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Self-reported cost-prohibitive dental care needs among Canadians

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Abstract: *Objectives:* To explore self-reported cost-prohibitive dental treatment needs among Canadians. *Methods:* Data were collected through a national telephone interview survey of 1006 randomly selected Canadian adults. Descriptive analyses based on socio-demographic characteristics and dental-related behaviours were undertaken. Logistic regression was used to determine the predictors of experiencing a cost-prohibitive dental care need. Chi-square tests were used to determine significant differences in the treatments reported as unaffordable by socio-demographic characteristics and dental-related behaviours. *Results:* Those of low income, no insurance coverage and poor self-rated oral health were more likely to report having a cost-prohibitive dental care need. The top needs reported as unaffordable were fillings, cleanings and check-ups. Comparatively, preventive services were selected as cost-prohibitive more often by the insured, dentures by the oldest group and extractions by those with a high school education or less. *Conclusions:* This study confirms that there are significant relationships between socio-demographic factors, dental-related behaviours and the types of dental services that are selected as unaffordable. Indirectly, this shows us how socio-demographic factors may influence the types of dental services that are reported as 'needed' by certain groups. Difficulties in distinguishing between the services that are 'needed' from and those that are 'wanted' demonstrate some of the policy complexity associated with publicly financed dental care.

Key words: dental care costs; dental services needs; socio-demographic factors

Introduction

In Canada, physician and hospital-based services are publicly funded by Canada's healthcare system, commonly referred to as 'Medicare', whereby the patient bears no cost at the point of purchase. This masks the high cost of providing health services to the general population. In contrast, the costs of dental services, which are not included in Medicare, become apparent as Canadians are largely responsible for financing their own care. Dental care is predominantly delivered in the private sector on a fee-for-service basis, with approximately 62.6% of Canadians paying for care through employment-based insurance and 31.9% through out-of-pocket expenditures (1). A small minority of the Canadian population, 5.5%, qualifies for public funding through government assistance programmes (1). These public programmes are generally restricted to socio-economically marginalized individuals (welfare recipients, aboriginal populations, those with disabilities, children of people with low income and the elderly).

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With a large portion of people financing their own care in a fee-for-service environment, cost becomes the predominant factor limiting access to care (2). For those who do not qualify for public funding or do not have dental insurance, dental care can be economically draining and can limit the types of dental services sought (2). For example, as reported in 2010 by the Canadian Health Measures Survey (CHMS) (1), the rates of annual visiting and receiving care are heavily influenced by income and insurance with 17.3% of people avoiding visiting and 16.5% declining recommended care owing to cost barriers. With regard to specific treatment inequalities, few Canadian studies have documented differences in dental treatments that are accessed or needed based on socio-demographic status (2). However, evidence suggests that the lower the income, the less often people consult a dentist for preventive care and the longer they wait when they experience a dental problem (3). For example, when investigating the reasons for seeking dental care, Millar and Locker (2) found that 25% of the lowest income group cited a filling or extraction, compared with 13% of the highest-income group. Similar results were found relative to insurance, with fillings and extractions reported more often by those without dental insurance (2). In contrast, those with higher incomes, namely those who are privately insured, generally seek preventive services (e.g. cleanings and check-ups) (1, 2). Although these differences can be explained by income and insurance, they can also partly be a reflection of public coverage. It has been argued that publicly funded dental care programmes across Canada are neither comprehensive nor universal, with people being asked to 'pick your worst toothache' owing to treatment often being restricted to emergency conditions only (4). Ultimately, limitations on the services covered by public programmes decrease accessibility to the more expensive or complex treatments that might be required.

A survey conducted by Quiñonez and Locker (5), which focuses on the Canadian population's opinions of publicly financed dental care, collected self-reported information on dental care needs. Specifically, they asked Canadians whether they had ever needed dental services in the past that they could not afford, and if so, which services were needed (5). Twenty-six per cent of those surveyed said that they have had a cost-prohibitive dental care need in the past, ranging from preventive to restorative services. Using these authors' data, the goals of this paper are as follows: to determine the predictors of experiencing a cost-prohibitive dental care need, outline the specific treatment needs of those who could not afford care and establish any significant treatment inequalities that exist based on socio-demographic characteristics and dental-related behaviours. This information should give policy leaders and dental professionals a more comprehensive idea of the population's perceived (and unmet) dental treatment needs. In addition, by determining which groups may be at particular risk of experiencing specific dental treatment needs, policymakers can better structure programmes to address the oral health needs of these groups.

