

Persistent but narrowing dental care inequalities in Canada from 2001 to 2016

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**Persistent but narrowing dental care inequalities in Canada
from 2001 to 2016**

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3 **Persistent but narrowing dental care inequalities in Canada from 2001 to 2016**
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Abstract

Background: Similar to the U.S., inequality in dental care use is long-standing in Canada. It remains unclear whether this inequality is improving or worsening. This study reports on: (i) income-related inequality in dental visits in Canada and across its provinces over time; and (ii) inter-provincial inequality in dental visits between Canadian provinces.

Methods: Seven nationally representative health surveys of the Canadian population were used, which collected data between 2001 and 2016. The magnitude of income-related inequality was measured using the Slope Index of Inequality (SII) and Relative Index of Inequality (RII). Inter-provincial inequality was examined using a number of indices, including Theil index.

Results: Income-related inequality in dental visits was present in all survey years, with those in higher income groups reporting higher dental visit prevalence rates. However, the SII and RII demonstrated a steady decline, meaning there was a decrease in the magnitude of inequality over time. Absolute and relative inequality reduced by 7.2% and 22.9% between 2000 and 2016, respectively. A similar decline was observed across most Canadian provinces. Inter-provincial differences in dental visits also decreased over time.

Conclusions: There appears to be persistent but narrowing income-related inequality in dental visits in Canada and across its provinces over time. Also, it appears that Canadian provinces are becoming more equal in terms of dental services use.

Practical implications: Narrowing income-related inequality in dental visits in Canada is promising, suggesting a more equal distribution of dental visits. Yet, unequal use of dental services remains an issue affecting the Canadian population.

Introduction

Dental care in Canada, unlike physician and hospital care, is almost wholly privately financed. Approximately \$17.1 billion was spent on dental care in 2018, with 94.2% paid for privately.¹ Of the 5.8% that was paid for by Canadian governments, most was targeted to low-income children and adults.² In fact, when one compares American and Canadian dental care systems, the similarities are significant.³ Most care is privately financed, with a significant portion covered by employer- and individually-sponsored dental plans and/or through out of pocket spending. The similarities also extend to the delivery of services, with almost all care delivered in private settings on a fee for service basis.

As in the United States (U.S.), cost barriers to dental care are well documented in Canada, with socially marginalized groups being less likely to visit a dentist.^{1,2} Income-related inequality in dental visits is common in both countries, with higher income groups being more likely to attend for care than lower income groups. One national Canadian survey estimated that one in five individuals avoided dental visits due to cost.⁴ Affordability challenges also affect middle-income groups.⁵ And among developed nations, Canada and the U.S. have the largest income-related inequality in dental visits.^{3,6} The issue of access has thus moved beyond academic interest into public and political debate.⁷

As in the U.S., there is also extensive inequality in oral health among Canadians, such as in decayed, missing and filled teeth, and edentulism.^{9,10} While arguments can be made to address structural factors to achieve equity, unequal access to care can also be tackled.¹¹ Greater cost-barriers to dental care are associated with poorer oral health,¹² and regular dental visits are

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3 associated with better oral health,¹³ thus inequality in oral health can be attributed, at least
4 partially, to inequality in access to and use of care. Given Canadians' universal access to hospital
5 and physician care, it is not surprising there is greater magnitude of inequality in oral health than
6 general health, demonstrating the importance of access to care.¹⁰ Consider that, higher public
7 dental care expenditure in Canadian provinces is associated with increased dental attendance
8 among provincial residents reporting poor oral health.^{14,15} In provinces with public dental care
9 programs targeting low-income children and seniors, children and seniors with poor oral health
10 are more likely to visit dentists than in provinces without these programs.¹⁴ Thus, at the
11 subnational level in Canada, variation in access to and use of dental services is present and likely
12 linked to the provincial environment (e.g. public and private dental care coverage and
13 expenditure).¹⁶

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31 Nevertheless, it remains unknown whether dental services use across income groups is becoming
32 more or less equal in Canada and across its provinces. This study examines dental visit
33 prevalence rates across five income groups in Canada and across its provinces over time. Various
34 measures are used to assess the extent of inequality in the distribution of dental visit prevalence
35 rates across these five income groups.

