

Dental Service Use and its Correlates in a Dentate Population: An Analysis of the Saskatchewan Population Health and Dynamics Survey, 1999–2000

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ABSTRACT

Objectives: To document the frequency of self-reported use of dental services within a 2-year period by a sample of dentate Saskatchewan residents aged 18 years and older; explore the correlates associated with dental service use for men and women separately; and examine the age, gender and income distribution of dental insurance coverage.

Methods: The 1999–2000 Saskatchewan Population Health and Dynamics Survey provided a representative sample of 5,003 dentate respondents (mean age 45.5 years; 52.3% women), 18 years and older, randomly selected and interviewed by telephone.

Results: Of those interviewed, 77% of the women and 67% of the men reported a dental visit within the previous 2 years. For women, logistic regression analysis indicated that when all other factors were held constant, the odds of dental service use within the last 2 years were higher among those who were aged 18–19 years, had post-secondary education or technical certification, were in the highest household income adequacy category, held dental insurance and engaged in such preventive behaviours as regular general checkups, eye checkups, skin self-examination and not smoking daily. For men, the odds of dental service use within the last 2 years were greater if they had education at or beyond the secondary level, were students, were in the upper or highest income adequacy levels, held dental insurance and engaged in preventive health behaviours such as general checkups, eye checkups and not smoking daily. Dental insurance coverage was strongly associated with household income adequacy and peaked among men and women aged 30–49 years.

Conclusions: This study indicates that the roles of gender, income, education, age, health-related behaviours and resources such as dental insurance should be considered in future public oral health strategies. We propose a conceptual model to aid in understanding the social structural and individual pathways to oral health.

MeSH Key Words: Canada; dental health services/utilization; health behavior; social environment

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Researchers in the field of oral health emphasize the interconnectedness of oral health and general well-being^{1–3} and assert that oral health must be considered on equal footing with physical and mental health on research and policy agendas.⁴

It follows that conceptual models representing the causal processes leading to physical and mental health also apply to oral health.

Figure 1 represents an ideal-type health cycle; it was adapted from earlier models^{5–8} to represent the conceptual framework that

Table 1 Household population aged 18 years and over who used a dental service within the last 2 years, by selected factors, Saskatchewan, 1999–2000

Factor	Women			Men		
	Number using service (n)	%	p value	Number using service (n)	%	p value
All respondents	2,019 (2,617)	77.1		1,607 (2,386)	67.4	
Socioeconomic factors						
Education level			0.000 ^{a,b}			0.000 ^{a,b}
Post-secondary graduation	440 (510)	86.3		308 (393)	78.4	
Technical certificate	767 (977)	78.5		486 (696)	69.8	
Secondary graduation	502 (675)	74.4		460 (688)	66.9	
Less than secondary graduation	310 (455)	68.1		353 (609)	58.0	
Labour force status			0.030 ^{a,b}			0.017 ^{a,b}
Not employed, 65 or younger	336 (462)	72.7		106 (167)	63.5	
Not employed, 66+	263 (352)	74.7		153 (228)	67.1	
Student	79 (100)	79.0		49 (57)	86.0	
Employed	1,341 (1,703)	78.7		1,299 (1,934)	67.2	
Household income adequacy			0.000 ^{a,b}			0.000 ^{a,b}
Highest	293 (328)	89.3		373 (477)	78.2	
Upper	749 (934)	80.2		650 (933)	69.7	
Middle	641 (884)	72.5		412 (666)	61.9	
Lower	238 (336)	70.8		114 (204)	55.9	
Lowest	98 (135)	72.6		58 (106)	54.7	
Demographic factors						
Age; years			0.001 ^{a,b}			0.000 ^{a,b}
18–19	40 (46)	87.0		41 (48)	85.4	
20–29	303 (416)	72.8		208 (356)	58.4	
30–39	502 (609)	82.4		366 (517)	70.8	
40–49	493 (630)	78.3		430 (619)	69.5	
50–59	284 (382)	74.3		250 (373)	67.0	
60+	397 (534)	74.3		312 (473)	66.0	
Marital status			0.169 ^a			0.043 ^{a,b}
Widowed	215 (295)	72.9		35 (62)	56.5	
Separated or divorced	206 (265)	77.7		122 (191)	63.9	
Never married	314 (392)	80.1		313 (485)	64.5	
Married	1,284 (1,664)	77.2		1,137 (1,648)	69.0	
Urban	1,214 (1,571)	77.3	0.849 ^c	924 (1,295)	71.4	0.000 ^{b,c}
Rural	805 (1,046)	77.0		683 (1,091)	62.6	
First Nations			0.531 ^a			0.002 ^{a,b}
Treaty or status	71 (92)	77.2		46 (57)	80.7	
Non-treaty or non-status First Nations	20 (23)	87.0		11 (26)	42.3	
Non First Nations	1,928 (2,502)	77.1		1,550 (2,303)	67.3	
Health-related resources						
Food security	1,859 (2,385)	77.9	0.003 ^{b,c}	1,521 (2,233)	68.1	0.002 ^{b,c}
Food insecurity	157 (227)	69.2		84 (150)	56.0	
Dental insurance	1,223 (1,500)	81.5	0.000 ^{b,c}	920 (1,264)	72.8	0.000 ^{b,c}
No dental insurance	796 (1,117)	71.3		687 (1,122)	61.2	

