 (70.0)		

Table 1 continued

Subjects demographics	N (%)	Visited dentist last year		<i>p</i> value*	Unadjusted odds ratio (95 % CI)
		Yes	No		
Does your child have dental coverage?					
No	158 (50.3)	45 (28.5)	113 (71.2)	<0.001	3.34 (2.09–5.33)
Yes	156 (49.7)	89 (57.1)	67 (42.9)		

p value < 0.05 are given in bold

* *p* values were assessed by Pearson Chi square test

** *p* values were assessed by *t* test

^a Total less than 314 as some participants did not report

(Table 6). Only 53.2 % of parents were aware of their child's caries status. However, no significant association was found between parental awareness of child's caries status and children's dental attendance ($p = 0.568$; Table 6).

Predictors of Children's Dental Attendance

Significant factors associated with children dental visits were further analyzed as predictors for utilization of dental services using logistic regression analysis (Table 7). Parents who associated caries with brown spots on teeth were twice (OR 2.12, 95 % CI 1.08–4.28) and those who believed in the effectiveness of parental checking were four times (OR 4.48, 95 % CI 1.79–11.13) more likely to visit the dentist for their child. On the other hand, parents believing that the dental check-up is a painful experience were 67 % less likely to visit the dentist compare to their counter parts (OR 0.33, 95 % CI 0.17–0.63). Both lack of insurance and time also reduced the odds of a dental visit by 65 and 59 % (OR 0.35, 95 % CI 0.16–0.68; OR 0.39, 95 % CI 0.12–0.99, respectively).

Discussion

Children of new immigrants have a low rate of dental attendance in the studied communities. Many parents were unaware of their child's caries status. Parental awareness was not significantly related to children's dental attendance. Out of the studied variables, perceived efficiency of parental checking, perceived dental check-up as a painful experience, lack of insurance, and lack of time were the main determinants of children's dental attendance.

Previous reports have shown low rates of dental visits among ethnic minorities [4] including immigrant families in Canada [10, 13] which is similar to our results. Low education and family income, family size, and lack of dental insurance along with being recent immigrants have been the sociodemographic features associated with poor

dental attendance [4, 5, 7, 9]. Duration in Canada and dental insurance were also found to be associated with dental attendance in the present study. Duration in the host country can have an indirect effect on children's dental attendance because parents who have lived longer in the host country may be more established and better informed about the available dental services and, therefore, more confident in obtaining dental care for their children. They may also feel more social demand for child's well-being in the domain of oral health as compared to their original country. The availability of dental insurance has been also shown to improve access to dental services [14], consistent with our results; however, having dental insurance did not seem to enhance the frequency of usage of dental care, especially preventive care, for children [14].

It is expected that parents' knowledge about caries and perceptions about dental visits to be the predictors of their care-seeking behavior. The majority of our participants associated caries with tooth discoloration or the presence of a hole in the tooth. However, only defining caries as brown spots, which is supported by the current knowledge, was a predictor for dental attendance. Theoretically, enhanced knowledge about the identity of carious lesions should help parents to detect the disease in an early stage and, in turn, will increase their perceived need for seeking care for their child. The perception that parental checking is effective in detecting caries was also a predictor of dental attendance in the present study. Such perception can be reinforced by enhancing parent's knowledge about early stages of carious lesions and promoting "lift the lip" habit in parents to become more aware of children's dental health status. However, parental awareness of children's untreated caries *per se* was not found to be a major determinant of dental attendance in our study as well as a previous report [5]. Possible explanation is that other perceptions and/or barriers may have stronger influences on the behaviour that would mask the impact of the awareness on predicting dental attendance. For example, the pain perception attributed to the dental visit has hindered the care-seeking behaviors among the adults for both themselves and their

