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Original Article

Impact of Dental Insurance on Dental Service Use and Oral Health Outcomes in Older Adults in Ontari

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ABSTRACT

Access to dental care remains unequal among older adults, particularly those with limited income. This study examined the impact of dental insurance coverage on both dental service utilization and self-reported oral health in seniors. The analysis also explored how these effects differed by income level. Data were drawn from the 2017/18 Canadian Community Health Survey (CCHS) Annual Component, including 10,030 individuals aged 65 and above living in Ontario. Marginal effects were estimated using multivariate probit regression models to quantify the influence of dental insurance on dental visits and oral health indicators. Seniors with dental coverage were 6.9% more likely to report excellent or very good oral health (ME: 6.9, 95% CI: 5.4–8.3) and 3.5% more likely to report no dietary restrictions due to oral problems (ME: 3.5, 95% CI: 1.9–5.1). The likelihood of visiting a dentist within the last year increased by 11.3% (ME: 11.3, 95% CI: 9.8–12.8), while the probability of seeking dental care only for emergencies decreased by 11.2% (ME: −11.2, 95% CI: −12.5 to −9.9). Across income categories, middle-income seniors experienced the largest changes, with a 13.1% higher probability of annual dental visits (ME: 13.1, 95% CI: 10.5–15.7) and a 14.4% reduction in emergency-only visits (ME: −14.4, 95% CI: −16.0 to −12.8). Dental insurance coverage is associated with increased dental service use and improved oral health outcomes among older adults. Policy interventions expanding coverage could reduce oral health disparities in this population.

Keywords: Older adults, Dental insurance, Dental service use, Oral health, Preventive dental care, Self-reported oral health

Introduction

Worldwide, populations are experiencing a demographic shift characterized by declining birth and death rates [1, 2]. Canada reflects this trend, with Statistics Canada reporting that life expectancy for Canadian men and women is projected at 79 and 84 years, respectively [1, 3]. The proportion of older adults in the country is rising, currently representing approximately 15% of the population, and expected to reach 25% by 2036 [1, 3]. This trend raises challenges regarding the provision of adequate social support and the reduction of oral health disparities in this growing age group.

Age is closely associated with poorer oral health outcomes due to factors such as gum recession, dry mouth (xerostomia), side effects from medications, chronic systemic illnesses, difficulties in maintaining oral hygiene, and dietary modifications [4]. Among Canadian seniors, poor oral health is prevalent; about one in six individuals aged 60–79 years have untreated dental caries. This age group also shows the highest average DMFT scores, with a mean of 15.7, compared to 12.3 for those aged 40–59 years and 6.9 for the 20–39 age group, according to the 2007/09 Canadian Health Measures Survey (CHMS) [4, 5]. Additionally, over half (58%) of seniors in this age bracket retain 21 or more natural teeth, which may further increase their dental care needs [4, 5]. A recent Public Health Ontario report highlighted that adults aged 65 and older face the greatest difficulties in accessing dental

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services, compared to younger populations [6]. Notably, approximately 60% lacked private dental insurance, and only 58.6% had attended a dental visit in the preceding year [6].

The concept of the "inverse care law" is evident in the Canadian dental care system, where those with the highest oral health needs often receive the least care [7]. While the utilization of general medical services increases with age in Canada, access to dental and oral health services declines [4, 8]. Studies examining the role of public dental funding and insurance coverage indicate that seniors with poorer oral health tend to visit dentists less frequently than those with better oral health [9, 10]. Financial barriers play a central role in this inequity, particularly as older adults often face reduced income and lose dental benefits after retirement, despite an increasing need for dental care [3, 11].

Income and access to dental insurance strongly influence how frequently older adults utilize dental services [9, 12]. Recent reviews show that seniors lacking dental coverage are considerably less likely to seek routine dental care [13]. These disparities are most pronounced in countries where dental services are primarily privately financed, including Canada and the United States [10]. Data from the CHMS indicate that 16% of Canadians aged 60–79 reported avoiding dental visits because of cost, making this group the most prone to lacking insurance, as dental expenses in Canada largely rely on out-of-pocket payments [5]. As a result, older adults frequently face unmet dental needs and untreated cavities, reflecting both the high cost of care and the tendency to prioritize other medical expenses over oral health. In essence, as dental care needs rise with age, access to services diminishes [3].

