

The U.S. Surgeon General's Report on Oral Health in America: A Canadian Perspective

• Herenia P. Lawrence, DDS, MSc, PhD •
 • James L. Leake, DDS, DDPH, MSc, FRCD(C) •

A b s t r a c t

This paper provides an overview of last year's U.S. Surgeon General's report on oral health, describes the burden of oral diseases and craniofacial disorders in the United States, and draws parallels with the state of dental health in Canada and in the province of Ontario. It concludes by focusing on the report's recommendations for future action and briefly notes some of the lessons that Canadians can learn from these findings. The goal of this paper is to stimulate further discussion of the issues raised in the report, in an effort to encourage public-private partnerships dedicated to the creation and support of programs to make oral health a more integral component of general health.

MeSH Key Words: *Canada; dental health services; health services accessibility; oral health*

© J Can Dent Assoc 2001: 67:(10)587
 This article has been peer reviewed.

The publication of the first U.S. Surgeon General's report on oral health, on May 25, 2000, clearly indicates a realization that oral health can have a significant impact on the overall health and well-being of the American population.¹ The theme of the report, "the mouth as a mirror of health or disease," suggests that a wealth of information can be derived by simply examining the mouth and surrounding oral tissues. The 308-page report, commissioned by the Office of the Surgeon General and prepared under the direction of Dr. David Satcher, notes that in the past 50 years great progress has been made in understanding the most common oral diseases, dental caries and periodontal disease. This progress has resulted in marked improvement in the oral health of Americans and other developed-world populations. However, the report also makes it very clear that, despite these advances, there exist profound disparities among various population groups in rates of oral and pharyngeal cancers, dental caries and craniofacial anomalies, as well as in general oral health and treatment opportunities. According to the report, poor children, the elderly, the developmentally disabled, the medically compromised, homebound and homeless people, those with HIV, and uninsured and institutionalized individuals, as well as members of ethnic minorities, remain most vulnerable to oral diseases. The Surgeon General goes

so far as to refer to a "neglected epidemic" because of the failure to recognize oral disease as a health priority in the United States.²

The Surgeon General's report offers Canadian health officials and caregivers an unprecedented opportunity to learn from the work of our neighbour to the south. This paper reviews a number of the key findings of the report and relates these findings to the Canadian situation in an effort to stimulate discussion on the implications of the Surgeon General's oral health report on national, provincial and local health programs in Canada.

Oral Health Redefined

An important innovation highlighted in the Surgeon General's report is a broader definition of oral health, which has significant implications for the provision of dental services. In 1948 the World Health Organization expanded the definition of health to mean "a complete state of physical, mental, and social well-being, and not just the absence of infirmity." Along these same lines, oral health must also include well-being and must be perceived as a critical component of general health. Given that the definition of oral health has been broadened, the focus of dental care programs and health services research should not be limited to diseases of the teeth, gums and their supporting tissues,

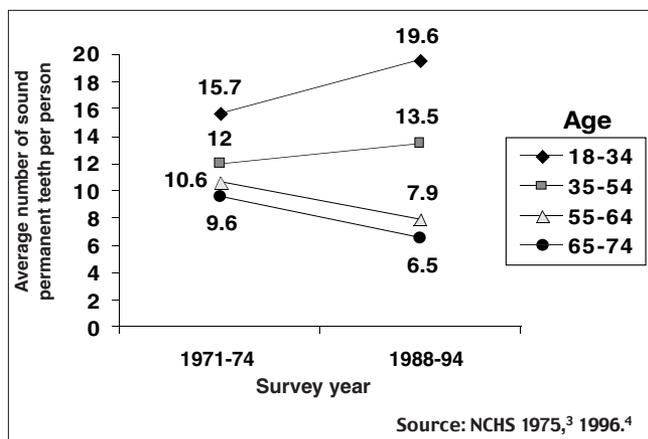


Figure 1: Mean number of sound permanent teeth per person 18 years of age or older in the United States.

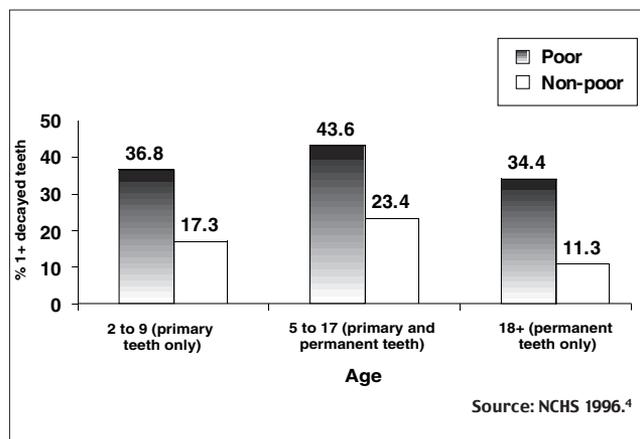


Figure 2: Percentage of people in the United States with at least one untreated decayed tooth.

but should also encompass chronic orofacial pain, oral and pharyngeal cancers, oral soft-tissue lesions, birth defects such as cleft lip and cleft palate, and other diseases and disorders that affect the oral, dental and craniofacial tissues, collectively known as the craniofacial complex.¹ Such an array of diseases and conditions has the potential to interfere with life functioning and quality of life, which further justifies making oral health a more integral part of general health care programs.

