

# Dental Service Utilization by Independently Dwelling Older Adults in Manitoba, Canada

Douglas J. Brothwell, MSc; Michelle Jay, DMD;  
Dieter J. Schönwetter, PhD

## Contact Author

Dr. Brothwell  
Email: [brothwel@ms.umanitoba.ca](mailto:brothwel@ms.umanitoba.ca)



## ABSTRACT

**Objectives:** The objectives of this study were to determine the rate of use of dental services by independently living older dentate and edentulous adults and the factors affecting utilization.

**Methods:** Data were derived from the cross-sectional Manitoba Study of Health and Aging. A personal interview included over 240 questions addressing sociodemographics, well-being, oral and general health, and health service utilization.

**Results:** The sample included 1,751 participants with a mean age of 76.2 years (standard deviation 7.1); 58.5% were women and 72.7% were edentulous. Only 383 participants (21.9%) reported having visited a dentist in the past 6 months. The visitation rate for dentate seniors was significantly higher than that for edentulous seniors (36.2% vs. 13.5%,  $p < 0.001$ ). Multiple logistic regression analysis revealed significant independent effects of 5 variables for each group. Predisposing factors predicting visitation for both groups were higher level of education and frequent use of professional services. For dentate adults, dental visitation was predicted by 3 enabling factors (main supporting person not a family member, fewer restrictions on activities of daily living, residence in a major urban centre) but no need factors. For edentulous participants, dental visitation was predicted by only 1 enabling factor (higher income) and 2 need factors (recent dental problems and longer duration of denture use).

**Conclusion:** Despite some common predisposing factors, the variables influencing dental utilization were different for dentate and edentulous adults; enabling factors played a greater role for the dentate and need factors were of greater importance for the edentulous. These findings seem to indicate that older dentate adults who visit the dentist do so because they can, while older edentulous people who visit the dentist do so because they must.

For citation purposes, the electronic version is the definitive version of this article: [www.cda-adc.ca/jcda/vol-74/issue-2/161.html](http://www.cda-adc.ca/jcda/vol-74/issue-2/161.html)

Four current trends should be of concern to Canadian dentistry. First, projections suggest that by 2026, 21% of the Canadian population will be  $\geq 65$  years of age<sup>1</sup> and that by 2041 there will be 3 times the current number of seniors.<sup>2</sup> Second, seniors are retaining more natural teeth<sup>3-6</sup> than in

the past; the rate of edentulism reported in Canadian studies ranges from 24% to 72%.<sup>3,5-14</sup> Third, oral disease is common in the elderly, with 70%–87% reportedly requiring dental treatment.<sup>4,9,11,15</sup> Health reports cite poor oral health, such as cavities and gum disease, as contributing to heart disease, diabetes and

respiratory diseases, especially in older adults.<sup>16</sup> Fourth, these high levels of need are not resulting in effective demand for care. Utilization patterns for dental services show that older Canadians are less likely to visit a dentist than younger Canadians.<sup>16-18</sup>

Oral health is increasingly being seen as essential for maintaining general health and well-being. A major challenge for the dental profession is ensuring that older adults, with their widely variable social and functional status, have appropriate access to dental services. This access is a topic of increased interest and discussion in Canada and elsewhere.<sup>19-23</sup>

Locker<sup>24</sup> has shown that older adults who visit the dentist more frequently have better oral health and fewer problems and are more satisfied with their oral health than non-visitors. Despite this fact and the high level of need for dental care,<sup>9,11</sup> older adults tend to seek fewer dental services than younger age groups.<sup>17</sup> The proportion of Canadian adults aged  $\geq 65$  years who visited a dentist in the preceding 12 months was reported as 23% in the 1978-79 Canada Health Survey,<sup>25</sup> 17.0% for Manitoba in 1986,<sup>9</sup> 34.3% in the 1993-94 Canada Health Survey,<sup>26</sup> 38.0% in the 1996-97 National Population Health Survey<sup>27</sup> and 41.1% in the 2000-01 Canadian Community Health Survey.<sup>28</sup> More recent Canadian data are not available.

