APPENDICES - INTRODUCTION

The following appendices represent research briefs developed for the Canadian Academy of Health Sciences (CAHS) panel during their investigation into access to oral health care in Canada. These appendices have been made available, as they may be useful for efforts at improving access to oral health care for particular vulnerable and disadvantaged groups. They represent a broad overview of the unique challenges that face these groups in terms of access to oral health care. Importantly the goal is not to provide a detailed account of, or recommendations for, the specific challenges of each group. The CAHS panel also recognizes that there are populations within each group that have not been discussed (e.g. independent elderly, Metis), as these groups described in these appendices are often heterogeneous.

In addition, Appendix F provides a definition of the acts permitted by different dental professionals in Saskatchewan. This province is provided as an example as it has the full range of dental professionals. However, it should be recognize that the precise definition of the scopes of practice of the different dental professionals varies by jurisdiction.

APPENDIX A: CHILDREN & ADOLESCENTS

THE CASE OF A YOUNG BOY WITH CAVITIES
Bobby is a 6 year-old boy living with his mother in a large Canadian town. He has four other brothers and sisters and shares a room with his brothers. He has only been in school for a year but already has difficulties and is regularly missing days at school and losing sleep because of the chronic toothache he is suffering. He does not really like going to school, the other kids tease him because he has black teeth. Furthermore, he often does not eat the same meals as his brothers and sisters because it hurts too much, so he ends up drinking lots of juice instead. His mother has difficulty finding time to take him to the dentist but after two nights with very little sleep for Bobby and her (and his brothers and sisters); she finally takes him to the local dentist. This dentist takes a quick look and tells her that Bobby has several badly decayed teeth but the treatment is too complicated for him to deal with so he is referring Bobby to a pediatric dentist specialist. The specialist is so busy that he can only see Bobby next week even though he is an "emergency" case. Given the pain Bobby is in, this is too long to wait but the local dentist has little choice but to prescribe antibiotics and painkillers for Bobby. The following week Bobby's mother organises time off work and a baby-sitter for her other children, and takes Bobby to the specialist. The specialist rapidly comes to the same conclusion as the referring dentist and says that Bobby needs to have 5 teeth extracted and another 4 fillings. Luckily most of the affected teeth are baby teeth so there is some hope for the adult teeth. However, Bobby needs to be put to sleep for this treatment because the extent of disease makes the treatment complex. Unfortunately, the waiting list is approximately one year. The specialist says that he can in the meantime extract the worst affected teeth using sedation and local anaesthetic – "this should work". The **problem** is that Bobby has a very severe level of a common chronic oral infection – dental caries – and the severity means that he needs specialised care. However, access to the appropriate specialist is very difficult even in an urgent situation like his, because of waiting times. The problem of access is made worse because when Bobby does get to an appropriate specialist, that professional has such limited operating room access that the wait for the required treatment is very long so the specialist has to suggest a compromise. This is despite all the cost of the care being covered by the government because Bobby is a young child. The concentration of a high number of sites infected by dental caries in one mouth is relatively common. Most young children have no dental decay or very low levels that require minimal intervention. However, a significant minority has a very high level of this infection because of the diet they are consuming and because members of this family cross-infect each other with the bacteria that cause dental decay. Indeed while this case history concentrated on Bobby, the rest of his family had similar problems because they are all consuming the same diet and also infected with large numbers of decay-causing bacteria. Furthermore, three of his siblings are obese and one of these is already diabetic. The potential **solutions** involve:

- Appropriate specialised services being available.
- Appropriate health promotion and disease prevention services being available, which recognise that the manifestations of illness demonstrated by Bobby and his siblings are all related to the poverty they live in and the diet they consume. Bobby and his siblings need appropriate medical (including dental) care but they also need a healthy environment to change their life course so that they do not become young and middle-aged with multiple chronic diseases.

The extent of Bobby's problems requires specialised dental care to treat the extensive disease he has. In addition, a sophisticated approach is required to help reduce and prevent the recurrence of disease given the disease-determining load he has to live with. As with many of the other cases and situations described in this report, it is clear that Bobby's oral health would be best managed by including it in the management of his overall health.

Oral Health and Disease in Children and Adolescents

Children

The oral health of Canadian children has improved remarkably in the past decades in terms of dental caries and the overall estimation of decayed, missing, or filled teeth (DMFT). The prevalence of DMFT in permanent teeth among Canadian children has reduced from affecting between 74% and 92% of children in the 1972 Nutrition Canada to less than 25% in the 2007–2009 Canadian Health Measures Survey (CHMS) data[1, 2]. The mean count of DMFT is recorded as 0.49 permanent teeth in the 2007–09 CHMS data compared to the mean estimates which ranged from roughly 2.5 to 8 permanent teeth in the 1972 Nutrition Canada. In 2007-2009, among Canadian children (age 6-11), 23.6% were affected by one or more decayed, missed, or filled teeth (DMFT), with boys being affected more compared to girls (26.8% of males versus 20.2% of females).The CHMS data also showed that 8.2% of Canadian children rated their oral health as poor or fair; and just like the case of Bobby, 7.6% reported avoiding foods because of problems with their mouth; and 5.4% reported persistent or ongoing pain anywhere in their mouth.

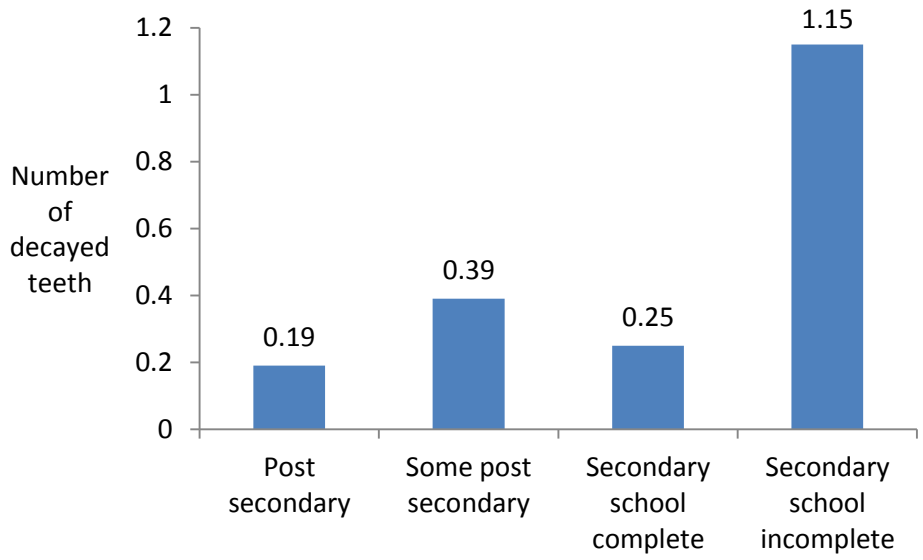
Adolescents

The CHMS data showed that the majority of Canadian adolescents have been affected by dental decay (58.8%); and girls are affected more compared to boys (62.7% of females versus 55.1% of males). The mean count of DMFT was recorded as 2.49 (2.91 for females versus 2.10 for males). The oral health status of Canadian adolescents, in terms of the experience of DMFT has enhanced noticeably in the last four decades. The prevalence of dental caries has fallen from 96.6% among Canadian adolescents in 1970–72 to 58.8% in the 2007-2009 CHMS data. Also, the mean count of DMFT was 9.2 in 1970–72 compared to 2.49 in the 2007-2009 CHMS data. The CHMS data also showed that 11.4% of Canadian adolescents rated their oral health as poor or fair; 12.5% reported avoiding foods because of problems with their mouth; and 10% reported persistent or ongoing pain anywhere in their mouth.

Factors Related to Oral Health and Disease in Children and Adolescents

The CHMS data reveal that the oral health of children and adolescents living in Canada is strongly determined by their age, with older children having experienced more dental decay and having more missing teeth. This is not surprising as one is more likely to experience some signs of dental decay, the older one is. More important, however, is the observation that household education is associated with the level of dental decay experienced by children and adolescents. Those children and adolescents living in households in which nobody has completed their secondary school education have 3-4 times as many decayed teeth as the other groups, with those living in families with the highest level of education having the lowest level of dental decay.

Figure A 1. Mean number of decayed teeth in children and adolescents living in Canada

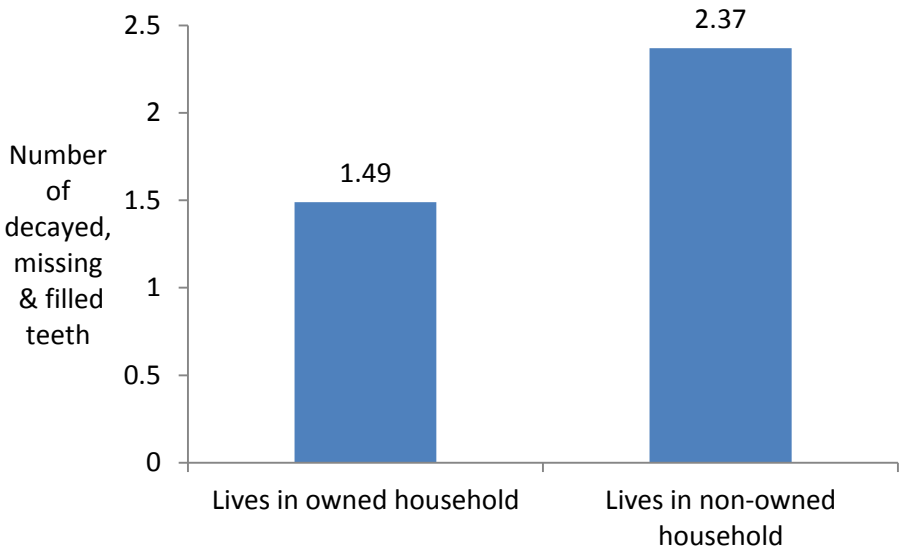


Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Similarly, and interestingly as a different form of socioeconomic indicator, ownership of the property in which families were living was also significantly associated with experience of decayed, missing and filled teeth. Those children and adolescents living in houses or other properties not owned by their parents had higher rates of decayed, missing or filled teeth, compared to those children living in houses owned by their parents. It was also noted that the experience of dental pain in children and adolescents was associated with family income and again household ownership (see figures below).

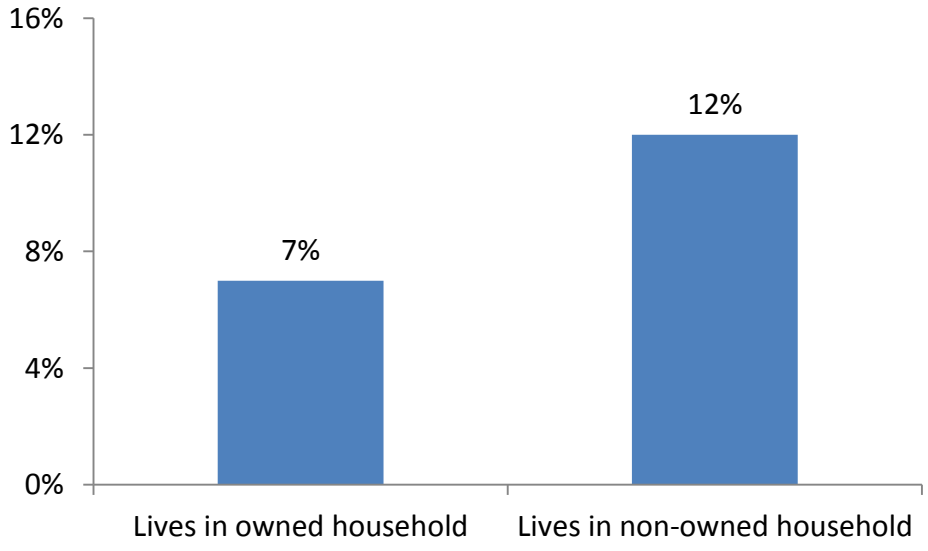
In conclusion, the factors associated with indicators of oral health and disease in children and adolescents living in Canada were socioeconomic factors, with highest education level in the household, household ownership and household income all being related to dental disease in this group.

Figure A 2. Mean number of decayed, missing and filled teeth in children and adolescents living in Canada



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Figure A 3. Percentage of children and adolescents living in Canada experiencing dental pain

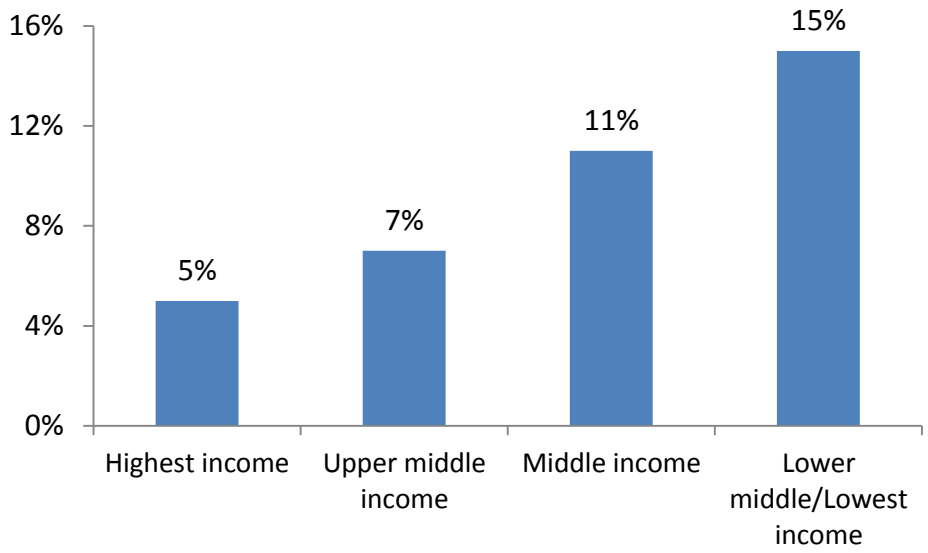


Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Oral Health Care Utilisation in Children and Adolescents

The CHMS data show that 9% of children have not visited a dental professional in the past year. Furthermore, 11.4% of children avoided visiting a dental professional within the last year because of costs and nearly 7.7% declined recommended care within the last year because of costs. As well, 16% of Canadian adolescents (aged 12-19 year old) did not make dental visits in the past year, with 9.5% of them avoiding visiting a dental professional within the last year because of costs, and 8.9% declining recommended care within the last year because of costs.

Figure A 4. Percentage of children and adolescents living in Canada experiencing dental pain

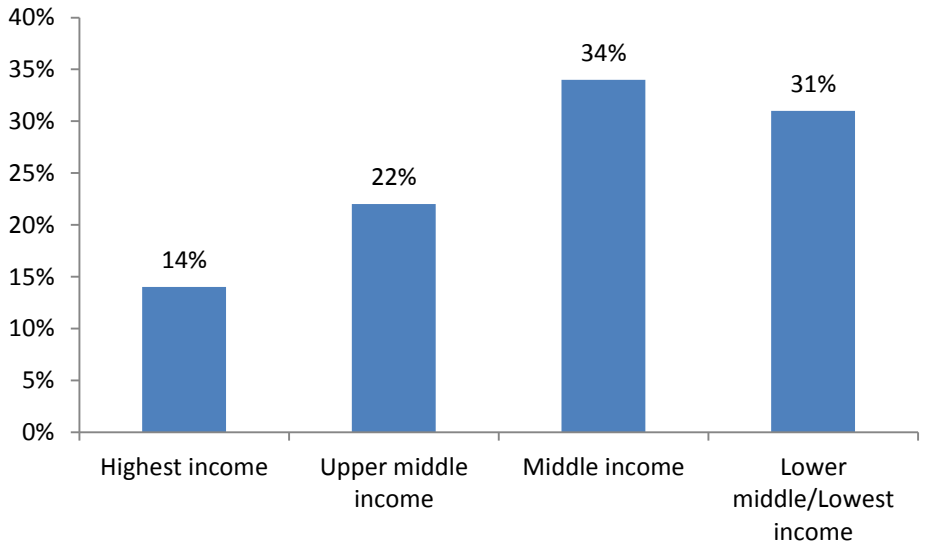


Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Factors Related to Oral Health Care Utilisation in Children

Income had a great influence on accessing oral health care among children and adolescents. Seven per cent of the children and adolescents from the highest income groups had not visited a dentist in the past year compared to 24% of those from the lowest income group. Only 2% of those in the highest income group, whereas 13% of those from the lowest income group avoided consulting a dentist because of the cost. However, those from the highest income group were more likely to be covered by dental insurance.

Figure A 5. Percentage of children and adolescents living in Canada without dental insurance coverage

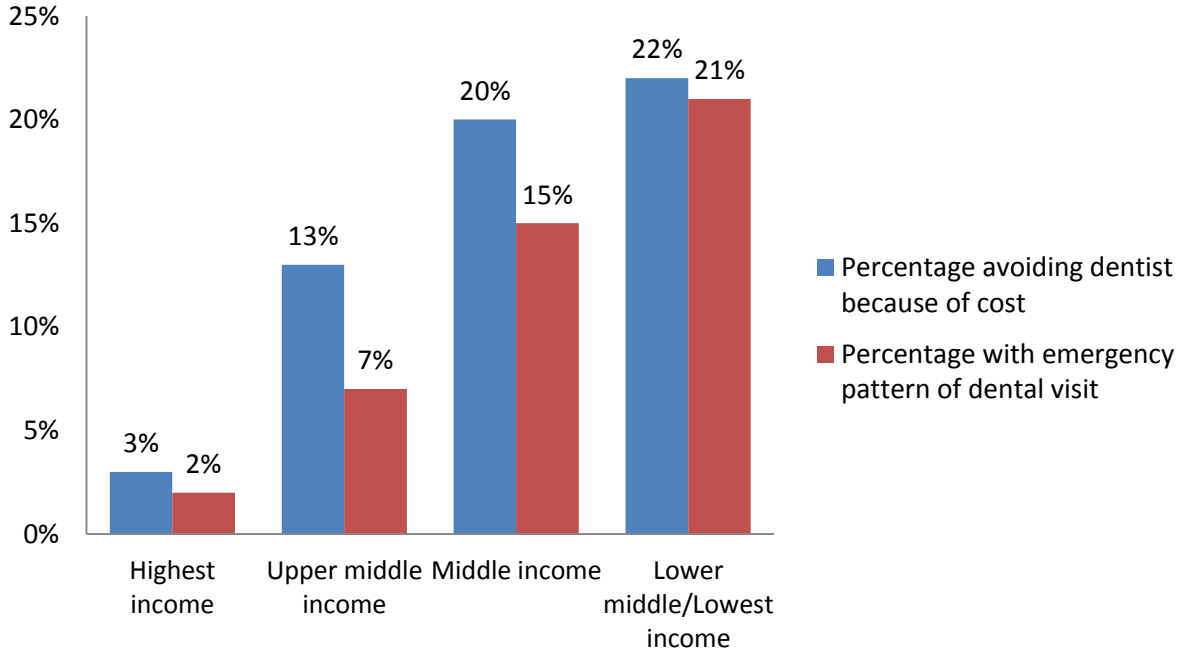


Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Those from the lowest income group were two times more likely to be without dental insurance compared to the highest income group. The gap between the richest and poorest groups however,

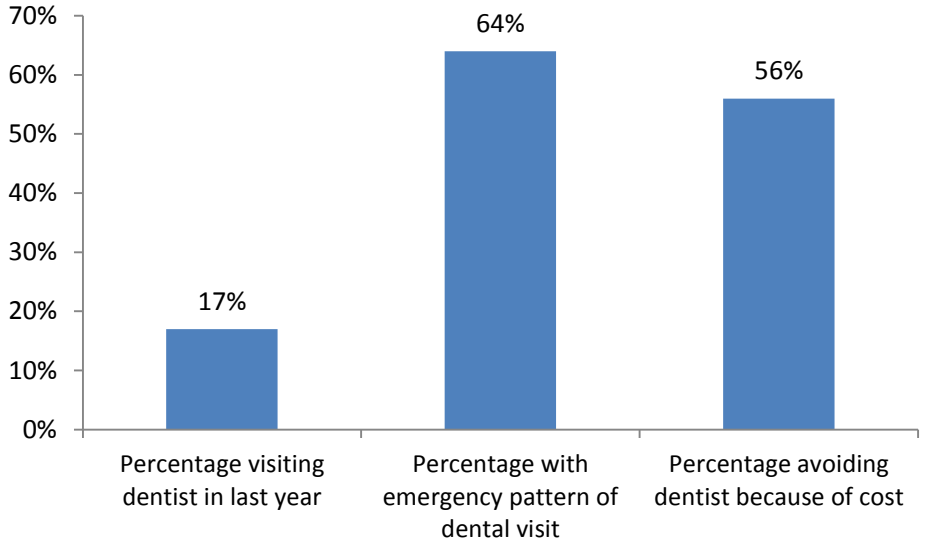
was most pronounced in terms of the pattern of visiting a dentist. Children and adolescents in the poorest income group were 10 times more likely to postpone seeking treatment until they have emergency reasons such as pain and 7 times more likely to avoid visiting a dentist because of cost.

Figure A 6. Household income and access to dental care in children and adolescents living in Canada



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Figure A 7. Indicators of utilisation of dental care in children and adolescents living in Canada who have no dental insurance



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Having no dental insurance remarkably limits access to oral health care among children and adolescents. Among children and adolescents living in Canada with no dental insurance coverage, only 17% consulted a dentist during the past year, while 56% avoided consulting a dentist because of cost and 64% reported consulting a dentist only with emergency problems rather than on a regular basis.

