

**Report  
of the**

**Sample survey of the oral health  
of  
Toronto children  
aged 5, 7, and 13**

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## **The oral health of Toronto children aged 5, 7, and 13**

**JL Leake, F Goettler, B Stahl-Quinlan, H Stewart**

### Executive Summary

A Dental Indices Survey was conducted in Toronto during the 1999-2000 school year to obtain valid estimates of the oral health status of a probability sample of children in the four regions of the amalgamated Toronto. The results were to help develop recommendations for programs to address any problems identified.

The Dental Indices Survey (DIS) is the provincial protocol whereby information on the oral health status and treatment needs of children is obtained by conducting direct assessments of children. Two specially trained dental hygienists examined the child's teeth and periodontal tissues using sterilized mouth mirrors and blunt probes with a standard light source. Parents were informed of any key findings to share with the family dentist and children with urgent dental conditions were provided with a parent notification form that they could use to obtain the care needed.

3657 participants aged 5, 7 or 13 participated in the survey. Over 30% of children had had one or more cavities; 30.0% in the 5 year-olds, 41.3% in the 7 year-olds, and 39.3% in the 13 year-olds. Approximately 7% of children in the two younger age groups had at least one condition requiring urgent care. However, by age 13 this had fallen to 1.7%. The percent of children with 2 or more untreated decayed teeth was 10.8% in the 5 year-olds 7.0% in the 7 year-olds and 2.0% in the 13 year-olds. The mean number of teeth decayed, or missing, or filled among deciduous (deft) and permanent teeth (DMFT) for ages 5 (1.22) and 7 (1.59) and among permanent teeth alone (DMFT) at age 13 (1.13) most of the severity scores is represented by filled teeth. Dental fluorosis (TSIF  $\geq$  2) was found among 14% of 7 year-olds, and 12.3% of 13 year-olds. There were few clinically important differences between the regions.

Periodontal conditions increased with age, by age 13, 38% needed treatment to remove scale from their teeth.

Detailed analysis shows that caries scores were lowest among those born in Toronto and those treated with sealants. Fluorosis prevalence (TSIF  $\geq$  2) was 12.7% and was lowest among those born outside Canada. The prevalence of is of the same order as all but one of the more recent studies in Toronto and should fall as the reduced water concentration take effect.

Early Childhood Tooth Decay was found among 10.6% of the 5 year-olds. The South and the East regions had the highest prevalence and the condition was higher among children born outside Canada.

### Summary of recommendations for Toronto Public Health

1. Inequalities in untreated decay, and the need for urgent care, are greatest at the youngest age levels. Children with urgent needs are by definition suffering from pain or dental infection.

These conditions and their systemic manifestations of fever and lethargy impede a child's ability to learn, just at the time they are beginning their elementary school experience. The prevalence of untreated decay on two or more teeth and urgent needs among the two youngest age-groups warrants Public Health's continued efforts to reduce these conditions.

2. While the oral health of the children does not appear to vary that much between the regions (Table 3) it does vary highly and significantly by the prior risk-level of the school (Table 4). There appears to be continued justification for concentrating scarce resources on the youngest children in the high-risk schools. Knowing that children born outside Canada means that the Department needs to continue its efforts to deliver programs in a culturally sensitive manner.
3. Periodontal conditions increase with age, such that over 42% of the 13 year-olds had calculus. High levels of calculus reflect inadequate home and professional care. Toronto Public Health staff need to investigate and apply better strategies to have children adopt good home care with professional support.
4. Sealant use is both lower than warranted by current guidelines and much of the effort appears to be directed to those who are not at risk of the disease. Given the evidence of the effectiveness of sealants, Toronto Public Health needs to continue to offer information on the appropriate use of sealants for its own staff. In addition they should call on professional organizations in Ontario to educate private practitioners on the appropriate use of dental sealants.
5. Moderate fluorosis, defined at the level of TSIF greater than or equal to 2, was evident among 13.4 % of children aged 7. It appears that neither the prevalence nor severity is increasing. Indeed both indicators should fall, among those born in Toronto, with the reduction of the target levels of fluoride in the City's water from 1.2 ppm to 0.8 ppm that occurred in the fall of 1999. Based on the findings of fluorosis, Toronto Public Health should step up its efforts to inform parents of very young children of the safe use of fluoride dentifrices.
6. It appears that Early Childhood Tooth Decay (ECTD) is increasing in prevalence. Based on this apparent increase, and the costs and consequences of the disease, Toronto Public Health needs to adopt a much more pro-active program to address ECTD. The pros and cons of a population-wide versus a high-risk approach need to be carefully considered.

## **The oral health of Toronto children aged 5, 7, and 13**

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### 1.0 Purpose

We report on the results of the Dental Indices Survey conducted in Toronto during the 1999-2000 school year. The purpose was to obtain valid estimates of the oral health status of children in the four regions of the amalgamated Toronto and to develop recommendations for programs to address the problems identified.

