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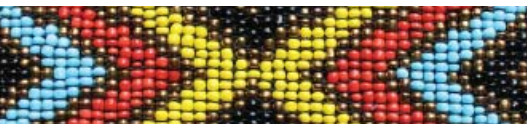

REPORT ON THE FINDINGS OF THE FIRST NATIONS ORAL HEALTH SURVEY (FNOHS) 2009-2010

NATIONAL REPORT

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In 2008 the First Nations Information Governance Committee (FNIGC) embarked on a new journey and agreed to participate in a First Nations health measurement survey. Due to the limited data available on First Nations' oral health and the limited access to services, it was recommended that a First Nations Oral Health Survey (FNOHS) be conducted on reserve and in northern First Nations communities. This survey collected information about the dental health of First Nations from eight randomly selected communities across the country and provides a national portrait of oral health among First Nations in Canada.

Dental disease and limited access to dental services is a major concern for First Nations. It was important for First Nations to define their oral health needs so that the appropriate programs and strategies can be implemented to address these needs. This survey provides a picture of the First Nations oral health status on reserve populations and allows for comparison with the Inuit Oral Health Survey and the rest of Canada thought the Canadian Health Measurement Survey (CHMS).

The data collected through this survey is owned and controlled by First Nations and is compliant with the First Nations Principles of OCAP (Ownership, Control, Access and Possession). This project was developed in collaboration through a Memorandum of Understanding with the Office of the Chief Dental Office of Health Canada. The FNOHS took advantage of the opportunities and built upon the First Nations Regional Health Survey (RHS) infrastructure and processes to conduct the survey.

The FNOHS also utilized the work and experience conducted by the CHMS, by using the CHMS oral health survey content, both the interview and clinical examination, as the core of the FNOHS survey and, at the same time, it was tailored to address additional areas of specific interest to the First Nations population and which are not covered in the CHMS.

This survey was an arduous process for all as it required a great deal of coordination to send the equipment to the selected sites across Canada, and hire and train local individuals to conduct the survey. We also experienced a number of delays in the survey process, however, despite these delays; we have now completed the final analysis of the report. The FNOHS also underwent a transition process and was formally transferred from the Assembly of First Nations to the newly created First Nations Information Governance Centre (FNIGC) in April 2010 (www.fnigc.ca).

We wish to thank all of the participating communities that agreed to participate in this survey process, Assembly of First Nations - Health and Social Secretariat, staff at the Office of the Chief Dental Officer and Dr. Herenia P. Lawrence for her contribution in the analysis of this report. Without your assistance the data gaps and realities and burdens of First Nations oral disease would continue to be undocumented. We look forward to positive outcomes in future programming and policy development based on the evidence contained in the FNOHS report.

The First Nations Information Governance Centre

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EXECUTIVE SUMMARY

This report provides the results of the First Nations Oral Health Survey (FNOHS) conducted by the First Nations Information Governance Centre with support from the Office of the Chief Dental Officer of Canada, which supplied examiners and expert advice. The survey was carried out in 2009–10 in five provinces and one territory of Canada, and consisted of face-to-face household interviews and clinical oral examinations. Overall, 1,188 First Nations aged 3 years and over participated in the survey interview (proxy interviews were conducted with parents/caregivers of children younger than 12 years of age), with 1,125 respondents completing the oral health examination component of the survey. The 2009–10 FNOHS aimed to describe levels of oral disease within a representative sample of First Nations living in remote and non-remote communities across Canada. A further aim of the survey was to evaluate differences in the oral health status of First Nations and non-First Nations Canadians. To this end, this report presents comparisons of the self-reported and clinical oral health outcomes of participants in the FNOHS with those of participants in the oral health component of the 2007–09 Canadian Health Measures Survey (CHMS) and the 2008–09 Inuit Oral Health Survey (IOHS). The results can be reliably compared because these three national surveys shared the same standardized protocol originally developed for the CHMS.

Household interviews revealed that when compared to non-Aboriginal Canadians, fewer First Nations of all ages reported visiting a dental professional in the previous 12 months. Among adults, 56.8% of First Nations had visited a dental professional in the previous year, while 71.6% of participants in the CHMS reported a dental visit within the same time frame. The main reason reported by First Nations for not going to a dental care provider was that services were not available in their communities and interviewers found that more than 75% of the survey respondents usually received care outside their communities. Cost, however, was not a barrier to accessing oral health services for First Nations. Only a small minority of respondents had avoided dental care due to the cost or declined recommended routine dental treatment in the previous year for the same reason. First Nations were also more likely to rate their oral health as fair or poor, to have experienced orofacial pain in the preceding month or, in the previous 12 months, to have suffered from chronic mouth pain, toothache or other oral symptoms, and to have avoided some foods due to problems with their teeth, mouth or dentures.

The presence of chronic dental pain and what appears to be poorer overall oral health among Canadian First Nations should translate into more dental sick-days. However, time lost from school, work or other normal activities for oral health reasons was reported by 17.9% of First Nations aged 12 years and over as compared to 39.1% of non-Aboriginal Canadians aged 6–79 years. That said, the number of hours per year clocked in the dental chair by First Nations was greater than the hours per year lost due to oral disease and professional treatment among non-Aboriginal Canadians.

The clinical examination component of the survey found that, overall, the oral health of most First Nations children and adolescents was poor. Approximately 86% of preschool children aged 3–5 years had experienced dental caries, with a mean of 7.62 primary (baby) teeth affected, and out of those 2.68 (35.2%) teeth remained untreated. The prevalence of coronal caries in school children aged 6–11 years was 93.9% and the mean caries severity score showed 6.58 teeth

affected, whereas only 1.10 (16.7%) teeth remained untreated. Adolescents aged 12–19 years, like their younger age cohorts, also had poor oral health, with 91.4% of children affected by dental caries and a total number of decayed, missing or filled teeth (DMFT) equal to 6.15, although much of this disease had been treated. In general, the prevalence and mean severity scores for First Nations exceeded those for their age-matched, non-Aboriginal Canadians counterparts by 1.6–2.9 times.

Fewer First Nations children and adolescents examined had dental sealants on their permanent molar teeth than their non-Aboriginal counterparts. The survey also revealed disparities in the prevalence of malocclusion and in accessing orthodontic treatment between First Nations and non-Aboriginal adolescents in Canada. Almost half (48.1%) of First Nations aged 12–17 years were judged to have less than acceptable occlusion. This estimate compares to a figure nearly 2.5 times lower (17.0%) for non-Aboriginals aged 12–19 years. Orthodontic treatment is more commonly provided in the adolescent years, but only 3.5% of First Nations adolescents were undergoing or had undergone orthodontics at the time of the FNOHS. That compares with 36.7% of non-Aboriginal adolescents who were receiving or had received orthodontic treatment at the time of the CHMS. One in four First Nations adolescents reported being denied orthodontic treatment because their case did not meet the Non-insured Health Benefits Program (NIHB) criteria.

Approximately 1 in 20 First Nations adults (6.3%) had lost all their natural teeth, compared to an equivalent finding in the CHMS of 6.4% for non-Aboriginal Canadians. Among the 93.7% of dentate First Nations, the average number of teeth present was 23.5 with 79.4% having a functional natural dentition, defined as 21 teeth or more. This proportion was 6% lower than that of non-Aboriginals, with 85.3% retaining their functional natural dentition. Despite similar overall levels of edentulism among adults surveyed in the FNOHS and the CHMS, mandibular dentures were less common among the First Nations.

Coronal caries experience was ubiquitous among First Nations adults. 99.9% had had coronal caries with a mean of 13.72 decayed, missing or filled teeth. Much of the decay had been treated, predominantly by fillings (55.1%) and by extractions (31.6%). Just over half of First Nations adults (56.5%) had one or more untreated coronal caries compared to 19.3% of non-Aboriginal Canadians.

Root caries, or decay of tooth roots that have become exposed because of periodontal disease and/or ageing, was more prevalent in First Nations adults (32.9%) than in non-Aboriginal adults (20.5%) and nearly 72% of the disease in First Nations remained untreated.

A small proportion of dentate First Nations adults were affected by periodontal disease. Despite abundant accumulation of soft debris and calculus, signs of periodontitis were found in only 16.8% of adults who had loss of attachment of 4 mm or more at one or more sites on indicator teeth and in 23.0% who had probing depths of 4 mm or more on at least one tooth. Additionally, 43.9% had moderate/severe gingivitis, which can be a precursor to destructive periodontitis. Gingivitis is reversible with proper and regular tooth brushing and flossing, but the FNOHS found that First Nations adolescents and adults were not brushing enough. Just over half (54.7%)

reported brushing their teeth at least twice daily with only a quarter of dentate First Nations flossing at least five times per week.

Compared to the Inuit, First Nations had higher rates of dental visitation within the last year, lower severity of coronal and root caries, lower prevalence of untreated coronal and root caries, lower rates of edentulism, more teeth present and greater numbers with a functional natural dentition, but higher debris, calculus and gingivitis scores.

There was also a group of oral health conditions that had a relatively low prevalence and did not vary meaningfully among the three survey populations. This was the case for oral mucosal lesions, found among 15.3% of First Nations aged 12 years and over. Another condition was dental fluorosis, which was primarily of the very mild or mild types (which are of little aesthetic concern) that affected 14.8% of First Nations children, aged 6–11. This can be compared to a somewhat similar prevalence (about 17.1%) among non-Aboriginal children, aged 6–12. Lastly, evidence of trauma to one or more incisor teeth was found among 6.9% of adolescents and in 25.9% of First Nations adults.

Consistent with the findings that First Nations have generally poorer oral health than non-Aboriginal Canadians, treatment needs were much higher among First Nations – 83.1% of dentate First Nations aged 6 years and over needed one or more types of treatment, compared to 33.9% of non-Aboriginal Canadians. The survey also found a mismatch between the clinically-measured oral health needs and the perceived need for dental treatment among First Nations. For example, 67.7% of parents or caregivers of First Nations preschool children aged 3–5 felt their child needed fillings, when in fact 90.3% were judged by the dentist-examiners to require fillings.

Taken together, the findings of the FNOHS indicate that the oral health of First Nations Canadians is poor across a range of clinical oral health indicators. When compared to the findings for non-Aboriginal Canadians, the amount of unmet dental care needs remains a significant problem in First Nations communities. Dental decay continues to be the most prevalent chronic disease among First Nations, particularly in children and adolescents, while coronal and root caries in adults are also of concern. On a more positive note, First Nations adults are retaining more of their natural teeth at levels on par with those of non-Aboriginal adults.

The results of this FNOHS study indicate that the oral conditions found among Canadian First Nations are closely associated with various determinants of health, such as age, income, education, and geographic barriers such as the remoteness of communities and also with risk factors, such as regular dental visits and smoking. Since this is the first nationwide survey to collect information on the oral health status of First Nations of all ages, future studies may wish to examine the effects of these health determinants and risk factors on reducing the burden of disease and improving the oral health of Canadian First Nations. In providing essential, baseline data to health professionals, stakeholders and policy makers, we believe the FNOHS marks a new beginning for the oral health of First Nations in Canada, and will serve as a platform to launch oral health care interventions and initiatives that will assist in reducing the disparities that are in evidence on the pages of this report.

1. INTRODUCTION

Prior to the publication of this report, we lacked a complete picture of the oral health of the First Nations peoples of Canada. Data tended to be limited to particular communities or geographic regions and oral health information had not been systematically collected through periodic epidemiologic surveys conducted either by Aboriginal organizations or by federal, provincial or territorial health departments as part of their vital statistics or disease surveillance systems. This was unfortunate because oral health surveys, regardless of their scope, provide essential information on the extent and severity of oral health conditions in their target populations so that appropriate efforts can be taken to reduce the burden of disease. Results from these surveys also can be used to monitor population trends, particularly when data from several survey years are compared. Similarly, national survey data, like those accumulated for this study, can also be weighed against those of other national and international studies to evaluate and assist in resolving oral health disparities.

The data that are available for Canadian First Nations consistently present a picture of oral health that is poorer than that of the non-First Nations population. Current research indicates that the First Nations of Canada have higher prevalence and severity of dental caries and periodontal disease and more unmet dental treatment needs than their non-First Nations counterparts. For example, a significant portion of the research on First Nations oral health has focused on the chronic disease known as early childhood caries or "baby bottle tooth decay", a term reflecting the association of the disease with infant feeding practices. In some First Nations communities, the prevalence of early childhood caries is three times higher than that in age-matched, non-Aboriginal children living in neighbouring urban centres (Lawrence *et al*., 2009). Disparities in oral health are also observed between on- and off-reserve First Nations. A large epidemiologic study conducted in Ontario found that when compared with non-Aboriginal children aged 3–5 years, off-reserve First Nations children had 2.9 to 3.5 times the risk of having severe early childhood caries and 1.8 to 2.5 times the risk of having untreated decayed teeth (Lawrence *et al*., 2009). Whereas First Nations children suffer disproportionately from dental caries, the levels of tooth decay among non-Aboriginal children in Canada have been declining since the 1970s (Nutrition Canada, 1977; Health Canada, 2010). Prior to the collection of data for the First Nations Oral Health Survey (FNOHS) in 2009, no national data existed upon which to estimate the extent of dental disease among First Nations children. Thus not only was information needed to estimate the current oral health status and treatment needs of First Nations children, but also to measure the rates of dental caries, periodontal disease and the general oral health status of First Nations adolescents and adults.

To be fair, the extent and distribution of current oral health conditions for the Canadian population as a whole was largely unknown until 2007. Although decades of Canadian health surveys have included a handful of questions about dental services utilization, oral health behaviours, and/or dentate status, until recently there were little data to reflect nationwide, clinical information on the oral health of Canadians. Statistics Canada recently completed the Canadian Health Measures Survey (CHMS), a national health status survey that included an oral health component (Health Canada, 2010). The clinical findings are being compared with the results from the only other complete national oral examination survey of all ages that was conducted between 1970 and 1972 as part of the Nutrition Canada National Survey (Nutrition

Canada, 1977). The questionnaire responses of the CHMS will allow for comparisons with the results from household interview surveys such as the Canadian Community Health Survey (CCHS), the National Population Health Survey (NPHS) and the National Longitudinal Survey of Children and Youth (NLSCY).

Nevertheless, the CHMS was not designed to assess the oral health status of Aboriginals in Canada. The CHMS, under the direction of Statistics Canada in partnership with Health Canada and the Public Health Agency of Canada, went to the field in 2007 and covered the majority of Canadians, but did not include persons living on Indian Reserves or Crown lands, residents of institutions, full-time members of the Canadian Forces, and residents of certain remote regions. These exclusion criteria meant, for example, that the majority of Inuit were not included. At the same time, First Nations living off reserve, Inuit living in non-remote areas and Métis, who live predominantly in southern urban centres, were selected but not specifically targeted as groups.

The report on the findings of the oral health component of the CHMS (2007–2009) was released in May 2010 (Health Canada, 2010). While some national-level statistics are presented according to Aboriginal identity, the sample sizes for those who identified themselves as Aboriginal were too small to provide reliable estimates and many of the oral health outcome measures for Aboriginals in the CMHS are either accompanied by cautionary notes or the estimates are not provided because of extreme sampling variability.

Although it seems that Canada has finally placed priority on measuring the oral health status of its population, information on the prevalence, extent and severity of dental diseases and conditions in the First Nations, Métis and Inuit populations in Canada is only now becoming available, thanks in part to this survey and the recently published Inuit Oral Health Survey (Health Canada *et al.*, 2011). Before this year, we lacked national health surveys of Aboriginal peoples that have included an oral health examination component. While some information on the health, development and living conditions of off-reserve First Nations, Métis, and Inuit children under the age of 6 years can be gleaned from the Aboriginal Children's Survey (ACS) conducted by Statistics Canada every 5 years following the Census, the ACS does not include oral health information. Similarly, the questionnaire content of the counterpart of the ACS, the Aboriginal Peoples Survey (APS) for those aged 6–14 years and 15 years and over does not collect information on areas relative to oral health and oral health care.

Thus the oral health of First Nations has never been fully assessed, prompting the rationale for this report on the first, national survey of the oral health of on-reserve First Nations of all ages. This survey provides baseline information on the oral health needs and current levels of care necessary for planning the best services to improve the oral health of Canadian First Nations. A clear understanding of baseline oral health status and treatment needs is essential to establish oral health priorities that will contribute positively to the health and quality of life of all First Nations peoples. Without these basic data, it is difficult to answer complex research questions, to determine how and where to direct oral health promotion, preventative and treatment interventions, or to affect policy changes that will benefit the First Nations of Canada.

First Nations Health Surveys

Historically, Canadian health surveys have excluded First Nations peoples living on reserve and the Inuit living in remote communities. These omissions provided the impetus for the First Nations peoples to create a self-governing health survey. In 1996–97, First Nations, through the Assembly of First Nations Chiefs Committee on Health, and its appointed committee, the First Nations Information Governance Committee, launched the First Nations and Inuit Regional Longitudinal Health Survey (FNIRLHS) conducted as a pilot survey in nine Canadian regions (Wien and McIntrye, 1999). The sample included First Nations persons living on reserve as well as Inuit living in communities in Labrador. The FNIRLHS contained a number of questions that addressed the perception of the quality of health services and the need and use of dental care services. While some data pertaining to children and youth were collected, the questions on dental services use, dental treatment needs, and dental problems or pain in the past month were asked only of adults, that is, persons 18 years of age and over. Following the creation of the FNIRLHS of 1996–97, the Inuit opted for an Inuit-specific research initiative and in 2002–03 the survey was again conducted but included First Nations communities only and is now called the First Nations Regional Longitudinal Health Survey (RHS) (First Nations Information Governance Committee, 2007a, b, c).

The RHS is a comprehensive national health survey of First Nations peoples and the only national research initiative owned, directed and implemented by Canadian First Nations. The survey is coordinated by the First Nations Information Governance Committee, ten First Nations regional organizations and a national team that overseas implementation, data analysis and reporting. In the 2002–03 RHS, 22,602 surveys were collected among adults, adolescents and children living in 238 First Nations communities across Canada and included questions on access to dental care and treatment needs for the three age cohorts. Every 4 years (until 2016) the RHS is collecting information about the health and living conditions of First Nations based on both traditional and Western understandings of health and well-being. Survey data are self-reported and no clinical data are being collected. The RHS goal is to provide culturally relevant and scientifically valid information by and for First Nations in order to help influence the development of holistic policies and programs for improving the well-being of First Nations across Canada.

A Cultural Framework was created as part of the RHS to guide the development of survey questions and the analysis and interpretation of the data in order to present information back to communities through the lens of First Nations peoples (Dumont, 2005). The framework is holistic and is based on the beliefs and values First Nations hold in common. It focuses on a balance of the concepts of "Total Health, Total Person and Total Environment" that take into account the importance of extended family connections, cultural continuity with the past and overall community wellness. The RHS has also developed, in collaboration with First Nations leaders, a ground-breaking Code of Research Ethics grounded in the key principles of Ownership, Control, Access and Possession of First Nations data (First Nations Information Governance Committee, 2007d; First Nations Centre, 2007). These principles are intended to express First Nations' inherent rights to self-determination in the areas of research and information governance.

Findings from the 2002–03 RHS questionnaires revealed that First Nations communities face significant barriers to dental care and experience extensive treatment needs. For example, 41% of First Nations adults reported not receiving any dental care in the past year and 19% of First Nations youth experienced some dental pain in the past month (First Nations Information Governance Committee, 2007a, b). First Nations children were also found to be at increased risk of poor oral and general health, as 1 in 4 children living on reserve were living below the poverty line as compared to 1 in 6 non-First Nations children. Overall, from parents/caregivers' responses, 1 in 3 First Nations children required some form of restorative dental work and in remote-isolated communities that figure jumped to more than 50% (First Nations Information Governance Committee, 2007c). Twenty-nine percent of First Nations 3–5 year-olds were affected by baby bottle tooth decay, with parent/caregivers in isolated communities being twice as likely to report their child had baby bottle tooth decay as compared to those families living in non-isolated communities. For children ages 9–11 years, the greatest access to dental care occurs when the child's mother has obtained some post-secondary education (First Nations Information Governance Committee, 2007b).

First Nations adults in the 2002–03 RHS also felt the influence of the determinants of health on their ability to gain access to oral health services. For example, adults who did not graduate from high school were less likely than those who completed a college degree to have received any dental care in the past year – 34.2% vs. 45.5%, respectively (First Nations Information Governance Committee, 2007a). First Nations adults who were unemployed were 11% less likely than those who were employed (full time) to have received any dental care in the past year (34.7% vs. 45.9%, respectively). More than a third of adults (36.9%) reported they required cavities to be filled or other types of restorative work.

In the FNIRLHS conducted in 1996–97, those who needed dental treatment also were asked to specify the kind of dental care that was required (Wien and McIntrye, 1999). Comparisons between the 1996–97 and the 2002–03 regional health surveys reveal a dramatic increase in the reported need for dental care (all types of treatment) specified by the respondents aged 18 and over. For example, the need for dental fillings, crowns or bridges increased more than two-fold (from 15.4% in 1996–97 to 36.9% in 2002–03), while increases were much higher for urgent dental problems, periodontal care and maintenance, as well as prostheses (problems related to dentures). Taken together, these results indicate that the oral health of First Nations people is not improving and that dental problems have rapidly escalated, suggesting that oral health services have yet to catch up with the oral health needs of First Nations communities.

First Nations and Inuit Oral Health Surveys

The RHS, while producing a wealth of scientifically credible and culturally valid data that will continue to inform health policy and programming in the years to come, does not, however, include a clinical examination component to assess the oral health status and the extent of dental treatment needs of survey participants. The first nationwide examination survey of the oral health of Canada's Indigenous peoples occurred in 1990–91 as a result of a partnership between the University of Toronto, the National School of Dental Therapy in Prince Albert, Saskatchewan, the Medical Services Branch of the Department of National Health and Welfare and 159 First Nations and Inuit communities (University of Toronto and National School of Dental Therapy,

1992). The objectives of the survey were to collect information on the oral health status, dental care levels and needs and preventive/risk behaviours of Aboriginal children living on reserve and in the two territories and to establish a baseline for health program managers and Aboriginal leaders to assist in planning appropriate dental services for their respective regions and jurisdictions. However, due to limited resources, the target populations of the study were restricted to Aboriginal children ages 6 and 12 living on reserve and, in Newfoundland, where there are no reserves, the children selected lived in predominantly Native communities. In the Yukon and Northwest Territories, children from all communities except Yellowknife were eligible. Owing partly to the availability of funds, Aboriginal children who lived in very remote small communities and in large urban centres were systematically excluded from the survey. In total, 4,058 examinations were completed (2,243 6-year-olds and 1,815 12-year-olds) which revealed that 91% of the First Nations and Inuit children surveyed were affected by dental caries. Six-year-old First Nations and Inuit children had 7.8 teeth attacked by dental caries and 12 year-olds had 4.4 teeth affected. Nearly 40% of the decayed, missing and filled teeth (dmft+DMFT) Index score for 6 year-olds were decayed primary (baby) teeth. In addition, factors that were found to be associated with the prevalence of caries were community isolation, lack of water fluoridation and a diet high in sugary snacks. Children in remote "fly-in" communities had the greatest unmet dental needs. The data from the 1990–91 survey called for more restorative dental treatment, especially for 6 year-olds, wider use of preventive strategies, including the use of dental sealants and the creation of new health promotion programs aimed at reducing the intake of high-sugar snacks among Indigenous children.

Five years after the 1990–91 survey on the oral health of First Nations and Inuit children, another attempt was made to collect national oral health data on these populations. A study was undertaken by the Saskatchewan Indian Federated College (SIFC), National School of Dental Therapy (NSDT) and conducted in 1996–97, but once again only targeted children ages 6 and 12 (Saskatchewan Indian Federated College, 2000). Comparisons of the two surveys showed no improvement in dental caries rates among these two age cohorts in the time between the studies. The dmft+DMFT at age 6 increased slightly from 8.94 in 1990–91 to 9.52 in 1996–97 and the DMFT at age 12 had changed little from 4.6 to 4.5. For those age 6, the proportions of the total indices that were filled was slightly better in 1996–97 (36% vs. 33%), but significantly worse with the DMFT of 12 year-olds in 1996–97 (56% vs. 65%). Although these two surveys provided limited trend information on the dental health of First Nations and Inuit children ages 6 and 12, from 1997 until 2011, the national oral health status of the majority of First Nations in Canada remained largely undocumented.

Where the oral health status of the Canadian Inuit is concerned, data are now available for evaluation following the release of the 2008–09 Inuit Oral Health Survey (IOHS) in June, 2011 (Health Canada *et al*., 2011). The IOHS was conducted by the Office of the Chief Dental Officer of Canada in partnership with Inuit government and regional organizations. It provided estimates for many of the same clinical oral health indicators used in the CHMS, as the IOHS adopted the CHMS standardised clinical protocol. The IOHS covered the Inuit population aged 3 to 40 years and over living in Canada's north, except for Nunavik. Findings revealed that compared to southern Canadians, Inuit children, adolescents and adults had higher levels of untreated decay and missing teeth, poorer self-reported oral health and oral health status (except for periodontal conditions), and poor access to services. They were significantly less likely to have visited a

dental professional in the previous year or to make regular dental visits, though very few reported that costs were a factor in avoiding visiting for dental care or accepting recommended treatment. The IOHS report recommended that greater attention be paid to community-based primary preventive care, supported by screening for early signs of disease and prompt basic treatment.

Filling the Data Gaps: The First Nations Oral Health Survey (FNOHS) 2009–10

In 2008, the RHS Team entered into a partnership with the Office of the Chief Dental Officer (OCDO) of Health Canada to conduct the First Nations Oral Health Survey (FNOHS), a national oral health examination survey of all ages of First Nations living on reserve. The FNOHS, which is the subject of the current report, began data collection in February 2009 and provides national level data on the clinical oral health status of First Nations. The survey, coordinated by the RHS Team, was implemented in First Nations communities with the assistance of the OCDO, which supplied examiners and expert advice to the survey. The FNOHS used the same oral health measures in its clinical examination and interview components as those used in the Canadian Health Measures Survey (CHMS) of 2007–09, with additional questions specific to the needs of the First Nations populations added so as to allow for comparisons between the national estimates and the First Nations estimates. The FNOHS also included children ages 3–5 in addition to the priority age groups included in the CHMS (6–11, 12–19, 20–39, 40–59 and 60–79) with data collection ending in February 2010. In the FNOHS, the age groups 40–59 and 60–79 were combined into one group, 40 years and over, for analysis purposes. The survey gathered information on risk factors and health determinants that affect First Nations communities, as well as essential baseline data for future oral health surveys of this population. The data collected will allow for wider comparisons with national and international oral health survey data and it is hoped that the findings will help in filling some of the data gaps in our understanding of the burden of oral disease in First Nations communities across the country.

In summary, this report of the findings of the First Nations Oral Health Survey of 2009–10 provides national estimates of the clinically assessed oral health status of on-reserve First Nations children, adolescents and adults and presents comparison data for the general Canadian population derived from the Oral Health Module of the Canadian Health Measures Survey conducted from 2007 to 2009 and for the Inuit population, from the Inuit Oral Health Survey of 2008–09. In this report, we also examine national estimates for respondent-assessed oral health and perceived impact on quality of life, felt dental treatment needs, preventive oral health behaviours, dental care access and utilization using the questionnaire component of the First Nations Oral Health Survey and compare the results with those found in the CHMS and IOHS. It is anticipated that the findings from the First Nations Oral Health Survey will address knowledge gaps in the critical areas of normative oral health status and treatment needs of First Nations peoples and will provide essential baseline data to measure progress towards preventing oral disease and eliminating oral health disparities across Canada.