Within Ontario, public funding for dental services is extremely limited, covering only 1.4% of costs, the lowest level among Canadian provinces [10]. Most provincial dental programs for low-income residents focus on children rather than seniors [10]. Currently, 43.3% of older adults in Ontario have dental coverage, including 5.3% with only public insurance and 37.1% with private plans, slightly above the national average of 36.4% (6.3% public only, 32.5% private) [14]. These figures are markedly lower than coverage levels in several European and Scandinavian countries, such as Germany (98%), the Czech Republic (96%), Denmark (92%), the Netherlands (87%), Poland (77%), and Sweden (64%) [15]. In comparison, the proportion of older adults in the United States with dental insurance is approximately 29.2% [16].

Globally, concerns are growing about equitable access to dental services for older adults with limited income [11]. In 2019, the Ontario government introduced programs providing dental coverage specifically for uninsured seniors aged 65 and older [17]. The Ontario Seniors Dental Care Program aims to deliver both preventive and restorative oral health services to low-income seniors [18]. More recently, the federal government implemented a publicly funded dental initiative that extends coverage to a wider range of seniors, increasing the income threshold from $37,100 under the provincial program to $90,000 per year [18, 19]. Using marginal effects (ME) models allows for a detailed understanding of how having dental insurance influences the utilization of dental services and oral health outcomes in this population [20, 21].

For this study, we used the 2017/18 cycle of the Canadian Community Health Survey (CCHS) – Annual Component, the most recent dataset available. The objectives were: (1) to evaluate the marginal effects of dental insurance coverage on dental service use and self-reported oral health among seniors, and (2) to analyze these effects across different income brackets to determine which groups gain the most benefit from dental insurance coverage.

Materials and Methods

Data source

The Canadian Community Health Survey (CCHS) Annual Component is a nationwide cross-sectional survey conducted by Statistics Canada to gather information on the health status and wellbeing of Canadians aged 12 and older, living across the 10 provinces and three territories. Exclusions included individuals residing on Indigenous reserves, in institutions, or in specific remote regions [22, 23]. Data collection occurred from January to December 2018, yielding 54,100 valid interviews via computer-assisted personal interviewing (CAPI), with a 58.8% response rate [23]. For this analysis, we focused exclusively on Ontario residents aged 65 years and above, to assess access to dental care for this vulnerable group. Detailed survey methodology is described by Statistics Canada [22, 23]. Since this study uses publicly available secondary data, research ethics approval was not required under Article 2.4 of the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans [24]. Reporting followed the STROBE guidelines for cross-sectional studies [25].

Exposure variable

The primary exposure of interest was dental insurance coverage, including both government-sponsored and private plans. Participants were asked whether they had insurance or a program covering all or part of dental costs, with possible responses coded as "Yes" or "No."

Outcome variables

We examined the link between dental insurance and two outcomes: dental care utilization and oral health status. Dental care utilization was measured using two indicators: time since the last dental visit and visits restricted to emergency care. The timing of the most recent dental appointment was categorized as ≤1 year or >1 year. Visits only for emergencies were coded as "Yes" if participants reported attending dental appointments solely for urgent needs, and "No" otherwise.

Oral health measures

Two primary indicators were used to evaluate oral health among participants: self-perceived oral health and the frequency of avoiding certain foods due to oral discomfort. Self-perceived oral health was assessed with the question: "How would you describe the overall condition of your mouth: excellent, very good, good, fair, or poor?" For the analysis, responses were grouped into three categories: excellent/very good, good, and fair/poor. The second measure captured how often participants avoided particular foods because of oral problems over the past year, with response options of "often," "sometimes," "rarely," or "never."

Covariates considered

Several variables from the CCHS dataset were included in multivariable models to adjust for potential confounding. These included age, gender, marital status, presence of dental insurance, household income quintile, highest level of education, self-rated general health, and diabetes status (type 1 or 2). Provincial-level household income was calculated relative to the low-income threshold for households of the same size and community type [26]. For quintile-based analyses, these deciles were combined into five groups.