Different visitation rates have been reported for edentulous and dentate adults in Ontario. A 1983 study reported that 22% of edentulous and 73% of dentate seniors visited a dentist within the previous year.<sup>29</sup> In 1987, rates of 10% and 46%, respectively, were reported.<sup>30</sup> In 1991, 17% and 72%, respectively, of edentulous and dentate Ontario adults aged 50 years or older reported having seen a dentist or denturist in the previous 12 months.<sup>31</sup>

Certain variables have been found to be associated with dental visitation. Using the Anderson model<sup>32</sup> of predisposing, enabling and need factors related to health service utilization, Evashwick and others<sup>33</sup> reported that, in contrast to physician visits, which were largely explained by the need construct, dental visits were better predicted by predisposing factors. Locker and colleagues<sup>31</sup> determined that dentate, urban-dwelling, dentally insured older adults with higher income and education were more likely to have visited a dentist. Given the large difference in visitation rates between the dentate and edentulous, it may be reasonable to expect the associated variables to be different. These differences have not been well explored in the available literature.

Knowledge of dental visitation rates and the associated determinants are important in understanding and addressing the oral health status of older adults. The purpose of this study was to report these rates among dentate and edentulous older Manitobans in 1991 and 1992, and to assess the determinants of visitation for these 2 groups. Although it has been 15 years since these data

were collected, they are reported here to provide a view of the situation at that time.

## Methods

Data were derived from the Manitoba Study of Health and Aging (MSHA-1) conducted by the University of Manitoba's Centre on Aging. A complete description of the MSHA-1 study has been published elsewhere<sup>34</sup> and is only briefly summarized here. This cross-sectional study targeted adults, aged  $\geq 65$  years, living independently. Of an estimated 144,000 people in that age group living in private households in Manitoba, 2,890 who were stratified by age and sex were randomly selected from the Manitoba Health Services Commission (MHSC) list. As a result of over-sampling of the older age groups in the MHSC list, the sample was not representative of the provincial age distribution. For example, although 16.7% of those in the study sample were  $\geq 85$  years, only 8% of the provincial population was in this age group at the time of this study. This purposive sampling approach was intended to ensure good representation by those who were likely to be facing greater health challenges. For the same reason, these data were used and are presented without adjustment.

## Interview

Data in the MSHA-1 were obtained through a series of interviews. Following initial telephone screening for cognitive impairment, these interviews were conducted by telephone, face to face or with caregivers. Questions were asked about sociodemographics, social support, physical and psychosocial well-being, general and oral health, health beliefs and health service utilization.

## Risk Variables

Of the 328 variables in the MSHA-1 database, the authors of the current analysis selected those thought to be of interest in understanding dental utilization. These variables, categorized according to the Anderson model of predisposing, enabling and need factors,<sup>32</sup> are presented in **Table 1**.

## Sociodemographic Variables

Sociodemographic variables included the independent variables sex, age, region of residence, years lived in Canada, years of schooling completed, ability to write in English and/or French, employment status, largest source of income and average monthly income.

## Health Status Variables

Health status variables included the independent variables physical well-being (e.g., self-perceived general health and health with respect to age), fatigue, ability to see and hear, experience of chronic pain in past 30 days, days spent sick in bed in past 30 days, days spent sick in hospital in past 30 days, number of reported chronic

**Table 1** Selected variables from the Manitoba Study of Health and Aging database, categorized according to the Anderson model<sup>32</sup>

| Predisposing factors           | Enabling factors             | Need factors                |
|--------------------------------|------------------------------|-----------------------------|
| Sex                            | Read English/French          | Modified mini-mental state  |
| Age                            | Write English/French         | Depression score            |
| Race                           | Largest source of income     | Feel tired                  |
| Employment                     | Monthly income               | Chronic pain                |
| Spouse employment              | Someone to help              | Days in hospital last month |
| Marital status                 | Emotional support            | Days sick in bed last month |
| Live alone                     | Number of people to count on | Eyesight                    |
| How many people live with      | Number of helpers            | Hearing                     |
| How is main relative related   | Number of companions         | Number of health problems   |
| Children out of household      | Troubles prevent activities  | General health              |
| Primary caregiver              | Regular physician            | Health for age              |
| Years of education             | Cognitive status             | Life satisfaction           |
| Level of schooling             | Income satisfaction          | Dentate status              |
| Health beliefs (4 variables)   | Region of residence          | Dental problem              |
| Years in Canada                | Activities of daily living   | Wear dentures               |
| Number of health services used |                              | Dentures fit                |
|                                |                              | Duration dentures used      |
|                                |                              | Visit dentist               |