2. METHODOLOGY

Background and rationale

The Canadian Health Measures Survey (CHMS), under the direction of Statistics Canada in partnership with Health Canada and the Public Health Agency of Canada, collected data from March 2007 to February 2009 on the majority of the Canadian population aged 6–79 years. While the CHMS was comprehensive, the sampling frame did not include persons living on First Nations reserves or Crown lands, residents of institutions, full-time members of the Canadian Forces or residents of certain remote regions (Health Canada, 2010). Though not specifically targeted, First Nations living off reserve, Inuit living in non-remote areas and Métis, who live predominantly in southern urban centres, did take part in the study but they were grouped together under the general heading of "Aboriginals". Therefore, the non-sampling of people living in the north and those living on First Nations reserves provided the impetus for the First Nations and the Inuit Oral Health Surveys, which began data collection in 2008 and 2009, respectively, as a means of complementing the CHMS and providing national level data on the oral health status of First Nations and Canadian Inuit.

The First Nations Oral Health Survey (FNOHS) was implemented in First Nations communities by the First Nations Regional Longitudinal Health Survey (RHS) National team with the assistance of the Office of the Chief Dental Officer (OCDO) of Health Canada. The OCDO supplied dentist-examiners and expert advice to the FNOHS, while survey sampling and analysis were provided by the RHS team. The FNOHS used the same oral health measures in the clinical examinations and in the interviews as those used in the CHMS, with additional questions specific to the needs of the First Nations population so as to allow for comparisons between the national estimates and the First Nations estimates. Both the Inuit Oral Health Survey (IOHS) and the FNOHS included children aged 3–5 years owing to the fact that Aboriginals in this age group experience much higher levels of tooth decay that require dental treatment under general anaesthesia than children of the same age in the general Canadian population. The data collection for the IOHS was completed in June 2009 while the FNOHS data collection ended in February 2010.

Sampling strategy

The sampling strategy for the FNOHS was based on the Indian Registry population data from Indian and Northern Affairs Canada (INAC). All First Nations communities with a population of 500 or more were eligible for selection; a minimum community size had to be used to ensure that selected communities were adequately large to support the community-level sample size. The sampling frame was divided into four regions based on population size and similar characteristics: 1. Atlantic region and Québec; 2. Ontario; 3. Manitoba, Saskatchewan, Alberta and the Northwest Territories; and 4. British Columbia and the Yukon. Within each region, one urban/non-remote rural community and one remote/special access community were randomly selected to participate in the survey.[1] If a community declined the invitation to participate, it was

[1] Urban/Rural First Nation = INAC classification of G1: Located within 50 km of the nearest service centre with year-round road access or G2: Located between 50 and 350 km from the nearest service centre with year-round road access. Remote/Special Access First Nation = INAC classification of G3: Located over 350 km from the nearest

randomly replaced by the same type of community within the same region (*i.e.*, the replacing of an urban/rural community from Ontario with a randomly selected urban/rural community also from Ontario). Below is the final list of the eight communities that participated in the 2009–10 FNOHS (Table 2.1):

Table 2.1 – Participating 2009–10 FNOHS communities

Community	Region
Burnt Church First Nation	NB
Natasquan	QC
Fort William First Nation	ON
Moose Cree First Nation	ON
Fort Good Hope	NWT
Grand Rapids First Nation	MB
Chemanius First Nation	BC
Ulkatcho (Anahim Lake)	BC

Once a community was selected, band leaders or reserve officials were sent an information package with an invitation to participate. Communities were also given copies of the survey tools (*i.e.*, the questionnaire and oral health examination form), a synopsis of the research methodology, information brochures about the survey, and related survey documentation (e.g. consent form).

A two-stage sampling design was used and the sampling unit was the individual. Specifically, after one urban/rural community and one remote/special access community within each of the four regions of the country agreed to participate, individual participants were then randomly selected from the bands' membership lists, according to one of the five age categories presented in the table below (Table 2.2). Since comparability with the CHMS was essential, the age groupings used in the FNOHS more or less align with those of the CHMS. Since the CHMS has five age groupings which are: 6–11, 12–19, 20–39, 40–59 and 60–79, the FNOHS combined the last two groupings and added the 3–5 age grouping. Consequently, no comparisons can be made between the FNOHS and CHMS for the 3–5 age grouping.

Within each community, a sample size of 158 randomly selected respondents was required with the sample size determined for oral conditions that had a prevalence of 50% or higher for the three younger age groups and 15% for the two older groups with a coefficient of variation of 16.5%. Due to the small sample size associated with limited funding for the survey, there was no breakdown by sex and only national estimates are made in this report.

service centre with year-round road access or G4: The First Nation has no year- round road access to a service centre and, as a result, experiences a higher cost of transportation.

Table 2.2 – Summary of sample size, by age group per community

Age Group	Sample Size
3-5 years	20
6-11 years	20
12-19 years	20
20-39 years	64
40 years and older	34
Total	158

Study Components

The FNOHS had two complementary study components: 1) a household interview lasting about 20 minutes that covered issues of self-reported oral health status, oral hygiene practices, access to oral health care, co-morbidities and risk factors, and 2) a clinical component which entailed a 10-minute examination of the teeth and mouth of the participants.

The FNOHS interview and clinical examination instruments were formatted for use in the Computer Assisted Personal Interview (CAPI) system, described in the 'Data Entry and Quality Control' section, for collection via laptop computers in the field. The survey instruments were available in both English and French.

Household Interview Component

The household interview component of the FNOHS was an interviewer-assisted, self-reported questionnaire completed either by an adult (18 years of age and over) or adolescent (12 to 17 years) participant, or answered by a parent/primary caregiver, if the selected participant was under the age of 12. The household interviewed questionnaire was conducted by a locally hired field worker who could speak the native language of the participant. Upon first contact, the field worker described the survey with the help of a descriptive brochure. If verbal consent was obtained, a printed consent form was signed by the respondent or child caregiver prior to the beginning of the interview process. The field worker then obtained the responses to the questionnaire and recorded them directly into a database using the laptop computer. There were 113 questions seeking information on satisfaction with oral health and appearance, oral symptoms, disability days, dental visits and preventive oral health care behaviours, dental care and access to care. Much of the content of the questionnaire overlapped with the CMHS household interview component (Health Canada, 2010) with some additional questions addressing First Nations-specific issues (*i.e.*, Non-insured Health Benefits) included. Upon completion of the questionnaire, the field worker scheduled an appointment for each of the respondents with a dentist-examiner.

Clinical Examination Component

The clinical component of the FNOHS recorded the oral health status of participants using the CMHS clinical protocol. Before the oral examination, the dentist-examiner asked a number of questions seeking information on oral health symptoms such as toothache, bleeding gums or dry mouth and on self-perceived treatment needs. In addition, respondents were asked medical history questions to ensure they could undergo a complete clinical oral examination[2]. No radiographs were taken as part of the clinical examination. The oral examination collected a wide array of clinical data, including conditions of edentulism and prosthesis wearing, mucosal lesions, dental fluorosis, occlusion, debris, gingivitis, calculus, periodontal measurement of probing depths and loss of attachment on indicator teeth, caries status of permanent teeth (28 teeth only) of each tooth crown and root, tooth-specific caries status of primary teeth, and incisor trauma. The dental indices and criteria used are described in the next section. Furthermore, dentists made recommendations for the type of treatment needed by participants and whether or not urgent treatment was required (Health Canada, 2010). Upon completion of the oral examination, treatment recommendations were provided to each of the participants.

Clinical Indices and Criteria

Examining dentists used objective clinical indices and criteria for measuring and recording oral health conditions. The examination protocols followed those used in the oral health component of the CHMS, which, in turn, followed the World Health Organization (WHO) survey methods protocol for conducting population-based oral health surveys (WHO, 1997). The Fédération Dentaire Internationale (FDI) tooth numbering system was also adopted. To better present the information, summary measures of oral disease were created for this report that are in line with those found in the CHMS oral health report. Information was collected on the following:

Dentate Status

The dentist-examiners recorded whether natural teeth or implants were present in the maxilla, mandible or in both arches. The prevalence of complete tooth loss, also referred to as edentulism, was defined as the percent of adults who had no natural teeth (*i.e.*, were edentulous). Adults who had at least one natural tooth were deemed ‘dentate’. In addition, the proportion of all adults with a full complement of 28 teeth (third molars/wisdom teeth were not examined), those with a “compromised” natural dentition of fewer than 21 teeth, as well as the mean number of natural teeth present were recorded and are reported in the results chapter. The threshold for a functional dentition set at 21 or more natural teeth is consistent with the classical concept of the “shortened dental arch” (SDA), which involves the patient being able to function with 10 pairs of occluding units (*i.e.*, a patient with incisors, canines, and premolars in the maxilla and mandible) (Käyser, 1981).

[2] Participants who suffered from certain medical conditions such as heart murmur requiring antibiotic prophylaxis for dental treatment, heart valve problems, or congenital heart disease, among other conditions participated in the dental examination but were exempt from periodontal probing.

Prosthetic Status

The use of full or partial removable dentures (in one or both arches) worn to the examination and the presence of fixed prostheses, such as bridges or implants, were recorded. The proportion of edentulous adults wearing dentures and dentate adults wearing dentures or bridges to replace missing teeth are presented in the results chapter.

Oral Mucosal Lesions

The point prevalence of oral mucosal lesions, defined as the proportion of participants presenting with specific types of these soft tissue lesions at the time of the examination, were recorded. All diagnoses were made clinically. The results are presented in tables for First Nations aged 12 years and older and for those aged 18 years and older.

Dental Fluorosis

Dental fluorosis is a hypomineralization of the dental hard tissues (enamel, dentin, and cementum) caused by long-term, excessive ingestion of fluoride during the period of tooth development prior to eruption (first 8 years of life for most permanent teeth excluding third molars). Once the tooth erupts, dental fluorosis refers to a range of visually detectable changes in the enamel. Depending on the quantity and timing of fluoride ingestion during the period of tooth development, the changes to the appearance of fluorotic teeth can range from barely visible lacy white markings in milder cases to converged opaque areas and pitting of the teeth in its severest forms. After eruption the pitted areas can become stained yellow to dark brown and the teeth often have a corroded appearance as a result of enamel loss.

The examiners recorded the prevalence and severity of dental fluorosis among children, aged 6–11, using the 6-point Dean's Fluorosis Index (Dean, 1942). A person-based score was calculated according to the most affected pair of maxillary central and lateral incisors. If the two maxillary central incisors or the two maxillary lateral incisors were not equally affected, the score for the less affected of the two teeth was recorded. The criteria for the Dean's Index are listed in Table 2.3.

Table 2.3 – Dean's Fluorosis Index criteria

Diagnosis	**Criteria**
Normal	The enamel is translucent. The enamel surface is smooth, glossy and usually has a pale creamy-white colour.
Questionable	The enamel shows slight aberrations from the translucency of normal enamel, which may range from a few white flecks to occasional white spots. This classification is utilized in those instances in which a definitive determination of the mildest form of fluorosis is not warranted and a classification of "normal" is not justified.
Very mild	Small opaque, paper-white areas scattered irregularly over the tooth

	surface, but involving less than 25% of the labial surface.
Mild	The white opacity of the enamel of the teeth is more extensive than the previous category ('very mild'), but covers less than 50% of labial tooth surface.
Moderate	White opaque areas affect more than 50% of the enamel surface. In addition, the enamel surfaces of the teeth show marked wear. Brown staining is frequently a disfiguring feature.
Severe	All enamel surfaces are badly affected and hypoplasia is so marked that the general form of the tooth may be affected. There are pitted or worn areas and brown stains are widespread; the teeth often have a corroded appearance.
All 4 maxillary anterior teeth absent	The teeth could also be unavailable for assessment owing to orthodontic bands

Source: Dean, 1942.

Orthodontic Conditions and Treatment Status

Occlusion refers to the alignment of teeth and the way that the upper and lower teeth fit together (bite), while malocclusion is a misalignment of opposing teeth and/or an incorrect relation between the teeth of the two dental arches. Ideally, all upper teeth should fit slightly over the lower teeth and the cusps of the molars fit the grooves of the opposite molars. The upper teeth keep the cheeks and lips from being bitten and the lower teeth protect the tongue. The effects of malocclusion go beyond masticatory function, as malocclusion may also affect psychological aspects of a person's oral health-related quality of life and his/her desire for braces.

The prevalence and type of malocclusion were quantified and qualified in dentate First Nations adults aged 12 years and older. Examiners recorded all occlusal conditions that were present, which meant that a participant could have more than one condition. Objective assessments of occlusion included the following nine options: acceptable occlusion, anterior crossbite, severe crowding, severe spacing, posterior crossbite, anterior open bite (1 mm), excessive overbite (100% or more), excessive overjet (9 mm), and midline shift (4 mm). Data on the current orthodontic treatment status of participants also were collected and categorized as: no orthodontic treatment, removable appliances, fixed appliances, both fixed and removable appliances, retainer placed post-treatment. An additional item was added at the end of the occlusion assessment that recorded whether the participant had received orthodontic treatment.

Periodontal Conditions

Dentate participants examined in the FNOHS were assessed for periodontal (gum) conditions provided they had no medical contraindications to periodontal probing. Probing was not conducted on children younger than 15 years of age. The types of conditions assessed were: gingivitis, oral hygiene (debris and calculus) and periodontitis.

1. Gingivitis

Gingivitis, or inflammation of the gums, occurs in response to the bacteria in plaque that accumulates at the gum line. It is characterized by redness, swelling or bleeding of the gums. Examiners assessed gingivitis by visual inspection and by the application of gentle pressure to the gum closest to the neck of the tooth using a dental probe. Usually, gingivitis is a painless condition.

The Gingival Index (GI) of Löe and Silness (1963) was used to assess inflammation of the marginal gingival tissues around six index teeth (if present) in dentate participants aged 15 years and over. The index teeth used were: the maxillary right first molar, the maxillary right lateral incisor, the maxillary left first bicuspid, the mandibular left first molar, the mandibular left lateral incisor and the mandibular right first bicuspid. The GI scores and criteria are shown in Table 2.4. The highest/worst GI score for each tooth was recorded and used to calculate the GI score for each participant.

Table 2.4 – Scores and Criteria for the Gingival Index (GI)

Score	Description	Criteria
0	Normal gingiva	No signs of gingival inflammation.
1	Mild inflammation	Slight change in colour or slight edema. No bleeding on probing.
2	Moderate inflammation	Redness, edema and glazing. Bleeding on probing.
3	Severe inflammation	Marked redness and edema. Ulceration or spontaneous bleeding.

Source: Löe and Silness, 1963.

2. Oral Hygiene

Gingivitis and periodontitis are principally caused by bacteria that accumulate in dental plaque, the sticky film that adheres to teeth. When plaque accumulates, often the result of infrequent or ineffective oral hygiene, the risk of both conditions increases.

Dental calculus, commonly known as tartar, is a hardened yellow or brown mineral deposit on teeth that is caused by unremoved plaque. Calculus is composed of mineral salts, food, and other debris that has hardened over time which cannot be removed with a toothbrush. Because of its rough surface, calculus attracts more debris and food particles, causing a repeating cycle of formation and build-up until it is removed by a dentist/periodontist.

The Debris Index (DI) and the Calculus Index (CI) components of the Oral Hygiene Index (OHI) of Greene and Vermillion (1960) were used to measure the coronal extension of plaque (Debris Index) and likewise, the coronal extension of supragingival calculus (tartar) and/or the concurrent occurrence of subgingival calculus (Calculus Index) on preselected tooth surfaces of the indicator teeth. The method for scoring calculus is the same as that applied to debris, with additional provisions made for recording subgingival deposits. The worst score for debris and for calculus was recorded for each tooth and an index was calculated independently for each

condition. The individual debris and calculus scores were not combined to obtain the Oral Hygiene Index, but rather tabulated separately. The criteria for classifying debris and calculus are presented in Tables 2.5 and 2.6, respectively.

Table 2.5 – Scores and Criteria for the Debris Index (DI)

Score	Criteria
0	No soft debris or stain present.
1	Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered.
2	Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.
3	Soft debris covering more than two thirds of the exposed tooth surface.

Source: Greene and Vermillion, 1960.

Table 2.6 – Scores and Criteria for the Calculus Index (CI)

Score	Criteria
0	No calculus present.
1	Supragingival calculus covering not more than one third of the exposed tooth surface.
2	Supragingival calculus covering more than one third, but not more than two thirds, of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth, or both.
3	Supragingival calculus covering more than two thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth, or both.

Source: Greene and Vermillion, 1960.

3. Periodontitis

Periodontitis, which is caused by a bacterial infection, is inflammation of the tissues surrounding the tooth that affects the gingiva (gum), the ligaments and the bone. The disease is asymptomatic, but in some cases, the infection can cause an abscess and become painful. In its severe forms there can be loss of bone that supports the tooth, resulting in the tooth becoming loose to the point that extraction is required. The loss of supporting structures (gingiva, bone and the attachment – the periodontal ligament between the teeth and bone) can result in the formation of 'pockets' between the gum and the tooth root. The depth of the pocket, measured in millimetres using a periodontal probe, is an indication of the severity of the destructive process.

In healthy young adults, the periodontal attachment is found at the junction of the enamel covering the crown and the beginning of the root which is covered in cementum – the cemento-enamel junction (CEJ). Using blunt probes with millimetre markings, examiners measured loss of attachment (LOA) as the distance from where the attachment is found in healthy young adults (the CEJ) to where it is found in a participant at the time of the examination. Examiners gently probed and identified the attachment point as the bottom of the pocket (periodontal crevice) and

then measured the distance from that point to the CEJ (possible range: 0–12 mm). For pocket depth, the distance from the free gingival margin to the bottom of the pocket was recorded (possible range: 0–9 mm). Thus, there were two measures to indicate periodontal tissue destruction: pocket (or probing) depth and loss of attachment.

There is no hard and fast consensus as to the case-definition of periodontitis. However, there is some agreement in the literature that a clinical loss of attachment (LOA) of 6 mm or more is a reasonable cutoff point to differentiate 'serious/severe' from 'moderate' periodontitis. The former can threaten the life of the tooth whereas the latter, usually applied to a LOA of 4–5 mm, rarely affects chewing function. Those with a LOA of 3 mm or less are usually considered as having a "healthy" periodontium.

Using the World Health Organization's indicator teeth (World Health Organization 1997), and depending on the teeth that were present, examiners probed 6 sites on each of up to 10 teeth. If all indicator teeth were present the examiner recorded the worst (highest) probing depths and loss of attachment measures for 6 sites on 8 molar teeth and 2 anterior teeth (teeth numbers 16, 17, 11, 26, 27, 36, 37, 31, 46, 47). The worst score for an individual participant was then used in the tables.

Periodontal Treatment Needs

Periodontal treatment needs were assessed using the Community Periodontal Index of Treatment Needs (CPITN) (Ainamo *et al*., 1982). The CPITN is an index developed to measure the amount and level of periodontal care required for adults. The index score includes the presence or absence of bleeding and calculus as well as the depth of pocket and requires use of a special periodontal probe – the CPITN probe. Codes 0 to 4 are ascribed to the teeth in one of the six sextants (17–14, 13–23, 24–27, 37–34, 33–43, and 44–47) examined according to the clinical criteria (Table 2.7), and from those findings the patient is categorised into one of four treatment groups on the basis of the most severe condition found.[3] Although the examiners did not record CPITN per se, the data that were recorded permitted participants of the FNOHS to be placed into the CPITN categories.

Table 2.7 – Codes and Criteria for the Community Periodontal Index of Treatment Needs (CPITN)

Code	Criteria
0	Healthy gingiva.
1	Bleeding observed, directly or by using the mouth mirror, after "sensing" (*i.e.*, gentle probing). There are no pockets and no calculus or overhangs of fillings. A maximum score of 1 indicates a need only for instructions on improving oral hygiene.
2	Calculus felt during probing. Dental calculus may be seen at, or felt underneath, the gingival margin. There are no pocket depths exceeding 3 mm. The treatment need for

[3] Treatment need codes of the CPITN have now been eliminated from the index because they became obsolete in view of current treatment methods. The index is now referred to as the Community Periodontal Index, or CPI (WHO, 1997).

	code 2 is the same as for code 3, scaling and improved oral hygiene.
3	Pocket depth is 4 or 5 mm and treatment of the sextant can usually be managed with thorough scaling and proper personal oral hygiene measures.
4	Pocket depth of 6 mm or more at one or more teeth. Such a sextant requires "complex treatment", *i.e.*, either deep scaling and root planing or surgical intervention, in addition to oral hygiene education. In most cases the patient would be referred to a specialist periodontist for treatment.
X	Excluded sextant (less than two teeth present).
9	Not recorded.

Source: Ainamo *et al*., 1982.

Coronal Caries

Coronal caries occurs on the crown – the visible portion of the tooth – that is covered in enamel and is recognized as one of the primary reasons why individuals seek dental care. In the FNOHS, coronal caries and its sequelae (missing teeth due to caries and filled teeth) were diagnosed using the World Health Organization Oral Health Surveys methods and criteria (World Health Organization, 1997). Detailed diagnostic and coding guidelines were included in the procedures manual for the dental examiners and recorders. Tooth-specific data points were used to calculate measures of caries prevalence and severity, based on the DMFT (or dmft) index (Klein *et al.*, 1938). Upper-case letters represent scores for permanent (adult) teeth and lower-case letters represent scores for primary or deciduous (baby) teeth. Although the 'M' component of the index is for teeth missing due to caries, to be consistent with the CHMS protocols and diagnostic criteria, missing teeth were coded as 'missing teeth lost to caries or periodontal disease'. However, the examiners did not count as 'missing due to disease' those teeth lost to trauma or those extracted because of orthodontic treatment. As with other clinical components in this study, no radiographs were taken to assist with caries diagnosis.

Two measures of prevalence were calculated: the prevalence of tooth decay (caries experience, which is the proportion of participants with at least one decayed, missing or filled tooth) and the prevalence of untreated coronal caries. Indices used for severity of disease were the number of decayed, missing and filled primary teeth (dmft) and the number of decayed, missing, and filled permanent teeth (DMFT).

In addition, the ratios of decayed, missing or filled teeth to the total number of decayed, missing and filled teeth were calculated (DT/DMFT%; MT/DMFT%, FT/DMFT%, respectively). These measures can be used to estimate the degree of unmet treatment need among the subset of the population with caries experience.

Root Caries

Root caries, as the name implies, is dental decay that attacks the tooth root(s) that have become exposed due to gingival recession. Gingival recession (receding gums) is caused by periodontal disease or results from the aging process. Owing to the fact that older adults are now much more likely to retain more of their natural teeth, root caries is seen more often by dentists than in the past. Root caries is more difficult to detect than coronal caries because it appears either as a

small, discrete lesion on a single root surface or as a lesion that circumscribes the root, making it more difficult to treat.

In the FNOHS, the presence of root caries and restorations was assessed at the tooth-level and recorded at the person-level, as the proportion of the dentate First Nations adults examined with one or more decayed root lesions and/or one or more filled root lesions (RDFT > 0), and as the mean number of carious or restored root lesions per person (*i.e.*, a RDFT count). In addition, the ratio of root decayed or filled teeth to the total number of root decayed and filled teeth was calculated (RDT/RDFT%; RFT/RDFT%, respectively), as well as the proportion of the population with at least one root carious lesion (RDT > 0) and the mean number of untreated teeth among those who had untreated root caries.

Dental Sealants

A dental sealant is a clear and protective coating that is applied by a dental professional to the occlusal (chewing) surface of the back teeth (mainly molars) to seal pits and fissures where plaque, food, and bacteria can become trapped. Sealants serve as a means of preventing cavity formation in the decay-susceptible areas of the tooth. Generally, if a child is assessed as susceptible to decay, all four first permanent molars are treated with sealant shortly after they erupt at age 6–7 years, and then the four second molars are treated when they erupt at age 12–14 years. However, if a child is extremely susceptible to caries, to the extent that decay is found on the smooth surfaces, sealants are not used since the tooth would require restoration.

Dental sealants were assessed in permanent molars (occlusal and buccal surfaces in lower molars and occlusal and lingual surfaces in upper molars), if the teeth were not decayed or otherwise restored. The prevalence of sealants was calculated as the proportion of participants having sealants on one or more permanent molar teeth among children aged 6 to 11 and adolescents aged 12 to 19. The mean number of dental sealants per person was calculated among those having one or more permanent molar teeth with a surface considered sealed.

Amalgam Count

At the end of the caries examination, dentist-examiners counted and recorded the number of tooth surfaces with amalgam fillings.

Incisor Trauma

Assessment of incisor trauma, performed on all dentate participants ages 6 and over with at least one permanent incisor, was based on clinical, non-radiographic evidence of tooth injury and treatment to the eight permanent incisors. Dental examiners also asked participants about any prior dental incisor trauma especially for lost teeth. For this report, the findings on traumatized teeth were aggregated into whether there was clinical evidence of trauma to a tooth (Codes 2–7) or not (Code 1) – see Table 2.8 for codes and criteria. The prevalence of incisor trauma (the proportion of participants with one or more incisor teeth lost or fractured), and the mean number of teeth affected among those with at least one lost or traumatized incisor, were computed.

Table 2.8 – Codes and Criteria Used for Recording Dental Trauma

Code	Criterion
1	No evidence of traumatic injury.
2	Unrestored enamel fracture – does not involve dentin.
3	Unrestored enamel fracture – involves dentin.
4	Untreated damage – dark discolouration, swelling, fistula. Untreated damage as evidenced by: 1) dark discolouration as compared with the other teeth (a discolouration of one tooth or adjacent teeth, which are otherwise healthy is considered a sign of injury) or 2) presence of swelling and/or fistula in the labial or lingual vestibule adjacent to an otherwise healthy tooth.
5	Restored fracture – full crown. Fracture restored, with a full crown. It may be necessary to question the respondent to determine the reason for the restoration.
6	Restored fracture – other restoration. Fracture restored, with less extensive restoration than a full crown. It may be necessary to question the respondent to determine the reason for the restoration.
7	Lingual restoration plus history of root canal treatment. Presence of lingual restoration as a sign of endodontic therapy, and a positive history from the respondent of root canal treatment following traumatic injury.
8	Other. Any tooth or space that does not fall into the preceding categories.

Dental Treatment Needs

A clinical assessment was made of the participants' dental treatment needs and this was compared with the participants' perceived needs. Briefly summarized, upon completion of the clinical examination, the dentist-examiners recorded whether the participant needed care and, if so, what type, and whether care was needed urgently (*i.e.*, within one week). Participants were informed at the time of the examination if they required urgent treatment. If the dentist identified a serious medical condition (e.g. oral lesion, severe acute infection) that required immediate medical attention, the participant was informed that he/she should seek care immediately (*i.e.*, 24–48 hours). Current dental care needs were categorised as: no treatment needed, prevention, fillings, temporomandibular joint disorder (TMD), surgery, periodontics, esthetics, endodontics, orthodontics, soft tissue, and other. The categories were not mutually exclusive.

The dentist-examiners also recorded the prosthetic treatment currently needed by partially dentate and edentulous participants. Objective prosthetic needs of the upper and lower arches of the participants were recorded separately and included the following options: no prosthetics needed, fixed bridge, implant, denture repair or relining, new partial denture, and new full denture. A participant could require more than one type of care.