Study population and methods

The data used in this paper stem from a 17-item questionnaire that was administered in March 2006 to a nationally representative sample of 1006 Canadian adults aged 18 years and over. The sample size calculation was based on Dillman (6): $n \cong [(P)(1 - P)]/(C/Z)^2$, where P is the proportion expected to choose one of two responses, C the assumed sampling error, and Z the zed statistic of the confidence interval. For a sample with a maximum variance and standard confidence interval of 95% ± 3%, then $n \cong [(1.96)(0.5)/(0.03)]^2 \cong 1089$. The data were collected through a telephone interview survey using random digit dialling and computer-assisted telephone interview technology. A private market research firm (Opinion Search, Inc., Ottawa, ON, Canada) was employed to collect the data. The sampling design was that used in all of their national telephone interview surveys. That is, Canada was divided into six regions, and telephone numbers identifying households were randomly sampled from these strata, broadly in proportion to the population size of the strata. Within strata, age and sex quotas were set to ensure an accurate representation of subjects according to these variables.

Approximately 47 000 calls were attempted, and after excluding numbers that were not in service, fax machines or invalid numbers, there were approximately 36 000 total eligible calls. After excluding busy signals, answering machines, calls with no answer, language barriers, ill or incapable respondents and no eligible respondent being available, a total of approximately 11 000 people were asked to participate in the survey. Of these, approximately 1100 people were co-operative contacts, with 1006 qualifying as eligible and completing the interview. This represents a participation rate of 9.1%. The data were also weighted to be representative of the Canadian population's age and sex profile using the 2001 Canadian Census. The study received approval from the University of Toronto's Office of Research Ethics; no personal identifiers were collected, and participation in the interview was taken to imply consent.

This paper focuses on two questions from the survey. 'In the past, have you needed dental care but could not afford it?' If yes: 'What types of dental care?' For the latter question, surveyors were given a chance to 'mark all that apply' from a basic list of services including 'check-ups, cleanings, fillings, dentures, extractions, root canals, gum surgeries, crowns, braces, cosmetic treatments and other.' The questionnaire also obtained data on dental-related behaviours (e.g. when was the last time that you went to a dentist? How do you usually pay for dental care? In general, what would you say the health of your teeth and mouth is?) and socio-demographic information (e.g. age, sex, income, education).

Using SPSS 17.0 (SPSS Inc., Chicago, IL, USA), descriptive analyses based on socio-demographic characteristics were undertaken for the sample as a whole and for those who responded negatively and positively to having a dental care need in the past that they could not afford. The original household income categories used by Quiñonez and Locker

(5) were combined to represent high (>$70 000)-, middle ($30 000–$70 000)- and low (<$30 000)-income groups. Those who said they pay for dental care through their own employment insurance or someone else's employment insurance were combined to represent the 'privately insured' group, and those who paid for care using a provincial or municipal programme belonged to the 'publicly insured' group. Those who pay for dental care out-of-pocket represent those with 'no insurance.'

Socio-demographic and dental-related behaviour variables (i.e. sex, age, household income, education, dental insurance, oral health status and last dental visit) that were significant ($P < 0.05$) at the bivariate level were entered as a block into a multiple logistic regression model to predict the outcome of having a cost-prohibitive dental care need. For those who found dental care cost-prohibitive, a multiple response set was defined for the types of services that were deemed unaffordable. Chi-square tests were then used to assess relationships between dental-related behaviours, socio-demographic characteristics and each of the services selected as unaffordable. The 'Don't know/Refused' category was excluded in all analysis.