health problems, limitation of activities of daily living due to health problems and number of reported limitations to activities of daily living, as well as psychological and psychosocial well-being (e.g., cognitive status, modified mini-mental state score, number of life aspects reported as “dissatisfied,” and self-perceived adequacy of income and assets to satisfy needs). Patterns of service use were also assessed (e.g., having a regular doctor and total number of public/private health services used).

*Mental Health Status*

Mental health status was assessed by 1 independent variable addressing depression. This variable was created by using the Centre for Epidemiologic Studies’ depression scale.<sup>35</sup> A 4-point scale was used to rate how often negative emotions (described by 20 different statements) were felt during the previous week. Responses were summed to give each participant a score, with higher scores reflecting a greater level of possible depression.

*Health Beliefs and Attitudes*

Three constructed independent variables addressed health beliefs. Health beliefs and attitudes were assessed using a 5-point Likert scale for 19 statements, which were then categorized to represent 2 dichotomous control loci for health status: external/chance control and internal/

self-control. Life satisfaction was measured using a 7-point terrible/delightful scale developed by Andrews and Withey.<sup>36</sup> Participants used the scale to rate how satisfied they felt in terms of 11 different questions on 5 aspects of their lives (health, finances, family relations, friendships and self-esteem). These items were dichotomized into either “less than satisfying” or “satisfying or more.” The items participants responded to as “satisfying or more” were summed to create a new independent variable used to indicate overall level of life satisfaction.

*Oral Health Status*

Five variables regarding oral health status and the use of dental service were available. Oral health status was defined by 4 questions: “Have you had dental problems (i.e., teeth need care, dentures don’t fit) in the past year?” “Do you wear dentures?” “Do your dentures fit to your satisfaction?” and “How long have you worn dentures?” For the purpose of this study, participants responding positively to the question, “Do you wear dentures?” were classified as edentulous, whereas those responding negatively were classified as dentate.

The fifth question, which addressed dental visitation (“Have you used the services of a dentist in the past 6 months?”) was used as the outcome variable for the purpose of this analysis. Unfortunately, rather than deter-

**Table 2** Sociodemographic characteristics of participants

| Characteristic           | No.   | Valid % <sup>a</sup> |
|--------------------------|-------|----------------------|
| Age (years)              |       |                      |
| 65–69                    | 380   | 21.7                 |
| 70–74                    | 336   | 19.2                 |
| 75–79                    | 502   | 28.7                 |
| ≥ 80                     | 533   | 30.4                 |
| Female                   | 1,025 | 58.5                 |
| Schooling ≥10 years      | 843   | 48.1                 |
| Monthly income ≥ \$1,200 | 753   | 54.6                 |
| Currently married        | 890   | 50.9                 |

<sup>a</sup>The valid percentage was calculated on the basis of the number of people who answered each question, which was less than 1,751 in some instances.

mining dental visitation within the previous 12 months, the MSHA-1 survey queried dental visitation as 1 variable in a series of 27 questions addressing use of numerous professional services in the previous 6 months. Although use of a visitation period of 6 months allows easy comparison with visitation rates for other professionals, it limits direct comparison with the 12-month dental utilization rates most commonly reported in the literature.

**Ethical Approval**

This study was approved by the Health Research Ethics Board of the University of Manitoba.

**Statistical Analysis**

Associations between the dependent outcome (i.e., having visited a dentist within the past 6 months) and all other variables were assessed using bivariate analyses (analysis of variance and  $\chi^2$ ). All variables showing a significant ( $p < 0.05$ ) association on bivariate analyses were entered into stepwise multiple logistic regression to look for independent effects on dental visitation. Separate analyses were conducted for dentate and edentulous participants.

