INEQUITIES IN ORAL HEALTH: ONTARIANS AGED 12 TO 19 YEARS

An analysis of data from the Ontario Health Survey 1990

David Locker and Barbara Payne

COMMUNITY DENTAL HEALTH SERVICES RESEARCH UNIT

HEALTH MEASUREMENT AND EPIDEMIOLOGY
REPORT NO. 4

1993

The Community Dental Health Services Research Unit is a joint project of the Faculty of Dentistry, University of Toronto and the Dental Division, North York Public Health Department. It is a Health Systems-Linked Research Unit funded by the Ontario Ministry of Health.

The opinions expressed in this report are those of the authors and no official endorsement by the Ministry is intended or should be inferred.

SUMMARY

Public dental health programs, which are provided to Ontario school-children up to the age of 14 years, promote equity in oral health by helping to ensure that all children have access to screening, prevention and health education services. In order to ascertain whether or not inequities in use of dental services and oral health emerge or widen after this age, data from the Ontario Health Survey 1990 were analyzed and used to compare the experience of Ontarians aged 12 to 14 years, 15 to 17 years and 18 to 19 years.

Overall, 83.3% of these young Ontarians had visited a dental care provide at least once in the previous year. This declined from 89.9% of those aged 12 to 14 years to 76.2% of those aged 18 to 19 years.

Rates of use of dental services varied by income and were consistently lower among individuals from low income compared to high income families. Evidence of widening inequities with age was observed. The difference in rates between individuals from low and high income backgrounds was 13.1% at age 12 to 14 years and 21.4% at age 18 to 19 years.

Use of dental services also varied according to dental insurance coverage with the insured more likely to have visited a dental care provider at least once in the previous year than the uninsured. Again the difference in visiting rates by the insured and uninsured was narrowest at age 12 to 14 years and widest at age 18 to 19 years.

Analysis by age, family income and insurance coverage revealed major differences in the use of dental services. The highest rate of visiting, at 95.9%, was observed among Ontarians aged 12 to 14 years from high income households with dental insurance, while the lowest rate, at 52.0%, was observed among 18 to 19 year-olds from low income uninsured households.

The limited data on oral health collected by the OHS suggested that oral health declined with age. Reports of toothache and sore or bleeding gums were more common among the oldest compared to the youngest age group. However, no pattern was observed with respect to income or when the data were analyzed jointly by age and family income.

ADOLESCENTS AS AN AT-RISK GROUP

Public dental health programmes for school children in Ontario include school-based dental screening, prevention and education services as well as management of the Children in Need of Dental Treatment (CINOT) programme. Screening, education and prevention services are provided to all children to age 13/14 years, while treatment services other than CINOT are provided by a few Ontario Public Health Departments according to the availability of funding. These programmes promote equity in oral health by helping to ensure that children from low income families, from families without dental insurance coverage or families encountering other barriers to dental care have access to dental services and information to promote oral health.

Data for the school population under the age of 14 years indicate a decline in rates of dental disease among a significant number of children and the concentration of disease within a high risk minority. However, no assessment of the dental status of adolescents age 14 years and over who are no longer eligible for public dental health programmes has been made, with the result that a data base with which to assess the need for or to plan for appropriate programmes is not available. Yet, the literature addressing the dental health status of adolescents suggests that this is a population at risk.

Adolescence is a period of physical, emotional, psychological and social change with unique characteristics that can impact on oral health status. Among these are the emergence of independent behaviours such as changes in dietary habits (freedom

to snack previously forbidden foods), use and abuse of legal and illegal drugs (alcohol, tobacco, marijuana), unsupervised self-care behaviours (toothbrushing, flossing), and risk-taking behaviour resulting in high rates of traumatic injuries (e.g., no seat belt use in cars) (Albino et al., 1982; American Academy of Paediatric Dentistry, 1992; Blum, 1991; Brindis and Lee, 1990; Handler, 1984). This independence reflects the declining influence of the family and the school on adolescent behaviour.

With few exceptions (e.g., Hamilton and Coulby, 1991; King et al., 1985; Lachapelle-Harvey and Sevigny, 1985), the Canadian literature on the oral health status of adolescents and their use of dental services is sparse and dated (Cageorge et al., 1980; Hunt et al., 1980; Stamm et al., 1980), or province specific (Lachapelle-Harvey and Sevigny (1985) in Quebec City and Wolfson and Lewis (1985) in Saskatchewan). In general, a negative depiction of adolescent oral health status is evident. Despite an overall decline in population caries, the rate of dental caries appears to be high in the adolescent population (American Academy of Paediatric Dentistry, 1992) with caries a major dental infectious disease problem (Ashley and Sainsbury, 1981; Booth and Ashley, 1987; Castaldi, 1980; Larsson et al., 1992; Sgan-Cohen et al., 1984). In addition to dental caries, relatively high rates of periodontal disease have also been reported (Addy et al., 1990; Bhat, 1991; Booth and Ashley, 1987; Clerehugh and Lennon, 1985; Tiainen et al., 1992; Wolfson and Lewis, 1985). Immunologic data on periodontal disease suggest that irreversible tissue damage begins in late adolescence due to both acute and chronic conditions such as injuries, gingivitis and periodontitis (American Academy of Paediatric Dentistry, 1992). In this

age group, occlusal problems such as third molar impaction or malposition, temporomandibular joint problems, the impact of congenitally missing teeth and malocclusion remain are other areas where treatment may be needed (American Academy of Paediatric Dentistry, 1992; Roberts et al., 1988). Of special importance to adolescents is the negative self-image and emotional impact of malocclusions particularly when family economic deprivation precludes the provision of orthodontic treatment.

