

# **The State of Dental Health in Alberta**

## **A Brief Report**

**Prepared by:**

Jody Wolfe

Sana Ishaque

Yin Nwe Aung



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# The State of Dental Health in Alberta

## A Brief Report

### I. Introduction

The Office of Alberta's Chief Medical Officer of Health commissioned the School of Public Health to write a brief report to summarize current research and available information about the potential public health benefits of dental health care. The report is intended to serve as a reference document for the Office of the Chief Medical Officer of Health and other interested stakeholders interested in this issue. Topically, potential costs to the health care system of an end to municipal water fluoridation, and the adequacy of dental care coverage of some segments of the working and non-working populations was of interest, as were other broad public health aspects of dental health.

#### Definitions used in this Report

Oral health is defined as:

*a state of the oral and related tissues and structures that contribute positively to physical, mental and social well-being and to the enjoyment of life's possibilities, by allowing the individual to speak, eat and socialize unhindered by pain, discomfort or embarrassment (Canadian Dental Association, 2005).*

Dental public health is defined by the American Board of Dental Public health as:

*the science and art of preventing and controlling dental diseases and promoting [dental] health through organized community efforts... It is concerned with dental health education of the public, with applied dental research, and with the administration of group dental care plans, as well as the prevention and control of dental diseases on a community basis (American Board of Dental Public Health, 2003).*

This report will focus on the part of oral health known as dental health, particularly the health and quality of the teeth and gums. For the purposes of this report, dental health includes:

- Individual-level prevention, maintenance, and treatment interventions
- Population-level dental health promotion strategies

The scope of this Report does not include:

- Emergency medical responses to acute injuries involving oral or dental structures
- Cosmetic or non-medically necessary enhancements

#### Aims of the Report

1. To briefly review the evidence on the prevalence and impacts of poor dental health to Canadians at the individual and population level (including costs), focusing wherever possible on subpopulations including children, the elderly, and vulnerable populations.
2. To describe dental health practices and insurance coverage of Canadians.
3. To document policy and program initiatives that have been implemented locally, provincially, and nationally to address the issue of dental health promotion and oral health care coverage.
4. To identify trends and gaps in knowledge.

## II. Methods

The process of compiling data for this report consisted of a review of (a) academic (peer reviewed) and (b) grey literatures (i.e., non-peer reviewed government reports, presentations by academic experts, documents from professional organizations); (c) existing national surveillance data; and (d) consultation with two Alberta public dental health experts. Only information most relevant to the aims of this report are summarized here.

### Data Sources

#### Reviews of the Scientific Literature

A search for review articles was performed in peer reviewed journals related to the relationship between dental health and general health. The search was limited to articles published from 2000 to 2011.

#### The Canadian Community Health Survey (CCHS)

The Canadian Community Health Survey (CCHS) is a series of national cross sectional surveys that have been carried out by Statistics Canada since 2001. To date there have been five cycles of the survey, with the first four cycles publically released. The 2008 iteration of CCHS (Cycle 4.1) interviewed 131,061 Canadians aged 12 and older, including 11,925 Albertans. Several indicators of dental health were included in the survey, however, the dental and oral health questions were considered optional content. Albertans were asked questions related to self-perceptions of overall oral health and dental visits in the past year in Cycles 2.1 and 4.1 only, and were not asked questions related to the quality of oral health or dental insurance coverage in any of Cycles 2.1, 3.1, or 4.1. Thus, only Canadian-level data, which does not include Albertans in the sample is available for most oral health and dental insurance indicators. Note, Cycle 5.1, which collected data in 2009-2010, had not been released at the time of reviewing data for this report. Public Use Microdata Files for Cycles 2.1 and 4.1 were analyzed for this report, using the master weights to calculate population point estimates.

#### Canadian Health Measures Survey (CHMS)

The Canadian Health Measures Survey (CHMS) was launched in 2007-08 by Statistics Canada, and will be repeated every two years. The survey includes information on oral health by clinical examination of Canadians aged 6-79 years, in addition to a wide variety of other health indicators. This data source is designed only to produce national estimates; thus, Alberta-specific estimates of dental health indicators are unavailable. Because it has only been implemented twice, it cannot yet provide information about trends over time. This report summarizes national data from the CHMS 2007-08 as reported in Report on the Findings of the Oral Health Component of the Canadian Health Measures Survey 2007–2009 (Health Canada, 2010).

#### Guidelines and Grey Literature Reports

1. World Health Organisation's Guidelines for Drinking Water Quality (2008)
2. Guidelines for Canadian Drinking Water Quality (Health Canada, 2009)
3. Nova Scotia Oral Health Review (Kraglund & Cooney, 2008)
4. Saskatchewan, Dental Health Screening Program Report Grade One and Grade Seven 2008-2009 (Vinay & Leslie, 2010)

### III. Dental Health Indicators in Alberta and Canada

This section provides an overview of available dental health indicators at the population level, as derived from our secondary analyses of national datasets (CCHS; CHMS).

#### Highlights

- Dental caries are a very common chronic health condition. The prevalence of dental caries is higher among preschoolers, low-income Canadians, and Aboriginal children and adults.
- Males and adults from lower income families are more likely to fail to meet a recommended self-care standard of brushing teeth at least twice per day.

#### Selected Modifiable Risk Factors for Dental Caries

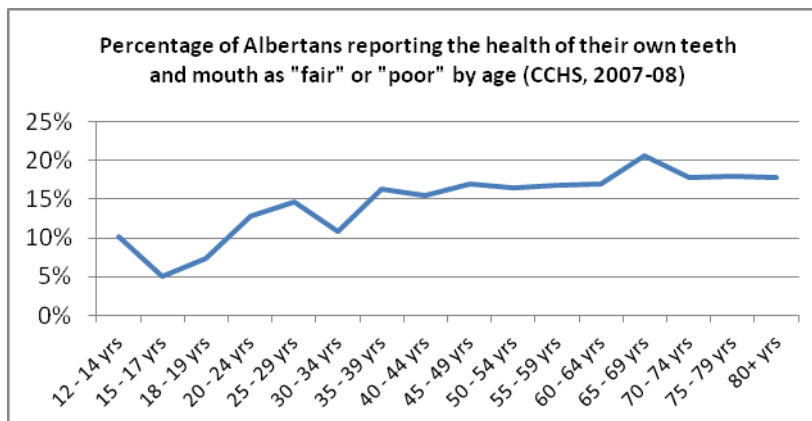
- Need for special health care
- Poor oral hygiene
- Poor diet
- Inappropriate infant feeding
- Poverty
- Social status
- Education
- Dental insurance coverage

(Selwitz, Ismail, & Pitts, 2007)

#### Self-Rated Health of Teeth and Mouth

In 2007-08, 14.6% of Albertans aged 12 and older rated the health of their own teeth and mouth as fair or poor when asked, according to the Canadian Community Health Survey (2007). This is consistent with self-perceptions observed among Albertans in 2003 (13.1%), and is similar to the fair or poor self-ratings of dental health for Canadians in general (13.7% in 2007-08).