continued

Illness support available	1,855 (2,397)	77.4	0.314 ^c	1,518 (2,228)	68.1	0.004 ^{b,c}
Illness support unavailable	163 (219)	74.4		88 (155)	56.8	
Health-related behaviours						
General checkup within last 2 years	1,633 (2,049)	79.7	0.000 ^{b,c}	927 (1,290)	71.9	0.000 ^{b,c}
General checkup 2 or more years prior	386 (568)	68.0		680 (1,096)	62.0	
Eye checkup within last 2 years	1,436 (1,784)	80.5	0.000 ^{b,c}	948 (1,295)	73.2	0.000 ^{b,c}
Eye checkup 2 or more years prior	583 (833)	70.0		659 (1,091)	60.4	
Regularly examine skin	1,284 (1,604)	80.0	0.000 ^{b,c}	733 (1,058)	69.3	0.073 ^c
Do not regularly examine skin	735 (1,013)	72.6		874 (1,328)	65.8	
Do not smoke daily	1,555 (1,966)	79.1	0.000 ^{b,c}	1,178 (1,692)	69.6	0.000 ^{b,c}
Smoke daily	464 (651)	71.3		429 (694)	61.8	

^aKruskal-Wallis H test.

^bSignificantly different from reference category ($p < 0.05$).

^cChi-square test.

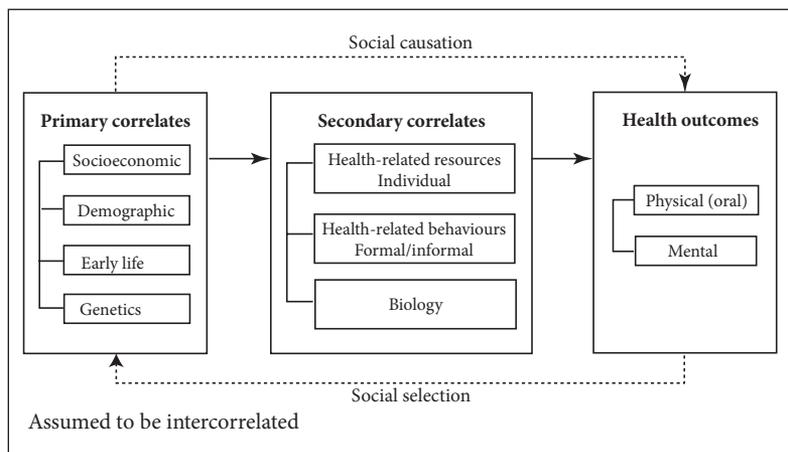


Figure 1: Ideal-type health cycle

guided the present study. We used this construct as an ideal-type⁹ to help contextualize and understand this study's findings.