Dental caries and periodontal disease in adolescence have been found to be associated with a number of social and behavioural factors. In general, males (Addy et al., 1990), those of lower socio-economic class (Addy et al., 1990; Clerehugh and Lennon, 1985; Honkala et al., 1991; Lachapelle-Harvey and Sevigny, 1985; Schou et al., 1990), those not living with family (Lissau et al., 1989) and members of immigrant ethnic groups (Bhat, 1991; Booth and Ashley, 1989; Clerehugh and Lennon, 1985; Durward and Wright, 1989; Hamilton and Coulby, 1991) tend to have worse oral health status (Wolfson and Lewis, 1985), to perform less frequent preventive oral hygiene behaviours (Addy et al., 1990; Bedi et al., 1992; Honkala et al., 1991; Sogaard et al., 1991; Walsh, 1985) and to indulge in potentially harmful dietary habits (Bedi et al., 1992; Clerehugh and Lennon, 1985; Honkala et al., 1991; Lachapelle-Harvey and Sevigny, 1985; Larsson et al., 1992; Rise et al., 1991). Other contributing factors to adolescent oral health status are levels of dental knowledge (Durward and Wright, 1989; Hamilton and Coulby, 1991; Hodge, 1981; Lachappelle-Harvey and Sevigny, 1985; Sgan-Cohen et al., 1984; Woolfolk et al., 1989), self-esteem

and self-rated attractiveness (Blinkhorn and Attwood, 1992; MacIntyre and West, 1991) and personality constructs such as locus of control (Duke and Cohen, 1975; Durward and Wright, 1989; Kent et al., 1984; Lissau et al., 1989). For the most part, those with higher dental knowledge levels, an internal locus of control, high self-esteem and who rate themselves as attractive in relation to their peers have lower DMFT scores and report higher levels of preventive behaviours such as toothbrushing, flossing, use of interdental devices and lower intake of cariogenic snack foods.

An issue of interest to the Community Dental Health Services Research Unit and its partner agency, the Dental Division of North York Public Health Department, concerns the potential changes in the use of dental services by and the oral health status of adolescents following cessation of eligibility for public dental health programmes. This interest stems from two observations. First, anecdotal evidence from the U.K. suggests that decisions regarding dental visits are transferred from parents to their children around the age of eleven. In addition, family support for health-promoting behaviours may be less than optimal at this age given the high rates of family conflict reported by Ontario adolescents (Ontario Ministry of Health, 1992a). Once institutional support for dental visits also ends with the cessation of school-based dental programmes, declining rates of dental visiting are likely to occur. Second, since school-based dental programmes promote equity in oral health, it is possible that inequities in both dental visiting and oral health will re-emerge or become more marked as individuals progress through adolescence without the benefit

of these or other public programmes. The Community Dental Health Services Research Unit is conducting a number of research projects which will address these issues.

THE ONTARIO HEALTH SURVEY 1990

The Ontario Health Survey 1990 provides a limited but unique body of data on the oral health status of and use of dental services by Ontarians aged 12 years and over. As such, it can be used to examine areas of interest relative to the oral health of adolescents. Consequently, data from the survey were analyzed to determine whether or not they provided evidence to support or refute the hypotheses outlined above.

For this report we arbitrarily defined adolescents as individuals aged from 12 years to 19 years and analyzed data on oral health status and use of dental services for three groups; 12 to 14 years; 15 to 17 years and 18 to 19 years. The focus of this report is variations according to age, family income and dental insurance coverage. Variations according to geographic region and Public Health Unit are also examined to the extent that sample sizes allow.

The design and methods of the Ontario Health Survey 1990 have been described in documents released by the Ontario Ministry of Health (Ontario Ministry of Health, 1992b) and details will not be repeated here.

Briefly, the target population for the study was all persons living in private households in 1990. People living in institutions, First Nations people living on

reserves and residents of extremely remote areas were excluded. The survey aimed to obtain data on approximately 1000 people in each PHU in the province. Approximately 760 households were randomly selected from each PHU and all persons living in the household included in the study. Data were collected by a personal interview with one member of the household able to give information for all members of the household and a self-administered questionnaire completed by each household member aged 12 years and over. Most questions on oral health and use of services were included in the latter.

Response rates to the survey were high. Data were collected from 6,831 subjects and subsequently weighted to represent 1,114,961 Ontarians aged 12 to 19 years. Consequently, all data presented in this report are population estimates and not sample statistics.