Calibration of Dentist-Examiners

The dentist-examiners for the FNOHS participated in calibration sessions consisting of classroom and clinical components. In the classroom component, the dentists learned the criteria for the oral health measures and in the clinical component, all of the dentists

examined volunteers and completed a series of exercises to ensure that they were measuring the oral conditions in a consistent manner. In addition, standard photographs representing the categories of dental fluorosis and study models of various occlusal conditions were used for the purpose of calibration.

Inter- and intra-examiner calibration tests were then conducted. All examiners achieved high agreement (Cohen's Kappa > 0.6) ensuring an appropriate level of validity and reliability of the results. The calibration sessions for the FNOHS were held just prior to the beginning of data collection. In one instance, there was a delay in the data collection for one site and a recalibration session was held to ensure the examiners were appropriately trained and calibrated. The dentist-examiner calibration processes used during the FNOHS were consistent with those of the CHMS.

Field Work and Data Collection

Field Worker Training

Field workers from each of the participating communities underwent specialized training to support the collection of the FNOHS interview and clinical components. The FNOHS training covered material on informed consent, interviewing techniques, sampling, questionnaire content, and the computerized data collection system. A Field Worker Training Manual guided the training sessions, which adapted materials from the First Nations Regional Longitudinal Health Survey (RHS) Training Manual as a foundation. Many of the field workers had been employed and trained with the RHS and as a result, were familiar with the Computer Assisted Personal Interview (CAPI) system and the research methodology. Field workers received additional training on the recording of oral health data and on infection control procedures by the OCDO-Health Canada staff to assist in the collection of the clinical component.

Data Entry and Quality Control

As mentioned above, all data were directly entered into laptop computers by the field workers at the time of the interviews and examinations. The Techneos© Entryware system (Techneos, Vancouver, BC, Canada) was used to support the Computer Assisted Personal Interview (CAPI) system and to ensure data reliability and security. The Entryware software package had three components:

1) Entryware Mobile – the software installed on the laptops to run the questionnaire and clinical components.

2) Entryware Designer – the software required to create and format the questionnaire component and to download and export the datasets in SPSS© format.

3) Entryware Web Console/Server – the software used to create users for Entryware Mobile and to monitor incoming data from the various community sites across Canada.

Eight laptops were purchased and had the Windows Vista© operating system installed which was compatible with the Entryware System described above. Data collection required a minimum of two laptops per site so that once data collection was completed in one community, the computers were shipped back to the RHS national office to be sent on to the next scheduled site.

Consent and Ethical Review

The FNOHS methodology and data collection instruments were reviewed and approved by the First Nations Information Governance Committee, comprised of representatives from ten First Nations regional organizations[4]. The FNOHS methodology and materials were also reviewed and approved by Health Canada's Research Ethics Board.

The FNOHS followed a model of informed consent. The consent form had the following sections: description of project purpose and partners; benefits and risks; privacy protections; right to refusal; and the statement of consent. All participants under the age of 18 years required the consent of a parent/primary caregiver. All data in the FNOHS dataset had and still have a confirmed valid consent form on record; if no valid consent form could be located at the time of data analysis, then the data were deleted from the survey. The signed consent forms are securely stored at the RHS national office.

This FNOHS report has been reviewed by all partners involved in the study and made available to the participating communities.

Data Cleaning and Analysis

Merged Database: Household and Clinical Data

To support the analysis of this report, the datasets from the household interview and clinical components were combined into one. Before the household and clinical databases were merged, several steps to validate the survey consent numbers were taken. Consent form numbers were checked against the consent database, the household component database, and the clinical component database. There were only four cases where data existed but no consent forms were found and these data were subsequently deleted from the sample. Furthermore, an additional case was deleted because the consent form was later voided. Once the consent numbers in the databases were validated, the household component was merged with the clinical database using the consent number as the link variable.

The final sample consisted of 1,188 respondents for the clinical component (Table 2.9). However, only 1,125 of those respondents completed both the clinical and household interview components. We achieved 94% of our overall targeted sample.

[4] Union of Nova Scotia Indians, Union of New Brunswick Indians, First Nations of Québec and Labrador Health and Social Services Commission, Chiefs of Ontario, Assembly of Manitoba Chiefs, Saskatoon Tribal Council, Assembly of Alberta Treaty Chiefs (Treaty 6, 7 and 8), Dene Nation, NWT, Council of Yukon First Nations, Assembly of First Nations.

Table 2.9 – Final Counts of Respondents in the FNOHS Clinical Database, by Age Group

Age Group	Total Sample
3-5	140
6-11	172
12-19	176
20-39	411
40+	289
N	1188

Data Analysis

Descriptive statistics were used to analyze the data from both the clinical and household interview components. Where necessary, summary measures of oral disease were computed and response categories were collapsed to create oral health outcome variables of interest. Data are presented here in a manner that is consistent with the reports on the oral health status of Canadians in the CHMS and IHOS. Specifically, the oral health status of First Nations is presented by selected socio-demographic characteristics, the remoteness factor of the community and other determinants of health. Percentages and means are reported with breakdowns by age group, where appropriate. When only clinical data are presented, the age groups for adolescents and young adults are the same as those in the CHMS, namely 12–19 years and 20–39 years, respectively to allow for comparisons of the results of the two surveys. However, when clinical data were merged with data from the household interviews in the FNOHS, the age groups for adolescents and young adults used were 12–17 years and 18–39 years, respectively. This was done in order to maximize the use of the data and not to leave out results for 18 and 19 year-olds when only data for adults were considered. All estimates were weighted to the Registered First Nations population in Canada. Variance estimation (95% confidence intervals, coefficients of variation) are not reported due to the design effect (only one urban/rural community and one remote/special access community in each region). Estimates based on a sample size less than 10 or with an extreme sampling variability (a coefficient of variation greater than 33.3%) have been suppressed and are marked in the tables with the letter "F". All analyses were conducted in-house by data analysts at the First Nations Information Governance Centre using the Complex Samples module in SPSS® (IBM Corporation, Armonk, NY, United States).

Strengths and Limitations

A major strength of this study is the achievement of scientifically valid research while respecting First Nations processes and goals of self-determination in research. The First Nations principles of Ownership, Control, Access, and Possession (OCAP) of data were considered essential to the completion of the survey (First Nations Centre, 2007). Additionally, the use of the CAPI system for survey data collection increased the quality of data recorded and the clinical component followed World Health Organization (WHO) standards.

A major limitation of the study was the small sample size and restrictions around the sample. Only eight communities were funded for the study and the inclusion of more communities would have helped to decrease the design effect. The sampling design used in the FNOHS was a two-

stage design where the first stage selected only one urban/rural community and one remote/special access community in each of the four geographic regions and the second stage selected persons in the target age groups in each sampled community. Sampling weights were calculated to reflect the different probabilities of selection and to enable estimates to be representative of the underlying First Nations population in Canada. However, since only one community was selected from each stratum, unbiased variance estimates could not be produced. National estimates were still produced for attributes of interest, such as the remoteness of the community. But national estimates with unbiased measures of their precision could not be attained. In addition, we cannot ignore the bias of restricting the sample to communities larger than 500 persons. Such a restriction means that populations from smaller communities are not represented by the results.

Another limitation is the fact that the study is cross-sectional and therefore only captures information at the time of the study; results are therefore bound by the timeline of the study and inferences about causation cannot be made. Finally, the household survey was self-reported and therefore subject to the usual risks of bias associated with self-reported data (*i.e.*, recall bias).

3. RESULTS

The results of the First Nations Oral Health Survey (FNOHS) are presented using a results table format similar to that used in the oral health component of the Canadian Health Measures Survey 2007–09 (CHMS) (Health Canada, 2010) and the Inuit Oral Health Survey 2008–09 (IOHS) report (Health Canada *et al.*, 2011). In the results table format, outcomes are defined in the table headings and the determining factors form the table rows. The FNOHS selected known determinants of health relevant to First Nations in order to illustrate the effect of the health determinants on the oral health of this population, and to more easily compare the FNOHS findings with those of the oral health component of the CHMS and the IOHS. The determinants chosen as subgroups include: age, sex, household income, dental visits, education, remoteness of community, smoking, dentate status and diabetes. As explained in the Methodology section, measures of variability are not provided due to the design effect. As a result, no claims about statistical significance of the findings are possible and the presentation of the results speaks of non-significant trends and/or consistent patterns in the data across three or more groups. Therefore, the text addresses absolute or relative differences in mean numbers or proportions that are clinically meaningful or sufficiently large to warrant comment. Also explained in the Methodology section are the age groupings used in this report which are consistent, to the best extent possible, with those used in the CHMS oral health module. However in this survey preschool children (ages 3–5 years) were included, whereas in the CHMS they were not studied. The FNOHS also combined the older age groups (ages 40–59 years and 60–79 years) into one group, those 40 years of age and older. In addition, to maximize the data reported and to allow for comparisons with the First Nations Regional Longitudinal Health Survey (RHS) 2002–03 data, adolescents were categorised as those aged 12–18 years and adults were grouped as those 19 years and older. Nevertheless, most of the clinical examination findings are presented based on the CHMS categories for adolescents and adults, ages 12–19 and 20 years and over, respectively, unless clinical data were merged, as in the case of findings related to the household interview component.

Sample Size

Table 1 shows the distribution of the FNOHS sample by age and other socio-demographic characteristics as well as smoking status. A total of 1,188 participants were examined and 1,125 completed both the clinical and the household interview components. The weighted percent and the actual number of participants are shown in each cell of Table 1. The distribution was balanced in terms of participant's sex but skewed towards lower numbers in the younger age groups, those with more than a high school education, those working for pay, those with higher household incomes, and those living in remote communities. Most adolescents (70.6%) in the sample surveyed were non-smokers while the majority of adults (62.9%) currently smoked. The Indian and Northern Affairs Canada (INAC) geographic zone definition was used to define the "remoteness" of the community, namely "non-remote" was an urban community located within 50 km of the nearest service centre with year-round road access or a rural community located between 50 and 350 km from the nearest service centre with year-round road access. A "remote" community was any community located over 350 km from the nearest service centre with year-round road access or a "special access" community, a First Nation that has no year-round road access to a service centre and, as a result, experiences higher costs for transportation.

SELF-REPORTED OUTCOMES

Perceptions and Impact of Oral Health on Quality of Life

Oral health examination surveys measure visible signs of oral disease and the treatment of that disease from an objective clinical perspective. Yet, standardised oral epidemiological examinations cannot assess subjective aspects of oral health such as pain, function and quality of life. This section adds to the examination findings by providing indicators of subjective oral health in the First Nations population. It reports on First Nations' perceptions of how they are affected by oral disease, including the experience of toothache, the impact of oral disease on quality of life, and the hours/days of work or school lost due to dental problems. Parents, guardians or other primary caregivers of children aged 3–11 years responded on behalf of their children whereas adolescents and adults responded for themselves.

As seen in Table 2, 78.5% of children (ages 3–11) and 60.1% of adolescents and adults reported that their oral health was good, very good or excellent. At the other end of the scale, 21.5% of children and 39.9% of adolescents and adults stated that their oral health was fair or poor. In view of that, 27.6% of children and 44.1% of adolescents and adults rated their satisfaction with their mouth appearance as "indifferent", "dissatisfied" or "very dissatisfied". Approximately 35% of children and 48.6% of adolescents and adults responded that they had found it uncomfortable to eat any food in the past 12 months because of problems with their mouth. 29.3% of child respondents and 39.7% of adolescent and adult respondents reported avoiding foods because of problems with their mouth in the past 12 months. The prevalence of ongoing or persistent pain in the mouth, reported as often or sometimes in the last 12 months, was higher in adolescents and adults (33.4%) than in children (20.4%).

Illness of any kind can have an indirect cost to society, most often in the form of time lost to individuals who miss either work or school to seek care. Approximately one in five children (21.3%) reported time-lost from school or from normal activities in the past 12 months for oral health reasons (Table 2). The mean number of days taken off per child per year was 1.7 for dental treatment outside the community and the mean number of hours for treatment in the community was 2.07. Less than one in five adolescents and adults (17.9%) reported having lost time from work or activities in the past 12 months because of check-ups, dental problems or treatment, with a mean of 2.96 days lost due to dental treatment outside the community and 3.92 hours lost to treatment in the community.

Oral Health Symptoms

Tooth, mouth, jaw and facial pain can have many causes, including dentine sensitivity to hot or cold foods or drinks, pain resulting from trauma, fractured or decayed teeth, infections, periodontal diseases and temporomandibular joint disorders (TMD). In the FNOHS, recent episodes of oral health symptoms, such as toothache experience in the past month, were assessed in the interviews with each adolescent and adult respondent or with the child's primary caregiver. Among all children aged 3–11, the majority had not experienced any orofacial pain (pain in the mouth, jaws or face) in the last four weeks (Table 3). The most frequently reported

oral symptom among children was dental pain when consuming hot or cold food or drinks (14.8%), as perceived by their parents/guardians. However, the parents/guardians of those aged 3–11 were more likely to report that their child experienced chronic bad breath (23.6%) and/or bleeding gums when brushing their teeth (14.8%). Adolescents and adults tended to report more oral symptoms in the past month than children. Nearly thirty percent (29.6%) reported experiencing toothache when consuming hot or cold foods or drinks in the previous four weeks and 11.9% experienced a spontaneous and severe tooth or mouth pain at night. About one-third of adolescents and adults (34%) complained of bleeding gums when brushing their teeth, 21.1% had chronic bad breath and 19.3% experienced chronic dry mouth.

Preventive Oral Health Care Behaviours

Two factors have been repeatedly shown to protect populations from dental caries and periodontal diseases: toothbrushing using fluoridated toothpaste and the regular use of oral health care services. The Canadian Dental Association recommends that adults and children brush their teeth twice a day with fluoride toothpaste and that they go for a dental exam every six months to a year, or more often, depending on an individual's oral health needs. The goal of regular dental visits is to catch problems early and to prevent new disease from occurring by educating patients on how best to take care of their teeth and gums.

Just over half of children (52.2%), adolescents and adults (54.7%) reported brushing their teeth or dentures twice a day or more frequently (Table 4). Lower percentages of dentate First Nations reported flossing their teeth at least five times a week; 19.6% of children flossed that frequently, compared to 25.0% of adolescents and adults. Approximately three in four children (73.0%) aged 3–11 years reported visiting a dental professional for check-ups or treatment once a year or more than once a year, compared to 59.9% of adolescents and adults. Approximately one in three First Nations adolescents and adults (32.3%) reported seeing a dentist only for emergency care. More details on the frequency of dental visits are provided in the next section.

Access to Dental Care

Access to dental care among First Nations focused on the time since the last dental visit and on the usual pattern of visits to a dentist, *i.e.*, for check-ups and treatment or for emergency care. In addition, adult and youth participants were asked to describe their experience with geographic, financial and/or other barriers to obtaining dental care while primary caregivers provided answers to these questions for child respondents.

Over half (56.8%) of First Nations adults aged 20 years and over reported they had visited a dental professional within the last year (Table 5). Young children aged 3–5 tended to have the highest rate of visits within the last year (78.5%), followed by children aged 6–11 (70.1%), then adolescents aged 12–19 (69.9%), young adults aged 20–39 (65.4%) and finally adults aged 40 years and older who had the lowest rate (46.8%). Nearly 15% of adults older than 39 years had seen a dentist five years ago or more. Of all the adult participants, 21.7% reported that they visited a dental provider for care between one and two years prior, showing that 78.5% of First Nations adults had had a dental visit for any reason within a two-year period.

Geography can limit access to dental care for many First Nations and can adversely influence the possibility of obtaining comprehensive and timely care. In the FNOHS a higher percentage of children (46.1%) who lived in urban (includes rural, non-remote communities) usually saw a dental professional more than once a year for check-ups or treatment as compared to 29.9% of those who lived in remote communities (Table 6). Similarly, 35.0% of adolescents and adults living in urban areas reported they usually visited a dentist more than once a year for preventive care or for regular treatment compared to 22.8% of those living in remote First Nations communities. However, an unanticipated trend was observed with higher percentages of First Nations of all ages living in remote communities reporting they visited a dentist about once a year for check-ups or treatment. Also contrary to expectations, 36.6% of adolescents and adults from urban communities reported visiting for emergency dental care only as compared to 13.4% of those living in remote First Nations communities.

The cost of dental care may also reduce the likelihood of dental visitation. In the FNOHS, participants were asked two questions about financial barriers to oral health care access: "In the past 12 months, have you/your child avoided going to a dental professional because of the cost of dental care?" and "In the past 12 months, have you avoided having all the dental treatment that was recommended to you/your child because of the cost?". Avoiding or delaying care due to costs is considered a barrier prior to seeking care, whereas foregoing treatment due to cost represents a barrier to the receipt of any recommended treatment. Just 2.0% of children and 5.8% of adolescents and adults said they avoided going to a dental professional because of the costs involved and 2.1% of children and 5.4% of adolescents and adults said they declined recommended care because of the cost (Table 7). By and large, the majority of respondents reported having a government program for First Nations that covered all or part of their dental expenses (the NIHB Program) which might explain why the cost of dental visits and treatment was not perceived as a barrier to care. Dental services were usually provided off-reserve, most likely by dentists enrolled with the NIHB Program who billed the government directly. That said, a small percentage of respondents – 4.9% of children and 9.0% of adolescents and adults – reported that they had been asked by their regular dental provider to pay out-of-pocket for their dental care. However, this did not include those who choose to pay upfront and then seek reimbursement from the NIHB Program after treatment was received. An additional 4.4% of parents/primary caregivers and 4.2% of adolescents and adults had been asked to pay for their child's, or their own, dental services when they were referred to a dental specialist by their regular dental provider. When the request for out-of-pocket payment for specialist dental services was made, it had happened only one time among approximately two-thirds of the respondents and in most instances payment was asked for before treatment was initiated.

The reasons why people do not visit a dental professional each year provides insight into the barriers faced in accessing services. Among children who had not visited a dental professional in the last year, 64.2% of parents/primary caregivers reported that this was because they had "no access to dental care", and 40.4% reported that this was because their child had "no need for care" (Table 8). Among adolescents and adults, 39.0% reported a lack of access to dental care, 29.9% did not feel a need for care, 9.5% were afraid of the dentist and/or had a past traumatic experience during dental treatment, 5.6% wanted to avoid a potentially painful experience and 5.0% did not attend due to cost. A further 12.1% of adolescents and adults reported "other" reasons for not visiting a dental professional in the last year. These included, but were not limited

to: long waiting lists, lack of transportation, unsure of costs, “don’t like the way natives are treated”, “full dentures”, “pregnant”, and “file was closed because of missed appointments”.

Table 9 provides the reasons why First Nations aged 12 years and older had not been to a dental professional in the past two years. Only a very small number of children ages 3–11 had not visited a dentist within the last two years, and therefore their responses could not be reported. Sixty percent of respondents reported that dental services were “not available at all in their community” and 9.4% said that dental care was “not available at the time required”, 37.7% had not gotten around to booking a dental appointment, 18.2% did not think dental care was necessary, 19.3% had personal or family responsibilities and approximately 11% reported fear (e.g., painful, embarrassing, finding something wrong) and cost as reasons for not visiting in the past two years. All other responses amounted to a relative frequency of less than 10%.

Table 10 provides information on the problems First Nations aged 12 years and over faced when accessing dental care services among those who had not been to a dental professional in the last three years or more. Nearly 60% reported that dental services were not available in their community and 16.3% said that the services were not available at the time they were requested or needed, 18.3% complained of the long waiting lists for dental care, and less than 6% gave other reasons (see Table 9). It should be noted that 17.8% reported no problems accessing dental care services.

Because dental care in many of the geographically remote and isolated First Nations communities is obtained through visiting dental providers who travel, from time-to-time, to these communities, access to oral health care can be compromised. Figure 1 shows the relative frequency of problems accessing dental care services by participants aged 12 and over, among those who had not been to a dental professional in the last three years or more, according to the remoteness of the community they lived in. The most obvious finding was that 45.7% of First Nations living in remote communities could not afford transportation costs to access dental services as compared to no respondents facing this barrier among those living in non-remote/urban communities.

Perceived Need and Access to Orthodontic Care

The FNOHS was interested in finding out about access to orthodontic care through the NIHB Program that covers cases of severe and functionally handicapping malocclusion. This benefit category is subject to many appeals stemming from unsuccessful requests for coverage of orthodontic treatment among First Nations people. For children aged 3–11 years just under 24% of their parents/primary caregivers considered their child needed orthodontic care (*i.e.*, braces, retainer), and approximately 15% of adolescents and adults perceived themselves to be in need of orthodontic care (Table 11). Those who perceived a need for orthodontic care were asked if the care was obtained. Most of the children (93.5%) did not receive orthodontic services which was an expected finding, as orthodontic treatment is usually initiated between ages 11 to 13. Of those aged 12 years and older, nearly three-quarters (73.6%) did not receive orthodontic care though they perceived a need for care.

Reasons reported by parents/caregivers for their children not receiving orthodontic care can be summarised in the following statements: “still too young for braces”, “services are not available in the community”, “the cost is an issue”, and “too far to travel” (Table 11). Among adolescents and adults, one-quarter of the cases of malocclusion did not meet NIHB criteria and 17.3% were denied costs, 22.9% did not want the service and 34.7% provided other reasons for not receiving orthodontic care that can be summarised by these following statements: “can’t afford the cost of the braces”, “dentist did not think it was needed”, “need other dental work done first”, “dentist said I was too old for braces”, “never been referred to a specialist”, “not certain about how to access orthodontic care services”, and “too costly to get to the out of town appointments”. Hardly anyone who was denied access to orthodontic treatment through the NIHB Program appealed the denial. When asked whether the lack of orthodontic care impacted on their self-esteem or mental health, 33.8% of adolescents and adults replied in the affirmative.

CLINICAL EXAMINATION FINDINGS

Coronal Caries

Children Aged 3–5 Years

Among preschool children aged 3–5 years, the majority, 85.9%, had experienced one or more cavities in their primary (baby) teeth at the time of the survey (Table 12). Just over 61% of these children had untreated tooth decay in their primary teeth. On average, children in this age group experienced 7.62 decayed, missing, or filled deciduous (baby) teeth (dmft). As an indicator of the effectiveness of the dental care delivery system in treating early childhood caries, 45.5% of the dmft had been filled and 35.2% were still decayed, while the remaining, approximately 19.3%, had been extracted. A total of 22.5% of preschool children had one or more amalgam fillings and the average number of tooth surfaces with amalgam restorations was 0.79 per child.

Some of the results in Table 12 are repeated in Table 13, with the focus of Table 13 on the characteristics believed to influence the prevalence and severity of dental caries in primary teeth of preschool-age First Nations children. Focusing on absolute differences of 25% or more, children from families with household incomes less than $20,000 per year had higher caries prevalence (98.6%), compared with preschoolers from families making more than $20,000 per year (69.5%). Similarly, severity tended to be 4.5 teeth higher in children from families with household incomes less than $20,000 per year (9.87 dmft) when compared to those from higher income families (5.38 dmft). Males had a mean dmft of 8.57, approximately 2.1 teeth more than females (6.49). Children who visited a dental professional in the last year and those whose primary caregiver had more than a high school education had approximately two teeth more with restorations (4.72 ft and 5.00 ft, respectively) than those who have not seen a dental care provider in the previous year (2.72 ft), or whose parent/caregiver had a high school education or less (3.09 ft).

Children Aged 6–11 Years

Children aged 6–11 have a mixture of primary/deciduous (baby) and permanent (adult) teeth. This dentition containing both primary and permanent teeth is known as the mixed-dentition and

is also called a transitional dentition. It usually occurs between 6 and 13 years of age. As permanent teeth erupt they replace the deciduous teeth resulting, by age 14, in the new permanent-tooth dentition. The caries experience in this age group was also very high, with 80.4% having at least one decayed, missing or filled primary tooth (dmft greater than zero), 67.1% having a DMFT score greater than zero and, combining the children's experience of dental caries on both primary and permanent teeth, the caries prevalence reached a level as high as 93.9% (Table 14).

The mean total count of the primary and permanent teeth decayed, missing or filled was 5.28 dmft and 1.87 DMFT, respectively (Table 14). The mean dmft *plus* DMFT was 6.58, of which 63.8% (4.20 ft+FT) were filled and 16.7% (1.10 dt+DT) were decayed (untreated); 19.5% (1.28 mt+MT) had been extracted. Amalgam restorations were present in 34.6% of children 6–11 years old and the mean amalgam count was 1.60 tooth surfaces filled per child.

The prevalence and severity scores for primary and permanent teeth among 6 year-olds are shown in the footnote of Table 14. 92.4% of 6 year-olds had one or more dmft *plus* DMFT, with a mean severity score of 7.79 dmft *plus* DMFT.

The results of children's (aged 6–11) experience of dental caries on deciduous, permanent teeth, and on both deciduous and permanent teeth are presented in Tables 15–17 according to the categories of factors influencing specific oral health measures. Caries on both deciduous and permanent teeth was found to be extremely prevalent among this age group, regardless of the risk determinant (Table 17). Caries severity on both deciduous and permanent teeth (mean dmft+DMFT), on the other hand, appeared somewhat higher among males than females (7.99 vs. 5.82), among children from families with lower household incomes versus higher incomes (8.29 vs. 5.06), and among those who had not visited a dental professional in the past year compared to those who had visited in the past year (8.33 vs. 6.00) (see Table 17). A trend for lower counts of untreated caries and missing/extracted teeth were observed among those who had received dental care within the last year.

Adolescents

Where adolescents are concerned, epidemiologic studies include only the permanent teeth, as most of the deciduous teeth have, by this point, been replaced. Nearly all (91.4%) adolescents, aged 12–19, had experienced coronal caries in one or more permanent teeth (Table 19). The mean DMFT was 6.15 teeth, of which 22.9% (1.41 DT) were decayed, only 4.4% (0.27 MT) were missing and the majority, 72.7% (4.47 FT), were filled. Despite a high percentage of treatment, nearly half of adolescents (46.4%) had untreated tooth decay on an average of 3.04 teeth. Just over half (52.2%) had at least one amalgam filling and the average number of surfaces with amalgam restorations was 4.11.

The footnote accompanying Table 19 shows a prevalence of caries among 12 year-olds of 82.2% and a mean DMFT at age 12 of 3.88. In addition, 31.4% of 12 year-olds had untreated tooth decay in their permanent teeth.

Among adolescents aged 12–17 years, 88.9% had experienced decay in one or more permanent teeth (Table 20). 99.2% of adolescent females and 83.6% of males had one or more DMFT at the examination and females had, on average, 1.93 more DMFT than males (6.40 versus 4.47). Examiners found that 86.2% of adolescents in this age group who resided in non-remote rural/urban communities had experienced caries and had a mean DMFT of 4.58 teeth affected, compared to 100% of adolescents living in remote communities who had a DMFT of 8.05, largely due to a higher filled component of the DMFT index (mean FT = 6.16). Additionally, a trend was noted for adolescents who smoked to have about one more decayed tooth, hence a higher total DMFT score, than adolescent non-smokers. A slight trend for a lower DMFT score was also observed favouring adolescents whose mothers had higher education.

Adults

Almost 100% of dentate adults aged 20 years and over had caries experience (DMFT > 0), with little difference between those aged 20–39 years (99.8%) and those aged 40 years and over (100.0%) (Table 24). Severity scores (mean DMFT) increased with age, from 11.76 in 20–39 year-olds to 16.15 in those aged 40 years or older, largely due to an increase in the number of extractions (mean MT at age 20–39 was 1.82 versus 7.44 at age 40 and over). For adults overall, the mean DMFT was 13.72, of which 13.3% was untreated decay (1.83 DT), 31.6% were extracted (4.33 MT), and 55.1% were filled teeth (7.56 FT). More than half of the dentate adults, 56.5%, had one or more teeth with untreated decay (DT > 0) with the average being 3.24 teeth affected. Approximately 87% had one or more teeth restored with amalgam and the average number of amalgam fillings in this sub-group was 8.9.