From a theory of social causation perspective, the direction of the relationships among these factors and health over the long-term is left to right⁷; social selection theory suggests that the short-term direction is right to left.¹⁰

Primary correlates, also termed macrosocial,⁸ upstream⁵ or first-order¹¹ determinants of health, are the factors that empirical research suggests indirectly influence health by shaping or contributing to secondary correlates. Secondary correlates, also referred to as proximal,⁵ intermediate,¹² downstream⁸ or second-order¹¹ factors, include individual behaviour,¹³ biology¹⁴ and resources.¹⁵ Primary correlates are generally understood to have a more indirect association with health than secondary correlates, exemplified by the association between low income and mortality among cigarette smokers¹³ and among those with poor dietary habits.¹⁶ In this example, higher mortality rates in lower social classes are not necessarily due to material deprivation

per se, but to the effects of such deprivation on such behaviours as smoking and poor eating habits and on such biologic factors as stress responses.¹⁷

The health cycle manifests itself not only within adults, but also within our offspring. The numerous ways in which our health is an accumulation of advantage and disadvantage throughout our lives begins with childhood environments shaped by the location of our parents within the social system, their biologic makeup, experiences and behaviours, and our own life experiences.¹⁸ This is particularly the case with respect to oral health. Recent studies concerning oral health in childhood note the significant relationships

between mothers' oral health and children's health,¹ parents' socioeconomic status and children's use of dental services,^{19,20} parents' socioeconomic status and children's oral health,^{2-4,21} parents' health-related practices and children's oral health^{22,23} and oral health and dental disease in childhood and adulthood.^{1,19}

The objectives of this study were to determine whether primary correlates, such as socioeconomic or demographic factors, were associated with dental service use within the last 2 years; whether secondary correlates such as health-related resources or behaviours were associated with dental service use within the last 2 years; whether these associations varied according to gender; and the gender, age and household income adequacy distribution of dental insurance coverage.

Methods

Sample

The Saskatchewan Population Health and Dynamics Survey (SPHDS) 1999–2000 was a cross-sectional study of Saskatchewan residents aged 18 years and over, randomly

Table 2 Adjusted odds ratios for dental service use within the last 2 years by selected factors, women aged 18 years and over, Saskatchewan, 1999–2000

Factor	Odds ratio	95% confidence interval	p value
Socioeconomic factors			
Education level			
Post-secondary graduation	1.98 ^a	1.38–2.83	0.000
Technical certificate	1.36 ^b	1.03–1.80	0.031
Secondary graduation	1.10	0.82–1.48	0.520
Less than secondary graduation ^c	1.00	—	—
Household income adequacy			
Highest	1.84 ^b	1.07–3.19	0.029
Upper	1.02	0.66–1.59	0.920
Middle	0.75	0.49–1.15	0.192
Lower	0.79	0.50–1.25	0.312
Lowest ^c	1.00	—	—
Demographic factors			
Age; years			
18–19	3.04 ^b	1.22–7.58	0.017
20–29	0.84	0.60–1.17	0.295
30–39	1.29	0.93–1.80	0.126
40–49	0.88	0.64–1.21	0.421
50–59	0.70 ^b	0.50–0.97	0.031
60+ ^c	1.00	—	—
Health-related resources			
Dental insurance ^d	1.54 ^a	1.24–1.90	0.000
Health-related behaviours			
General checkup within last 2 years ^d	1.66 ^a	1.34–2.07	0.000
Eye checkup within last 2 years ^d	1.61 ^a	1.32–1.97	0.000
Regularly examine skin ^d	1.40 ^b	1.15–1.70	0.001
Do not smoke daily ^d	1.47 ^a	1.18–1.83	0.000

^aSignificantly different from reference category ($p < 0.001$).

^bSignificantly different from reference category ($p < 0.05$).

^cReference category; odds ratio is 1.

^dReference category is lack of the characteristic or behaviour.