### 2.0 Background

The Dental Indices Survey (DIS) is the provincial protocol whereby information on the oral health status and treatment needs of children is obtained by conducting direct assessments of children. The Provincial system uses standards first issued by the Canadian Dental Association in 1963 and followed in Ontario since 1970. Until recently the survey has been conducted on children of odd ages (3, 5, 7, 9, 11 and 13).

The DIS is mandated under the Mandatory Health Programs and Services Guidelines (December, 1997) pursuant to Section 7 of the Health Protection and Promotion Act RSO. 1990, c.H.7. The requirement is found in Requirements and Standards for both Program Planning and Evaluation (Item 2g) and Child Health (Items 8a and 8b).

The protocol for the DIS is defined in the Ministry of Health *Dental Indices Survey (DIS) Protocol*, January 1, 1998. This requires that all children at school entry Jr. and Senior Kindergarten receive a detailed dental examination with the findings recorded on machine readable format and submitted at year-end to the Ministry of Health for aggregation into a provincial summary. The examinations require 5-10 minutes per child and are provided by specially calibrated hygienists and recorders.

The last, relatively comprehensive, provincial survey was conducted in 1994, and the understanding at that time was that it would be repeated in 1998 and every four years thereafter. The 1994 survey was conducted a sample of children meant to be representative of the province, but in many jurisdictions additional children were included so that the data would reflect the health of children by health unit.

The current provincial protocol was changed from previous years. In the 1997 mandatory guidelines, the DIS was combined with the Jr. and Senior Kindergarten dental quick screening program and used to rank the schools into severity (risk) categories. Medium and high-risk schools are to receive further screening, clinical prevention and dental health education programs. Allocating more intensive preventive programming for children in schools with high needs is consistent with needs-based planning and focusing scarce resources on the areas that are most likely to gain health improvement.

However, one year's experience (1997/98) with the new protocol showed that combining the DIS with the quick screening on all Jr. and Sr. Kindergarten was not effective and was wasteful of staff resources. For example, conducting the detailed examinations on these two age groups, approximately 50,000 children, @ 5-10 minutes each represents 4-8 survey teams (8-16 staff) every year for the entire school year. Further, once a critical sample size is reached, information on additional children increases the precision of the estimates only marginally. Lastly, following the protocol means that the information on the children in the older ages is biased since children in low-risk schools have no chance of being included.

This survey was conducted on a probability sample of children in order to provide a valid estimate of the oral health status of the children in the amalgamated Toronto and its four health regions.

### 3.0 Objectives

The objectives were established by a meeting of the then dental managers in the fall of 1998. These represented a compromise between the desire for adequate information against the obvious constraints of staff time, given the priorities of their other programs. The objectives were:

1. To collect information on the oral health status and treatment needs of children that will be valid for each region and sufficiently precise to represent the health of the children in high, medium and low risk schools.
2. To use the provincially agreed examination standards,
3. To include, because of staffing constraints, only children of ages 5, 7 and 13.

### 4.0 Methods

The methods were approved by the Office of Research Services, University of Toronto, Research and Education, Policy and Programs Division, Toronto Public Health, and both the Toronto District Board of Education and the Toronto Catholic District School Board

#### 4.1 Sampling scheme

Based on the 1994 data, estimates of the precision for the percent of children who were caries free and mean DMFT scores were examined for sample sizes of 75, 100, and 200 children. The managers agreed that the increase in precision gained by including more than 100 children was not worth the additional costs. They decided to include 100 children per cell, per age cohort, per risk category. Thus the sample would consist of 3 (age groups) X 4 (regions) X 3 (risk groups) X 100 children = 3600 children

A database of all Toronto Public and Catholic School Board schools was prepared which contained information on the school name, address, health region, numbers of children enrolled in Sr. Kindergarten (age 5), Grade 2 (age 7), and Grade 8 (age 13), the school's risk category ranking (high medium and low) according to the 1997/98 DIS. According to the Ontario DIS protocol, a school was at medium risk if between 9.5% and 14% of junior and senior kindergarten children had decay on 2 or more teeth. If the proportion was less than 9.5% the

children in the school were deemed to be at low risk and if higher than 14% at high-risk. These risk categories are used to allocate further screening programs.

The sampling scheme represented a trade-off between the benefits of having data from subjects in all schools weighed against the costs of travel and time to visit all the schools. Enrolling children from 6 schools to obtain the 100 children from each age group, region, and risk category seemed to be a reasonable compromise. Accordingly, a two-stage sampling process was used, first to select the schools using probability proportionate to size, and second to determine the systematic sampling ratio to be used within each age-group/region/risk level of the selected schools (see Appendix 2).