Analytical approach

Weighted descriptive statistics were used to summarize participant characteristics for the total sample and stratified by dental insurance coverage. Differences in categorical variables between insured and uninsured participants were examined using chi-square tests.

To measure how dental insurance status affected the outcomes, we applied the average marginal effects (ME) methodology described by Onukwugha [20, 21]. Unlike relative measures such as odds ratios (OR) or relative risk (RR), MEs express differences in absolute terms, providing a clearer indication of the practical impact on the outcomes rather than just the direction of association [20, 21]. Absolute measures are easier to interpret. For example, an OR of 2.4 for dental insurance in predicting excellent or very good oral health indicates higher odds compared to those without coverage but does not quantify the individual-level change. By contrast, an ME of 0.2 directly implies that the probability of reporting excellent or very good oral health increases by 20 percentage points for insured participants relative to those uninsured. A comprehensive explanation of the marginal effects approach is available in Onukwugha [20, 21].

In this research, a multivariate probit regression model was used to estimate MEs, adjusting for the covariates described earlier. We employed ordered/discrete ME models. To handle missing data, multiple imputation was carried out in SPSS (version 26.0, Armonk, NY), generating 10 completed datasets with 10 burn-in iterations. Each dataset was analyzed independently in SAS® software, and the results from all 10 datasets were pooled according to Rubin's rules [27]. Household income had the lowest missing proportion at 0.04%, whereas last dental visit had the highest at 7.54%. Age and sex variables were fully observed with no missing data.

Results and Discussion

The final analytic cohort included 10,030 individuals **(Figure 1)**. Among them, 56.7% reported their oral health as excellent or very good, while 72.7% indicated that they never avoided certain foods because of oral health issues. Regarding dental visit patterns, 67.9% had seen a dentist within the last year, whereas 22.0% reported seeking dental care exclusively for emergency situations. A majority of participants (57.5%) did not have any

dental insurance. **Table 1** summarizes the overall characteristics of the study population, with additional breakdowns provided separately for those with and without dental insurance.

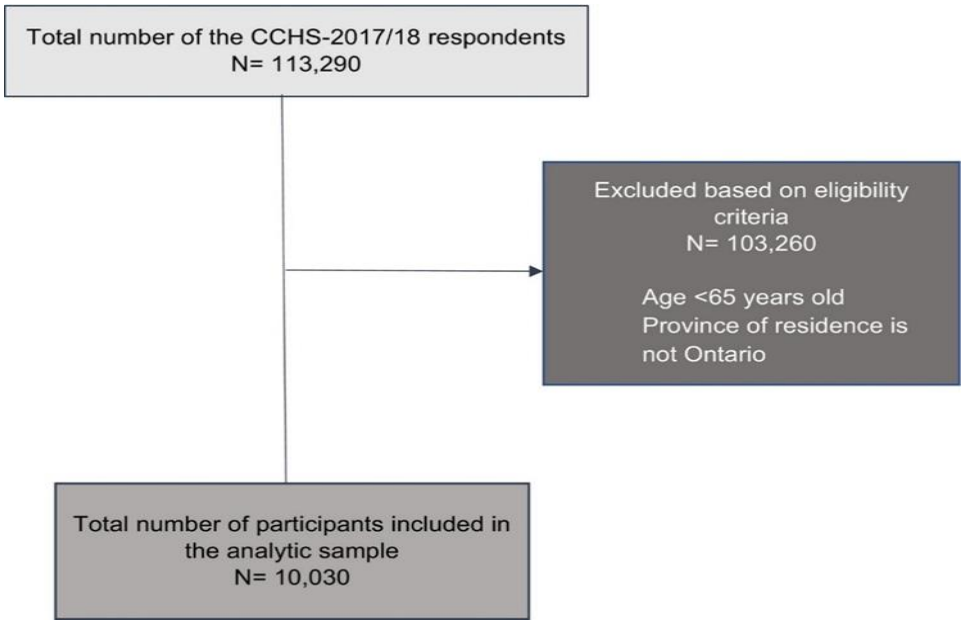

Figure 1. Flow diagram illustrating selection of the analytic sample.