**Results**

**Demographic Characteristics**

Of the 2,890 adults randomly selected from the MHSC sample list, 480 were ineligible (deceased or moved to a personal care home); 162 could not be contacted, and 54 could not be screened (for example, those who were deaf). Of the remaining 2,194 potential participants for the MSHA-1, 443 refused to participate (20.2%). The remaining 1,751 independently living, elderly adults were between 65 and 101 years of age (mean 76.2 years, standard deviation [SD] 7.1) (Table 2). Participants were predominantly white (91.4%), female (58.5%) and married (50.9%). Although 42.0% lived alone, most had some

**Table 3** Health characteristics of participants

| Variable                                      | No.   | Valid % <sup>a</sup> |
|---|-------|----------------------|
| Self-reported good general health             | 1,315 | 75.3                 |
| ≥ 4 limitations on activities of daily living | 527   | 30.1                 |
| ≥ 4 health services used in past year         | 982   | 56.1                 |
| Edentulous                                    | 1,269 | 72.7                 |
| Dental problem in past year                   | 341   | 19.5                 |

<sup>a</sup>The valid percentage was calculated on the basis of the number of people who answered each question, which was less than 1,751 in some instances.

form of social support, such as 1 or more people to count on (96.7%) or to provide emotional support (71.4%), companionship (97.2%) or help (98.3%). In all, 77.0% were born in Canada. Of those born outside Canada, most (64.0%) had lived in Canada for over 60 years and only 2.5% had been in Canada for fewer than 20 years. The mean number of years of education was 6.7 (SD 3.6), with 35.1% completing a minimum level of education at a high school level and < 2% with no formal education. Most participants could read (95.4%) and write (92.1%) in English or French or both. While average monthly household incomes ranged from \$200 to \$10,000 (mean \$1,564.98, SD \$1,202.09), fewer than a quarter (24.2%) had a monthly income of \$1,800 or above. Old age security and private pensions were most commonly reported as the greatest source of income. Employment was considered to be the largest source of income by < 1% of participants. Most participants (87.0%) felt that their income and assets satisfied their needs adequately or very well. In all, 1,269 participants (72.7% of those who answered the question) were edentulous; only 477 participants (27.3%) were dentate. Most participants reported good general health (75.3%), although nearly a third reported 4 or more limitations in activities of daily living and more than half used 4 or more health services in the previous year (Table 3). Very few (19.5%) reported dental problems in the past year.

**Dentist/Denturist Visitation**

Of the 1,751 participants, 383 (21.9%) reported visiting a dentist or denturist (i.e., licensed provider with a scope of practice limited to care of removable prosthodontics) within the previous 6 months. Consistent with previously reported results,<sup>29,31</sup> the visitation rate for dentate participants was significantly higher (36.2%) than for edentulous participants (13.5%) based on  $\chi^2$  analysis ( $p < 0.001$ ).

**Bivariate Analysis**

Bivariate analysis of dentate participants revealed 18 independent variables that were significantly ( $p < 0.05$ ) associated with having visited a dentist within the pre-

**Table 4** Multiple logistic regression analysis of dental visitation rates by dentate participants<sup>a</sup>

| Variable   | B     | p value | OR   | 95% CI    |
|--|-------|---------|------|-----------|
| Education<br>(1 = none, 2 = some, 3 = high school, 4 = college)                                  | 0.388 | 0.012   | 1.47 | 1.09–2.00 |
| Main supporting relative<br>(0 = family, 1 = other)  | 0.923 | 0.013   | 2.52 | 1.21–5.22 |
| Activities of daily living category<br>(1 = 4 or more difficulties, 2 = 3 or fewer difficulties) | 0.825 | 0.030   | 2.28 | 1.08–4.81 |
| Use of health services<br>(1 = 3 or fewer services, 2 = 4 or more services)                      | 0.940 | < 0.001 | 2.56 | 1.53–4.28 |
| Region of residence<br>(1 = outside Winnipeg, 2 = Winnipeg)                                      | 0.741 | 0.023   | 2.10 | 1.11–3.98 |

<sup>a</sup>The model shows that higher education, main supporting person not a family member, fewer limitations on activities of daily living, greater use of health services and residence in a major urban centre had a significant independent positive effect on visitation rate. Sensitivity of the model = 60.9%, specificity of the model = 75.3%.  
Note: B = regression coefficient, OR = odds ratio, CI = confidence interval.