The majority of adolescents represented, 93.4%, were in school and only 6.6% were working. The proportion in school declined with age; from 99.7% of those aged 12 to 14 years to 74.9% of those aged 18 to 19 years. One fifth, 19.8%, of this older group were working at a job.

Guidelines for the release of data

A number of guidelines govern the release of estimates from the survey. Where estimates are based on fewer than 30 survey respondents they cannot be released and are replaced in the tables by -. Where samples sizes are such that coefficients of variation fell between 16.6 and 25.0% the estimates are qualified by an asterisk (*).

These estimates are subject to high sampling variability. Where the coefficient of variation is 25.1% or more the estimate cannot be released and must be replaced in the tables by -. Further information on these guidelines is to be found in documentation released by the Ontario Ministry of Health (Hunter, 1992).

DATA ON ORAL HEALTH AND USE OF DENTAL SERVICES

As the survey did not involve clinical examinations, data on oral health status were obtained by means of self-reports. Because it was possible to include only a few questions on oral health in the survey the following key oral health indicators were used:

* dental status (dentate/edentulous)
* denture status
* ability to chew
* dental and facial pain
* other oral symptoms

Clearly, the first three are inappropriate for an adolescent population and information on oral pain and other symptoms provide only a limited indication of their oral health status.

Questions on the use of dental services were more comprehensive and included the following:

* time since last visit to a dental care provider

* pattern of dental visiting

* number of visits in the last year

* for those not visiting in the last year, main reason for not visiting

* dental insurance coverage

The first two variables were used to construct two indicators reflecting the use of dental services. These were: 1) the percentage reporting one or more visits to a dental care provider in the previous year, and 2) the percentage without a dental visit in the previous year who also reported using dental services only when having pain or other trouble.

Data on the number of dental visits in the previous year were obtained during the personal interview phase so that the majority were proxy responses and likely to be unreliable. Consequently, these data were not analyzed.

Data on dental insurance coverage were also included as part of the personal interview phase of the survey and have been included in this report since we believe them to be reliable.

Because the data on the use of dental services were more extensive than the data on oral health status, they are the focus of this report.

USE OF DENTAL SERVICES BY ONTARIO ADOLESCENTS

Overall, 83.3% of young Ontarians had visited a dental care provider at least once in the previous year, 2.2% had not had a visit in the previous year but reported visiting regularly for a dental examination, 2.3% had not had a visit in the previous year and visited irregularly for dental examinations and 12.2% had not had a visit in the previous year and only visited when having pain or other trouble (Table 1). The last group comprised 64.6% of those without a dental visit in the previous year.

The percentage with at least one dental visit in the previous year declined with age; from 89.9% of those aged 12 to 14 years to 76.2% of those aged 18 to 19 years (Table 2). The percent visiting only when having symptoms also varied systematically by age. It was lowest among those aged 12 to 14 years, at 8.4%, and highest among those aged 18 to 19 years at 15.0% (Table 1). This means that almost one in six of the oldest group did not receive regular preventive or maintenance care.

Table 3 shows the reasons given by those not making a dental visit in the previous year. The main reasons were nothing was wrong (44.7%); too expensive (21.1%); afraid of or dislike dentists (11.0%) and too busy (13.5%).

Dental insurance coverage

Just over three-quarters (77.2%) of Ontarians aged 12 to 19 years had dental insurance coverage. This varied from 80.5% of those aged 12 to 14 years to 73.3% of those aged 18 to 19 years. The percent covered was inversely related to family income. Among those from low income backgrounds only 60.7% had coverage

compared with 86.0% of those from high income backgrounds.

Table 4 shows the percentage covered by age and income. The highest rate of coverage was among 12 to 14 year olds from families with high incomes, 88.7% of whom were covered. The lowest rate was among 18 to 19 year-olds from low income families, only 49.4% of whom had coverage.

Effect of family income and insurance coverage on dental visiting

Table 5 shows the percentage with at least one dental visit in the previous year by age, family income and dental insurance coverage. Table 6 shows the results of a similar analysis for those reporting visiting only when having symptoms.

The percent with one or more dental visits in the previous year varied systematically by income. It was 70.7% for adolescents from low income families but rose to 88.9% for adolescents from high income families. Within each of the three age groups more individuals from high income households had received care than from low income households. In addition, visiting rates declined with age in each income group. Less than two-thirds of 18 and 19 year-olds from low income families had seen a dental care provider. These data also provide evidence of widening inequities with age. The gap between individuals from low income and high income families was 13.1% at age 12 to 14 years and 21.4% at 18 to 19 years.

As expected, visiting rates also varied by dental insurance coverage. They were consistently lower among the uninsured than the insured. Again, the gap between the insured and the uninsured was narrowest at age 12 to 14 years.

An identical pattern can be discerned in Table 6. The percentage visiting only when having pain or other trouble was inversely related to family income and increased with age within each income group. Most striking of all is the fact that, overall, one quarter of adolescents from low income families only visited when having pain or other trouble and for 18 and 19 year-olds from these disadvantaged households almost one-third only visited the dentist symptomatically.