Table 1. Descriptive characteristics of older Ontarians based on the 2017/18 Canadian Community Health Survey (CCHS) Annual component.

Variables	Overall Sample	Participants with Dental Insurance	Participants without Dental Insurance
	N = 10,030a	N = 4,266 (42.5%)	N = 5,764 (57.5%)
	Weighted N	%	Weighted N
Age			
65–69 years	3,462	34.5	1,683
70–74 years	2,609	26.0	1,058
75–79 years	1,721	17.2	693
80+ years	2,238	22.3	832
Sex			
Male	4,587	45.7	2,049
Female	5,443	54.3	2,217
Marital Status			
Married	6,170	61.5	2,783
Common-law	377	3.7	193
Widowed/Divorced/Separated	2,968	29.6	1,082
Single	516	5.1	208
Household Income Quintile			
<$20,000	520	5.2	87
$20,000–39,000	1,998	19.9	432
$40,000–59,000	1,982	19.7	782
$60,000–79,000	1,485	14.8	723
≥$80,000	4,045	40.3	2,243
Highest Education Level			
Less than Secondary	2,341	23.3	739
Secondary Graduate	2,382	23.7	1,045
Postsecondary Graduate	5,307	53.0	2,482

Self-Reported General Health			
Excellent/Very Good	4,698	46.8	2,164
Good	3,349	33.4	1,398
Fair/Poor	1,983	19.8	705
Diabetes			
Yes	1,888	18.8	709
No	8,142	81.2	3,557
Self-Reported Oral Health			
Excellent/Very Good	5,691	56.7	2,703
Good	3,132	31.2	1,176
Fair/Poor	1,207	12.1	387
Frequency of Avoiding Foods			
Often	384	3.8	107
Sometimes	926	9.2	306
Rarely	1,434	14.3	643
Never	7,287	72.7	3,211
Last Dental Visit			
≤1 Year	6,810	67.9	3,322
>1 Year	3,221	32.1	945
Dental Visits Only for Emergencies			
Yes	2,210	22.0	537
No	7,820	78.0	3,730

a. Some variable frequencies may not sum exactly to the total sample due to the application of sampling weights, which were divided by 10 for the multiple imputation iterations. Rounding to the nearest whole number created minor discrepancies of ±1 participant in certain categories.

b. Column frequencies are weighted to reflect population-level estimates.

Having dental insurance was linked to a higher probability of routine dental check-ups within the past 12 months and a lower likelihood of visiting the dentist solely for urgent care. Specifically, participants holding dental insurance had an 11.3 percentage point greater chance (ME: 11.3, 95% CI: 9.8–12.8) **(Figure 2)** of reporting a dental visit in the last year compared to those without coverage. Conversely, dental insurance reduced the likelihood of emergency-only dental visits by 11.2 percentage points (ME: 11.2, 95% CI: —12.5 to —9.9) **(Figure 2)**.

Figure 2 displays the marginal effects by income subgroup (low, middle, high) as well as the overall study population. Across all income levels, insured individuals were more likely to report a dental visit within the past year (ME: 11.3, 95% CI: 9.8–12.8). The effect was largest among middle-income participants (ME: 13.1, 95% CI: 10.5–15.7), with smaller effects seen in the low- (ME: 5.3, 95% CI: 2.5–8.1) and high-income groups (ME: 10.9, 95% CI: 8.8–13.0). Regarding emergency-only visits, having dental insurance decreased the probability of such visits across all income groups (ME: —11.2, 95% CI: —12.5 to —9.9), with the middle-income group showing the largest reduction (ME: —14.4, 95% CI: —16.0 to —12.8), followed by the low-income group (ME: —11.9, 95% CI: —16.0 to —7.8), and the smallest decrease in the high-income group (ME: —5.8, 95% CI: —7.6 to —4.0). All marginal effects were adjusted for age, sex, marital status, household income, education level, self-rated general health, diabetes status (Type 1 or 2), and dental insurance.