Status of Oral Health in the United States, Canada and Ontario

Dental Caries

U.S. national data^{3,4} presented in the Surgeon General's report document major increases in the percentage of children and adolescents 5 to 17 years of age who have never experienced dental caries in their permanent teeth. There has also been a decline in coronal caries in young adults since 1974, as measured by the average number of teeth without decay or fillings (Fig. 1). However, these trends were not evident among those 55 to 74 years of age (Fig. 1). Noteworthy is the lack of data on root caries for middle-aged and older Americans, for whom the most recent estimates were derived from the 1986 oral health survey of employed adults and senior citizens.⁵

Despite progress in reducing dental caries, the Surgeon General's report notes that people in families with incomes below the poverty level experience twice as much dental decay as those who are economically better off.^{4,6} Children in families of low socioeconomic status are particularly vulnerable to oral health problems and severe tooth decay, which can affect their growth and development.⁷⁻⁹ Furthermore, caries in poor individuals are more likely to be untreated than caries in those living above the poverty level: more than one-third of poor children 2 to 9 years of age have at least one untreated decayed primary tooth,

Table 1 Dental caries experience among Ontario children aged 5 to 6 and 12 to 13 by ethnic background, 1990/1994

	Born in Canada	Born Outside Canada	Aboriginal
% deft = 0 or DMFT = 0			
Age 5	69	55	15
Age 13	53	38	11
Mean deft or DMFT			
Age 5	1.2	2.1	6.5
Age 13	1.4	2.2	3.9
% Decayed			
Age 5 (d/def)	32	51	39
Age 13 (D/DMFT)	9	15	31

Sources: MOH DIS, 1993-94;¹⁰ OHS Can's Aboriginal Children 1990-91;¹¹ Leake and Main, 1996.¹²

whereas only 17% of their more affluent peers have this level of decay (Fig. 2).⁴ In Canada, data from the Ontario Ministry of Health's Dental Index System surveys of odd-aged children also showed a decline in the mean number of decayed, missing and filled teeth in the primary (def) and permanent dentition (DMFT) from 1980 to 1994 (Fig. 3).¹⁰ The decline was more dramatic for 13-year-old children (59.5% reduction in DMFT) than for 5-year-old children (39.6% reduction in def).

As in the United States, sex, age, income, and race or ethnicity are important determinants of oral health status in Canada. For example, Ontario aboriginal children and children born outside Canada who are living in Ontario typically have fewer sound teeth, higher mean deft or DMFT, and more untreated decay than non-aboriginal children in the province (Table 1).¹⁰⁻¹² In a group of 13- to 14-year-olds

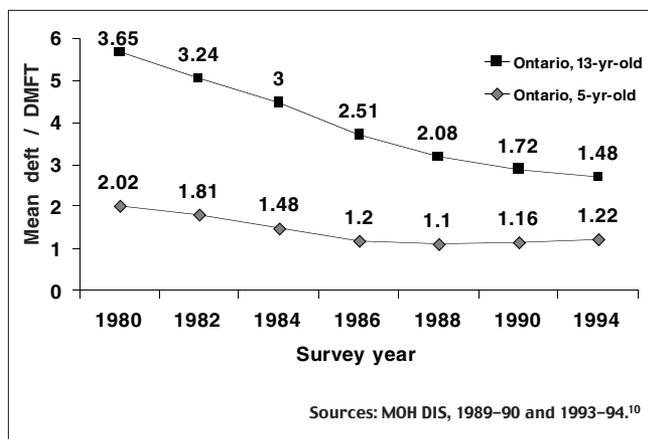


Figure 3: Mean deft and DMFT in children 5 and 13 years of age in Ontario, 1980-1994.

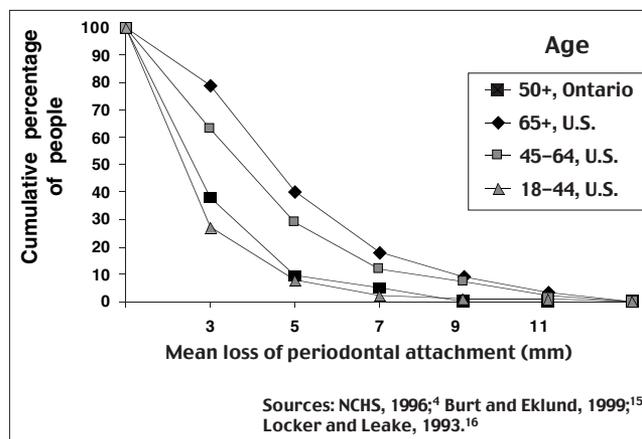


Figure 4: Loss of periodontal attachment among adults in the United States and Ontario.

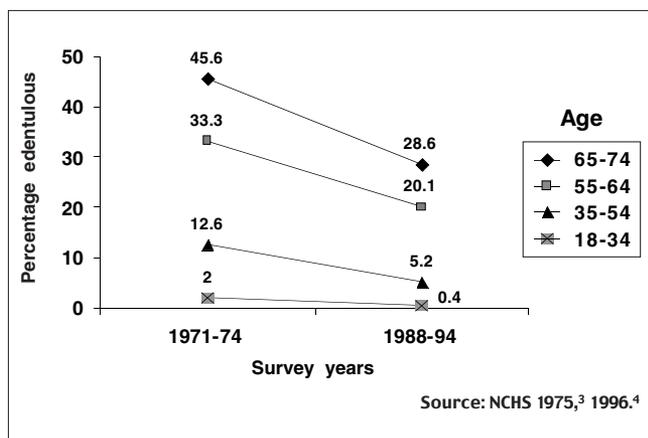


Figure 5: Percentage of edentulous adults in the United States.