Caries experience among dentate adults aged 18 years and over was almost ubiquitous (Table 25). The severity of caries, as expressed by the mean DMFT, was 13.41. The mean DMFT estimate tended to be lower for the younger age cohort of 18–39 year-olds (11.46) than the 40 and older age cohort (16.15) and was higher among those living in remote communities (15.26) than those in non-remote rural/urban communities (13.00). Adults with more than a high school education had the lowest mean number of decayed teeth (0.63) and the highest mean number of filled teeth (9.99) relative to the overall averages (1.82 DT and 7.53 FT). Being older and not visiting a dentist in the past year tended to be linked with higher counts of missing teeth.

Dental Sealants

Children Aged 6–11 Years

Among children aged 6–11 years, 21.2% had one or more surfaces sealed on their permanent molar teeth and the mean count was 2.15 teeth (out of 4 first molars) among those with at least one sealed tooth (Table 14). As shown in Table 18, sealant applications in this age group were somewhat more common for females (25.9%), children who had seen a dental professional in the last year (30.6%), and those whose parent/caregiver had higher education (39.4%).

Adolescents

Sealants were found in 27.4% of adolescents aged 12–19 (Table 19) and 28.2% of those aged 12–17 (Table 21). The mean number of sealants was 3.06 in 12–19 year-olds (Table 19) and 3.07 in 12–17 year-olds (Table 21). This means that an average of 3 out of 8 permanent molars received the protective effects of sealant applications.

Sealant use among adolescents (ages 12–17) was more common among males (45.9%), recent dental visitors (34.5%) and non-smokers (37.6%), and least common among those whose mother had more than a high school education (13.0%), although this last result seems anomalous (Table 21). While the average number of sealants among those with at least one sealed tooth was approximately 3, adolescents living in remote First Nations communities had the lowest mean number of sealed teeth at 1.36.

Edentulism and Retention of Natural Teeth

Complete tooth loss (edentulism) is an indicator of impaired dental function and is a consequence of extensive past disease experience or a surgical approach to treatment. Edentulism is also the result of a lack of access to quality care or the provision of care in a timely manner. One in three (32.6%) First Nations adults aged 60 years and over had lost all of their natural teeth and nearly 46% had teeth only in the mandible (Table 22). The proportion of adults who were dentate in the maxilla only cannot, however, be published because the results were not sufficiently stable. Although edentulism was virtually non-existent among adults younger than 40 years of age (98.2% dentate), 8.8% of middle-aged adults (40–59 years) are edentulous.

As seen in the first column of Table 23, 8.9% of First Nations adults who visited a dental professional more than one year ago were edentulous compared to only 2.0% of those who had seen a dental professional in the last year. As dental health has improved and more teeth are retained, measures that describe the number of teeth present are increasingly used. For example, among the overall sample of dentate First Nations adults (93.7%), 21.7% had all 28 teeth[5] while 20.6% had fewer than 21 teeth. The retention of 21 or more natural teeth is generally used to define a minimum functional natural dentition. Conversely, having fewer than 21 teeth is indicative of a compromised dentition. Adult females, those aged 20–39 years or those who visited a dental professional in the previous year tended to have either a full complement of teeth or retained at least 21 teeth. In addition, level of education appears to have had an effect on the proportion of adults with a compromised natural dentition of fewer than 21 teeth with 22.5% of those with a high school education or less having a compromised dentition as compared to 9.7% of those with more than a high school education.

Another measure that is used to give an indication of the adequacy of oral function is the mean (average) number of natural teeth present. In the FNOHS, dentate adults had a mean of 23.5 natural teeth per person (Table 23). The mean number of natural teeth per person was higher in 20 to 39 year-olds (25.5) than in adults aged 40 years and older (20.5).

[5] Note that only 28 teeth were counted; third molars (wisdom teeth) were ignored in the examination.

Root Caries in Adults

Approximately 33% of dentate adults aged 20 years and over in the FNOHS had root caries (including untreated and restored lesions) (Table 26). Prevalence of root caries doubled with age: 22.3% among participants aged 20–39 years and 46.5% among those aged 40–59 years. Unfortunately, there were not enough numbers of dentate adults older than 59 years to produce reliable estimates. The prevalence of root caries (untreated and treated) for those 40 years of age and older was 46.2%. Nearly 24% of all adults had one or more untreated carious lesions on an average of 3.33 roots, with untreated root caries rates increasing with age: 18.3% among participants aged 20–39 years and 32.3% among those aged 40–59 years. The overall mean number of root decayed or filled teeth (RDFT) was low at approximately one tooth (1.10) and 71.8% of the index were composed of decayed root cavities (RDT = 0.79); only 28.2% (RFT = 0.31) of the index were root fillings.

As expected, the prevalence and severity of root caries among dentate First Nations adults older than 18 years (Table 27) were similar to those of adults 20 years and older (Table 26). Women older than 18 had a 9.7% lower prevalence of root decayed or filled teeth (27.4%) than men (37.1%) in the same age group. In addition to sex and age, the prevalence of root caries (untreated and treated) appeared to be influenced by the remoteness of the community, e.g., adults living in remote communities had 9.9% lower prevalence of root caries (23.9%) than residents of non-remote/urban communities (33.8%). The root decayed and filled numbers were so few that the results of the cross-tabulation of the mean RDFT index (and its components) with the determining characteristics did not yield values that can be readily interpreted.

Untreated Coronal and Root Caries in Adults

Table 28 provides more details on the burden of untreated dental caries among First Nations adults (ages 18+) for both coronal and root caries, separately. Over half (56.5%) of First Nations adults had untreated coronal caries and the prevalence of untreated coronal caries was 2.4-fold higher than that for untreated root caries (23.4%). Among those with one or more decayed teeth, there were 2.9-times more coronal cavities (9.51) than root cavities (3.23). For both untreated coronal and root caries, males tended to have a higher prevalence than females, and recent dental visitors tended to have a lower prevalence than those who made a dental visit more than one year prior to the survey. Older adults had a lower prevalence of untreated coronal caries but a higher prevalence of untreated root caries. The prevalence of untreated crowns and the prevalence and mean counts of untreated roots favoured adults with more than a high school education.

Periodontal Conditions

There were high prevalence rates of debris, calculus and gingivitis among dentate First Nations adults aged 20 and over (Table 29). Approximately 45% of adults examined had more than one-third of the crown of at least one of the 10 indicator teeth covered with debris or stain. Worst scores (2 or 3) for calculus were found among 44.7% of First Nations adults, while a similar proportion of adults (43.9%) presented with the highest scores for gingivitis (2 or 3). On the other hand, the prevalence of periodontitis was concentrated in a limited number of adults.

Indeed, 23.0% of those examined had at least one tooth with a periodontal pocket depth greater than or equal to 4 mm and only 16.8% had attachment loss of 4 mm or more in at least one tooth.

Poor general health can play a critical role in the onset and progression of periodontal disease. For example, people with diabetes are more likely to have periodontal disease than people without diabetes. In fact, periodontal disease is often considered a complication of diabetes. In turn, periodontal disease can affect the control of diabetes by increasing blood sugar levels which leads to diabetic complications. The 2002–03 First Nations Regional Longitudinal Health Survey (RHS) documented high rates of diabetes in First Nations communities that were well above the national average (First Nations Information Governance Committee, 2007e). In the FNOHS, 15.9% of First Nations adults 18 years and older had been diagnosed with diabetes (88.6% type 2; 11.1% type 1), with prevalence increasing with age (Table 30). The prevalence of diabetes was lowest among 18–39 year-olds (7.1%) and highest among those 40 years and older (26.8%).

Relative differences in prevalence of periodontal conditions associated with diabetic status were not formally tested, but tended to favour the non-diabetic group, except for attachment loss of 4 mm or more (Table 31). As indicated in Table 31, among adults 20 years and older, diabetics had 1.6 times the prevalence of an attachment loss of 4 mm or more in at least one of the indicator teeth when compared to those who did not suffer from diabetes (23.7% versus 15.0%).

Table 32 shows the distribution of debris scores and the percent with calculus scores of 2 or 3 among adults 18 and over by selected determinants of health. As the majority of participants had a very high prevalence of calculus, scores of 2 and 3 for calculus were combined and the information for calculus scores 0 and 1 were omitted. Males were twice as likely as females to have a debris score of 3 (13.2% versus 6.1%, respectively). Similarly for calculus, the percentages were 54.1% and 34.8%, for males and females, respectively. Somewhat higher proportions of the older age group (40 years and older) and those with more than a high school education had no soft debris or staining (debris score of 0). Worst scores (2 or 3) for calculus tended to be found among those aged 40 and older, those who had not visited a dental professional in the last year and those with less than a high school education.

Only 10.8% of males, but 21.8% of females, had a normal gingiva, with more than half (52.3%) of the examined males and 38.9% of the females having gingival bleeding (GI scores 2 or 3) on at least one site (Table 33). Scores of 2 and 3 were again combined since the number of individuals scoring 3 was too low to report. Those with high school education or less (48.2%) had greater occurrence of gingivitis scores of 2 or 3 than those with a high school education or more (29.4%). Thus those having more than a high school education and not smoking showed fewer signs of gingivitis (GI score 0).

The findings on the distribution of dentate participants according to their worst (deepest) probing score, ranging from 0–1 mm to 6 mm or more, indicate that 77.5% of First Nations adults had their worst probing depth as 3 mm or less (Table 34). The prevalence of moderate disease (at least one pocket of 4 or 5 mm) was found among 18.0% of the population and only 4.4% have, or had, severe disease based on a worst score of 6 mm or greater. There was a tendency for more males, older adults and infrequent dental attendees to have deeper pocketing. These were also the groups showing higher mean pocket depths among those with at least one site with a pocket of 4

mm or more. The overall mean pocket depth for this sub-group was 4.74 mm; 4.92 for males and 4.53 for females.

The findings on the distribution of the adult First Nations population according to the worst (greatest) loss of attachment (LOA) reveal that 83.9% had good periodontal health (LOA = 0–3 mm), 10.8% had a moderate level of disease (LOA = 4–5 mm) and 5.3% have, or had, severe periodontal disease (LOA ≥ 6 mm) (Table 35). Severe disease tended to be more prevalent among males (7.1%) compared to females (3.9%), older (10.9%) compared to younger (1.7%) and those who visited a dental professional more than one year previous (8.6%) compared to recent dental visitors (3.3%). In addition, study participants who lived in non-remote/urban communities (85.4%), compared to those living in remote communities (77.0%), tended to have good periodontal health (LOA = 0–3 mm). Finally, the mean loss of attachment (LOA) for those with at least 4 mm of attachment loss at one site was 5.23 mm, with the mean score lowest for those aged 18 to 39 (4.90 mm) and those with more than a high school education (4.77 mm).

Periodontal Treatment Needs

The Community Periodontal Index of Treatment Needs (CPITN), which evaluates a population's periodontal treatment needs, highlighted important findings in the FNOHS (Table 36). Of those surveyed, 37.2% of First Nations adolescents aged 15 to 19 years, 21.3% of adults aged 20 to 39 and 18.8% of those aged 40 years and over had no periodontal treatment needs. Only 13.5% of adolescents and 2.0% of young adults (ages 20–39) had at least one tooth with gingival bleeding as their worst condition (the percentage among those 40 and older could not be reported). The participants with gingivitis alone required only an oral hygiene (brushing and flossing) program to improve their condition. In contrast, roughly 49.3% of adolescents (ages 15 to 19), 73.5% of young adults and 59.4% of adults older than 40 years of age were classified in categories 2 or 3, meaning that they presented with supra- or sub-gingival calculus and other plaque retentive factors or a periodontal pocket of 4 or 5 mm, or both, on at least one tooth, as their worst conditions (they could also have gingivitis). These individuals required treatment consisting of oral hygiene instruction and scaling. Finally, no adolescents, 2.9% of young adults and 5.6% of 40 year-olds and older had at least one tooth with a 6 mm or deeper periodontal pocket, representing about 1 person out of 20 with a periodontal lesion requiring complex treatment.

By subtracting the percentages in the column titled‘0: Healthy' from 100 in Table 37, the prevalence of any periodontal treatment need can be computed. The prevalence of periodontal care needs tended to be higher among males (85.8%) than females (73.9%), those with a high school education or less (82.7%) compared to those who had more than a high school education (65%) and those living in remote First Nations communities (83.5%) compared to those living in non-remote rural/urban communities (76.9%).

Incisor Trauma

Table 38 shows the findings on the prevalence of dental trauma in the eight anterior incisor (front) teeth of the child, adolescent and adult dentate population in the FNOHS. Overall, 25.9% of dentate adults and 6.9% of adolescents had one or more lost or traumatized anterior teeth with a mean of 2.16 and 1.42 teeth affected, respectively. Most had signs of fractured teeth as opposed

to teeth lost due to trauma. Evidence of avulsed teeth (tooth loss due to trauma) was found among 8.0% of adults on an average of two incisors, while the majority (22.7%) presented with evidence of incisor fractures on fewer than two teeth (1.82). Very few adolescents had lost a permanent tooth because of trauma to merit reporting and only 3.9% experienced fractures with a mean of 1.71 teeth affected. So few teeth among children had evidence of previous trauma (lost or fractured) on their incisor teeth that neither the prevalence nor the mean number of teeth lost can be reported.

Not reported in any table is the prevalence of trauma on individual teeth. Dental trauma was more than 5.3 times more prevalent on maxillary (21.9%) than on mandibular incisors (4.1%). In all the age groups, the teeth most likely to be affected were the maxillary central incisors.

Trauma prevalence (teeth lost or traumatized) in adults aged 18 and over tended to be higher in males (30.0%) than in females (21.9%); higher in adults with a high school education or less (28.3%) than those with more than high school education (15.2%) and; higher in smokers (29.9%) than in non-smokers (18.3%) (Table 39). The mean estimates by determining characteristics ranged from 1.61 to 2.44 lost or traumatized teeth, among those with at least one tooth affected.

Dental Fluorosis

Dental fluorosis is a condition caused by the ingestion, through food or drink, of too much fluoride during early tooth development, *i.e.*, under the age of eight. In its mildest form, fluorosis may affect the look of a tooth, but will not affect its function. For example, mild fluorosis can lead to white stains on the teeth that are barely noticeable. Moderate fluorosis is the point at which a person could notice visible changes of a cosmetic concern on the surface of the tooth. Severe fluorosis, caused by excessive intake of fluoride, can be painful, cause ugly brown stains with pitting and flaking of friable enamel that can lead to problems with chewing.

Among First Nations children aged 6–11, 61.9% were unaffected by dental fluorosis (Table 40). The severity of fluorosis was low, with 6.6% classified as having ‘questionable’ dental fluorosis, 7.3% with ‘very mild’ and 7.4% having ‘mild’ fluorosis. The prevalence of a ‘moderate’ degree of severity, according to Dean’s Index, was too low (less than 0.1%) to merit reporting. No children exhibited signs of ‘severe’ dental fluorosis and the remaining 16.7% of children in this age group had all four maxillary anterior teeth absent.

If Dean’s ‘questionable’ category is included in the computation of the prevalence of dental fluorosis, then about one in four First Nations children aged 6–11 (25.7%) can be classified as having a mild form of the condition (because the cosmetically important scores of moderate or severe were virtually non-existent in this child population) (Table 41). Although a tendency toward a higher prevalence of dental fluorosis was noted in girls (27.5% vs. 23.2%), the child’s sex was unlikely to be significantly associated with the prevalence of fluorosis. A low household income of less than $20,000 per year, visiting a dental professional more than one year ago, parent/caregiver’s education level of high school or less and living in a non-remote rural or in an urban community tended to be determining characteristics for higher prevalences of fluorosis.

Orthodontic Conditions and Treatment Status

The prevalence of malocclusion, or the proportion of participants who were judged to have less than acceptable occlusion, was found among 30.3% of dentate First Nations aged of 12 years and over (Table 42). The most common malocclusion conditions in the population were severe crowding (14.9%) and crossbites, both anterior (9.6%) and posterior (6.9%). The other types of malocclusion had prevalences less than 4%.

A negligible proportion of First Nations older than 12 (1.4%) were receiving orthodontic treatment at the time of the survey (Table 42). Less than 1.0% (0.7%) had fixed appliances. The rest of the data on the type of care cannot be reported. The examiners found that 8.7% of First Nations had received orthodontic treatment prior to the survey.

When analyses were limited to those between the ages of 12 and 59 years, there was a noticeable decrease in the prevalence of less than acceptable occlusion with age; nearly half of adolescents aged 12–17 were judged to have deviations from the ideal occlusion (48.1%), followed by young adults aged 18–39 (31.2%) and adults aged 40–59 (15.4%) (Table 43). Among adolescents, malocclusion is more prevalent among smokers (47.7%) than non-smokers (37.5%) and appears to be strongly influenced by maternal level of education. Among young adults aged 18–39, males and those living in remote communities had the highest prevalence estimates of malocclusion, whereas the highest prevalence in adults aged 40–59 was found among those with more than a high school education. Overall, there was a strong trend for less than acceptable occlusion for those living in remote communities (32.7%), compared to those in non-remote or urban communities (24.1%).

Orthodontic treatment currently, or in the past, was observed more frequently among young adults (ages 18–39) with higher incomes and education, who visited a dental professional in the previous year, or who lived in non-remote/urban communities, although the results are unlikely to be statistically significant (Table 44). Only 3.5% of adolescents (ages 12–17) and 3.4% of adults (ages 40 or older) had received, or were receiving, orthodontic treatment. None of the other determinants used in this report appear to significantly influence the receipt of orthodontic care among adolescents aged 12–17 and adults 40 years of age or older. Had the sample been larger, perhaps having more than a high school education would surface as a determinant of access to orthodontic treatment among adults.

Oral Mucosal Lesions

Oral mucosal lesions were found among 15.3% of First Nations aged 12 years and over (Table 45). Denture stomatitis was the most common condition, found among 29.0% of the population. Other conditions, in descending order of prevalence, were: sinus or fistula (15.0%), traumatic or unspecified ulcer (13.6%), mucosal white patches (11.0%) and angular cheilitis (2.2%). Those categorised as ‘other’ included two fibromas (one occurred on the tongue), but the majority of the findings for ‘other’ were missing data.

Of the 11.0% with white mucosal lesions, the vast majority of the lesions were leukoplakia (93.8%), and 6.2% were candidiasis (Table 45). Leukoplakia is the most frequent type of oral

precancerous lesion and appears in the oral cavity as a white patch that cannot be rubbed off, typically in the oral mucosa, lateral borders of the tongue and floor of the mouth. A prevalence of leukoplakia of 10.3% among those First Nations 12 years or older is considered to be high. Leukoplakia apparently occurs with population prevalences among adults (15 years or older) ranging from 1.1% to 3.6% (Petersen *et al.*, 2005).

Table 46 presents and compares lesion prevalence by various determinants among First Nations adults aged 18 years and over. Females had higher prevalences of angular cheilitis and denture stomatitis, but lower prevalences of mucosal white patches and sinus or fistulas than males. Stomatitis, hyperplasia, ulcers, inflammation and angular cheilitis are denture-related lesions, which may explain why females were more likely to be afflicted with some of these conditions. A high percentage (38.4%) of adults aged 40 years and over had denture stomatitis and 16.3% had angular cheilitis. Denture stomatitis was also more common among the lower (28.4%) as compared to the higher income group (19.1%), among those who had not received (32.0%) as compared to those who had received professional care in the last year (26.6%), those living in remote (37.5%) as compared to non-remote/urban communities (29.4%), and those with more than a high school education (45.9%) as compared to those with a high school education or less (26.1%), though the latter comparison seems anomalous. Mucosal white patches were found among 15.6% of adults who currently smoke. In general, lesion prevalences differed by sex, age, household income, dental visiting behaviour, level of education, remoteness of community, and smoking status, but due to extreme sampling variability or small sample size, formal statistical inference could not be performed.

Prosthetic Status

Removable dentures, also called ‘false teeth’ are worn to replace missing teeth, with the objective of improving oral function, such as eating and speaking, or improving appearance. Partially dentate people may wear a removable denture to replace one or more teeth, or wear a complete/full denture if they had all of their teeth extracted from one of their jaws. One, or a few teeth can be replaced with a ‘bridge’ that is fixed to adjacent natural teeth, or implants that are surgically inserted into the jaw.

Denture-wearing (fixed or removable) among the dentate was most common on the maxillary arch, with 6.2% wearing a chrome partial denture, 5.4% wearing an acrylic full denture, and 2.9% an acrylic partial denture, compared to 3.3% wearing a chrome partial denture in the mandible (Table 47). The examiners found implants in only 1.8% of dentate First Nations and all the implants were located in the maxilla.

Generally, the determinants reveal few differences in the percent of dentate adults wearing dentures or fixed bridges (Table 48), though the percent wearing maxillary dentures/fixed bridges appears more common among those aged 40 years and older than those aged 18–39 years (12.3% vs. 2.6%, respectively). This finding is consistent with the fact that older adults have fewer numbers of teeth, particularly in the maxilla (see Table 22).

Denture wearing by completely edentulous First Nations adults was more common on the upper arch (upper jaw) than on the lower (93.3% vs. 65.1%, respectively); of those, 6.7% were not wearing a maxillary denture at the time of the examination as compared to 34.9% not wearing a mandibular denture (Table 49). Moreover, a huge disparity was observed in denture use by edentulous adults when the FNOHS and CHMS results are compared. The FNOHS revealed that 65.1% of the edentulous First Nations wear both maxillary and mandibular dentures as compared to 93.2% of non-Aboriginal edentulous adults in the CHMS (Health Canada, 2010).

The greatest differences in the proportion wearing dentures occurred between the household income groups, with denture wearing highest (85.5%) for those with higher incomes compared to 58.3% among those with lower incomes (Table 50). At the same time, a higher proportion of edentulous adults who never smoked (82.7%) wore dentures compared to smokers (50.8%).

Prosthetic Treatment Needs

The FNOHS dental examinations recorded the prosthetic treatment needs of both dentate and edentulous adults aged 20 years and over. Approximately 67.0% and 71.2% of dentate adults had no prosthetic needs in the upper and lower arches, respectively (Table 51); 24.0% were clinically judged as needing a new partial denture in the upper arch and 24.8% needed one in the lower arch. All of the other types of prosthetic treatments were not sufficiently numerous and were required by less than 5% of the dentate adults, except for 5.5% of those who required a new full denture in the maxilla.

Among edentulous adults, 61.2% required no prosthodontic care for the maxilla while 39.3% required no care for the mandible (Table 52). The prosthetic treatment options for the edentulous participants were relatively limited, including either a new full denture or denture repair or relining. Thirty percent of edentulous adults needed a new full denture in the maxilla and 37.8% needed a new full mandibular denture. Denture relining is a procedure that involves “shaving away” the underside of the denture and filling the space with acrylic, silicone or other materials, to assure a proper fit to the gums. Since the mouth and the dental ridges change or shrink over time, a denture reline is necessary to keep the denture fitting well and to prevent the dental ridges from resorbing more rapidly. 15.6% and 29.7% of edentulous adults were clinically judged as needing denture repair or reline for the upper and lower arches, respectively.

Dental Treatment Needs

Perceived Need for Dental Treatment

An individual’s perceived need for dental care is regarded as one of the primary reasons for visiting a dentist. Perceived need for different types of dental care gives an indication of the dental services that could be required by the target population. For these reasons perceived needs for dental care are often included in oral health surveys. However, it should be noted that clinically assessed or normative needs that are the result of a professional diagnosis are considered the gold standard. In the FNOHS participants were asked “What untreated condition(s) do you think you have?” at the beginning of the examination. The examiner

interpreted the examinee's answers and checked all the appropriate treatments from a list of 12 options. The treatment options were not mutually exclusive nor were they hierarchical.

Across all age groups the perceived need for any type of dental care increased from the lowest percentage in 6–11 year-old children (27.3%, or 100 minus 72.7% with no treatment needed) to the highest percentage in adults aged 20 years and over (53.2%) (Table 53). The types of perceived treatment needs varied across the age groups. For example, the highest percentage reporting a need for fillings was among adolescents (76.4%). Adolescents were also more likely to report a need for orthodontic treatment (31.7%), followed by 23.6% of children aged 6–11 and 4.9% of adults. One in four First Nations youth said they needed surgery and just over half (52.4%) perceived themselves to be in need of preventive care. Parents or caregivers of young children (ages 3–5) identified just two categories of need – prevention (15.6%) and restorations (67.7%). One in three First Nations adults perceived themselves to be in need of surgery (tooth extractions), 60.5% reported the need for tooth restorations, 31.1% reported needing preventive care and 15.4% felt they required partial or full dentures. Adults not only perceived more dental needs, they also reported a need for more specialized types of treatment such endodontics (root canal therapy), implants and treatment for temporomandibular joint disorders, as seen in Table 53. Interestingly, hardly anyone in the study population indicated they needed treatment purely for aesthetic purposes.

Clinically Assessed Dental Needs

Table 54 on clinically assessed dental treatment needs mirrors Table 53, except for prosthetic needs for dentate and edentulous adults which are reported in a separate section of this chapter. Perceived and clinically diagnosed (normative) assessments were compared for overall proportions. There was a wide discrepancy between the normative needs and the perceived needs of the individual in this population. Consistent across all age groups, a smaller proportion of those who were clinically assessed as needing treatment felt that they required it. In other words, participants severely under-reported their dental care needs, if the dental examination findings are used as the gold standard. A case in point is periodontics; 24.1% of adults were clinically judged as needing periodontal (gum) treatment (Table 54), whereas only 2.7% felt that they needed such care (Table 53). The same was true for all age groups and for most types of treatment, with a few exceptions such as orthodontic treatment needs, which tended to be over-reported by children (ages 6–11) and adolescents (ages 12–19), and the need for dental extractions, which also tended to be over-reported by adolescents and adults.

Table 55 shows the distribution of needs by selected characteristics for the dentate population aged 6 years and older. As shown, only 16.9% had no treatment needs identified at the examination. The percent with no treatment needs tended to be higher among the 12–17 age group, those who visited a dentist in the last year, those with higher education, those who lived in remote communities, and non-smokers.

Overall, 7.8% of those aged 6 years and older had at least one urgent condition, and the needs ranged from a collection of miscellaneous conditions (temporomandibular joint treatment, aesthetics, soft tissue) experienced by 4.0% of First Nations, to endodontics (6.3%), orthodontics (8.1), periodontics (17.0), surgery (22.7%), prosthodontics (26.6%), and restorations (70.0%)

(Table 55). However, the level of dental needs remained dependent on the age of the participant, in that adults required more prosthodontic, surgical, and periodontal services, while children and adolescents required more orthodontic treatment. Dental fillings were required by a large percentage of the population, regardless of the participant's age and there were no absolute differences by sex, income, education, or smoking status large enough to suggest any associations, except for recent dental care visits, which favoured those who visited a dental professional in the past year. Additionally, nearly 75% of First Nations living in remote communities had a need for restorations compared to 69% of those living in non-remote/urban communities. Surgical needs were most affected by the participant's level of income and education, and smoking status.

