

# Fluorides in Caries Prevention

## INTRODUCTION

Fluoride compounds are chemical substances found in various forms in nature, including air, fresh water, sea water, plants and fish. Fluorides have been used to prevent dental caries through use in community water fluoridation, fluoride-containing toothpastes, professionally-applied topical fluorides and several food and drink sources. The incidence of dental caries has been declining steadily in the industrialized world due to the widespread availability and use of fluorides. The protective effects of fluorides are greatest when the teeth have erupted into the mouth.



## COMMUNITY WATER FLUORIDATION

Community water fluoridation has been identified as one of the ten most effective public health achievements in the past century.<sup>7</sup> It is an effective, equitable and efficient means of preventing dental caries.<sup>8</sup>

Fluoride was added to the municipal drinking water supply in Brampton and Mississauga in the early 1960s and is monitored continuously. The Town of Bolton in Caledon was connected to the municipal water system from Brampton in early 2002 and has been receiving fluoridated drinking water since that time. The remaining areas of Caledon are served by 13 municipal communal wells, which provide drinking water to approximately 10,800 people, and private wells (which are not fluoridated), which provide water to approximately 19,000 people.

Recent provincial and federal reviews of drinking water fluoridation levels resulted in new recommendations for optimal levels of fluoride in municipal water supplies. The current recommended optimal levels of 0.5 to 0.8 parts per million (0.5–0.8 mg/L) were implemented in mid-2000 at the municipal water treatment plants in Peel.