The data in Table 7 allow the combined effect of age, family income and dental insurance coverage on dental visiting to be examined. At each age, high income insured individuals were the most likely to have made a dental visit in the previous year and low income uninsured individuals the least likely. The highest percentage reporting one or more visits in the last year was observed among those aged 12 to 14 years from high income families with insurance (95.9%). The lowest was observed among those aged 15 to 17 years from low income families without insurance (52.0%). Only 2.6% of the former only visited when having pain or other trouble compared to 37.1% of the latter (Table 8).

These data provide additional evidence suggesting that inequities in the use of dental services widen following cessation of eligibility for public dental health programmes. The gap between the groups with the least and the most favourable visiting rates was narrower among those aged 12 to 14 years (20.2%), than among those aged 15 to 17 years (39.1%) and those aged 18 to 19 years (33.3%) (Table 7).

The same pattern emerges if the groups are compared on the basis of the percentage who only visit when having pain or other trouble (Table 8). The gap

between the least and most favourable groups was 18.6% at 12 to 14 years, 30.5% at 15 to 17 years and 29.3% at 18 to 19 years.

These data also indicate that dental insurance coverage promotes access to dental care for all income groups at all three ages. Of interest is the fact that income differences in dental visiting are observed within the group with dental insurance coverage, suggesting the existence of other than financial barriers to dental health care for Ontario adolescents from low income backgrounds.

Variation by Region and PHU

Regional differences in dental visiting by adolescents are shown in Tables 9 and 10 and variations by PHU in Table 11. The number of subjects in each PHU was too small to allow for estimates for the three age groups used in the analysis. Consequently, these percentages refer to Ontarians 12 to 19 years as a whole.

Data by region show that the decline in the percent visiting a dental care provider in the previous year with age occurs in all parts of the province (Table 9). At each age, visiting rates were higher in the South West and Central regions than in the East and the North. Rates varied from 93.0% of 12 to 14 year-olds living in the South West to 64.9% of 18 to 19 year-olds living in the North West.

The proportion who reported visiting only when having pain or other trouble was lowest among 12 to 14 year-olds in the Central West (5.3%) and highest among 18 to 19 year-olds in the North East (19.9%) (Table 9). This represents almost a four-fold difference in the proportion not receiving regular dental care.

As with the province as a whole, income gradients were observed in all regions, with adolescents from low income households being less likely than those from high income households to have had at least one dental visit in the previous year (Table 10). Similarly, in all regions those from households without dental insurance coverage were less likely to have had a dental visit. Regional differences were most marked among individuals without dental insurance coverage with rates varying from 73.8% in the South West to 45.6% in the North West. A similar analysis by age was not possible because of low sample sizes.

Variations in reported visiting rates were also observed by PHU for 12 to 19 year-olds overall (Table 11). The proportion reporting a dental visit in the previous year was lowest in Toronto (York) at 65.0% and highest in Durham at 92.7%. Small sample sizes meant that most estimates of the proportions visiting only when having pain or other trouble were not reportable and also prevented a more detailed analysis of variations by PHU.

ORAL HEALTH STATUS OF ONTARIO ADOLESCENTS

As anticipated, the overwhelming majority of adolescents, 96.7%, reported that they were dentate and did not wear dentures or bridges. Relatively few, 2.7%, stated that they had a problem chewing one or more of three indicators foods included in the questionnaire (apples, carrot, firm meats).

However, 39.1% reported that they had experienced one or more of four oral symptoms during the previous month; 15.6% had toothache, 24.5% pain in the teeth

with hot and cold foods, 8.9% pain in the jaw joint and 16.4% sore or bleeding gums. One-in-seven reported having two or more of these symptoms.

Table 12 shows these distribution of these symptoms by age group and family income. Three of the four symptoms were more likely to be reported by 18 to 19 years olds than 12 to 14 year olds. The prevalence of toothache in the oldest age group was high, at 19.6%, and half as prevalent again as in the youngest age group. In addition, the proportion reporting two or more of these symptoms in the previous month increased with age.

The relationship between oral symptoms and family income was not clear-cut and differences between the groups tended to be small. These data, then, provide little evidence of systematic income inequities in self-reported oral health status among Ontarians aged 12 to 19 years.

When the data were analyzed to assess the combined effect of age and family income on symptom experience clear patterns did not emerge. The hypothesis that income inequities in oral health emerge or become marked as individuals progress through adolescence is not supported by these data.

Table 13 shows regional differences in the percent reporting toothache, sore or bleeding gums or two or more of the four symptoms included in the questionnaire. In general, adolescents living in the East and the North were more likely to have had oral symptoms although the differences were often small in percentage terms. Among 18 to 19 year-olds living in the North East or North West, more than one in five had had toothache or sore and bleeding gums in the previous month. A similar analysis

by region and family income tended to suggest that where income inequities existed they were more marked in the North East and North West than in other regions (Table 14).

Analysis of symptom experience by PHU was not possible given the numbers of subjects in each PHU and the relatively low prevalence of the symptoms. Many of the estimated rates were not reportable due to large coefficients of variation.