Impacts of Poor Oral Health in Children and Adolescents

Among children:

- 8.2 % rated their oral health as poor or fair
- 7.6 % avoiding foods because of problems with their mouth
- 5.4% reporting persistent pain or ongoing pain anywhere in their mouth

Among adolescents:

- 11.4 % rated their oral health as poor or fair
- 12.5 % avoiding foods because of problems with their mouth
- 10.4% reporting persistent pain or ongoing pain anywhere in their mouth

Individual impacts can be divided into biological and social, both of a functional nature (chewing, speaking, learning, working, self-esteem, general health-related). For example, Jürgensen et al have shown that active dental caries and total dental caries experience is associated with toothache, missing school, and impairments to daily life activities (eating, smiling and sleeping) [3]. As in Bobby's case, he was losing sleep and missing school due to the pain associated with chronic tooth decay. Blumenshine et al. demonstrate that children with both poor oral health and general health are 2.3 times more likely to report poor school performance [4]. Similarly, Jackson et al. show that children with poor oral health are nearly 3 times more likely to miss school as a result of dental pain [5]. Importantly, these authors found that absences caused by pain are associated with poorer school performance, yet absences for routine care are not, pointing to the nature of what types of dental visiting patterns are associated with disparity (i.e. those with dental insurance visit the dentist for preventive care, those without tend to visit for emergency reasons). These authors also demonstrated that oral health status is associated with performance independent of the absence of pain, meaning that as an end-point, pain is by far the extreme, with the threshold for impacts present much earlier when experiencing poor oral health. Ultimately, Muirhead and Marcenes have shown that school performance indicators such as literacy and math scores are good proxies for school caries experience [6].

This disparity also extends to other oral conditions, such as dental injuries and malocclusion. Fakhruddin et al. showed that children with untreated dental injuries experienced more chewing difficulties, avoided smiling and experienced affected social interactions (concerned with what others think, did not want to talk to other children) compared with their non-injured peers [7]. In Bobby's case, he was teased often at school for the appearance of his decayed, black teeth. Agou et al. also showed that malocclusion does have quality of life impacts on children, and more specifically, on children with low self-esteem [8]. This study also demonstrated that socioeconomic

status is a significant mediator of the quality of life impacts on children. For example, Locker demonstrated that the worse the quality of life impact, the greater the effect on children of lower socioeconomic status [9]. These results correlate well with other work by Locker indicating that income disparities in oral health-related quality of life outcomes remain after accounting for differences in levels of oral disease[10]. For Locker, this implies that treatment for these children has the potential for greater health and psychological gains, exactly in those populations where government intervention is most warranted.

In terms of general health, numerous authors have reported that rampant dental caries in children inhibits adequate nutrition, thereby adversely affecting growth and development. This finding has been operationalized in terms body weight, with those children experiencing disease weighing less than matched controls [11, 12]. Moreover, these authors also reported that when treated, children with rampant dental caries demonstrated renewed "weight gain" and in some instances "catch up growth." Nevertheless, Casamassimo [13]and Thomas et al. [14]have reported conflicting findings, suggesting that this may not be the case in all populations. In Bobby's case, he avoided chewing food due the chronic pain he experienced, and often substituted meals for juice. Casamassimo [13] and Thomas et al. [14] do, however, agree that children that receive complete dental rehabilitation under general anaesthesia demonstrate significant improvement in their quality of life, as reported by their parents.

As for the familial impacts of poor oral health, relatively little has been documented in this regard [15, 16]. Nevertheless, one study demonstrated that when children in a household are suffering from severe oral conditions, this resulted in: impacts on parental or family activities, impacts on parental emotions, conflict in the family, and financial difficulties [16]. Finally, the literature indicates that socioeconomic disadvantage in childhood leads to long lasting negative influences on adult oral health [17-19]. These studies demonstrate this relationship to be independent of childhood oral health and where the child ends up in the socioeconomic hierarchy as an adult. In addition, adverse socioeconomic conditions in childhood foster the development of a weaker sense of coherence that can lead to poor oral health-related behaviours and stress coping mechanisms, both of which have lifelong negative effects on adult oral health. The implications of these findings reflect the need of public policy to address the basic social determinants during the critical time of childhood in order to effectively reduce the gap in oral health inequalities.

Benefits of Oral Health Care in Children and Adolescents

In terms of the benefits of oral health care for children, much is known about the strong preventive effects of dental sealants and fluoride varnish. Both reduce the burden of oral disease, and the latter, when coupled to other public health programming, has the potential to save governments money [20, 21]. For example, in the State of North Carolina, two innovative models of financing oral health care services have demonstrated significant returns. First, food security programming has introduced oral health education and dental referrals for low-income families and their children. Importantly, when compared to those children that do not receive the services, those that do go to a dentist more often end up consuming less costly dental care over time. The

intervention also reduced the amount of children's general anaesthesia care. The second program involves the financing of oral health education, screening and referral, and fluoride varnish applications by physician- and nurses-aids in public and private practice. A strong evaluation program has demonstrated similar results, confirming impacts on dental care utilisation and consumption over time.

In the context of childhood oral disease, parenting significantly affects the oral health of children [22-24]. Caries-related habits established during infancy are maintained throughout childhood [25, 26] and into adolescence [27]. So as reviewed above, the fact that poor oral health habits can extend well into adulthood, it would seem reasonable that exposing the family, in particular primary caregivers, to oral health education and early preventive treatment holds intuitive benefit.

For high-risk populations in particular, the clinical effectiveness of early dental health education has been demonstrated in the socio-economically challenged/high caries districts of Leeds and Glasgow in the United Kingdom [28, 29]. In this context, a preventive dental programme started with pregnant mothers, and continued until children were six years of age, showing beneficial effects on the dental health of the children [30]. Prolonged benefits were found when the children were ten years of age [31]. Kowash et al. also observed that the mothers of infants participating in the dental health education programme also improved their own dental health-related habits [32].

In a study among Medicaid-enrolled children in the United States, those children who had their first preventive dental visit by the age of one year were more likely to have subsequent preventive visits. They were less likely to have subsequent restorative or emergency visits compared to children who had their first preventive visit at the age of two or three years. The average dentally-related costs for children who had received preventive care before the age of one year were approximately one half of the costs for children who had received their first preventive care at the age of three to four years [33].

Some studies in the Nordic countries further indicate that in populations with an overall low level of caries occurrence, early risk-based prevention can be effective in reducing both costs and dental caries in pre-school children, provided that the screening and preventive measures are delegated to preventive dental assistants [34-37]. In short, it is reasonable to assume that improving child oral health in high- and low-risk contexts can have benefits for children and their caregivers, potentially extending into school performance and social experiences among those at greatest risk.

Models of Health Care Delivery that Could Improve Access for Children

It appears that models of care that privilege early intervention among children and with a preventive focus have the potential to save governments and society resources in terms of the effects of poor oral health and the need for curative oral health care. Perhaps the case of Bobby could have been prevented had early intervention strategies been available to him. Long-

established modalities have proven their cost-effectiveness, such as fluoride therapies and the placement of dental sealants. Oral health education is subtler in terms of effectiveness, but in high-risk environments coupled with particular techniques, there are potential gains to be made.

Traditional oral health education, which focuses on delivering dental knowledge and instruction to patients, has been criticized for its ineffectiveness [38, 39]. Studies have shown that simply teaching someone to brush and floss, for example, fails to improve patient hygiene and long-term oral health habits. Although conventional oral health education methods fall short of their goals, small but positive results have been obtained using approaches that focus on behaviour modification as opposed to knowledge acquisition. Studies have shown that several factors can be used to bring about a change in oral health habits including: 1) initiation of an education program in early childhood [28, 29, 40, 41], 2) repetition and reinforcement [42] and 3) involvement of educators and/or primary caregivers [30, 31, 42, 43].

Alternative models of care are also positive, meaning the use of medical and social settings, as was demonstrated in the case of North Carolina through the use physicians, nurses, and community workers [20, 21, 33]. Another alternate setting that has a strong historical basis is the delivery of preventive and/or clinical care in school-based settings [44-46]. In Canada, dental therapy is the best example of a successful program based in schools [46, 47].

Table. Summary of the original studies cited in the 'appendix a: children & adolescents'.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[1]	Report					
[2]	Report					
[3]	Cross-sectional	School-based	Laos	621 schoolchildren (12-year old)	To: assess the level of oral health of Lao 12-year-olds in urban and semi-urban settings; study the impact of poor oral health on quality of life; analyse the association between oral health and socio-behavioural factors; investigate the relation between obesity and oral health.	Decayed teeth were associated with impairments of daily life activities and missed school classes.
[4]	Cross-sectional	State-wide Health survey	US (North Carolina)	2871 schoolchildren	Evaluating the impact of poor oral health status on school performance	Children with both poor oral health and general health were 2.3 times more likely to report poor school performance. Children with either poor oral health or general health were 1.4 times more likely to report poor school performance.
[5]	Cross-sectional	State-wide Health survey	US (North Carolina)	2871 schoolchildren	Evaluating the relationship between children's oral health status and school attendance and performance	Children with poor oral health status were nearly 3 times more likely than were their counterparts to miss school as a result of dental pain.
[6]	Ecological study		UK	55 primary schools	To investigate whether measures of school performance and socioeconomic circumstances	Early school performance was good indicators of dental caries.

					could be used as indicators of caries experience	
[7]	Case-control	School-based	Canada (Ontario)	270 children aged 12–14 years	To measure the impact of dental trauma on quality of life	Injured children who were untreated experienced more social impact than their non-injured peers.
[8]	Cross-sectional	Clinic based (children seeking orthodontic treatment)	Canada (Ontario)	191 children aged 11-14 years	To examine the relationship between self-esteem and oral-health-related quality of life	The impact of malocclusion on quality of life is substantial in children with low self-esteem. Compared with normative measures of malocclusion, self-esteem is a more salient determinant of OHRQoL in children seeking orthodontic treatment.
[9]	Cross-sectional	School-based	Canada (Ontario)	370 children aged 11-14 years	To assess socioeconomic disparities in the oral health related quality of life	There was a gradient across income categories with children from low income households having poorer oral health-related quality of life.
[10]	Cross-sectional	National health survey (Canadian Community Health Survey 2003)	Canada	2754 dentate persons aged 20 years and over	To determine if psychosocial factors explain the socioeconomic disparities in self-perceived oral health	Psychosocial factors partly but do not wholly explain the socioeconomic disparities in self-perceived oral health in this population after controlling for tooth loss and denture wearing.
[11]						
[12]	Longitudinal prospective observational study	Clinic-based	UK (Manchester)	218 children aged 2-12 years	to examine whether the removal of carious teeth affected children's growth relative to that of a standard population	Extraction of carious teeth in five and six year old children promotes weight gain and possibly growth.
[13]						

[14]						
[15]	Cross-sectional	Clinic-based	Germany	147 families (5-7 year old children & parents)	To evaluate the impact of OHRQOL of children with oro-facial clefts on family functioning	Having children with oro-facial clefts negatively affects the family functioning.
[16]	Cross-sectional	Clinic-based	Canada (Ontario)	266 parents–caregivers	To develop and evaluate the Family Impact Scale, a measure of the family impact of child oral and oro-facial disorders.	This study suggests that child oral and oro-facial conditions have a pervasive impact on the family
[17]	Cross-sectional	National health survey (Finnish Health 2000 Survey)	Finland	5318 dentate adults aged 30 years and over	To assess the role of adulthood socioeconomic status and sense of coherence in the relationship between childhood SES and adult oral health-related behaviours.	Childhood SES was related to adult oral health-related behaviours but only indirectly via adulthood SES and adult SOC
[18]	Longitudinal retrospective observational study	Health Survey (Dunedin Multidisciplinary Health and Development Study)	New Zealand (Dunedin)	972 adults aged 32 year old	Identifying the risk factors that contribute to an excess risk of poor adult health among children who experience socioeconomic disadvantage	Low childhood SES was associated with an increased risk of substance dependence and poor physical health in adulthood
[19]	Population-based birth cohort study	Health Survey	Brazil (Pelotas)	888 adolescents aged 15 years old	To investigate the influence of family socioeconomic trajectories from childhood to adolescence on dental caries and associated behaviours	Adolescents who were always poor showed, in general, a worse pattern of dental caries, whereas adolescents who never were poor had a better pattern of dental caries.
[20]	Population-based cohort study	Health Survey	US (North Carolina)	21277	To investigate the effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dentally related Medicaid expenditures	Participating in the WIC program has the potential for decreasing dentally related costs to the Medicaid program, while increasing use of dental services

					for young children.	
[21]	Population-based cohort study	Health Survey	US (North Carolina)	21277	To investigate the effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dental services use by Medicaid children in North Carolina	Children who participated in WIC had an increased probability of having a dental visit, were more likely to use preventive and restorative services, and were less likely to use emergency services
[22]	Interventional study	Clinic-based	Sweden	Parents of 4 year old children	To interpret the manner in which nformation **on** dental health care, systematically offered at child health centers, is assimilated among parents of preschool children with different caries experience.	Parents of healthy children had a significantly higher level of education than parents of diseased children. The level of education did not influence the knowledge as such but rather the ability to put the knowledge into practice.
[23]	Prospective cohort study	Health Survey (Finnish Family Competence Study	Finland	Children aged 3, 5, and 7 years	To analyze the prevalence of dental caries as well as associations of dental health and family competence among 7-year-old children and their families	Six explanatory variables (inconsistency in childrearing, under-evaluation of consistent behavior, emphasis on the mere explaining of causes and consequences without an example, father's previous caries history, child's frequent consumption of sweets and only occasional toothbrushing) were independently associated with child's caries occurrence.
[24]	Cross-sectional	School-based	Finland	489 children aged 11 and 12	to determine whether the presence of active initial caries	Both parental and child-related factors were found to be associated

				year old and their parents	lesions among 11 to 12-yearold schoolchildren is associated with parental and child-related factors and whether there are gender differences in these associations.	with active initial caries lesions.
[25]	Prospective cohort study	Health Survey (Finnish Family Competence Study)	Finland	1074 10-year-old children	To elucidate whether variables recorded in early childhood would have a long-lasting predictive value of poor dental health	Early childhood risk factors of poor dental health seem to be stable even after 10 years of life and the changing of teeth from primary to permanent ones.
[26]	Prospective cohort study	Health Survey	Sweden	Children aged 1-3 year old	1) to investigate whether oral hygiene and dietary habits established at 1 year of age are maintained at 2 years of age 2) to analyze caries-related factors with regard to oral health between the age of 1 and 3 years	Canes-related habits, such as oral hygiene and dietary habits, established during infancy are maintained throughout early childhood.
[27]	Prospective cohort study	Health Survey	Sweden	Children aged 1-3 year old	To investigate whether oral hygiene habits and parent-related factors, recorded in early childhood, have a predictive value in relation to approximal caries experience at the age of 15 years	Good oral hygiene habits, established in early childhood, provide a foundation for a low experience of approximal caries in adolescents.
[28]	Prospective cohort study	Health Survey	Scotland (Glasgow)	Five year old children	The aim of this study was to assess dental health outcomes by the secondary analysis of routine epidemiological datasets.	Dental health improvements were observed in pilot districts and across all communities following the roll-out of the programme.
[29]	Prospective cohort study	Health Survey	UK	Children aged 1 year old	To determine the effect of dental health education (DHE) on caries	Regular home visits to mothers with infants, commencing at or

					incidence in infants, through regular home visits by trained dental health educators over a period of 3 years.	soon after the time of the eruption of the first deciduous teeth, was shown to be effective in preventing the occurrence of nursing caries.
[30]	Case-control	Clinic-based	Chile (Vina del Mar)	Children aged 3.5 year old and their parents	To evaluate the effectiveness of prenatal and postnatal preventive dental program after the first four years.	The preventive dental program was effective in inhibiting caries in pre-school children, even in a population already receiving the benefits of community water fluoridation.
[31]	Case-control	Clinic-based	Chile (Vina del Mar)	37 children	To evaluate the prevalence of caries in the permanent 1st molars of a group of 9 to 10-year-old children, and to determine the long-term effect of a mother-child preventive dental program	Examination of children 4 years after discontinuation of a caries preventive program reflected a long-term reduction in the decayed and filled surfaces score of permanent 1st molars.
[32]	Report					
[33]	Prospective cohort study	Clinic-based	US (North Carolina)	9204 children	To determine the effects of early preventive dental visits on subsequent utilization and costs of dental services among preschool-aged children.	preschool-aged, Medicaid-enrolled children who had an early preventive dental visit were more likely to use subsequent preventive services and experience lower dentally related costs.
[34]	Report					
[35]	Case-control	Clinic-based	Sweden (Jonkoping)	292 children aged 1-6 year old	To evaluate a new strategy for the dental care of pre-school children which includes an early caries risk assessment and early preventive care.	Early primary prevention (before the onset of caries attack) and a structured and systematic approach to dental care for pre-school children result in good

						oral health for the children and may be economically profitable for a society with organized public dental service for pre-school children.
[36]	Prospective cohort study	Clinic-based	Finland	325 children	To evaluate outcomes in young children of risk-based management of dental caries in comparison with routine prevention.	In young children, risk-based management of caries seems practical, and prevention of caries can be targeted efficiently to individuals at risk.
[37]						
[38]	Systematic review				To examine the quality of oral health promotion research evidence and to assess the effectiveness of health promotion, aimed at improving oral health	Oral health promotion which brings about the use of fluoride is effective for reducing caries. Chairside oral health promotion has been shown to be effective more consistently than other methods of health promotion. Mass media programmes have not been shown to be effective.
[39]	Systematic review				To assess the quality of the evidence presented by studies of the effectiveness of dental health education	Dental health interventions have a small positive, but temporary effect on plaque accumulation; no discernible effect on caries increment and a consistent positive effect on knowledge levels.
[40]	Prospective cohort study	School-based	Israel (Jerusalem)	196 first grade children	to evaluate the effect of a pragmatic educational program on tooth brushing skills of young schoolchildren	Educational program caused improvement of personal manual skills specifically for those areas of the dentition which demand most efforts in oral hygiene promotion.
[41]	Interventional		UK	420 children	To assess toothbrushing skills in	A high correlation was found

				aged 2-4 years	pre-school children	between the proportion of children innately possessing a particular skill and the proportion who subsequently learned it from the lesson
[42]	Case-control	School-based	China (Wuhan)	918 children, their parents and teachers	To assess oral health outcomes of a school-based oral health education (OHE) programme on children, mothers and schoolteachers in China, and to evaluate the methods applied and materials used.	The programme had positive effects on gingival bleeding score and oral health behaviour of children, and on oral health knowledge and attitudes of mothers and teachers. No positive effect on dental caries incidence rate was demonstrated by the OHE programme.
[43]	Report					
[44]	Report					
[45]	Report					
[46]	Report					
[47]	Report					

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APPENDIX B: PEOPLE LIVING AND WORKING IN POVERTY

THE CASE OF A MAN WORKING FOR LOW WAGES

Mr. B is a 30 year old man who left school at 16 years of age, has no formal training in any sphere of work and has been in and out of employment in a series of largely short term and often part time, low skill jobs. He has recently settled in a small two-bedroom apartment with his partner and their two young children. He currently has a part time job, for which he is paid a little above the minimum age, but it does not provide him or his family with health or dental insurance. He recently had an accident at home while he was moving furniture and suffered a broken nose and two broken front teeth and cuts and bruises to his face. He went to the hospital where he rapidly received the necessary treatment to repair his broken nose and suture the cuts to his face. However, for his teeth he was told to visit his dentist. He does not have a dentist. Initially he left the situation because the affected teeth were not painful, although they were very un-aesthetic. During the past week his face has become swollen above the affected teeth and they are very painful. He does not have enough money to afford a visit to the dentist and cannot afford the time off work as he may lose his job, and he simply cannot afford that with a young family to look after. The dentists he knows of do not have an evening or weekend clinic, and he knows of no "drop-in/emergency" dental clinic in the city. Furthermore, when he last visited a dentist the latter clearly did not understand Mr. B and was not very empathetic to his life situation, making him feel bad.

The **problem** is that Mr. B receives no government benefits and so is not entitled to any government-funded dental care, and his employment does not provide dental insurance. According to Statistics Canada, he and his family are below the poverty line for the area in Canada in which they live but the only way he can pay for dental care is "out-of-pocket". He simply cannot afford dental care. In addition, Mr. B has unfortunately also encountered the non-empathetic approach people in his position can experience when consulting health care professionals. That is, the large majority of health care professionals come from well-educated backgrounds and have a certain set of expectations and habits that make up the culture of being a health care professional. This culture of expectations, experiences and habits is completely different to that of Mr. B and many similarly vulnerable groups. Thus there is a level of misunderstanding between the two and this is compounded by a communication dynamic wherein Mr. B feels powerless and ineffective in expressing and having understood his health care needs. This situation is not helped by the lack of accommodation of routine private dental services, with evening, weekend and emergency clinics being difficult to locate, and many dentists being reluctant to accept people who are not already on their books or who do not have dental insurance as emergency patients.

The potential **solutions** involve:

1. Government coverage of urgent dental care needs for workers on low income and their families.
2. Service delivery settings and timing that accommodate the needs of people with precarious job security, working difficult hours and with no private transport and little capacity to afford public transport.
3. Service delivery personnel with training that renders the service understandable and

acceptable to its target clientele.

Although the special needs of workers on low income are in some ways subtler than the average middle or high income person, they are nevertheless present and the private dental office system does not always work well for this group. Thus government-subsidised, urgent dental care services provided in locations and at times that best suit this clientele are important.

Oral Health and Disease in People Living and Working in Poverty

There is considerable evidence that low socioeconomic status and poverty constitute the main determinants of poor health in industrialized societies. Income has long been seen as a strong determinant of health in general, and findings from national and provincial health interview surveys and studies of local populations demonstrate evidence of disparities in oral health among low income families [1-4]. For example, a study of older adults [1] found income gradients with respect to edentulism, missing teeth, decayed crown and root surfaces, periodontal attachment loss, chewing difficulties, and impact on quality of life and satisfaction with oral health status. Furthermore, in a study of Canadian children aged 5–14 years, socioeconomic gradients were discovered with respect to dental caries experience, missing teeth, prevalence of urgent dental care needs [3]. Most recently, findings from the 2007-2009 CHMS demonstrate that lower income Canadians have almost two times worse oral health outcomes compared to higher income Canadians as measured by: greater prevalence and number of untreated decay, edentulism, soft tissue lesions, loss of attachment and higher calculus and debris scores [5].