#### 4.2 Enrolment of participants

Principals and staff were contacted and informed of the survey and their co-operation obtained. Using the schools' usual means of communication, parents with children in the target grades/rooms were sent a letter (see Appendix ). The letter was drafted by staff in the City familiar with the literacy levels of parents and allowed the parents to refuse to have their child participate. Children without parental refusal were selected according to the sampling ratio for that school and invited to participate. Substitutes were obtained in the same fashion for selected children who, on their own, stated that they did not wish to be included.

#### 4.3. Examination and recording

The survey examination followed the guidelines issued by the Ontario Ministry of Health and used in previous dental health surveys in Ontario except that we did not record the child's name. Two specially trained dental hygienists examined the child's teeth and periodontal tissues using sterilized mouth mirrors and blunt probes with a standard light source. Assistants using number codes recorded the findings on computers. The survey examination took no more than 5 minutes and was conducted in a private area of the school. Parents were informed of any key findings to share with the family dentist and children with urgent dental conditions were provided with a parent notification form that they could use to obtain the care needed.

Most of the data were entered at the time of the examination on a laptop computer using EPI Info. When the second examiner was working concurrently, the data were recorded on paper records and entered later. The computer files were and backed up each day.

#### 4.4 Calibration and training of examiners

Both examiners were trained at separate daylong sessions by the senior investigator who reviewed the clinical protocol and illustrated it with the same 35mm slides. Then students were examined by both the investigator and the dental hygienist to ensure consistency with the criteria. Compliance with the protocol was rechecked on five occasions by the senior investigator.

#### 4.5 Analysis

The data were transferred to SPSSPC for analysis. The descriptive findings were weighted to the full population in that age group. Associations with the potential determinants were conducted on the unweighted data. The selection of results to report followed the template for dental health status reports for Ontario public health units (O'Keefe, 1995) but was supplemented with more detailed analysis on results by region.

#### 4.6 Approvals

The survey was approved by the Toronto Catholic District School Board, the Toronto District Board of Education, the Ethical Review Board at the University of Toronto and Research and Education staff, Toronto Public Health. The clinical procedures and format were consistent with the Mandatory Program Guidelines under the Health Protection and Promotion Act. Children missed 5-10 minutes of school. They suffered no harm from the examination. The periodontal health examination protocol specifies that no probing is to be conducted thus, avoiding any risk of bacteremia. We did not collect the child's name or other individual identification.

#### 5.0 Results

##### 5.1 Descriptive findings

The cleaned data file contains the results of 3657 examinations. One hygienist examined 90.1% of the children. Controlling for age and risk level in the region where they overlapped, there was no statistical difference in the major measures of health, mean def+DMFT, percent with two or more decayed teeth or percent with fluorosis by examiner. Thus, the findings should be consistent within the survey and variability will not be due to examiner bias or reliability.

Table 1 shows distribution of the 3657 participants in the survey by the sampling categories. We hoped to obtain 100 children in each cell, and expected the examiner teams to not fall below 95 nor exceed 115. They examined the required sample within that range for all but one cell.

Table 2 shows the major dental health indicators by age group (5, 7, and 13) in the weighted sample. Over 30% of children had had one or more cavities; 30.0% in the 5 year-olds, 41.3% in the 7 year-olds, and 39.3% in the 13 year-olds. The apparent fall in prevalence between ages 7 and 13 is due to the naturally occurring loss of deciduous teeth after age 7, and replacement with healthy permanent successors by age 13.

Approximately 7% of children in the two younger age groups had at least one condition requiring urgent care. However, by age 13 this had fallen to 1.7%. The percent of children with 2 or more untreated decayed teeth was 10.8% in the 5 year-olds 7.0% in the 7 year-olds and 2.0% in the 13 year-olds.

The table also shows the mean number of teeth decayed, or missing, or filled among deciduous (dft) and permanent teeth (DMFT) for ages 5 (1.22) and 7 (1.59) and among permanent teeth alone (DMFT) at age 13 (1.13).

As seen dental fluorosis (TSIF  $\geq 2$ ) was most prevalent in the 7 year-olds. Fluorosis is known to be more obvious in the permanent dentition, and especially in newly erupted teeth. Thus, assessing fluorosis of children aged 7 should provide the highest estimate of prevalence and

severity. True to expectations slightly more, 14%, of the 7 year-olds had fluorosis of 2 or more compared to 13 year-olds prevalence of 12.3%.

Table 3 compares the oral health indicators, as in Table 2, by region using the findings for the 7 year-olds. As seen, none of the indicators differed significantly between regions except for the mean caries severity scores as measured by the deft + DMFT counts. Here children in the South had the highest score (1.9 def+DMFT) and those in the East had the lowest (1.4 def+DMFT).