DISCUSSION

In this report, data from the Ontario Health Survey 1990 have been used to pursue a number of hypotheses concerning the use of dental services and oral health status of Ontarians aged 12 to 19 years. These were that, as individuals progressed through adolescence:

1. rates of dental visiting would decline;
2. income inequities in the use of dental services would emerge or become more marked;
3. oral health status would worsen;
4. income inequities in oral health would emerge or become more marked.

In addition, geographic variations in use of dental services and oral health status have been examined to the extent that the data allowed.

Data from the Ontario Health Survey 1990 provide some support for hypotheses 1 to 3. Rates of dental visiting declined between the age of 12 to 14 years

and 18 to 19 years with fewer at this age having had at least one dental visit in the previous year. In addition, the proportion who only used dental services when having pain or other trouble almost doubled.

For Ontario adolescents overall, there was an inverse relationship between household income and use of dental services. Individuals from low income households were the least likely to have had at least one dental visit in the previous year and the most likely to report visiting only when having pain or other trouble. As expected, inequities were also observed according to dental insurance coverage; those without coverage were less likely to receive regular dental care.

The data also give some support to the hypothesis that inequities become more marked with aging. The gap between low and high income groups in terms of dental visiting is narrowest at age 12 to 14 years and widest at 18 to 19 years. The same effect is observed with respect to dental insurance; the gap between the insured and uninsured increases from the youngest to the oldest age group.

When the combined effect of age, income and dental insurance coverage is examined the extent of inequities among Ontario adolescents becomes apparent. Among Ontarians aged 12 to 14 years from high income households with dental insurance coverage, almost all, 95.9%, had one or more dental visits in the previous year. For Ontarians aged 15 to 17 years and 18 to 19 years from low income households without dental insurance, only 52.0% and 52.5% respectively had visited a dental care provider in the previous year. Differences of a similar magnitude are observed when the percent only visiting with pain or other trouble is examined.

The data on oral health status need to be treated with some caution. While subjective reports of dental pain and other symptoms are valuable health status indicators in their own right, they bear an unknown relationship to oral health status measured clinically. Consequently, they provide a very limited picture of the oral health status of Ontario adolescents.

With this in mind, there is some evidence to suggest that the oral health status of Ontario adolescents does decline as they age. Rates of toothache are one-and-a-half times as high among those aged 18 to 19 years as they are in 12 to 14 year-olds. Almost one in five of the older age group had experienced this problem in the previous month. The relationship of sore and bleeding gums to age was not as systematic as with toothache, although rates were higher among 15 to 17 and 18 to 19 year olds than those aged 12 to 14 years. Similarly, the proportion of 18 to 19 year olds reporting two or more of the four symptoms included in the questionnaire was almost twice as high as that for 12 to 14 year olds.

The data, however, did not provide evidence suggesting marked income inequities in oral health nor did they support hypothesis 4; that inequities in oral health status would emerge or widen as adolescents aged. The relationship of oral health status with income was not clear-cut, being direct for some indicators and inverse for others, and all differences observed were small in percentage terms. In addition, analysis of the data by age and household income showed no clear patterns.

Analysis of the data by region and PHU was limited by sample size considerations. Regional differences in dental visiting were observed overall and for

the three age groups used in the analysis although the extent of inequity was not striking. More substantial differences emerged when income and insurance coverage was included in the analysis. Low income groups and those without dental insurance living in the North were the least likely to have had at least one dental visit in the previous year.

Variations in the use of dental services were also present by PHU but small sample sizes prevented further analysis at this level.

The extent of the inequities in dental visiting and oral health status among Ontario adolescents are somewhat anomalous in the context of national and provincial health policies which emphasize equity in health. Clearly, if oral health is believed to be an important health issue and public concern some mechanism needs to be found for ensuring that all Ontario adolescents have equal opportunities for attaining and maintaining optimal oral health.

The data reviewed in this report are consistent with the idea that public dental health services of the kind provided up to age 14 years reduce the extent of inequity in oral health. Whether this effect would be observed among older adolescents if provision was extended to those aged 15 to 19 years is not known. Adolescence is a period of transition and numerous factors are likely to impact on the adoption and maintenance of healthy behaviours at this stage of life.

Further research using appropriate research designs and measurement techniques is necessary to confirm the main findings of this report, to cast light on the factors influencing adolescent oral health and oral health behaviours and to provide the basis for interventions to ensure equity.

REFERENCES

Addy M, Dummer PMH, Hunter ML, Kingdon A, Shaw WC. The effect of toothbrushing frequency, toothbrushing hand, sex and social class on the incidence of plaque, gingivitis and pocketing in adolescents: a longitudinal cohort study. Community Dental Health 7: 237-247, 1990.

Albino, JE, Tedesco LA and Phipps GT. Social and psychological problems of adolescence and their relevance to dental care. International Dental Journal 32(2): 184-193, 1982.

American Academy of Paediatric Dentistry. Reference Manual, 1991-92.

Ashley, FP, Sainsbury RH. The effect of a school-based plaque control programme on caries and gingivitis. British Dental Journal 150: 41-45, 1981.