36 37 38 39 40 41 42 43 44 **Methods**

45 46 47 48 49 *Data source and population*

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3 Seven nationally representative surveys of the Canadian population were used: the Canadian
4 Community Health Survey (CCHS) 2000-2001; CCHS 2003; CCHS 2005; CCHS 2007-2008;
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6 CCHS 2009-2010; CCHS 2013-2014; and CCHS 2015-2016. Public Use Microdata Files
7
8 provide comparable data on dental visits and socio-demographic factors. These surveys exclude
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10 individuals living on Indian Reserves and Crown Lands, in institutions, full-time members of the
11
12 Canadian Forces, and residents of remote regions.
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19 Data for adults aged 19 and older in the ten Canadian provinces were included. All analyses
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21 employed survey sampling weights. To ensure comparable estimates across time, age-
22
23 standardized proportions were calculated and standardized to the 2011 Canadian population.
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25 Participants were excluded if they had missing income or dental visit data. Less than 2% had
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27 missing data for dental visits. Statistics Canada started imputing missing income data in 2011
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29 using a regression model including respondent and household characteristics.¹⁷ Thus, less than
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31 1% of the survey samples had missing income values in 2013-2014 and 2015-2016. The
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33 unweighted non-response rate for income, however, was between 10% to 16% in the other
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35 surveys. Analyses were performed using STATA 13.
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42 *Dental visits*

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47 The outcome was reporting a dental visit in the past year and dichotomized as “yes/no”. Dental
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49 visits is asked from all participants. The Public Health Agency of Canada uses this variable as an
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51 indicator for monitoring inequality in dental care.¹⁸
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Income

Total household income was the indicator of socioeconomic status. Household income in 2000-2001 and 2003 were reported as “income adequacy,” classifying Canadians into five categories based on household income accounting for the number of people living in the household. Later surveys reported household income deciles at the national and provincial level based on the adjusted ratio of household income to a standard low-income cut-off accounting for household and community size. Availability of provincial income deciles allowed for comparisons of income-related inequality from 2005 onward.

Regression-based measures of inequality

Income-related inequality is reported using two regression-based measures: Slope Index of Inequality (SII) and Relative Index of Inequality (RII).¹⁹ These measure absolute and relative inequality, respectively, while accounting for the population share of each income group.²⁰

The SII is based on the regression of the mid-point value of the health outcome (dental visit rate) for each income group across the cumulative distribution. The regressed value is interpreted as the hypothetical absolute difference in the health outcome between the worst- and best-off. For example, an SII of 18 in dental visits indicates an 18-percentage point difference between the bottom and top of the income distribution. The SII was calculated using generalized linear models (GLM) for binomial distribution:

$$\bar{Y} = \beta_0 + \beta_1 \bar{R}_j$$

where j indicates the income group, \bar{Y} the dental visit rate and \bar{R}_j the average relative ranking of income group j ; β_0 is the estimated dental visit rate for a hypothetical individual at the bottom of the income distribution and β_1 is the difference in dental visit rate between the hypothetical individual at the bottom of the income distribution and the hypothetical person at the top ($R_j=0$ versus $R_j=1$). Positive SII values indicate pro-rich inequality, meaning more dental attendance among higher income groups.

RII values greater than 1.0 also indicate pro-rich inequality. For example, an RII value of 1.5 in dental visits indicates that dental attendance at the top of the income distribution is 1.5 times higher than at the bottom. The RII was estimated the Machenbach and Kunst method:²¹

$$RII_1 = h(1)/h(0)$$

where $h(x)$ is the health outcome as a function of the income ranking x ; and 0 and 1 are the positions of the hypothetical best and worst-placed income groups, respectively.