In Table 4 we provide the health indicators by the prior school-risk category. As seen all of the oral health indicators for the 5 year-olds vary significantly by risk category. Those children in the high-risk schools have indicators that are from 1.35 times (percent with caries experience) to 2.92 times (% urgent) worse than the children attending the low risk schools. Disparities in dental health between risk categories of schools persist in the children aged 7 and the differences were only somewhat less extreme, from 1.28 (% with caries experience) to 2.89 times (% urgent). The fluorosis levels are presented FOR THE 7 year-olds and show an opposite trend, i.e., there appeared to be less fluorosis in the high-risk schools, but the differences were not beyond chance. For the oldest group, only the proportion experiencing caries is statistically different and the ratio is 1.15 from low to high. For the other indicators the trends appear to have reversed but the differences in health indicators were not statistically different.

The prevalence of debris (plaque), gingivitis (inflamed gums), and calculus (tartar) are measures of risks and disease of the periodontal tissues supporting the teeth. As shown in Table 5, the proportion with debris was lowest on the children aged 13, but both gingivitis and calculus increased with age. While the measure of these conditions is not extensive, it is obvious that the current combination of professional and home care is not meeting the needs of the children.

The needs for care were examined in detail for the 13 year-olds and are displayed in Table 6 for each region and for the City overall. The indicators are in a hierarchy increasing in severity from none to instruction, polishing, and scaling. Children needing the two higher levels of care needs would often have recorded a need for one or more of the lower level of services. According to the chi-square statistical test, these results do differ between the region ( $p < .001$ ). More of the children in the South region (59.3%) have no periodontal needs, whereas the children in the North and East have the highest level of needs. For these 13 year-olds over 35% needed scaling plus other services to remove and prevent the recurrence of calculus. Not shown in the table is the finding that periodontal treatment needs did not differ by risk-level of the school.

## 5.2 Components and determinants of caries scores

Table 7 provides the detail on the caries severity score with the mean and standard deviation for each of the components of the deft and DMFT for the three age groups. These findings are weighted to represent the population in the City.

### Place of birth

Table 8 shows that, for those aged 7, place of birth significantly influences three measures of oral health: any caries prevalence (% with one or more deft and DMFT); mean def+DMFT scores; and the proportion needing urgent care. For both the proportion of children needing urgent care and the mean def+DMFT, the differences between immigrant children and those born in Toronto are more than two-fold.

## Sealants

Children at age 6 and 7 whose first permanent molars have just emerged ( and are not carious) are candidates for having those four molars sealed. Recent guidelines call for this to be done where there is a history of previous decay (in the deciduous dentition) and where the occlusal surfaces of the molars are deeply fissured. We do not have any indication of the depth of the fissures on the molars but Table 9 shows the prevalence of sealants by the history of deciduous tooth decay and by place of birth. Overall, 14% of children had one or more sealants; 10% of those 749 caries free on the deciduous dentition and 19% of those with deft equal to or greater than one. If the guidelines are accurate, then a much higher proportion than 19% of those with previous deciduous decay should have received sealants.

At the same time the access to sealants, where they are indicated, is shown in the top row of data in the table. As seen there is no significant difference between the proportion receiving one or more sealants by place of birth. In contrast, where the guidelines would not support the provision of sealants (def<sup>t</sup> = 0), children born in Toronto, and Canada have much higher proportions of sealant provision.

The beneficial effect of sealing the four first molars (and the four second permanent molars, which emerge between ages 12-14) is seen in Table 10. The contrasts in both the prevalence of decay and mean DMFT scores are dramatic. Where four, or eight, teeth have been sealed over 80% of the children are caries free and the mean severity scores (DMFT) are either low (0.36 DMFT for four teeth sealed) or zero (where eight sealed teeth).

### 5.3 Detailed analysis of fluorosis

Fluorosis is an opaque, white, parchment-like appearance to the tooth surface. It is of aesthetic concern, and is therefore scored when it appears on the upper anterior teeth using the Tooth Surface Index of Fluorosis. For the Ontario protocol, the index has four categories of increasing severity: none = 0; fluorosis on up to 1/3 of the tooth surface = 1; fluorosis on between 1/3 and 2/3 of the tooth surface = 2; and fluorosis on more than 2/3 of the tooth surface = 3 and staining or pitting = 4. Table 11 shows the distribution of the four degrees of severity of fluorosis by age group. The reporting cut-off, a score of 2 or more, described in the 'template' (O'Keefe, 1995) and reported earlier (Table 2), reflects the untested hypothesis that most parents and children would not be aware of a condition scoring 1. At that stage the lesion is not prominent, having indistinct borders and flecks of white in a lattice-like appearance. To the extent that this is the case, the prevalence of scores of 1 among 12.8% and 8.2% of 7 year-olds and 13-year-olds, respectively, would not be as clinically important as scores of 2 or higher. For the two older

groups, roughly 5% of children had scores of 3 or 4, which is likely noticeable by most, if not all, children and parents.