Bedi, R, Sutcliffe P, Donnan PT, McConnachie J. Preventive oral health related behaviour of dentally anxious schoolchildren aged 13-14 years in Lothian, Scotland. Community Dental Health 9: 19-29, 1992.

Bhat M. Periodontal health of 14-17-year-old US schoolchildren. Journal of Public Health Dentistry 51(1): 5-11, 1991.

Blinkhorn A, Attwood D. Social correlates of dental health and dental service use. MRC Medical Sociology Unit, University of Glasgow. Work in Progress 1991. February 1992.

Blum RW. Global trends in adolescent health. Journal of the American Medical Association 265(20): 2711-2719, 1991.

Booth V, Ashley F. The oral health of a group of 15-17 year old British school children of different ethnic origin. Community Dental Health 6: 195-205, 1989.

Brindis CD, Lee PR. Public policy issues affecting the health care delivery system of adolescents. Journal of Adolescent Health Care 11: 387-397, 1990.

Cageorge SM, Ryding WH, Leake JL. Dental health status survey of Manitoba children. Journal of the Canadian Dental Association 46: 108-116, 1980.

Castaldi CR. Introduction. In: Castaldi CR, Brass GA (eds). Dentistry for the Adolescent. W.B. Saunders & Co., 1980.

Clerehugh V, Lennon MA. A two-year longitudinal study of early periodontitis in 14- to 16-year-old schoolchildren. Community Dental Health 3: 135-141, 1986.

Duke MP, Cohen B. Locus of control as an indicator of patient cooperation. Journal of the American College of Dentists 42: 174-178, 1975.

Durward CS, Wright FAC. Dental knowledge, attitudes, and behaviours of Indochinese and Australian-born adolescents. Community Dentistry and Oral Epidemiology 17: 14-18, 1989.

Handler SL. Understanding the adolescent patient. New York State Dental Journal 50: 480-482, 1984.

Hamilton ME, Coulby WM. Oral health knowledge and habits of senior elementary school students. Journal of Public Health Dentistry 41(4): 212-219, 1991.

Hodge HC. The relationship of television advertising to toothbrushing beliefs, attitudes, knowledge and behaviour of adolescents. In: Leather DS, Hastings GB, Davies JK (eds). Health Education and the Media. Pergamon Press, 1981.

Honkala E, Karovonen S, Rimpelä, Rajalä M, Rimpelä M, Prättälä R. Oral health promotion among Finnish adolescents between 1977 and 1989. Health Promotion International 6(1): 21-30, 1991.

Hunt AM, Lewis DW, Banting D and Foster MK. Ontario dental health survey - 1978. Journal of the Canadian Dental Association 46(2): 117-124, 1980.

Hunter L. Guidelines for the analysis and release of data from the Ontario Health Survey. Ontario Ministry of Health, 1992.

Kent GG, Matthews RM, White FH. Locus of control and oral health. Journal of the American Dental Association 109: 67-69, 1984.

King, AC, Robertson, AS, Warren, WK. Summary Report: Canada Health Attitudes and Behaviours Survey. Kingston: Queen's University, 1985.

Lachapelle-Harvey D, Sévigny J. Multiple regression analysis of dental status and related food behaviour of French Canadian adolescents. Community Dentistry and Oral Epidemiology 13: 226-229, 1985.

Larsson B, Johansson I, Ericson T. Prevalence of caries in adolescents in relation to diet. Community Dentistry and Oral Epidemiology 20: 133-137, 1992.

Lissau I, Holst D, Frlish-Hasché E. Use of dental services among Danish youths: role of the social environment, the individual, and the delivery system. Community Dentistry and Oral Epidemiology 17: 109-116, 1989.

MacIntyre S, West P. Social, developmental and health correlates of 'attractiveness' in adolescence. Sociology of Health and Illness 13(2): 149-167, 1991.

Ontario Ministry of Health. Ontario Health Survey 1990: Highlights. Ministry of Health, Ontario. Premiers Council on Health, Well-being and Social Justice, 1992a.

Ontario Ministry of Health. Ontario Health Survey 1990. User's Guide Volume 1: Documentation. Ministry of Health, Ontario. Premier's Council on Health, Well-being and Social Justice, 1992b.

Roberts EE, Beales JG, Dixon L, Willcocks AJ, Willmot DR. The orthodontic condition and treatment status of a sample of 14-year-old children in North Derbyshire. Community Dental Health 6: 249-256, 1989.

Rise J, Haugejorden O, Wold B, Aarö LE. Distribution of dental health behaviours in Nordic schoolchildren. Community Dentistry and Oral Epidemiology 19: 9-13, 1991.

Schou L, Currie C, McQueen D. Using a "lifestyle" perspective to understand toothbrushing behaviour in Scottish schoolchildren. Community Dentistry and Oral Epidemiology 18: 230-234, 1990

Sgan-Cohen HD, Lipsky R, Behar R. Caries, diet, dental knowledge and socioeconomic variables in a population of 15-year-old Israeli schoolchildren. Community Dentistry and Oral Epidemiology 12: 332-335, 1984.

Søgaard AJ, Grytten J, Holst D. Recent changes in health related dental behaviours in Norway. Community Dentistry and Oral Epidemiology 19: 241-245, 1991.