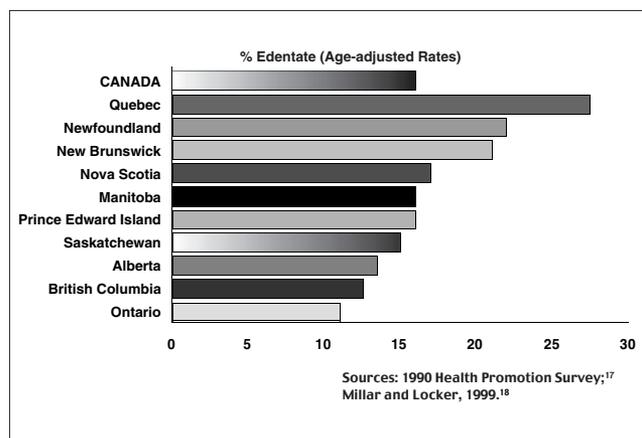


Figure 6: Edentulous Canadians 15 years of age and older, 1990.

living in North York, Ontario, only 3.5% of those born in Canada, but 22.9% of those who had immigrated to Canada in the previous 2 years, needed restorations.¹³ Urgent care was needed by 0.5% and 10.4% of these groups, respectively.¹³ A recent panel discussion at the Consensus Development Conference on the Diagnosis and Management of Dental Caries Throughout Life, convened by the National Institutes of Health, noted that effective dentistry requires identification of children at high risk for extensive caries so that they may receive early and intensive preventive intervention. Children at low risk must also be identified to reduce unnecessary care and expenditures.¹⁴

Periodontal Diseases

According to the Surgeon General's findings, most adults show signs of periodontal or gingival disease (Fig. 4).^{4,15} Although older adults have greater loss of periodontal attachment than younger adults, severe loss (at least 6 to 7 mm at one or more sites) occurs in only a small proportion of each age group (Fig. 4).

Data from the early 1990s on periodontal disease in adults 50 years of age or older living independently in 4 communities in Ontario agree with the U.S. data, and only a small proportion of the population had severe disease (Fig. 4).¹⁶ Less than 5% of this group of older adults experienced mean attachment loss of 6 mm or more, and less than 10% had a mean loss of 4 mm or more.

Tooth Loss and Edentulism

Perhaps the most significant findings in the Surgeon General's report are those related to tooth loss and complete edentulism (Fig. 5).^{3,4} Far fewer people are edentulous today than was the case a generation ago. About 30% of adults 65 years of age or older are edentulous, whereas 20 years ago, 46% of adults in this age group had no teeth. However, the proportion is higher among those living in poverty.

The most recent information available on the proportion of the Canadian population with no natural teeth comes from the 1990 Health Promotion Survey (Fig. 6).^{17,18} In

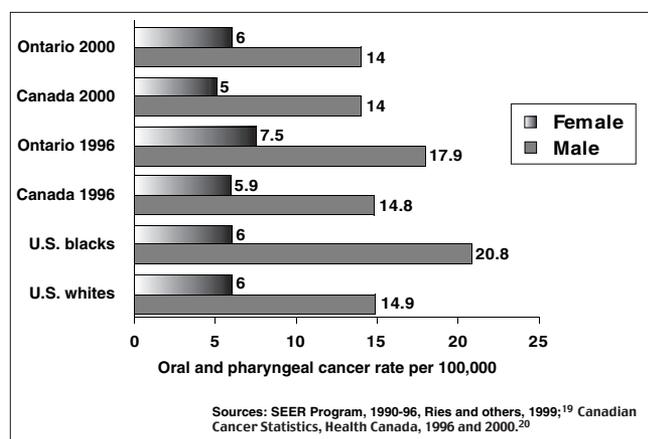


Figure 7: Incidence rates of oral and pharyngeal cancers in the United States, Canada and Ontario.

that year, 17% of Canadians 15 years of age or older were edentulous. In Ontario, the rate was 11%, the lowest rate of complete tooth loss among all Canadian provinces. However, the data also varied by household income levels, with substantially higher rates of edentulism in lower-income groups.

Oral and Pharyngeal Cancers

The incidence rates for oral and pharyngeal cancers in the United States in 1996¹⁹ were remarkably similar to those in Canada for the same year (Fig. 7).²⁰ Incidence rates for oral and pharyngeal cancers are higher for males than females in the United States, Canada and Ontario, and are also higher for black American males than for white American males (Fig. 7). Incidence rates for oral and pharyngeal cancers have declined in Canada and Ontario since 1996 (Fig. 7). In addition, although chronic diseases and cancers were previously less of a concern for residents of the Northwest Territories, in recent years the prevalence of all types of cancer has been increasing in this region of the country.²¹ This trend is of particular significance in light of the aging of the population in Northern Canada.²¹

The mortality rate for oral and pharyngeal cancers in the United States¹⁹ is approximately 1 in 4 individuals diagnosed each year; the comparable rate in Canada is 1 in 3.²⁰ These cancers are diagnosed primarily in elderly people, and at present the prognosis is poor. The 5-year survival rate for white American patients is 56%, but for black patients it is only 34%¹⁹ (comparable Canadian figures are not available, as cancer statistics in this country are not broken down by race).