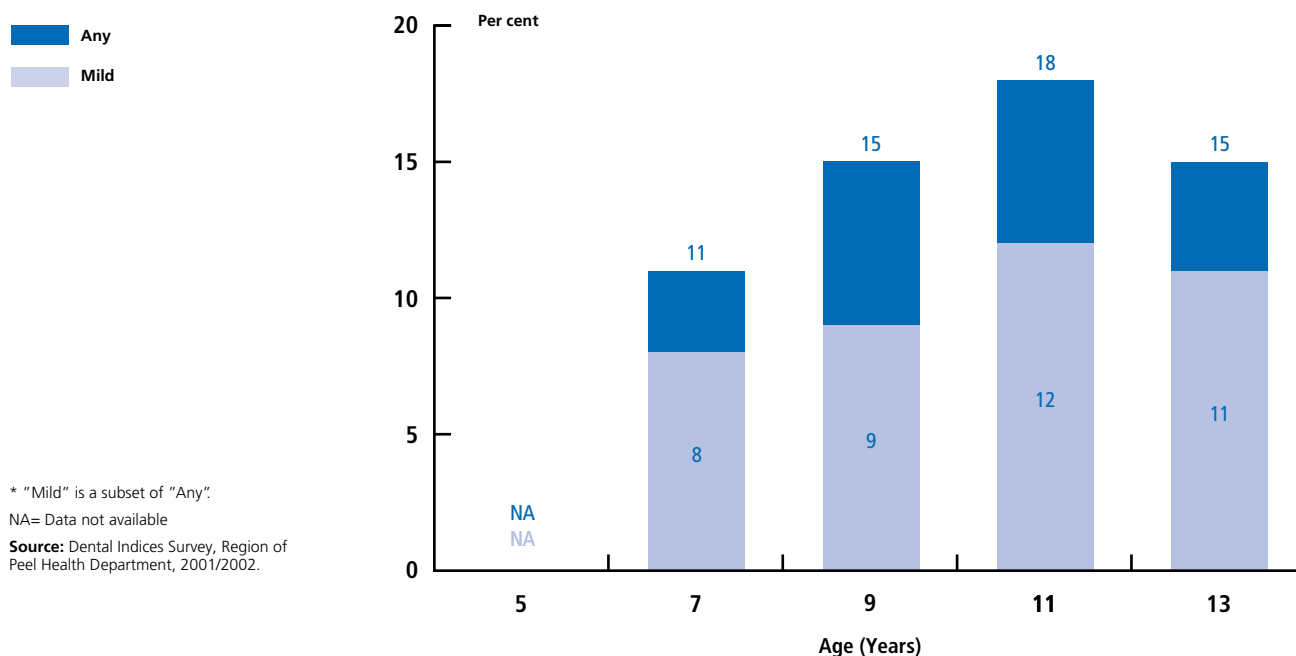
## FLUOROSIS

Excessive exposure to fluorides, especially during the early years of tooth formation, may result in enamel fluorosis. Fluorosis is tooth discoloration which may range from patchy white staining of the tooth enamel in its mildest form to pitted brown staining in its severe form. Mild fluorosis is the most common presentation in Canada. Mild fluorosis is not easily visible to non-professionals but indicates the ingestion of a greater than optimal amount of fluoride. Fluorosis is assessed using various indices that describe the severity of the condition. The 2001/2002 *Peel Dental Indices Survey* used the Tooth Surface Index of Fluorosis (TSIF).<sup>9</sup>

In Peel, fluorosis most commonly presents in the mild form. The prevalence and the severity of fluorosis does not constitute a public health threat.

Among the Peel children surveyed, 13% overall were identified as having some form of fluorosis. Nine per cent had mild fluorosis, 3% had moderate fluorosis and 1% had severe fluorosis. Fluorosis could not be scored in 8% of students surveyed because the indicator teeth were not present. The proportion of Peel children with any or mild fluorosis by age is shown in Figure 3.1.

**Figure 3.1: Proportion of Children with Any or Mild\* Fluorosis by Age, Region of Peel, 2001/2002**



\* TSIF = Tooth Surface Index of Fluorosis<sup>9</sup>  
 0 = No fluorosis  
 1 = Fluorosis on less than one-third of the tooth  
 2 = Fluorosis on at least one-third but less than two-thirds of the tooth  
 3 = Fluorosis on two-thirds or more of the tooth  
 4 = Staining, pitting or both, in conjunction with TSIF score 1, 2 or 3

The proportion of children with any type of fluorosis was higher in the fluoridated communities of Brampton and Mississauga than in Caledon which has not universally received fluoridated water (see Table 3.1). The prevalence and forms of fluorosis observed in Brampton and Mississauga were similar to dental survey results from Toronto<sup>10</sup> which also has the recommended levels of fluoride in the drinking water supply.

**Table 3.1—Proportion of Children with Any or Mild\* Fluorosis by Age and Municipality, Region of Peel, 2001/2002**

Municipality	Age (Years)							
	7		9		11		13	
	Mild*	Any	Mild*	Any	Mild*	Any	Mild*	Any
Brampton	11	15	11	17	13	21	10	13
Caledon	2	2	2	3	4	4	4	4
Mississauga	8	12	10	16	14	18	13	21
Peel	8	11	9	15	12	18	11	15