4. COMPARISONS WITH NATIONAL ORAL HEALTH SURVEYS AND KEY FINDINGS

The 2009–10 First Nations Oral Health Survey (FNOHS) aimed to describe levels of oral disease, using both self-reported and clinical measures, within a representative sample of First Nations living in remote and non-remote communities in Canada. A further aim of the survey was to evaluate differences in the oral health status of First Nations and non-First Nations Canadians. To this end, this chapter presents comparisons of the self-reported and clinical oral health outcomes of participants in the FNOHS with those of participants in the oral health component of the 2007–09 Canadian Health Measures Survey (CHMS) and the 2008–09 Inuit Oral Health Survey (IOHS). The results can be reliably compared because these three national surveys shared the same standardised protocol originally developed for the CHMS. However, often the comparisons presented in this chapter had to allow for the differing age groups examined. As stated before, the FNOHS and the IOHS included a 3–5 year-old age group, an age group that the CHMS did not target. The FNOHS and the IOHS also combined the findings for all participants over the age of 40 into one group whereas the CHMS reported separately on 40–59 year-olds and 60–79 year-olds. The smaller sample size of the FNOHS (1,188) compared to the CHMS (5,586) necessitated that age groups be further combined so as to make possible certain comparisons between those age groups. One additional caveat where the FNOHS is concerned is the lack of 95% confidence intervals for all point estimates due to the design effect, which is explained in Chapter 2 on Methodology. Thus, while we were able to examine the FNOHS findings in light of the results of these recent Canadian oral health surveys, conclusions about differences among the results of the three surveys must be approached with some caution.

SELF-REPORTED ORAL HEALTH OUTCOMES

More than two and a half times as many First Nations aged 12 years and older (39.9%) reported having fair/poor oral health as compared to non-Aboriginals aged 6–79 years (15.1%) in the CHMS, although this comparison should allow for the differing age groups. Similarly, more than three times as many First Nations (39.7%) reported avoiding particular foods in the past 12 months because of problems with their mouth compared to 11.9% of non-Aboriginal Canadians. In addition, 33.4% of First Nations experienced chronic pain in their mouth in the past 12 months compared to 11.1% of non-Aboriginal Canadians. These findings indicate that First Nations clearly have worse perceptions of their oral health and the avoidance of some foods and the problem of chronic pain suggest more impacts on their oral health-related quality of life than non-Aboriginal Canadians.

The presence of chronic dental pain and what appears to be poorer overall oral health among Canadian First Nations should translate into more dental sick-days, with the indirect costs of lost work or educational time shared by the individual and society. However, with rates of unemployment and school absenteeism already high in First Nations communities, the results of the FNOHS point to the fact that fewer First Nations reported spending time away from their work or school desks for dental check-ups or treatment than non-Aboriginals. Time lost from school, work or other normal activities for oral health reasons was reported by 17.9% of First Nations aged 12 years and over compared to 39.1% of non-Aboriginal Canadians aged 6–79 years. However, on average, 2.96 days per year were lost by First Nations due to dental treatment outside the community and 3.91 hours per year were lost to treatment in the community. The

3.91 hours per year clocked in the dental chair by First Nations was greater than the 3.55 hours per year lost due to oral disease and professional treatment among non-Aboriginal Canadians. This adds further support to findings, addressed in the next section, that First Nations are more likely to have problems accessing care, and when they receive care, the treatment required takes longer and is more complex.

Where day-to-day preventive oral health care practices are concerned, lower proportions of First Nations children (52.2%) and adolescents and adults (54.7%) compared to 73.2% of the CHMS population claimed to brush their teeth at least twice a day. Slightly lower percentages of dentate First Nations children (19.6%) and adolescents and adults (25.0%) claimed to floss at least five times per week when compared to other Canadians (28.3%). Other preventive oral health care behaviours that can be compared with the CHMS results include using oral health services for routine check-ups, rather than visiting only when dental problems arise. Approximately three-quarters of First Nations children reported usually using oral health services at least once per year for check-ups or treatment compared to 91.3% of non-Aboriginal Canadian children. While this figure is troubling enough, the FNOHS revealed that 40% of First Nations adolescents and adults do not see a dentist at least once a year. The next section presents more detailed comparisons between First Nations, Inuit and non-Aboriginals in Canada on the frequency of dental visits and access to dental care.

Access to Dental Care

In this report, and in the CHMS and IOHS studies, visiting a dental professional within the last year is used as one of the indicators of access to dental care, for children, adolescents and adults. Table 4.1 provides the age-specific comparisons by these three most recent Canadian oral health surveys. Higher proportions of non-Aboriginal and Aboriginal Canadians living off reserve reported having visited a dentist in the last year compared to those First Nations surveyed in the FNOHS for the age groups 6–11, 12–19 and 40 and older. The sole exception was found for the 20–39 year olds, for whom rates of dental visits were comparable; 65.4% First Nations and 67.7% non-Aboriginals. The most striking absolute difference was among the 40-plus age cohort of First Nations. Just under one-half (46.8%) of First Nations adults aged 40 years and older visited a dental care provider in the last year; approximately three-quarters (76.5%) of non-Aboriginal Canadians and 83.4% of Aboriginals living off reserve (ages 40–59) made such a visit. Even among the oldest age cohort (those aged 60–79 years), about 20% more non-Aboriginal Canadians (68.2%) reported having visited a dental provider in the last year than did First Nations.

While the First Nations figures on dental visitation lag behind those of the general Canadian population, they are generally much better than those of the Canadian Inuit. Table 4.1 indicates that the percentages of First Nations who reported seeing a dental professional in the last year are higher for all age groups, with the greatest difference found between First Nations and Inuit preschool-aged children. About 31% more parents/caregivers of 3- to 5-year-old First Nations (78.5%) reported their child made a dental visit in the previous year than did those of Inuit preschoolers (47.7% “E”).

Consistent with the finding that the vast majority of First Nations reported having access to the NIHB Program that covered their dental expenses, only a small minority of 2.0% of children and 5.8% of adolescents and adults in the FNOHS reported they avoided visiting a dental professional because of the costs involved. Similarly, equally small proportions of First Nations children (2.1%) and adolescents and adults (5.4%) reported declining recommended dental care because of the cost, with between 4.2%–9.0% ever being asked by their regular dental provider or specialist to pay for dental services out-of-pocket. In contrast, 17.3% of the CHMS respondents reported avoiding visiting a dentist, and 16.5% reported declining recommended care because of costs. Despite the fact that costs were not a factor in the decision to visit the dentist or in the decision to accept a dental provider's treatment recommendations, care was most often obtained off-reserve rather than on-reserve. In fact, the principal reason given by First Nations for not going to a dental professional in the past two or three years was the unavailability of services in their communities. Just under half of those living in remote First Nations communities (45.7%) complained of transportation costs for dental treatment outside their communities. Once again, the problem is not the cost of dental care for First Nations, but the availability and accessibility to that care.

TABLE 4.1 Percent who reported visiting a dental professional in the previous 12 months, by age group and national survey

Age group (yrs)	CHMS 2007–09		IOHS 2008–09 %	FNOHS 2009–10 %
	Non-Aboriginal %	Aboriginal* %		
3–5	NA	NA	47.7 **E**	78.5
6–11	91.3	92.2	58.0 **E**	70.1
12–19	84.5	74.6	55.8 **E**	69.9
20–39	67.7	70.7 **E**	56.4	65.4
40+	NR	NR	33.2 **E**	46.8
40–59	76.5	83.4	NR	NR
60+	68.2 (ages 60–79)	83.9 (ages 60–79)	NR	NR
All Adults (20+)	71.6 (ages 20–79)		NR	56.8

*Persons claiming Aboriginal heritage living off reserve

Sources: CHMS = Oral Health Component of the Canadian Health Measures Survey 2007–09 (Health Canada, 2010)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10

NA = not applicable

NR = not reported

E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)

CLINICAL FINDINGS

Preschool Children

Dental Caries

Despite a high utilization of dental services by 3–5-year-old First Nations children (78.5%), nearly 86% of preschoolers experienced early childhood caries (ECC) (Table 4.2). The disease was also widespread among 3–5 year-old Inuit (85.3%) where its severity was worse than that for young First Nations. First Nations also had a lower percentage of the dmft index that was decayed compared with Inuit of the same age which may be explained by differences in the dental care delivery system's effectiveness in treating the burden of illness in the more remote communities of the Canadian Yukon Territory, Northwest Territories, Nunavut, Northern Québec and Labrador. Preschool First Nations children experienced 7.62 decayed, missing, or filled deciduous (baby) teeth (dmft) compared with 8.22 among preschool Inuit children. The percentage of decayed caries in the dmft index was 1.4 times higher in the Inuit (49.4%) than in First Nations preschool children (35.2%). The average number of teeth requiring treatment was 4.06 among the Inuit, which represented 1.4 teeth more to be restored than their First Nations counterparts who had an average of 2.68 decayed teeth. Preschool children were not examined in the CHMS so disparities in oral health associated with dental caries in this age cohort cannot be examined here. However, the results for First Nations and Inuit are consistent with findings from epidemiologic studies conducted in the last decade that showed Aboriginal children ages 3 to 5 years as having three to five times the amount of tooth decay than non-Aboriginal children of the same age (Peressini *et al.*, 2004a, b; Lawrence *et al.*, 2004; Schroth *et al.*, 2005a, b; Schroth *et al.*, 2008; Leake *at al*., 2008; Lawrence *et al.*, 2009; Pacey *et al.*, 2010).

TABLE 4.2 Prevalence and severity of dental caries among First Nations and Inuit children aged 3–5 years, by national survey

Caries index	IOHS 2008–09	FNOHS 2009–10
Caries prevalence: % with dmft > 0	85.3	85.9
Caries severity: mean dmft	8.22	7.62
Untreated caries: % dt/dmft and (mean dt)	49.4 (4.06 teeth **E**)	35.2 (2.68 teeth)

Sources: IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10
E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)

School-Age children

Dental Caries

In this survey, 93.9% of school children, aged 6–11 years, had one or more primary or permanent teeth affected by dental caries with a mean count of 6.58 for the combined dmft and DMFT index scores (Table 4.3). These findings are very similar to those for Inuit school-age children (93.4% caries prevalence and 7.08 mean dmft + DMFT) with a difference of half a tooth in the mean dmft + DMFT count favouring First Nations. The percent of the combined dmft and DMFT that was untreated caries, on the other hand, was 1.93-fold higher in Inuit (32.2%) than in First Nations (16.7%) and the number of untreated teeth averaged around 2.3 and 1.1, respectively. In the CHMS, 55.2% of non-Aboriginals, but 89.2% of First Nations school children residing outside their communities, were affected with mean counts of 2.28 and 6.62 dmf + DMF teeth, respectively. Here, 14.5% of non-Aboriginal children's affected teeth remained decayed, a rate comparable to that of First Nations (16.7%), but with a much lower average decayed tooth count per child (0.33) compared to First Nations (1.10) and Inuit (2.28) school-aged children.

TABLE 4.3 Prevalence (and severity) of dental caries, sealants and fluorosis among children aged 6–11 years, by national survey

Oral health measure	CHMS 2007–09		IOHS 2008–09	FNOHS 2009–10
	Non-Aboriginal	Aboriginal*		
Caries prevalence: % with dmft + DMFT > 0	55.2	89.2	93.4	93.9
Caries severity: mean dmft + DMFT	2.28	6.62 **E**	7.08	6.58
Untreated caries: % (dt + DT)/(dmft + DMFT) and (mean dt + DT)	14.5 (0.33 teeth)	**F**	32.2 (2.28 teeth **E**)	16.7 (1.10 teeth)
Sealant prevalence: % with ≥ 1 sealant on permanent molar teeth and (mean no. of teeth sealed)	31.9 (2.87 molars)	26.8 (3.17 molars **E**)	**F**	21.2 (2.15 molars)
Dental fluorosis: % with very mild	17.1	**F**	7.0 (includes	14.8

or higher levels (Dean's Index)	(ages 6–12)		'questionable')	

*Persons claiming Aboriginal heritage living off reserve
Sources: CHMS = Oral Health Component of the Canadian Health Measures Survey 2007–09 (Health Canada, 2010)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10
E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)
F = Data suppressed due to insufficient sample size or extreme sampling variability

Trends in the Oral Health of First Nations and Inuit children Aged 6 and 12

The levels (prevalence and severity) of dental caries as measured in 6 and 12 year olds are global oral health indicators used by the World Health Organization. Table 4.4 presents comparisons for 6- and 12-year-old First Nations and Inuit children among four Aboriginal-specific oral health surveys conducted in Canada spanning a period of 20 years. It is very disappointing to find that 6-year-old prevalence and severity of caries experience have not seen any changes for the two largest Aboriginal groups in Canada during this time period. The only positive change, albeit a modest one in the past 20 years, was observed in 12-year-old First Nations and Inuit for the prevalence and severity of caries in permanent teeth (see Table 4.4).

TABLE 4.4 Prevalence and severity of dental caries in 6- and 12-year-old First Nations and Inuit children, by national survey

Oral health indicator	FNIOHS 1990–91	FNIOHS 1996–97	IOHS 2008–09	FNOHS 2009–10
6-year-old prevalence of caries: % with dmft + DMFT > 0	91.0	94.6	86.0	92.4
6-year-old caries severity: mean dmft + DMFT	7.8	9.1	8.3	7.8
12-year-old prevalence of caries: % with DMFT > 0	91.0	91.2	**F**	82.2
12-year-old caries severity: mean DMFT	4.5	4.4	**F**	3.9

Sources: FNIOHS = First Nations and Inuit Oral Health Survey 1990–91 (University of Toronto and National School of Dental Therapy, 1992)

FNIOHS = First Nations and Inuit Oral Health Survey 1996–97 (Saskatchewan Indian Federated College, National School of Dental Therapy, 2000)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10
F = Data suppressed due to insufficient sample size or extreme sampling variability

Dental Sealants

Dental sealants are highly effective in preventing dental caries that occur on the surfaces of teeth that have pits and fissures. As found in the CHMS, almost 32% of non-Aboriginal children in Canada, aged 6–11, had one or more sealants, and among those children the mean number of molars sealed was 2.87 (Table 4.3). In comparison, fewer Aboriginal children (26.8%) examined in the CHMS and those examined in the FNOHS (21.2%) had one or more sealants on 3.17 and 2.15 molar teeth, on average.

Dental Fluorosis

The prevalence of fluorosis in First Nations children, aged 6–11, was defined as the proportion of the population with very mild or higher levels of dental fluorosis (Dean, 1942). Using this definition, 14.8% of First Nations were affected compared to a somewhat similar prevalence (about 17.1%) among non-Aboriginal children, aged 6–12 (Table 4.3). The lowest prevalence of dental fluorosis was found among Inuit children at 7.0%, even including the 'questionable' category of the Dean's Fluorosis Index.

Adolescents

Dental Caries

The FNOHS found that 91.4% of adolescents had one or more teeth affected by dental caries and the mean count was 6.15 DMFT with 1.41 (22.9%) decayed (Table 4.5). In comparison, 57.7% of non-Aboriginal adolescents in the CHMS had one or more teeth affected by caries, with 0.33 (13.6%) teeth still decayed, and with a DMFT of 2.43, a number 2.5 times lower than that of their First Nations counterparts. The severity of dental caries tended to be lower in First Nations (6.15 DMFT) than in Inuit (9.49 DMFT) adolescents, but higher for First Nations living on reserve when measured against those living off reserve (3.57 "E" DMFT). The prevalence of untreated caries was again lower in First Nations (22.9%) than in the Inuit (38.0%) who had, on average, close to four teeth requiring care (3.61 "E" DT).

TABLE 4.5 Prevalence (and severity) of dental caries, sealants, incisor trauma and malocclusion among adolescents aged 12–19 years, by national survey

Oral health measure	CHMS 2007–09		IOHS 2008–09	FNOHS 2009–10
	Non-Aboriginal	Aboriginal*		
Caries prevalence: % with DMFT > 0	57.7	75.9	96.7	91.4
Caries severity: mean DMFT	2.43	3.57 **E**	9.49	6.15
Untreated caries: % DT/DMFT and (mean DT)	13.6 (0.33 teeth **E**)	**F**	38.0 (3.61 teeth **E**)	22.9 (1.41 teeth)
Sealant prevalence: % with ≥ 1 sealant on permanent molar teeth and (mean no. of teeth sealed)	50.0 (3.59 molars)	59.4 **E** (2.45 molars)	**F**	27.4 (3.06 molars)
Incisor trauma: % with ≥ 1 teeth lost or traumatized and (mean no. of incisor teeth affected)	15.5 (1.31 incisors)	26.4 **E** (1.44 incisors)	NR	6.9 (1.42 incisors)
Malocclusion: % with less than acceptable occlusion (WHO 1997)	17.0	43.1 **E**	NR	48.1 (ages 12–17)

*Persons claiming Aboriginal heritage living off reserve

Sources: CHMS = Oral Health Component of the Canadian Health Measures Survey 2007–09 (Health Canada, 2010)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10

NR = not reported

E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)

F = Data suppressed due to insufficient sample size or extreme sampling variability

Dental Sealants

Twenty-seven percent of First Nations adolescents had received dental sealants at the time of the survey with a mean count of 3.06 for those with sealants (Table 4.5). In comparison, nearly double the proportion of adolescents in the CHMS had received dental sealants. The CHMS reported that 50.0% of non-Aboriginal and 59.4% "E" of Aboriginal adolescents had sealants with mean counts between the groups of 3.59 and 2.45, respectively. The use of sealants by Inuit adolescents was too low to be reported in the IOHS.

Incisor Trauma

The FNOHS examiners found evidence of trauma to the anterior teeth among 6.9% of adolescents, and the equivalent figure among non-Aboriginal adolescents is over two times higher (15.5%) and even higher among Aboriginals living off reserve (26.4% "E") (Table 4.5).

Malocclusion

Great disparities exist in the prevalence of malocclusion and in the access to orthodontic treatment between First Nations and non-Aboriginal adolescents in Canada. Almost half (48.1%) of on-reserve First Nations aged 12–17 years were judged to have less than acceptable occlusion. This estimate compares to 43.1% "E" of Aboriginal adolescents living off reserve and to a figure nearly 2.5 times lower (17.0%) for non-Aboriginals aged 12–19 years (Table 4.5).

Orthodontic treatment is more commonly provided in the adolescent years. 36.7% of non-Aboriginal adolescents were receiving or had received orthodontic treatment at the time of the CHMS, while only 3.5% of First Nations adolescents were undergoing or had undergone orthodontics at the time of the FNOHS. Likewise, only 5.6% of Inuit adolescents were receiving or had received orthodontic care when they were examined for the IOHS.

Based on the results of the household interview component of the FNOHS, 14.7% of First Nations aged 12 years and over perceived a need for orthodontic care and among those, 73.6% had yet to have their malocclusion treated. Furthermore, 25.1% were denied orthodontic treatment because their case did not meet the NIHB criteria. Of those who had yet to receive care, 33.8% reported that their malocclusion impacted on their self-esteem.

Adults

Edentulism and Retention of Natural Teeth

Table 4.6 presents the findings of the FNOHS on complete tooth loss (edentulism) and tooth retention in comparison to those of the CHMS and the IOHS. The FNOHS found that 6.3% of adults aged 20 and older were edentulous (had lost all their natural teeth), compared to an equivalent finding in the CHMS of 6.4% for non-Aboriginal Canadians. Inuit adults had a higher rate of edentulism (9.7%) than both First Nations and non-Aboriginals. The FNOHS and the CHMS did not find any differences by sex, but in the IOHS edentulism seemed more prevalent

among females. Edentulism tended to be more prevalent among Inuit adults aged 40 and older (21.3%) than in First Nations adults of the same age group (13.1%). No valid age-specific comparisons between the FNOHS and the CHMS on the rates of edentulism could be made based on the results presented in Table 4.6.

The CHMS used the criteria that fewer than 21 teeth represented an inadequate dentition. This is consistent with one of the World Health Organization's global goals for oral health for the year 2020 that seeks "to increase the number of individuals with functional dentitions (21 or more natural teeth) ... at ages 35–44 and 65–74 years" by that year (Hobdell *et al.*, 2003). The FNOHS adopted the criteria for the shortened dental arch (SDA) and found that overall, 79.4% of adults had at least 21 teeth, 81.9% in females and 76.7% in males (Table 4.6). The CHMS found that 85.3% of dentate adults had at least 21 teeth with differences by age but not by sex; the proportion declined from 99.2% "E" for young adults, to 83.5% for those aged 40–59 years and to 57.8% for the oldest age group. Even though comparisons are difficult to make because of the varied age groups used to report the results, it appears that comparatively lower proportions of older First Nations have shortened dental arches than their non-Aboriginal counterparts. Compared to Inuit adults, First Nations adults are more likely to retain a functional natural dentition of not less than 21 teeth throughout their lives. First Nations adults had three more teeth than Inuit adults (23.5 vs. 20.2) whereas non-Aboriginal adults had, on average, 24.5 teeth present. Relative to the older dentate Inuit, aged 40 years and over, First Nations had, on average, five more teeth present (15.8 teeth in Inuit and 20.5 teeth in First Nations aged 40 and over).

TABLE 4.6 Edentulism and tooth retention among adults, by sex, age group and national survey

	Percent edentulous			Percent with 21+ teeth			Mean number of teeth present		
	CHMS 2007–09	IOHS 2008–09	FNOHS 2009–10	CHMS 2007–09	IOHS 2008–09	FNOHS 2009–10	CHMS 2007–09	IOHS 2008–09	FNOHS 2009–10
All	6.4*	9.7	6.3	85.3*	61.5	79.4	24.5*	20.2	23.5
Female	6.5	11.1 **E**	6.8	85.0	56.9	81.9	24.4	19.6	24.1
Male	6.3	7.6 **E**	6.0	85.9	68.0 **E**	76.7	24.7	21.1	22.8
Age 20–39	**F**	**F**	**F**	99.2 **E**	79.9	95.3	27.1	22.9	25.5
Age 40+	NR	21.3	13.1	NR	31.0	55.2	NR	15.8	20.5
Age 40–59	4.4**E**	NR	NR	83.5	NR	NR	24.1	NR	NR
Age 60–79	21.7	NR	NR	57.8	NR	NR	19.4	NR	NR

*Non-Aboriginal Canadians
Sources: CHMS = Oral Health Component of the Canadian Health Measures Survey 2007–09 (Health Canada, 2010)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10
NR = not reported

E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)
F = Data suppressed due to insufficient sample size or extreme sampling variability
Note: Surveyors did not examine third molar (wisdom) teeth

Denture Use

Despite similar overall levels of edentulism among adults surveyed in the FNOHS and the CHMS, denture wearing appears to be less common among the edentulous First Nations. The examiners in the FNOHS found that only 65.1% of edentulous participants wore a denture on the lower arch and 93.3% wore one on the upper arch. In contrast, the majority of the edentulous survey participants in the CHMS wore full dentures on both upper and lower arches (93.3% overall; 93.2% non-Aboriginal adults).

Dental Caries

1. Coronal Caries

The CHMS reported that 95.9% of non-Aboriginal and 97.7% of off-reserve Aboriginal dentate adults aged 20–79 years had experienced coronal caries with mean DMFT counts of 10.64 and 11.98, respectively (Table 4.7). According to the FNOHS, 99.9% of dentate First Nations adults had experienced coronal decay with a mean count of 13.72. As seen in Table 4.7, the prevalence of coronal caries was very high but similar among adult participants in the Canadian, Inuit and First Nations oral health surveys. However, non-Aboriginal adults had fewer numbers of teeth affected (10.64) than First Nations (13.72) and Inuit (16.77). In addition, a higher proportion of the disease remained untreated in the First Nations and Inuit populations compared to the non-Aboriginal population of Canada. More than half of First Nations (56.5%) and Inuit (59.0%) adults had at least one tooth that needed restoring with averages of 3.24 and 3.86 “E” decayed teeth, respectively. This compares to 19.3% and 34.4% of non-Aboriginals and Aboriginals living off reserve needing fillings, with averages of 2.96 and 3.04 “E” decayed teeth, respectively.

TABLE 4.7 Prevalence (and severity) of coronal caries, root caries and incisor trauma among dentate adults aged 20 years and over, by national survey

Oral health measure	CHMS 2007–09		IOHS 2008–09 (ages 20+)	FNOHS 2009–10 (ages 20+)
	Non-Aboriginal (ages 20–79)	Aboriginal* (ages 20–79)		
Coronal caries prevalence: % with DMFT > 0	95.9	97.7	99.4	99.9
Coronal caries severity: mean DMFT	10.64	11.98	16.77	13.72
Prevalence of untreated coronal decay: % with ≥ 1 untreated coronal caries and (mean DT among those affected)	19.3 (2.96 teeth)	34.4 (3.04 teeth **E**)	59.0 (3.86 teeth **E**)	56.5 (3.24 teeth)
Root caries prevalence: % with RDFT > 0	20.5	**F**	44.3	32.9
Root caries severity: mean RDFT	0.66	**F**	1.52	1.10
Prevalence of untreated root decay: % with ≥ 1 untreated root caries and (mean RDT among those affected)	6.6 (2.76 roots)	**F**	33.4 **E** (4.53 teeth **E**)	23.8 (3.33 teeth)
Incisor trauma: % with ≥ 1 teeth lost or traumatized and (mean no. of incisor teeth affected)	23.9 (1.67 incisors)	19.9 **E** (1.23 incisors)	NR	25.9 (2.16 incisors)

*Persons claiming Aboriginal heritage living off reserve

Sources: CHMS = Oral Health Component of the Canadian Health Measures Survey 2007–09 (Health Canada, 2010)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)

FNOHS = First Nations Oral Health Survey 2009–10
NR = not reported
E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)
F = Data suppressed due to insufficient sample size or extreme sampling variability

2. Root Caries

The CHMS reported that 20.5% of non-Aboriginal adults had experienced root caries (decay of tooth roots that have become exposed largely due to periodontal diseases) with an average of 0.66 decayed or filled tooth roots (RDFT) (Table 4.7). The equivalent prevalence and severity estimates for First Nations are 32.9% and a mean of 1.10 RDFT. Root caries was even more prevalent (44.3%) and mean counts also were higher (1.52 RDFT) among the Inuit than among First Nations and non-First Nations in Canada. Nearly 24% of dentate First Nations adults had one or more root decayed or filled teeth still decayed compared to only 6.6% of non-Aboriginal Canadians surveyed in the CHMS. Once again, the prevalence of untreated root caries was even higher among the Inuit (33.4% "E") though this estimate is unstable owing to the high sampling variability. Of those with untreated roots, dentate First Nations adults had 3.3 roots that were decayed compared to 2.8 among non-Aboriginal adults and 4.5 "E" tooth roots among the Inuit.

Incisor Trauma

Evidence of trauma to one or more incisor teeth was found in 25.9% of adults examined in the FNOHS and 23.9% of non-Aboriginal adults examined in the CHMS (Table 4.7). The prevalence of trauma to incisors was slightly lower among off reserve Aboriginals (19.9% "E").

Periodontal Status

Examiners for the FNOHS found that 45.4% of dentate First Nations aged 20 years and older had abundant accumulation of soft debris and 44.7% had calculus compared to 26.8% and 10.7% of non-Aboriginal adults, respectively (Table 4.8). As a result of higher plaque accumulation, moderate/severe gingivitis was more prevalent in First Nations (43.9%) than in non-First Nations (32.2%). Alternatively, comparable data from the CHMS show that 20.2% of non-Aboriginal adults had 4 mm or more of probing pocket depths; the equivalent prevalence estimate for First Nations was 23.0%. In addition, only 16.8% of dentate First Nations adults had lost 4 mm or more of attachment at one or more sites. This compares to 21.2% of non-Aboriginal adults and to 17.0% of Inuit adults. Thus, it appears that First Nations adults have poorer gingival health but better periodontal health than non-Aboriginal Canadians. However, these findings may have been affected by the differing numbers of teeth present in the populations and/or the prevalence of diabetes or the smoking behaviour of First Nations adults. The gingival and periodontal conditions of Inuit adults were somewhat better (lower prevalences) than those of non-Aboriginal Canadians with the exception of calculus, which tended to be more prevalent among the Inuit.