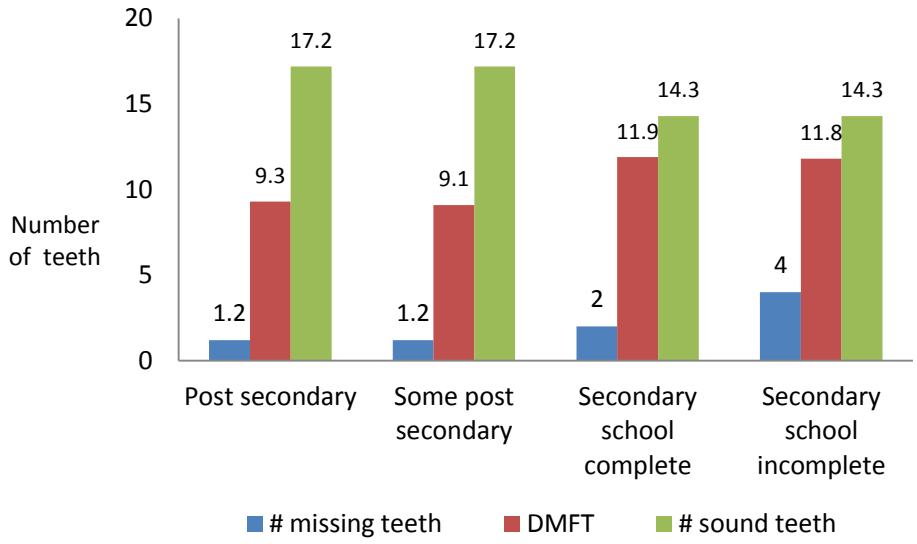
Factors Related to Oral Health and Disease in People Living and Working in Poverty

According to the CHMS, the factors most commonly related to the oral health status of adults are socioeconomic indicators such as household income and highest level of education in the household. Indicators of access to dental care and also some oral-health-related behaviours such as smoking or the use of dental floss were factors related to oral health and disease. Household education level was related to numbers of missing teeth, numbers of decayed, missing and filled teeth counted together, and numbers of sound, healthy teeth, with those in lower education households having more missing teeth and experience of decay and fewer sound teeth.

In addition, indicators of access to dental care were related to oral health and disease in adults, with:

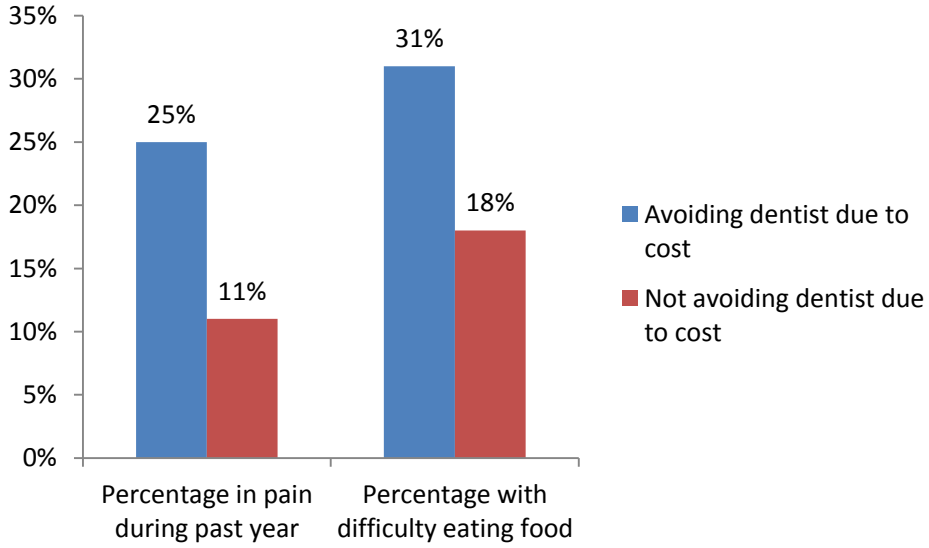
- Pattern of dental consultation (regular versus emergency visits) being associated with numbers of decayed and numbers of filled teeth, and having less than 21 teeth present in the mouth.
- Visiting the dentist in the last year being associated with numbers of decayed and filled teeth and having periodontal disease.
- Avoiding the dentist due to cost being related to having persistent pain and persistent difficulty eating food.

Figure B 1. Highest level of education in household and oral health indicators in adults



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Figure B 2. Dental pain and problems eating food among adults avoiding or not the dentist due to cost



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

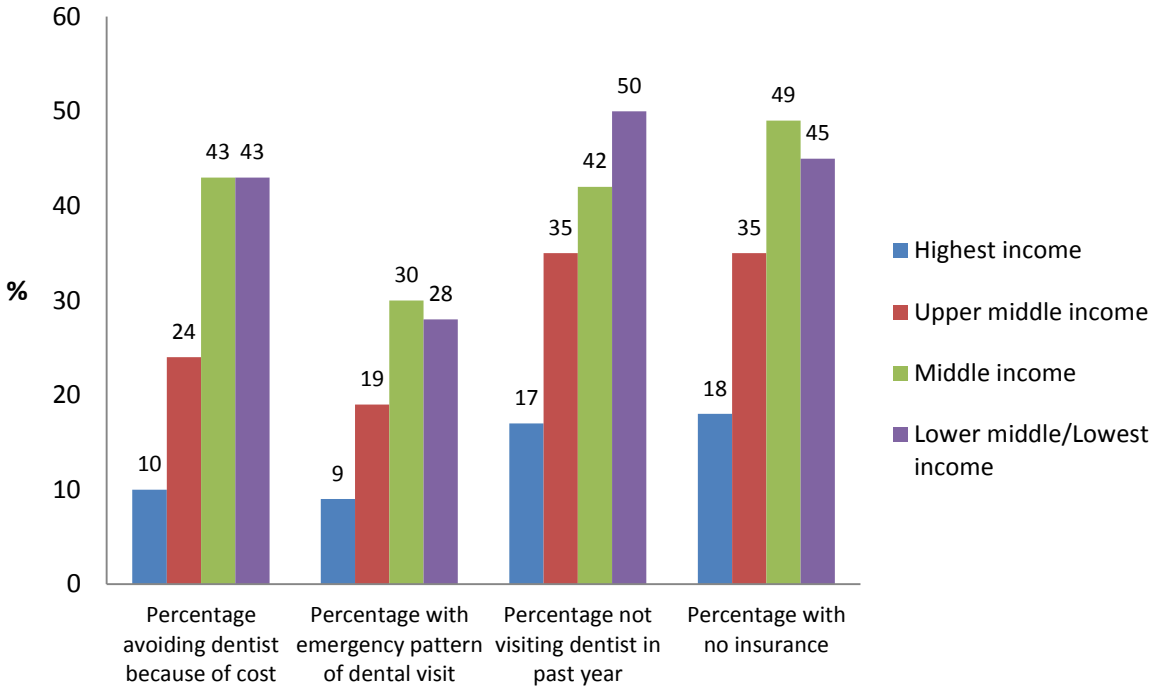
Oral Health Care Utilization in People Living and Working in Poverty

The CHMS data show that half of the adults from the lowest income group did not visit a dentist in the past year compared to 17% of those from the highest income group. Furthermore, 43% of those in the lowest income group avoided consulting a dentist because of the cost whereas only 10% of those from the highest income group did the same.

Factors Related to Oral Health Care Utilization in People Living and Working in Poverty

According to the CHMS, and as demonstrated in Mr. B's case, income is strongly related to accessing oral health care among adults. The gap between the richest and poorest group was present in terms of the pattern of visiting dentist. Adults in the poorest income group were three times more likely to postpone seeking treatment until they have emergency reasons such as pain.

Figure B 3. Indicators of access to dental care in adults, and level of income



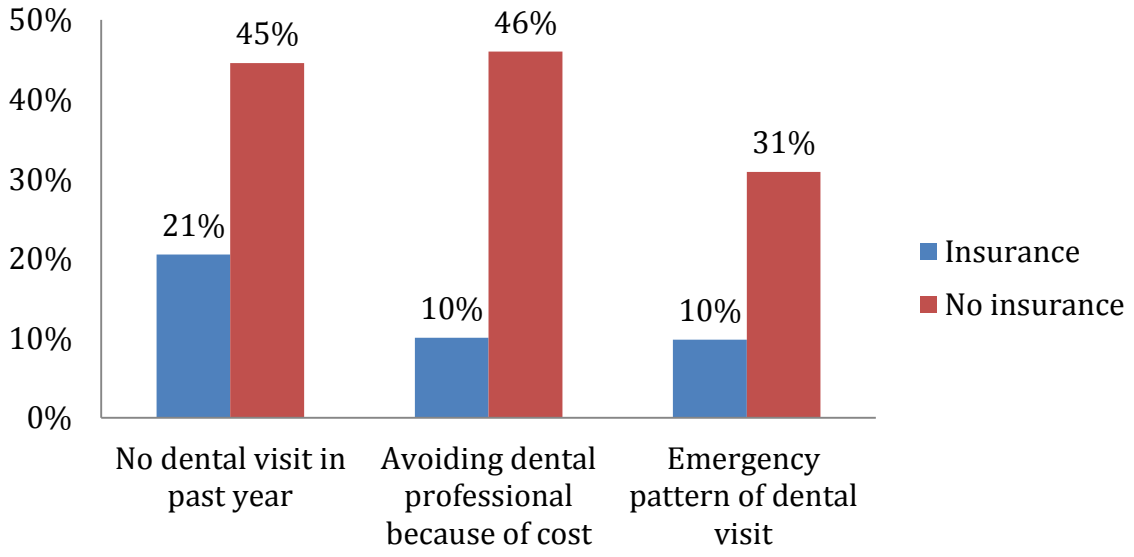
Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Insurance in turn was strongly related to accessing dental care. Those from the highest income group were more likely to be covered by dental insurance. And adults with no dental insurance demonstrated limited access to oral health care. This is evident in the case of Mr. B where lack of dental insurance prohibited him from obtaining the appropriate care for his broken, infected teeth. Further, adults who were not covered by dental insurance were 2.1 times more likely not to visit dentist in the past year, 4.6 times more likely to avoid dentist because of the cost and three times more likely to postpone seeking treatment until they have emergency reasons such as pain.

Impacts of Poor Oral Health in People Living and Working in Poverty

As demonstrated in the case of Mr. B, poor oral health and not being able to access dental care has clear and negative impacts on the quality of life by influencing eating, speaking, and socializing – in turn influencing productivity. Significant amounts of literature exist to document the many oral health-related quality of life impacts of poor oral health. This chapter will concentrate on the impacts associated with productivity. Nevertheless, it should not be forgotten that, in the end, the pain of toothache is severe, and acts like any extreme pain, it is brutal and overwhelming; these two words should be enough to rationalize the negative impacts of poor oral health.

Figure B 4. Indicators of access to dental care among adults with and without insurance



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Yet in terms of productivity, McGrath et al. found that among those with dental infection, 1 in 5 reported that they had to take time off work or study because of these problems [6]. Invariably, those that report poorer oral health also have a greater amount of days missed from work; low-income Canadians that report chronic painful aching in their mouths are more likely to have experienced a disability day associated with a dental problem in the previous two weeks [7]. Likely mediated through psychosocial mechanisms, poor oral health ultimately leads to a compromised existence [8]. Living with consistent pain and infection inevitably wears people down, affecting fundamental things like sleep and completing the tasks of daily living.

There are also system impacts. For example, governments and health care systems are affected by inefficient and ineffective allocation of resources when it comes to populations with poor oral health. Recent work has demonstrated the influence of poor access to dental care on the health care system through the use of hospital emergency departments for dental conditions that are most effectively treated in regular dental settings [9]. This is an allocation issue, and one that extends to the use of physician offices as well [10]. Ultimately, if hospitalization occurs, costs can be extreme, and the pathway associated with this endpoint negatively consumes societal resources not meant for dental care that are more reasonably used for other illnesses.

Working poverty should also be considered here, as it is a unique case wholly established by our policy approach to dental care. For example, national population estimates demonstrate that those with no income report more dental visits than those making $15-30,000 a year, pointing to the role of public insurance and the importance of insurance generally [11]. Analysis of a recent population-based survey demonstrates that working poor persons with no dental insurance coverage were more likely to report poorer outcomes, such as worse oral health, visiting a dentist

only in emergencies, having a functionally impaired dentition, and/or being unable to afford dental care [7]. The uninsured were also more likely to have reported self-employment income. Those with no history of social assistance also appeared to be better off, reporting a lesser likelihood of poor oral health, visiting only in emergencies, having a functionally impaired dentition, and/or being unable to afford dental care (Table 1).

Table 1. Age- and sex-adjusted odds ratios for various outcomes, by insurance status, and by reported history of social assistance

	[1]WP with no dental insurance OR (95% [2]CI)	WP with no history of social assistance OR (95% CI)
Reported oral health as poor or very poor	1.81 (1.36, 2.41)	0.45 (0.31, 0.67)
Only visits for emergencies	3.80 (2.62, 5.51)	0.53 (0.35, 0.79)
Had visited dentist within the previous year	0.29 (0.17, 0.49)	2.27 (1.31, 3.94)
Impaired dental functioning (less than 21 teeth)	1.81 (1.05, 3.11)	0.31 (0.17, 0.55)
Perceived a need for dental treatment	2.28 (1.69, 3.07)	0.41 (0.28, 0.62)
Reported inability to afford dental care	2.19 (1.60, 3.00)	0.49 (0.27, 0.59)
Gave something up to pay for dental care	2.00 (1.29, 3.10)	0.56 (0.34, 0.94)
Reported self-employment income	2.97 (2.00, 4.40)	1.30 (0.77, 2.19)
High school education or less	1.45 (1.09, 1.93)	0.54 (0.37, 0.79)

[1] *WP – working poor*

[2] *CI – confidence interval*

Source: Quinonez et al, [7]

Benefits of Oral Health Care in People Living and Working in Poverty

Most research on the benefits of oral health care centres on prosthetic rehabilitation. This research demonstrates potential gains in masticatory function and social functioning. Locker likely has the most general, and arguably most useful study, in terms of demonstrating the importance of basic dental treatment on the lives of those that suffer from oral disease [12]. Following approximately 900 older adults over a three-year period, Locker found that those who reported their oral health as improving were far more likely to have made dental visits and received dental services. Locker concluded that, "improvements in the oral health of older adults depends upon access to comprehensive dental treatments which can address fully their clinical and self-perceived needs."

In terms of productivity, Hyde et al. evaluated employment outcomes after the receipt of dental care by adults receiving social assistance [13]. Their research showed that participants in a back-to-work type program that provided free dental care were twice as likely to gain a favourable/neutral employment outcome after completing their dental treatment. The

introduction of public dental benefits has also been demonstrated to improve various outcomes. Long has shown that in one American state, after the restoration of dental and other health benefits through Medicaid, there came a drop in the share of adults reporting high out-of-pocket costs and problems paying medical and dental bills, a decrease in those that reported not accessing dental care because of cost, and an increase in the number of low-income adults with a dental care visit [14]. This undoubtedly would benefit adults in situations similar to Mr. B's case, working low paying jobs that do not offer any medical or dental benefits.

Rocha compared the adult labour supply and employment levels of municipalities covered by the Family Health Program ("Programa Saúde da Família", PSF), which included dental service in conjunction with general health care, with those not covered by the program [15]. The results revealed the municipalities eight years into the PSF program had adult labour supply 6.8 percentage points higher and employment 11.0 percentage points higher than otherwise equivalent municipalities not covered by the PSF.

Bond conducted pre- and post-treatment surveys and interviews to evaluate the impact of Teeth First Trial on long-term unemployed persons with dental conditions [16]. Thirty-five people were eligible for the trial, but only ten finished their treatment. Eight reported improvements in terms of self-image, and two commented that they no longer felt embarrassed when smiling. One participant found work, and two other participants believed they would find work soon. Another was going to undertake further training and four claimed that dental treatment improved their physical appearance, increasing their job prospects.

According to feedback from patients, Tucker reported higher levels of self-esteem in those who received dental services among 1,237 HIV/AIDS patients and 846 homeless and uninsured individuals; particularly among those receiving dentures [17]. Patients, whose appearance mattered in their work, reported an increased ability to secure and maintain their jobs as well.

Models of Health Care Delivery to Improve Access for People Living and Working in Poverty

Canadian governments arguably need to reconsider how they support the delivery of dental care. Historically, support has come in the form of service delivery for low-income individuals through the financing of direct and indirect delivery options, and through subsidies to middle and high income individuals through tax-support for non-wage benefits. Unfortunately though, as this report has demonstrated, and as evidenced by the case of Mr. B, this is insufficient to meet everyone's needs, and results in some significant gaps in care.

One can argue for the need to provide a more robust public option for those that cannot afford care in private dental practices. Right now, there are little to no public options available, even though recent research has shown that the lower a person's income, the greater the preference to access care in public, community health centre-type settings [7]. This is also supported by the fact that dentists in general are not satisfied with the fees paid to them by public programs, and

sometimes are not willing to see publicly insured patients both because of these fees and the associated administration, and because of the qualities they perceive as problematic in these individuals (i.e. a lack of self-care, regularly miss appointments) [7, 9].

Tax subsidies for private health and dental plans among unincorporated self-employed individuals already exist in Canada, yet this option needs to be promoted. That said, dental care can still remain out of reach for many working poor families, and broadening the base of public support for these families is important as well. As discussed, some level of broad universalism is an alternative, supplemented by deeper levels of support for specific at-risk groups.

Again, the issue of fair financing deserves attention. In this regard, one option then is to tax these supplementary health and dental benefits as they do in Quebec, and then funnel these revenues to fund more programs aimed at those without insurance and those that experience difficulties in accessing dental care. As reported in the Commission on the Future of Health Care in Canada, in 1994, the forgone revenue from proving employers and employees with tax breaks for the provision of private health and dental benefits was estimated at approximately 1.5 billion dollars for all governments [18]. Finkelstein notes the estimate at 1.6 billion dollars in 1998 for the federal government alone, and argues that this only includes lost revenue from the tax subsidy for those above a certain income, and that the total loss in revenue may be much higher once foregone revenues from provincial and payroll taxes are considered [19]. To be sure, the Commission on the Future of Health Care in Canada estimated the loss in revenue for all governments to be approximately 4 billion dollars.

Table. Summary of the original studies cited in the 'appendix b: people living and working in poverty'

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[1]						
[2]						
[3]						
[4]						
[5]						
[6]	Prospective cohort study	Clinic-based	Hong Kong	100 patients undergoing lower third molar surgery	To evaluate patients' perceptions of changes in oral health related quality of life (OHQOL) in the early postoperative period following third molar surgery.	The study concludes that there is a significant deterioration in oral health related quality of life in the immediate postoperative period following third molar surgery; particularly during the first five days.
[7]	Cross-sectional	Health survey	Canada	1005 Canadian adults and 2219 Canadian dentists	To test the hypotheses that socially marginalised Canadians are more likely to prefer seeking dental care in a public rather than private setting, and that Canadian dentists are more likely to prefer public dental care plans that approximate private insurance processes.	The majority of Canadians prefer to seek dental care in a private setting. Most Canadian dentists believe that governments should be involved in dental care, yet only less than half of them believe this role should include direct delivery.
[8]	Cross-sectional	Health survey	Canada	2754 Canadian adults	To determine if psychosocial factors explain the socioeconomic disparities in self-perceived oral health that persist after controlling for oral status variables.	Psychosocial factors partly but do not wholly explain the socioeconomic disparities in self-perceived oral health in this population after controlling for tooth loss and denture wearing.
[9]	Cross-sectional	Health	Canada	67125	To explore the nature of	Emergency department visits for

		survey		Canadians visiting emergency departments	emergency department visits for dental problems of non-traumatic origin in Canada's largest province, Ontario	dental problems of non-traumatic origin are not insignificant. The visits were greater than for diabetes and hypertensive diseases.
[10]	Cross-sectional	Health survey	Canada	1005 Canadian adults	To explore disability days, or bed days and cut-down days, associated with dental problems in Canada.	Disability days as a result of dental problems were low in Canada. Younger age groups, those with the lowest incomes, college educations, no dental insurance, oral pain and a history of visiting a hospital emergency room for a dental problem, were all more likely to report a dental disability day.
[11]	Cross-sectional	National health survey	Canada	Canadians aged 12 or older	To investigate the effect of socioeconomic status on patients' use of dental services and dental insurance coverage	The probability of receiving any dental care over the course of a year increases markedly with dental insurance, household income, and level of education.
[12]	Prospective cohort study	Health survey	Canada - Ontario	Canadian adults aged 50 and older	To assess the relationship between self-perceived change in oral health status and the provision of dental treatment in an older adult population	Improvements in the oral health of older adults depend upon access to comprehensive dental treatments which can address fully their clinical and self-perceived needs
[13]	Prospective cohort study	Health survey	US - California	American adults older than 21	To evaluate the intervention effects of rehabilitative dental treatment on the oral health related quality of life and employment of welfare recipients	Oral health improves the quality of life and employment outcome for this welfare population.
[14]	Prospective cohort study	Health survey	US - Massachusetts	American adults aged	Determining the effect of health care reform in Massachusetts	The uninsurance rate dropped by almost half

				18–64		
[15]						
[16]						
[17]						
[18]						
[19]	Cross-sectional		Canada		To investigate the effect of the tax subsidy to employer-provided health insurance on coverage by such insurance. Changes in Quebec are compared to changes in other Canadian provinces not affected by the tax change	Tax change was associated with a decrease of about one-fifth in coverage by employer-provided supplementary health insurance in Quebec

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APPENDIX C: ABORIGINAL GROUPS

THE CASE OF A FIRST NATIONS WOMAN LIVING IN A FIRST NATIONS COMMUNITY

Mrs. D is 50 years old, obese and diabetic. Her diabetes is poorly controlled. She has many teeth affected by decay and gum disease and has already had a number of teeth extracted. Mrs. D is part of a First Nations group, living in a remote community, where a dentist contracted by her band council visits irregularly. Her community also used to have a dental therapist working in the community health centre that used to be available for emergencies, but they are now gone. Due to the general lack of available health and dental care in the community, her and her family travel long distances by car to visit the nearest city for services, yet this is difficult due to a lack of economic resources. She is a grandmother, and while she, her children and grandchildren are considered "Status Indians," at one point, they were not, until administrative rules were changed that gave them access to a variety of health services, including dental care.