Results

Table 1 demonstrates the characteristics of the entire sample surveyed ($n = 1006$), the subsample consisting of those people who responded negatively to having a dental service in the past that they could not afford ($n = 738$) and the subsample of those who responded positively to this question ($n = 260$). Among those who said they had needed a dental service in the past that they could not afford, the majority were women (61%), belonged to the 35–54 age group (43%), earned <$70 000 (71%) and had a greater than high school education (55%). They had access to some form of dental insurance (52%), reported their oral health as good to excellent (74%) and had visited a dentist within the last 3 years (79%).

Table 2 describes the odds of having reported a cost-prohibitive dental care need in the past. Adjusting for the influence of all variables simultaneously, women, those aged 35–54, those households earning <$30 000, those who pay for dental expenses out-of-pocket, and those who rated their oral health as poor to fair, were all more likely to report needing dental care in the past that they could not afford.

Table 3 shows a multiple response set for the services selected by those who said that they had needed dental care in the past but could not afford it. Each respondent could have selected more than one service as cost-prohibitive therefore making the total percentage of responses over 100%. On average, two items were deemed unaffordable per respondent, with fillings (35.3%), cleanings (34.6%) and check-ups (30.0%) mentioned by most. From most to least, the services selected as unaffordable were as follows: fillings, cleanings, check-ups, root canals, dentures, crowns, other, extractions, braces, gum surgeries and cosmetic treatments.

Table 4 displays the significant relationships ($P < 0.05$) found between socio-demographic characteristics and unaffordable dental care needs. All socio-demographic and dental-related behaviour variables were tested (see *Study population and methods*). Income and self-reported oral health were not significantly related with any cost-prohibitive need. Fillings, gum surgeries and 'other' dental needs were not significantly related with any of these variables and are therefore not shown as well. Significant differences in the services selected as unaffordable by socio-demographic characteristics and dental-related behaviours were found between check-ups and insurance, which were chosen by those who were privately insured more than those who were publicly insured or not insured; cleanings and dentures were chosen by those who were 18–34 years and by those aged 55 and over, respectively; dentures and extractions were chosen by those with equal to or less than a high school education; root canals and crowns by those who visited a dentist <3 years ago; and crowns were selected by women.

Table 1. **Characteristics for entire sample ($n = 1006$) and for those who responded negatively ($n = 738$) and positively ($n = 260$) to having a cost-prohibitive dental need in the past**

	Percentage		
	$n = 1006$	$n = 738$	$n = 260$*
Sex			
Male	48.5	52.3	38.7
Female	51.5	47.7	61.3
Age			
18–34	29.2	28.7	30.7
35–54	41.1	40.5	43.4
55 and over	29.2	30.4	25.5
Don't know/refused	0.4	0.4	0.4
Income (household)			
Low income (<$30 000)	19.6	14.5	34.4
Middle income ($30 000–$70 000)	36.7	36.8	36.6
High income ($70 000+)	25.4	29.5	13.7
Missing income	18.4	19.2	15.3
Education			
Equal to or less than high school	39.1	37.6	44.4
Greater than high school	58.9	60.5	54.5
Don't know/refused	1.9	1.9	1.1
Dental insurance			
Private insurance	58.0	62.4	46.0
Public insurance	4.3	3.7	5.7
Out-of-pocket	35.3	31.5	46.1
Don't know/refused	2.5	2.4	2.3
Oral health status			
Poor to fair	13.9	10.2	24.6
Good to excellent	85.4	89.5	74.0
Don't know/refused	0.7	0.3	1.5
Last dental visit			
Less than 3 years ago	84.6	86.7	78.9
3–5 years ago	3.6	3.0	5.5
Greater than 5 years ago or never	11.2	9.6	15.4
Don't know/refused	0.6	0.7	0.2

*Eight cases missing therefore subsamples do not add up with entire sample of $n = 1006$.