Figure 1.



The percentage of Albertans who rated the health of their own teeth and mouth health as fair or poor tended to increase with age, peaking among those in the 65-69 age range (20.6% in 2007-08; see Figure 1).

Alberta males were more likely to rate their dental health as fair or poor (17.0%) compared to females (12.1%) in 2007-08.

These age and sex trends were

consistent with what was observed for all Canadians, and in past cycles of the survey.

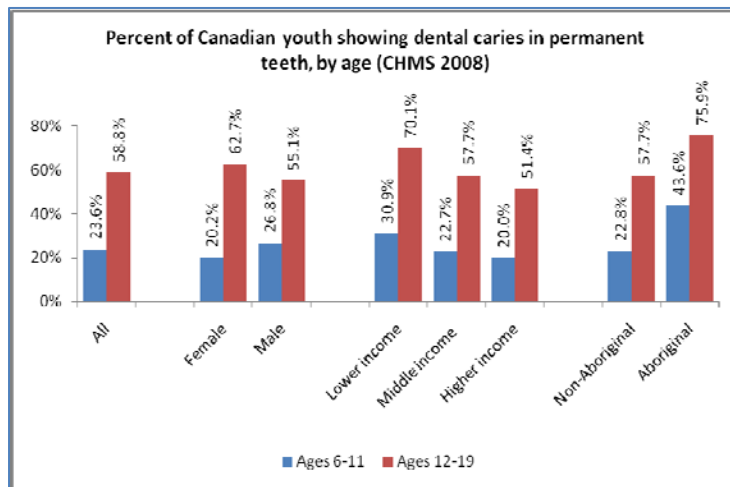
#### Prevalence of Dental Decay in Children

Dental caries, also known as cavities or tooth decay, is the localized destruction of susceptible dental hard tissue by acidic by-products from bacterial fermentation of dietary carbohydrates (Selwitz, Ismail, & Pitts, 2007).

Dental caries is one of the most common preventable health conditions. The severity of caries can vary, although it is generally progressive; it starts at a subclinical level as invisible lesion and can gradually advance to visible enamel decay then to established enamel decay, and finally to severe enamel decay (Pitts, 2004) that can result in the breakdown of teeth, pain, loss of function, infection, extensive restorative treatment needs or permanent tooth loss.

Caries progression, as opposed to reversal, consists of a delicate balance between the aforementioned factors—namely, a bacterially generated acid challenge and a combination of demineralization inhibition and reversal by remineralization. The balance between pathological factors (such as bacteria and carbohydrates) and protective factors (such as saliva, calcium, phosphate and fluoride) is a delicate one that swings either way several times daily in most people (Featherstone, 2000).

Figure 2.



Prevalence of dental caries was assessed in the CMHS by observation of decayed, missing, or filled (DMFT) selected indicator teeth. Older children are more likely to have dental caries than younger children (Figure 2) with the prevalence doubling from 23.6% in Canadian children aged 6-11 to 58.8% among children aged 12-18 (Canadian Health Measures Survey, 2007). Those from lower income families, Aboriginal Canadian children, and those who have not visited a dentist in the past year are more likely to show signs of caries.

Additional information about the dental health of Canada’s Inuit population can be found in the Inuit Oral Health Survey Report 2008-2009, however, because the sampling frame did not include Inuit individuals living in Alberta, these data are not presented here.

### Prevalence of Dental Decay in Adults

Among adults who have at least one permanent tooth remaining (known as “dentate adults”), the prevalence of decayed, missing, or filled teeth (DMFT) is quite high (95.9%), making it a less sensitive indicator of potential disparities across demographic groups (see Table 1). Another indicator of dental health among dentate adults, however, is the amount of untreated tooth decay. The CMHS survey assessed the percentage of dentate adults with one or more untreated coronal (on the crown of the tooth) caries. The results, presented in Table 1 below, reveal important differences in the prevalence of untreated decay related to gender, age, Aboriginal identity, education, income, insurance, and dentist visits.

Overall, 19.7% of dentate adults in Canada have at least one tooth with untreated coronal decay. This indicator of dental problems is more common among males, young adults, Aboriginals, those with lower household educational attainment, those with lower or middle incomes compared to those in the higher income bracket, the publically or uninsured compared to the privately insured, and those who have not visited a dentist in the past year.

*Table 1. Percentage of Dentate Adults Showing Coronal Caries or Untreated Coronal Decay in at Least One Tooth, by Selected Demographic Characteristics (CHMS 2008)*

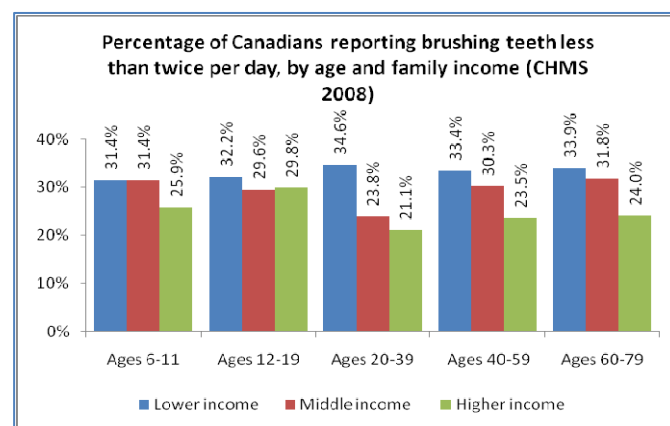
	At least one tooth showing coronal caries (DFMT)		At least one tooth with untreated coronal decay	
	Percent	95% Confidence Interval	Percent	95% Confidence Interval
<b>All</b>	<b>95.9%</b>	<b>94.5–97.0%</b>	<b>19.7%</b>	<b>17.2–22.4%</b>
Female <sup>a</sup>	96.5%	94.4–97.8%	16.1%	12.9–19.9%
Male <sup>a</sup>	95.4%	93.7–96.6%	23.4%	21.0–25.9%
Age 20-39 <sup>b</sup>	91.2%	88.1–93.5%	22.5%	19.7–25.6%
Age 40-59	98.8%	96.8–99.6%	18.5%	15.1–22.4%
Age 60-79 <sup>b</sup>	100.0%		16.0%	13.0–19.5%
Non-Aboriginal <sup>c</sup>	95.9%	94.5–96.9%	19.3%	16.7–22.1%
Aboriginal <sup>c</sup>	97.7%	87.8–99.6%	34.4%	27.9–41.6%
Highest household education = diploma or degree <sup>d</sup>	95.6%	94.2–96.6%	16.7%	14.7–18.9%
Highest household education < diploma/degree <sup>d</sup>	97.1%	92.3–98.9%	28.3%	24.2–32.9%
Higher income <sup>ef</sup>	96.8%	95.3–97.8%	13.5%	10.2–17.8%
Middle income <sup>e</sup>	96.2%	94.0–97.6%	21.9%	18.1–26.3%
Lower income <sup>f</sup>	94.7%	90.7–97.1%	29.8%	24.3–35.9%
Income unreported	91.4%	83.0–95.9%	27.2%	16.2–41.9%
Privately insured <sup>gh</sup>	95.5%	93.7–96.8%	15.9%	13.2–19.0%
Publically insured <sup>g</sup>	96.9%	94.9–98.1%	35.8%	26.3–46.7%
Not insured <sup>h</sup>	96.7%	94.5–98.1%	25.0%	20.8–29.7%
Visited a dental professional in past year <sup>i</sup>	96.7%	94.9–97.9%	12.9%	10.9–15.0%
Did not visit a dental professional in past year <sup>i</sup>	95.3%	92.4–97.1%	37.0%	32.1–42.2%

Note: Shared superscripts represent pairs that are significantly different from one another,  $p < .05$   
Source: Health Canada (2010).