Recently, Mrs. D has developed a dental abscess that is causing her extreme pain, sleepless nights, and she now has a swollen face due to the infection. She needs urgent dental care but there is currently no dentist in her community. The next dental visit is not due for weeks, and she cannot afford to drive into the city. She is able to obtain a prescription for antibiotics from the nurse at the local community health centre. However, she really needs surgical intervention to remove the source of the infection otherwise the swelling could begin to compromise her airway and/or her eye socket, endangering her sight and/or her life. She needs a basic dental extraction. Twenty-four hours following the initial consultation, Mrs. D returns for another consultation as things are worsening. The nurse notes that the swelling is larger, she has a high temperature and there is clearly an urgent need to intervene surgically. Mrs. D is driven by the local medical transportation service to the nearest rural community with an on-call dentist, and the necessary urgent care to deal with the acute infection occurs. However, the dentist notes a number of other teeth in Mrs. D's mouth with low grade, chronic infections, which are at high risk for becoming sources of acute infections, similar to the current problem, in the near future. The dentist is also unwilling to treat her remaining teeth, as he has not received payment for services he provided to members of Mrs. D's community. He suggests she wait until the next dental visit to her community.

The **problem** is Mrs. D's cumulative, chronic health problems resulting from her social situation. Her obesity, diabetes, dental decay, gum disease and tooth loss are all inter-related to her diet and health care habits, which in turn are strongly related to her socio-cultural situation. This level of chronic disease that Mrs. D experiences, is beyond the capacity of conventional health care services to manage. Although the acute problem was dealt with, Mrs. D's mouth is full of other potential acute infections. Ultimately, she will probably have all her teeth removed and her diet will become even worse than before because of the limitations subsequent to having no teeth or eating with prostheses.

Mrs. D's obesity, diabetes and dental decay are all related to over consumption of refined carbohydrates. A dentist, oral surgeon, physician or other health professional, while essential to manage urgent problems such as that of Mrs. D, can have very little effect on the overall health of Mrs. D. They are always managing the emergencies "downstream". A completely different approach is required to prevent these chronic health problems

"upstream". Mrs. D presents regularly to the dentist when he visits her community approximately every 6 months because she knows she has many dental problems. However, because the care required would take many appointments over several months to perform in ideal circumstances, and since the dentist is only present for 3-4 days each time, and each time it is a different dentist, they always perform "compromise care", trying to patch up the many problems so she can last another 6 months without serious urgent problems. Evidently this approach does not work. Furthermore, at one point, when there was one present, the local dental therapist could at least manage her emergencies until the dentist arrived.

The health links to her socio-cultural situation are also quite subtle and complex, as she simultaneously benefits and suffers because of her status as a state-recognized "Indian." Before changes in administration, she lived off-reserve, and had access to her province's low-income dental benefits program, plus she paid for care herself when she could afford it. Then the federal government gave her "status," and she no longer had to pay, but she was also now no longer eligible for her province's low-income public dental benefits either. More recently, her band council had taken over the administration of her community's dental benefits, and this was causing new problems, like dentists in the surrounding areas not wanting to treat members of her community.

In summary then, the (oral) health care system that Mrs. D has access to is barely sufficient to deal with her relatively regular emergencies and is nowhere near sufficient to treat her chronic diseases nor prevent further episodes of disease. It is clear that an individual such as Mrs. D, and a population of people like her, many of whom have similar levels and severity of health problems, require a radically different approach to accessing good quality care. The current system simply does not work to either treat current disease or prevent new disease. This raises the issue of organisation of services and the types of health care professionals required to best manage Mrs. D's health.

The potential **solutions** involve:

1. Innovative approaches for recruitment and human resource planning, including expanding roles of other members of the dental health team and other primary care providers.
2. Early preventive programs that are integrated with existing health services and programs.
3. Oral health promotion programs based on a cultural wellness model, integrating traditional practices (and wisdom) with current oral health practices.
4. Incorporating fluoride varnish as part of a regular well-child program by trained health auxiliaries, community health workers, or physicians and participation within the community.

When observing the Aboriginal situation in Canada, it is apparent that dental benefits for vulnerable groups do not translate into better utilization or improved dental outcomes. Thus, by itself, insurance cannot eliminate the burden of dental caries in these communities. Other strategies, including early preventive measures, are better approaches to reduce the burden of oral disease.

Oral Health and Disease in Aboriginal Peoples

Sadly, the case of Mrs. D is not uncommon among Aboriginal populations. Aboriginal people are believed to suffer some of the worst oral disease in Canada. Recently, two surveys can help us confirm this: the 2008/09 Inuit Oral Health Survey and the 2009/10 First Nations Oral Health Survey. Both of these surveys examined 1,265 individuals in six and eight communities, respectively. The surveys were modelled on the CHMS for comparability. These surveys confirm that across all categories, these aboriginal groups experience a greater burden of oral disease than their general Canadian counterpart:

- While 73% of Canadian aged 6-79 years reported brushing their teeth at least twice per day, 55% of First Nations individuals aged 12-79 years reported doing the same, as did 42% of Inuit aged 3 years and over.
- While no national Canadian data exists, the prevalence of dental decay among First Nations children aged 3 to 5 years was 86%, with a mean dmft of 7.62, and a prevalence of untreated decay of 35.2%; among Inuit, the prevalence of decay stood at 85%, with a mean dmft of 8.22, and a prevalence of untreated decay of 49%.
- Comparatively, among Canadian children aged 6 to 11 years, the prevalence of dmft + DMFT stood at 57%, it was 94% for First Nations children and 93% for Inuit children; for Canadian children, 2.48 teeth were involved, 6.58 for First Nations children, and 7.08 for Inuit children.
- While among Canadian adolescents aged 12 to 19 years, 51% had sealants (mean 3.51 teeth), only 27% (mean 3.06) of First Nations adolescents had this preventive modality, and the percentage was too low to report among Inuit adolescents.
- While 84% of Canadians reported their oral health as good to excellent, 60% of First Nations individuals and 65% of Inuit did so.
- While 12% of Canadians reported avoiding food because of pain in their mouth or teeth, 40% of First Nations individuals and 30% of Inuit did so.

Oral Health Care Utilization in Aboriginal Peoples

In terms of oral health care utilization:

- While 74% of Canadian aged 6-79 years reported a dental visit in the last year, 60% of First Nations individuals aged 12-79 years reported such a visit, as did 50% of Inuit aged 3 years and over.
- Interestingly, while 17% of Canadians reported avoiding dental care because of costs, 6% of First Nations individuals and 4% of Inuit did so. This likely reflects the fact that the federal government, through its Non Insured Health Benefits program provides registered and eligible First Nations and Inuit individuals insurance that covers dental care.

Factors Related to Oral Health and Disease and Oral Health Care Utilisation in Aboriginal Peoples

Why is the oral health of aboriginal people so poor in comparison to the general Canadian population? Why do they report less visits to the dentist within the last year yet do not report cost as a barrier as often as the general population? To some extent, the answers are relatively

straightforward: the determinants of oral health and disease and oral health care utilization among Aboriginal people are the same as for any group experiencing the effects of poverty; additionally, many Aboriginal groups live in isolated areas, thus dental care is not readily available, yet if they are eligible, they are insured for dental care through the federal government's Non Insured Health Benefits program. In terms of the latter, this is the same situation that was observed when discussing the issue of working poverty, namely people without employment that have public insurance do not face cost as a barrier as much as those with employment but without insurance, as the presence of insurance removes the costs of dental care at the point of purchase, thus facilitating access to care.

Nevertheless, in terms of their colonial history, there are specific and unique challenges associated with being part of an Aboriginal group when it comes to accessing health services, including dental care. To understand this, it is important to understand the history of the Non Insured Health Benefits program and Aboriginal health services policy in Canada.

The history of the Non-Insured Health Benefits and Aboriginal health services policy in Canada dates back hundreds of years. The Auditor General of Canada (1993) described the NIHBs as 'evolving gradually.' More importantly, she described them in a very specific governance and political context [1]:

> *"The provincial and territorial governments are primarily responsible for the delivery of health care [in Canada]. Some provinces have included [Aboriginal populations] in programs [but] others have not. [These] governments consider that the federal government should accept full responsibility for [Aboriginal populations]. The federal government […] considers that all residents of a province are entitled to provincial health services, including [Aboriginal populations]. It maintains that [its] provision of health services to [Aboriginal populations] is based on policy and not on treaty or other legal obligations. Most [Aboriginal groups] generally consider that all necessary health services must be provided to them under Aboriginal and treaty rights [and] represent a fiduciary obligation owed by the [federal] Crown"*

Early on, traders, religious missions, and mining companies provided health services for Aboriginal populations on behalf of the federal Crown, and this included services now associated with the NIHBs (e.g., medical equipment and supplies, pharmacy). By 1943, of the eleven hospitals in Canada's largest Aboriginal territory, all but two were owned and operated by church or industry [2]. In 1946, the health responsibilities of the federal Department of Mines and Resources were brought under the newly formed Department of National Health and Welfare, becoming known as the Indian and Northern Health Service. Religious and private institutions were administratively replaced, and by 1956, federal authorities were "operating 18 hospitals (growing to 22 by 1960), 33 nursing stations (37 by 1960), 52 health centres containing dispensaries, and 13 other health centres employing full-time physicians or nurses (83 health centres by 1960)"[2]. In 1962, the Indian and Northern Health Service was eliminated and amalgamated to the newly formed Medical Services Branch of Health and Welfare Canada.

A discrete Aboriginal health service system was now observable in the midst of a developing Canadian welfare state. For example, the Hospital Insurance and Diagnostic Services Act of 1957 and the Medical Care Act of 1966 socially insured hospital and physician care in Canada, and structured the social redistribution of health resources along the range of insured and uninsured services (or non-commercial and commercial social goods). This characterisation was applied to Aboriginal health services, and in this way, the NIHBs came to represent socially uninsured services or commercial social goods.

Yet the NIHBs did not acquire their programmatic aspect until the late 1970s. In the 1960s, the Medical Services Branch described them as 'medically necessary uninsured medical and dental benefits'. Before this, the NIHBs were simply conceived as activities within larger programs (i.e., the medical equipment, supplies, transportation, and pharmaceuticals needed for nursing and physician care), and in some instances, were conceived as discrete activities themselves (e.g., travelling dental and vision clinics). In effect, delivery developed out of historical custom, and existed as the product of meeting the medical requirements arising out of need.

Defining these medical requirements was again linked to the broader health care environment. For Canadians overall, socially uninsured services became the purview of the insurance industry, namely in the latter's role as underwriter for the 'supplementary health benefits' of employer-employee contracts (i.e., employment-based health insurance) [3]. Yet due to welfare ideals, some provincial and municipal governments began to publicly finance uninsured services as well, specifically as part of social assistance benefits, or through targeted direct delivery (e.g., low-income dental clinics). Since large segments of the Aboriginal population met the criteria of need, and since jurisdictional dynamics often precluded provincial intervention, federal authority began to provide uninsured services to 'match' provincial forms of coverage.

The social dynamics of the 1960s then intersected with the politics of Aboriginal life in Canada, as the poor living conditions of Aboriginal communities became widely recognised in the context of juridical claims over the confiscation of Aboriginal lands [4, 5]. In response, the federal government tabled the 1969 'White Paper on Indian policy,' proposing to repeal major federal legislation, terminating the Ministry of Indian and Northern Affairs, and shifting responsibility of Aboriginal populations to provincial and territorial authorities. The Aboriginal activism in response was coordinated and significant, and garnered international attention, eventually forcing federal authority to negotiate with Aboriginal leadership. One outcome was the funding of 'native economic development corporations' or 'ethno nationalist capitalist organisations' [6]. These agents of collective representation were required to adopt the structures of the nation-state (e.g., elections, permanent political authority, a cadre of largely non-Aboriginal advisors), and came to act, in part, as governmental representation. In this regard, they actively placed pressure on federal authority for health services seen as rightfully belonging to their constituents, including the NIHBs. In light of all of this activity, the atmosphere of power relations within the Aboriginal health services policy environment was changed, closely linking health care to the general push towards Aboriginal self-government and self-determination [7].

To this end, in 1975, the federal government clarified that it was still ‘a matter of policy rather than statutory or treaty obligation that the federal government provided certain health services to Indians’ [1]. Three years later, the federal government introduced 'Guidelines for Uninsured Medical and Dental Benefits' in an effort to standardise practices across the country and set limits on benefits. The Guidelines proposed restricting eligibility to those that lived on Aboriginal lands held in trust by the Crown (i.e., reserves), and to those who met the criteria of a financial means test. In 1979, in the face of intense opposition from the Aboriginal community, a moratorium was placed on the Guidelines.

The federal government concurrently tabled the ‘Indian Health Policy,’ establishing the then current level of NIHB service as the norm for budgetary purposes [8]. The policy established ‘professional medical or dental judgement or other fair and comparable Canadian standards’ as the criteria for NIHB delivery. It also promoted consultation with Aboriginal groups and ‘their participation in the administration and delivery of health programs.’

It is important that federal authority linked NIHB provision to ‘professional medical and dental judgement,’ as this entrenched the historical involvement of the health professions in the NIHB program. By the 1970s, for example, Aboriginal health services had become a discrete service culture and economy, and professional contractors and academic institutions were involved in everything from dental services to obstetrical care [9-12]. With embedded economic interests, these contractors came to play an important role in defining and structuring services.

By this time as well, the push towards self-government and for community control over health services was significant [2, 5, 7]. Numerous federal committees were now considering the issue, and formal land claims negotiations included some discussion on the ‘passing of control’ of health services from federal to Aboriginal authority. ‘Community demonstration projects’ developed, and in some regions, so did the creation of ‘regional health boards’ with significant Aboriginal membership and direction. Yet none included transfers of control over the NIHBs.

One reason for this was that changes in demography along with legislative influences on categorisation practices began to have a significant effect on the NIHBs [8, 13]. Both increased population eligibility, resulting in the rapid growth of NIHB expenditures, from $36 to $400 million in one decade [2]. Politically and economically, an ever-expanding envelope of services was problematic for federal authority, especially since the latter’s efforts were routinely aimed on containing program expenditures [1, 8, 14].

Yet cost-control was difficult in the context of ‘passing control.’ For instance, the transfer of health programs resulted in a local and regional administration largely staffed by Aboriginal persons, public employees that were more sympathetic to the realities of those receiving care than at any other time in the history of Aboriginal health services. Authorising the provision and payment of a wide variety of services under the NIHBs became routine. To be sure, with a category defined as ‘other health care services,’ Canada’s Auditor General [1] readily recognised that “[d]efficiencies exist in expenditure control processes.”

By the early 1990s, regardless of regional and local custom and past definitions of care, centralised federal authority began to develop 'national program directives and administrative procedures' to enforce particular aspects of their original policy (i.e., only provide eligible benefits and heavily apply status clauses). This time also observed the most robust efforts at control over the NIHBs, both from the point of view of the strong federal deterrence of program expansion, and relative to Aboriginal organisations that sought and gained more governing and programmatic opportunities over the services.

Relative to the former, federal cost-containment ushered in the 'envelope environment,' where freedoms to structure programming were introduced as a response to Aboriginal pressures, yet where eligibility criteria became more stringent, and where no new money could flow beyond a fixed financial ceiling. This made it difficult for Aboriginal governments, as their programs were significantly challenged in the face of such controls. To be sure, NIHB services were often made available to all community members, irrespective of state-recognised status. Further, costs were naturally inflationary, as they were driven by unpredictable factors such as geographic isolation and high medical need.

The late 1990s represented the apex of federal measures, which cut millions from fiscal transfers. In response, as in many other jurisdictions in Canada, Aboriginal governments attempted to generate their own-source revenue [15]. More of an effort was thus placed on controlling services that held options for economic development, such as the commercial social goods constituting the NIHBs [11, 12].

It is important to consider that by this time, the NIHBs largely functioned as a form of public third party financing, delivered through providers in the private sector. When servicing isolated communities, the NIHBs also functioned through contracts with health services providers (e.g., medical transportation firms, academic health faculties, health professionals). In this regard, not only were the NIHBs viewed as a potential vehicle for economic development, they also lent themselves to being treated like actual insurance. To this end, federal authority began to contract private sector firms as claims-processors for the publicly financed program, and also began to track expenditures and providers much like insurance firms do when attempting to control costs.

The use of private sector firms as claims-processors speaks to the complex nature of the NIHBs. Firstly, the program remained with no specific enabling legislation, leaving gaps in the definitions of purpose, expected results and outcomes of the program [1]. So not only was the program caught up in social debates about Aboriginal rights and jurisdictional responsibilities, there also remained a general confusion as to what exactly the program accomplished:

> *"So whereas a health program might have objectives defined in terms of improving health status, a health insurance plan would have as its objective to provide coverage, up to pre-determined limits, for specified medically required services and products. The auditors found that, in practice, the program is managed more as an insurance plan […] [al]though the premiums, deductibles and co-payment provisions commonly found in health insurance plans are absent in this program"*

The consequences of this for a sustainable public program were imminent, and expressed succinctly by the then top bureaucrat of the program:

> *"Look, [NIHB] is one of the only programs that you fund. You bill it but you fund as well, so the more you bill the more you fund. And insurance companies aren't like that. Insurance companies will levy a premium if they haven't got enough money, they'll up the premium so everyone pays more the next year anyway. That's the message we have to get through, that's a hard message to get through because [stakeholders] don't want to hear it" [16]*

In short, it appears that the NIHB service and policy environment is immediately met by the challenges of federal cost-containment measures, where the major impetus for programmatic success is diametrically opposed to the goals of the program's many service providers and their activities within private health markets.

Relative to the transferring of control, the nature of the program also meant that it remained unclear what exactly was being transferred, a public program or an insurance mechanism. NIHB transfers were thus slowed and in some cases held back [17]. Yet by 1997, in the wake of a federal Royal Commission on Aboriginal Peoples, a new mandate for the NIHB program was approved. Once again, it continued the practice of updating definitions for 'program objectives, principles, client eligibility and benefits,' proposing a 'benefits strategy to ensure a fiscally sustainable approach to managing the program,' while giving the authority to transfer the NIHBs [18].

This was a welcome development for Aboriginal organisations seeking to continue their control over programmatic activities in the name of self-government, and dovetailed well with their continued attempts to generate revenue. Yet it was difficult to generate revenue with a program consistently earmarked for cost-control, much less one that has an expenditure ceiling. Heavily critiquing federal measures thus became commonplace, with Aboriginal and professional lobbyists sometimes working together in an effort to maintain and/or expand services [18-21].

In closing, it is clear that through the NIHBs, a diverse set of services are gathered into a discrete system for the delivery of socially uninsured health care to Aboriginal populations in Canada. Due to its unclear status, this portion of Aboriginal health services policy and structure has situated along a margin, at once a public program and a third party insurance mechanism. As an economy, this involves the state as the primary payer and the market as a provider, yet lacks the user charges to make it a truly gainful economic endeavour.

Impacts of Poor Oral Health in Aboriginal Peoples

Aboriginal people in Canada bear a disproportionate burden of illness, with the oral health status of Aboriginals falling well below that of other Canadians. While 84% of Canadians reported their oral health as good to excellent, only 60% of First Nations individuals and 65% of Inuit did so. Additionally, while 12% of Canadians reported avoiding food because of pain in their mouth or teeth, 40% of First Nations individuals and 30% of Inuit did so.

Benefits of Oral Health Care in Aboriginal Peoples

In Canada, there have been a number of interventions implemented in Aboriginal communities to improve the oral health of Aboriginal Peoples. For example, a service training project, which began in 2002 in Hartley Bay British Columbia, brought paediatric residents from the University of British Columbia into a northern First Nation community to provide well-child care that included oral health anticipatory guidance for parents and caregivers. Results from the project indicated successful process outcomes, such as increased dental efforts for preventive care rather than for dental restorations and extractions [22].

Further, the ECC-preventive component of the Women and Child Community Nutrition Program delivered to First Nations communities in the Sioux Lookout Zone [23], provides culturally appropriate and community-specific nutrition and dental preventive education to pregnant women, new mothers, and elders raising children. Evaluation results have showed that the program significantly improves caregivers' knowledge of ECC, children's oral hygiene and body mass index, as well as community capacity to address oral health issues.

In terms of the benefits of oral health care for children, much is known about the preventive effects fluoride varnish in reducing the burden of oral disease and the potential to save governments money [24, 25]. In 2004, FNIHB of Health Canada established the Children's Oral Health Initiative, as a policy response to the oral health needs of Aboriginal children. It was introduced to prevent dental caries and improve oral health among young First Nations and Inuit children living on reserves and promotes disease prevention at the community level through early detection and treatment coupled with organized health promotion and education activities [26]. To date, COHI efforts have reduced decay rates in children and increased the awareness of the importance of oral health [26]. Between 2003-04 and 2006-07, the rate of children aged 0-4 accessing services from COHI increased from 16 per cent to 30 per cent. As a result, the percent of children with caries-free teeth has increased from 39.4 per cent in 2006-07 to 44.4 per cent two years later. Also, the percent of children with two or more decayed teeth have decreased in this time period [26].

Models of Health Care Delivery that Could Improve Access for Aboriginal Peoples

Apart from the daily effects of poverty, many of the difficulties faced by aboriginal people stem from the administrative challenges associated with their unique relationship with the Canadian State. Two examples are described here. The first concerns how the 'passing of control' over NIHB services created challenges for the delivery of dental care in private dental practices. The second concerns the same issue, but this time points to the deterioration of the dental therapy program, which from the mid-1970s into the late 1990s acted as a bulwark against the lack of availability of dental care in many aboriginal communities.

As mentioned above, with the major economic retrenchments of the 1990s, many Canadian governments looked to revenue generation to ease their struggles [15]. For Aboriginal governments, this was tied to the NIHBs, as control could potentially lead to economic growth. To

be sure, historically, positive gains could be observed in the efforts of the non-Aboriginal contractors delivering the commercial social goods. To this end, transfers of control brought both governmentally- and market-oriented Aboriginal organisations into competition for governmental tenders, and the results held impacts for the consumer.