In other words, the SII represents the overall rate difference, while the RII the rate ratio.

Measuring inter-provincial inequality

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3 Inter-provincial inequality is estimated using simple and complex measures for non-ordered
4 groups (i.e. provinces). The range and “highest to lowest ratio” are estimates for simple absolute
5 and relative inequality, respectively. The two complex indices for evaluating absolute and
6 and relative inequality, respectively. The two complex indices for evaluating absolute and
7 relative inequality for non-ordered groups were the “weighted absolute mean difference” and
8 Theil index, respectively.¹⁹ The weighted absolute difference from the overall mean is calculated
9 by deducting the difference in dental visit rate in each province from the national rate, then
10 multiplying the absolute values of these differences by the population size of each province.
11 These weighted differences are then summed and divided by total population size. Greater values
12 of the weighted absolute mean difference imply greater absolute inequality. The Theil index
13 estimates the relative inequality accounting for the proportion of the sample in each group
14 (provinces) and the average of the health outcome in each province to the national mean value.
15 The Theil index was calculated as¹⁹:

$$Theil\ index = \sum_{i=1}^N p_i r_i \ln(r_i)$$

16 where, for province i , p_i is the proportion of the Canadian population, and r_i is the ratio of dental
17 visit rate in province i to the dental visit rate of the Canadian population. The minimum value of
18 the Theil index is 0 (no inter-provincial inequality) with no upper bound for the maximum; as
19 inequality increases, the Theil index becomes greater.

20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 **Results**

52 53 54 55 *Survey sample characteristics*

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5 Age-standardized proportions are reported for sex, income, and dental visits in Table 1. The
6 distribution of sex was similar, whereas the distribution of income varied. In the first two
7 surveys, due to methodological variation, uneven numbers of participants were reported in each
8 category, whereas almost equal number of participants were in five categories of income from
9 2005 onward.
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19 *Income-related inequality in dental visits in Canada*

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24 Age-standardized proportions and prevalence rates (PRs) for dental visits across income groups
25 are reported in Table 2. Overall, the proportion reporting a dental visit was greater in higher
26 income groups. The largest income gap was in 2003, where the prevalence of visiting a dentist
27 for the highest income group was 1.88 times greater than the lowest (PR=1.88; 95% CI: 1.73-
28 2.03). The smallest gap was in 2015-2016, where the prevalence of a dental visit among the
29 highest income group was 1.68 times greater than the lowest (PR=1.68; 95% CI: 1.63- 1.73).
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40 The SII and RII reveal ongoing absolute and relative income-related inequality in dental visits in
41 Canada (Table 2). The lowest SII was in 2015-2016, indicating a 40.2-percentage point
42 difference in dental visits between the top and bottom of the income distribution. Similarly, the
43 lowest RII was in 2015-2016, where the prevalence of dental visits was 1.78 times higher at the
44 top of the income distribution compared to the bottom. The SII and RII also declined steadily in
45 Canada over time (Figure 1 and Table 2). Absolute inequality reduced by 7.2 percentage points
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3 from 47.4 (2000-2001) to 40.2 (2015-2016). Relative inequality reduced by 22.9% from 2.31
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5 (2000-2001) to 1.78 (2015-2016).
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10 *Income-related inequality in dental visits across Canadian provinces*

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14 Generally, across Canadian provinces, Newfoundland and Labrador had the greatest relative and
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16 absolute inequality (Table 3). For example, in 2005, the highest income group in Newfoundland
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18 and Labrador visited a dentist 4.42 times more than the lowest. In absolute terms, in the same
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20 year, there was a 63-percentage point difference in the proportion reporting a dental visit
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22 between the highest and lowest income group.
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29 Inequality in dental visits decreased across most Canadian provinces over time. The largest
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31 reductions in relative inequality were in Newfoundland and Labrador and Prince Edward Island,
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33 dropping by 42% and 38%, respectively, while relative inequality did not change or marginally
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35 increased in Ontario and Saskatchewan. The largest reductions in absolute inequality were in
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37 Prince Edward Island, dropping by 31.6%, while absolute inequality did not change in Ontario
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39 and increased in New Brunswick and Manitoba.
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45 *Inter-provincial inequality in dental visits*