### Dental Self-Care Behaviour

Regular self-care practices are an extremely important factor influencing dental caries rates at the population level. One of the key measures of self-care is regular flossing and toothbrushing. Recent CHMS survey results show that 73.2% of Canadians report brushing their teeth at least twice per day. However, males were less likely than females to meet this standard, with 18.8% of males compared to 5.4% of females reporting brushing their teeth less than twice per day. After age 20, those from lower income families are more likely to fail to meet the standard of brushing twice per day than are people from higher income families (see Figure 3).

Figure 3.



## IV. Relationships between Dental Health and General Health

This section provides an overview of current scientific literature on oral health and general health associations, as derived from our review of the scientific literature. There are two most common dental diseases: caries, and periodontal disease (Parkin & Devlin, 2003), which will be the focus of this report.

### Highlights

- Dental health is an important component of general health status;
- There is bidirectional, complex relationship between dental and general health;
- Poor dental health is associated with adverse health-related quality of life and poorer school performance;
- There is strong empirical support linking poor dental health to diabetes, coronary heart disease, chronic respiratory disease, and pneumonia;
- A collaborative approach among dental health, medical and other health providers, provincial and federal health departments and educators can promote optimal dental health.

### Dental Conditions and Quality of Life

The negative consequences of oral disease can affect overall quality of life (QOL). In June 2008, a Canada-wide telephone survey of 2019 adults was performed to gather data on subjective oral health, and global rating of QOL. Participants were asked about problems with teeth, mouth, dentures, the extent to which these issues bothered them, affect their QOL, and global rating of their QOL. Overall, 19.5% reported one or more impacts “fairly often” or “very often.” Of these, almost half (48.3%) reported being bothered by these problems, more than one-third (40%) reported that their life overall was affected, and quality of life was affected in slightly more than one-third (36.0%; Locker & Quiñonez, 2010).

### Dental Disease and School Performance

Dental disease, being chronic, can affect a child’s ability to attend school. For example, a U.S. study showed that children with poor dental health status were three times more likely to miss school due to dental pain compared with their counterparts. Poor dental health is associated with poorer school performance independent of school absence; absence caused by dental pain was associated with performance poorer school performance, but absence for routine care was not (Jackson, Vann, Kotch, Pahel, & Lee, 2011).



## **Periodontal Disease and General Health**

Periodontal disease (POD) refers to diseases that affect the gingiva and cause damage to the supporting connective tissue and bone which anchor the teeth to the jaws (Williams, 1990).

### **Periodontal Disease and Diabetes.**

People with diabetes are at an increased risk for POD, and POD has also been linked to poor control of diabetes. POD is often referred to as the sixth complication of diabetes (Kraglund & Cooney, 2008; Loe, 1993). A secondary analysis of the U.S. National Health and Nutrition Examination Survey indicated that diabetic adults are almost 3 times as likely to have periodontitis compared to non-diabetic adults (Tsai, Hayes, & Taylor, 2002). POD can induce insulin resistance and poor glycemic control among diabetics and non-diabetics (Kuo, Polson, & Kang, 2008), which in turn can cause diabetic complications. A number of studies have reported improved glycemic control in diabetics after treatment of POD. There is increased hyperglycemia attributable to POD in individuals with Type I and Type II DM (Darre, Vergnes, Gourdy, & Sixou, 2008; Janket, Wightman, Baird, Van Dyke, & Jones, 2005; Kuo et al., 2008; Simpson, Needleman, Wild, Moles, & Mills, 2010; Taylor, 2001; Teeuw, Gerdes, & Loos, 2010).

### **Periodontal Disease and Coronary Heart Diseases.**

Coronary Heart Disease (CHD) is a narrowing of the small blood vessels that supply blood and oxygen to the heart. Studies have been conducted to demonstrate impact of dental health on CHD. In addition, current literature suggests that periodontitis could be a potentially modifiable independent risk factor in the development and progress of CHD.

Reviews of the relationship between periodontal disease and CHD report that studies using varying methods consistently show increased risk of CHD attributed to POD (Bahekar, Singh, Saha, Molnar, & Arora, 2007; Fisher, Borgnakke, & Taylor, 2010; Humphrey, Fu, Buckley, Freeman, & Helfand, 2008; Kuo et al., 2008; Williams et al., 2008). In another systematic review, Lam and colleagues reported beneficial effects of oral health promotion on systematic blood markers found to be elevated in CHD (Lam, Zhang, Samaranayake, Li, & McGrath, 2010).

**Periodontal Disease and Respiratory Disease.** There is emerging evidence of links between poor oral health and chronic respiratory disease as well as aspiration pneumonia among elderly (Anil & Al-Ghamdi, 2006; Azarpazhooh & Leake, 2006). Poor oral hygiene can result in, or worsen, pneumonia and respiratory infections, especially among elderly nursing home and Intensive Care Unit (ICU) residents (Azarpazhooh & Leake, 2006). A recent study suggests that one case of pneumonia can be avoided by providing oral hygiene to eight to 15 individuals (Sjogren, Nilsson, Forsell, Johansson, & Hoogstraate, 2008).

## V. Cost, Funding, and Usage of Dental Care in Canada and Alberta

This section provides information regarding dental health expenditures in Canada, health system impacts related to dental health, dental insurance coverage, dental care availability and access, professional regulation, and public dental health programs in Alberta.

### Highlights

- There are marked social inequalities in oral health among Canadians.
- Insurance coverage for dental health services is very important determinant of dental care access, with more adequate insurance coverage associated with more frequent dental visits and better dental health.
- Only 50% of low income Canadians have dental insurance compared to 80% of high income group.

### Dental Health Expenditures

Oral health is not publically insured in Canada. Among the OECD countries, Canada ranks second last in the public financing of dental health (Parkin, 2003). Most of the dental services provided in private dental clinics are paid by patients either out of pocket (35%) or through private dental insurance (nearly 60%; Quinonez & Locker, 2007). Dental care is publically financed in Canada (a) for those on social assistance and their dependents, and (b) individuals with state recognized indigenous status. The government-financed portion of dental health accounted for 6% of total national health expenditures in Canada in 2007/2008. As Leake noted (2004), more affluent, insured Canadians receive tax-free dental care while the un-insured have to pay in after-tax dollars. Further, the taxes that could be collected on private dental health insurance benefits are instead collected through other taxes paid for by all Canadians, including those who do not have access to the benefits.