Tobacco use, through both smoking and use of smokeless tobacco, accounts for nearly 90% of oral and pharyngeal cancers and thus represents the greatest single preventable risk factor for oral cancer.²² After years of decline, the use of smokeless tobacco in the United States, particularly among schoolchildren and native adolescents,

appears to be on the increase.²³ Despite the tobacco industry's claim that its advertising does not target young people, research evidence indicates that tobacco and alcohol advertisers continue to target youth via the print media.²⁴

Since 1990, a decline in smoking prevalence has been confirmed among Canadians 25 years of age and older.²⁰ However, of particular concern is the concurrent increase in the rate of smoking in those 15 to 19 years of age (both males and females), from 21% in 1990 to 28% in 1996.²⁰ This increase represents an important challenge for cancer control and for oral health in Canada. Under the Chronic Diseases Program of the Ontario Ministry of Health and Long-term Care, boards of health are required to work with health care professionals to provide information and education on the benefits and methods of quitting smoking, including community smoking cessation programs. The March 2001 issue of the *Journal of the Canadian Dental Association* documented information about some of the health promotion programs and initiatives available to help Canadians stop smoking.

Orofacial Pain and Temporomandibular Disorders

Pain, a common symptom of craniofacial disorders, is accompanied by interference with vital functions such as eating, swallowing and speaking. Facial pain is also a major component of trigeminal neuralgia, facial shingles (post-herpetic neuralgia), temporomandibular disorders (TMDs) and fibromyalgia. Twenty-two per cent of U.S. adults reported some form of oral or facial pain in the previous 6 months.²⁵ The prevalence of TMD-related signs and pain symptoms in the population ranges from 5% to 15%, with peak prevalence between 20 to 40 years of age.²⁶ Frequent episodes of TMD jaw pain were reported by 7% of a randomized stratified sample from the general population in the province of Quebec.²⁷ The rate for women was higher than that for men, particularly among those 35 to 54 years of age (10.4% and 6.8%, respectively).²⁷

Dental Care Utilization and Dental Insurance

Visiting a health care provider at least once per year is an indicator of a person's ability to access professional services. Yet the Surgeon General reports that 25% of poor children had not seen a dentist before kindergarten, and that most children in this group were uninsured. Given the private market for medical care in the United States, the report found medical insurance to be a strong predictor of access to dental insurance and dental care. For each child without medical insurance, there are at least 2.6 children without dental insurance, and for every adult 19 years of age or older without medical insurance, there are 3 without dental insurance. Uninsured children are 2.5 times less likely than insured children to receive dental care, but children from families without dental insurance are 3 times more likely to

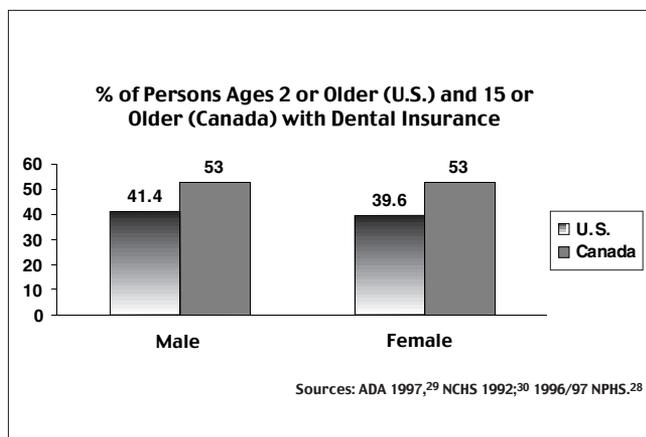


Figure 8: Dental insurance coverage by sex in the United States and Canada.

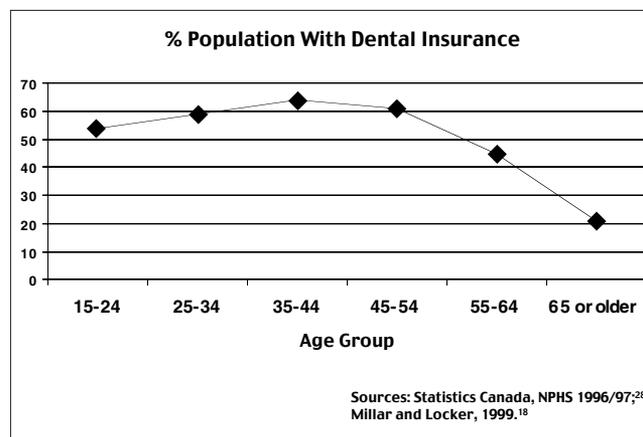


Figure 9: Dental insurance coverage by age in Canada, excluding the territories (data from the 1996/97 National Population Health Survey).

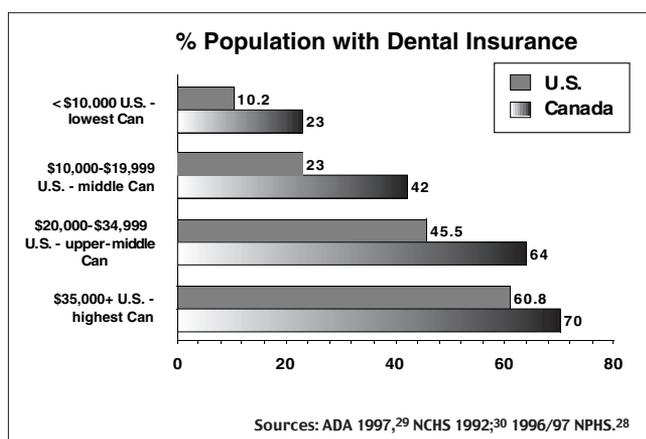


Figure 10: Dental insurance coverage by annual household income in the United States and Canada.