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49 Table 4 shows age-standardized proportions for having a dental visit in Canada and for its
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51 provinces over time. Dental visits increased by 10 percentage points from 57.8% (2000-2001) to
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53 67.4% (2015-2016). Ontario reported the highest proportion of dental visits in all but one survey.
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3 The second highest proportion of dental visits was in British Columbia and, except for 2015-
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5 2016, the lowest proportion was in Newfoundland and Labrador.
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10 Greater increases in the proportion of dental visits were found in provinces with low dental visits
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12 (Table 4). For example, in Newfoundland and Labrador, dental visits increased by 21.4
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14 percentage points from 2000-2001 to 2015-2016. Conversely, there was only a 4.6-percentage
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16 point increase in Ontario. Absolute and relative differences between Canadian provinces,
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18 measured by the range and “highest to lowest ratio,” have narrowed over time. The decreasing
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20 values of the “weighted absolute mean difference” and Theil index suggest narrowing inter-
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22 provincial inequality.
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28 **Discussion**

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33 We address an important question: Has inequality in dental visits narrowed or widened in
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35 Canada? The unequal provision of dental care in Canada is well-established,^{2-7,9,12,14-16}
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37 supporting our finding of persistent income-related inequality in dental visits over time. Similar
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39 to the national trend, absolute and relative inequality declined within Canadian provinces, albeit
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41 with some exceptions. For example, the magnitude of absolute and relative inequality remained
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43 the same in Ontario, while dropping more than 30% in Prince Edward Island. While we
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45 identified inter-provincial variation in dental services use, there appears to be a narrowing of the
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47 gap, meaning Canadian provinces are becoming more similar in the proportion of adults utilizing
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49 dental services.
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3 There are a number of possible explanations for our findings. We focus discussion on changes to
4 macro-level factors that could affect affordability or demand for dental care, including
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6 macroeconomic conditions, changes in labour and insurance markets, and cultural and societal
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8 values.
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14 Changes in macroeconomic conditions, such as income inequality, may explain variation in
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16 inequality in dental service use in Canada. For example, in a cross-sectional study, higher
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18 income inequality in Canadian municipalities (measured by the Gini coefficient) was associated
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20 with lower dental services use.²² Between 2000 and 2015, the highest level of income inequality
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22 (Gini coefficient) was found in Ontario,²³ which is consistent with high levels of inequality in
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24 dental visits. However, changes in the Gini coefficient over the period of observation did not
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26 follow changes in inequality nationally or provincially.²³ For example, despite narrowing
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28 inequality in dental visits, income inequality in Canada did not change substantially between
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30 2000 and 2015 (Gini coefficient 0.317 to 0.314, respectively),²³ suggesting income inequality
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32 cannot be the entire story.
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40 Another explanation relates to changes in labour markets, which impact on affordability and thus
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42 inequality in dental visits across income groups. From the 1970s to 2000s, Canada's labour
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44 market polarized and became more precarious.^{24,25} Workers were separated into high- and low-
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46 income groups with a decline in middle-income groups. Beyond the 2000s, wages polarized with
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48 slight increases among low-income relative to middle-income groups, and larger increases in
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50 high-income relative to middle-income groups. This suggests that income-related inequality in
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52 dental visits might have grown, yet this was not the case.
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5 Precarious employment is particularly important, as traditionally, full-time and higher-quality