The majority (83%) of Canadians are in favour of publically financed dental care (Quinonez & Locker, 2007). The Alberta government spent approximately \$49,276,000 on oral health promotion and dental health services for socially marginalized, long term care residents, low-income children, and inpatient procedures (see Table 2).

The table in Appendix I shows Alberta's publically-funded dental health insurance programs based on an environmental scan conducted in 2005 (Quiñonez, Locker, Sherret, Grootendorst, Azarpazhooh, & Figueiredo, 2005) and a summary of listings of dental services listed on the Alberta Health Services website as of 2011.

Table 2: Dental Public Health Expenditures in Canada, Alberta and British Columbia (2007/2008)

	Targeted dental public health	Targeted treatment for the socially marginalized	Canada Health Act	Total publicly financed dental care
Canada (federal)	\$247,687,000			\$247,687,000
Alberta	\$6,000,000 <sup>a</sup>	\$40,000,000 <sup>a</sup>	\$3,276,000	\$49,276,000
British Columbia	\$3,500,000	\$44,809,000	\$1,539,000	\$49,848,000

<sup>a</sup> Estimate

Source: Quiñonez, Sherret, Grootendorst, Shim, Azarpazhooh, Locker (2006).

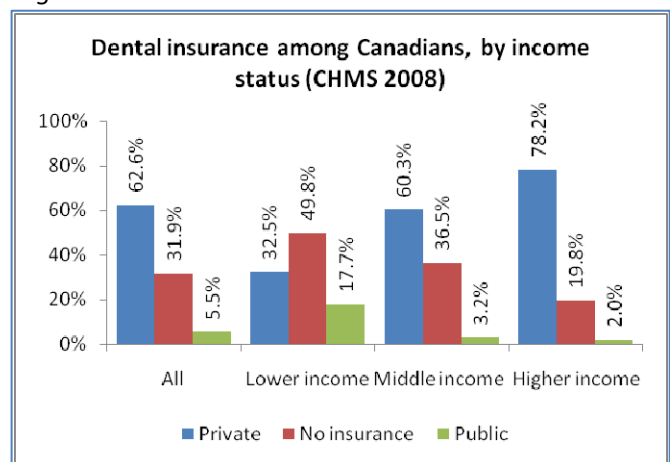
## Impact on the Healthcare System

It is important to note that public funding for dental health care also takes place within the acute care setting. A study of emergency department visits associated with dental care unrelated to trauma in Ontario revealed that just under 1% of visits to ERs in Ontario during the 2003/04, 2004/05, and 2005/06 fiscal years were for such causes, including tooth abscess, toothache (not otherwise specified), and dental caries (Quiñonez, Gibson, Jokovic, & Locker, 2009). In that three-year period, there were 141,365 ER visits for non-traumatic dental complaints, more than for either diabetes or hypertensive diseases. The authors note that two indicators that the incidence of ER visits for non-traumatic dental concerns is related to access to dental care are that, (1) most of the visits were made by those in the 20 to 44 year old age range, a life period in which fewer people qualify for government-funded dental insurance; and (2) the majority of visits were classified as less severe (78% were triaged as less urgent or non-urgent) and typically resulted in discharge (93%).

## Dental Insurance

According to results of the Canadian Health Measures Survey, more than half (62.6%) of Canadians report having some form of private dental insurance (see Figure 4), although the type and amount of coverage can vary greatly. In addition, 31.9% of Canadians report having no insurance at all. However, having dental insurance is closely related to income status. Among those in the lower income bracket, about half (49.8%) report that they have no insurance at all, and only 32.5% have private insurance. In contrast, most of those in the highest income category (78.2%) report having private dental insurance, while only 19.8% of these Canadians have no dental coverage.

Figure 4.



## Dental Health Care Availability

In Alberta, the number of dentists has steadily increased from 1,355 in 1991 to 1,865 in 2001 and 2,070, as of 2012, consistent with the general growth of the population over this time. Between 1995 and 2005, there were about 56 dentists per 100,000 people in Alberta. However, by 2009, it is estimated that there will be about 64 dentists per 100,000 people (or 1 dentist for every 1,568 Albertans; Canadian Dental Association, 2005).

High risk groups can face economic, geographic, social and cultural, legislative, medical, and educational roadblocks to accessing dental care (Kraglund & Cooney, 2008). Coverage by dental insurance can help overcome the financial barrier to dental care. However, not all the population groups could pay for the insurance premium, with income as one of the strongest determinants of dental insurance coverage (Kraglund & Cooney, 2008). The populations most affected by inequalities in dental health care access are seniors, First Nations and Inuit people, people with low incomes, and people with severe handicaps. Any increase in availability of dental care will only improve dental health at the population level, if those most in need are able to access this care.

## Dental Care Utilization

More than half of Canadians report having visited a dentist in the past year. In Alberta, 35.4% report that their last visit to a dentist was more than a year ago (Canadian Community Health Survey, 2008). Failing to visit a dentist annually is more common in rural health zones (South, 42.7%; Central, 40.6%; Northern, 40.8%; see Figure 5), compared to Edmonton and Calgary.

Figure 5.

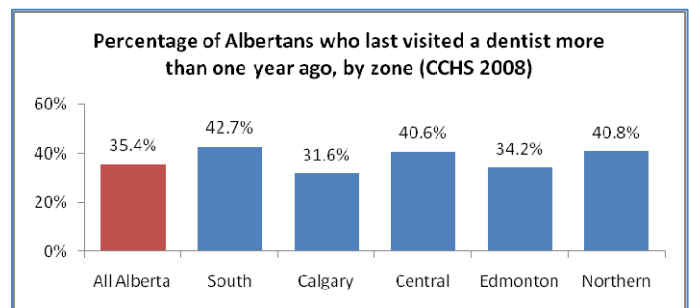
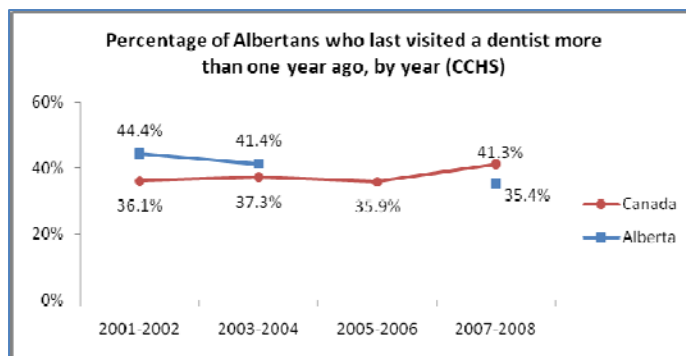


Figure 6.