Table 2 Parents' knowledge and perceptions of caries

Knowledge	N (%)	N visited the dentist (%)	<i>p</i> value*	Unadjusted odds ratios (95 % CI)
Signs parents associate with caries ^a				
Stain	41 (13.1)	16 (39.0)	0.599	–
Black spot	201 (64.0)	84 (41.8)	0.625	–
Brown spot	57 (18.2)	32 (56.1)	0.025	1.95 (1.09–3.47)
Yellow teeth	45 (14.3)	20 (44.4)	0.811	–
Hole in the teeth	136 (43.3)	57 (41.9)	0.778	–
Bad breath	37 (11.8)	16 (43.2)	0.955	–
If my child does not eat properly	20 (6.4)	3 (15.0)	0.01**	0.22 (0.06–0.76)
If my child does not sleep properly	10 (3.2)	1 (10.0)	0.083**	–
Pain	89 (28.3)	41 (46.1)	0.463	–
Infection	23 (7.3)	9 (39.1)	0.711	–
What causes of cavities are you aware of? ^a				
Sugary foods and drinks	258 (82.2)	115 (44.6)	0.283	–
Poor oral hygiene	194 (61.8)	92 (47.4)	0.053	–
Bacteria	72 (22.9)	40 (55.6)	0.016	1.97 (1.16–3.35)
Inappropriate bottle feeding	50 (15.9)	28 (56.0)	0.048	1.90 (1.03–3.49)
Genetics	23 (7.3)	13 (56.5)	0.184	–
Inappropriate breast feeding	10 (3.2)	5 (50.0)	0.665	–
Cavities in baby teeth get worse slowly				
Agree	249 (79.3)	108 (43.0)	0.623	–
Disagree	31 (9.9)	11 (35.5)		–
Not sure	34 (10.8)	15 (44.1)		–
Children can be emotionally affected as a result of having cavities				
Agree	193 (61.5)	84 (43.5)	0.490	–
Disagree	68 (21.7)	31 (45.6)		–
Not sure	53 (16.9)	19 (35.8)		–
Dentist check-up is not necessary if parents check their children's teeth regularly				
Agree	39 (12.2)	14 (35.9)	0.395	–
Disagree	252 (80.3)	112 (44.4)		–
Not sure	23 (7.5)	8 (37.8)		–
Parents can find cavities in baby teeth easily				
Agree	156 (49.7)	66 (42.3)	0.250	–
Disagree	88 (28.0)	43 (48.9)		–
Not sure	70 (22.3)	25 (35.7)		–
Cavities are normal in baby teeth				
Agree	76 (24.2)	33 (43.4)	0.729	–
Disagree	174 (55.4)	75 (43.1)		–
Not sure	64 (20.4)	26 (40.6)		–
There is not much that parents can do to prevent cavities in children				
Agree	63 (20.1)	27 (42.9)	0.124	–
Disagree	169 (53.8)	101 (59.8)		–
Not sure	82 (26.1)	6 (7.3)		–
Cavities in baby teeth do not affect the adult teeth				
Agree	72 (22.9)	23 (31.9)	0.676	–
Disagree	218 (69.4)	74 (33.9)		–
Not sure	24 (7.6)	17 (70.8)		–

Table 2 continued

Knowledge	N (%)	N visited the dentist (%)	<i>p</i> value*	Unadjusted odds ratios (95 % CI)
Cavities don't affect children's overall health				
Agree	72 (22.9)	36 (50.0)	0.154	–
Disagree	196 (62.4)	81 (41.3)		–
Not sure	46 (14.6)	17 (37.0)		–
Having cavities in baby teeth is not a big deal because they will fall out				
Agree	67 (21.3)	20 (29.9)	0.104	–
Disagree	210 (66.9)	97 (46.2)		–
Not sure	37 (11.8)	17 (45.9)		–