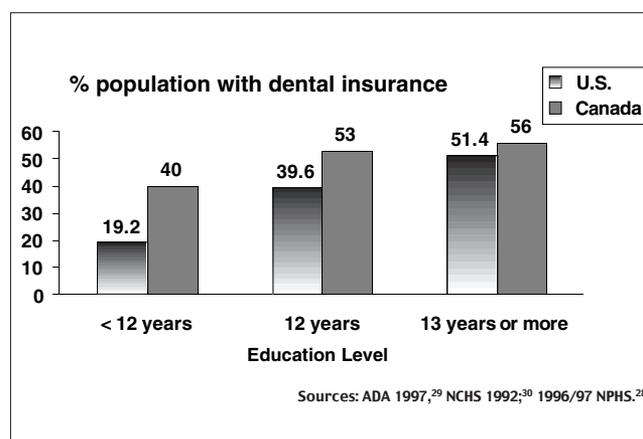


Figure 11: Dental insurance coverage by education level in the United States and Canada.

have dental needs than children with either public or private insurance. The report concludes that the U.S. Medicaid program has not been able to fill the gap in providing dental care to poor children and that fewer than 1 in 5 Medicaid-covered children received a single dental visit in a recent year-long period.

Among adults in the United States, a little less than 2-thirds reported having visited a dentist in the previous 12 months. For respondents participating in Statistics Canada's 1996/97 National Population Health Survey the figure was similar but slightly lower: 59% for adults 15 years of age or older.²⁸ In both the United States and Canada, those with incomes at or above the poverty level are roughly twice as likely to report a dental visit in the previous 12 months as those whose incomes are below the poverty level. Adults with dental insurance in Canada are 2.7 times more likely to report a dental visit in the previous year as those who are not insured.¹⁸

In Canada, some provinces provide a mix of coverage for children, senior citizens and social assistance recipients.

However, most dental coverage is provided through private dental care plans, which are often available through employers. According to the 1996/97 National Population Health Survey, about half of Canadians 15 years of age or older (53%)²⁸ reported having dental insurance; the comparable figure for the United States is approximately 40% (Fig. 8).^{29,30} However, many elderly individuals often lose their dental insurance when they retire (Fig. 9).^{28,18} The situation may be worse for older women, who generally have lower incomes and may never have had dental insurance. Dental coverage also varies by race and ethnicity in the United States, and by income (Fig. 10), and education levels (Fig. 11) in both the United States and Canada.

Relationship Between Oral Health and General Health

The Surgeon General's report explores the relationship between oral health and general health and reviews the literature regarding emerging associations between oral diseases

and diabetes, heart disease and stroke, respiratory disorders, and adverse pregnancy outcomes.¹ Oral diseases and disorders affect health and well-being throughout life, but the mouth also reflects one's general health and well-being. Thus, the mouth is seen as both a portal and a barrier to systemic risk factors. Examples are given of how oral tissues may signal the presence of disease, disease progression, or exposure to risk factors, and how oral cells and fluids, such as saliva, are increasingly being used as diagnostic tools.¹

One of the report's findings is that immunocompromised patients, such as those with HIV infection and those undergoing organ transplantation, are at higher risk for oral problems such as candidiasis. The report identifies the need for more oral health data at the national, state and local levels for people with disabilities, those with alternative sexual orientations, migrant populations and the homeless.¹ The current lack of data in the United States, which is also a problem in Canada, limits the capacity to fully document the magnitude of oral health problems and hinders the development of new health programs to meet the needs of these communities.

Effects of Oral Health on Well-being and Quality of Life

The Surgeon General's report emphasizes the relationship between oral health and quality of life, presenting data on the effects of poor health and altered appearance on speech, eating, sleeping, swallowing and breathing. Congenital malformations, such as cleft lip and cleft palate, may undermine self-image and self-esteem, discourage normal social interaction, and lead to chronic stress and depression, as well as to financial stress related to the cost of treatment. Cleft lip and cleft palate are among the most common congenital malformations, and prevalence varies by race (1 in 600 live births for white Americans and 1 in 1850 live births for black Americans).³¹ The report's findings highlight how cultural values and symbolism are attached to facial appearance, including the appearance of the teeth, and can play an important role in dental care utilization. Several studies have found that reduced quality of life related to oral health is associated with poor clinical status and reduced access to care.^{1,32}

Oral and craniofacial diseases contribute to a range of problems for employed adults, including restricted activity, bed days, work loss and lost school days for their children. On average, U.S. adults experience 3.7 restricted-activity days and 1.7 bed days and lose 1.9 days of work per 100 employed persons each year because of acute dental conditions or dental visits.⁴ The social impact of oral diseases in children is also substantial. More than 51 million school hours, or 3.1 school days per 100 schoolchildren, are lost each year to dental-related illness. In addition, poor children suffer nearly 12 times more restricted-activity days

than children from higher-income families.⁴ Statistics Canada's 1996/97 National Population Health Survey²⁸ did not specifically look at the impact of oral diseases on quality of life and well-being, or at days lost to dental-related disability, which makes comparisons between the United States and Canada difficult. However, Canadian studies have indicated that not only are oral and facial pain common but also that these conditions can affect daily life, undermining psychological and social well-being to a surprising degree.^{33,34}