Rates of failing to visit a dentist within the past year have changed over time (see Figure 6). Although in Canada the trend since 2001 has been a slight increase in the failure to annually obtain dental care, the trend among Albertans has been a decrease in this problem.

Interestingly, while physician visits are more likely for individuals with medical concerns,

those who are older, and those from a lower income background, dental visits are more likely among those who are more educated, wealthier, healthier, and younger (Sabbah & Leake, 2000). This raises the questions of whether the right populations are accessing dental care.

## Barriers to Dental Care Utilization

Although dental care utilization appears to be increasing over time in Alberta, there are still barriers to accessing services that represent avenues for improving access at a population level. Respondents to the Canadian Community Health Survey who had not seen a dentist in three or more years were asked why they had not sought dental care. The most common barriers to seeking dental care among Albertans (see inset, right) related to failure to see the need to go, cost, lack of prioritization, and fear.

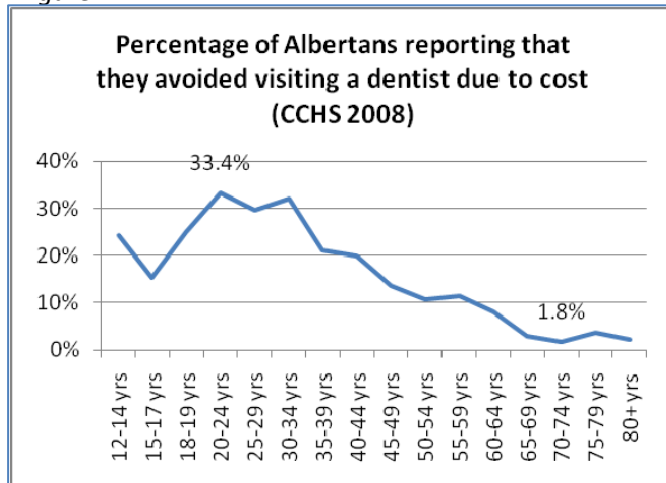
Cost of dental services is one of the major obstacles in utilizing the dental care services. Albertans were more likely than those from other provinces included in the study to say that they did not visit a dentist in the last 3 years because of the cost (CCHS, 2008).

### Most Commonly Cited Reasons for Not Seeing a Dentist among Albertans

- Individual thought it unnecessary (34.4%)
- Thought it not needed because the individual has dentures (25.9%)
- Cost (17.1%)
- Haven't gotten around to it (15.0%)
- Fear (7.4%)

(Selwitz, Ismail, & Pitts, 2007)

Figure 7.



Avoiding visits to the dentist because of the cost peaks for Albertans aged 20 to 24 (33.4%) and is least common among those aged 70 to 74 years (1.8%; CCHS, 2008; see Figure 7).

Among Canadians in general, income status is strongly related to perceptions of affordability of dental care (CHMS, 2008). Among those who had not visited a dentist in the past year, 34.5% of people in the low income category indicated that cost was the reason, compared to only 8.8% of those in the highest income category.

## Professional Regulation of Dentistry and Dental Services

The practice of dentistry is regulated by the National Examination Board of Canada in conjunction with The Commission on Dental Accreditation of Canada and the Royal College of Dentists of Canada. To practice in Alberta a dentist must be licensed at Federal and provincial level (*Alberta Dental Association and College*).

In Alberta the delivery of publicly funded oral health services falls under the umbrella of Alberta Health Services (AHS). There are 21 mouth and dental Services provided by the Alberta Health Care Insurance Plan (AHCIP). These include consultations, examinations, procedures and services that are generally performed by an oral maxillofacial surgeon, oral pathologist, or anaesthesiologist in a hospital or acute care setting.

## Publically Funded Dental Care Programs

In addition to the publically-funded dental services mentioned above, Alberta Health and Wellness also funds a number of public health programs and services for dental health care through the [Income and Employment Supports Act](#), [Assured Income for the Severely Handicapped \(AISH\)](#), [Dental and Optical Assistance for Seniors Programs \(DASP\)](#), and the [Children's Health Benefit](#). Appendix I provides the eligibility requirement and services provided under these provincial programs.

## VI. Fluoridation

This section summarizes academic literature on the nature of fluoride and the health impacts of fluoridation. It also provides a brief synopsis of the history of municipal fluoridation policy decisions in Alberta and across Canada.

### Highlights

- Community water fluoridation has been identified by the Canadian public health association as one of the twelve great public health achievements in the past 100 years.
- Every \$1 invested in water fluoridation saves \$38 in dental treatment costs.
- However, only 45% of Canadians live in communities with fluoridated water supplies.

### What is Fluoride?

Fluoride is a naturally occurring chemical compound that can help prevent dental decay. Fluoride, in low concentrations, is found to be beneficial for dental health and has preventive effect on dental caries. Individuals can be exposed to fluoride naturally (i.e., fluoride found naturally in water sources), and by means of systemic supplementation (i.e. fluoride added to water supplies), or topical supplements (e.g., fluoride in toothpastes or mouthwashes).

### Are There Health Risks Associated with Exposure to Fluoride?

Dental fluorosis is the change in appearance of teeth due to ingestion of higher than optimal amounts of fluoride in early childhood while tooth enamel is forming (occurs both in water fluoridation as well as non water fluoridation communities).

Notwithstanding beneficial effects, exposure to fluoride at high levels can produce adverse effects, such as mild dental fluorosis (visible on specialists exam only), skeletal fluorosis (with adverse changes in bone structure), and crippling skeletal fluorosis (International Program on Chemical Safety, 2002).

#### Guidelines for Drinking Water Quality

Canadian Guidelines  
Min: 0.7mg/L  
Max: 1.5mg/L  
(*Health Canada, 2008*)

World Health Organization Guidelines  
Min: .5mg/L  
Max: 1.5mg/L  
(*WHO, 2011*)

## Fluoride and General Health

Researchers have investigated associations between exposure to fluoride and certain cancers and have found no relationship with cancer in general (International Program on Chemical Safety, 2002), two kinds of bone cancer (Blakey, et al., 2010), and bladder cancer (Alexander & Olsen, 2007). Fluoride is not found to be associated with adverse pregnancy outcomes such as Down syndrome, or any other congenital malformations (WHO, 2011). A meta analysis showed that fluoride significantly increases bone mineral density, but does not result in a reduction in vertebral fracture (Haguenaer, Welch, Shea, Tugwell, Adachi, & Wells, 2000), although there is some inconsistency among individual studies.

Results of studies examining the association between water fluoridation and skeletal fluorosis have been inconsistent and at the present no consensus can be reached about whether fluoridation may increase risk or be protective in this regard. Skeletal fluorosis, which can lead to an increased risk for hip fractures, tends to occur only at very high exposure levels, and has rarely been documented in Canada. (Health Canada, 2009).

## Fluoride and Dental Health

Early childhood caries is the decay of any primary tooth in a child less than six years of age, and it often requires extensive treatment under general anaesthesia (American Academy of Pediatric Dentistry, 2011).