Note: Hosmer and Lemeshow chi-square = 2.48, $p = 0.96$ (i.e., the model fits the data); Nagelkerke R-square = 0.11 (i.e., the model explains about 11% of the variation in the outcome); c statistic = 0.68 (i.e., the model correctly classifies 68% of respondents)

selected from households with a telephone. Between October 1999 and June 2000, telephone interviewers collected data from a final sample of 7,082 residents. The response rate was 77%. Comparison with the 2001 census showed that the SPHDS was reasonably representative of the Saskatchewan population, with people under 24 years of age slightly underrepresented and those aged 65 years and over slightly overrepresented. Of the final sample of 7,082 respondents, 3,206 (45%) were men and 3,876 (55%) were women. This sample was within $\pm 1.4\%$ of the population parameter for Saskatchewan, given a 95% confidence interval.

For the purposes of this analysis, we excluded survey respondents who had false teeth and who did not provide valid responses for all of the relevant variables included in the logistic regression models. This reduced the sample from 7,082 to 5,003 dentate respondents (2,617 [52.3%] women and 2,386 [47.7%] men); their average age was 46 years. The average age of all excluded respondents ($n = 2,079$) was 62 years; 61% of them were women and 39% men.

Dependent Variable

The dependent variable used in the bivariate and multiple logistic regression analyses, “dental visit within the last 2 years” (dental service use), was based on the initial question, “When did you last have a dental checkup or treatment?” Responses were grouped into 1 of the following 8 categories: within the last 11 months, 1 to < 2 years ago, 2 to < 3 years ago, 3 to < 5 years ago, 5 or more years ago, never, not applicable due to false teeth or do not know/cannot remember. For the purposes of our study, the first 2 categories were combined (< 2 years); the remaining categories were collapsed (≥ 2 years or never); and respondents with false teeth and those who did not provide a valid response were excluded from the analysis.

Independent Variables

Primary correlates included socioeconomic indicators, specifically education level, labour force status and household income adequacy, as well as the demographic indicators age, marital status, urban residency and First Nations status. Secondary correlates consisted of health-related resources: food security, dental insurance and illness support. Formal health-related behaviours involved interaction with a health professional and included obtaining a general checkup less than 2 years ago and an eye checkup less than 2 years ago. Informal health-related behaviours included regularly examining one’s skin (by self or others) for changes in moles or coloured spots and smoking at least 1 cigarette a day.

Statistical Analysis

This study presents cross-tabulations and odds ratios, with tests of significance, to compare respondents who reported dental service use within the last 2 years in terms

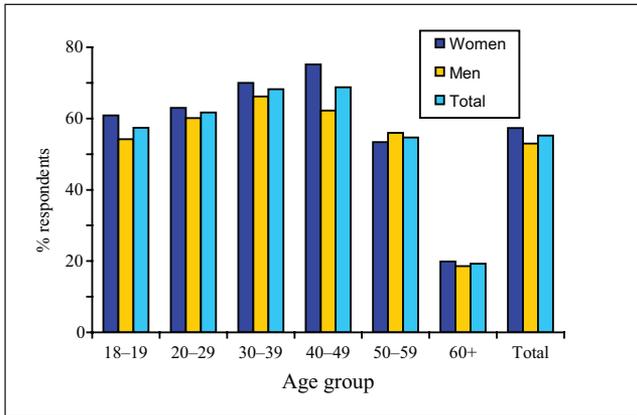


Figure 2: Percentage of respondents with dental insurance coverage by age group, Saskatchewan, 1999–2000

Note: Dental insurance refers to any work plans for self or spouse, extended plans, partial or capped insurance to cover the cost of a dental checkup or treatment for self.

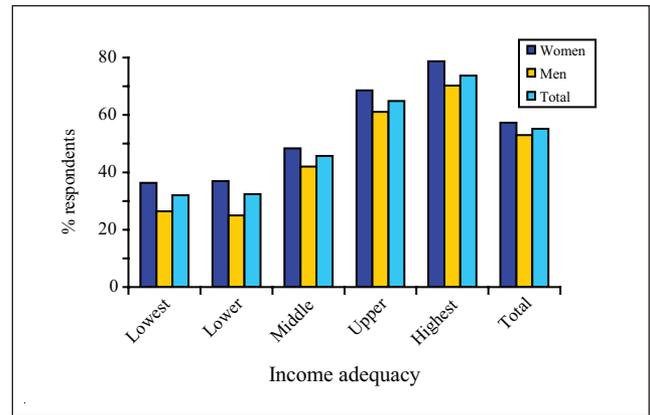


Figure 3: Percentage of respondents with dental insurance coverage by household income adequacy, Saskatchewan, 1999–2000