**Table 5** Multiple logistic regression analysis of dental visitation by edentulous participants<sup>a</sup>

| Variable   | B     | p value | OR   | 95% CI    |
|--|-------|---------|------|-----------|
| Education<br>(1 = none, 2 = some, 3 = high school, 4 = college)                          | 0.295 | 0.011   | 1.34 | 1.07–1.69 |
| Use of health services<br>(1 = 3 or fewer services, 2 = 4 or more services)              | 1.025 | < 0.001 | 2.97 | 1.84–4.23 |
| Dental problems<br>(1 = yes, 2 = no)   | 0.674 | 0.003   | 1.96 | 1.27–3.04 |
| Length of denture wear (years)<br>(1 = 40 or more, 2 = 25–39, 3 = 15–24, 4 = 14 or less) | 0.528 | < 0.001 | 1.70 | 1.42–2.02 |
| Income<br>(1 = up to \$1,199/month, 2 = \$1,200/month or more)                           | 0.688 | 0.004   | 2.00 | 1.25–3.17 |

<sup>a</sup>The model shows that higher education, higher use of health services, recent dental problems, longer length of denture wear and higher income had a significant independent positive effect on visitation rate. Sensitivity of the model = 59.3%, specificity of the model = 85.6%.  
Note: B = regression coefficient, OR = odds ratio, CI = confidence interval.

vious 6 months. Visitation by dentate participants was significantly higher with better reading and writing ability, higher income, higher satisfaction with income, being employed, fewer restrictions on activities of daily living, better eyesight, higher mental function and cognitive status, having others available to provide emotional support, having a regular physician, higher education, not having a recent sickness, urban region of residence, not having an external locus of control (belief that health status is a matter of chance and not under an individual's control), higher use of other health services, having someone who is not a relative as the person's main support, and feeling that health is something which must be accepted since there is nothing that can be done about it.

Bivariate analysis of edentulous participants revealed 14 independent variables that were significantly ( $p < 0.05$ ) associated with having visited a dentist within the previous 6 months. Visitation by the edentulous participants was significantly higher with being married, better writing ability, higher income and satisfaction

with income, being employed, fewer restrictions to the activities of daily living, higher mental function and cognitive status, better general health and health for age, not having an external locus of control, having had recent dental problems, longer duration of denture wear and higher use of other health services.

#### Multivariate Analysis

For dentate participants, multiple logistic regression analysis showed that only 5 variables had a significant independent positive effect on visitation rate: higher education, main supporting person not a family member, fewer limitations on activities of daily living, greater use of health services and residence in a major urban centre (Table 4).

For edentulous participants, multiple logistic regression analysis also showed that 5 variables had a significant independent positive effect on visitation rate: higher education, higher use of health services, recent dental problems, longer length of denture wear and higher income (Table 5).

This model was only moderately successful in predicting who had visited a dentist in the past 6 months. Sensitivity (60.9% and 59.3% for dentate and edentulous groups, respectively) and specificity (75.3% and 85.6%) ratings indicate that the models were better at identifying those who did not visit than those who did.

## Discussion

Regular dental visitation is important in maintaining good health. Older adults who visit a dentist more frequently have been shown to have better oral health and fewer problems and are more satisfied with their oral health.<sup>24,37</sup> The importance of dental visitation also applies to edentulous adults.

In 1991 and 1992, although edentulism was common among older Manitobans (72.7%), dental visitation within the previous 6 months was not (21.9%). These numbers compare poorly with edentulism and 12-month visitation rates reported for Canada in 2000 (58% and 37%, respectively).<sup>6</sup> Whether the higher rate of edentulism is attributable to the interview question (“Do you wear dentures?”) is not known. Consistent with previous research findings, dentate participants were more than twice as likely to visit a dentist (36.2%) compared with edentulous participants (13.5%). Although some variables predicting visitation were common to both groups (i.e., higher education level and frequent use of professional services), the dentate and edentulous groups each had unique predicting variables.

The Anderson model of health service utilization<sup>32</sup> provides additional insight into what determines dental visitation by dentate and edentulous patients by categorizing associated variables as predisposing, enabling and need factors, which correspond to demographic, economic and health status characteristics, respectively.