6 jobs offer employer-sponsored dental insurance (benefits) plans; the major mechanism by which
7 dental care is financed in Canada.²⁶ This is linked to changes in private insurance and
8 government-sponsored, or public, insurance. For example, unpublished data demonstrate
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10 fluctuations in the share of the population covered by dental insurance, yet this has remained
11 relatively steady (66.3% in 1998, 67.7% in 2005, 64.8% in 2010, 66.3% in 2014). Employer-
12 sponsored plans make up a decreasing share of this coverage (86.0% in 2005, 84.9% in 2010,
13 84.1% in 2014), and government-sponsored (7.9% in 2005, 8.8% in 2010, 9.2% in 2014) and
14 individually-sponsored (6.8% in 2005, 7.0% in 2010, 7.6% in 2014) plans an increasing share.
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16 Unfortunately, provincial estimates are not available. Regardless, changes in coverage may
17 explain decreasing income-related inequality in dental visits. Although, in general terms, the
18 decreases observed would arguably be more attributable to increases in the largest share of the
19 dental insurance market, namely employer-sponsored plans (which has not happened), and not in
20 relation to the modest growth in the smallest share of this market, or government- and
21 individually-sponsored plans.
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42 Changes in inequality may also be linked to the quality of dental insurance. It is anecdotally
43 reported that private and public plans are covering less over time.²⁶ Data show that private
44 insurers are paying a lesser amount of the dental bill, while both per capita dental care
45 expenditure and dental care prices have increased in real terms.^{5,15} In either case, this would
46 drive growth in inequality, not the reverse, which we have shown.
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3 The cultural and societal drive for improved oral appearance²⁷ may also be influential. Canadians
4 may be demanding more dental care in the context of historical decreases in normative need and
5 increasing financial barriers to care.^{5,9,26} Unfortunately, in Canada, there is limited data available
6 on out of pocket spending for dental care to describe demand at the national and provincial level.
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14 Finally, other macro-level factors may help explain interprovincial variation in income-related
15 inequality in dental visits observed in this study (Supplemental Table). For example, the
16 improvements observed in Prince Edward Island may be due to a declining unemployment rate
17 (12.0% in 2000 to 10.4% in 2015) and lower income inequality over the observation period.
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24 While in Newfoundland and Labrador, declining unemployment rates and investments and
25 improvements to the public low-income adult dental program in 2011²⁷ may explain the reduced
26 inequality observed in the province. Nevertheless, due to what appears to be an unclear and
27 complex relationship between macro-level factors and inequality in dental service use, as well as
28 the lack of available provincial- and national-level data to flesh out this relationship, we do not
29 have a definitive nor satisfying explanation for the variation and changes to inequality that we
30 have demonstrated for Canada and its provinces.
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42 This study should be interpreted in the context of its limitations. First, the wording of the survey
43 question on dental visits has changed. In the two most recent surveys, the notion of consulting a
44 dental hygienist was added in order to reflect the fact that, in some jurisdictions, dental
45 hygienists can now practice independently. Whether our estimates have been affected is
46 unknown, as is any impact on the measurement of dental visits. Second, the contribution of
47 changes in insurance coverage to inequality could not be assessed due to a lack of provincial-
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3 level data. Third, variation in reporting of the income variable between surveys (before and after
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5 2005) impedes comparing dental visit rates in these two periods. However, it is unlikely that
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7 methodological variation affects our findings in terms of summary measures of inequality, which
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9 account for the population share of each income group. Also, since we used the Public Use
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11 Microdata Files, it was not possible to impute missing income data for surveys carried out before
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13 2011, unlike after when data imputation was completed by Statistics Canada.¹⁷ Fourth, while the
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15 SII and RII remain standard indicators for inequality, some argue they do not do enough to
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17 capture changes in socioeconomic status, such as increasing educational attainment over time.²⁹
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24 In conclusion, our analyses suggest absolute and relative inequality in dental visits among
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26 Canadian adults has decreased over time. While the provision of dental care in Canada remains
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28 unequal, it has become more equal. Next, is to better understand the factors driving such
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30 declines.
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35 **Acknowledgment**

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37 Support for this study was generously provided by Green Shield Canada (GSC).
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Table 1. Sample population characteristics across CCHS surveys: frequencies and age-standardized proportions.