Note: Dental insurance refers to any work plans for self or spouse, extended plans, partial, or capped insurance, to cover the cost of a dental checkup or treatment for self.

of 4 categories of indicators. We also examine dental insurance coverage by age group and income adequacy. These analyses are stratified by gender.

Independent variables indicating significant bivariate association ($p < 0.05$) with the dependent variable of dental service use within the last 2 years (Table 1) were included in multiple logistic regression analyses (Tables 2 and 3). Multivariate analysis was undertaken to examine the association between each of these variables and dental service use, while controlling for the effect of the other variables. This analysis used forward selection with likelihood ratio selection, with $p < 0.05$ entry and $p > 0.05$ removal criteria. Our purpose in using this iterative model-building strategy was to determine the best-fitting model of the variables that affected the odds of dental service use and to include no irrelevant predictors.^{24,25}

The fit of each model was assessed using the Hosmer and Lemeshow chi-square, the c statistic and the Nagelkerke R-square test.

Results

Time Since Last Dental Visit and Dental Insurance

Most dentate respondents (52.2%) had visited a dentist within 11 months before the interview; women were significantly more likely than men ($p < 0.001$) to have had a dental visit during this time frame (56.6% vs. 47.4%). Within the previous 2 years, 72.5% of respondents had visited a dentist; women were significantly more likely than men ($p < 0.001$) to have had a dental visit in this period (77.1% vs. 67.4%). A further 8.5% had visited within 2 to < 3 years, 6.7% visited within 3 to < 5 years; 11.8% visited within 5 or more years; and 0.5% reported that they had never had a dental checkup or treatment.

Dental insurance coverage varied significantly according to age group: coverage peaked among respond-

ents aged 30–49 years and dropped sharply after age 59 years (Fig. 2). Coverage increased noticeably with household income adequacy (Fig. 3).

Bivariate Analysis

Education level, labour force status, household income adequacy and age were significantly associated with dental service use by both women and men (Table 1). In addition, treaty or First Nations status men, married men and urban men were significantly more likely than their male counterparts to have had a dental visit within the last 2 years.

Food security and dental insurance were significantly positively related to dental visits for men and women; however, having illness support available was positively associated with dental service use only for men. Use of dental services was also significantly higher among men and women who engaged in preventive health behaviours; regularly examining one's skin was the exception to this finding, as it was significantly associated with dental visits only for women.

Multivariate Analysis

Logistic regression analysis indicated that of the primary correlates included in this analysis, education level, household income adequacy and age remained significantly associated with women's dental visits within the last 2 years (Table 2). Women with education beyond secondary graduation level and women who belonged to the highest income adequacy category were 1.5–2 times more likely to use dental services than their counterparts at the lowest education and income adequacy levels. Moreover, women aged 18–19 years were 3 times as likely to use dental services as women aged 60 and over. However, the odds of dental visits for women aged 50–59 years

Table 3 Adjusted odds ratios for dental service within the last 2 years by selected factors, men aged 18 years and over, Saskatchewan, 1999–2000