Table 12 shows the distribution of the 7 and thirteen year-old children with any fluorosis at all ( $TSIF \geq 1$ ) and with fluorosis scores of 2 or greater ( $TSIF \geq 2$ ) by birthplace. The differences are significant no matter what the cut-off used to identify the condition. In both definitions, the proportion of children with the condition is about the same for children born in Toronto and the sample as a whole. Children born outside Canada have the least fluorosis and children born elsewhere in Canada are next highest. Those for whom we could get no information on birthplace had the highest proportion with the condition. For the clinically important levels ( $TSIF \geq 2$ ), they had levels that were 1.5 times those of the children born in Toronto.

Thus, the children with no place of birth on the database are somewhat remarkable, in that they have both high caries prevalence and severity (see Table 8) and the highest fluorosis scores.

### Relationship of fluorosis and caries

Table 13 relates the prevalence and severity of caries to the fluorosis scores. The prevalence of children with caries is highest where there is no fluorosis and decreases with higher scores. Similarly, there is a trend for the mean caries scores to be lower among those who have higher levels of fluorosis but the statistical test showed the differences were not beyond chance.

### 5.4 Early Childhood Tooth Decay

Early childhood tooth decay (also known as baby-bottle tooth decay, nursing caries, early childhood caries) is a rampant form of dental caries that affects very young children. It is believed to result from frequent and prolonged exposure to sweet liquids and syrups either from a bottle, or soother, or sometimes the mothers breast-milk. The most aggressive condition occurs on the very young children, decaying the anterior teeth as they come in (say from age 6 months) and resulting in a hospital admission for removal of the teeth under general anaesthetic. While decay on the maxillary anterior deciduous teeth is diagnostic, other teeth are usually decayed too.

For this analysis, a count of the number of decayed or filled deciduous anterior teeth, among the children aged 5, was performed. Table 14 shows the distribution of children by the number of affected anterior teeth. While there has been debate over the appropriate case definition. (Ismail & Sohn, 1999) it is clear that no matter what cut off we use to define a case, children with one or more anteriors affected, have significantly more deft. Accordingly, for the analysis that follows, we use a case definition of one or more decayed or filled (due to caries) deciduous anterior teeth. As seen in Table 14, using the unweighted sample, the prevalence was 9.4% (100% - 90.6%).

Using the weighted sample (Table 15), 9.6% of children had had ECTD. The prevalence did vary by region with the West Region having the lowest (7.5%) prevalence.

Table 16 shows that the condition also varied by place of birth, with those born outside Canada having the highest prevalence (14.5%).

## 6.0 Implications for Toronto Public Health

This study will allow managers to better identify the oral health status and program needs of the children in the new Toronto. Previous data provided only a partial picture, or were out of date or were collected in variable ways. This study was conducted on a representative sample with specifically trained examiners who were supervised and standardized to follow strictly the Ontario DIS protocol. The results therefore should be valid and consistent among all areas of the City.

The first finding of note is that caries continues to be found in 30% or more of children. This is a higher proportion than is found for other infectious diseases. The inequalities in untreated decay, and the need for urgent care, are greatest at the youngest age levels. Children with urgent needs are by definition suffering from pain or dental infection. These conditions and their systemic manifestations of fever and lethargy impede a child's ability to learn, just at the time they are beginning their elementary school experience. The proportion with urgent needs among those at the two the youngest ages is sufficiently high to warrant Public Health's continued efforts to reduce it.

While the oral health of the children does not appear to vary that much between the regions (Table 3) it does vary highly and significantly by the prior risk-level of the school (Table 4). The younger children attending the high-risk schools had from 28% to 292 % worse health-indicators than did those in the low-risk schools. These findings confirm the predictive validity of the system of establishing the caries risk-levels of the schools, keeping in mind that any such system will not serve high needs children who attend low-risk schools. There would appear to be justification for concentrating scarce resources on the youngest children in the high-risk schools.

By age 13, differences in caries, by risk level of the school, have largely disappeared. While this may be due to the efforts of the school-based screening, and care delivery programs, it may also be due to the mobility of students to schools different than they attended when they were younger - a mixing effect reducing the variability. It is also, no doubt due to the natural exfoliation of the balance of the deciduous dentition, leaving healthy permanent teeth.

Lower levels of dental caries, among 13 year-olds, does not hold for the indicators of periodontal conditions. They increase with age, such that over 42% of the 13 year-olds had calculus. These levels of periodontal conditions are much higher than those reported in the former East York in 1995 (O'Keefe, 1995). High levels of calculus reflect inadequate home and professional care.

In the detailed analysis of caries indicators, the disease and its sequelae continue to be associated with the place of birth of the child. Children born outside Canada have the highest prevalence of decay, severity scores and urgent needs (Table 8). Sealant use is both lower than indicated by current guidelines (Leake et al., 1999) and much of the effort appears to be directed to those who are not at risk of the disease. Given the evidence of the effectiveness of sealants (Table 10), Toronto Public Health needs to continue to offer information on the appropriate use of sealants for its own staff and should call on professional organizations in Ontario to educate private practitioners accordingly.