TABLE 4.8 Prevalence of periodontal conditions among dentate adults aged 20 years and over, by national survey

Periodontal index	CHMS 2007–09		IOHS 2008–09 (ages 20+) %	FNOHS 2009–10 (ages 20+) %
	Non-Aboriginal (ages 20–79) %	Aboriginal* (ages 20–79) %		
Debris (score 2 or 3)	26.8	18.2** **E**	21.4**	45.4
Calculus (score 2 or 3)	10.7	8.8 **E**	19.9	44.7
Gingivitis (score 2 or 3)	32.2	**F**	30.6 **E**	43.9
Pocket Depth (≥ 4 mm)	20.2	**F**	16.5	23.0
Loss of Attachment (≥ 4 mm)	21.2	**F**	17.0 **E**	16.8

*Persons claiming Aboriginal heritage living off reserve

**Debris score 2 only

Sources: CHMS = Oral Health Component of the Canadian Health Measures Survey 2007–09 (Health Canada, 2010)
IOHS = Inuit Oral Health Survey 2008–09 (Health Canada *et al.*, 2011)
FNOHS = First Nations Oral Health Survey 2009–10

E = Interpret with caution (high sampling variability; coefficient of variation 16.6% to 33.3%)

F = Data suppressed due to insufficient sample size or extreme sampling variability

A comparison of the CPITN scores is, once again, somewhat difficult to make because of the different age groupings used in the FNOHS and the CHMS. The only age group both surveys had in common was the 20–39 year olds. In this age group, First Nations had better gingival and periodontal health with 21.3% having a healthy periodontium and no treatment required compared to 10.9% of those in the CHMS, although the more severe categories seem to favour the participants in the CHMS. It should be noted that the computation of the CPITN score "1" for gingival bleeding in the CHMS diverges from the actual index recommendation for bleeding on probing. Instead the CHMS counted any gingival inflammation, mild or otherwise, as score "1". The FNOHS, on the other hand, followed the index criteria, precluding the possibility of comparisons for this particular category.

Oral Mucosal Lesions

In the case of oral mucosal lesions, similar frequencies were found among First Nations aged 12 years and older (15.3%), Inuit adults (9.9% "E") and non-Aboriginal Canadian adults aged 20 years and older (11.7%).

Malocclusion

Lastly, the FNOHS examiners also found that 31.2% of adults, aged 18–39, and 15.4% of those aged 40–59 had less than acceptable occlusion compared to 24.1% and 26.3% of non-Aboriginal Canadians aged 20–39 and 40–59 years, respectively.

Clinically Diagnosed Dental Needs

Approximately four in five First Nations (83.1%) aged 6 years and over were in need of some sort of dental care, as per the findings of the clinical oral examinations. This figure compares to much lower proportions in the CHMS – 33.9% of non-Aboriginal and 44.4% of Aboriginal Canadians living off reserve requiring care. No other direct comparison can be made between the FNOHS and CHMS clinically diagnosed dental needs, as the CHMS adopted a "hierarchy of needs" approach, whereby participants were triaged based on the severity of their condition and the urgency of the treatment required (Otchere *et al.*, 1990). Accordingly, the hierarchy prioritized urgent needs first (*i.e.*, severe infection, dental pain or suspected oral cancer) followed by surgical, endodontic, restorative, prosthodontic, periodontic, orthodontic, and a group of services including problems with the jaw, aesthetics and soft tissues. The list ended with those participants requiring no dental treatment.

Rather than using the "hierarchy of needs" approach, the FNOHS adopted an analytical approach that was based on the "frequency of needs". For example, 70.0% of First Nations 6 years of age and older were judged to need restorations (fillings), but these same individuals could also need other types of care. While the CHMS approach created mutually exclusive categories of need, the FNOHS was interested in determining the extent to which each treatment type was required by the sampled population. This approach was preferred over the "hierarchy of needs" because it allowed researchers to identify the level of demand for particular types of dental services which will assist in future program planning and resource allocation. However, separate sections of the clinical examination form addressed orthodontic and prosthodontic treatment needs. Periodontal examination data also permitted the computation of the CPITN index. The same hierarchical approach to treatment needs used in the CHMS was also used in the IOHS precluding direct comparisons with the results of the FNOHS. Overall, 72.6% of Inuit aged 3 years and older had dental treatment needs identified during the IOHS oral examinations.

Oral Health Disparities among Indigenous Populations Outside of Canada

The oral health disparities noted above between First Nations (on- and off-reserve), Inuit and non-Aboriginal Canadians are not, unfortunately, surprising given that these disparities are indirectly or directly associated with a variety of challenges facing First Nations communities across Canada. The so-called social determinants of health, including lower levels of

employment and education, poor and overcrowded housing, limited access to adequate and culturally-appropriate health services, the problems associated with poverty, food insecurity and those related to alcohol and drug addiction are some of the most serious concerns affecting not only the health and well-being of individuals, but also the overall wellness of First Nations communities.

Other national and international oral health survey reports also speak to the issue of dental health disparities between the Native and non-Native populations. These reports consistently document major improvements in oral health for the population as a whole, but at the same time, they identified inequalities in oral heath between Indigenous peoples and non-Indigenous populations that remain significant. An American Indian (AI) or Alaska Native (AN) child aged 2–5 years, for example is almost three times more likely than a child in the general U.S. population to have untreated dental decay, as indicated by the 1999 Indian Health Service (IHS) oral health survey of AI and AN dental patients and by the third National Health and Nutrition Examination Survey (1988–1994), respectively (Indian Health Service, 2002; U.S. Department of Health and Human Services, 2007). The oral health care of AI and AN is the responsibility of the IHS. The IHS conducted oral health surveys of its client population in 1983–84, 1991 and 1999 and these revealed a steep increase in the prevalence of untreated decay among AI/AN children under age 5 years from 40% in 1983–84, to 56% in 1991, and up to 68% in 1999 (Centers for Disease Control, 1985; Indian Health Service, 1993 and 2002).

Not only are young Indigenous children disproportionally affected by oral disease, other age groups of Indigenous peoples are subject to inequalities in oral health and oral health care access. The most recent national oral health examination survey in Australia, the National Survey of Adult Oral Health (NSAOH), conducted in 2004–06 among adults (those aged 15 years and over), revealed a 2.3-fold difference in the prevalence of untreated coronal decay between Indigenous (57.0%) and non-Indigenous (25.1%) Australians (Slade *et al.*, 2007). The survey found that Indigenous Australians were more likely to report a need for fillings or extractions, have poorer perceptions of their oral health, experience toothache and severe incisor wear, and avoid certain foods because of dental problems than non-Indigenous Australians. Indigenous Australian adults also experienced significant barriers to accessing dental care, primarily due to cost. Though Australian Aboriginals were faced with far more dental-related problems than non-Aboriginal Australians, the former were significantly less likely than the latter to report visiting the same dentist at least once a year for a check-up.

Clinical data for 16–20-year-old participants in the 2004–06 NSAOH were compared to those of participants in an Aboriginal birth cohort study in the Northern Territory of Australia (Jamieson *et al.*, 2010). The results confirmed the disproportionate burden of oral disease in the Aboriginal population of Australia. Poorer clinical oral health outcomes were between 2 to 11 times higher in the cohort of young Australian Aboriginal adults than their age-matched, national counterparts. The mean number of decayed teeth was 4.19 in the Aboriginal sample as compared to 0.52 in the national sample. Nearly three in four Aboriginals had one or more untreated decayed teeth compared to one in four in the NSAOH. The Relative Risk associated with the prevalence of moderate or severe periodontal disease in Aboriginals compared to NSAOH participants was 10.8 (26.9% vs. 2.5%). Australian Aboriginals aged 16–20 also had significantly higher prevalence estimates of plaque, calculus and gingivitis.

The most up-to-date information on the oral health status of New Zealand adults and children comes from the 2009 New Zealand Oral Health Survey (NZOHS) (Ministry of Health of New Zealand, 2010). That survey had good representation of Māori, Pacific Island and Asian New Zealanders and found that among the non-European population of the North and South Islands, the Māori (the Indigenous people of New Zealand), experienced greater disparities in oral health outcomes and access to services than the non-Māori, in particular with regard to missing teeth and untreated decay. Māori adults were almost twice as likely to be edentulous as non-Māori. Among dentate adults, Māori had higher levels of partial tooth loss and untreated coronal and root decay, and more severe lifetime dental decay experience (higher DMFT) than non-Māori adults. They also had a higher prevalence of periodontal pocketing and loss of attachment, and were significantly less likely to have a functional natural dentition. The survey also found lower dental service attendance rates among Māori than non-Māori adults. Even among children and adolescents who are eligible to receive free, publicly-funded oral health care from birth until 18 years of age, the survey found that Māori and Pacific Island children faced greater barriers to accessing care and had poorer oral health outcomes than New Zealand children of European ancestry.

In summary, Indigenous populations in Canada as well as those in the United States, Australia and New Zealand and elsewhere face unique challenges to their oral health, including exceedingly high rates of dental decay for all ages, especially among very young children (Parker *et al.*, 2010), and high rates of tooth loss and other oral conditions that place undue stress on the dental care delivery systems in their respective countries at a time when governments are cutting, rather than adding services. Thus it is all the more important to find cost-effective interventions that address the oral health disparities between Indigenous and non-Indigenous populations and that aid in the delivery of timely and adequate oral health care for First Nations communities. Steps in this direction are now being taken at the community, regional and national levels in Canada, indicative of the focus of the FNOHS, RHS, IOHS and other health surveys targeting First Nations and Inuit communities. For instance, community-based and national initiatives to prevent dental caries in young Aboriginal children in Canada that begin by improving the oral and general health of young women and mothers through preconception interventions are being implemented, as studies and other surveys such as the FNOHS have repeatedly indicated that oral disease starts at an early age, so prevention must also start early, even before babies are born (Lawrence, 2010).

This report provides important information to increase the understanding of the oral health needs of First Nations. It will serve as a baseline for future national oral epidemiologic surveys of this population to monitor oral health-related outcomes and to assist in the implementation of programs that promote, maintain, and restore oral health. In spite of the persistent experience of oral disease and associated pain and discomfort that Aboriginals in Canada have endured in the past, these reports and the interventions they spawn hold much hope for the future. Finally, ownership and control of this survey, and others like it, by Canadian First Nations offers another reason for optimism. Ownership and control of the research process and its output is allowing for greater capacity building and providing First Nations communities with the data needed to inform planning, policy and advocacy at all levels of governance. Survey results will also help in

charting the progress of communities as they work to close the oral health divide that exists between First Nations and non-Aboriginal Canadians.

KEY FINDINGS

The key clinical and self-reported findings from this survey along with comparisons with the CHMS and IOHS include the following:

Preschool Children

Almost four in five (78.5%) 3–5-year-old First Nations children had visited a dental professional in the past year, 30.8% more than Inuit preschool children aged 3–5 years (47.7%).

The overall oral health of most preschool First Nations children (aged 3–5 years) was poor:

- 85.9% had experienced caries in the primary dentition.
- 61.3% had untreated coronal caries in at least one primary tooth.
- This age group had, on average, 7.62 decayed, missing (due to dental decay) or filled primary teeth (*i.e.*, dmft = 7.62).
- 35.2% of the dmft were decayed teeth and 45.5% were filled teeth.
- From the assessments and evaluation of the dentist-examiners, 62.4% of preschool children required some type of dental treatment, and of those 90.3% needed fillings and 82.9% required prevention.

Relative to Inuit preschool children, First Nations preschoolers had:

- a similar prevalence of caries (85.9% for First Nations vs. 85.3% for Inuit);
- a lower dmft (7.62 for First Nations vs. 8.22 for Inuit);
- a 1.4 times lower percentage of the dmft index that was decayed (35.2% for First Nations vs. 49.4% for Inuit).

School-Age Children

A lower proportion of First Nations school children aged 6–11 years (70.1%) had visited a dental professional in the past year, compared to non-Aboriginal and Aboriginal school children living off reserve (91.3% and 92.2%, respectively). Inuit children aged 6–11 were least likely to have visited a dentist in the last year (58.0%).

Children aged 6–11 years have a mix of primary and permanent teeth:

- Four in five (80.4%) had experienced caries in the primary dentition, 67.1% had caries experience in the permanent dentition and the majority (93.9%) had caries experience in either primary or permanent teeth.
- This age group had, on average, 5.28 decayed, missing (due to dental decay) or filled primary teeth (dmft), 1.87 decayed, missing (due to dental decay) or filled permanent teeth (DMFT), and 6.58 combined dmft and DMFT.
- 16.7% of the combined dmft and DMFT were decayed teeth and 63.8% were filled teeth.
- Compared to non-Aboriginal Canadian children aged 6–11, First Nations children had 1.7 times higher prevalence of caries (93.9% vs. 55.2%) and 2.9 times higher caries severity

(6.68 vs. 2.28 DMFT); the mean number of untreated decayed teeth was 3.3 times higher (1.10 vs. 0.33 DT).

- First Nations and Inuit children aged 6–11 had the same caries prevalence and somewhat similar DMFT, but Inuit children had 2.1 times more teeth that were decayed than First Nations (2.28 for Inuit vs. 1.10 for First Nations).
- 21.2% of school children, aged 6–11, had dental sealants and among those, 2.15 permanent molar teeth were sealed, compared to 31.9% of non-Aboriginal children, who had sealants placed on an average of 2.87 teeth.
- 14.8% of First Nations aged 6–11 had dental fluorosis (mostly very mild or mild levels) compared to a somewhat similar prevalence (about 17.1%) among non-Aboriginal children, aged 6–12. The Inuit children had the lowest prevalence of dental fluorosis at 7.0%, even including the 'questionable' category of the Dean's Fluorosis Index.
- Four in five (80.7%) school children required dental treatment as per clinical diagnoses, and of those 63.0% needed fillings, 90.2% required preventative care, 8.4% needed surgery (*i.e.*, tooth extraction), and 11.8% needed orthodontic treatment (braces).

Compared to non-Aboriginal children aged 6–11 years, more First Nations children aged 3–11 reported poor oral health and higher frequency of pain and food avoidance because of dental problems. About 52% of First Nations children brushed their teeth at least twice a day; 19.6% flossed at least 5 times per week. The equivalent rates of brushing and flossing for non-Aboriginal children were 72.4% and 11.9%, respectively.

Trends in the Oral Health of First Nations and Inuit children Aged 6 and 12

Since the first oral health examination survey of Canada's Aboriginal children aged 6 and 12 twenty years ago, the 6-year-old prevalence and severity of caries experience have not seen any changes for the two largest Aboriginal groups in Canada (ref). Caries prevalence in 12-year-old Aboriginal children has decreased from 91.0% in 1990–91, to 82.2% in 2009–10. The severity of caries in permanent teeth among 12 year olds has declined by 0.6 of a tooth – from 4.5 DMFT in 1990–91 to a DMFT of 3.9 in 2009–10.

Adolescents

The proportion of First Nations adolescents, aged 12–19 years, who had visited a dental professional in the last year was lower than that for non-Aboriginal adolescents (69.9% vs. 84.5%), but higher than the proportion visiting a dentist in past year among Inuit adolescents (55.8% "E").

Adolescents aged 12–19 years, like their younger age cohorts, had poor oral health:

- 91.4% had experienced caries in their permanent teeth.
- 46.4% had untreated coronal decay in at least one permanent tooth.
- This age group had, on average, 6.15 decayed, missing or filled permanent teeth (DMFT).
- 22.9% of the DMFT were decayed teeth and 72.7% were filled teeth.

- Compared to non-Aboriginal Canadian adolescents, First Nations adolescents had 1.6 times higher prevalence of caries (91.4% vs. 57.7%) and 2.5 times higher caries severity (6.15 vs. 2.43 DMFT); the mean number of untreated decayed teeth was 4.3 times higher (1.41 vs. 0.33 DT).
- Inuit adolescents had 1.5 times higher DMFT count than First Nations adolescents (9.49 vs. 6.15, respectively), and 2.6 times higher mean number of decayed teeth (3.61 vs. 1.41, respectively).
- 27.4% of First Nations adolescents had received dental sealants with a mean count among those with a sealant of 3.06, compared to 50.0% of non-Aboriginal adolescents, who had sealants placed on an average of 3.59 teeth.
- 6.9% of First Nations adolescents had experienced trauma to one or more of their front teeth, compared to 15.5% of non-Aboriginal adolescents.
- Almost one in two (48.1%) First Nations aged 12–17 years were judged by the dentist-examiners to have less than acceptable occlusion. This estimate compares to 17.0% of non-Aboriginals aged 12–19 years.
- The FNOHS examiners found that more than three-quarters (77.5%) of adolescents had dental treatment needs, of whom 65.2% required fillings, 86.4% needed preventative care, 12.5% needed surgery (*i.e.*, extractions), 19.0% were in need of orthodontic treatment, and 2.6% needed gum care.

Adults

Approximately three in five (56.8%) First Nations adults aged 20 years and over had visited a dental professional in the previous year, but rates of dental visitation were higher for younger adults aged 20–39 (65.4%) than older adults aged 40 and older (46.8%). In contrast, 67.7%, 76.5% and 68.2% of non-Aboriginal adults aged 20–39, 40–59 and 60 and older, respectively, had visited a dental professional in the year preceding the CHMS. Inuit adults were least likely to have visited a dental care provider in the past year.

The main reason reported by First Nations adults for not visiting a dental care provider in the past year was that dental services were not available in their communities. Very few reported that costs were a factor in avoiding visiting a dentist or accepting recommended treatment.

First Nations adults who usually attended the dentist for treatment for dental emergencies were more likely to report oral symptoms. About 19.5% had experienced toothache in the previous four weeks and 34.0% complained of bleeding gums.

Tooth retention among First Nations adults was generally good:

- Approximately 1 in 20 adults (6.3%) had lost all their natural teeth, 6.8% females and 6.0% males. These rates of edentulism are very similar to those of non-Aboriginal Canadian adults (6.4% overall; 6.5% females and 6.3% males).
- 13.1% of adults aged 40 years and older were edentulous.
- Among the 93.7% who were dentate, 20.6% had an inadequate dentition with fewer than 21 teeth; the mean number of teeth present was 23.5. Slightly fewer (14.7%) non-Aboriginal adults had an inadequate dentition, with an average of 24.5 teeth present,

excluding the four third molars (wisdom teeth), which were not counted in the examinations.

- Only 65.1% of edentulous First Nations wore dentures on the lower arch and 93.3% wore dentures on the upper arch, while 93.3% of edentulous adults surveyed in the CHMS wore full dentures on both upper and lower arches.
- Inuit adults aged 40 years and older were 1.6 times more likely to be edentulous than First Nations adults (21.3% vs. 13.1%).

However, within this picture of good tooth retention among First Nations adults, concerns about high levels of coronal and root caries remain. Among dentate adults:

- Nearly all (99.9%) First Nations adults aged 20 years and over had experienced coronal caries.
- Three in five (56.5%) had untreated coronal decay in at least one permanent tooth (mean of 3.24 decayed crowns among those with decayed teeth), compared to only 19.3% of non-Aboriginal adults.
- This age group had, on average, 13.72 decayed, missing or filled permanent teeth (DMFT) – three more teeth with caries experience than non-Aboriginal adults (DMFT = 10.64). Inuit adults had six more teeth affected than non-Aboriginal adults (DMFT = 16.77).
- 13.3% of the DMFT were decayed teeth, 31.6% were missing teeth and 55.1% were filled teeth.
- One in three (32.9%) had one or more root decayed or filled teeth, compared to one in five (20.5%) non-Aboriginal adults.
- One in four (23.8%) had untreated root caries in at least one permanent tooth (mean of 3.33 decayed roots among those with decayed teeth), compared to 1 in 20 (6.6%) non-Aboriginal adults.
- This age group had, on average, 1.10 root decayed or filled permanent teeth (RDFT) – 1.7 times the average for non-Aboriginal adults (0.33).
- 71.8% of the RDFT were decayed roots and 28.2% were filled roots.
- Root caries among Inuit adults was more prevalent (44.3%) than in First Nations and more caries was untreated (33.4%).

One in four (25.9%) First Nations adults had evidence of trauma to one or more incisor teeth, a rate comparable to that of non-Aboriginal adults (23.9%) examined in the CHMS.

A small proportion of dentate First Nations adults were affected by periodontal disease:

- One in four (23.0%) had periodontal pocketing of 4 mm or more on at least one tooth.
- Only 16.8% had loss of attachment of 4 mm or more at one or more sites, compared to 21.2% of non-Aboriginal adults and to 17.0 “E” Inuit adults.
- Despite low evidence of periodontitis, there was an abundance of debris and calculus accumulation found among 45.4% and 44.7% of First Nations adults, respectively, and moderate or severe gingivitis among 43.9%. This may be explained by the fact that just over half of adolescents and adults (54.7%) reported brushing their teeth at least two times per day and a quarter of dentate First Nations flossed their teeth at least five times per week.

FNOHS examiners also found that 31.2% of adults, aged 18–39, and 15.4% of those aged 40–59 had less than acceptable occlusion compared to somewhat fewer, 24.1% and 26.3%, of non-Aboriginal Canadians aged 20–39 and 40–59 years, respectively.

Oral mucosal lesions were found with similar frequency in First Nations aged 12 years and older (15.3%), Inuit adults (9.9% “E”) and non-Aboriginal Canadian adults aged 20 years and older (11.7%).

There was clear evidence of unmet need for dental care from the survey:

- The examiners found that 8.2% of adults were in need of urgent treatment, 83.1% had dental treatment needs, of whom 70.3% required fillings, 87.2% needed preventative care; 28.6% needed surgery, 24.1% needed periodontic (gum) treatment, and 6.8% needed endodontic (root canal) treatment.
- Also, there was a mismatch between perceived (by the respondent) and normative (determined by the dentist-examiner) needs that occurred among all age groups. For example, 46.8% of First Nations adults had no perceived dental problems, whereas the dentist-examiner found that, in actuality, First Nations were under-reporting their dental needs and the number was closer to 17%.

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TABLE 1 Socio-demographic characteristics and smoking status of the 2009–10 First Nations Oral Health Survey population

Characteristic	Age group											
	Young children 3–5 years		Children 6–11 years		Adolescents 12–17 years		Young adults 18–39 years		Adults 40+ years		All adults 18+ years	
	Wtd %	N	Wtd %	N	Wtd %	N	Wtd %	N	Wtd %	N	Wtd %	N
All	6.8	140	13.4	172	14.6	142	36.3	445	28.9	289	65.2	734
Female	49.3	58	58.0	90	49.1	68	58.2	246	53.4	163	56.1	409
Male	50.7	69	42.0	69	50.9	63	41.8	180	46.6	119	43.9	299
Highest level of education of child's primary caregiver or adult respondent												
High school or less	85.1	82	90.8	124	NA	NA	86.0	362	75.3	200	81.4	562
> High school	14.9	11	9.2	21			14.0	59	24.7	64	18.6	123
Mother's highest level of education												
High school or less	NA	NA	NA	NA	91.7	97	NA	NA	NA	NA	NA	NA
> High school					8.3	12						
Father's highest level of education												
High school or less	NA	NA	NA	NA	89.1	91	NA	NA	NA	NA	NA	NA
> High school					10.9	11						
Primary caregiver or adult working for pay	20.6	26	35.4	47	NA	NA	36.2	149	43.7	109	39.5	258
Mother working for pay	NA	NA	NA	NA	41.5	56	NA	NA	NA	NA	NA	NA
Father working for pay	NA	NA	NA	NA	62.2	54	NA	NA	NA	NA	NA	NA
Household income*												
< $20,000 per year	61.3	37	46.9	46	NA	NA	68.3	183	47.5	96	58.7	279
$20,000/yr or more	38.7	31	53.1	45			31.7	85	52.5	95	41.3	180

Non-remote/urban community**	78.9	70	79.5	80	80.9	75	80.2	246	83.5	147	81.7	393
Remote community***	21.1	70	20.5	92	19.1	67	19.8	199	16.5	142	18.3	341
Daily smoker					21.4	24	51.8	216	36.5	92	45.1	308
Occasional smoker	NA	NA	NA	NA	7.9	8	16.5	77	19.4	46	17.8	123
Non-smoker					70.6	94	31.7	130	44.2	139	37.1	269

NA = Not applicable, as respondents were not asked the question

*48% of respondents did not answer the household income question (Not applicable=142, Don't know=234, Refused=142, and System missing=52)

**This includes urban communities within 50 km of nearest services and rural communities 50 km–350 km from nearest services

***This includes remote communities more than 350 km from nearest services and special access communities (no year-round road access)

TABLE 2 Self-reported* oral health and oral health impact on quality of life among First Nations aged 3–11 years and 12 years and over

Oral health outcome	Age group	
	All children 3–11 years Wtd %	Adolescents & adults 12+ years Wtd %
Excellent/very good/good oral health	78.5	60.1
Fair/poor oral health	21.5	39.9
Very satisfied/satisfied with mouth appearance	72.4	55.9
Indifferent/dissatisfied/very dissatisfied with mouth appearance	27.6	44.1
Often/sometimes/rarely found it uncomfortable to eat any food	34.7	48.6
Never found it uncomfortable to eat any food in the past 12 months	65.3	51.4
Often/sometimes/rarely avoided particular foods	29.3	39.7
Never avoided particular foods in the past 12 months	70.7	60.3
Often/sometimes/rarely had persistent or chronic pain in the mouth	20.4	33.4
Never had persistent or chronic pain in the mouth in the past 12 months	79.6	66.6
Have taken time away from work, school or normal activities because of the need for dental treatment	21.3	17.9
Have not taken time away from work, school or normal activities because of the need for dental treatment in the past 12 months	78.7	82.1

*by child's proxy or respondent

TABLE 3 Oral health symptoms reported* by First Nations aged 3–11 years and 12 years and over

Oral health symptoms in the PAST MONTH	Age group	
	All children 3–11 years Wtd %	Adolescents & adults 12+ years Wtd %
Toothache	10.5	19.5
Dental pain when consuming hot or cold foods or drinks	14.8	29.6
Severe tooth or mouth pain at night	4.0	11.9
Pain in or around jaw joints	F	15.9
Other pain in the mouth	3.3	12.2
Bleeding gums when brushing teeth	14.8	34.0
Chronic dry mouth	7.4	19.3
Chronic bad breath	23.6	21.1

*by child's proxy or respondent
F = Estimate not provided because of extreme sampling variability or small sample size
Note: Responses were not mutually exclusive

TABLE 4 Preventive oral health care behaviours reported* by First Nations aged 3–11 years and 12 years and over

Preventive oral health care behaviour	Age group	
	All children 3–11 years Wtd %	Adolescents & adults 12+ years Wtd %
Brush teeth and/or dentures 2 or more times per day	52.2	54.7
Brush teeth and/or dentures less than 2 times per day	47.8	45.3
Floss teeth at least 5 times per week (dentate only)	19.6	25.0
Floss teeth less than 5 times per week (dentate only)	80.4	75.0
See a dental professional once a year or more than once a year for check-ups or treatment	73.0	59.9
See a dental professional less than once a year for check-ups or treatment	16.7	7.8
Only for emergency care	0.3	32.3

*by child's proxy or respondent

TABLE 5 Frequency of visits to a dental professional by First Nations, by age group