Initially, NIHB transfers were slowed by the structural uncertainties of the program, and by the Auditor General of Canada's [14] recommendation that improvements in administrative processes be achieved prior to any 'transfer pilot.' Transfer "must recognize the weaknesses identified and assign responsibility for fixing them" [14]. By 1995, although the implementation of 30 pilot projects had been planned, only "22 proposals [had] received a negotiating mandate [with] few approved for pilot implementation, [and] only one pilot under way" [14]. In 1997, a renewed mandate then re-established the authority to transfer the program, and made available for pilot transfer medical transportation, vision care, and medical supplies and equipment. Shortly after, possibilities for control over drug and dental benefits were brought on line.

Importantly, managing discrete aspects of the NIHBs had actually been a routine part of previous agreements for community health program transfers (e.g., communities managing medical transportation, or involved in coordinating itinerant service providers). Yet the 'first three NIHB pilot projects' to assess 'full control' were not reported as commencing until 1996 [27]. In this sense, while the first wave of NIHB transfers stressed the incorporation and management of providers into the dynamic of community health programming, the second wave of transfers were different:

> *"Although the [new pilot] transfer[s] [to] [Aboriginal] control will follow a similar process to community health transfers, there are [some] key differences: [1] Unlike community health programs, the costs of providing benefits to community members are influenced […] by pressures such as client utilization and market increases. [2] The provision of benefits is dependent on private sector providers and markets. [3] Unlike services such as nursing […] providing benefits requires expertise in health benefit management which may not already exist at the community level"[27]*

To this end, the federal government proposed various management and delivery options, namely community level corporations, regional level health management corporations, and/or Aboriginal/non-Aboriginal corporate partnerships, all acting, in some regard, as economic and self-government vehicles.

In terms of dentistry, a heated competition for dental contracts ensued [10-12]. The competition took two forms. The first concerned winning contracts to deliver dental care in isolated aboriginal communities. Due to the privileging of aboriginal interests in the context of NIHB transfers, existing professional contractors looked for ways to partner with aboriginal stakeholders to form corporations that would be seen as favourable to federal authority. Nevertheless, some professional stakeholders could not achieve these partnerships, and believed they were going to lose their long-held contracts. With historically strong relationships with federal stakeholders, they criticized the contracting process, warned against the experience of new contractors, and as a

result slowed down the disbursement of contracts. Most importantly, this left many aboriginal communities without dental care as contracting debates were being resolved.

The second form of competition concerned the processing of claims. As the NIHBs also took the form of a third-party insurance mechanism, some aboriginal organizations/communities took on the processing and payment of claims for their members in an effort to control services and for economic benefit. Unfortunately, with a learning curve, this left many dental providers without payment for services they had delivered, and in some cases, left patients with unfinished treatments as service providers stopped care as they waited for payment.

The final issue here concerns dental therapy. As described previously, the dental therapy model was brought to Canada as a response to the lack of dental care available to isolated aboriginal communities. The program was adopted across Canada in Aboriginal reserves, and provincially in Saskatchewan and Manitoba, which due to their large aboriginal population, provided services to many off-reserve aboriginal populations. Yet over time, due to economic and professional pressures, dental therapy programs were degraded to almost nothing. For on-reserve communities, this decline involved the transfer of control over the dental therapy training program to an indigenous organization. This transfer occurred in 1995 as part of the push towards aboriginal self-government, and did not develop positively, with an external review expressing serious concern:

> *"[I]t was evident that the [transfer] resulted in staff and student discontent and confusion, [it] alienated many dental therapists in the field and was generally harmful to the credibility of […] dental therapy. [Both federal and indigenous authorities] must share the responsibility for the problems. The [transfer] did not involve any 'training period' [...]. [Federal] staff did not provide adequate support [and] it was apparent that the expertise […] for training dental therapists was beyond the resources of [the contractor]"[28].*

Over time, the National School of Dental Therapy was no longer producing enough graduates, and has recently closed as a result. Again, this has major implications for isolated aboriginal communities that depended on dental therapists as their first line for dental care provision. This is demonstrated in the case of Mrs. D where previously she obtained oral health care services from dental therapists in her community, which have since been removed and replaced with intermittent care by visiting dentists. In short, all of this was made possible by conflating the administration of service delivery activities with Aboriginal governance and the hope of economic opportunity in NIHB markets. Ultimately though, of the original 16 NIHB transfer pilots, there is now only one, and in dissolving these transfer pilots, not unlike Mrs. D, left many Aboriginal people with treatment delays, and/or with no recourse to continue treatments already underway.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[1]	Report					
[2]	Report					
[3]	Report					
[4]	Report					
[5]	Report					
[6]	Report					
[7]	Report					
[8]	Report					
[9]	Report					
[10]	Report					
[11]	Report					
[12]	Report					
[13]	Report					
[14]	Report					
[15]	Report					
[16]	Report					
[17]	Report					
[18]	Report					
[19]	Report					
[20]	Report					
[21]	Report					
[22]	Report					
[23]	Report					
[24]	Population-based cohort study	Health Survey	US (North Carolina)	21277	To investigate the effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dentally related Medicaid expenditures for young children.	Participating in the WIC program has the potential for decreasing dentally related costs to the Medicaid program, while increasing use of dental services
[25]	Population-	Health	US (North	21277	To investigate the effects of the	Children who participated in WIC had an

	based cohort study	Survey	Carolina)		Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dental services use by Medicaid children in North Carolina	increased probability of having a dental visit, were more likely to use preventive and restorative services, and were less likely to use emergency services
[26]	Report					
[27]	Report					
[28]	Report					

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APPENDIX D: ELDERLY PEOPLE

THE CASE OF AN ELDERLY LADY

Mrs. A is an eighty year-old woman who has been living independently in a major urban centre. She has mobility limitations due to severe arthritis and has begun to show signs of memory loss. She and her daughter have decided that it is best that she move into the local seniors' residence, where she will have better access to health care and social activities and will be closer to friends who reside there. Prior to moving, it is decided that she should have her teeth checked. She is especially concerned about her upper partial denture that is over twenty years old and that is now loose with a few teeth missing. Mrs. A had lost her dental benefits after retirement but has a modest dental plan as part of her late husband's death benefits. Her dentist suggests that her treatment needs should be addressed prior to her move. He proposes an aggressive treatment plan including the removal of several teeth that would likely require ongoing treatment if not extracted. He is aware that there is no dental provider available on site at the seniors' residence, and that daily personal care will likely become a challenge for Mrs. A. as her frailty and dependence on others continue to increase. Mrs. A had already noticed that a friend's breath was becoming unpleasant, and that her diet had to be changed to softer foods due to difficulty eating with several very mobile and painful teeth. Mrs. A really wants to avoid these problems.

The **problem** is that the many elderly Canadians have difficulty accessing oral health care because of limited income and loss of dental benefits upon retirement, limited mobility and fear. In addition, adult dental care has become more complex and the presence of intricate bridging, crowns, implants and the like, make intervention less straight forward than a simple extraction. This situation is even worse for frail or dependent adults living in residential care. Few facilities have routine oral screening to support appropriate oral health care planning. Referrals for professional care are generally ad hoc. Canadian dentists have little training in managing the complex health, functional and social problems experienced by those who are dependent or frail. There is little public financing and infrastructure to support those who cannot pay for professional care. This falls to out-of-pocket payments by patients, their families and/or the residential facilities. Mrs. A is thus very fortunate to have some means to pay for her own dental care. Yet due to busy schedules, a lack of knowledge and training, and other competing care needs, oral health and oral health care are often low on the list of priorities for professional and non-professional carers of older adults who are frail and dependent. Further, despite having dental coverage through her late husband's death benefits, the policy covers only a portion of the needed interventions and expensive out-of-pocket costs may ensue. Ultimately, the impact of poor oral health resulting from less than optimal care can have a serious impact on her overall health and quality of life.

The **potential solutions** involve:

1. On-site screening by people trained to look for several signs of oral disease.

2. On-site preventive care by people trained to provide good hygiene and healthy food.
3. Domiciliary treatment/rehabilitative care by people trained to provide fluoride therapy, professional hygiene, symptom management, acute infection management and restorative and prosthetic care as required.
4. Appropriate training of the various personnel to perform the aforementioned tasks.

These potential solutions require flexible use of a variety of health care professionals and non-professional carers. The tasks need to fit into the health care protocols that already exist for semi- and non-autonomous seniors living in institutions. In addition, appropriate sources of funds to pay for these tasks and appropriate payment schemes designed to achieve the goal of good (oral) health for such seniors. Finally, the special needs and the difficulty in caring for the population in question, needs to be recognised and appropriate training provided.

Oral Health and Disease in Elderly People

In 2007-2009, among elderly Canadians (age 60-79):

- 100% are affected by one or more decayed, missed, or filled teeth (DMFT)
- 21.7% are edentulous
- 14.2% rated their oral health as poor or fair
- 12.7% avoiding foods because of problems with their mouth
- 7.4% reporting persistent pain or ongoing pain anywhere in their mouth.

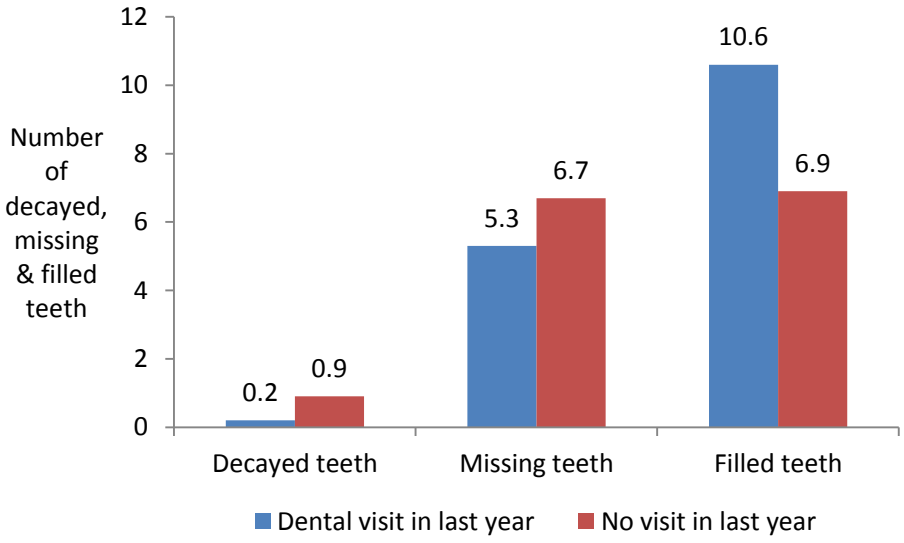
However, there has been a remarkable improvement in oral health status of Canadian elderly population in the last decades. The number of elderly Canadians without natural teeth dropped considerably in the 2007-2009 CHMS data compared to 1970–72 Nutrition Canada. In 1970–72, 52% of Canadians aged 60 and older were edentulous (female: 49.5%, male 55.7%) whereas 21.7% Canadians aged 60–79 were recorded as edentulous according to the 2007-2009 CHMS data.

Factors Related to Oral Health and Disease in Elderly People

There are many factors that contribute to the poor oral health of seniors. Those who are aging are keeping their teeth longer, thereby increasing the lifetime risk of exposure to various oral diseases and conditions. This exposure to disease can manifest as periodontal disease, caries, edentulism, soft tissue lesions, etc. The Federal Dental Advisory Committee [1] also reported that the sugar-laden snacks offered to elders to stimulate their appetite, threatens their oral health. They reported that caries initiated and sustained by sugar and other refined carbohydrates could destroy an entire natural dentition in a matter of months.

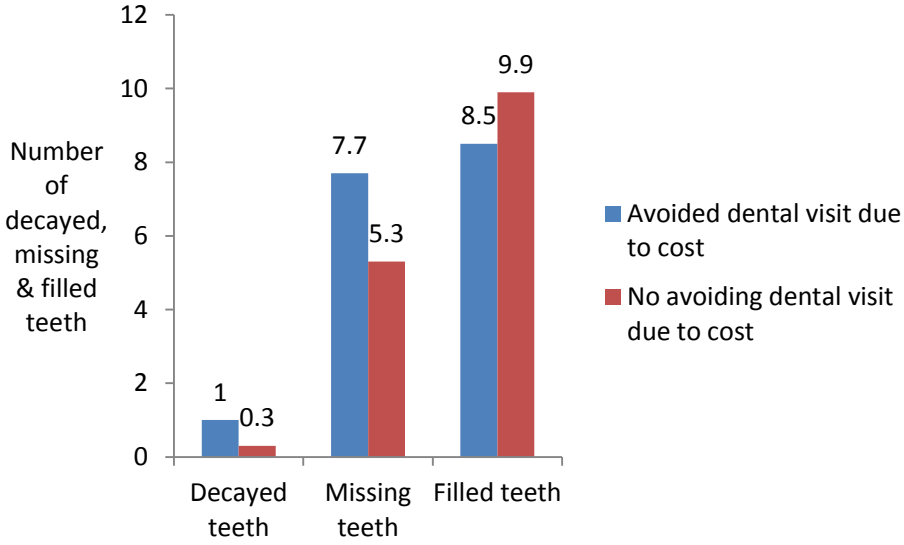
In the CHMS study adults aged 60-79 years were included and we analyzed data for this group, categorizing them as elderly people living in Canada. When investigating which factors were related to indicators of oral health and disease in this group, socioeconomic factors were largely absent, while indicators of access were very common.

Figure D 1. Dental status and visits to the dentist among elderly people living in Canada



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

Figure D 2. Dental status and avoidance of dental visits due to cost among elderly people living in Canada



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

General diseases also have a significant impact on oral health in the elderly. For example, chronic conditions such as arthritis and dementia have been found to diminish manual dexterity and the ability of older adults to perform effective oral hygiene practices [2]. Medications prescribed for depression, sleeping difficulties, hypertension and other chronic disorders have also been found to reduce salivary flow, and in turn, disturb the normal protective function of saliva [1, 2]. On the whole, there are many internal and external factors that contribute to the poor oral health of seniors.

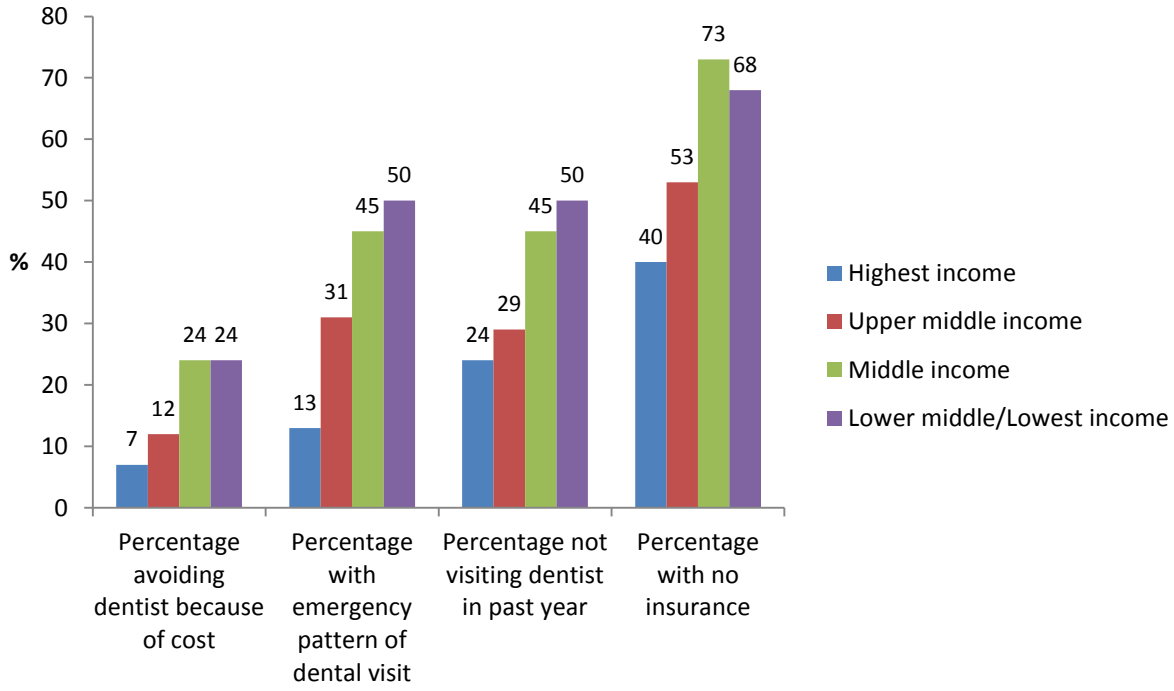
Oral Health Care Utilisation in Elderly People

Dental care utilization has been found to decrease substantially with aging. The CHMS found that 68.4% of those aged 60-79 reported a dental visit in the last year, which was the lowest among all age groups [3]. Marvin noted that among homebound seniors, 60-90% reported a need for dental services, but only 26% reported visiting a dentist at least once every 2 years and 12-16% had not visited a dentist in over 5 years [4]. Looking at dental utilization of the institutionalized, it was found that only 9-25% of seniors see a dentist once a year and 30-75% have not visited a dentist in over 5 years [4]. Inversely, many studies have found that an increase in age results in an increase in the use of physician services. McNally reported that health care utilization in Canada had increased to 89% for community dwelling people over the age of 65, while visits to the dentist decreased to 38% for the same age cohort [2]. Also, for those even older in age (85+), visits for medical care increased to 92%, while visits to the dentist decreased further to 28% [2]. Ultimately, this contrast draws even more attention to the decline in dental care utilization with increasing age.

Factors Related to Oral Health Care Utilisation in Elderly People

Income had a great influence on accessing oral health care among elderly people living in Canada. Half of the elderly population from the lowest income group have not visited a dentist in the past year compared to 24% of those from the highest income group. Only 7% of those in the highest income group avoided seeing a dentist because of the cost whereas 24% of those from the lowest income group avoided a dentist due to cost. Just as with the children and adults in the CHMS data described previously, those from the highest income group were more likely to be covered by dental insurance. The gap between the richest and poorest group was also present in terms of the pattern of visiting dentist. Older adults in the poorest income group were four times more likely to postpone seeking treatment until they have emergency reasons such as pain.

Figure D 3. Indicators of access to dental care and household income in elderly people living in Canada



Source: Created by the authors from the analyses of the 2007-2009 Canadian Health Measures Survey data

A number of barriers exist for seniors in accessing appropriate and needed oral health care. These access barriers are complex, and do not just involve financial barriers. They involve geographic and physical barriers for the homebound and institutionalized, and for the latter, involve a lack of institutional support for maintaining their oral health and meeting their oral health care needs (i.e. lack of home care and nursing providers conducting oral hygiene screening and maintenance, and a lack of dental providers in long-term care settings). This was demonstrated in the case of Mrs. A, where her move to residential care essentially eliminated her ability to access regular oral care.

Financial Barriers and the Lack of Dental Insurance

Many seniors live in relative poverty and rely on small pensions for economic survival (Smorang, 2003). Locker found that 28% of seniors live in households with annual incomes of less than $15,000 and 52% with incomes of less than $30,000 [5]. In addition to low incomes, the CHMS found that among the elderly population, the lowest rate of private insurance (38.6%) and the highest rate of no insurance (53.2%) were found among adults 60-

79 years of age. Utilization and access to dental care is heavily dependent on insurance, and when compounded by the reality of fixed incomes, dental care can become cost-prohibitive.

Geographical Barriers

Seniors are often isolated from family and other social supports. This can make mobility and transportation primary barriers to care, especially for those living in rural remote areas, those who are homebound and those residing in long-term care facilities [6-8]. In addition, physical barriers in dental offices, such as lack of wheelchair accessibility, limit access for many seniors [8]. Innovative mechanisms to improve service delivery to this population have been discussed and include mobile dental clinics and designated transportation for those who are geographically isolated [7].

Lack of Providers

Several studies have shown that there is a lack of willingness by dentists to treat elderly patients due to their discernment that seniors are impatient, do not have the endurance to undergo treatment, and require more chair time [4]. Inadequate remuneration for the services provided and for the special care needs associated with geriatric dentistry, greatly deters dentists from providing care in long-term care institutions and in private dental offices [8]. Within long-term care facilities it has been found that oral care is considered to be the most undesirable task among caregivers [9]. Evidence suggests that this could be a result of nurses feeling ill-equipped to provide such care due to a lack of education in this area, with oral hygiene not being given the importance it deserves, especially when competing with the numerous care needs of patients [9].

Lack of Perceived Need

The most common reason for not seeking dental care by independent, functionally dependent, and institutionalized older adults, is their lack of perceived need for dental services. This lack of perceived need has been shown to be an even greater barrier to dental care than financial cost [4]. These populations do not seek assistance because they accept pain as a normal part of aging. Also, a decrease in cognitive ability, a reduced ability to tolerate procedures, and an increase in anxiety and fear of new situations or procedures, may decrease a senior's desire for care [4]. Focus group findings from a study of seniors in Nova Scotia confirm that fear and a lack of awareness about the importance of regular oral health care, limits the ability to obtain care [7].

Impacts of Poor Oral Health in Elderly People

The CHMS data found that 14.2% of the Canadian elderly population rated their oral health as poor or fair; 12.7% reported avoiding foods because of problems with their mouth; and 7.4% reported persistent or ongoing pain somewhere in their mouth. Poor oral health can lead to numerous deleterious impacts to an aging individual. It can influence their quality of life by affecting their nutritional status (chewing, swallowing), facial esthetics, and social interaction (speaking and cognitive function) [9, 10]. The impact of poor oral health also extends to general health. For example, infections from dental abscesses and from the bacterial plaque associated with gingival and periodontal diseases can damage the cardiovascular and endocrine systems [1]. However, it is pneumonia from the aspiration of oral bacteria into the lungs that has gained the most attention and has become the leading cause of death from infection in long-term care residents [9].

Benefits of Oral Health Care in Elderly People

Given that substantial economic and intellectual resources are allocated to the production and distribution of oral health services it is important to evaluate if these services are effective [10, 11]. Yoneyama et al. have shown that by providing oral care in long-term care settings, the risk of developing aspiration pneumonia is reduced. This study also found that patients receiving oral care had fewer febrile days than patients not receiving oral care, and furthermore, the removal of latent oral infections and potential problems could reduce the incidence of lower respiratory tract infection [10]. In terms of quality of life, Locker has shown that dental treatment has a marked effect on the self-perceived dental health of older adults [11]. Other benefits of treatment include an improvement in the ability to chew food, to maintain a nutritious diet, to socialize, to be free of pain and ultimately be able to function in daily life [11].