Moderate fluorosis, defined at the level of TSIF greater than or equal to 2, was evident among 13.4 % of children aged 7. This compares to a prevalence of fluorosis of 13.9 % reported by O'Keefe (1995) in East York, 13% found by Osuji et al (1988) again in East York, 19% in Scarborough reported by Johnston and Shosenberg (1986) for life-long residents and 34% reported by Lewis (1982) among life-long residents of Toronto and East York living within one mile of a known source of air-borne fluoride emissions. Since not all five year olds had permanent anterior teeth, 7 and 13 year-olds were used to identify the risks of fluorosis and its association with dental caries as per O'Keefe's (1995) template. 'Moderate' fluorosis (TSIF  $\geq$  2) was associated with place of birth; those with no birthplace recorded had the highest proportion (23.0% - Table 12) of children with fluorosis and those born in Toronto next highest at 15.4%. Since other studies used different indices and two tried to study the effect only on life-long residents it is difficult to discern a trend. However, over time, both prevalence and severity should fall among those born in Toronto with the reduction of the target levels of fluoride in the City's water from 1.2 ppm to 0.8 ppm that occurred in the fall of 1999.

The data show that being born in Toronto goes together with low caries and average fluorosis levels. The lower caries prevalence and severity may have been achieved through the combination of exposure to fluorides of all kinds, the high level of socio-economic development (good food and housing), and the care of readily available dental care providers. The fluorosis prevalence and severity is related to swallowing toothpaste, along with the background levels of fluoride in the water. It is interesting to observe that the levels of fluoride consumption, as demonstrated by the TSIF scores, continues to be related to the prevalence of caries (Table 13) - the relationships demonstrated in the past (Eklund and Striffler, 1980) still hold.

Based on the findings of fluorosis, Toronto Public Health should step up its efforts to inform parents of very young children of the safe use of fluoride dentifrice.

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## 8.0 Tables

Table 1 - Number of participants in the Toronto 2000 DIS Survey by age, region and risk category

RISK	AGE	REGION				TOTAL
		<u>NORTH</u>	<u>SOUTH</u>	<u>EAST</u>	<u>WEST</u>	
Low	5	97	108	106	97	408
	7	102	99	100	100	401
	13	100	98	105	98	401
	Subtotal	299	305	311	295	1210
Medium	5	98	97	108	103	406
	7	102	93	97	95	387
	13	96	99	99	110	404
	Subtotal	296	289	304	308	1197
High	5	101	95	103	106	405
	7	106	118	99	101	424
	13	100	101	106	114	421
	Subtotal	307	314	308	321	1250
All	5	296	300	317	306	1219
	7	310	310	296	296	1212
	13	296	298	310	322	1226
	TOTAL	902	908	923	924	3657

Table 2 - Percent of children with caries experience, the percent with urgent treatment needs, the mean def+DMF teeth and the percent with moderate degree of fluorosis (TSIF  $\geq$  2) in Toronto DIS 2000 survey children - weighted findings.

Indicator	Age (weighted n)		
	<u>5 (3185)</u>	<u>7 (2792)</u>	<u>13 (2493)</u>
Percent with experience of cavities	30.0	41.3	39.3
Percent with urgent treatment needs	6.8	7.4	1.7
Percent with two or more decayed teeth	10.8	7.0	2.0
Mean def+DMFT	1.22	1.59	1.13
Percent with moderate fluorosis (TSIF $\geq$ 2)	2.1	14.0	12.3

Table 3 - Percent of 7 year-old children that have ever had a cavity, the percent with urgent treatment needs, the mean def+DMF teeth and the percent requiring treatment on two or more teeth in the four health districts of Toronto - weighted results.

Indicator (statistical test result)	Region (weighted n)			
	<u>North</u> (670)	<u>South</u> (636)	<u>East</u> (890)	<u>West</u> (599)
Percent with experience of caries (ns)	41.8	43.0	36.7	40.3
Percent with urgent treatment needs (ns)	8.1	6.6	8.2	7.8
Percent requiring treatment on two or more teeth (ns)	7.5	7.1	8.1	4.7
Mean def+DMFT (p=.002, Anova)	1.6	1.9	1.4	1.6

(ns) = not statistically significant

Table 4 - Oral health indicators by age and risk level of schools among participants in the Toronto DIS 2000 survey