Frequency of visits	Age group					
	Young children 3–5 years	Children 6–11 years	Adolescents 12–19 years	Young adults 20–39 years	Adults 40+ years	All adults 20+ years
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
Less than 1 year ago	78.5	70.1	69.9	65.4	46.8	56.8
1 year to less than 2 years ago	18.6	10.9	21.8	21.3	22.1	21.7
2 years to less than 3 years ago	F	13.1	1.8	7.8	9.6	8.7
3 years to less than 4 years ago	0.0	F	0.0	1.2	4.2	2.6
4 years to less than 5 years ago	0.0	0.0	F	F	F	1.8
5 or more years ago	0.0	0.0	F	3.0	14.7	8.4
Never	F	F	0.0	0.0	F	F

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 6 Frequency of visits to a dental professional by First Nations aged 3–11 years and 12 years and over, by geographic location

Frequency of dental visits	All children 3-11 years		Adolescents and adults 12+ years	
	Urban Wtd %	Remote Wtd %	Urban Wtd %	Remote Wtd %
More than once a year	46.1	29.9	35.0	22.8
Once a year	25.1	50.2	21.1	36.6
Less than once a year	F	5.2	4.2	4.3
Only for emergency care	12.1	F	36.6	13.4
Never	13.1	11.4	3.0	5.7

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 7 Access to dental care among First Nations aged 3–11 years and 12 years and over

Access to dental care	Age group	
	All children 3–11 years Wtd %	Adolescents & adults 12+ years Wtd %
Avoided going to a dental professional in the past 12 months because of the cost	2.0	5.8
Avoided ALL of the dental treatment that was recommended in the past 12 months because of the cost	2.1	5.4
Have family insurance or a government program that covers all or part of dental expenses	87.1	81.4
Type of dental insurance plan		
An employer-sponsored plan	8.9	10.8
A provincial program for children and seniors	0.0	0.0
A private plan	F	F
A government program for social service clients	1.2	2.4
A government program for First Nations	96.8	95.0
Other	F	F
Site of usual dental care		
On-reserve/in community	11.3	8.3
Off-reserve/out of community	75.5	82.0
Both on and off reserve	13.2	9.6
Have been asked by regular dental provider to pay for dental services	4.9	9.0
Have been asked by dental specialist to pay for dental services	4.4	4.2

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 8 Reasons for not going to the dentist in the past 12 months reported* by First Nations aged 3–11 years and 12 years and over

Barriers to dental access in the PAST YEAR	Age group	
	All children 3–11 years Wtd %	Adolescents & adults 12+ years Wtd %
Cost	F	5.0
Fear of dentist/past traumatic experience	F	9.5
Avoid pain	F	5.6
No access to dental care	64.2	39.0
No need of care	40.4	29.9
Other**	F	12.1

*by child's proxy or respondent
F = Estimate not provided because of extreme sampling variability or small sample size
**Other reasons include but are not limited to: long waiting lists, lack of transportation, unsure of costs, "don't like the way natives are treated", "full dentures", "pregnant", and "file was closed because of missed appointments"
Note: Responses were not mutually exclusive

TABLE 9 Reasons for not going to a dental professional in the past 2 years reported by First Nations aged 12 years and over

Barriers to dental access in the PAST TWO YEARS	Age group
	Adolescents & adults 12+ years Wtd %
I have not gotten around to it	37.7
I did not think it was necessary	18.2
Personal or family responsibilities	19.3
Not available at time required	9.4
Not available at all in the community	60.3
Waiting time was too long	8.1
Transportation problems (*i.e.*, postponement, reservation bumped)	7.7
Cost	10.8
Fear (e.g. painful, embarrassing, finding something wrong)	10.8
Not covered by NIHB	3.9

NIHB = Non-insured Health Benefits Dental Program
Note: Responses were not mutually exclusive

TABLE 10 Problems accessing dental care services reported by First Nations aged 12 years and over who had not been to a dental professional in 3 years or more

Problems accessing dental care services	Age group
	Adolescents & adults 12+ years Wtd %
No problems	17.8
Services not available in my community	59.5
Services not available when requested/needed	16.3
Waiting list too long	18.3
Could not afford direct cost of care	5.6
Could not afford transportation cost	4.2
Could not arrange transportation	4.6
Chose not to visit available dental professional in community	4.4

*by child's proxy or respondent
Note: Responses were not mutually exclusive

TABLE 11 Perceived* need and access to orthodontic care among First Nations aged 3–11 years and 12 years and over

Orthodontic care and access	Age group	
	All children 3–11 years Wtd %	Adolescents & adults 12+ years Wtd %
Perceived a need for orthodontic care	23.8	14.7
Did NOT receive orthodontic care though they perceived a need for care	93.5	73.6
Reason for not receiving orthodontic care		
Denied costs	0.0	17.3
Did not meet NIHB criteria	F	25.1
Do not want the service	F	22.9
Other**	71.3	34.7
Appealed the denial	0.0	F
The lack of orthodontic care impacted on self-esteem/mental health	NA	33.8

*by child's proxy or respondent
F = Estimate not provided because of extreme sampling variability or small sample size
**Other reasons for children include but are not limited to: "still too young for braces", "services are not available in the community", "the cost is an issue", and "too far to travel". For adolescents and adults: "can't afford the cost of the braces", "dentist did not think it was needed", "need other dental work done first", "dentist said I was too old for braces", "never been referred to a specialist", "not certain about how to access orthodontic care services", and "too costly to get to the out of town appointments".
NA = Not applicable
NIHB = Non-insured Health Benefits Dental Program

TABLE 12 Prevalence and severity of dental caries in primary teeth and amalgam fillings among First Nations aged 3–5 years

Dental caries indices and amalgam fillings	Age group
	Young children 3–5 years
Wtd % of children with dmft > 0	85.9
Wtd % of children with 1 or more decayed primary teeth – dt > 0	61.3
Mean wtd n of primary teeth decayed – dt	2.68
Mean wtd n of primary teeth missing – mt	1.46
Mean wtd n of primary teeth filled – ft	3.47
Mean wtd n of primary teeth decayed, missing or filled – dmft	7.62
Wtd % of dmft that are decayed – dt/dmft	35.2
Wtd % of dmft that are filled – ft/dmft	45.5
Wtd % of children with 1 or more amalgam fillings	22.5
Mean wtd n of tooth surfaces with amalgam fillings	0.79

NA = Not applicable
Note: 6-year-old wtd prevalence of caries (dmft > 0) = 92.4%; wtd mean dmft at age 6 = 7.79

TABLE 13 Prevalence and severity of dental caries in primary teeth of First Nations aged 3–5 years, by selected characteristics

Characteristic	Prevalence	Mean number of primary teeth			
	Percent with dmft>0	decayed	missing	filled	decayed, missing or filled
	Wtd %	Wtd mean	Wtd mean	Wtd mean	Wtd mean
All	85.9	2.68	1.46	3.47	7.62
Female	80.0	3.33	0.86	2.29	6.49
Male	91.4	2.03	2.04	4.50	8.57
Household income					
Less than $20,000/yr	98.6	3.68	1.91	4.28	9.87
$20,000/yr or more	69.5	1.52	1.21	2.65	5.38
Visited a dental professional in the last year	87.8	1.65	1.47	4.72	7.83
Visited a dental professional more than one year ago	85.8	3.02	2.12	2.72	7.86
Caregiver's level of education					
High school or less	89.6	3.20	1.68	3.09	7.98
More than high school	90.9	1.38	1.66	5.00	8.04
Non-remote/urban community	87.5	2.64	1.49	3.72	7.86
Remote community	80.4	2.79	1.37	2.66	6.82

TABLE 14 Prevalence and severity of dental caries, amalgam fillings and sealants among First Nations aged 6–11 years

Dental caries indices, amalgam fillings and sealants	Age group
	Children 6–11 years
Wtd % of children with dmft > 0	80.4
Mean wtd n of primary teeth decayed – dt	0.59
Mean wtd n of primary teeth missing – mt	1.24
Mean wtd n of primary teeth filled – ft	3.45
Mean wtd n of primary teeth decayed, missing or filled – dmft	5.28
Wtd % of children with DMFT > 0	67.1
Mean wtd n of permanent teeth decayed – DT	0.57
Mean wtd n of permanent teeth missing – MT	0.17
Mean wtd n of permanent teeth filled – FT	1.13
Mean wtd n of permanent teeth decayed, missing or filled – DMFT	1.87
Wtd % of children with dmft + DMFT > 0	93.9
Mean wtd n of primary and permanent teeth decayed – dt + DT	1.10
Mean wtd n of primary and permanent teeth missing – mt + MT	1.28
Mean wtd n of primary and permanent teeth filled – ft + FT	4.20
Mean wtd n of primary and permanent teeth decayed, missing or filled – dmft + DMFT	6.58
Wtd % of dmft that are decayed – dt/dmft	11.2
Wtd % of dmft that are filled – ft/dmft	65.3
Wtd % of DMFT that are decayed – DT/DMFT	30.5
Wtd % of DMFT that are filled – FT/DMFT	60.4
Wtd % of dmft + DMFT that are decayed – (dt+DT)/(dmft+DMFT)	16.7
Wtd % of dmft + DMFT that are filled – (ft+FT)/(dmft+DMFT)	63.8
Wtd % of children with 1 or more amalgam fillings	34.6
Mean wtd n of tooth surfaces with amalgam fillings	1.60
Wtd % of children with 1 or more sealants on permanent molar teeth	21.2
Mean wtd n of sealants on permanent molar teeth among those with 1 or more sealants	2.15

Note: 6-year-old wtd prevalence of caries (dmft + DMFT > 0) = 92.4%; wtd mean dmft + DMFT at age 6 = 7.79

TABLE 15 Prevalence and severity of dental caries in primary teeth of First Nations aged 6–11 years, by selected characteristics

Characteristic	Prevalence	Mean number of primary teeth			
	Percent with dmft>0	decayed	missing	filled	decayed, missing or and filled
	Wtd %	Wtd mean	Wtd mean	Wtd mean	Wtd mean
All	80.4	0.59	1.24	3.45	5.28
Female	80.0	0.61	0.88	2.93	4.42
Male	81.7	0.57	1.79	4.27	6.62
Household income					
Less than $20,000	93.0	0.65	1.04	5.33	7.02
$20,000 or more	64.0	0.59	0.74	1.65	2.98
Visited a dental professional in the last year	78.9	0.37	0.91	3.45	4.74
Visited a dental professional more than one year ago	80.2	0.35	2.11	3.80	6.26
Caregiver's level of education					
High school or less	81.9	0.59	1.37	3.51	5.47
More than high school	73.9	0.91	0.55	2.81	4.28
Non-remote/urban community	84.5	0.46	1.40	3.92	5.73
Remote community	66.7	1.01	0.68	1.89	3.58

TABLE 16 Prevalence and severity of dental caries in permanent teeth of First Nations aged 6–11 years, by selected characteristics

Characteristic	Prevalence	Mean number of permanent teeth			
	Percent with DMFT>0	Decayed	Missing	Filled	Decayed, Missing or Filled
	Wtd %	Wtd mean	Wtd mean	Wtd mean	Wtd mean
All	67.1	0.57	0.17	1.13	1.87
Female	58.1	0.43	0.23	0.97	1.63
Male	77.2	0.74	0.10	1.20	2.04
Household income					
Less than $20,000/yr	48.1	0.45	0.36	0.80	1.61
$20,000/yr or more	78.7	0.67	0.07	1.59	2.33
Visited a dental professional in the last year	63.7	0.32	0.19	1.24	1.75
Visited a dental professional more than one year ago	75.7	1.04	0.17	0.86	2.08
Caregiver's education					
High school or less	66.3	0.62	0.20	0.92	1.74
More than high school	80.2	0.30	0.00	2.32	2.62
Non-remote/urban community	63.9	0.54	0.19	1.19	1.72
Remote community	79.6	0.69	0.13	1.52	2.48

TABLE 17 Prevalence and severity of dental caries in primary and permanent teeth of First Nations aged 6-11 years, by selected characteristics

Characteristic	Prevalence	Mean number of primary and permanent teeth			
	Percent with dmft+DMFT>0	decayed+Decayed	missing+Missing	filled+Filled	dmft+DMFT
	Wtd %	Wtd mean	Wtd mean	Wtd mean	Wtd mean
All	93.9	1.10	1.28	4.20	6.58
Female	93.1	1.01	1.06	3.75	5.82
Male	95.6	1.24	1.71	5.05	7.99
Household income					
Less than $20,000/yr	100.0	1.07	1.36	5.86	8.29
$20,000/yr or more	90.1	1.21	0.75	3.09	5.06
Visited a dental professional in the last year	92.8	0.65	1.01	4.34	6.00
Visited a dental professional more than one year ago	96.0	1.39	2.28	4.66	8.33
Caregiver's level of education					
High school or less	95.0	1.18	1.49	4.23	6.90
More than high school	93.0	1.09	0.47	4.74	6.29
Non-remote/urban community	93.8	0.94	1.40	4.37	6.71
Remote community	94.3	1.70	0.80	3.55	6.06

TABLE 18 Prevalence and mean number of dental sealants among First Nations aged 6–11 years, by selected characteristics

Characteristic	Weighted percent with ≥ 1 sealant on permanent molar teeth	Weighted mean number of sealants on permanent molar teeth among those with 1 or more sealants
All	21.2	2.15
Female	25.9	2.20
Male	16.3	2.11
Household income		
Less than $20,000/yr	20.4	2.21
$20,000/yr or more	24.2	1.12
Visited a dental professional in the last year	30.6	2.19
Visited a dental professional more than one year ago	F	F
Caregiver's level of education		
High school or less	16.8	1.95
More than high school	39.4	2.07
Non-remote/urban community	21.2	2.20
Remote community	21.3	1.95

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 19 Prevalence and severity of dental caries, amalgam fillings and sealants among First Nations aged 12–19 years

Dental caries indices (coronal caries), amalgam fillings and sealants	Age group
	Adolescents 12–19 years
Wtd % of adolescents with DMFT > 0	91.4
Mean wtd n of permanent teeth decayed – DT	1.41
Mean wtd n of permanent teeth missing – MT	0.27
Mean wtd n of permanent teeth filled – FT	4.47
Mean wtd n of permanent teeth decayed, missing or filled – DMFT	6.15
Wtd % of DMFT that are decayed (95% CI) – DT/DMFT	22.9
Wtd % of DMFT that are missing (95% CI) – MT/DMFT	4.4
Wtd % of DMFT that are filled (95% CI) – FT/DMFT	72.7
Wtd % of adolescents with 1 or more untreated coronal caries – DT > 0	46.4
Mean wtd n of untreated teeth among those with 1 or more untreated coronal caries	3.04
Wtd % of adolescents with 1 or more amalgam fillings	52.2
Mean wtd n of tooth surfaces with amalgam fillings	4.11
Wtd % of adolescents with 1 or more sealants on permanent molar teeth	27.4
Mean wtd n of sealants on permanent molar teeth among those with 1 or more sealants	3.06

Note: 12-year-old wtd prevalence of caries (DMFT > 0) = 82.2%; wtd mean DMFT at age 12 = 3.88; wtd % with untreated caries at age 12 = 31.4%

TABLE 20 Prevalence and severity of dental caries in permanent teeth of First Nations aged 12–17 years, by selected characteristics

Characteristic	Prevalence	Mean number of permanent teeth			
	Percent with DMFT>0	Decayed	Missing	Filled	Decayed, Missing or Filled
	Wtd %	Wtd mean	Wtd mean	Wtd mean	Wtd mean
All	88.9	1.33	0.23	3.68	5.25
Female	99.2	1.57	0.44	4.39	6.40
Male	83.6	1.21	0.07	3.18	4.47
Visited a dental professional in the last year	87.3	1.08	0.31	4.08	5.47
Visited a dental professional more than one year ago	100.0	1.88	0.14	3.06	5.09
High school or less*	90.1	1.72	0.28	3.58	5.58
More than high school	94.3	0.08	0.01	3.78	3.87
Non-remote/urban community	86.2	1.33	0.16	3.10	4.58
Remote community	100.0	1.36	0.53	6.16	8.05
Smoker	100.0	2.29	0.69	4.28	7.26
Non-smoker	97.3	1.21	0.11	4.11	5.43

*Based on mother's highest level of education
Note: Adolescent respondents were not asked about household income

TABLE 21 Prevalence and mean number of dental sealants among First Nations aged 12–17 years, by selected characteristics

Characteristic	Sealants	
	Weighted percent with ≥ 1 sealant on permanent molar teeth	Weighted mean number of sealants on permanent molar teeth among those with 1 or more sealants
All	28.2	3.07
Female	15.2	2.52
Male	45.9	3.28
Visited a dental professional in the last year	34.5	3.48
Visited a dental professional more than one year ago	24.2	F
High school or less*	28.7	2.88
More than high school	13.0	F
Non-remote/urban community	28.6	3.44
Remote community	26.1	1.36
Smoker	F	F
Non-smoker	37.6	2.81

*Based on mother's highest level of education
F = Estimate not provided because of extreme sampling variability or small sample size
Note: Adolescent respondents were not asked about household income

TABLE 22 Dentate status of First Nations adults, by age group

Dentate Status	Age group		
	Young adults 20–39 years	Adults ages 40–59 years	Older adults 60+ years
Wtd % of adults Dentate – both arches	98.2	83.0	18.5
Wtd % of adults Dentate – upper arch only	F	F	F
Wtd % of adults Dentate – lower arch only	F	7.8	45.9
Wtd % of adults Edentulous with one or more implants	0.0	0.0	0.0
Wtd % of adults Edentulous	F	8.8	32.6

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 23 Edentulism and retention of natural teeth among First Nations aged 20 years and over, by selected characteristics

Characteristic	Percent edentulous	% with 28 teeth	% with fewer than 21 teeth	Mean number of teeth present
	Wtd %	Wtd %	Wtd %	Wtd mean
All	6.3	21.7	20.6	23.5
Female	6.8	27.1	18.1	24.1
Male	6.0	15.4	23.3	22.8
Age 20-39	F	31.5	4.7	25.5
Age 40+	13.1	6.8	44.8	20.5
Less than $20,000	5.8	18.1	21.6	23.0
$20,000 or more	6.9	15.1	25.6	22.9
Visited a dental professional in the last year	2.0	25.0	15.0	24.2
Visited a dental professional more than one year ago	8.9	17.5	29.7	22.5
High school or less	5.7	22.8	22.5	23.3
More than high school	7.6	16.8	9.7	24.7
Non-remote/urban community	5.9	21.7	19.6	23.6
Remote community	7.9	21.5	24.9	22.8
Smoker	5.0	22.1	20.4	23.4
Non-smoker	8.0	22.1	18.6	23.9

F = Estimate not provided because of extreme sampling variability or small sample size.

TABLE 24 Prevalence and severity of coronal caries and amalgam fillings among dentate First Nations adults, by age group

Dental caries indices (CORONAL caries) and amalgam fillings	Age group		
	Young adults 20–39 years	Adults ages 40+ years	All adults 20+ years
Wtd % of adults with DMFT > 0	99.8	100.0	99.9
Mean wtd n of permanent teeth decayed – DT	2.10	1.50	1.83
Mean wtd n of permanent teeth missing – MT	1.82	7.44	4.33
Mean wtd n of permanent teeth filled – FT	7.84	7.21	7.56
Mean wtd n of permanent teeth decayed, missing or filled – DMFT	11.76	16.15	13.72
Wtd % of DMFT that are decayed – DT/DMFT	17.9	9.3	13.3
Wtd % of DMFT that are missing – MT/DMFT	15.5	46.1	31.6
Wtd % of DMFT that are filled – FT/DMFT	66.7	44.6	55.1
Wtd % of adults with 1 or more untreated coronal caries – DT > 0	62.3	49.4	56.5
Mean wtd n of untreated teeth among those with 1 or more untreated coronal caries	3.37	3.04	3.24
Wtd % of adults with 1 or more amalgam fillings	87.3	85.6	86.6
Mean wtd n of tooth surfaces with amalgam fillings	8.84	8.97	8.90

TABLE 25 Prevalence and severity of coronal caries in permanent teeth of dentate First Nations aged 18 years and over, by selected characteristics

Characteristic	Prevalence	Mean number of permanent teeth			
	Percent with DMFT>0 Wtd %	Decayed Wtd mean	Missing Wtd mean	Filled Wtd mean	Decayed, Missing, or Filled Wtd mean
All	99.9	1.82	4.06	7.53	13.41
Female	99.9	1.70	3.57	7.90	13.17
Male	100.0	2.03	4.61	6.98	13.62
Age 18-39	99.9	2.05	1.66	7.76	11.46
Age 40+	100.0	1.50	7.44	7.21	16.15
Household income					
Less than $20,000/yr	100.0	2.23	4.09	6.94	13.27
$20,000/yr or more	100.0	1.66	4.59	7.56	13.82
Visited a dental professional in the last year	99.9	1.51	2.98	8.47	12.97
Visited a dental professional more than one year ago	100.0	2.29	5.35	6.54	14.17
High school or less	99.9	2.13	4.09	6.96	13.19
More than high school	100.0	0.63	3.10	9.99	13.72
Non-remote/urban community	100.0	1.79	3.80	7.41	13.00
Remote community	99.6	1.95	5.23	8.08	15.26
Smoker	99.9	2.07	4.13	7.41	13.61
Non-smoker	100.0	1.42	3.80	7.65	12.87

TABLE 26 Prevalence and severity of root caries among dentate First Nations adults, by age group

Dental caries indices (ROOT caries)	Age group			
	Young adults 20–39 years	Adults ages 40–59 years	Adults ages 40+ years	All adults 20+ years
Wtd % of adults with 1 or more root decayed or filled teeth – RDFT > 0	22.3	46.5	46.2	32.9
Mean wtd n of root decayed teeth – RDT	0.67	0.99	0.95	0.79
Mean wtd n of root filled teeth – RFT	0.15	0.48	0.51	0.31
Mean wtd n of root decayed or filled teeth – RDFT	0.82	1.47	1.46	1.10
Wtd % of RDFT that are decayed – RDT/RDFT	81.7	67.3	65.1	71.8
Wtd % of RDFT that are filled – RFT/RDFT	18.3	32.7	34.9	28.2
Wtd % of adults with 1 or more untreated root caries – RDT > 0	18.3	32.3	30.7	23.8
Mean wtd n of untreated teeth among those with 1 or more untreated root caries	3.64	3.06	3.09	3.33

TABLE 27 Prevalence and severity of root caries among dentate First Nations aged 18 years and over, by selected characteristics

Characteristic	Wtd percent with 1 or more root decayed or filled teeth	Root decayed teeth Wtd mean	Root filled Teeth Wtd mean	Root decayed or filled teeth Wtd mean
All	32.0	0.76	0.29	1.05
Female	27.4	0.47	0.29	0.76
Male	37.1	1.13	0.29	1.42
Age 18-39	21.4	0.61	0.14	0.75
Age 40+	47.4	0.97	0.52	1.49
Household income				
Less than $20,000/yr	34.3	1.02	0.10	1.13
$20,000/yr or more	28.2	0.65	0.35	1.00
Visited a dental professional in the last year	29.9	0.62	0.34	0.96
Visited a dental professional more than one year ago	33.8	0.93	0.21	1.14
High school or less	30.7	0.89	0.23	1.12
More than high school	32.7	0.13	0.52	0.65
Non-remote/urban community	33.8	0.80	0.32	1.12
Remote community	23.9	0.57	0.17	0.74
Smoker	31.7	0.86	0.22	1.08
Non-smoker	31.1	0.61	0.40	1.02

TABLE 28 Prevalence and severity of untreated decay in dentate First Nations aged 18 years and over, by selected characteristics

Characteristic	Untreated coronal caries		Untreated root caries	
	Wtd % with 1 or more	Wtd mean number of untreated teeth among those with ≥ 1	Wtd % with 1 or more	Wtd mean number of untreated teeth among those with ≥ 1
All	56.5	9.51	23.4	3.23
Female	53.6	9.79	17.1	2.76
Male	61.3	9.15	32.0	3.54
Age 18-39	60.6	9.83	17.9	3.42
Age 40+	50.7	9.05	31.5	3.08
Household income				
Less than $20,000/yr	62.1	9.27	19.8	3.43
$20,000/yr or more	56.9	9.35	20.4	3.20
Visited a dental professional in the last year	52.4	10.01	20.9	2.96
Visited a dental professional more than one year ago	64.6	9.08	27.3	3.40
High school or less	62.7	9.27	26.2	3.41
More than high school	35.1	10.64	11.5	1.13
Non-remote/urban community	56.8	9.31	24.4	3.28
Remote community	55.4	10.45	19.2	2.97
Smoker	59.2	9.68	25.8	3.33
Non-smoker	52.0	9.19	19.6	3.13

TABLE 29 Periodontal conditions in dentate First Nations aged 20 years and over

Periodontal Indices	Age group
	All adults 20+ years
Wtd % of adults with Debris score 2 or 3	45.4
Wtd % of adults with Calculus score 2 or 3	44.7
Wtd % of adults with Gingivitis score 2 or 3	43.9
Wtd % of adults with Periodontal Pockets of 4 mm or more	23.0
Wtd % of adults with Attachment Loss of 4 mm or more	16.8

Highest Debris score: 2 = 1/3 to 2/3 of surface covered by debris; 3 = more than 2/3 of surface covered
Highest Calculus score: 2 = 1/3 to 2/3 of surface covered by calculus; 3 = more than 2/3 of surface covered
Highest Gingivitis score: 2 = moderate gingival inflammation; 3 = severe inflammation

TABLE 30 Prevalence of diabetes among First Nations, by type and age group

Diabetes status	Age group					
	Young children 3–5 years	Children 6–11 years	Adolescents 12–17 years	Young adults 18–39 years	Adults 40+ years	All adults 18+ years
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
Diabetic	0.0	0.0	0.0	7.1	26.8	15.9
Type 1	0.0	0.0	0.0	F	10.4	11.1
Type 2	0.0	0.0	0.0	86.1	89.6	88.6
Gestational	NA	NA	0.0	F	0.0	F

NA = Not applicable

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 31 Periodontal conditions in dentate First Nations aged 20 years and over, by diabetic status

Periodontal Indices	Age group 20+ years	
	Diabetic	Non-diabetic
Wtd % of adults with Debris score 2 or 3	48.0	45.2
Wtd % of adults with Calculus score 2 or 3	35.6	47.4
Wtd % of adults with Gingivitis score 2 or 3	37.2	45.9
Wtd % of adults with Periodontal Pockets of 4 mm or more	18.6	23.4
Wtd % of adults with Attachment Loss of 4 mm or more	23.7	15.0

F = Estimate not provided because of extreme sampling variability or small sample size
Highest Debris score: 2 = 1/3 to 2/3 of surface covered by debris; 3 = more than 2/3 of surface covered
Highest Calculus score: 2 = 1/3 to 2/3 of surface covered by calculus; 3 = more than 2/3 of surface covered
Highest Gingivitis score: 2 = moderate gingival inflammation; 3 = severe inflammation

TABLE 32 Percent of dentate First Nations aged 18 years and over, by highest score for debris* and calculus and by selected characteristics**

Characteristic	Debris score				Calculus score
	0	1	2	3	2 or 3
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
All	10.5	44.8	35.1	9.0	42.8
Female	12.6	46.0	35.2	6.1	34.8
Male	6.3	44.7	34.8	13.2	54.1
Age 18-39	6.2	46.6	36.4	10.6	38.3
Age 40+	16.8	42.3	33.1	6.8	49.2
Household income					
Less than $20,000/yr	8.1	35.9	45.5	9.9	47.4
$20,000/yr or more	9.6	52.5	29.2	8.5	45.9
Visited a dental professional in the last year	9.1	45.2	34.3	10.9	36.1
Visited a dental professional more than one year ago	11.3	46.2	35.3	7.2	51.2
High school or less	6.8	43.4	38.8	10.4	48.3
More than high school	21.7	53.1	21.5	F	22.5
Non-remote/urban community	11.0	41.2	37.7	9.7	42.1
Remote community	8.4	61.7	22.9	6.0	45.9
Smoker	8.9	43.0	37.0	10.4	45.8
Non-smoker	10.3	50.6	31.2	7.6	40.5

F = Estimate not provided because of extreme sampling variability or small sample size

*Debris Index (DI) score:

0: No soft debris or stain; 1: Less than 1/3 of surface covered; 2: 1/3 to 2/3 of surface covered; 3: More than 2/3 of surface covered.