Factor	Odds ratio	95% confidence interval	p value
Socioeconomic factors			
Education level			
Post-secondary graduation	2.04 ^a	1.48–2.82	0.000
Technical certificate	1.56 ^b	1.20–2.01	0.001
Secondary graduation	1.47 ^b	1.13–1.90	0.004
Less than secondary graduation ^c	1.00	—	—
Labour force status			
Not employed, 65 or younger	1.02	0.71–1.47	0.920
Not employed, 66+	1.15	0.76–1.72	0.510
Student	3.51 ^b	1.54–8.00	0.003
Employed ^c	1.00	—	—
Household income adequacy			
Highest	2.28 ^b	1.42–3.68	0.001
Upper	1.67 ^b	1.08–2.59	0.021
Middle	1.32	0.85–2.04	0.218
Lower	1.13	0.69–1.85	0.635
Lowest ^c	1.00	—	—
Demographic factors			
Age; years			
18–19	1.83	0.73–4.58	0.194
20–29	0.58 ^b	0.39–0.86	0.006
30–39	1.15	0.79–1.67	0.477
40–49	1.01	0.71–1.45	0.950
50–59	0.85	0.59–1.22	0.380
60+ ^c	1.00	—	—
First Nations			
Treaty or status	2.92 ^b	1.43–5.94	0.003
Non-treaty or non-status First Nations	0.36 ^b	0.16–0.87	0.018
Non First Nations ^c	1.00	—	—
Health-related resources			
Dental insurance ^d	1.35 ^b	1.10–1.65	0.003
Health-related behaviours			
General checkup within last 2 years ^d	1.39 ^b	1.15–1.68	0.001
Eye checkup within last 2 years ^d	1.49 ^a	1.24–1.80	0.000
Do not smoke daily ^d	1.26 ^b	1.03–1.53	0.027

^aSignificantly different from reference category ($p < 0.001$).

^bSignificantly different from reference category ($p < 0.05$).

^cReference category; odds ratio is 1.00.

^dReference category is lack of the characteristic or behaviour.

Note: Hosmer and Lemeshow chi-square = 12.34, $p = 0.14$; Nagelkerke R-square = 0.11; c statistic = 0.67.

were significantly lower than for women aged 60 and over.

Several secondary correlates also remained significantly associated with women's dental visits within the last 2 years. Specifically, women with dental insurance were 1.5 times more likely to use dental services than women without dental insurance. All preventive health behaviours remained positively associated with women's dental visits, including having general or eye checkups within the last 2 years, regularly examining one's skin and not smoking daily.

Primary correlates significantly associated with dental visits made by men in the last 2 years included education level, labour force status, household income adequacy, age and First Nations status (**Table 3**). The odds of dental service use by male students were more than 3 times those of their employed counterparts. Men with education at or beyond high school graduation level and men within the top 2 income adequacy levels were 1.5 times to more than twice as likely to visit a dentist than men at the lowest education and income adequacy levels. In addition, men aged 20–29 years had lower odds of dental service use than men aged 60 and over.

Some secondary correlates also remained significantly associated with dental service use by men. For instance, men with dental insurance had greater odds of dental visits than men without dental insurance. Men who engaged in such health-related behaviours as general checkups and eye checkups within the last 2 years also had greater odds of dental service use, compared with men who did not engage in such behaviours. As well, men who did not smoke daily had greater odds of dental service use than men who did smoke daily.

Discussion

In this study, we uncovered definite and significant associations between dental service use within the last 2 years and primary correlates of health (socio-economic and demographic factors) that varied with gender. Furthermore, labour force status (being a student) and First

Nations status were significantly positively related to dental service use by men, but not by women.

These results correspond with previous findings in certain respects. For instance, previous studies have documented significant positive relations between dental visits and income^{1,2,4,12,21,26–31} and between dental visits and education.^{4,12,21,27,28,30,31} However, although our results indicate that the top 2 income adequacy levels and education completed at or beyond the secondary graduation level are associated with men's dental visits, for women, only the top income adequacy level and education completed at the technical or post-secondary level are associated with dental service use. Furthermore, researchers have noted that people of higher social status are more likely to engage in uninsured health-related behaviours, such as eye examinations or chiropractor visits within the past year²⁶; those in lower social positions are more likely to engage in insured health-related behaviours such as general physician checkups²⁶ but less likely to receive such care when necessary due to cost barriers.³⁰