AGE	HEALTH INDICATOR	<u>RISK LEVEL OF SCHOOLS</u>			RATIO OF HIGH TO LOW RISK (p value for test of difference)
		LOW	MEDIUM	HIGH	
5	With caries experience (%)	24.8	27.1	33.6	1.35 (.015 Chisq)
	With urgent needs (%)	3.9	5.2	11.4	2.92 (< .001 Chisq)
	With 2 or more decayed teeth (%)	6.1	10.1	13.8	2.26 (.001 Chisq)
	Decayed, missing and filled deciduous teeth (mean)	1.01	1.07	1.4	1.39 (.036 Anova)
7	With caries experience (%)	35.2	40.1	45.0	1.28 (.015 Chisq)
	With urgent needs (%)	3.5	8.5	10.1	2.89 (.001 Chisq)
	With 2 or more decayed teeth (%)	3.7	7.5	8.5	2.29 (.016 Chisq)
	Decayed, missing and filled deciduous and permanent teeth (mean)	1.28	1.60	1.88	1.47 (.005 Anova)
	With moderate fluorosis or worse on permanent teeth	15.8	14.2	10.4	0.65 (.06 ns Chisq)
13	With caries experience (%)	39.2	40.1	45.0	1.15 (.015 Chisq)
	With urgent needs (%)	2.5	1.2	1.4	0.56 (.33 ns Chisq)
	With 2 or more decayed teeth (%)	3.2	1.0	1.7	0.53 (.06 ns Chisq)
	Decayed, missing and filled permanent teeth (mean)	1.05	1.29	1.28	1.21 (.167 ns Chisq)

Table 5 - Prevalence of debris, gingivitis and calculus by age among participants in Toronto 2000 DIS survey - weighted results

	5 (3185)	Age (n) 7 (2793)	13 (2493)
Debris on 2 or more teeth	84.3	89.7	77.9
Gingivitis	11.5	23.7	29.4
Calculus	6.5	14.2	42.6

Table 6 - Percent of Toronto 13 year-olds participants in Toronto DIS 2000 survey with periodontal care needs by region - weighted results

Type of periodontal care needed	Region (number in region)				<u>All Regions</u>
	<u>North</u> (n = 575)	<u>South</u> (n = 572)	<u>East</u> (n = 857)	<u>West</u> (n = 487)	
None	48.0	59.3	42.0	53.8	49.7
Preventive instruction only	7.5	4.5	16.9	2.7	10.2
Tooth polishing (stain removal with or without preventive instruction)	4.2	1.6	1.6	2.7	2.4
Scaling (with or without instruction or stain removal)	40.3	34.6	39.4	35.1	37.7

Chisq p<.001

Table 7 - Component caries scores by age among participants in the Toronto 2000 DIS Survey - weighted results

AGE		mean decid teeth decayed	mean perm teeth decayed	decid teeth missing due to caries	perm teeth missing due to caries	decid filled teeth	perm teeth filled	decid teeth decayed extracted and filled	perm teeth decayed extracted and filled	percent with no caries history 'Caries immune'	Mean DEF/DMFT
5-6 (n= 3185)	Mean	.42	.003	.08	.00	.71	.006	1.21	.009	69.8	1.22
	<i>Std. Deviation</i>	1.20	.06	.56	.00	1.85	.09	2.47	.111		2.48
7-8 (n=2792)	Mean	.29	.01	.10	.001	1.08	.10	1.47	.12	59.7	1.59
	<i>Std. Deviation</i>	.92	.15	.55	.03	2.07	.46	2.50	.50		2.66
13-14 (n= 2493)	Mean		.08		.002		1.05		1.14	61.0	1.14
	<i>Std. Deviation</i>		.43		.05		1.84		1.90		1.90

Table 8 - Caries experience and need for urgent care among 7 year-old participants in the Toronto 2000 DIS Survey according to birthplace

Caries experience (n)	Birthplace				Total (1212)
	<u>Toronto, Canada</u> (744)	<u>Canada, elsewhere</u> (37)	<u>Outside Canada</u> (269)	<u>Not stated</u> (162)	
Percent with deft + DMFT $\geq$ 1	35.8	40.5	48.0	47.5	40.2 p < .001 Chisq
Mean def+DMFT (sd)	1.17 (2.2)	1.86 (2.9)	2.44 (3.3)	2.06 (3.0)	1.59 (2.7) p < .001 Anova
Percent needing urgent care	5.6	8.1	13.8	4.9	7.4 p < .001 Chisq

Table 9 - Percent of children with one or more sealants on first permanent molars among 7 year-old participants in the Toronto DIS 2000, by birthplace and caries in the deciduous dentition

<u>Deciduous tooth caries</u>	<u>Birthplace</u>				<u>Total</u>
	<u>Toronto, Canada</u>	<u>Canada, elsewhere</u>	<u>Outside Canada</u>	<u>Not Stated</u>	
deft ≥ 1	20 (249)	6.7 (15)	18 (125)	23 (74)	19 (463) p= .52 Chisq
deft = 0	12 (495)	23 (22)	4.9 (144)	5.7 (89)	10 (749) p = .008 Chisq
All	14 (744)	16 (37)	11 (269)	14 (102)	14 (1212)

Table 10 - Caries prevalence and severity among 13 year-olds participating in the Toronto 2000 DIS survey according to the number of permanent teeth sealed.