**Calculus Index (CI) score:

0: No calculus; 1: Less than 1/3 of surface covered; 2: 1/3 to 2/3 of surface covered; 3: More than 2/3 of surface covered.

TABLE 33 Percent of dentate First Nations aged 18 years and over, by highest score for gingivitis* and by selected characteristics

Characteristic	Gingivitis score		
	0	1	2 or 3
	Wtd %	Wtd %	Wtd %
All	17.1	37.6	44.4
Female	21.8	38.5	38.9
Male	10.8	35.7	52.3
Age 18-39	18.8	33.5	47.6
Age 40+	14.7	43.6	39.8
Household income			
Less than $20,000/yr	12.7	31.5	55.2
$20,000/yr or more	13.7	45.2	40.1
Visited a dental professional in the last year	19.2	39.0	41.7
Visited a dental professional more than one year ago	15.1	34.3	49.1
High school or less	14.3	36.3	48.2
More than high school	26.4	44.2	29.4
Non-remote/urban community	17.1	38.4	44.0
Remote community	17.4	33.7	46.2
Smoker	14.6	36.2	48.1
Non-smoker	20.6	38.4	40.4

*Gingival Index (GI) score:
0: Normal gingival
1: Mild inflammation – slight change in color, slight edema. No bleeding on probing.
2: Moderate inflammation – redness, edema, and glazing. Bleeding on probing.
3: Severe inflammation – marked redness and edema. Ulceration. Tendency to spontaneous bleeding.

TABLE 34 Prevalence and severity of periodontal pockets among dentate First Nations aged 18 years and over, by highest score and selected characteristics

Characteristic	0-1 mm	2 mm	3 mm	4 mm	5 mm	≥ 6 mm	Mean pocket depth among those with at least one pocket ≥ 4 mm
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd mean
All	5.1	32.4	40.0	12.4	5.6	4.4	4.74
Female	5.6	34.1	40.7	11.9	5.9	1.8	4.53
Male	4.3	28.9	41.1	13.1	4.8	7.7	4.92
Age 18-39	2.9	37.4	40.1	12.2	4.8	2.7	4.54
Age 40+	8.6	24.8	39.9	12.8	6.8	7.2	4.96
Household income							
Less than $20,000/yr	3.9	35.2	40.9	14.0	1.6	4.4	4.73
$20,000/yr or more	4.4	24.0	41.5	15.7	6.6	7.7	4.75
Visited a dental professional in the last year	5.3	33.9	40.2	11.9	5.9	2.8	4.58
Visited a dental professional more than one year ago	4.6	29.9	40.1	13.6	4.4	7.4	4.94
High school or less	5.4	29.5	42.5	12.1	5.3	5.2	4.79
More than high school	F	41.8	32.2	15.1	7.0	F	4.42
Non-remote/urban community	5.7	33.0	39.1	12.0	5.1	5.1	4.79
Remote community	2.6	29.7	44.3	14.1	8.0	1.3	4.51
Smoker	4.5	32.4	39.4	12.6	6.0	5.0	4.80
Non-smoker	5.7	31.5	42.0	12.6	4.6	3.6	4.59

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 35 Prevalence and severity of attachment loss among dentate First Nations aged 18 years and over, by highest score and selected characteristics

Characteristic	0-1 mm	2 mm	3 mm	4 mm	5 mm	≥ 6 mm	Mean loss of attachment among those with attachment loss of at least ≥ 4 mm
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd mean
All	39.9	24.6	19.4	5.0	5.8	5.3	5.23
Female	45.6	25.8	16.1	4.3	4.3	3.9	5.20
Male	33.3	22.9	23.9	5.8	6.9	7.1	5.25
Age 18-39	55.4	24.0	11.9	3.8	3.2	1.7	4.90
Age 40+	16.5	25.5	30.7	6.7	9.8	10.9	5.39
Household income							
Less than $20,000/yr	51.1	19.9	13.3	5.3	4.1	6.2	5.33
$20,000/yr or more	28.4	24.2	32.9	5.4	5.2	4.0	5.00
Visited a dental professional in the last year	42.8	27.3	19.8	3.3	3.5	3.3	5.13
Visited a dental professional more than one year ago	36.8	18.9	20.4	7.7	7.6	8.6	5.26
High school or less	41.2	23.2	20.6	5.0	4.4	5.6	5.24
More than high school	39.0	27.4	17.9	5.5	9.0	F	4.77
Non-remote/urban community	42.3	23.7	19.4	4.0	5.6	5.0	5.24
Remote community	29.1	28.5	19.4	9.4	6.8	6.9	5.22
Smoker	37.7	29.5	17.3	5.3	5.0	5.2	5.23
Non-smoker	44.8	17.3	21.4	4.6	6.4	5.6	5.22

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 36 Prevalence of periodontal conditions among dentate First Nations, by CPITN* scores and age groups

Age group	0: Healthy	1: Gingival bleeding	2: Calculus	3: Pocket(s) 4–5 mm	4: Pocket(s) 6 mm or more
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
15–19	37.2	13.5	43.1	F	0.0
20–39	21.3	2.0	55.5	18.0	2.9
40+	18.8	F	44.0	15.4	5.6

F = Estimates not provided because of extreme sampling variability or small sample size.
*CPITN = Community Periodontal Index of Treatment Needs:
Highest CPITN score 0: healthy gingival/periodontal tissues (no treatment required).
Highest CPITN score 1: gingival bleeding (GI scores 2 and 3. Indicates a need only for instructions on improved oral hygiene – oral hygiene education).
Highest CPITN score 2: dental calculus (scaling and improved oral hygiene).
Highest CPITN score 3: pocket depth of 4 or 5 mm (scaling and improved oral hygiene).
Highest CPITN score 4: pocket depth of 6 mm or more (complex treatment, e.g. deep scaling and root planing or surgical intervention, in addition to oral hygiene education).

TABLE 37 Prevalence of periodontal conditions among dentate First Nations aged 18 years and over, by CPITN* scores and selected characteristics

Characteristic	0: Healthy	1: Gingival bleeding	2: Calculus	3: Pocket(s) 4-5 mm	4: Pocket(s) ≥ 6 mm
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
All	21.9	3.3	53.6	16.8	4.1
Female	26.1	5.2	50.3	16.4	1.7
Male	14.2	F	60.5	16.8	7.2
Age 18-39	22.1	3.6	55.6	16.1	2.5
Age 40+	21.6	F	50.6	17.7	6.5
Household income					
Less than $20,000/yr	19.6	3.2	58.8	14.1	4.0
$20,000/yr or more	14.7	F	53.7	21.0	7.2
Visited a dental professional in the last year	22.5	4.6	53.1	16.9	2.7
Visited a dental professional more than one year ago	19.9	F	55.7	16.1	6.6
High school or less	17.3	4.2	57.2	16.1	4.8
More than high school	35.0	0.0	43.4	20.7	F
Non-remote/urban community	23.1	3.9	52.4	15.9	4.8
Remote community	16.5	1.0	58.7	20.7	1.3
Smoker	20.8	2.6	54.6	17.0	4.6
Non-smoker	19.7	4.6	55.5	16.5	3.5

F = Estimate not provided because of extreme sampling variability or small sample size
*CPITN = Community Periodontal Index of Treatment Needs:
Highest CPITN score 0: healthy gingival/periodontal tissues (no treatment required).
Highest CPITN score 1: gingival bleeding (GI scores 2 and 3. Indicates a need only for instructions on improved oral hygiene – oral hygiene education).
Highest CPITN score 2: dental calculus (scaling and improved oral hygiene).
Highest CPITN score 3: pocket depth of 4 or 5 mm (scaling and improved oral hygiene).
Highest CPITN score 4: pocket depth of 6 mm or more (complex treatment, e.g. deep scaling and root planing or surgical intervention, in addition to oral hygiene education).

TABLE 38 Prevalence of incisor trauma among dentate First Nations children, adolescents and adults

Dental Trauma	Age group		
	Children 6–11 years	Adolescents 12–19 years	All adults 20+years
Wtd % with 1 or more incisor teeth lost due to trauma	F	F	8.0
Mean wtd n of incisor teeth lost due to trauma among those with at least one tooth lost	F	F	2.00
Wtd % with 1 or more incisor teeth fractured/traumatized	F	3.9	22.7
Mean wtd n of incisor teeth fractured/traumatized among those with at least one tooth affected	F	1.71	1.82
Wtd % with 1 or more incisor teeth lost or fractured/traumatized	F	6.9	25.9
Mean wtd n of incisor teeth lost or fractured/traumatized among those with at least one tooth affected	F	1.42	2.16

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 39 Prevalence of incisor trauma among dentate First Nations aged 18 years and over, by selected characteristics

Characteristic	Lost		Fractured		Lost or fractured	
	Wtd % with 1 or more incisor teeth lost due to trauma	Wtd mean number of incisor teeth lost due to trauma among those with at least one lost	Wtd % with 1 or more traumatized incisor teeth	Wtd mean number of incisor teeth traumatized among those with at least one tooth affected	Wtd % with 1 or more lost or traumatized incisor teeth	Wtd mean number of incisor teeth lost or traumatized among those with at least one tooth affected
All	7.7	1.99	21.9	1.81	25.4	2.14
Female	7.0	1.78	18.3	1.50	21.9	1.81
Male	8.6	2.25	26.9	2.07	30.0	2.44
Age 18-39	6.2	1.49	23.0	1.81	26.0	1.95
Age 40+	9.8	2.44	20.3	1.82	24.5	2.42
Household income						
Less than $20,000/yr	9.6	1.91	26.2	1.81	29.3	2.22
$20,000/yr or more	7.2	2.21	21.5	1.72	24.0	2.17
Visited a dental professional in the last year	9.1	1.70	21.0	1.95	25.8	2.17
Visited a dental professional more than one year ago	5.5	2.54	23.6	1.56	25.2	1.99
High school or less	9.3	2.03	23.9	1.88	28.3	2.22
More than high school	F	1.76	15.2	1.38	15.2	1.61
Non-remote/urban community	7.4	2.02	22.4	1.81	25.5	2.15
Remote community	9.0	1.86	19.8	1.80	25.1	2.05
Smoker	8.1	1.94	25.5	1.86	29.9	2.08
Non-smoker	7.3	2.16	16.2	1.63	18.3	2.28

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 40 Prevalence and severity of dental fluorosis (Dean's Index) among First Nations aged 6–11 years

Normal teeth	Questionable*	Very mild	Mild	Moderate	All 4 anterior teeth absent
Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
61.9	6.6	7.3	7.4	F	16.7

*Poorly defined and could be due to antibiotic usage, infection, severe fever, or trauma
F = Estimate not provided because of extreme sampling variability or small sample size
Note: No participant was found to have "severe" dental fluorosis.

TABLE 41 Prevalence of fluorosis (Dean's Index) among First Nations aged 6-11 years, by selected characteristics

Characteristic	Presence of Fluorosis* Wtd %
All	25.7
Female	27.5
Male	23.2
Household income	
Less than $20,000/yr	41.7
$20,000/yr or more	17.9
Visited a dental professional in the last year	23.3
Visited a dental professional more than one year ago	34.0
Caregiver's level of education	
High school or less	29.8
More than high school	F
Non-remote/urban community	29.5
Remote community	13.7

*This combines the following categories: questionable, very mild, mild, and moderate.
F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 42 Prevalence and type of malocclusion among First Nations aged 12 years and over*, current orthodontic treatment status and percent who had received orthodontic treatment prior to the survey

Malocclusion, orthodontic treatment status and treatment history	Age group 12+ years
	Wtd %
Less than acceptable occlusion	30.3
Type of malocclusion	
Anterior crossbite	9.6
Severe crowding	14.9
Severe spacing	1.4
Posterior crossbite	6.9
Anterior open bite (1 mm)	3.3
Excessive overbite (100% or more)	F
Excessive overjet (9 mm)	1.6
Midline shift (4 mm)	3.5
Current orthodontic treatment status	
No orthodontic treatment	98.6
Fixed appliances	0.7
Retainer – post completion	F
Participant received orthodontic treatment in the past	8.7

*Only applies to individuals with teeth on both arches.
Note: Types of malocclusion are not mutually exclusive.
F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 43 Prevalence of less than acceptable occlusion among First Nations aged 12–59 years old*, by selected characteristics

Characteristic	Age group			
	Adolescents 12–17 years	Young adults 18–39 years	Adults 40–59 years	Ages 18–59 years
	Wtd %	Wtd %	Wtd %	Wtd %
All	48.1	31.2	15.4	25.6
Female	40.6	25.5	16.1	22.4
Male	46.1	37.9	15.6	29.3
Household income				
Less than $20,000/yr	NA	31.9	10.8	25.7
$20,000/yr or more		25.0	15.8	20.6
Visited a dental professional in the last year	40.2	30.0	11.7	24.1
Visited a dental professional more than one year ago	43.7	32.1	18.8	26.5
High school or less	39.4**	31.7	9.1	24.8
More than high school	79.4**	25.2	28.6	26.9
Non-remote/urban community	48.4	29.5	15.1	24.1
Remote community	46.9	38.3	17.2	32.7
Smoker	47.7	31.2	18.6	27.2
Non-smoker	37.5	28.8	12.6	22.3

*Only applies to individuals with teeth on both arches.
**Based on mother's highest level of education
NA = Not applicable since adolescents were not asked about household income

TABLE 44 Prevalence of orthodontic treatment currently or in the past among First Nations aged 12 years and over*, by selected characteristics

Characteristic	Age group		
	Adolescents 12–17	Young adults 18–39	Adults 40+
	Wtd %	Wtd %	Wtd %
All	3.5	17.1	3.4
Female	5.3	19.5	4.8
Male	F	13.0	F
Household income			
Less than $20,000/yr	NA	12.5	0.0
$20,000/yr or more		22.5	F
Visited a dental professional in the last year	5.3	19.7	5.6
Visited a dental professional more than one year ago	F	13.2	F
High school or less	2.5**	15.5	F
More than high school	F	24.4	12.5
Non-remote/urban community	3.6	19.2	3.7
Remote community	F	8.5	F
Smoker	F	17.8	F
Non-smoker	3.0	15.0	4.6

*Only applies to individuals with teeth on both arches.

**Based on mother's highest level of education

F = Estimate not provided because of extreme sampling variability or small sample size

NA = Not applicable since adolescents were not asked about household income

TABLE 45 Prevalence of oral mucosal lesions among First Nations aged 12 years and over, by type of lesion

Mucosal status and type of lesion	Age group 12+ years
	Wtd %
No mucosal abnormalities	84.7
With 1 or more lesions	15.3
Angular cheilitis	2.2
Mucosal white patches	11.0
Leukoplakia	93.8
Lichen planus	0.0
Candidiasis	6.2
Denture stomatitis	29.0
Denture induced hyperplasia (epulis)	F
Glossitis	0.0
Sinus or fistula	15.0
Aphthous ulcer	F
Traumatic or unspecified ulcer	13.6
Other*	15.0

Note: Types of soft tissue lesions are not mutually exclusive
*Other includes: 1 fibroma on the tongue, 1 traumatic fibroma, and 21 blanks
F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 46 Prevalence of oral mucosal lesions among First Nations aged 18 years and over, by type and selected characteristics

Characteristic	Angular Cheilitis	Mucosal White Patches	Denture Stomatitis	Sinus or Fistula	Traumatic or other ulcer
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
All	11.7	11.5	30.4	15.5	13.8
Female	16.6	7.9	48.7	2.8	16.4
Male	8.6	15.4	17.8	20.1	12.3
Age 18-39	F	13.2	F	11.7	19.7
Age 40+	16.3	10.8	38.4	16.4	11.0
Household income					
Less than $20,000/yr	6.4	F	28.4	3.8	15.8
$20,000/yr or more	F	F	19.1	F	F
Visited a dental professional in the last year	F	F	26.6	4.6	14.3
Visited a dental professional more than one year ago	17.2	14.4	32.0	18.0	12.5
High school or less	14.2	10.0	26.1	15.9	11.3
More than high school	F	F	45.9	0.0	26.8
Non-remote/urban community	12.5	11.4	29.4	14.6	11.8
Remote community	6.3	12.5	37.5	17.9	27.9
Smoker	F	15.6	31.1	9.8	15.1
Non-smoker	33.8	F	33.7	19.4	11.7

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 47 Prosthetic status of dentate First Nations aged 20 years and over

Prosthetic status	Age group 20+ years	
	Upper arch Wtd %	Lower arch Wtd %
No prosthetics	85.0	95.1
Fixed bridge	F	F
Implant	1.8	0.0
Partial denture – acrylic	2.9	F
Partial denture – cast chrome	6.2	3.3
Full denture	5.4	F

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 48 Denture use among dentate First Nations aged 18 years and over, by selected characteristics

Characteristic	Among dentate, percent wearing dentures or fixed bridges		
	Upper arch only Wtd %	Lower arch only Wtd%	Both upper and lower arches Wtd %
All	6.6	1.5	2.4
Female	6.9	F	2.5
Male	5.8	F	F
Age 18-39	2.6	0.0	F
Age 40+	12.3	3.7	5.5
Household income			
Less than $20,000/yr	6.2	F	F
$20,000/y or more	4.6	F	F
Visited a dental professional in the last year	4.9	F	2.6
Visited a dental professional more than one year ago	8.3	F	F
High school or less	5.9	F	1.8
More than high school	8.4	F	F
Non-remote/urban community	6.8	F	2.2
Remote community	5.5	F	3.3
Smoker	7.3	F	1.6
Non-smoker	5.0	F	F

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 49 Prosthetic status of edentulous First Nations aged 20 years and over

Prosthetic status	Age group 20+ years	
	Upper arch Wtd %	Lower arch Wtd %
No prosthetics	6.7	34.9
Fixed bridge	0.0	0.0
Implant	0.0	0.0
Partial denture – acrylic	0.0	0.0
Partial denture – cast chrome	0.0	0.0
Full denture	93.3	65.1

TABLE 50 Denture use among edentulous First Nations aged 18 years and over, by selected characteristics

Characteristic	Among edentulous, percent wearing dentures
	Both upper and lower arches Wtd %
All	65.1
Female	63.4
Male	67.5
Age 18-39	F
Age 40+	64.6
Household income	
Less than $20,000/yr	58.3
$20,000/yr or more	85.5
Visited a dental professional in the last year	78.9
Visited a dental professional more than one year ago	68.7
High school or less	71.0
More than high school	F
Non-remote/urban community	61.7
Remote community	76.6
Smoker	50.8
Non-smoker	82.7

F = Estimate not provided because of extreme sampling variability or small sample size

TABLE 51 Prosthetic treatment needs of dentate First Nations aged 20 years and over

Prosthetic needs	Age group 20+ years	
	Upper arch Wtd %	Lower arch Wtd %
No prosthetics needed	66.6	71.2
Fixed bridge	3.9	2.3
Implant	1.8	0.9
Denture repair or reline	1.7	F
New partial denture	24.0	24.8
New full denture	5.5	1.8

F = Estimate not provided because of extreme sampling variability or small sample size
Note: Percentages do not add up to 100% because treatment needs were not mutually exclusive

TABLE 52 Prosthetic treatment needs of edentulous First Nations aged 20 years and over

Prosthetic needs	Age group 20+ years	
	Upper arch Wtd %	Lower arch Wtd %
No prosthetics needed	61.2	39.3
Fixed bridge	0.0	0.0
Implant	0.0	0.0
Denture repair or reline	15.6	29.7
New partial denture	0.0	0.0
New full denture	30.0	37.8

Note: Percentages do not add up to 100% because treatment needs were not mutually exclusive

TABLE 53 Perceived* dental treatment needs of First Nations, by type of treatment and age group

Perceived dental treatment needs	Age group			
	Young children 3–5 years Wtd %	Children 6–11 years Wtd %	Adolescents 12–19 years Wtd %	Adults 20+ years Wtd %
No treatment needed	70.5	72.7	53.1	46.8
Prevention	15.6	49.1	52.4	31.1
Fillings/Restorations	67.7	63.6	76.4	60.5
Temporomandibular joint disorder (TMD)	0.0	0.0	F	3.3
Surgery	F	F	25.0	34.2
Periodontics	0.0	F	F	2.7
Esthetics	0.0	0.0	0.0	F
Endodontics	0.0	0.0	F	6.5
Orthodontics	0.0	23.6	31.7	4.9
Soft tissue	0.0	0.0	0.0	F
Prosthetics – partial or full denture	0.0	0.0	F	15.4
Prosthetics – implant, bridge, or crown	0.0	0.0	F	4.5
Other**	F	F	F	4.3

*by child's proxy or respondent
F = Estimate not provided because of extreme sampling variability or small sample size
Note: Percentages do not add up to 100% because treatment needs were not mutually exclusive

TABLE 54 Clinically assessed dental treatment needs of First Nations, by type of treatment and age group

Dental treatment needs	Age group			
	Young children 3–5 years Wtd %	Children 6–11 years Wtd %	Adolescents 12–19 years Wtd %	Adults 20+ years Wtd %
No treatment needed	37.6	19.3	22.5	16.9
Prevention	82.9	90.2	86.4	87.2
Fillings/Restorations	90.3	63.0	65.2	70.3
Temporomandibular disorder (TMD)	0.0	0.0	F	1.6
Surgery	17.3	8.4	12.5	28.6
Periodontics	F	F	2.6	24.1
Esthetics	F	F	F	1.8
Endodontics	F	F	F	6.8
Orthodontics	0.0	11.8	19.0	3.9
Soft tissue	F	0.0	0.0	3.1
Other	F	0.0	0.0	F
Urgent*	F	F	F	8.2

F = Estimate not provided because of extreme sampling variability or small sample size
*Any type of treatment required urgently
Note: Percentages do not add up to 100% because treatment needs were not mutually exclusive

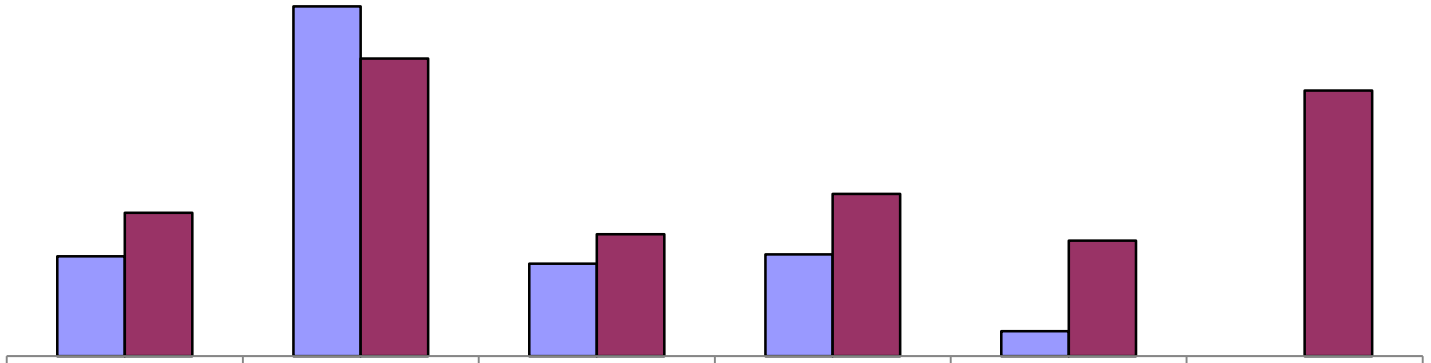
TABLE 55 Percent of dentate First Nations aged 6 years and over, by type of treatment required and by selected characteristics

Characteristic	Urgent	Surgery	Endodontics	Restorations	Prosthodontics	Periodontics	Orthodontics	Misc.*	No treatment needed
	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %	Wtd %
All	7.8	22.7	6.3	70.0	26.6	17.0	8.1	4.0	16.9
Female	8.6	21.7	6.7	65.9	26.7	13.0	9.3	5.8	18.2
Male	7.6	24.5	5.1	76.9	26.7	22.2	5.2	2.2	15.9
Age 6-11	F	8.4	F	63.0	0.0	F	11.8	F	19.3
Age 12-17	F	7.6	F	65.4	F	F	22.6	F	22.0
Age 18-39	8.9	29.6	8.0	77.4	19.0	17.2	5.6	4.2	16.3
Age 40+	8.9	28.0	6.1	65.5	66.8	33.5	F	4.6	13.7
Less than $20,000**	12.1	31.3	7.8	71.8	36.8	21.3	8.7	4.4	9.4
$20,000 or more	F	16.3	4.5	66.7	42.2	18.1	3.9	5.6	10.5
Visited a dental professional in the last year***	9.0	22.5	7.3	68.2	25.2	17.8	7.5	5.9	20.4
Visited a dental professional more than one year ago	9.7	31.3	5.2	78.9	41.6	22.5	6.3	3.8	11.0
Child visited a dental professional in the last year****	F	9.6	F	52.1	0.0	F	17.0	F	22.4
Child visited a dental professional more than one year ago	0.0	F	0.0	73.3	0.0	0.0	F	0.0	F
High school or less*****	8.6	27.2	6.0	72.8	32.0	21.0	5.8	2.9	12.0
More than high school	F	13.9	7.0	61.6	32.1	14.3	F	9.6	25.1
High school or less******	F	8.2	F	75.7	F	F	18.3	F	18.0
More than high school	0.0	0.0	0.0	F	0.0	0.0	F	0.0	F
Non-remote/urban community	9.5	22.7	6.2	69.1	26.9	15.4	7.9	4.5	14.5
Remote community	F	22.7	6.5	74.7	25.3	25.2	9.2	1.2	27.6
Smoker*******	9.7	30.0	8.2	73.0	34.8	21.7	6.0	6.9	13.0
Non-smoker	8.8	21.0	7.2	69.2	27.0	17.7	6.3	F	23.3

*Miscellaneous needs include Temporomandibular Joint Disorder (TMD), esthetics, or soft tissue, as well as needs classified as “other”.
F = Estimate not provided because of extreme sampling variability or small sample size
**Question not asked of youth respondents (ages 12-17)
***Question specific to respondents ages 12+
****Question applies to children 6-11
*****Question applies to parents/caregivers of children 11 and under as well as adults (18+)
******Based on mother’s highest level of education (for respondents 12-17 only)

*******Question applies to respondents ages 12+
Note: Percentages do not add up to 100% because treatment needs were not mutually exclusive

Figure 1. Problems accessing dental services in the last 3 years or more by geographic location



	No problems	Services not available in community	Services not available when requested/ needed	Waiting list is too long	Could not afford direct cost of care	Could not afford transportation cost
Non-remote/urban	17.2%	60.2%	15.9%	17.5%	4.3%	0.0%
Remote	24.7%	51.2%	21.0%	27.9%	19.9%	45.7%