One study, comparing early childhood caries in fluoridated and non-fluoridated regions of Saskatchewan, showed that children from fluoridated areas had better oral health compared with children from non-fluoridated localities (Vinay & Leslie, 2010). However, a study that more comprehensively considers other possible contributing factors is needed.

## Water Fluoridation in Alberta

In Canada, municipalities are responsible for decisions and costs associated with water fluoridation.

Until 1980, the water fluoridation coverage of Alberta was similar to National rates. Starting from 2006, however the coverage level increased over the national level, until in 2007-2008, the percentage of the Alberta population receiving fluorinated water was 1.5 times higher than the national level. (74.7% versus 45.1%; see Appendix I).

Edmonton has had fluoridated drinking water since 1967 at levels of 1.0 mg/L. Natural fluoride levels in Calgary (0.1 to 0.4 mg/L) are, on average, about one third of Edmonton's natural levels (Suarez-Almazor, Flowerdew, Saunders, Soskolne, & Russell, 1993; The City of Calgary: Fluoride). Calgary went through five plebiscites on water fluoridation up to 1998. A vote in 1989 received a majority; Calgary began adding fluoride to its drinking water at a target of 1.0 mg/L. In 1998, The City and Alberta Health Services reviewed water fluoridation as a public policy, and a panel of five experts recommended a reduction in the level of fluoride to 0.7mg/L. This change was adopted in 1999. In February 2011, the City of Calgary decided to discontinue fluoridation (CBC News, 2011).

The fluoridation history of other Canadian provinces is provided in Appendix II.

## VII. Summary and Areas for Future Inquiry

- Dental health care coverage varies widely across the provinces. Compared to dental coverage in some other provinces, coverage in Alberta is less comprehensive.
- Consistent with national trends, dental health for many Albertans is quite high. However, there is room for improvement among several subpopulations, including those with lower incomes. This is particularly important given that a lack of insurance coverage for dental health services is a main barrier to preventive services and may be associated with a greater burden of disease.
- Interventions to promote dental health and improve access to dental care would likely be most effective if designed to address the needs of special populations with indicators of poorer dental health. An important consideration with surveillance is that because the prevalence of such indicators as “no caries” is already quite high, it will be difficult to see new programs or policies impact general population rates. Evaluation of such interventions for special populations would need to be at the appropriate level in order to detect change.
- Research suggests that poor dental health can result in significant costs to the provincial health care system when dental health problems progress to the point of needing surgical intervention, or when uninsured individuals seek treatment for pain, infection, or other complications in an emergency department setting. Future analyses may be needed to determine the extent to which provincial health care dollars are being spent on dental health care in emergency department and surgical settings within hospitals.
- Currently there are insufficient data from existing sources to comprehensively describe the state of dental health in children and adults in Alberta. The most comprehensive survey available, the Canadian Health Measures Survey is designed to present results at a national level and does not sample sufficiently to present province-level results with great accuracy. The dental health items included in the Canadian Community Health Survey do provide important information at a provincial level, however they rely on self-report, rather than examination by a trained interviewer. Finally, the last provincial survey was conducted in 1985 and included only 13 year olds.



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## Appendix I: Public Health Programming in Alberta

Program	Eligibility	Services covered	Utilization	Service environment	Administration
<b>Alberta Health and Wellness</b>					
<b>Regional Dental Public Health Services</b> ( <i>prior to amalgamation of regional health authorities</i> )	Targeted preschoolers, school-age children, adults, and elderly	Targeted preschoolers, school-age children, adults, and elderly		Dental hygienists and assistants/ regional health units, schools, residential facilities; includes clinical dental services in Capital and Calgary health regions	Regionally administered

Program	Eligibility	Services covered	Utilization	Service environment	Administration
<b>Alberta Health Services</b>					
<b>Cleft Lip and Palate Clinic, Cleft Palate Services</b>	children who have been born with a cleft lip and/or cleft palate as well as other craniofacial anomalies.	Comprehensive care for by a multidisciplinary team consisting of Plastic Surgeons, an Oral/Maxillofacial Surgeon, Pediatric Otolaryngologist (ear, nose, throat doctor), Pediatrician, Orthodontist, Audiologist and Speech Language specialist, Social Worker and the Clinic Coordinator.	Unknown	Children's Hospitals in Edmonton and Calgary	Unknown
<b>Craniofacial Clinic</b>	Children with craniofacial medical conditions which include deformities of the skull e.g. craniosynostosis and plagiocephaly, as well as syndromes such as Pierre-Robin, Cruzon, Treacher-Collins.	The Craniofacial Clinic cares for Monitoring, intervention and follow-up is also provided for infants with positional plagiocephaly, and children being treated through the dynamic orthotic cranioplasty program.	Unknown	Hospital	Unknown

Program	Eligibility	Services covered	Utilization	Service environment	Administration
<b>Alberta Health Services, continued</b>					
<b>Early Childhood Oral Health Services</b>	Early Childhood Oral Health Services (ECOHS) to children who are at high risk for dental disease. Most clients are identified through a questionnaire that is completed by a parent during the Child Health Immunization clinic or are referred by another health professional or if the parent has concern about the child's oral health.	Provides dental prevention services	Unknown	Health centres, health units, hospital clinics throughout Alberta	Unknown
<b>Head Start Health Team</b>	Children must be enrolled in participating Edmonton Head Start programs.	Dental fluoride is applied to children in the program, with consent of parents	Unknown	Community locations in Edmonton	Unknown
<b>Oral Health - Dental Treatment Services</b>	Those without private insurance and lower income.	<ul style="list-style-type: none"> <li>•Reduced-fee dental treatment services by qualified dentists to families in financial need and without access to dental insurance;</li> <li>•Check-ups, X-rays, fluoride treatment, sealants, scalings, fillings, front tooth root canals, extractions, etc.</li> </ul>	Unknown	Various health centre and community locations in Alberta	Fees are 20% of the cost at private dental clinics

Program	Eligibility	Services covered	Utilization	Service environment	Administration
<b>Alberta Health Services, continued</b>					
<b>Oral Health Programs: Central Zone</b>	Available to children from 12 months to 18 years old, in some cases based on financial need	Preventive clinical services for children, urgent dental treatment for children with visible tooth decay, pain, broken teeth and signs of infection, Community education	Unknown	Various health centres in Central Zone	Unknown
<b>School Dental Programs, Services</b>	Students in grades kindergarten to Grade 6.	Programs such as fluoride rinse and Care For A Smile (sealants & fluoride varnish). Also offers services from health centres or daycares.	Unknown	Various	Unknown
<b>Seniors Dental Program</b>	Caregivers of residents in nursing homes and auxiliary hospitals	Dental hygienists provide education sessions to caregivers in the facilities. The sessions outline proper mouthcare for the residents.	Unknown	Various locations in Edmonton area	Unknown
<b>Tiny Teeth Program</b>	Birth up to and including 5 years old, but not yet in grade one	Oral inspection with possible cleaning and/or fluoride varnish application. Referral to Dentist when needed.	Unknown	Various locations in the North Zone	Unknown