Dental insurance was also associated with improved self-perceived oral health and reduced avoidance of foods due to oral problems. Participants with insurance were 6.9 percentage points more likely (ME: 6.9, 95% CI: 5.4–8.3) **(Figure 3)** to rate their oral health as excellent or very good, and 3.5 percentage points more likely (ME: 3.5, 95% CI: 1.9–5.1) to report never avoiding foods due to oral issues compared to those without dental coverage.

The presence of dental insurance was linked to more frequent routine dental visits and fewer visits limited to emergencies. Individuals with dental coverage were 11.3 percentage points more likely (ME: 11.3, 95% CI: 9.8–12.8) **(Figure 2)** to have seen a dentist within the past year compared with those without coverage. In contrast, having dental insurance lowered the probability of visiting a dentist only for urgent care by 11.2 percentage points (ME: 11.2, 95% CI: —12.5 to —9.9) **(Figure 2)**.

Figure 2 illustrates these marginal effects across different income levels (low, middle, high) and for the total study population. Across all income categories, insured participants had higher odds of a dental visit in the previous 12 months (ME: 11.3, 95% CI: 9.8–12.8). The largest effect was observed among the middle-income group (ME: 13.1, 95% CI: 10.5–15.7), followed by the high-income (ME: 10.9, 95% CI: 8.8–13.0) and low-income groups (ME: 5.3, 95% CI: 2.5–8.1). Regarding emergency-only visits, dental coverage consistently reduced the likelihood across income brackets (ME: —11.2, 95% CI: —12.5 to —9.9), with the greatest decrease in the middle-income subgroup (ME: —14.4, 95% CI: —16.0 to —12.8), followed by low-income (ME: —11.9, 95% CI: —16.0 to —7.8), and the smallest reduction among high-income participants (ME: —5.8, 95% CI: —7.6 to —4.0). All analyses were adjusted for age, sex, marital status, household income, education, self-reported general health, diabetes status, and dental insurance coverage.

Dental insurance also showed positive associations with oral health outcomes. Those with coverage were 6.9 percentage points more likely (ME: 6.9, 95% CI: 5.4–8.3) **(Figure 3)** to report excellent or very good oral health. Additionally, insured individuals were 3.5 percentage points more likely (ME: 3.5, 95% CI: 1.9–5.1) to indicate that they never avoided certain foods due to oral health issues compared to uninsured participants.