p value < 0.05 are given in bold

* *p* values were assessed by Pearson Chi square test

** *p* value was assessed by Fisher-exact test

^a Total can more than 100 % as multiple answers were allowed

Table 3 Participants' oral health habits

OH Behaviour	N (%)	N visited the dentist (%)	<i>p</i> value*	Unadjusted odds ratios (95 % CI)
How are your child's teeth being cleaned?				
Toothbrush	23 (7.3)	7 (30.4)	0.573	–
Toothbrush and toothpaste	256 (81.5)	110 (43.0)		
Toothbrush, toothpaste and floss	35 (11.1)	17 (48.6)		
Who mostly cleans your child's teeth?				
Child	144 (45.9)	69 (47.9)	0.142	–
Mother	142 (45.2)	52 (36.6)		
Father	28 (8.9)	13 (46.4)		
How many times a day are your child's teeth cleaned?				
Less than once a day	15 (4.8)	5 (33.3)	0.229	–
Once	128 (40.8)	52 (40.6)		
Twice	156 (49.7)	80 (51.3)		
More than twice	15 (4.8)	6 (40.0)		
When did you start cleaning your child's teeth?				
Before age 1	73 (23.2)	28 (38.4)	0.535	–
Age 1–2	146 (46.5)	65 (44.5)		
Age 2–3	66 (21.0)	26 (39.4)		
Age 3–4	25 (8.0)	13 (52.0)		
After age 4	2 (0.6)	1 (50.0)		
When did your child start cleaning his/her own teeth?				
Before age 2	26 (8.3)	11 (42.3)	0.183	–
Age 2–4	132 (42.0)	56 (42.4)		
Age 4–6	91 (29.0)	46 (50.5)		
After age 6	12 (3.8)	6 (50.0)		
Didn't start yet	51 (16.2)	15 (29.4)		
Is your child still bottle-fed or breast-fed?				
No	271 (86.3)	124 (45.8)	0.005	0.36 (0.17–0.76)
Yes	43 (13.7)	10 (23.3)		
How often does your child consume foods or drinks high in sugar?				
Never (less than once a day and only with the meals)	19 (6.1)	6 (31.6)	0.448	–
Occasionally (1 to 3 times either between or with meals)	190 (60.5)	82 (43.2)		
Frequently (more than 3 times between meals)	105 (33.4)	46 (43.8)		

p value < 0.05 are given in bold

* *p* value was assessed by Pearson Chi square test

Table 4 Parents' perceptions about dental attendance

Perceptions and believes	N (%)	N visited the dentist (%)	<i>p</i> value*	Unadjusted odds ratios (95 % CI)
How effective is parental checking to know if a child has cavities?				
Not effective	70 (22.3)	19 (27.1)	–	Reference
Somewhat effective	97 (30.9)	51 (52.6)	0.050	0.51 (0.26–1.00)
Very effective	141 (44.9)	64 (45.4)	0.018	1.42 (1.05–2.38)
How easy is it for you to see any cavities in your child's teeth?				
Not easy	134 (42.7)	56 (41.8)	0.712	–
Somewhat easy	109 (34.7)	50 (45.9)		–
Very easy	71 (22.6)	28 (39.4)		–
How effective is a dentist check-up to detect cavities?				
Not effective	19 (6.1)	5 (26.3)	0.304	–
Somewhat effective	40 (12.7)	22 (55.0)		–
Very effective	255 (81.2)	107 (42.0)		–
Do you think that dentists may perform unnecessary treatments?				
No	168 (53.5)	73 (43.5)	0.913	–
Yes	63 (20.1)	26 (41.3)		–
Not sure	83 (26.4)	35 (42.2)		–
Do you think that a dentist check-up is painful?				
No	187 (59.6)	71 (38.0)	–	Reference
Yes	85 (27.1)	50 (58.8)	0.003	0.45 (0.11–0.56)
Not sure	42 (13.4)	13 (31.0)	0.390	0.73 (0.35–1.50)
Do you think that your child may get other diseases at the dental clinic?				
No	218 (69.4)	91 (41.7)	0.561	–
Yes	39 (12.4)	20 (51.3)		–
Not sure	57 (18.2)	23 (40.4)		–

p value < 0.05 are given in bold

* *p* value was assessed by Pearson Chi square test

children [11, 15]. Increased awareness about the importance of dental visits for prevention of future complicated treatments and educating parents that those visits do not necessarily cause any discomfort for their child may increase children's dental attendance.