Number of sealed teeth (number of children)	Percent with DMFT = 0	Mean DMFT
0 (867)	58	1.37
1-3 (171)	43	1.31
4 (112)	83	0.36
5-7 (39)	62	0.77
8 (26)	100	0.00
9 and more (11)	54	0.64
ALL (1226)	59	1.21
p value for differences	< .001 Chisq	< .001 Anova

Table 11 - Percent distribution of Tooth Surface Index of Fluorosis scores, by age, among participants in the Toronto 2000 DIS Survey - weighted results

TSIF SCORE	AGE		
	5-6	7-8	13-14
TSIF = 0	94.8	73.2	79.6
TSIF= 1 white colour on less than 1/3 tooth	3.1	12.8	8.2
TSIF= 2 white on 1/3 to 2/3 tooth	1.5	9.2	6.6
TSIF= 3 white on 2/3 or more of tooth	.5	4.5	3.9
TSIF = 4 staining or pitting	.1	.3	1.8
Weighted number of students	3185	2792	2493

Table 12 - TSIF scores by birthplace among 7 and 13 year-old participants in the Toronto 2000 DIS Survey

TSIF Score (p value)	Birthplace				Total
	<u>Toronto,</u> <u>Canada</u>	<u>Canada,</u> <u>elsewhere</u>	<u>Outside</u> <u>Canada</u>	<u>Not</u> <u>stated</u>	
TSIF=0	73.4	85.2	86.9	63.8	74.9
TSIF ≥ 1	26.6	14.8	13.1	36.2	23.1 (p < .001 Chisq)
TSIF ≥ 2	15.4	8.2	4.9	23.0	12.7 (p < .001 Chisq)
Number of children	1265	61	800	309	2435

Table 13 - Relationship between fluorosis severity and no previous caries experience among 7 year-old participants in the Toronto 2000 DIS Survey

	Fluorosis scores (n)			
	TSIF=0 (902)	TSIF=1 (146)	TSIF ≥2 (162)	Total (1210)
Percent with caries experience - deft+DMFT ≥ 1 (p = .014 Chisq 2df)	42.4	30.1	37.0	40.2
Mean def+DMFT (p = .067 Anova)	1.69	1.36	1.23	1.59

Table 14 - Distribution of number of deciduous anterior teeth decayed or filled among 5 year-olds participants in the Toronto DIS 2000 survey - unweighted results

<u>Number of teeth affected</u>	<u>Percent of children</u> (n = 1219)	<u>Mean deft</u> (p < .001 Anova)
0	90.6	0.77
1	2.1	4.1
2	4.6	4.1
3	1.3	6.8
4	1.3	7.6

\* weighted prevalence is 9.6% for one or more teeth affected

Table 15 - Distribution of ECTD\* among 5 year-old participants in the Toronto DIS 2000 survey by Region - weighted results

	Region				Total
(n)	North (674)	South (644)	East (933)	West (934)	(3185)
*Percent with one or more teeth affected	9.1	11.5	10.7	7.5	9.6 p = .029 Chisq

Table 16 - Prevalence of ECTD\* among 5 year-old participants in the Toronto DIS 2000 Survey by place of birth - unweighted results

	Birth place				
	<u>Toronto</u>	<u>Canada outside of Toronto</u>	<u>Outside Canada</u>	<u>Not stated</u>	<u>Total</u>
(n)	(765)	(36)	(221)	(197)	(1219)
*Percent with one or more teeth affected	8.0	2.8	14.5	10.7	9.4 p = .013 Chisq

9.0 Appendices

Draft letter to parents

To plan future dental programs, Toronto public health is doing a survey of the dental health of children aged 5, 7, and 13. Your child's school has been chosen for the survey and your child may be asked to participate.

The five to ten minute examination will follow the standards issued by the Ontario Ministry of Health. Specially trained dental hygienists will look at the teeth and gums. They will use sterilized small mouth mirrors and blunt probes - similar to a dentist's regular check-up. They will not use dental x-rays. We will not be recording your child's name on the computer so no private information can be linked to him or her. We will tell you if he or she needs any dental services.

Please allow your child to participate. This will help greatly in planning our services.

Should you not want your child to participate, please complete the form below and return it to your child's teacher. He or she will still be eligible for the usual public health services.

If you have any questions or wish to change your mind, please call \_\_\_\_\_ the survey co-ordinator at \_\_\_\_ - \_\_\_\_.

S Basrur  
MOH

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Toronto Public Health Dental Survey Team

I do not want my child \_\_\_\_\_ (print child's name) in Grade \_\_\_\_ at school \_\_\_\_\_ (print school name) to participate in the dental health survey.

Signed

Parent/guardian

I do not want my child \_\_\_\_\_ (print child's name) in Grade \_\_\_\_ at school \_\_\_\_\_ to participate in the dental health survey.

Signed

Parent/guardian