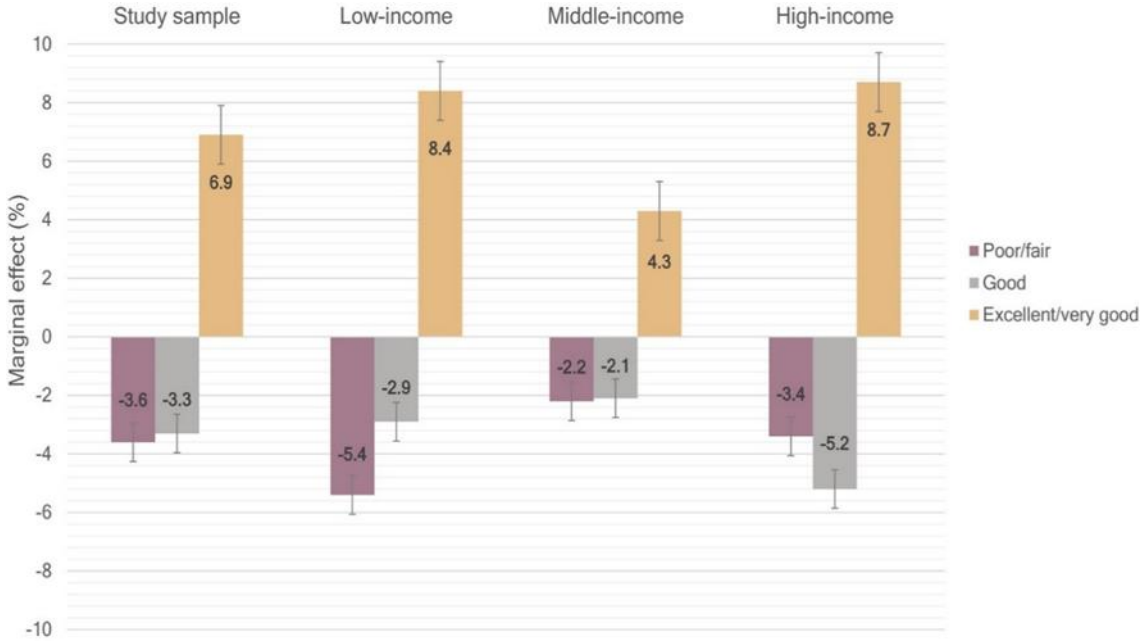

Figure 3. Effects of Dental Insurance on Self-Assessed Oral Health

This figure illustrates how having dental insurance relates to self-reported oral health across different income groups (low, middle, high) and the total study sample. Individuals with dental coverage were more likely to rate their oral health as very good or excellent compared to those without coverage (ME: 6.9, 95% CI: 5.4, 8.3), and these patterns were largely consistent across income categories. Similarly, avoiding certain foods because of oral problems did not differ significantly between income groups. All marginal effects presented here were calculated using an ordered probit model and adjusted for age, sex, marital status, household income, education, self-rated general health, diabetes status (Type 1 or 2), and dental insurance.

Insurance had the strongest impact on the likelihood of visiting a dentist within the past year among middle-income participants. Across all income levels, having dental coverage increased the probability of a dental visit compared to being uninsured (ME low: 5.3, 95% CI: 2.5, 8.1; ME middle: 13.1, 95% CI: 10.5, 15.7; ME high: 10.9, 95% CI: 8.8, 13.0) **(Figure 2)**. The middle-income group experienced the largest increase (ME: 13.1, 95% CI: 10.5, 15.7), while the low- and high-income groups had smaller gains (ME low: 5.3, 95% CI: 2.5, 8.1; ME high: 10.9, 95% CI: 8.8, 13.0).

When examining visits limited to emergencies, dental insurance reduced the likelihood of using care only in urgent situations for all income groups (ME low: –11.9, 95% CI: –16.0, –7.8; ME middle: –14.4, 95% CI: –16.0, –12.8; ME high: –5.8, 95% CI: –7.6, –4.0) **(Figure 2)**. The middle-income quintile showed the largest reduction, followed by the low-income group, while the high-income group showed the smallest change.

Looking at oral health outcomes, insured individuals were more likely to report very good or excellent oral health in all income categories (ME low: 8.4, 95% CI: 5.9, 11.0; ME middle: 4.3, 95% CI: 2.0, 6.5; ME high: 8.7, 95% CI: 7.0, 10.5) **(Figure 3)**. Differences between income groups were minimal. Likewise, income level did not meaningfully influence the tendency to avoid foods due to oral issues.

The present analysis found that dental coverage was linked to improved oral health and greater use of dental services among older adults in Ontario, consistent across all income groups after adjusting for confounding factors. However, the magnitude of these effects was relatively modest, with increases not exceeding 11 percentage points in the overall population. Among income categories, the middle-income group showed the strongest influence of dental insurance on dental care use compared to both low- and high-income groups.

These outcomes align with previous research in Canada [9, 28], the United States [29–31], and Australia [32]. For example, Zivkovic *et al*. [28], using data from the 2013–2014 Canadian Community Health Survey, reported that dental insurance was positively associated with both dental visits and self-rated oral health among Ontarians aged 12 and older. Specifically, insured adults over 65 were 20.4 percentage points more likely to have visited a dentist in the past year (ME: 20.4, 95% CI: 18.8–22.1) and 9.5 percentage points more likely to rate their oral health as very good or excellent, compared with those without coverage [28].

In the U.S., projections from the Health and Retirement Survey indicate that introducing universal dental coverage could increase dental visit rates from 75% to 80% among individuals aged 50 years and above [30]. Similarly, Singhal *et al*. [31] found that Medicaid dental benefits were strongly linked to dental utilization among low-income older adults; seniors without Medicaid coverage were the least likely to have visited a dentist in the past year (RR = 0.83, 95% CI: 0.74–0.94). In Australia, evidence from the 2004–2006 National Survey of Adult Oral Health demonstrated that adults lacking dental insurance experienced poorer oral health than those with coverage, and possessing insurance increased dental visit frequency by 43 percentage points [32].