Barriers to parental care-seeking behaviors identified in the present study and previous reports [5, 16] include lack of insurance, time, transportation, and family support. Dental cost has been the most common reported reason behind suboptimal use of dental services as it can restrict access to dental care [17, 18]. Having insurance has been found to be an enabling factor increasing the use of dental services [18, 19]. Similarly, in our study, lack of dental insurance reduced the odds of dental attendance significantly. Although lack of access to care including uninsured status has been the most standing barrier to dental attendance [8, 11, 15], the availability of care and dental insurance has not been proven to be a solo predictor of dental attendance [8]. Perceived need is another important factor that promotes care-seeking behaviour among individuals with chronic health concerns like dental problems

or for prevention [20]. Therefore, the phenomenon is multifactorial and has to be approached using a multi-dimensional model.

The retrospective design of the present study was one of the limitations due to recall bias. To reduce such effect, the key outcome was if the child had a dental visit during last year and did not contain more details. In addition, the questionnaire was first tested in a small focus group of adult women with children and no recall issues were noticed. Therefore, recall bias was less likely to be a problem that would affect the results of the present study. Another limitation was restriction of recruitment to the communities that expressed interest and that the researchers had access to. As a result, our sample may not represent all ethnic minorities in Edmonton. Although a convenience sample was collected, the reached number of participants was enough to provide evidence based on sampling error of 0.05 and significance level of 0.05. In the present study, only clinical examination was used for caries assessment, this may underestimate the overall caries level due to

Table 5 Parents' perceived barriers to dental attendance

Barriers	N (%)	N visited the dentist (%)	<i>p</i> value*	Unadjusted odds ratios (95 % CI)
How much child's resistance would prevent you from checking your child's teeth?				
Not at all	194 (61.8)	81 (41.8)	0.719	–
Somewhat	85 (27.1)	36 (42.4)		–
Very much	35 (11.1)	17 (48.6)		–
How much lack of time would prevent you from checking your child's teeth?				
Not at all	233 (74.2)	100 (42.9)	0.934	–
Somewhat	67 (21.3)	29 (43.3)		–
Very much	14 (4.5)	5 (35.7)		–
How much lack of knowledge would prevent you from checking your child's teeth?				
Not at all	153 (48.7)	68 (44.4)	0.437	–
Somewhat	118 (37.6)	46 (39.0)		–
Very much	41 (13.1)	20 (48.8)		–
How easy is it for you to make a dental appointment?				
Not easy	75 (23.9)	32 (42.7)	0.203	–
Somewhat easy	68 (21.7)	23 (33.8)		–
Very easy	171 (54.5)	79 (46.2)		–
How easy is it for you to take your child to the dental clinic?				
Not easy	46 (14.6)	23 (50.0)	0.809	–
Somewhat easy	84 (26.8)	34 (40.5)		–
Very easy	172 (54.8)	77 (44.8)		–
How easy is it for you to communicate with the dentist?				
Not easy	67 (21.3)	27 (40.3)	0.815	–
Somewhat easy	57 (18.2)	23 (40.4)		–
Very easy	190 (60.5)	84 (44.2)		–
How much lack of insurance would prevent you from taking your child to the dentist?				
Not at all	153 (48.7)	84 (54.9)	–	Reference
Somewhat	46 (14.6)	21 (45.7)	0.195	0.64 (0.33–1.25)
Very much	115 (36.6)	29 (25.2)	<0.001	0.26 (0.15–0.45)
How much lack of time would prevent you from taking your child to the dentist?				
Not at all	246 (78.3)	116 (47.2)	–	Reference
Somewhat	48 (15.3)	10 (20.8)	0.616	0.79 (0.31–2.02)
Very much	20 (6.4)	8 (40.0)	0.001	0.28 (0.14–0.59)
How much lack of transportation would prevent you from taking your child to the dentist?				
Not at all	229 (72.9)	108 (47.2)	–	Reference
Somewhat	49 (15.6)	12 (24.5)	0.03	0.35 (0.17–0.71)
Very much	36 (11.5)	14 (38.9)	0.372	0.72 (0.35–1.49)
How much finding a dentist for your child would prevent you from taking your child to the dentist?				
Not at all	107 (34.1)	100 (93.5)	–	Reference
Somewhat	56 (17.8)	20 (35.7)	0.068	0.56 (0.30–1.04)
Very much	51 (16.2)	14 (27.5)	0.007	0.39 (0.19–0.78)
How much lack of somebody to take care of the other children would prevent you from taking your child to the dentist?				
Not at all	265 (84.4)	110 (41.5)	0.533	–
Somewhat	25 (8.0)	12 (48.0)		–
Very much	21 (6.7)	12 (57.1)		–