Discussion

This study confirms that socio-demographic characteristics and dental-related behaviours can predict the outcome of experiencing a cost-prohibitive dental care need and can further

Table 2. **The odds of having experienced a cost-prohibitive dental care need**

Variables	Adjusted OR* [95% CI]	*P* value
Female	1.6 [1.1, 2.2]	0.010
Male	Reference	
Age		
18–34	2.2 [1.4, 3.5]	0.001
35–54	2.3 [1.5, 3.7]	0.000
55 and over	Reference	
Income		
Low	4.2 [2.4, 7.3]	0.000
Middle	2.0 [1.3, 3.2]	0.002
High	Reference	
Education		
Equal to or less than high school	0.9 [0.6, 1.3]	0.666
Greater than high school	Reference	
Insurance		
Public	1.1 [0.5, 2.7]	0.773
Out-of-pocket	1.7 [1.7, 2.5]	0.005
Private	Reference	
Self-rating of oral health		
Poor to fair	2.5 [1.6, 3.9]	0.000
Good to excellent	Reference	
Last dental visit		
Less than 3 years ago	0.8 [0.5, 1.4]	0.502
3–5 years ago	0.8 [0.3, 2.0]	0.626
Greater than 5 years ago/Never	Reference	

*All variables entered simultaneously.

Table 3. **Multiple response set for treatment needed by those who could not afford dental care**

	*n**	% Responses	% Respondents*
Checkups	76	12.9	30.0
Cleanings	87	14.9	34.6
Fillings	89	15.2	35.3
Extractions	36	6.1	14.1
Dentures	64	11.0	25.5
Root canals	70	11.9	27.6
Gum surgeries	22	3.7	8.7
Crowns	51	8.8	20.4
Braces	35	6.0	13.8
Cosmetic treatments	16	2.8	6.5
Other	39	6.6	15.3
Total	584	100.0	232.0

*Numbers are greater than subsample ($n = 260$) and over 100% because each person could have had one or more treatment need(s).

influence the types of treatment services that are found to be unaffordable. Among this sample of Canadian adults, the odds of having a cost-prohibitive dental care need increases significantly by sex (female), age (middle age), income (low income), insurance (uninsured) and oral health status (reporting poor oral health). Sex, age, education, type of dental insurance and last dental visit are also related to the types of dental services that were selected as unaffordable. Many of the results obtained corroborate findings from other studies. For example, individuals with the lowest incomes (<$30 000) were approximately four times more likely than those of the highest incomes ($70 000+) to report an unaffordable need. This is expected as the literature shows that this group is more likely to pay for dental care out-of-pocket and/or is covered for very limited services by public funding (1). It was also found that not having insurance and rating one's oral health as poor to fair were determining factors for experiencing cost-prohibitive needs. Similarly, the CHMS found that the highest rates of declining recommended dental care occurred among those who had no insurance coverage (1). Bhatti *et al.* (7) also found that those with poorer oral health were less likely to receive dental care and, in turn, have more unmet needs than those who rated their oral health as good to excellent. When asked to define the dental treatment(s) that were deemed affordable in the past, the majority of those surveyed selected fillings. Studies have shown that procedures relating to the replacement of existing restorations make up a significant portion of any restorative dental care provided (8). Moreover, contrary to the past when the appearance of metal displayed in one's mouth was relatively socially acceptable, now many patients prefer the more aesthetically pleasing tooth-coloured restoration (9). This poses a twofold problem. In a broad sense, for those removing their current silver amalgam fillings and replacing them with tooth-coloured composite resins, studies have found that the cycle of re-restoration alone often causes unneeded destruction of tooth structure and an increased need for continued and repeated restorations (10). This can become costly, especially as most third-party payment organizations do not pay for numerous aesthetic restorative procedures (9). In addition, composite resins deteriorate at a relatively faster rate than amalgam fillings therefore requiring removal and replacement sooner, thus incurring additional costs (10). Following fillings, preventive maintenance needs such as cleanings and check-ups were selected as most cost-prohibitive. Although these needs are not as costly as other services, they are more routinely sought and/or required. As a result, dental costs can accumulate, especially for people at risk for oral diseases such as those who use tobacco or have diabetes, whereby more frequent visits are recommended. Preventive needs can also be costly for those who are uninsured and even for those who are covered by public insurance, considering public programmes often focus their coverage on emergency/urgent services (e.g. extractions) (11).