The outcomes of this study highlight critical equity considerations in dental care and oral health for older Ontarians. While having dental insurance was generally linked to greater dental service use and fewer visits limited to emergencies across all income levels, the differences in marginal effects suggest that the benefits are not evenly distributed. Interestingly, older adults in the middle-income bracket appeared to gain the most from insurance compared with both low- and high-income peers. This indicates that without coverage, middle-income seniors may face unique challenges in accessing dental care, signaling that affordability barriers extend beyond just low-income groups.

Data from six Canadian surveys [33] show that dental insurance coverage among middle-income Canadians was only 48.7%, the lowest across all income groups. This group also experienced the sharpest increase in financial barriers to care, rising from 12.6% in 1996 to 34.1% in 2009, along with the largest growth in out-of-pocket dental spending [33]. Contributing factors include a decline in the availability and quality of employer-provided dental insurance [34]. Historically, public dental programs have focused primarily on low-income populations, often overlooking the needs of middle-income individuals. These findings underscore the importance of developing dental care policies that address the full spectrum of income groups to reduce inequities effectively.

The oral health of older adults has been identified by the WHO Global Oral Health Programme as a high-priority issue that demands immediate intervention [35]. Because oral well-being is closely connected to overall systemic health [35], publicly funded dental programs can play a crucial role in enhancing both the general health and quality of life of seniors. For example, Alberta's senior-focused dental program has resulted in the highest rates of dental service use among elderly individuals with poor oral health [10].

Recently, Ontario introduced a publicly funded Seniors Dental Care Program aimed at low-income older adults [17]. In parallel, the federal government announced the Canadian Dental Care Plan, designed to extend coverage to a wider population of low- and middle-income seniors, including those with annual net incomes up to $90,000—substantially higher than Ontario's $37,100 cutoff. Such programs are expected to reduce financial barriers that previously limited access to dental services for these groups.

Nonetheless, availability of dental professionals remains a concern. In Ontario, there is approximately one dentist for every 1,230 residents, which is slightly higher than the national average of one dentist per 1,530 Canadians [36]. Urban areas generally enjoy sufficient dental coverage, but rural regions continue to experience shortages, which may restrict access even when services are offered at no cost under these new programs.

This study has several important limitations. Because the survey data are cross-sectional, it is not possible to determine whether dental insurance directly causes the outcomes observed. Moreover, the length of time participants had dental coverage is unknown, so the reported marginal effects cannot be clearly attributed to short-

, medium-, or long-term impacts. Without this temporal information, the average marginal effects may not reflect a specific period. Future research should examine how the duration of insurance affects oral health, with particular attention to short-term outcomes like emergency-only dental visits, which are a key focus in public health planning.

The reliance on self-reported information from the CCHS-Annual survey introduces potential recall bias, as responses depend on participants' perceptions. In addition, objective measures of dental health, such as DMFT scores, were not collected, limiting the precision and reliability of the findings. Selection bias is another consideration, since insured and uninsured individuals differ in sociodemographic characteristics **(Table 1)**, and random assignment was not possible. This was addressed by controlling for variables such as income and education in the adjusted analyses. Finally, the exclusion of residents from certain remote areas and institutional settings limits the generalizability of the results to these populations.

Despite these limitations, the study has notable strengths. It is the first provincially representative analysis to assess the link between dental insurance and both dental care use and oral health outcomes among older adults in Ontario using the most recent CCHS cycle. The 2017/18 data are particularly valuable, as they predate the launch of the Ontario Seniors Dental Care Program, which targets low-income seniors. By establishing this baseline, future studies can evaluate the program's effectiveness by comparing subsequent CCHS cycles. This approach will support evidence-based policy development and program refinement. While the findings are specific to Ontario, they may also inform other Canadian provinces seeking to improve dental care access for older adults with unmet oral health needs.

Conclusion

Having dental insurance appears to enhance access to dental services and may reduce the adverse consequences associated with poor oral health among older adults.

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Ethics Statement: None

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