In addition, we found that the age groupings associated with dental service use were dissimilar for men and women: men 20–29 years of age had the lowest odds of dental visits, while women 50–59 years of age had the lowest and women 18–19 years had the highest odds of dental service use. Studies using data collected by Statistics Canada since 1996 have also demonstrated that dental consultation rates vary according to age group: 1-year telephone consultation or in-person dental visits were highest among Canadians 15–24 and 35–44 years of age in 1996–1997²⁷; highest among Canadians aged 15–19 years in 2000–2001³²; and highest among Canadians aged 15–24, 35–54 years in 2003.³¹ People over 65 years of age were least likely of any age group to have a dental consultation, according to these national studies.^{27,31,32}

We also uncovered marked and significant associations between dental visits and secondary correlates of health (health-related resources and behaviours) when controlling for all other factors in this analysis. However, these relations remain fairly consistent regardless of gender. Specifically, men and women with dental insurance had greater odds of dental service use within the last 2 years than their counterparts without this resource. Men and women who engaged in preventive health behaviours, such as general checkups or eye checkups within the last 2 years, and who did not smoke daily were also more likely to have had a dental visit within the last 2 years. The only gender difference in the secondary correlates of dental visits emerged with respect to regular skin examination; it was related to greater odds of dental service use by women but not by men. As in this study, previous research has also found positive links between dental visits and dental insurance,^{1,20,31} as well as between dental visits and other health-related behaviours such as not smoking.^{3,28}

The intent of our conceptual model was to contextualize the results of this study. For the purpose of comparison, we used 2 primary correlates (household income adequacy and age), 1 secondary correlate (dental insurance) and dental service use as a health outcome. First, people with higher household income adequacy were more likely to have dental insurance coverage; dental insurance coverage was significantly higher among those aged 30–49 years than those in any other age group. Second, dental service use within the last 2 years was significantly higher among people with dental insurance than those without insurance, regardless of household income adequacy level. Third, dental service use within the last 2 years was significantly higher among people in the highest income adequacy households than the lowest, regardless of dental insurance coverage. However, the association between age and dental service use varied according to gender. Specifically, although women aged 18–19 years had greater odds of dental service use than women aged 60 years and over, men aged 20–29 years had lower odds of dental service use than men aged 60 years and over.

Limitations of the Study

The dependent measure employed in this analysis and the cross-sectional design of the survey limit the generalizations that can be derived from this study. In addition, several points should be considered when comparing this study with studies using other data, such as those from the National Population Health Survey (NPHS)³³ and Canadian Community Health Survey (CCHS).³⁴

First, the definition of “dental service use/dental visit” used in this study differs from that in other studies. Interviewers for the NPHS and CCHS asked respondents aged 12 years and older, “In the last 12 months, how many times have you seen or talked on the telephone with a dentist or orthodontist about your physical, emotional, or mental health?” In contrast, our study offers analyses based on dental service use within the 2 years before the survey; includes only those who had in-person dental checkups or treatments; inquired about “dental checkup or treatment” without specifying the professional who might have provided that treatment; and includes adult respondents aged 18 years and over.

We employed a conceptual model as a theoretical context within which we placed our findings. We examined cross-sectional associations rather than the causal pathways presented in our conceptual model. We focused on discovering associations between selected primary correlates and a secondary correlate (dental insurance) and between selected primary and secondary correlates and dental service use. Longitudinal data, such as those available from the NPHS for 1994–1995, 1996–1997

and 1998–99 would be useful for testing such causal pathways.

Conclusions

These results highlight 4 issues relevant to public oral health. The first concerns gender and dental visits: women are more likely than men to have had a dental visit within the last 2 years, and the factors associated with dental service use vary slightly with gender. The second issue concerns the social inequities that were evident in dental service use, particularly with respect to income, education and age. Third, regardless of household income adequacy, people with dental insurance are more likely to use dental services than those without dental insurance. Fourth, regular health-related behaviours that involve health professionals, such as general medical checkups and eye checkups, are associated with recent use of dental services.

We expect that recent efforts to implement a national survey of Canadians' oral health,³⁵ particularly if longitudinal, will present a further opportunity to use the conceptual model presented in this paper. Future research into the interactive effects of the social environment and health-related behaviours and resources on the oral health of Canadians may provide further evidence for targeting segments of the population most in need of federally funded oral health strategies. ➤

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