<b>Alberta Employment and Immigration</b>					
<b>Alberta Work Income Supports</b>	<p>People who do not have the resources to meet basic needs; the level of assistance depends on each individual's situation including financial resources, ability to work and the number of children in the family</p> <p>People in three general situations qualify:</p> <ul style="list-style-type: none"> <li>- Not Expected-to-Work (NETW), those who have difficulty working because of a chronic mental or physical health problem or because of multiple barriers to employment</li> <li>- Expected-to-Work (ETW), those who are looking for work, working or unable to work in the short-term</li> <li>- Learners, people who need academic upgrading or training so they can get a job</li> </ul>	<p>Standard Dental Coverage is primarily limited to relief from dental pain and oral infection; coverage can include some diagnostic, restorative, and prosthodontic care (ETW, Learner)</p> <p>Supplementary Dental Coverage includes Standard benefits with some diagnostic, restorative, endodontic, periodontal, prosthodontic, and oral surgery services (NETW)</p>	Dentist and denturist/private practices	Centrally administered, adjudication and payment functions the responsibility of Alberta Blue Cross	Centrally administered, adjudication and payment functions the responsibility of Alberta Blue Cross
<b>Alberta Child Health Benefit (ACHB)</b>	ACHB is a premium-free health benefit plan for children <18yrs living in low income families	Standard Dental Coverage	65,640 cases per month eligible \$17.78 per case per month	As above	As above
<b>Alberta Adult Health Benefit (AAHB)</b>	For NETW and ETW clients and their children who leave Income Supports for work, and to AISH recipients who leave the program due to employment income or Canada Pension Plan Disability benefits	Provides continuing premium-free benefits (Standard Dental Coverage)	1,050 cases per month eligible	As above	As above

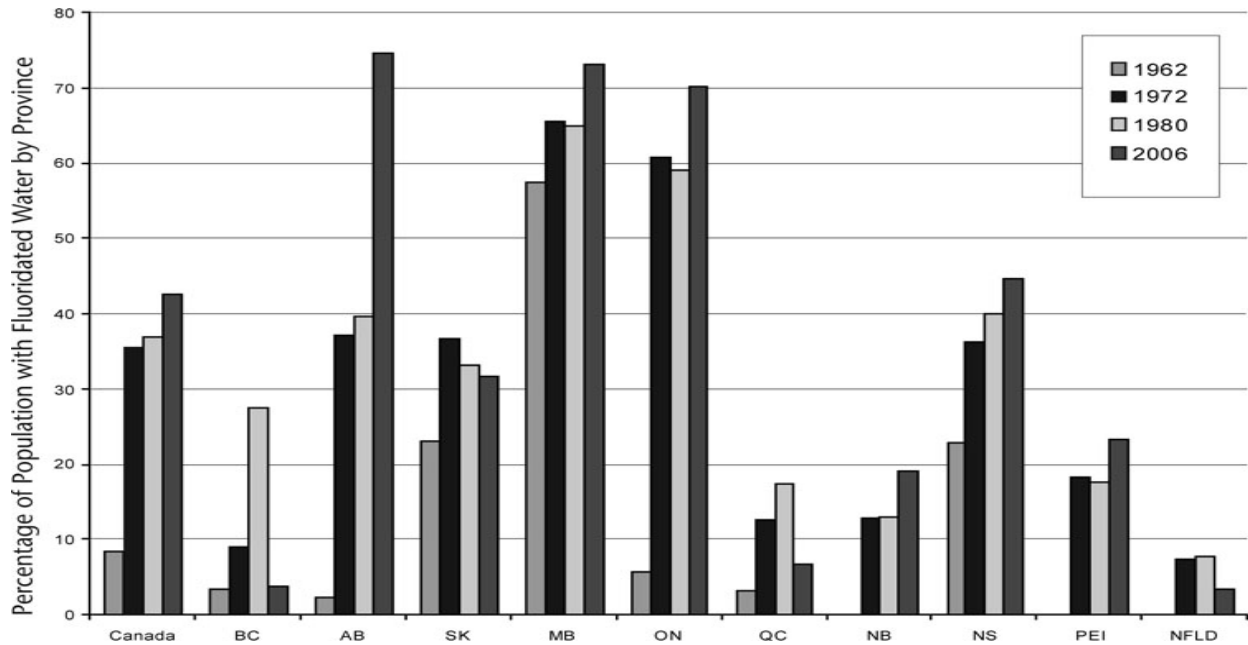


Program	Eligibility	Services covered	Utilization	Service environment	Administration
<b>Alberta Seniors and Community Supports</b>					
<b>Dental Assistance for Seniors Program (formerly EHB)</b>	Those >65yrs meeting income thresholds; up to a program maximum of \$5,000 per person every five years	Depending on income, partial or maximum coverage; some diagnostic, restorative, endodontic, periodontal, prosthodontic, and oral surgery services	Dentists \$101.92/patient  Denturists \$221.79/patient		
<b>Assured Income for the Severely Handicapped (AISH)</b>	AISH provides health benefits for adults 18-64yrs with a permanent disability that severely impairs their ability to earn a living; level of benefits depends on income and assets		31,250 cases per month eligible		
<b>Family Support for Children with Disabilities</b>	Services for families with disabled children not covered under any other plan; must be directly related to the child's disability; pays for the portion of costs exceeding those covered by the guardian's dental insurance or benefit plan, or if the guardian does not have such insurance, the costs exceeding \$250 annually	As above, some orthodontic treatment	6,695 cases per month eligible		<a href="http://www.child.alberta.ca/home/591.cfm">http://www.child.alberta.ca/home/591.cfm</a>

Program	Eligibility	Services covered	Utilization	Service environment	Administration
<b>Other Programs</b>					
<b>Boyle McCauley Health Clinic Dental Clinic</b>	individuals must live in our catchment area and experience multiple barriers to accessing health care services i.e. homeless, poverty, addictions, and mental health issues.	A community health centre that provides primary health care services on-site and in the community.	Unknown	Community centre	Fees based on sliding scale according to income

Sources: Quiñonez, Locker, Sherret, Grootendorst, Azarpazhooh, & Figueiredo (2005); Alberta Health Services (2011).

## Appendix II: Percentage of Population with Fluoridated Water, by Province



Source: Carstairs (2010).