Unique predictors of visitation for dentate participants included 3 enabling factors: main supporting person not a family member, fewer restrictions on activities of daily living and residing in an urban region. It is interesting that visitation by dentate participants was not explained by any need factors. In contrast, the unique predictors of visitation for edentulous participants included only 1 enabling factor — higher income — and 2 need factors — dental problems and longer duration of denture use. These findings seem to indicate that older dentate participants who visit the dentist do so because they can, while older edentulous participants who visit the dentist do so because they must. It seems likely that the higher visitation rate of dentate participants may reflect visits for preventive reasons.

An unexpected finding of note was that participants whose main supporting person was a family member were less likely to have visited the dentist than those whose main support was a non-family member. Considering that these 2 groups did not differ significantly in terms of

limitations on activities of daily living, cognitive status or number of health problems reported, the difference may be related to resistance of family members to provide appropriate support for dental office visits, an issue considered by some to be a form of elder abuse.<sup>38</sup> Another contributing factor could be that older adults are more reluctant to impose on family members for help.

This study investigated dental visitation rates within the previous 6 months rather than the usual 12-month period. Although our results appear to be relatively consistent with those of other studies of Canadian older adults, they cannot be directly compared with previous studies. Furthermore, it is not known whether the associated predictive variables would have been different had participants been queried about visitation in the previous 12 months.

As previously stated, this study is based on data that are now 15 years old. Given the aging of the population and changes in population oral health status that have occurred since 1991, caution should be exercised when interpreting the results in a contemporary context. However, publishing this information at this time will allow for important comparisons to be made by researchers in the future, as we continue to monitor the rates of dental visitation by older Canadians.

## Implications for Future Research and Application

This study provides a first step in identifying the various predictors of dental visitation for independently dwelling dentate and edentulous older adults; these will have implications for both future research and application. Further research should focus on determining the mechanisms through which these variables act. This might be best accomplished by qualitative methods that focus specifically on motivating factors and barriers responsible for older adults visiting or not visiting their dentists. More specifically, a longitudinal study that tracks dental visits by older adults as they move from independent living to more dependent lifestyles would provide valuable information about the factors that help ensure dental visits. If such research replicates current findings — identifying predictors of dental visits such as non-family support and income — steps might be taken to ensure that all older adults have access to dental visits and, thus, improve the oral health and well-being of our aging population. ✦

*Acknowledgments:* The Manitoba Study of Health and Aging was funded primarily by Manitoba Health. Additional funding came from the Canadian Study of Health and Aging, the Seniors Independence Research Program, the National Health Research and Development Program and Health Canada.

*Presented orally at the International Association of Dental Research, 2004, Honolulu, United States.*

## THE AUTHORS



**Dr. Brothwell** is head of community dentistry, faculty of dentistry, University of Manitoba, Winnipeg, Manitoba.



**Dr. Jay** is a dentist in private practice and a part-time instructor, faculty of dentistry, University of Manitoba, Winnipeg, Manitoba.



**Dr. Schönwetter** is an education specialist, faculty of dentistry, University of Manitoba, Winnipeg, Manitoba.

**Correspondence to:** Dr. Douglas Brothwell, Faculty of Dentistry, University of Manitoba, P129, 780 Bannatyne Ave, Winnipeg MB R3E 0W2.

The authors have no declared financial interests.

This article has been peer reviewed.