Publicly Funded Dental Programs in the United States and Canada

Clinical oral health care is predominantly provided by a private-practice dental workforce in both the United States and Canada. In both countries government has tried to reduce dental health disparities through targeted, as opposed to universal, programs. American federal and state assistance programs — Medicare, Medicaid, the Children's Health Insurance Program, the Indian Health Service and other programs for selected oral health services — exist for all indigent and medically indigent persons, children, elderly people, people with disabilities, Native Americans and Alaskan Inuit. Not only are these programs limited in scope, but their reimbursement levels are low relative to the usual fees for care. The report found the U.S. public health infrastructure for oral health insufficient to address the needs of disadvantaged groups.³⁵ The publicly funded dental programs in Canada that carry out similar duties are listed at the Web site www.caphd-acsdp.org/programs.html and in a 1999 paper by Bennett and Leake.³⁶ However, expenditures under these programs have not been identified, and public funding levels in the United States and Canada have not been compared.

Estimates of national expenditures for dental health care and financing and reimbursement mechanisms demonstrate that Americans do invest substantially in oral health care services. Expenditures for dental services alone made up 4.9% of U.S. health expenditures in 1998 — \$53.8 billion out of \$1.1 trillion. However, this figure does not take into consideration dental care expenditures for services provided by dentists (and by nondentists in hospital settings) for the management of severe early childhood caries, cleft lip or cleft palate, or facial injuries. Although they are somewhat outdated, 1989 expenditures on dental services in Canada made up 5.5% or \$3.1 billion of total health care expenditures.³⁷ Public funds accounted for only 14% of these expenditures in 1987. The proportion varied from 3% in Ontario to 75% in the Yukon and the Northwest Territories. Group dental insurance plans paid dentists \$1.13 billion in total direct claims in 1997.³⁸ For administrative-services-only plans, the total benefit payments in 1996 were \$1.15 billion.³⁸

Table 2 Population per active licensed oral health care provider in 1992 and per cent reduction since 1982, by type of provider and province/territory

	Population per Oral Health Provider and % Reduction					
	Dentist		Dental Assistant		Dental Hygienist	
	N	%	N	%	N	%
CANADA	1,919	10.0	13,675	+11.1	2,716	51.5
Newfoundland	4,026	10.4	11,596	72.0	13,177	47.7
Prince Edward Island	2,676	9.9	1,639	29.1	4,370	26.5
Nova Scotia	2,104	21.9	8,861	39.7	2,596	55.4
New Brunswick	3,160	12.4	9,363	25.3	4,711	61.1
Québec	2,180	12.6	342,010	+381.3	2,565	68.6
Ontario	1,736	7.4	84,046	+87.4	2,489	43.6
Manitoba	2,032	13.4	21,413	+72.3	2,447	36.8
Saskatchewan	2,823	3.5	1,474	79.5	5,274	65.1
Alberta	1,860	12.3	4,727	+95.9	2,647	38.6
British Columbia	1,600	2.3	10,606	+33.0	2,926	47.9
Yukon	1,829	+7.6			5,183	56.4
N.W.T.	1,114	49.6	8,914		12,480	+22.8

Source: Health Personnel in Canada, 1992.²⁸

Oral Health Care Providers

The capacity to provide accessible oral health care to citizens of the United States is challenged by a declining dentist-to-population ratio, currently 1 dentist for every 1715 people.³⁹ Although there is no agreement on the optimal value, the dentist-to-population ratio is expected to reach 1:1862 by 2020.¹ In contrast, the ratio of dentists to total population in Canada is increasing (Table 2).⁴⁰ Since 1982, the number of dentists has increased in every province and territory (except the Yukon Territory), as reflected by a reduction in the population-to-dentist ratio. In addition, the number of dental hygienists has increased in all provinces and territories, including the Yukon, as shown by the reduction in the population-to-hygienist ratio. The Surgeon General reports that the reasons for the decline in the number of dentists in the United States include increased educational debt, racial or ethnic disparities in the oral health profession, and personnel needs for faculty and clinical research. These factors have come to affect career choices, practice location, dental education and research, and, ultimately, the health of the public. The American Dental Association⁴¹ and the American Dental Education Association⁴² have made numerous recommendations to address these issues.

A Framework for Action

In its conclusion, the Surgeon General's report calls for a national plan to eliminate health disparities and improve oral health for all Americans. The report charts a broad course of action, which includes the following components:

1. enhancing the public's understanding of the meaning of oral health and the relationship of the mouth to the rest of the body;

2. raising awareness of the importance of oral health among government policy-makers so as to create effective public policy that will improve oral health in the United States; and
3. educating nondental health professionals about oral health and disease and their role in ensuring that patients receive good oral health care.

Also recommended are expanding the science base to determine the people and populations most at risk for serious oral health conditions and accelerating the application of research findings to targeted and effective health prevention methods, and promoting their adoption by the public and health professions.