Models of Health Care Delivery that Could Improve Access for Elderly People

This is a difficult area, as it is known that few dental providers are interested in mobile dentistry and/or in delivering care in long-term care settings. Yet with seniors experiencing limited mobility, it makes sense that home care-type services would be important. Most definitely, having services available in long-term care settings is fundamental as well; both delivered by existing home and long-term care staff, and by dental providers.

Research has shown that an interdisciplinary approach to oral health care improves knowledge, awareness and moves oral health practices closer to best practice. In the context of elderly people, this interdisciplinary team can include nurses, physicians, occupational

therapists and speech language pathologists in addition to dental hygienists, denturists and dentists [9]. It is also recognized that unregulated health care providers, families and clients do provide care, and should be included in this team approach [9].

One proposed solution coming to the forefront is the push for independent dental hygiene practice. There is a severe shortage of dental health professionals serving individuals who are homebound or living in care facilities. Reducing regulatory barriers for dental hygienists in provinces such as British Columbia, Saskatchewan and Ontario have been shown to improve access to dental services for this segment of the population that cannot access traditional dental treatment [6]. National and provincial dental and dental hygiene associations have undertaken many initiatives to help elderly populations with special needs [4]. The College of Dental Hygienists of Ontario is actively seeking support for its efforts with elders and hopes to produce a realistic funding model that will resolve the cost barrier associated with treatment for elders [4].

The Registered Nurses' Association of Ontario [9] and The Canadian Dental Association [12] suggest similar long- and short-term strategies to improve oral health and access to care for seniors that include: educating seniors, families and caregivers on the importance of maintaining good oral health; developing mandatory oral health standards in LTC facilities for daily oral care and annual access to professional care; supporting collaboration among health care providers to promote oral health as part of overall health; creating single point entry assessment instruments that include oral health when determining continuing care service needs; supporting tax-based (income-tested) dental benefits for seniors in LTC facilities and seniors with low income; supporting training for facility staff on geriatric dentistry and lastly; allocating space with the appropriate dental equipment to provide preventive, surgical and restorative care on site.

Regarding the oral health of seniors, special concern is placed on the elderly who are living in poverty, homebound, dealing with multiple systemic health problems, and are residents of care facilities. These populations face substantial barriers and profound disparities in accessing needed dental services. Without a comprehensive plan in place to address these gaps in services, the treatment needs of the elderly will continue to go unmet and become more predominant as this segment of the population grows.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[1]	Report					
[2]	Report					
[3]	Report					
[4]	Report					
[5]	Report					
[6]	Report					
[7]	Report					
[8]	Report					
[9]	Report					
[10]	Case-control	Nursing home	Japan	417 older adults (mean age=82)	To investigate whether oral care lowers the frequency of pneumonia in institutionalized older people	Oral care may be useful in preventing pneumonia in older patients in nursing homes
[11]	Prospective cohort study	Population health survey	Canada (Ontario)	907 older adults aged 50 and older living independently	To assess the relationship between self-perceived change in oral health status and the provision of dental treatment in an older adult population	Improvements in the oral health of older adults depend upon access to comprehensive dental treatments which can address fully their clinical and self-perceived needs
[12]	Report					

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APPENDIX E: OTHER VULNERABLE GROUPS

THE CASE OF AN INDIVIDUAL WITH PHYSICAL AND COGNITIVE DISABILITIES

Sam is a physically and cognitively disabled adolescent who lives with his parents. He is not mobile, is in a wheel chair, and receives dental care from a hospital clinic that specializes in care for the disabled. His parents have tried for him to receive care in their local area, but dentists have been unwilling or uncomfortable in treating him due to the challenges of his medical and dental conditions. The hospital dentist can often do much of the work by simply managing Sam's behaviour, sometimes with the use of medications. Yet for more serious work, like extractions, he needs to use the operating room to complete treatment, yet this often involves long waiting lists. Also, recently, Sam's parents have noticed that the dental plan that covers his care has been scaling back on what services he can receive, which means fewer preventive visits, which they highly value, as it is even hard for them to brush his teeth. They also have no dental insurance to offset costs, and with two other children, their middle-income living is often stretched when it comes to dental care. Their support worker also has trouble brushing his teeth, and they have asked if a dentist or dental hygienist can come to their home, but no such publicly funded services are available.

The **problem** is that the many people with disabilities cannot visit the dentist because of limited mobility, challenging medical conditions and because of the influence of not having insurance. Further, for the vast majority living in institutions, this almost always means having no access to oral health care of any sort. So Sam unfortunately must have his dental treatment done under general anaesthetic in a hospital setting, where there are very little preventive efforts. The impact is chronic disease in the mouth, ranging from the personal and functional to the life-threatening. In short the problems are ignorance, lack of training for oral and non-oral health care professionals and the absence of a system to organise and finance care for individuals with cognitive and physical disabilities.

The potential **solutions** involve:

1. Government coverage of urgent dental care needs for people with disabilities.
2. Treatment/rehabilitative care by people trained to provide fluoride therapy, professional hygiene and symptom management.
3. Appropriate training of the various personnel to perform the aforementioned tasks.

These solutions require appropriate sources of funds to pay for these tasks and appropriate payment schemes designed to achieve the goal of good (oral) health for people with disabilities. The special needs and the difficulty in caring for individuals with disabilities needs to be recognised and appropriate training provided.

Oral Health and Disease in People with Disabilities

There are different types of disabilities. They can be apparent, such as with vision, speech, hearing, and/or developmental disabilities, or not perceived easily such as in psychological or intellectual disabilities. Statistics Canada has estimated that there are 4.4 million Canadians who have a disability. Nationally, 3.7% of children aged 0 to 15 years, 11.5% of youth and working-age adults (15 to 64 years), and 43.4% of seniors 65 and older have a disability. Over the age of 15, more women (17.7%) report disability than men (15.4%). These numbers are expected to increase due to population growth, increased reporting, an aging population and more accurate and sensitive methods for detection and diagnosis [1].

Oral disease in persons with disabilities has been noted as similar to non-disabled persons, yet persons with disabilities are noted to have higher rates of untreated disease and greater numbers of extracted teeth [2-5]. Oral hygiene is said to be poorer in persons with disabilities, making them more susceptible to oral disease.

Individuals with disabilities present specific clinical and policy challenges. They may not be able to express pain or describe symptoms, and cooperation under clinical assessment may also be difficult. The breadth of disabilities also makes the targeting of policies difficult. Nevertheless, failure to achieve timely dental care has the same implications as with any other population (i.e. increased suffering and morbidity, increased treatment costs) [5, 6]. Regular preventive care has also been reported to improve the health of persons with disabilities [5, 6] (Brown 1980; Tesini and Fenton 1994).

Factors Related to Oral Health and Disease in People with Disabilities

The majority of people with disabilities lives in family, foster or group homes [7, 8]. Yet some require long-term care facilities due to the nature of their disability [9]. Some studies show that 35-80% of disabled persons have had no difficulty accessing care, while others show 50-70% have had difficulty [7, 9-13].

Barriers to care include proximity to dental clinics, financial difficulties, psychological and health disabilities that prevent routine care, and legal issues such as consent and guardianship. If dental care is available, dentists may not feel comfortable treating persons with disabilities (such as the case with Sam) because of increased time and cost, or a lack of adequate training or suitable facilities. Nevertheless, in the province of Ontario, 89% of general dentists and 100% of pediatric dentists indicated that they are willing to treat persons with disabilities [14]. Public coverage for persons with disabilities also results in numerous issues previously described concerning dentists and their reported difficulties with public dental care plans.

Proximity is of importance with respect to securing care, as persons with disabilities cannot always travel long distances or use public transport. Sometimes the cost of transportation is cost-prohibitive, thus persons with disabilities can be highly reliant on caregivers for transportation. Financial factors can also prevent persons with disabilities and/or their caregivers from taking time off work to attend dental appointments [12, 15]. As with the other populations previously described, financial barriers can also result from low income or a lack of or inadequate dental insurance. There is also a minority of people, like Sam, with disabilities who cannot be treated in regular dental settings and require general anesthesia in a hospital setting. This further restricts access to care, as hospital dental services are not common and usually have significant waiting lists.

Access to Dental Care and Disability

In 1971, Kenny and McKim reported that 25.9% of children with cerebral palsy and 15.5% of children with Down syndrome had difficulty accessing dental care [16]. In 1986, McDermott and El Badrawy found that parents of children with disabilities were generally satisfied with the dental treatment their children received [9]. In 2004, Allison and Lawrence compared the dental care received by Down syndrome children with that of their non-Down syndrome siblings and found that children with Down syndrome received less dental treatment than their siblings [4].

In 2009, Koneru and Sigal reported that, in Ontario, most persons with disabilities were insured for dental care through the Ontario Disability Support Program (ODSP) [17]. The majority of the people that they surveyed (83%) had seen a dentist within the past year. Almost half saw the dentist every 6 months (41.9%), whereas 5.5% saw the dentist only for emergencies. Most saw a general dentist (73.6%) and attended a private dental clinic (73.3%), followed by hospital clinics (20.7%) and public health clinics (7.6%). Nearly half (51.3%) did not require special modifications to receive dental care, but 23.2% required sedation and 22.4% required general anesthesia. Approximately 71.0% reported no difficulty in accessing dental care. The most common barriers reported were an inability to tolerate/cooperate with treatment (18.9%), fear (17.5%), cost (16.4%), and transportation difficulties (10.7%). The strongest predictor of difficulty in accessing dental care was a requirement for special modifications to receive treatment. Most caregivers (89%) also believed that oral health was an important part of overall health.

In 2010, Abbasnezhad-Ghadi reported on children with autism in Ontario, and found that the majority visited a dentist regularly (71%) and had private dental insurance (64%) [18]. She concluded that the majority of children/adolescents with autism had access to dental care, and

that difficulties accessing dental care were related to family structure, parental education and perceptions of dentists' knowledge concerning the disability.

THE CASE OF A RECENT IMMIGRANT

Mrs. J is a recent refugee. She has a toothache, as does her 12 year-old son. She just found out from one of her friends that they have access to some dental insurance through the federal government, but that it may have already expired. She has to wait to access provincial services for herself and her child. She cannot believe she let something like this slip, but she has been so concerned about settling herself and her child that seeing a dentist was not a top priority. She has been trying to find a job, enroll in English classes, and in enrolling in school so she can retrain as a nurse. She also just met a friend, who knows a dentist from their home country, but he has not been able to retrain as a dentist, and that is a shame, since he would have been perfect as a dentist, knowing her language and likely appreciating her current experiences and situation. She hopes her settlement worker can help her, but he has not mentioned anything about dental insurance before, and most of the information she received was not in her language, making it difficult to understand. Her boy's toothache is even worse than hers too, and he has been losing sleep, and as a result so has she, which makes long days resettling herself worse. She also knows that her black stained teeth are not considered normal like they are at home, and she has been told by friends that she will need to have them polished thoroughly if she hopes to find a job.

The **problem** is that Mrs. J and her son have a very severe level of dental caries and they need appropriate dental treatment to eliminate the source of pain and infection. With the stress of integration, in addition to language barriers and lack of knowledge about dental insurance coverage for refugees, it has become very difficult for them to receive care. Without dental insurance coverage, Mrs. J simply cannot afford to pay for dental care for her and her son. Mrs. J feels helpless and does not understand the complexities of the health care system in Canada.

The potential **solutions** may involve:

1. Government coverage for urgent dental care needs for refugees and new immigrants to Canada.
2. Integration services, including, health literacy education opportunities for incoming refugees and immigrants.
3. Health care delivery settings that accommodate the languages and cultural differences of refugees and immigrants, including trained health care professionals empathetic to the life situations of these individuals.

Oral Health and Disease in Immigrants and Refugees

The domestic immigrant and refugee system in Canada is statutorily governed by the *Immigration and Refugee Protection Act*. The objectives are to provide social and economic benefit to Canada, to facilitate integration, and to offer protection. Immigration and refugee flows are dynamic responses to social and economic unrest, and social violence. Resettlement countries therefore experience some level of flux in relation to the particular needs of the populations they have undertaken to accept and/or protect. For example, for refugees, in 2010, the Government of Canada had a total of 23,110 refugee claimants, with the top five countries being Hungary, China, Columbia, Mexico, and Sri Lanka [19].

In some cases, protracted conflict, instability, and relative poverty in countries of origin or first asylum often prevent epidemiological research on oral health. As a result, estimating the level of need in immigrant and refugee populations pre-arrival in Canada is difficult. However, for refugees, available information indicates that refugee communities must be considered as high-risk groups for oral illness [20].

A review of refugees in Australia found significant untreated decay in the adult population [21]. Another Australian study noted decay, periodontal diseases, malocclusion, orofacial trauma, missing and fractured teeth, and oral cancer as the most common oral health problems among refugees [22]. Many refugees who are being resettled also have poor oral health as a result of poor diet and limited access to the resources required for dental hygiene in the course of the refugee experience [23]. Additionally, poor dental health may be the result of damage to the teeth and gums sustained through torture and other traumatic experiences [24, 25]. Researchers have also highlighted age-specific vulnerabilities. Refugee children, like Mrs. J's son, typically have high rates of dental caries [26, 27]. Refugee elders, who themselves already face additional barriers to successful integration, often have dental problems that create further health complications [24].

The paucity of specific data on the oral health of refugees in Canada points to a general neglect of oral health issues in the considerations of the overall health and wellbeing of refugees. Of the available research, a 2005 Statistics Canada report ("LSIC") documenting the early settlement experiences of immigrants in Canada, including refugees, recognized marked differences in the self-reporting of dental health issues – 22% of refugees reported dental problems compared with 11% of the average immigrant population. In 2005, refugees in Winnipeg were interviewed about their health concerns; while few respondents mentioned oral health as a concern, community representatives identified it as a major need for this population [28].

Factors Related to Oral Health and Disease in Immigrants and Refugees

It is not uncommon to have no access to dental care in refugee camps, and limited care available in countries of asylum from which refugees are resettled. For the 26,000 Rohingya refugees in UNHCR-administered camps in Bangladesh for example, there is no dental care available [29]. Importantly, in recent UNHCR consultations in the same country, dental problems and access to dental care were among the health concerns highlighted by refugees themselves [30]. In Thailand, refugees from Myanmar (Burma) who are in Bangkok may, on a discretionary basis, receive referrals for dental care, which is limited to fillings and extractions [31].

Most reports on access to dental care among newcomers to Canada tend to concern immigrants [32]. Some have reflected similar rates of use of dental services for immigrants and native-born Canadians. However, extrapolating these results to refugees is problematic as they may face more or heightened difficulties in accessing care than other immigrants. The most commonly cited are financial constraints, cultural and language barriers [23, 28]. In the LSIC study, 20% of refugees reported difficulties accessing healthcare, with 43% of them citing the high cost as the most significant barrier. Importantly, cost considerations factor into not only the cost of health (dental) services, but also associated costs such as transport and childcare while accessing services.

As is the experience with Mrs. J, poor access to health information and lower levels of education and literacy are other barriers, as is a lack of familiarity with the health care system [33]. The medical and dental literature suggests that cultural beliefs and practices affect health care utilization [34, 35]. Mental health issues, post-migration stress, and perceived discrimination may be an impediment to the pursuit of health (dental) care as well [23, 36, 37]. It has also been suggested that oral care may be deferred given the more immediate medical problems that some refugees have.

Sex influences the proportionate effect of these barriers on women and men. For example, women immigrants tend to have lower levels of language acquisition and higher levels of caretaking responsibilities than men in equivalent situations [38-40]. [41]

A study dental services use among immigrant women aged 30-44 years old residing in Quebec found an under-utilization of preventive dental care by recent immigrants (55%) compared to long-term immigrants (69%) and non-immigrants (76%). This was attributed to both financial and cultural barriers [42]. Finally, a study by Locker et al. compared the oral health status of foreign-born with Canadian-born adolescents aged 13 and 14 years in Ontario [43]. They found that the oral health status of the former group was lower than those born in Canada and that

they make less use of dental services. However, these differences were found to be less pronounced the longer the study subjects lived in Canada. The improvement in oral health status was postulated to be a result of exposure to dental public programs following arrival in Canada and to other possible factors such as improvement in socio-economic status and upward social mobility of immigrant families over the years since their arrival. The authors note that provincial children programs often end in early adolescence concomitant with decreases in utilization rates of oral health services. Ultimately, these data confirm that health care workers and policy makers must be sensitive to the disparate and significant needs and circumstances of immigrants, refugees and asylum seekers.

Resettlement and Integration

Integration is a dynamic process that will vary between individuals and family units, contingent on a host of internal and external variables. It is reported that the most common and significant barriers to successful integration are poverty, unemployment, lack of language skills, difficulties in securing adequate housing, and discrimination [44]. These can also compound previous mental and emotional distress and/or precipitate its existence [45, 46]. It is arguable that poor oral health only acts to exacerbate this dynamic, first as part of the causative chain that leads to increased social marginalization, and second as an outcome of such processes (e.g., missing teeth and/or pain due to dental disease impacts language acquisition and productive work, which in turn can promote poor integration and/or limit gainful employment, which itself promotes material deprivation such as food insecurity and/or economic barriers to accessing oral health care, which then limits the opportunity to maximise oral health and overall wellbeing, and so on).

Successful resettlement implies possessing an internal sense of wellbeing and self-sufficiency, as well as language proficiency and employment (Beiser 2003). Many authors have noted that existing resettlement services in Canada are currently inadequate to meet these needs, especially in medical care and life-skills training (Simich et al. 2006; Gushulak and William 2004; Steele et al. 2002).

Despite their evident need and the number of barriers facing integration, the starting point in discussing any intervention (e.g., access to dental care) must be in recognizing refugees as highly active agents (Lamba 2003). With an early investment in their future, it is argued that refugees generally become contributing members of their adopted societies [38]. As part of this, UNHCR has given particular concern to accessing dental care [24]. UNHCR cites the “critical role” that oral health plays in the integration process, and recommends specific provisions for dental care as part of resettlement [24]. Currently, the Canadian resettlement process, as

described to the researchers, does not take full advantage of the opportunities to integrate oral health and dental care.

Poor oral health status, and its concomitant social and material exclusion, is one integration barrier that can be partly overcome. For example, receiving dental care can positively benefit an individual in the immediate sense by relieving pain, but can also have a more lasting effect on their ability to search for (or maintain) employment, attend language classes, and increase their sense of self-respect and dignity. Of particular note is the opportunity to make a substantive impact on the oral health of refugee children. Access to preventive care for children is a well-documented and cost-effective way of subverting what might be poor oral health practices that result from years of displacement, instability, and lack of resources.

A related point concerns the implicit assumption that, after the expiry of coverage by the Interim Federal Health program, these populations will be able to access dental services. The cost of dental care nonetheless remains prohibitively high for most. If refugees do transition from government sponsorship onto provincial social assistance, the types of dental care services available also remain limited. For those who do find work, that work tends to be in low skilled and sporadic positions that are not likely to include employer health insurance. Therefore, it is likely that anything beyond the most basic dental services remain out of reach for most members of this population for an extended time.

The Interim Federal Health Program

The IFH program covers select refugees and asylum-seekers, providing temporary medical coverage during the settlement period and prior to qualification for provincial health-care coverage. The IFH covers emergency and essential dental services. Emergency services are those procedures necessary to alleviate pain and active infection, hemorrhage and the result of oral trauma. Essential services are procedures for serious dental problems that remain once the emergency services have been provided. Nevertheless, when compared to other public dental care programs in Canada, IFH finances a relatively minimal cadre of dental care services for refugees and asylum-seekers, and suffers from all of the difficulties associated with public programs that finance care in private dental offices. As of June 30, 2012, the products and services covered through the IFH will be reduced, essentially eliminating most pharmacy benefits, and all vision, dental and other supplemental benefits for refugee claimants. This is a sad reality for refugees such as Mrs. J and her young son, where the inability to access dental care can act to promote social exclusion and prohibit chances of employment and integration into society.

The Humanitarian Policy Bases for Rationing Dental Care

Canada has made an undertaking to those availing themselves of its protection – the refugee system is first and foremost a humanitarian enterprise in recognition of the fact that individuals and their families are, at times, forced to flee their homes, communities, and countries for reasons beyond their control. While they may arrive as victims of persecution, they bring with them the potential to become full and active participants in their country of asylum and, it is argued here, should be supported in ways that allow that potential to be realized. Providing services that play an important role in determining a person's health and social status over the long- and short-term (e.g., dental care) is one of the ways to fulfill the moral and legal obligations of protection writ large.

The Health Policy Bases for Rationing Dental Care

Access to health care services, including dental care services, represents a social determinant of health. This means that not having access to dental care can act to promote social exclusion, which itself has imminent impacts on human health and wellbeing. Access to dental care allows for the relatively immediate resolution of dental problems that can at times be of an emergent and acute nature (i.e., toothache and infection). In short, if considered equally, relief of pain and infection represent the most immediate health reason for why access to dental care is necessary, while the ability to thrive socially and economically represents the most distal health reason for why such access is fundamental.

The position of CIC as a federal agency also creates another important health policy basis for rationing dental care. In lieu of its historical relationship with First Nations and Inuit populations, and in lieu of their status as populations in social need, the federal government grants access to generally uninsured health services (e.g., dental care) in order to meet current provincial standards for equitable access to such services amongst such populations [47]. By extrapolation, as another federal agency, CIC can arguably ration dental care to refugees and asylum-seekers, in lieu of their status as populations in social need, as a way to meet current provincial standards.

Overall, evidence and general observation suggests that refugees and asylum-seekers experience comparatively greater oral health and dental care needs than immigrants and/or the general population. In addition to the other health issues and challenges associated with resettlement and integration, refugees and asylum-seekers clearly represent a population in need. The inequitable details of this need form the backdrop of the humanitarian and health policy bases for the rationing of dental care to this population. Ultimately, this rationing would ideally meet the general Canadian standard for rationing publicly financed dental care. In this regard, it appears that currently, the IFH program arguably falls short of meeting this standard.