## References

1. Statistics Canada. Population projections. *The Daily* March 13, 2001. Ottawa: Statistics Canada. Available: [www.statcan.ca/Daily/English/010313/d010313a.htm](http://www.statcan.ca/Daily/English/010313/d010313a.htm) (accessed 2008 Feb 27).
2. Thompson GW, Kreisel PS. The impact of the demographics of aging and the edentulous condition on dental care services. *J Prosthet Dent* 1998; 79(1):56–9.
3. Leake JL. A review of regional studies on the dental health of older Canadians. *Gerodontology* 1988; 7(1):11–19.
4. Ettinger RL, Beck JD. The new elderly: what can the dental profession expect? *Spec Care Dentist* 1982; 2(2):62–9.
5. Locker D, Leake JL. Coronal and root decay experience in older adults in Ontario, Canada. *J Public Health Dent* 1993; 53(3):158–64.
6. Peterson PE. The world oral health report 2003: continuous improvement of oral health in the 21st century — the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003; 31(Suppl 1):3–23.
7. Hamilton ME. Oral health status and the elderly in northern economies. *Can J Community Dent* 1987; 2(1):27–49.
8. Kuc IM, Hargreaves JA, Thompson GW, Donald EA, Basu T, Overton TR, and others. Dental health status and treatment needs of elderly residents of Edmonton, Alberta. *J Can Dent Assoc* 1990; 56(6):521–5.
9. Knazan YL. Application of PRECEDE to dental health promotion for a Canadian well-elderly population. *Gerodontology* 1986; 2(5):180–5.
10. Leake JL, Otchere D. Planning for the future: report on the oral health of Ontario's seniors. *Ont Dent* 1988; 65(2):27–32.
11. Galan D, Brex M, Heath MR. Oral health status of a population of community-dwelling older Canadians. *Gerodontology* 1995; 12(1):41–8.
12. Galan D, Odlum O, Brex M. Oral health status of elderly Canadian Inuit (Eskimo). *Community Dent Oral Epidemiol* 1993; 21(1):53–6.
13. Hoover JN, Packota GV. Oral health status and treatment needs of elderly patients in a teaching hospital in Saskatchewan. *J Can Dent Assoc* 1988; 54(3):177–80.
14. Simard PL, Brodeur JM, Kandelman D, Lepage Y. Prosthetic status and needs of the elderly in Quebec. *J Can Dent Assoc* 1985; 51(1):79–81.
15. Hawkins RJ, Main PA, Locker D. Oral health status and treatment needs of Canadian adults aged 85 years and over. *Spec Care Dentist* 1998; 18(4):164–9.
16. Leake JL. The history of dental programs for older adults. *J Can Dent Assoc* 2000; 66(6):316–9.
17. Sabbah W, Leake JL. Comparing characteristics of Canadians who visited dentists and physicians during 1993/94: a secondary analysis. *J Can Dent Assoc* 2000; 66(2):90–5.
18. Statistics Canada. Contact with dental professionals in past 12 months, age groups 12 years and over and 65 years and older, in Nova Scotia and Canada. Ottawa: Statistics Canada; 2003.
19. Main P, Leake J, Burman D. Oral health care in Canada — a view from the trenches. *J Can Dent Assoc* 2006; 72(4):319. Available: [www.cda-adc.ca/jcda/vol-72/issue-4/319.html](http://www.cda-adc.ca/jcda/vol-72/issue-4/319.html).
20. Leake JL. Access and care: reports from Canadian dental education and care facilities. *J Can Dent Assoc* 2005; 71(7):469–71.
21. Kiyak HA, Reichmuth M. Barriers to and enablers of older adults' use of dental services. *J Dent Educ* 2005; 69(9):975–86.
22. Dolan TA, Atchinson K, Huynh TN. Access to dental care among older adults in the United States. *J Dent Educ* 2005; 69(9):961–74.
23. Seniors Oral Health Collaboration. The oral health of seniors in Nova Scotia, policy scan and analysis synthesis report. Halifax: Nova Scotia Department of Health; 2006.
24. Locker D. Does dental care improve the oral health of older adults? *Community Dent Health* 2001; 18(1):7–15.
25. Fact book on aging in Canada. Ottawa: Health and Welfare Canada; 1983. p. 60–1.
26. Sabbah W, Leake JL. Comparing characteristics of Canadians who visited dentists and physicians during 1993/94: a secondary analysis. *J Can Dent Assoc* 2000; 66(1):90–5.
27. Statistics Canada. National Population Health Survey, 1994/95. Ottawa: Statistics Canada; 1995.
28. Statistics Canada. Canadian Community Health Survey, 2000/01. Ottawa: Statistics Canada; 2001.
29. Ellis E, Hyduk S, McFarlane G. Dentures from the dime store will not be enough: dental status and needs of senior citizens living independently. Toronto: City of Toronto Eastern Health Area, Department of Public Health; 1983.
30. Leake JL, Price SA, Schabas RE. Oral health status and need for care among elderly in East York, Ontario collective residencies — 1985. *Canadian J Public Health* 1987; 78(5):323–8.
31. Locker D, Leake JL, Lee J, Main PA, Hicks T, Hamilton M. Utilization of dental services by older adults in four Ontario communities. *J Can Dent Assoc* 1991; 57(11):879–86.
32. Anderson R, Newman J. Societal and individual determinants of medical care utilization in the United States. *Milbank Mem Fund Q Health Soc* 1973; 51(1):95–124.
33. Evashwick C, Rowe G, Diehr P, Branch L. Factors explaining the use of health care services by the elderly. *Health Serv Res* 1984; 19(3):357–82.
34. Segall A, Montgomery P, Manfreda J, Blandford A. Manitoba Study of Health and Aging: final report, technical section. Winnipeg: MSHA research group, Centre on Aging, University of Manitoba; 1995.
35. Teng EL, Chui HC. The Modified Mini-Mental State (3MS) examination. *J Clin Psychiatry* 1987; 48(8):314–8.
36. Andrews FM, Withey SR. Social indicators of well-being. New York: Plenum Press; 1976.
37. Richards W, Ameen J. The impact of attendance patterns on oral health in a general dental practice. *Br Dent J* 2002; 193(12):697–702.
38. Glassman PD, Chavez EM, Hawks D. Abuse and neglect of elderly individuals: guidelines for oral health professionals. *J Calif Dent Assoc* 2004; 32(4):323–35.