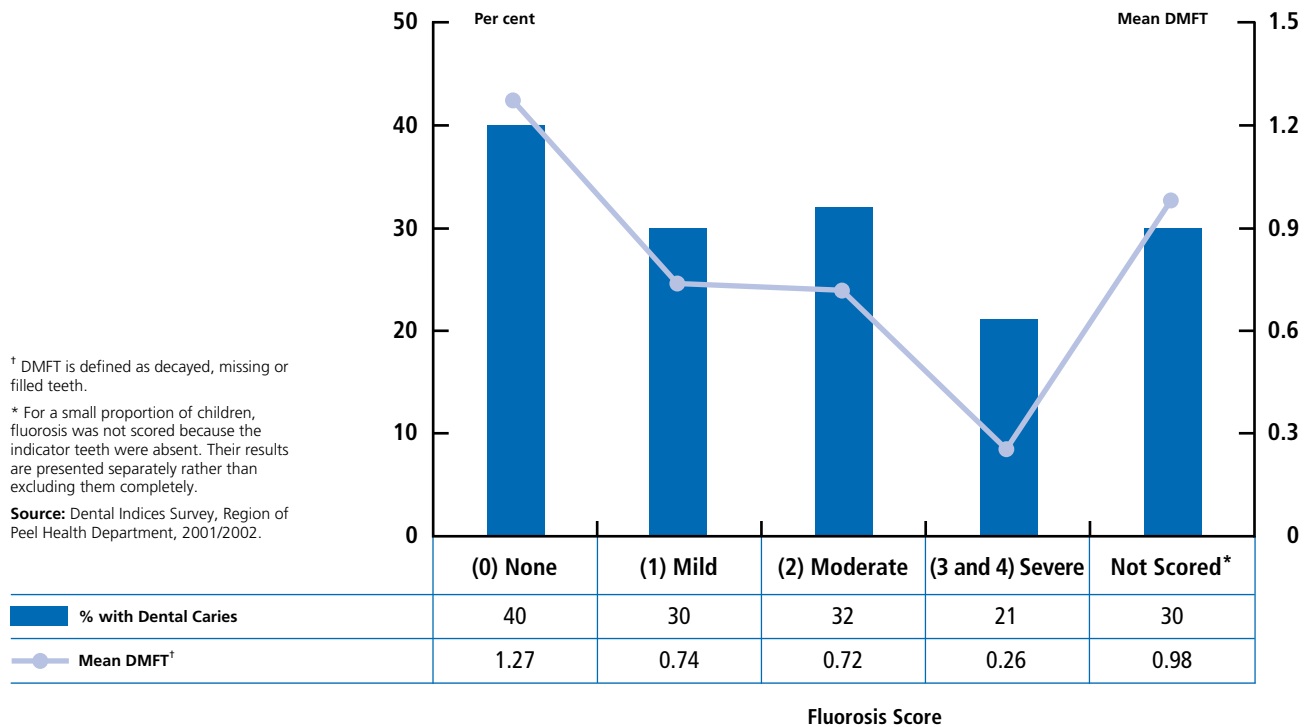
\* "Mild" is a subset of "Any".  
**Source:** Dental Indices Survey, Region of Peel Health Department, 2001/2002.

### FLUOROSIS AND DENTAL CARIES

The prevalence of dental caries is usually lower among children with fluorosis due to the protective effect of fluoride exposure. This effect was observed among the children surveyed in Peel. The prevalence and severity of dental caries was highest among children with no evidence of fluorosis. Figure 3.2 (see the following page) shows the relationship between fluorosis and the prevalence of dental caries. Among those children with no fluorosis, 40% had experienced dental caries. In comparison 30% of children with mild fluorosis and 21% of children with severe fluorosis had experienced dental caries.

The mean number of teeth affected by dental caries follows a similar relationship with fluorosis. Children with no fluorosis had more teeth affected by decay than children with fluorosis. The mean number of teeth affected by decay was 1.3 among children with no fluorosis compared with 0.7 and 0.3 teeth affected among children with mild and severe fluorosis, respectively. Similar results were reported in Toronto.<sup>10</sup> Lack of current data does not permit comparison with provincial averages.

**Figure 3.2: Proportion of Children Aged 5, 7, 9, 11 and 13 with Dental Caries by Fluorosis Score, Region of Peel, 2001/2002**



† DMFT is defined as decayed, missing or filled teeth.  
 \* For a small proportion of children, fluorosis was not scored because the indicator teeth were absent. Their results are presented separately rather than excluding them completely.  
 Source: Dental Indices Survey, Region of Peel Health Department, 2001/2002.

### SUMMARY

Fluorides are effective in preventing dental caries. The lake-based community water supply in Brampton and Mississauga is fluoridated within the recommended fluoride concentration levels. This lake-based source also supplies Bolton in the Town of Caledon. The remainder of Caledon is supplied by a non-fluoridated, well-based municipal water supply and private wells. The availability and widespread use of fluorides have been associated with increased prevalence of fluorosis. Dental fluorosis is a patchy enamel discoloration which results from ingestion of fluoride during tooth formation. In 2001/2002, the prevalence of fluorosis among children was 13% overall in Peel and was higher in Brampton and Mississauga compared with Caledon. Children identified with fluorosis had a lower prevalence of dental caries compared with children who had no fluorosis. The prevalence and the severity of fluorosis in Peel does not constitute a public health threat.