Stamm JW, Dixter CT, Langlais RP. Principal dental health indices for 13-14 year old Quebec children. Journal of the Canadian Dental Association 46: 125-137, 1980.

Tiainen L, Asikainen S, Saxén L. Puberty-associated gingivitis. Community Dentistry and Oral Epidemiology 20: 87-89, 1992.

Walsh MM. Effects of school-based dental health education on knowledge, attitudes and behavior of adolescents in San Francisco. Community Dentistry and Oral Epidemiology 13(3): 143-147, 1985.

Wolfson SM, Lewis MH. A survey of periodontal conditions in Saskatchewan adolescents. Journal of the Canadian Dental Association 7: 486-489, 1985.

Woolfolk MW, Lang WP, Faja BW. Oral health knowledge and sources of information among elementary schoolchildren. Journal of Public Health Dentistry 49(1): 39-43, 1989.

TABLE 1

USE OF DENTAL SERVICES BY ONTARIO ADOLESCENTS

	%
One or more dental visits in previous year:	83.3
No visit in previous year:	
Visit regularly	2.2
Visit irregularly	2.3
Visit only with pain or other trouble	12.2

TABLE 2

USE OF DENTAL SERVICES BY AGE

Age:	12-14 years	15-17 years	18-19 years	All
% with at least one dental visit in previous year	89.9	82.0	76.2	83.3
% who only use services when having pain or other trouble	8.4	13.5	15.0	12.2

TABLE 3

MAIN REASON FOR NOT VISITING A DENTAL CARE PROVIDER IN THE PAST YEAR BY AGE (%)

Age:	12-14 yrs	15-17 yrs	18-19 yrs	All
Too expensive	20.3	19.2	24.5	21.1
Afraid or dislike dentists	10.9	9.8	11.2	11.0
Too busy	8.4	13.0	18.3	13.5
Nothing wrong	48.9	50.0	37.1	44.7
Don't know a dentist	1.4	1.9	4.0	3.0
Dentist's office too far away	0.1	0.8	1.2	0.7
Physical/medical problems prevent visiting	0.2	0.2	0.2	0.2
Other	9.8	5.1	3.6	5.8

TABLE 4

DENTAL INSURANCE COVERAGE BY AGE AND FAMILY INCOME

Income:	Low	Medium	High
Age:			
12-14 years	69.2	78.1	88.7
15-17 years	63.3	73.5	86.1
18-19 years	49.4	69.8	82.8

TABLE 5

PERCENT WITH AT LEAST ONE DENTAL VISIT IN LAST YEAR

Age:	12-14 yrs	15-17 yrs	18-19 yrs	All
Income:				
Low	82.0	70.5	61.0	70.7
Medium	84.9	76.7	69.2	77.8
High	95.1	88.4	82.4	88.9
Dental Insurance:				
Yes	91.8	87.9	81.9	87.7
No	81.7	62.4	60.6	67.1

TABLE 6

PERCENT VISITING DENTIST ONLY WHEN HAVING PAIN OR OTHER TROUBLE

Age:	12-14 yrs	15-17 yrs	18-19 yrs	All
Income:				
Low	19.3	22.1	31.4	24.2
Medium	11.2	18.6	17.7	15.7
High	3.2	8.4	10.0	7.1
Dental Insurance:				
Yes	6.1	8.7	10.6	8.3
No	18.1	29.2	27.4	25.5

TABLE 7

PERCENT WITH A DENTAL VISIT IN PREVIOUS YEAR:
COMBINED EFFECT OF AGE, INCOME AND INSURANCE COVERAGE

Insurance Coverage:		Yes	No
12-14 years:	Low income	85.1	75.7
	Medium income	87.5	75.2
	High income	95.9	88.2
15-17 years:	Low income	81.1	52.0
	Medium income	83.2	58.7
	High income	91.1	71.8
18-19 years:	Low income	68.7	52.5
	Medium income	75.1	55.7
	High income	85.8	65.0

TABLE 8

PERCENT VISITING ONLY WHEN HAVING PAIN OR OTHER TROUBLE: COMBINED EFFECT OF AGE, INCOME AND INSURANCE COVERAGE

Insurance coverage:		Yes	No
12-14 years:	Low income	18.5	20.9
	Medium income	8.5	21.0
	High income	2.6	8.8
15-17 years:	Low income	13.4	37.1
	Medium income	13.3	32.8
	High income	6.6	19.3
18-19 years:	Low income	26.6	36.6
	Medium income	12.6	28.6
	High income	7.3	22.8

TABLE 9

DENTAL VISITING BY AGE AND REGION

Age:	All		12-14 years		15-17 years		18-19 years	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Southwest	85.2	11.1	93.0	6.6	84.3	12.2	77.2	15.0
Central West	83.4	9.8	92.7	5.3	82.8	11.6	73.5	12.5
Central East	83.8	13.5	88.6	10.9	82.3	14.7	80.0	15.0
East	81.4	12.5	91.3	7.5	79.3	14.8	71.3	15.8
North East	77.8	13.3	84.6	6.8	79.5	13.8	71.1	19.9
North West	77.5	11.8	81.8	11.2	80.3	9.8	64.9	16.8

(a) Percent with at least one dental visit in the previous year.
(b) Percent visiting only when having pain or other trouble.