Dental service utilization by independently dwelling older adults in Manitoba, Canada. *J Can Dent Assoc*. 2008; 74(2):161-161f. 8. Pavi E, Karampli E, Zavras D, Dardavesis T, Kyriopoulos J. Social determinants of dental health services utilisation of Greek adults. *Community Dent Health*. 2010; 27(3):145-150. 9. Koletsi-Kounari H, Tzavara C, Tountas Y. Health-related lifestyle behaviours, socio-demographic characteristics and use of dental health services in Greek adults. *Community Dent Health*. 2011; 28(1):47-52. 10. Santos-Eggimann B, Junod J, Cornaz S. Health services utilisation in older Europeans... Objectives: The objectives of this study were to determine the rate of use of dental services by independently living older dentate and edentulous adults and the factors affecting utilization. Methods: Data were derived from the cross-sectional Manitoba Study of Health and Aging. A personal interview included over 240 questions addressing sociodemographics, well-being, oral and general health, and health service utilization. Variables that were significantly associated with visitation on bivariate analysis were entered into separate logistic regressions for dentate and edentulous participants. The Anderson model of health service utilization was used to categorize variables with significant independent effects as predisposing, enabling and need factors. Utilization patterns for dental services show that older Canadians are less likely to visit a dentist than younger Canadians. 16-18. Oral health is increasingly being seen as essential for maintaining general health and well-being. A major challenge for the dental profession is ensuring that older adults, with their widely variable social and functional status, have appropriate access to dental services. Locker24 has shown that older adults who visit the dentist more frequently have better oral health and fewer problems and are more satisfied with their oral health than non-visitors. Coronal and root decay experience in older adults in Ontario, Canada. *J Public Health Dent* 1993; 53(3):158-64. 6. Peterson PE. Dental service utilization by independently dwelling older adults in Manitoba, Canada. *J Can Dent Assoc* 2008;74:161-161f. 23. Petersen PE, Yamamoto T. Improving the oral health of older people: the approach of WHO Global Oral Health Program. *Community Dent Oral Epidemiol* 2005;33:81-92. 24. British Society for Disability and Oral Health. Registered Charity No 1044897. Guidelines for the delivery of a domiciliary oral health care service 2009; available at: <http://www.bsdh.org.uk>. Dental service utilization by independently dwelling older adults in Manitoba, Canada. D. Brothwell, M. Jay, D. SchÄnnewetter. *Medicine. Journal*. 2008. 51. PDF. Utilization of dental health services by community-dwelling older adults in Japan who attended a weekly educational programme. K. Ikebe, T. Nokubi, R. Ettinger. *Medicine. Gerodontology*. 2002. 13. Save.