p value < 0.05 are given in bold

* *p* value was assessed by Pearson Chi square test

undiagnosed interproximal caries lesions which can be identified more accurately using radiographs.

Table 6 Children's caries status and parents' awareness of their child oral health status

Variables	N (%)	Visited dentist last year		<i>p</i> value*
		Yes	No	
Perceived dental status				
Aware	167 (53.2)	69 (41.3)	98 (58.7)	0.568
Unaware	147 (46.7)	65 (44.3)	82 (55.7)	
Mean (SD) DMFT/dmft	3.1 (3.5)	3.9 (3.8)	2.4 (3.1)	<0.001**
Mean (SD) DMFS/dmfs	6.5 (10.8)	9.3 (13.4)	4.4 (7.8)	<0.001**
Mean (SD) DT/dt	2.2 (2.9)	2.4 (3.1)	2.1 (2.7)	0.281**
Mean (SD) DS/ds	3.8 (6.3)	4.1 (6.6)	3.5 (6.1)	0.473**

* *p* values were assessed by Pearson Chi square test** *p* values were assessed by *t* test**Table 7** Final logistic regression prediction model of dental attendance adjusted for all significant studied factors

Independent variables*	Adjusted odds ratios	95 % CI	<i>p</i> value
Brown spot is associated with caries			
No	Reference	—	—
Yes	2.12	1.08–4.28	0.045
How effective is parental checking to know if a child has cavities?			
Not effective	Reference	—	—
Somewhat effective	3.45	1.63–8.54	0.003
Very effective	4.48	1.79–11.13	0.001
Do you think that a dentist check-up is painful?			
No	Reference	—	—
Yes	0.33	0.17–0.63	0.001
Not sure	1.05	0.42–2.49	0.960
How much lack of insurance would prevent you from taking your child to the dentist?			
Not at all	Reference	—	—
Somewhat	0.68	0.29–1.41	0.363
Very much	0.35	0.16–0.68	0.002
How much lack of time would prevent you from taking your child to the dentist?			
Not at all	Reference	—	—
Somewhat	0.55	0.19–2.65	0.541
Very much	0.41	0.12–0.99	0.048

* Only significant variables ($p < 0.05$) were kept in the final model. Odds ratios were adjusted for other variables in the model

In conclusion, the care-seeking behaviour in the studied new immigrant population was determined by parents' actual and perceived ability of identifying dental caries in children, their availability of time and access to dental care, and the perception that dental visit is not a painful experience. These factors have to be taken into consideration when designing oral health promotion programs for new immigrants to overcome the perceived barriers affecting their dental attendance. In addition, policies to provide easy access to care for new immigrant communities is important to improve their dental attendance.

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Compliance with Ethical Standards

Conflict of interest All authors declare no conflict of interests.

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