	Survey years													
	CCHS 2000-2001		CCHS 2003		CCHS 2005		CCHS 2007-2008		CCHS 2009-2010		CCHS 2013-2014		CCHS 2015-2016	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Sex														
Male	50,637	48.9	50,973	49	51,261	49	50,883	49	47,784	49.1	49,029	49.1	43,987	49.1
Female	60,612	51.1	62,479	51	62,488	51	62,840	51	59,324	50.9	62,471	50.9	52,163	50.9
Province														
Newfoundland and Labrador	3,244	1.8	3,402	1.7	3,602	1.7	3,630	1.6	3,340	1.6	3,563	1.5	2,890	1.5
Prince Edward Island	3,264	0.4	1,777	0.4	1,761	0.4	2,108	0.4	1,678	0.4	1,787	0.4	1,590	0.4
Nova Scotia	4,555	3.1	4,307	3	4,475	2.9	4,628	2.9	4,191	2.8	4,762	2.7	4,311	2.7
New Brunswick	4,310	2.5	4,246	2.4	4,501	2.4	4,931	2.3	4,336	2.3	4,474	2.2	3,004	2.1
Quebec	19,186	24.4	24,028	24.2	25,778	24.1	21,088	23.8	20,087	23.6	21,002	23.5	20,956	23.4
Ontario	34,189	38.4	36,951	38.7	36,628	39	39,031	39	37,367	39	38,015	38.9	29,666	38.8
Manitoba	7,287	3.5	6,638	3.4	6,437	3.4	6,626	3.4	6,030	3.4	6,636	3.4	4,832	3.3
Saskatchewan	6,861	3.1	6,539	3	6,760	2.9	6,930	2.8	6,546	2.8	6,652	2.9	4,140	2.9
Alberta	12,400	9.5	11,676	9.7	10,217	9.8	10,469	10.3	10,172	10.6	10,746	11.2	11,801	11.5
British Columbia	15,953	13.4	13,888	13.4	13,590	13.4	14,282	13.6	13,361	13.6	13,863	13.4	12,960	13.3
Income														
1 st Group (lowest)	4,877	3.8	3,844	2.8	23,174	19.6	20,772	19.4	19,313	19.6	21,180	19.3	19,316	19.3
2 nd Group	10,469	7.5	8,633	6.1	19,848	19.7	19,558	19.9	18,236	20.1	23,965	20.1	19,893	20
3 rd Group	24,750	22	22,070	19.6	18,671	20.1	18,564	19.9	17,704	19.9	22,503	20.1	19,042	20.3
4 th Group	35,179	35.8	34,261	34.7	17,969	20.3	18,831	20.6	16,940	20	21,097	20	18,531	19.9
5 th Group (highest)	24,470	30.8	28,800	36.8	18,502	20.4	19,046	20.2	17,875	20.4	22,661	20.5	19,315	20.5
Dental visit														
No	51,436	42.2	50,025	38.5	50,091	38.4	46,829	37.5	42,210	35.7	42,249	35.2	33,358	32.6
Yes	59,706	57.8	63,281	61.5	63,531	61.6	66,413	62.5	64,811	64.3	69,147	64.8	61,326	67.4
Full Sample	111,249	100	113,452	100	113,749	100	113,723	100	107,108	100	111,500	100	96,150	100

Table 2. Dental visit rates (%) and prevalence rates (PR) of annual dental visit by income level, and summary measures of income-related inequality in Canada (2001-2016).