The report emphasizes the importance of building partnerships to enhance education, service and research and to eliminate barriers to care. Using the Surgeon General's framework for action, the National Institute of Dental and Craniofacial Research has developed *A Plan to Eliminate Craniofacial, Oral, and Dental Health Disparities*.^{43,44} The 3-part plan focuses on research, research capacity and information dissemination as a means of understanding and addressing health disparities, building a more diverse workforce and expediting the transfer of research advances for adoption by the public and health care providers.^{43,44}

Conclusion

So what can Canadians glean from this report? First, Canada's national and provincial data for many oral and craniofacial diseases and conditions and for special population groups are limited or nonexistent, a situation that must be addressed. Second, the available national, provincial and regional data suggest important variations within and

among provinces in the patterns of disease and health care. Therefore, more research is needed to identify and investigate regional differences in oral and craniofacial health and treatment needs, to develop patient-based measures of disease and oral health that incorporate quality-of-life outcomes, to study the determinants of dental health and care utilization in an aging and diverse Canadian population and, finally, to apply in Canada interventions that have been demonstrated to be effective in eliminating oral health disparities. Furthermore, the dental profession in Canada is uniquely positioned to ensure that oral health is seen as integral to general health by changing public, policymakers' and health providers' perceptions about oral health and disease; assessing patients' known risks of oral diseases; educating patients about health-promoting behaviours; removing barriers to care; enhancing health infrastructures to meet projected oral health needs; accelerating the transfer of science into practice; and continuing to participate in private-public partnerships.

The Surgeon General's report is an indication that North Americans are taking a more holistic approach to health care, and it is encouraging to see that oral health is being included as an important component of general health and well-being. We hope that policy-makers, researchers, and public and private health care practitioners will redouble their efforts to provide all Canadians with oral health care that is both accessible and of the highest quality. ♦

Acknowledgment: Special thanks to Susan Deshmukh for her help in preparing the graphs for this paper.

Dr. Lawrence is assistant professor, discipline of community dentistry, faculty of dentistry, University of Toronto.

Dr. Leake is professor and head, discipline of community dentistry, faculty of dentistry, University of Toronto.

Correspondence to: Dr. Herenia P. Lawrence, Discipline of Community Dentistry, Faculty of Dentistry, University of Toronto, 124 Edward St., Toronto, ON M5G 1G6. E-mail: herenia.lawrence@utoronto.ca.

The views expressed are those of the authors and do not necessarily reflect the opinions or official policies of the Canadian Dental Association.

References

1. U.S. Department of Health and Human Services. Oral health in America: A report of the surgeon general. Rockville, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research, 2000. NIH publication 00-4713. Available from: URL: <http://www.nidcr.nih.gov/sgr/oralhealth.asp>.
2. Allukian M Jr. The neglected epidemic and the Surgeon General's report: a call to action for better oral health. *Am J Public Health* 2000; 90(6):843-5.
3. National Center for Health Statistics (NCHS). First National Health and Nutrition Examination Survey (NHANES I). Hyattsville, MD: NCHS, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, 1975.
4. National Center for Health Statistics (NCHS). Third National Health and Nutrition Examination Survey (NHANES III). Hyattsville, MD: NCHS, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, 1996.
5. Miller AJ, Brunelle JA, Carlos JP, Brown LJ, Löe H. Oral health of United States adults. The national survey of oral health in US employed adults and seniors. National findings: 1985-1986. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, 1987; NIH Publ No 87-2868.
6. U.S. General Accounting Office (GAO). Dental disease is a chronic problem among low-income populations. Report to Congressional Requesters (GAO/HEHS-00-72). April 2000.
7. Acs G, Lodolini G, Kaminsky S, Cisneros G. Effect of nursing caries on body weight in a pediatric population. *Pediatr Dent* 1992; 14(5):302-5.
8. Ayhan H, Suskan E, Yildirim S. The effect of nursing or rampant caries on height, body weight and head circumference. *J Clin Pediatr Dent* 1996; 20(3):209-12.
9. Acs G, Shulman R, Ng MW, Chussid S. The effect of dental rehabilitation on the body weight of children with early childhood caries. *Pediatr Dent* 1999; 21(2):109-13.
10. Woodward GL, Knight A. Re-collection and analysis of data from the Ontario Dental Health Indices Survey. Newmarket, Ontario: Central East Health Information Partnership, July 1999.
11. Leake JL, editor. Oral health survey of Canada's Aboriginal children aged 6 and 12, 1990-91. Department of Community Dentistry, University of Toronto and National School of Dental Therapy, 1992.
12. Leake JL, Main PA. The distribution of dental conditions and care in Ontario. *Ont Dent* 1996; 73(6):18-22.
13. Locker D, Clarke M, Murray H. Oral health status of Canadian-born and immigrant adolescents in North York, Ontario. *Community Dent Oral Epidemiol* 1998; 26(3):177-81.
14. Diagnosis and Management of Dental Caries Throughout Life. NIH Consensus Statement Online 2001 March 26-28; 18(1):1-24. Available from: URL: http://odp.od.nih.gov/consensus/cons/115/115_intro.htm.
15. Burt BA, Eklund SA. Periodontal diseases. In: Burt BA, Eklund SA, editors. Dentistry, dental practice, and the community. Philadelphia: W.B. Saunders Co.; 1999. p. 237-58.
16. Locker D, Leake JL. Risk indicators and risk markers for periodontal disease experience in older adults living independently in Ontario, Canada. *J Dent Res* 1993; 72(1):9-17.
17. Stephens T, Fowler Graham D, editors. Canada's Health Promotion Survey, 1990: Technical Report (Health and Welfare Canada Cat. No. H39-263/2-1990E) Ottawa: Minister of Supply and Services Canada, 1993.
18. Millar WJ, Locker D. Dental insurance and use of dental services. *Health Rep* (Statistics Canada Cat. No. 82-003-XPB) 1999; 11:55-65.
19. Ries LA, Kosary CL, Hankey BF, Miller BA, Clegg L, Edwards BK, editors. SEER cancer statistics review, 1973-1996. Bethesda, MD: National Cancer Institute, 1999.
20. National Cancer Institute of Canada: Canadian Cancer Statistics 2000, Toronto, Canada, 2000. Available from: URL: <http://www.cancer.ca> and <http://www.ncic.cancer.ca>.
21. Veuglers PJ, Yip AM, Mq D. The north-south gradient in health: analytic applications for public health. *Can J Public Health* 2001; 92(2):95-8.
22. Peto R, Lopez A, Boreham J, Thum M, Heath C. In: Slama K, editor. Tobacco and health. Proceedings of the 9th World Conference on Tobacco and Health. Health effects of tobacco use: global estimates and projections. New York: Plenum Press, 1995.
23. Tomar SL, Winn DM, Swango PA, Giovino GA, Kleinman DV. Oral mucosal smokeless tobacco lesions among adolescents in the United States. *J Dent Res* 1997; 76(6):1277-86.
24. Moore BT, Rankin KV, Jones DL. Comparative study of tobacco, alcohol and health promotion in popular print media. *J Dent Res* 2001; 80(Spec Iss Abstract No. 493):97.
25. Lipton JA, Ship JA, Larach-Robinson D. Estimated prevalence and distribution of reported orofacial pain in the United States. *J Am Dent Assoc* 1993; 124(10):115-21.
26. Von Korff M. Health services research and temporomandibular pain. In: Sessle BJ, Bryant PS, Dionne RA, editors. Temporomandibular disorders and related pain conditions. Seattle: IASP Press, 1995. p. 227-36.