THE CASE OF A COUPLE LIVING IN A RURAL SETTING

Mr. and Mrs. L live in a rural community of approximately 6,000 people. They are losing their long-term dentist due to his retirement, and he has told them that he has not been able to attract an associate or someone to buy his practice, so there may be no dentist in their community from now on. They live three hours away from the nearest dentist, and as farmers, they are often very busy and have a hard time making the trip to into the next major town. Being self-employed, they also have no insurance, and their experience has shown them that the dentists in the city require payment right away, unlike their local dentist who has a strong relationship with them and knows that they can pay, but not until they sell their crops at the end of the season.

The **problem** is Mr. and Mrs. L face a number of access barriers that are not limited to geographic isolation. The shortage of and difficulty in retaining healthcare providers in rural communities and lack of education in regards to preventive dental behaviour are also issues of concern in Canadian rural communities.

The potential **solutions** involve:

1. Innovative approaches for recruitment and human resource planning, including expanding roles of other members of the dental health team and other primary care providers.
2. Remote-learning opportunities for dental students, such as a "residency program" in rural private dental offices, a local hospital or community clinic.

Oral Health and Disease in Rural People

Approximately 95% of Canada's land mass is rural [48] with a quarter of the country's population inhabiting these areas [49]. Canadian policies, services and infrastructure have generally focused on the health of urban populations and have neglected that of rural dwellers. Consequently, rural residents have been shown to: exhibit less healthy behaviors, such as smoking and less-healthy dietary practices; be less physically active; have shorter life expectancies; have higher mortality rates from cardiovascular and respiratory disease, diabetes, motor vehicle accidents and suicide; and have higher infant mortality rates [48]. In regards to oral health, little attention and priority has been given to understanding the oral health status and needs of Canadian rural populations [50]. This is mainly due to challenges faced in conducting rural research in terms of organization and implementation [51]. Yet, from the minimal literature concerning oral health in Canadian rural and remote communities, it is evident that disparities in oral health status and access to dental care exist [52, 53].

A study conducted in northern Alberta communities found that the rural inhabitants had poor oral health-related quality of life in addition to a high rate of treatment needs for oral health problems[54]. Much of the current research has focused on the oral health of seniors in rural settings For example, a study by Vargas et al., noted that the oral health of the elderly living in rural areas is not as favorable as that of their counterparts living in urban areas [55]. This study also stated that this situation is complicated further as the proportion of older people is increasing in rural areas [55]. This is primarily due to the population aging in place, the out-migration of younger people to cities in search of better employment, and, in some counties, the in-migration of elderly people in search of retirement destinations [55]. In a study by Westover, a questionnaire and oral screening were conducted with seniors in rural Alberta to determine their oral health needs [56]. This study found that both the dentate and the edentulous populations had high levels of treatment needs [56]. Of the dentate respondents, 41.8 percent had coronal caries and all respondents had calculus and/or pocketing[56]. Among denture wearers, 64.4 percent were found to have calculus on one or both dentures, and 61.2 percent of lower dentures exhibited poor retention [56]. Although valuable research has reported on the oral health of rural seniors, more comprehensive data for the Canadian rural population as a whole is needed.

Factors Related to Oral Health and Disease in Rural People

Studies have demonstrated that both cultural and environmental factors influence health behaviours and health outcomes, and that "rural culture" is considered to be a health determinant [57]. Generally, the socioeconomic status of rural people is characterized by low personal incomes, low educational attainment, lack of health/dental insurance and high unemployment rates [48, 49]. In addition, inadequate access to quality food stores, food insecurity, and unhealthy dietary habits, places this population at an increased risk of experiencing poor oral health. The attitudes and beliefs towards dental care are also determinants of oral health and disease. Pitblado & Pong found that among rural individuals, medical care was regarded by most as essential, and dental care was largely seen as discretionary [58]. Several studies have noted that there is a need to educate rural residents as to what optimal oral health is, and how to engage in appropriate preventative behaviors[56]. Overall, low socioeconomic status as well as a lack of importance placed on oral health, contributes to the poor oral health of rural people.

Oral Health Care Utilization in Rural People

Dental care utilization has been found to be infrequent in rural populations. For example, Vargas et al., conducted a study of elderly people residing in rural areas in the United States and found that they were less likely to use dental services than were urban elderly people [55].

They also found that fewer rural residents went to the dentist in the previous year, and a larger proportion of rural residents were episodic users. As for Canadian data, a study by Martinez et al. found that rural residents of Quebec were less inclined to consult physicians and even less likely to use the services of dentists and orthodontists [59]. Pitblado & Pong compared regional variations in the utilization of medical and dental services in Ontario and found that 81 percent of northerners, compared with 83 percent of southerners, had contact with a physician over a one-year period [58]. On the other hand, differences in the utilization of the services of dentists were considerable, with only 57 percent of northerners having contact with a dentist over a one-year period compared with 66 percent of southerners[58]. Ultimately, this contrast between the utilization of physician services and dental services further highlights the sporadic use of oral health care services in rural areas.

Factors Related to Oral Health Care Utilization in Rural People

Not unlike the situation of Mr. and Mrs. L, rural populations face a number of barriers in accessing the appropriate needed dental and oral health care. These access barriers are complex, and are not limited to geographic isolation. The shortage of health providers in rural communities and a lack of education in regards to preventative dental behaviour are also issues of concern in Canadian rural communities.

Geographic Remoteness

Many studies have investigated the effect of geographic distance on the utilization of dental health services. It has been demonstrated in the literature and in the case of Mr. and Mrs. L, that overall, the disparity in oral health status of rural communities is directly functional to their distance from urban centres. In other words, distance has been found to have a dissuasive effect: the greater the distance, the lesser the tendency to seek health services[50]. This ultimately hinders access to dental health care, resulting in poor oral health outcomes. Furthermore, the costs to travel to services acts as a barrier to care, especially since those living in rural communities tend to be of low socioeconomic status and have low incomes [60, 61].

Lack of Providers

The shortage of and difficulty in retaining healthcare providers (physicians, specialists, dentists, and nurses) has been cited in several studies as a major barrier to care in rural communities [60, 61]. For example, Griffith noted that although it was possible to obtain funding and resources to build dental facilities and purchase equipment in Pender County, North Carolina, it was very difficult to recruit and retain professional staff [61]. Williams speculated that the reasons behind dental professionals reluctance to work in rural areas could be: an ill-informed negative stereotype of small town life (i.e., fewer cultural and entertainment opportunities, decreased ability to practice one's faith, smaller schools) and a perception that financial success

is not possible (due to less disposable income for health care in general or no demand for comprehensive care) [62]. In support of the later, the Canadian autonomy of dental care providers to choose favorable economic environments for practice is reflected in the concentration of the dental workforce. In 2001, only 11% of dentists, 16% of dental hygienists, and 13% of denturists were located in rural areas in Canada . In 2005, the dentist/population ratio was 3 times less in rural than in urban areas [64]. Four years later, in 2009, the shortage of rural dentists had become worse, and this ratio increased by 0.5% [65]. With the number of new dental graduates expected to decline and the number of retiring dentists expected to increase, the supply of dentists in rural areas will become more of a concern [55].

Lack of Education

Several studies have noted that there is a lack of importance placed on preventative oral health care, especially since more pressing health issues tend to take priority in rural settings. In Westover's study of rural seniors in Alberta, it was found that although 40.6 percent of seniors had been to a dentist/denturist within the last year, 70.1 percent saw a dentist/denturist only when they experienced pain or problems [56]. Furthermore, of those who had not been to a dentist/denturist within a year, 83.9 percent said the primary reason was because there was nothing wrong [56]. This demonstrates that rural residents are less likely to engage in oral disease prevention and promotion of healthy behaviors, because they lack education in these areas. Self-related dental health, dental attendance, and dental fear, have also been found to be significant factors affecting the use of dental care in rural areas [66].

Impacts of Poor Oral Health in Rural People

Poor oral health can have numerous harmful impacts on rural individuals. There is good evidence of links between dental and other chronic diseases, for example, infections from dental abscesses and from the bacterial plaque associated with gingival and periodontal diseases can damage the cardiovascular and endocrine systems [67]. It has been argued that the impact of poor oral health amongst rural individuals extends well beyond dental caries, tooth discoloration, and oral malodour and is a major contributor to self-esteem and attempts at social acceptance [67]. Broken teeth can act to diminish employment prospects and lead to problems dealing with people and health services, which result in further disadvantage to an already marginalized group [67].

Benefits of Oral Health Care in Rural People

Although there is some evidence to indicate that increasing the number of dentists in an area and providing financial support for care increases dental service utilization, Pitbaldo & Pong cite several studies that found otherwise [58]. For example, the addition of more dentists in Quebec after 1985 did not drive further growth in utilization, and the removal of financial barriers for

dental services resulted in only a modest increase in the uptake of dental treatment and a substantial proportion of the eligible population did not take advantage of the free dental care provided [58]. Pitbaldo & Pong found that general health conditions and certain dental health behaviours play more of a role in dental care utilization in rural settings than solely increasing access [58]. They argue that while making dental services more accessible is still needed, the real challenge in encouraging better oral health and preventive dentistry is through health promotion and education [58]. Overall, in addition to providing professional access and financial means to care, these results suggest that health promotion and education will increase dental service utilization and create better oral health outcomes in rural communities across Canada.

Models of Health Care Delivery that Could Improve Access for Rural People

Although there are some rural oral health programs in the United States, Australia and a few developing countries, few rural oral health programs have been integrated in Canada [68]. Since there have been found to be significant differences within and between rural areas, initiatives to improve rural health cannot be planned according to a "one size fits all" model, but rather tailored to the complexities of each situation [59]. Although generally, efforts to improve access to dental care for rural people have focused on the collaboration of dental and health professionals as well as the involvement of dental schools, in addressing rural health issues.

Collaboration between Health Professionals

Although it is imperative that researchers in both oral and general health collaborate to assess the common oral and general health needs in rural communities [68], this can be taken a step further. From a clinical perspective, multidisciplinary physicians, especially those working in rural areas, should be familiar with oral disease, particularly because of the lack of dental care providers in remote areas. For Example, oral cancer screening can be performed by a general practitioner (GP) as part of a routine checkup and patients in intensive care units can benefit from the provision of adequate oral care [68]. Already implemented in rural and urban dental clinics in Kentucky, Heaton et al., (2004) found the presence of a General Practice Residency (GPR) program, with each clinic employing at least one postdoctoral GP resident. One of the primary goals of a GPR program is to provide postdoctoral training opportunities and enable GP residents to provide dental care to those individuals with fewer economical resources [66].

Involvement of Dental Schools

Williams discuses several ways of improving access to dental care in rural communities through making changes to the admission process and curriculum of dental schools [62]. This study suggests that first, a systematic examination of the current Canadian dental school

demographic (and the admission criteria for those yet to apply) needs to be undertaken, with a goal to determine whether we can predict where today's graduates might want to settle into practice [62]. With avoiding discrimination in any way, schools would need to find a way to select students based on the demographic they, as future dentists, would serve [62]. A second proposal by Williams (2008) suggests that remote-learning opportunities be created, such as a "residency program" in a private dental office, a local hospital or community clinic. This could expose all dental students to at least some aspect of rural community life[62]. In line with the latter, the Alberta government, in collaboration with the University of Alberta's Faculty of Dentistry, has provided dental services in 3 rural community hospitals for many years now [69]. The close association of dental students with rural physicians not only provides invaluable experience, but it also encourages the students to establish dental practices in such needy areas [69]. As for the logistics, the government provides capital and operational funding; the university provides management, professional services and quality assurance; and the department of dentistry manages the satellite portion of the dental outreach service to the 3 rural communities [69]. After more than 25 years of service, the outreach dental program serves as a template for other Canadian dental programs as it is a highly valued component of the University of Alberta dental curriculum [69].

In conclusion, as we saw in the case of Mr. and Mrs. L, we know that factors such geographic remoteness, socioeconomic deprivation, and a lack of dental providers and oral health knowledge negatively influences oral health perception, behaviors and outcomes in rural areas. However, there is a need to characterize the oral health status and oral health care utilization of people who reside in Canadian rural areas to a greater extent. Although it is common knowledge that oral health is a problem among rural residents, knowing the magnitude of the problem is necessary in determining the need for and type of necessary intervention.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[17]	Cross-sectional	Health survey	Canada (Ontario)	Individuals with disabilities aged 2-75 years old	-to determine the proportion of persons primarily with developmental disabilities who encounter difficulties accessing dental care -to identify perceived barriers to accessing dental care and to determine if persons with disabilities and their caregivers believe that oral health is important	The majority of persons with disabilities and most caregivers believed that oral health is important for overall health
[35]	Cross-sectional	Health survey	US (Milwaukee)	120 adults aged 18–50	To describe perceived general and oral health, and use of dental/physician services; and among a group of refugee adults	About half of Hmong adults rated their oral health and access to dental care as poor. Dental insurance, access to dental care, past preventive dental/physician visits and perceived general health were associated with perceived oral health
[32]	Cross-sectional	Health survey	Canada	Chinese Canadians aged 55 years and older	examines the predictors for elderly Chinese immigrants' use of dental care services	There is a need for considering the cultural characteristics and background of elderly Chinese immigrants when strengthening oral health promotion.
[23]	Cross-sectional	Health survey	Canada (Toronto)	342 Ethiopian adults residing in Toronto	to examine the health service utilization patterns of Ethiopian immigrants and refugees	family physicians could play important role in identifying and treating Ethiopian clients who present with somatic symptoms
[33]	Cross-	Health	Australia	34 of 35	To determine barriers that affect	most refugee families are not totally

	sectional	survey		eligible sub-Saharan African refugee families	access to health care for refugees from sub-Saharan Africa resettled in Sydney.	isolated in Australia, but form early connections with cultural, social and religious groups of their own ethnic background.
[70]	Cross-sectional	Health survey	Sweden	193 Chilean and 92 Polish refugees in the county of Stockholm	to determine dental health status in two separate groups of Chilean and Polish refugees in Sweden	when compared with Swedish individuals of a corresponding age, the refugee groups have a high prevalence of caries and periodontal disease
[5]	Cross-sectional	Residential homes, day centres or community homes of people with learning disabilities	UK (Sheffield)	209 adults (18-65 years) with learning disabilities	To investigate the oral health status of adults on Sheffield's Learning Disability Case Register, and their reported use of dental services	Adults with learning disabilities living in the community have greater unmet oral health needs than their residential counterparts and are less likely to have regular contact with dental services.
[14]	Cross-sectional		Canada (Ontario)	General dentist and pediatric dentists licensed to work in Ontario	to determine the involvement of Ontario's general and pediatric dentists in providing care to patients with special health care needs	general and pediatric dentists in Ontario provide a full range of dental services to PSHCNs, treat patients with a variety of disabilities and of all ages and are interested in pursuing continuing education that focuses on the delivery of dental care to patients with special health care needs
[27]	Cross-sectional		US (Massachusetts)	224 newly arrived refugees aged 6 months to 18	to describe the prevalence of caries experience and untreated decay among newly arrived refugee children stratified by their region of	The prevalence of caries experience and untreated caries differed significantly between refugee children and US children.

				years	origin and compared with US children	
[4]	Cross-sectional	A Canadian National Survey	Canada	2271 people with Down syndrome (DS) and their siblings without DS	To examine whether Canadians with Down syndrome (DS) have dental care that is different to that of their siblings without DS	Canadians with Down syndrome receive different dental care compared to their siblings without DS
[10]	Cross-sectional		US (Alabama)	2,057 parents of children aged 3 to 13 years with special needs	to determine the parents' perceptions of access and barriers to dental care for their children with special needs	While the majority of respondents said their children had access to dental care, one-third said their children had problems receiving this care.
[37]	Qualitative (semi-structured interviews)		Canada (Montreal)	17 pregnant Southeast Asian women	To investigate the role of acculturation in understanding the relationship between migration and low birthweight	Findings suggested that acculturation had negative consequences for immigrant women. Higher levels of acculturation were associated with dieting during pregnancy, inadequate social support and stressful life experiences
[21]	Case-control		Australia	86 refugees aged 15-44 years from Iraq and the former Yugoslavia	To measure and compare the prevalence and distribution of tooth decay among two refugee groups recently arrived in Australia.	Significant differences were found between refugees and emergency dental care recipients, with refugees having a higher prevalence and more uniform distribution of untreated decay.
[3]	Cross-sectional		France (Clermont-Ferrand)	103 special needs patients aged between 18 months and	To assess the ability of carers and dental professionals to estimate treatment need in a group of children and adults with special needs.	Access of patients with special needs to dental care may be limited by the ability of their carers to evaluate their oral condition and/or by the persons' inability to express their

				47 years		pain or discomfort
[54]	Cross-sectional	Patients attending 3 dental outreach clinics	Canada (Alberta)	Adult aged 18 and older	To examine the influence of various socio-demographic and clinical variables on OHQOL in the setting of outreach clinics in northern Alberta, Canada	The clientele of these outreach clinics was generally young but had high treatment needs.
[45]	Cross-sectional	Community-based Health Survey	Canada (Ontario)	220 adult Sudanese immigrants	To examine overall health status, indicators of mental distress, economic hardship and expectations of life in Canada	Those Sudanese for whom life in Canada was not what they expected and those who experienced economic hardship as measured by worry over having enough money for food or medicine experienced poorer overall health and reported a greater number of symptoms of psychological distress
[69]	Cross-sectional		Canada (Alberta)	University of Alberta dentistry students in their fourth and final year	To report the results of an analysis of data for students' performance in outreach program	Dental students readily adjusted to an unfamiliar environment. Their motivation seemed high and that, along with a supportive professional environment, seemed to enable them to manage the challenging assignments to which they were exposed.
[66]	Cross-sectional		US (Kentucky)	Adults from two rural areas and one urban area	to assess the use of dental services in both rural and urban areas of Kentucky and to examine challenges facing practitioners in rural areas	Patients in the urban area reported having more dental insurance but not better dental health. Patients in more rural areas reported seeking more emergency dental treatment but not more dental fear
[55]	Cross-sectional	National Health	US	American older adults	To describe oral health indicators for the older adult population by place	Older rural adults were more likely than their urban counterparts to be

		Survey			of residence (rural and urban) in the United States	uninsured for dental care and were less likely to report dental visits in the past year. A higher proportion of rural residents than urban residents were edentulous and reported poor dental status. There were no differences in unmet dental needs, percentage of people with untreated caries or in mean DMFT by place of residence.

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APPENDIX F: The Dental Disciplines Act of Saskatchewan (1997)

Chapter D-4.1 of The Statutes of Saskatchewan, 1997
(consult Table of Saskatchewan Statutes for effective dates.
Last proclamation date December 1, 2000) as amended by the
Statutes of Saskatchewan, 2001, c.8; 2002, c.R-8.2; 2009,
c.T-23.01; and 2010, c.19 and 20.

Page 18 - Authorized practices

(1) **A dentist** is authorized, subject to the terms, conditions and limitations of that person's licence:
(a) to communicate a conclusion, identifying a disease, disorder or dysfunction of the oral-facial complex as the cause of a person's symptoms;
(b) to perform a procedure on tissues of the oral-facial complex below the dermis, below the surface of a mucous membrane or in or below the surfaces of the teeth, including the scaling of teeth;
(c) to harvest tissue for the purpose of surgery on the oral-facial complex;
(d) to correct a fracture of a bone of the oral-facial complex or correct a dislocation of a joint of the oral-facial complex;
(e) to administer a substance by injection or inhalation in the provision of dental treatment;
(f) to prescribe or dispense drugs in the provision of dental treatment;
(g) to fit or dispense a dental prosthesis, or an orthodontic appliance or a device used inside the mouth to protect teeth from abnormal functioning; and
(h) to expose, process and mount dental radiographs in accordance with The Radiation Health and Safety Act, 1985.

(2) A **dental technician** is authorized, subject to the terms, conditions and limitations of that person's licence:
(a) to make, produce, reproduce, construct, furnish, supply, alter and repair a denture, bridge or prosthetic appliance, or thing to be used in, on, in connection with, or in the treatment of a human tooth, jaw or associated structure or tissue for a person in accordance with a prescription of a dentist to perform any of these services for the person, if the practices can be performed without intraoral procedures or the taking of impressions;
(b) to make structural repairs to a removable dental prosthesis or replace teeth in a dental prosthesis, if these practices can be performed without intraoral procedures or the taking of impressions; and
(c) to take shades for proper colour, including performing the necessary intraoral procedures.

(3) A **denturist** is authorized, subject to the terms, conditions and limitations of

that person's licence, to make, repair, reline, alter, replace or furnish a removable dental prosthesis, and for that purpose carry out non-surgical intraoral procedures, including the taking of impressions that are necessary to make, repair, reline, alter, replace or furnish a removable dental prosthesis.

(4) A **dental assistant** is authorized, subject to the terms, conditions and limitations of that person's licence, to assist and to perform intraoral assisting services that include:
(a) the introduction and manipulation of dental materials and devices in the mouth;
(b) orthodontic and restorative procedures consistent with an approved education program in dental assisting; and
(c) the exposure, processing and mounting of dental radiographs in accordance with The Radiation Health and Safety Act, 1985.

(5) A **dental hygienist** is authorized, subject to the terms, conditions and limitations of that person's licence:
(a) to communicate an assessment and treatment plan regarding periodontal health;
(b) to perform supragingival and subgingival debridement;
(c) to perform orthodontic and restorative procedures consistent with an approved education program in dental hygiene;
(d) to administer local anaesthesia in the provision of dental treatment; and
(e) to expose, process and mount dental radiographs in accordance with The Radiation Health and Safety Act, 1985.

(6) A **dental therapist** is authorized, subject to the terms, conditions and limitations of that person's licence:
(a) to communicate a conclusion identifying dental caries or dental abscesses as the cause of a person's symptoms;
(b) to perform a procedure in or below the surface of the teeth, conduct simple extractions of primary and permanent teeth and perform space maintenance on teeth;
(c) to administer local anaesthesia in the provision of dental treatment; and
(d) to expose, process and mount dental radiographs in accordance with The Radiation Health and Safety Act, 1985.