Province/Territory	Total Population	Population with fluoridated water	Percent with fluoridated water	Population without fluoridated water	Percent without fluoridated water
Canada	31,611,911	14,258,078	45.1%	17,364,803	54.9%
Alberta	3,290,350	2,457,406	74.7%	832,944	25.3%
British Columbia	4,113,000	152,241	3.7%	3,960,759	96.3%
Saskatchewan	968,157	356,096	36.8%	612,061	63.2%
Manitoba	1,148,401	803,116	69.9%	345,285	30.1%
Ontario	12,160,282	9,229,015	75.9%	2,931,267	24.1%
Quebec	7,546,131	489,420	6.4%	7,067,711	93.7%
New Brunswick	729,498	188,607	25.9%	540,891	74.2%
Nova Scotia	913,462	519,031	56.8%	394,431	43.2%
Prince Edward Island	135,851	32,174	23.7%	103,677	76.3%
Newfoundland/ Labrador	505,469	7,572	1.5%	497,897	98.5%
Nunavut	29,474	0	0.0%	29,474	100.0%
Northwest Territories	41,464	23,400	56.4%	18,034	43.6%
Yukon	30,372	0	0.0%	30,372	100.0%

Source: Health Canada (2008).

## Appendix III: History of Provincial Fluoridation Decisions

### Alberta (74.7%)

Edmonton has had fluoridated drinking water since 1967 at levels of 1 mg/L. Natural fluoride levels in Calgary (0.1 to 0.4 mg/L) are, on average, about one third of Edmonton's levels (Suarez-Almazor, Flowerdew, Saunders, Soskolne, & Russell, 2009; City of Calgary, undated ). Calgary went through 5 plebiscites on fluoride up to 1998. A vote in 1989 received a majority; Calgary began adding fluoride to its drinking water at a target of 1.0 mg/L (Rabb-Waytovich, 2009). In 1998, The City and Alberta Health Services reviewed water fluoridation as a public policy, and a panel of five experts recommended a reduction in the level of fluoride to 0.7mg/L. This change was adopted in 1999 (city of Calgary, undated). In February 2011, City of Calgary decided to discontinue fluoridation (CBC, 2011a).

### Ontario (75.9%)

Ontario was one of the first places in the world to introduce community water fluoridation as a public health initiative to reduce tooth decay. The first Canadian community water fluoridation trials began in Brantford, Ontario in 1945. In March 1961, Toronto city council voted in favour of immediate fluoridation and those opposed to fluoridation campaigned at the end of that month. Referendum was held in December 1962, and fluoridation was passed with 50.7% (Carstairs, 2010). Since 2008, the fluoridation debate in Ontario has been very active. At least 8 communities were challenged to discontinue community water fluoridation. Some Ontario cities have decided to adjust their fluoride levels, with Toronto and Hamilton lowering their levels to 0.6 parts per million (Rabb-Waytovich, 2009).

Though Waterloo city has fluoridated since 1967, but referendum in 2010, 50.3% of voters said no, and fluoridation was ended (Region of Waterloo, undated; CTV, 2010). Dryden (by referendum) and Niagara (by regional council) voted not to restart its water fluoridation program. Municipal councils voted to continue fluoridation in Hamilton, Tottenham and Atikokan. Halton and Norfolk councils voted to continue fluoridation while awaiting the final report of the Federal-Provincial-Territorial Committee on Drinking Water (Rabb-Waytovich, 2009). Thunder Bay, which is not fluoridated, has implemented a public education program on community water fluoridation. April 4 2011, Toronto's board of Health voted to continue fluoridation in water (Rabb-Waytovich, 2009; City of Toronto, 2011).

### Manitoba (69.9%)

Fluoridation passed easily in Winnipeg, without any referendum. Despite of recommendation of Health committee of the city council in March 1952, Winnipeg has added fluoride to its drinking water in December 1956 (Carstairs, 2010). In 2011 March, the city council lowered the level of fluoride in water from 0.85 to 0.7 ppm. There are 63 communities in Manitoba fluoridating their water systems representing 95% of the population on a public water supply (CBC, 2011b).

### Nova Scotia (56.8%)

Fluoridation in Nova Scotia began in the 1970s. Currently, 57% of the population has access to fluoridated water. The Nova Scotia Department of Health Promotion and Protection supports the fluoridation of drinking water to help prevent caries. April 2011, Regional council voted 11-2 in favour of fluoridation; fluoride will continue to be added to municipal water supplies around the Cape Breton Regional Municipality (CBC, 2011c). The province has a fluoride mouth rinse program offered in select schools for children 4–12 years of age.

### **British Columbia (3.7%)**

Despite the British Columbia Ministry of Health Services supporting water fluoridation in the prevention of caries, less than 4% of B.C. community water is fluoridated (Rabb-Waytovich, 2009). Results of referenda in 1992 in Comox/Courtenay and Campbell River led to the discontinuation of water fluoridation after being fluoridated for approximately 25 years. Kamloops voted to discontinue to fluoridate (Maupomé, Clark, Levy, & Berkowitz, 2001).

### **Saskatchewan (36.8%)**

The South Saskatchewan River has some naturally occurring fluoride at a level of 0.14 parts per million. The City of Regina has never added fluoride to its drinking water, despite several past debates on the issue. Fluoridation was approved by city council but no national health grants were available at the time. When money became available, an anti-fluoridation movement petitioned council for a referendum. Regina voters rejected fluoridation in four plebiscites between 1954 and 1985 and city council decided, on a procedural technicality, not to hold a fifth plebiscite in 1997 (Regina Leader Post, undated). Cypress Health Region reports suggested the need of fluoridation in November, 2010, due to the disparity in levels of cavity between CWF and NCWF area. Saskatoon suspended water fluoridation while working to upgrade their water treatment plant in March 2011 (Public Health Services Saskatoon Health Region Oral Health Program, 2009).

### **Quebec (6.4%)**

After several years of debate, national assembly 1975 decided to fluoride water to all municipalities in Quebec by 1 Jan 1977. However, when the Parti Quebecois was elected in 1976, the legislation mandating fluoridation was suspended. Municipalities are free to introduce fluoridation if they wished and the province continued to provide funds for purchase of fluoridation equipments (Carstairs, 2010). Quebec City introduced water fluoridation in 1972, and discontinued it in 2008. Dorval added fluoride to its drinking water supply for half a century but was forced to stop in 2003, when the filtration system broke down. Dorval resumed fluoridation after a 5-year hiatus (Rabb-Waytovich, 2009). Montreal's water supply remains non-fluoridated (Carstairs, 2010).

### **Newfoundland/Labrador (1.5%)**

Only 1.5% of the province's community water is fluoridated, down from 3.5% in 2005. Most private and community water sources in the province come from wells which may have natural sources of fluoride (Rabb-Waytovich, 2009). (See also the map "Areas of potential fluoride concentration in well water" at: [www.env.gov.nl.ca/Env/env/waterres/Groundwater/Fluoride/GW&Fluoride.asp](http://www.env.gov.nl.ca/Env/env/waterres/Groundwater/Fluoride/GW&Fluoride.asp)).

### **Prince Edward Island (23.7%)**

A plebiscite on fluoridation was held in Charlottetown in 1967. Fluoridation began in 1968 in this city as well as the Canadian Forces Base in Summerside. Currently, P.E.I. is focusing on preventive dental programs for children and adolescents through schools, which include topical fluoride application for the partial prevention of tooth decay (Rabb-Waytovich, 2009).

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