27. Goulet JP, Lavigne GJ, Lund JP. Jaw pain prevalence among French-speaking Canadians in Québec and related symptoms of temporomandibular disorders. *J Dent Res* 1995; 74(11):1738-44.
28. Statistics Canada. National Population Health Survey, 1996-97, special tabulations. (Statistics Canada Cat. No. 82-567-XPB) Ottawa: Minister of Industry, 1998.
29. American Dental Association (ADA), Survey Center. Key dental facts. Chicago, IL: American Dental Association, 1997.
30. National Center for Health Statistics (NCHS). Current estimates from the National Survey. 1992; 10:1835.
31. Schulman J, Edmonds LD, McClearn AB, Jensvold N, Shaw GM. Surveillance for and comparison of birth defect prevalences in two geographic areas — United States, 1983-88. *Mor Mortal Wkly Rep CDC Surveill Summ* 1993; 42(1):1-7.
32. Slade GD, editor. Measuring oral health and quality of life. Chapel Hill, NC: University of North Carolina, Dental Ecology, 1997.
33. Locker D, Grushka M. The impact of dental and facial pain. *J Dent Res* 1987; 66(9):1414-7.
34. Locker D, Clarke M, Payne B. Self-perceived oral health status, psychological well-being, and life satisfaction in an older adult population. *J Dent Res* 2000; 79(4):970-5.
35. U.S. General Accounting Office (GAO). Factors contributing to low use of dental services by low-income populations. Report to Congressional Requesters (GAO/HEHS-00-149). September 2000.
36. Bennett S, Leake J. Canada's publicly-funded dental programs. *Can J Community Dent* 1999; 14:33-44.
37. Leake JL, Porter J, Lewis DW. A macroeconomic review of dentistry in the 1980s. *J Can Dent Assoc* 1993; 59(3):281-7.
38. Ismail AI. Dental care in Canada. In: Burt BA, Eklund SA, eds. Dentistry, dental practice, and the community. Philadelphia: W.B. Saunders Co.; 1999. p. 134-49.
39. Health Resources and Services Administration (HRSA). Bureau of Health Professions, Office of Research and Planning. Dental supply model, 1999. Available from: URL: <http://www.hrsa.dhhs.gov/bhpr/healthworkforce/factbook.htm>.
40. Health and Welfare Canada. Health Personnel in Canada, 1992. (Health and Welfare Canada Cat. H1-9/1-1992) Ottawa: Minister of Supply and Services Canada, 1995.
41. Evans CA, Kleinman DV. The Surgeon General's report on America's oral health: opportunities for the dental profession. *J Am Dent Assoc* 2000; 131(12):1721-8.
42. Ferrillo PJ Jr, Chance KB, Garcia RI, Kerschbaum WE, Koelbl JJ, Molinari JA, and others. Report of the ADEA President's Task Force on the Surgeon General's report on oral health. *J Dent Educ* 2000; 64(10):708-14.
43. National Institute of Dental and Craniofacial Research. NIDCR to implement health disparities plan. Bethesda, MD: NIDCR Research Digest, February 2001.
44. National Institute of Dental and Craniofacial Research. A plan to eliminate craniofacial, oral, and dental health disparities. Bethesda, MD: NIDCR, February 2001. Available from: URL: http://www.nidcr.nih.gov/research/health_disp.asp

C D A R E S O U R C E
C E N T R E

The Resource Centre can e-mail CDA members the executive summary of the *U.S. Surgeon General's Report on Oral Health in America*. CDA members can contact the Resource Centre at tel.: 1-800-267-6354 or (613) 523-1770, ext. 2223; fax: (613) 523-6574; e-mail: info@cda-adc.ca.