APPENDIX G: Table of evidence in literature and reports cited in the main report

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[1]	Professional opinion					
[2]	Professional opinion					
[3]	Glossary					
[4]	Methodological paper					
[5]	Methodological paper					
[6]	Cross-sectional	National health survey	Vietnam	Children younger than 10	To explain health sector inequalities using decomposition method in Vietnam	Rising inequalities are largely accounted for by increases in average consumption and its protective effect, and rising inequality and general improvements at the commune level
[7]	Report					
[8]	Review study					
[9]	Review study					
[10]	Report					
[11]	Cross-sectional	National health survey	Canada	Canadians aged 12 or older	To examine whether equity in healthcare use vary across Canadian provinces	There was a pro-rich inequity in the probability of a GP, specialist and dentist visit, and no significant evidence of inequity in inpatient care in Canada. There were some variations in inequity across provinces.
[12]	Cross-sectional	National health survey	Canada	Canadians aged 12 or older	To study the extent and drivers of income-related inequity in utilization of dental services in Canada	Access to preventive care is the most "pro-rich" type of dental care utilization. Also, income-related inequity in preventive dental care utilization is three times larger than what is measured for specialist services utilization in Canada
[13]	Report					
[14]	Report					
[15]	Report					
[16]	Report					
[17]	Report					
[18]	Report					
[19]	Report					
[20]	Report					
[21]	Report					
[22]	Review					
[23]	Report					
[24]	Mixed methods (historical review & cross-sectional)		Canada		To understand how have historical changes in dental care financing influenced household out-of-pocket expenditures for dental care in Canada	Alleviating the price barrier to care is a fundamental part of improving equity in dental care in Canada.
[25]	Report					
[26]	Methodological paper					

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[27]	Review study					
[28]	Cross-sectional	National health survey	Canada	Canadians aged 12 or older	To compare visiting dentists and physicians and the factors that influence the use of dentists' and physicians' services.	Visiting a family physician is more likely to occur for people who are ill or pregnant, visiting a dentist is more likely to occur for young, healthy, wealthy and highly educated people
[29]	Newspaper article					
[30]	Newspaper article					
[31]	Newspaper article					
[32]	Report					
[33]	Governmental report					
[34]	Governmental report					
[35]	Governmental report					
[36]	Governmental report					
[37]	Governmental report					
[38]	Report					
[39]	Report					
[40]	Report					
[41]	Report					
[42]	Report					
[43]	Mixed methods (Historical review & cross-sectional)	National health survey	Canada	Canadians aged 18 to 64	To explore the development of Canadian dental care policy and the place of the working poor within it.	The lack of insurance was consistently associated with the worse oral health and dental care outcomes. There was a strong social gradient to inequalities in oral health
[44]	Master thesis					
[45]	Review					
[46]	Report					
[47]	Case-control	Clinic-based	US	823 women between 13 and 17 weeks of gestation	To study the effect of nonsurgical periodontal treatment on preterm birth	Treatment of periodontitis in pregnant women improves periodontal disease and is safe but does not significantly alter rates of preterm birth, low birth weight, or fetal growth restriction

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[48]	Cross-sectional	National health survey	Canada	1067 Canadian dentists And 1005 Canadian adults	To test the hypotheses that socially marginalized Canadians are more likely to prefer seeking dental care in a public rather than private setting, and that Canadian dentists are more likely to prefer public dental care plans that approximate private insurance processes	The majority of Canadians prefer to seek dental care in a private setting rather than community clinics and dental schools. Most Canadian dentists believe that governments should be involved in dental care, yet less than half of them believe this role should include direct delivery.
[49]	Randomized clinical trial	Clinical research	Portugal	1748 restorations	To compare the longevity of amalgam and composite	Amalgam restorations performed better than did composite restorations.
[50]	Report					
[51]	Report					
[52]	Review					
[53]	Review					
[54]	Report					
[55]	Cross-sectional		Canada		To investigate the effect of the tax subsidy to employer-provided health insurance on coverage by such insurance. Changes in Quebec are compared to changes in other Canadian provinces not affected by the tax change	Tax change was associated with a decrease of about one-fifth in coverage by employer-provided supplementary health insurance in Quebec
[56]	Cross-sectional	National health survey	Canada	Canadians aged 12 or older	To investigate the effect of socioeconomic status on patients' use of dental services and dental insurance coverage	The probability of receiving any dental care over the course of a year increases markedly with dental insurance, household income, and level of education.
[57]	Cross-sectional	National health survey	Canada	Canadians aged 18 to 64	To identify predictors of dental care utilization by working poor Canadians	Dental care utilization was associated with relinquishing spending on other goods and services, which suggests that dental care utilization is a competing financial demand for economically constrained adults
[58]	Report					

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[59]	Review					
[60]	Review					
[61]	Book chapter					
[62]	Professional opinion					
[63]	Cross-sectional	School-based	Laos	621 schoolchildren (12-year old)	To assess the level of oral health of Lao 12-year-olds in urban and semi-urban settings; study the impact of poor oral health on quality of life; analyse the association between oral health and socio-behavioural factors; investigate the relation between obesity and oral health.	Decayed teeth were associated with impairments of daily life activities and missed school classes.
[64]	Cross-sectional	State-wide Health survey	US (North Carolina)	2871 schoolchildren	Evaluating the impact of poor oral health status on school performance	Children with both poor oral health and general health were 2.3 times more likely to report poor school performance. Children with either poor oral health or general health were 1.4 times more likely to report poor school performance.
[65]	Cross-sectional	State-wide Health survey	US (North Carolina)	2871 schoolchildren	Evaluating the relationship between children's oral health status and school attendance and performance	Children with poor oral health status were nearly 3 times more likely than were their counterparts to miss school as a result of dental pain.
[66]	Cross-sectional	Clinic based (children seeking orthodontic treatment)	Canada (Ontario)	191 children aged 11-14 years	To examine the relationship between self-esteem and oral-health-related quality of life	The impact of malocclusion on quality of life is substantial in children with low self-esteem. Compared with normative measures of malocclusion, self-esteem is a more salient determinant of OHRQoL in children seeking orthodontic treatment.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[67]	Cross-sectional	School-based	Canada (Ontario)	370 children aged 11-14 years	To assess socioeconomic disparities in the oral health related quality of life	There was a gradient across income categories with children from low income households having poorer oral health-related quality of life.
[68]	Cross-sectional	National health survey (Canadian Community Health Survey 2003)	Canada	2754 dentate persons aged 20 years and over	To determine if psychosocial factors explain the socioeconomic disparities in self-perceived oral health	Psychosocial factors partly but do not wholly explain the socioeconomic disparities in self-perceived oral health in this population after controlling for tooth loss and denture wearing.
[69]	Prospective cohort study	Clinic-based	Hong Kong	100 patients undergoing lower third molar surgery	To evaluate patients' perceptions of changes in oral health related quality of life (OHQOL) in the early postoperative period following third molar surgery.	The study concludes that there is a significant deterioration in oral health related quality of life in the immediate postoperative period following third molar surgery; particularly during the first five days.
[70]	Cross-sectional	Health survey	Canada	1005 Canadian adults	To explore disability days, or bed days and cut-down days, associated with dental problems in Canada.	Disability days as a result of dental problems were low in Canada. Younger age groups, those with the lowest incomes, college educations, no dental insurance, oral pain and a history of visiting a hospital emergency room for a dental problem, were all more likely to report a dental disability day.
[71]	Cross-sectional	Health survey	Canada	67125 Canadians visiting emergency departments	To explore the nature of emergency department visits for dental problems of non-traumatic origin in Canada's largest province, Ontario	Emergency department visits for dental problems of non-traumatic origin are not insignificant. The visits were greater than for diabetes and hypertensive diseases.
[72]	Cross-sectional	Provincial survey	Canada (Ontario)		To identity the use and associated costs of acute health care services for conditions related to poor access to dental care in Ontario	Repeat utilisation is present; low-income groups receive the most care; most problems are considered non-urgent. The emergency department visits likely reflect barriers in accessing dental care.
[73]	Prospective cohort study	Clinic-based	US (North Carolina)	9204 children	To determine the effects of early preventive dental visits on subsequent utilization and costs of dental services among preschool-aged children.	preschool-aged, Medicaid-enrolled children who had an early preventive dental visit were more likely to use subsequent preventive services and experience lower dentally related costs.
[74]	Prospective cohort study	Health survey	Canada (Ontario)	Canadian adults aged 50 and older	To assess the relationship between self-perceived change in oral health status and the provision of dental treatment in an older adult population	Improvements in the oral health of older adults depend upon access to comprehensive dental treatments which can address fully their clinical and self-perceived needs

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[75]	Case-control	Nursing home	Japan	417 older adults (mean age=82)	To investigate whether oral care lowers the frequency of pneumonia in institutionalized older people	Oral care may be useful in preventing pneumonia in older patients in nursing homes
[76]	Systematic review			Five publications	To systematically review the literature on oral health care interventions in frail older people and the effect on the incidence of aspiration pneumonia	oral health care, consisting of tooth brushing after each meal, cleaning dentures once a day, and professional oral health care once a week, seems the best intervention to reduce the incidence of aspiration pneumonia
[77]	Systematic review			Seven publications	To investigate the relationship between periodontal therapy and glycaemic control in people with diabetes and to identify the appropriate future strategy for this question.	There is some evidence of improvement in metabolic control in people with diabetes, after treating periodontal disease. There are few studies available and individually these lacked the power to detect a significant effect.
[78]	Clinical trial	Clinic-based	UK (London)	94 subjects suffering from generalized periodontitis	To explore the outcomes of periodontal therapy in terms of changes in C-reactive protein (CRP)-associated cardiovascular disease	Periodontitis may add to the inflammatory burden of the individual and may result in increased levels of cardiovascular risk
[79]	Clinical trial	Clinic-based	US (North Carolina)	22 periodontal patients older than 30	To examine whether chronic inflammatory burden of periodontal disease may lead to impaired functioning of the vascular endothelium	Improvement in endothelial function, as measured by flow-mediated dilation of the brachial artery, may be possible through near-elimination of chronic oral infection
[80]	Case-control	Clinic-based	Austria	30 patients with severe periodontitis and 31 control subjects	To examine whether periodontal treatment would improve endothelial dysfunction	Treatment of severe periodontitis reverses endothelial dysfunction.
[81]	Cross-sectional	National health survey	Scotland	11 869 men and women, mean age 50	To examine if self reported toothbrushing behaviour is associated with cardiovascular disease and markers of inflammation (C reactive protein) and coagulation (fibrinogen)	Poor oral hygiene is associated with higher levels of risk of cardiovascular disease and low grade inflammation

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[82]	Case-control	Nursing homes	Japan	88 elderly persons	To evaluate the role of professional oral health care by dental hygienists in reducing respiratory infections in elderly persons requiring nursing care	Professional oral health care by dental hygienists is effective in preventing respiratory infections in elderly persons requiring nursing care
[83]	Book chapter					
[84]	Case-control	Clinic-based	US	823 women between 13 and 17 weeks of gestation	To study the effect of nonsurgical periodontal treatment on preterm birth	Treatment of periodontitis in pregnant women improves periodontal disease and is safe but does not significantly alter rates of preterm birth, low birth weight, or fetal growth restriction
[85]	Cross-sectional	Health survey	Brazil	652 13-year-olds	To elucidate the relationship between relevant biological, behavioural, socio-economic and psychological conditions, experienced in very early life and along the life course, and dental caries experience using the life course approach	There is an association between socio-economic and biological factors in very early life and levels of caries in adolescents
[86]	Cross-sectional	National health survey	US	2355 participants aged 60 and older	To assess relationships between systemic exposure to periodontal pathogens and cognitive test outcomes	A serological marker of periodontitis is associated with impaired delayed memory and calculation.
[87]	Professional opinion					
[88]	Cross-sectional	Health survey	US	850 elderly residents of a retirement community	To assess whether self-rated oral health captures a unique component of SRH that is not captured by other health measures.	Self-rated oral health has a unique role in people's perceptions of their overall health
[89]	Qualitative study	Interview	Canada (Montreal)	15 individuals on social assistance	To answer (a) how do people on social assistance perceive and experience oral health? and (b) What kinds of strategies do they develop to improve oral health?	Perception of oral health strongly influences treatment preference and explains low and selective use of dental services in this disadvantaged population
[90]	Professional opinion					

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[91]	Systematic review			175 publications	To review the safety and efficacy of fluoridation of drinking water.	The evidence of a beneficial reduction in caries should be considered together with the increased prevalence of dental fluorosis. There was no clear evidence of other potential adverse effects
[92]	Review					
[93]						
[94]	Systematic review			Twenty-four studies	To analyze the effectiveness of fissure sealants in preventing dental caries	Effectiveness of fissure sealants in preventing caries decreased with time, and increased when drinking water was fluoridated
[95]	Randomized clinical trial		Spain		To compare sealant with fluoride varnish in the prevention of occlusal caries in permanent first molars of children over a nine-year period	Both sealants and varnish were effective. The sealants performed better than the varnish
[96]	Review					
[97]					To assess the local cost savings resulting from community water fluoridation, given current exposure levels to other fluoride sources	Water fluoridation offers significant cost savings
[98]	Cross-sectional	Health survey		256 high-risk children	To compare the costs and patient acceptability of two methods of PATF professionally applied topical fluorides (foam and varnish)	Varnish applications were found to take less time than foam and resulted in fewer signs of discomfort.
[99]	Population-based cohort study	Health Survey	US (North Carolina)	21277	To investigate the effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dentally related Medicaid expenditures for young children.	Participating in the WIC program has the potential for decreasing dentally related costs to the Medicaid program, while increasing use of dental services
[100]	Population-based cohort study	Health Survey	US (North Carolina)	21277	To investigate the effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dental services use by Medicaid children in North Carolina	Children who participated in WIC had an increased probability of having a dental visit, were more likely to use preventive and restorative services, and were less likely to use emergency services
[101]	Interventional study	Clinic-based	Sweden	Parents of 4 year old children	To interpret the manner in which information **on** dental health care, systematically offered at child health centres, is assimilated among parents of preschool children with different caries experience.	Parents of healthy children had a significantly higher level of education than parents of diseased children. The level of education did not influence the knowledge as such but rather the ability to put the knowledge into practice.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[102]	Cross-sectional	School-based	Finland	489 children aged 11 and 12 year old and their parents	to determine whether the presence of active initial caries lesions among 11 to 12-yearold schoolchildren is associated with parental and child-related factors and whether there are gender differences in these associations.	Both parental and child-related factors were found to be associated with active initial caries lesions.
[103]	Prospective cohort study	Health Survey (Finnish Family Competence Study)	Finland	1074 10-year-old children	To elucidate whether variables recorded in early childhood would have a long-lasting predictive value of poor dental health	Early childhood risk factors of poor dental health seem to be stable even after 10 years of life and the changing of teeth from primary to permanent ones.
[104]	Prospective cohort study	Health Survey	Sweden	Children aged 1-3 year old	1) to investigate whether oral hygiene and dietary habits established at 1 year of age are maintained at 2 years of age 2) to analyze caries-related factors with regard to oral health between the age of 1 and 3 years	Canes-related habits, such as oral hygiene and dietary habits, established during infancy are maintained throughout early childhood.
[105]	Prospective cohort study	Health Survey (Finnish Family Competence Study	Finland	Children aged 3, 5, and 7 years	To analyze the prevalence of dental caries as well as associations of dental health and family competence among 7-year-old children and their families	Six explanatory variables (inconsistency in childrearing, under-evaluation of consistent behavior, emphasis on the mere explaining of causes and consequences without an example, father's previous caries history, child's frequent consumption of sweets and only occasional toothbrushing) were independently associated with child's caries occurrence.
[106]	Prospective cohort study	Health Survey	Sweden	Children aged 1-3 year old	To investigate whether oral hygiene habits and parent-related factors, recorded in early childhood, have a predictive value in relation to approximal caries experience at the age of 15 years	Good oral hygiene habits, established in early childhood, provide a foundation for a low experience of approximal caries in adolescents.
[107]	Systematic review				To examine the quality of oral health promotion research evidence and to assess the effectiveness of health promotion, aimed at improving oral health	Oral health promotion which brings about the use of fluoride is effective for reducing caries. Chairside oral health promotion has been shown to be effective more consistently than other methods of health promotion. Mass media programmes have not been shown to be effective.
[108]	Systematic review				To assess the quality of the evidence presented by studies of the effectiveness of dental health education	Dental health interventions have a small positive, but temporary effect on plaque accumulation; no discernible effect on caries increment and a consistent positive effect on knowledge levels.

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[109]	Review					
[110]	Prospective cohort study	Health Survey	UK	Children aged 1 year old	To determine the effect of dental health education (DHE) on caries incidence in infants, through regular home visits by trained dental health educators over a period of 3 years.	Regular home visits to mothers with infants, commencing at or soon after the time of the eruption of the first deciduous teeth, was shown to be effective in preventing the occurrence of nursing caries.
[111]						
[112]	Prospective cohort study	Health Survey	Chile	180 One to 3.5 year old children	To evaluate the effectiveness of mother and child preventive dental program after the first four years	The preventive dental program was effective in inhibiting caries in pre-school children, even in a population already receiving the benefits of community water fluoridation
[113]	Prospective cohort study	Health Survey	Chile	9 to 10-year-old children	To evaluate the prevalence of caries in the permanent 1st molars of a group of 9 to 10-year-old children, and to determine the long-term effect of a mother-child preventive dental program	Examination of children 4 years after discontinuation of a caries preventive program reflected a long-term reduction in the DFS score of permanent 1st molars
[114]	Report					
[115]	Case-control	Clinic-based	Sweden (Jonkoping)	292 children aged 1-6 year old	To evaluate a new strategy for the dental care of pre-school children which includes an early caries risk assessment and early preventive care.	Early primary prevention (before the onset of caries attack) and a structured and systematic approach to dental care for pre-school children result in good oral health for the children and may be economically profitable for a society with organized public dental service for pre-school children.
[116]	Prospective cohort study	Clinic-based	Finland	325 children	To evaluate outcomes in young children of risk-based management of dental caries in comparison with routine prevention.	In young children, risk-based management of caries seems practical, and prevention of caries can be targeted efficiently to individuals at risk.
[117]	Review					
[118]	Review					
[119]	Review					
[120]	Review					
[121]	Review					
[122]	Cross-sectional	Survey	Canada	1016 Canadian dentists	To investigate the opinions of Canada’s major dental care service provider regarding publicly financed dental care	Canadian dentists support governmental involvement in dental care, preferring investments in prevention to direct delivery.
[123]	Report					

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[124]	Analyzing administrative data		US		To evaluate whether administrative changes, including higher fee schedules for dental services in were associated with improved dentist participation and utilization of dental services by children	The increase in fees and changes in administration were positively associated with improved dentist participation and children's use of dental services.
[125]	Cross-sectional		US		Determining the effect of health care reform in Massachusetts	The uninsurance rate for adults ages 18–64 dropped by almost half.
[126]	Cross-sectional	Health survey	Thailand	32748 Thai adults aged 15 years and over	To assess the socioeconomic-related (in)equality and horizontal (in)equity in oral healthcare utilization	There are pro-rich inequality and inequity in oral healthcare utilization
[127]	Report					
[128]	Report					
[129]	Report					
[130]	Report					
[131]	Report					
[132]	Review					
[133]	Report					
[134]	Report					
[135]	Cross-sectional	Clinic-based	US	910 restorations	To compare the outcomes of restorations placed by restorative function auxiliaries (RFAs) with those placed by dentists	There was no significant difference in problem rates for restorations placed by restorative function auxiliaries versus those placed by dentists
[136]	Review study					
[137]	Report					
[138]	Report					
[139]	Prospective cohort study		Scotland		To develop and evaluate a model of integrated primary dental and medical care	The number of registered joint patients attending both medical and dental practices increased by 90%.
[140]	Report					
[141]	Report					
[142]	Cross-sectional		US	110 children aged 18 to 36 months	To determine which child-rearing practices are associated with nursing caries	There was no strong evidence to support the relationship between child-rearing practices and nursing caries
[143]	Cross-sectional		US	632 elementary schoolchildren (aged 5 to 12 years)	This investigation assessed two methods for estimating epidemiologic indicators of oral health status among children: (1) a visual-only screening, performed independently by a dental hygienist and a registered nurse; and (2) a parent- or guardian-completed questionnaire.	Screening by dental hygienists or nurses can provide valid data for surveillance of dental caries and treatment needs
[144]	Cross-sectional		US	258 preschool-aged children (122 males and 136 females)	To determine the accuracy of paediatric primary care providers' screening and referral for early childhood caries.	After 2 hours of training in infant oral health, the paediatric primary care providers achieved an adequate level of accuracy in identifying children with cavitated carious lesions

Study	Study design	Setting	Country (City/Province)	Sample (age)	Aim	Results
[145]	Report					
[146]	Cross-sectional			Subject between 2-19 year olds	To describes a model for a school-based program designed to reduce dental access disparities and examines its financial feasibility in states with different Medicaid reimbursement rates	The model program has considerable promise for reducing access disparities at a lower cost per child than current Medicaid programs
[147]	Professional opinion					
[148]	Randomized Controlled Trial		UK (Sheffield)	49 Senior dental students	To compare the effects of outreach placement with traditional, exclusively dental school-based clinical experience on students' confidence in providing treatment for patients presenting with common dental problems.	Dental outreach training in primary care settings is more effective than dental school training alone in improving students' confidence in tackling clinical situations.
[149]	Prospective cohort study	Survey	US	144 freshman dental students	To assess dental students' attitudes towards access to dental care for the underserved over time	The students' attitudes about societal expectations to care for the oral health of the underserved remained stable over the study period, but they became more uncertain of who should be responsible for fulfilling that obligation, who should receive that care, and their capability to provide this care while in dental school.
[150]	Cross-sectional		UK	58 dentists	To evaluate the perception of dentist toward their teaching program	Dentists reported that the educational experiences they gained were positive and have had a beneficial effect on their subsequent clinical careers.

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