This study illustrates how socio-demographic factors may influence the types of dental services that are reported as needed by certain groups. Several significant associations were found, some of which can be considered a public health concern and others not. As a matter of policy, it is important to distinguish which treatment 'needs' constitute a public health concern, especially when assessing the cost-effectiveness and comprehensiveness of public coverage. For this reason, we cannot consider the association of braces and cosmetic treatments with age as a public health concern, as these services are generally considered demands not needs. Similarly, it can be difficult to rationalize how basic preventive services (cleanings and check-ups) were found to be unaffordable by

Table 4. **Relationships between socio-demographic characteristics and cost-prohibitive dental needs**

	Check-ups		Cleanings		Dentures		Extractions		Root canals		Crowns	
Characteristics	%	χ^2 (d.f., *P* value)	%	χ^2 (d.f., *P* value)	%	χ^2 (d.f., *P* value)	%	χ^2 (d.f., *P* value)	%	χ^2 (d.f., *P* value)	%	χ^2 (d.f., *P* value)
Sex												
Male		NS		NS		NS		NS		NS	23.1	6.804
Female											76.9	(1, 0.009)
Age group												
18–34		NS	42.5	8.350	0.0	38.828		NS		NS		NS
35–54			35.6	(2, 0.015)	34.3	(2, 0.000)						
55 and over			21.8		65.7							
Education												
≤High school		NS		NS	62.9	5.271	62.5	10.657		NS		NS
>High school					37.1	(1, 0.022)	37.5	(1, 0.001)				
Type of Insurance												
Private	60.3	7.240		NS		NS		NS		NS		NS
Public	4.1	(2, 0.027)										
Out-of-pocket	35.6											
Last dental visit												
<3 years ago		NS		NS		NS		NS	94.3	13.3	98.1	14.163
3–5 years ago									1.4	(2, 0.001)	0.0	(2, 0.001)
>5 years ago or never									4.3		1.9	

NS, non-significant relationships ($P > 0.05$).

privately insured individuals. This seems counterintuitive as the costs of basic preventive services are usually covered for those with private insurance. However, the nature of this coverage varies. Insurance companies act as benefit carriers that reimburse patients based on the level of coverage decided by the employer (7). This means that even with insurance, most individuals do not receive 100% coverage and are required to pay the remaining balance out-of-pocket. Nevertheless, the question remains as to whether the residual costs of dental care felt by the privately insured can be considered a public health concern.

A significant relationship was also found between selecting dentures as unaffordable and being 55 years of age or older. This finding is important as the number of dental care needs increase with age, the ability to finance this care may also decrease. For example, retirement is usually accompanied by a decrease in income and the loss of employment-based dental insurance, thereby making the purchase of expensive prosthetics such as dentures unattainable (12). Dentures and extractions were also related to education, with those with equal to or less than a high school education selecting both services more frequently. Generally, those who are less educated are usually from low-income families, are publicly insured, older in age and are more likely to seek extractions, compared with the highest-income group (2, 7, 12). Therefore, there appears to be a significant link between having a lower educational level and choosing services as unaffordable that reflect poor oral health like dentures and extractions.

There are numerous limitations of this study's methods and findings. Using data gathered through telephone interview surveys, there is an increasing concern that these types of surveys are not as representative as they used to be, especially as more and more people opt for cellular telephones instead of conventional landlines (13). As a result, the study's data are overrepresented by older, higher income and educated people who have landlines. Additionally, when considering the services reported as unaffordable, it can be questioned whether those surveyed reported an actual need, versus selecting services that are known to be very costly such as root canals, dentures and crowns. Several participants selected the category 'other' as a cost-prohibitive treatment need; therefore, investigation into what services were perceived to fall into that category is needed in the future.

Nevertheless, this is the first study to explore in-depth the dental services that are reported as needed but deemed inaccessible to certain socio-demographic groups owing to cost. Although interpretation of these results can show us the specific needs of certain groups, it is difficult to determine which relationships truly constitute a disparity that qualifies as a public health concern. Several studies, including this one, use self-reported data to demonstrate inequalities in oral health care. Although patient self-reported data are the most convenient mechanism for obtaining first-hand oral health outcome information, it is known to be heavily influenced by personal beliefs, cultural background and other social factors (14). In this regard, to gain insight into the true needs of the Canadian population, clinically determined dental treatment needs would need to be assessed to fully meet the demands of policy formulation.

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