TABLE 10

PERCENT WITH AT LEAST ONE DENTAL VISIT IN THE PREVIOUS YEAR BY REGION, INCOME AND INSURANCE COVERAGE: ONTARIANS AGED 12-19 YEARS

Region	Income			Insurance Coverage	
	Low	**Medium**	**High**	**Yes**	**No**
South West	76.3	81.0	92.3	89.6	73.8
Central West	67.7	80.2	91.1	87.9	66.4
Central East	75.9	74.5	88.6	88.7	66.6
East	66.7	80.1	85.4	85.4	68.1
North East	58.7	78.7	87.6	84.8	56.8
North West	64.9	65.8	84.6	82.5	45.6*

*Qualified estimate

TABLE 11

DENTAL VISITING BY PHU

	% with at least one visit in previous year		% with at least one visit in previous year
Algoma	89.9	Northwestern	75.1
Brant	86.4	Ottawa-Carleton	84.5
Bruce	69.0	Oxford	81.2
Durham	92.7	Peel	80.0
East Ontario	70.8	Perth	81.0
Elgin-St. Thomas	80.2	Peterborough	87.4
Essex-Windsor	85.5	Porcupine	71.0
Grey-Owen sound	77.0	Renfrew	83.5
Haldiman-Norfolk	84.1	Simcoe	84.9
Haliburton-Kawartha	88.0	Sudbury	78.3
Halton	89.9	Thunder Bay	79.0
Hamilton-Wentworth	82.7	Tamiskaming	77.0
Hastings-Prince Edward	77.9	East York	87.0
Huron	86.9	Etobicoke	88.5
Kent-Chatham	83.6	North York	87.0
Kingston-Frontenac-Lennox	78.1	Scarborough	73.6
Lambton	89.3	Toronto (City)	81.0
Leeds-Grenville-Lanark	87.3	Toronto (York)	65.0*
Middlesex-London	91.2	Waterloo	77.3
Muskoka-Parry Sound	77.0	Wellington-Dufferin-Guelph	86.1
Niagara	81.9	York Region	88.0
North Bay	75.1		

TABLE 12

PERCENT REPORTING SYMPTOMS BY AGE AND FAMILY INCOME

	Age (years)			Income		
	12-14	**15-17**	**18-19**	**Low**	**Medium**	**High**
Toothache	13.5	14.8	19.6	16.7	17.3	14.8
Pain in teeth with hot/cold/ sweets	22.4	26.0	25.0	26.6	24.5	24.1
Pain in jaw joint	5.5	10.6	10.7	8.5	7.4	10.0
Sore or bleeding gums	13.5	17.8	17.8	15.5	14.9	17.6
Two or more symptoms	10.2	16.0	17.3	16.0	15.3	14.1

TABLE 13

PERCENT REPORTING SELECTED ORAL SYMPTOMS IN PREVIOUS MONTH BY REGION AND AGE

Region:		SW	CW	CE	E	NE	NW
Toothache:	12-14 yrs	12.0	15.5	11.6	14.2	18.6	17.1
	15-17 yrs	14.3	15.0	14.6	15.5	13.5	18.3
	18-19 yrs	16.6	21.1	19.1	18.0	25.3	23.4
	All	14.2	16.7	14.8	15.7	18.6	19.1
Sore/bleeding gums	12-14 yrs	15.2	12.3	11.8	16.6	15.6	16.2
	15-17 yrs	15.4	19.3	17.2	16.3	21.7	24.6
	18-19 yrs	12.8	16.8	16.5	24.6	21.9	32.2
	All	14.6	16.4	15.2	18.6	19.7	23.4
Two or more oral symptoms	12-14 yrs	10.9	10.4	8.7	10.0	15.4	15.8
	15-17 yrs	14.7	16.9	15.2	18.8	14.4	19.6
	18-19 yrs	15.9	17.0	16.1	17.2	22.5	34.2
	All	13.2	14.8	13.3	15.3	17.1	21.2

TABLE 14

PERCENT REPORTING SELECTED ORAL SYMPTOMS IN THE PREVIOUS MONTH BY REGION AND INCOME

Region:		SW	CW	CE	E	NE	NW
Toothache:	Low income	13.0	18.7	11.4	19.2	27.8	32.1
	Medium income	14.7	17.4	19.5	15.0	17.7	16.8
	High income	11.2	13.9	15.8	15.4	15.9	16.9
Sore/bleeding gums:	Low income	8.2	19.9	15.6	11.2	20.5	23.5
	Medium income	20.3	18.2	10.4	12.4	18.1	15.9
	High income	13.1	14.8	17.6	23.9	20.3	17.4
Two or more symptoms:	Low income	14.1	17.5	12.7	14.0	23.8	40.1
	Medium income	19.0	16.8	13.4	17.0	14.6	17.2
	High income	9.5	11.6	16.4	14.2	15.5	17.3