	Survey years													
	CCHS 2000-2001		CCHS 2003		CCHS 2005		CCHS 2007-2008		CCHS 2009-2010		CCHS 2013-2014		CCHS 2015-2016	
	%	PR (95% CI)	%	PR (95% CI)	%	PR (95% CI)	%	PR (95% CI)	%	PR (95% CI)	%	PR (95% CI)	%	PR (95% CI)
Group 1 (lowest)	41.9	Reference	41.0	Reference	42.5	Reference	44.0	Reference	43.6	Reference	45.6	Reference	48.5	Reference
Group 2	35.5	0.85 (0.78, 0.92)	38.3	0.93 (0.85, 1.03)	55.4	1.3 (1.27, 1.34)	55.4	1.26 (1.23, 1.29)	57.1	1.31 (1.25, 1.38)	56.3	1.23 (1.18, 1.29)	59.2	1.22 (1.17, 1.27)
Group 3	43.8	1.05 (0.97, 1.13)	46.1	1.12 (1.04, 1.22)	64.3	1.51 (1.47, 1.56)	65.5	1.49 (1.44, 1.53)	67.4	1.55 (1.47, 1.63)	66.5	1.46 (1.4, 1.51)	69.3	1.43 (1.38, 1.48)
Group 4	59.7	1.42 (1.34, 1.51)	62.7	1.53 (1.42, 1.65)	71.9	1.69 (1.64, 1.75)	73.1	1.66 (1.6, 1.72)	75.3	1.73 (1.65, 1.81)	74.2	1.63 (1.56, 1.7)	76.5	1.58 (1.53, 1.62)
Group 5	74.2	1.77 (1.65, 1.9)	76.9	1.88 (1.73, 2.03)	78.5	1.85 (1.77, 1.92)	78.6	1.79 (1.73, 1.85)	81.1	1.86 (1.77, 1.96)	80.5	1.76 (1.69, 1.84)	81.3	1.68 (1.63, 1.73)
Indices of Inequality														
RII (95% CI) ^a	2.31 (2.19, 2.44)		2.2 (2.09, 2.31)		2 (1.91, 2.09)		1.93 (1.85, 2.01)		1.97 (1.88, 2.06)		1.89 (1.8, 1.98)		1.78 (1.72, 1.84)	
SII (95% CI) ^a	47.4 (45, 49.8)		48.7 (47, 50.8)		44.5 (42, 46.6)		43.2 (41, 45.6)		45.9 (43, 48.7)		42.5 (40, 45.5)		40.2 (38, 42.3)	

^a All inequality indices were statistically significant at *** p<0.001

Table 3. RII and SII measures of inequality in dental visits in Canadian provinces.

Relative Index of inequality (RII) ^b	Survey Years					Change % ^a
	CCHS 2005	CCHS 2007-2008	CCHS 2009-2010	CCHS 2013-2014	CCHS 2015-2016	
Newfoundland and Labrador	4.42 (4.05, 4.81)	3.53 (3.09, 4.04)	3.63 (2.58, 5.09)	2.94 (2.64, 3.28)	2.57 (2.21, 2.97)	(42.0)
Prince Edward Island	2.92 (2.9, 2.94)	2.77 (2.77, 2.77)	2.24 (2.24, 2.24)	2.63 (2.63, 2.63)	1.81 (1.81, 1.81)	(38.0)
Nova Scotia	2.86 (2.49, 3.28)	2.67 (2.27, 3.13)	2.51 (2.24, 2.81)	2.49 (2.27, 2.73)	2.31 (2.01, 2.66)	(19.2)
New Brunswick	2.67 (2.07, 3.45)	3.09 (2.69, 3.57)	2.45 (2.11, 2.84)	2.3 (2.02, 2.62)	2.57 (2.39, 2.76)	(3.7)
Quebec	2.25 (2.13, 2.38)	2.18 (2.05, 2.32)	2.34 (2.25, 2.43)	2.27 (2.14, 2.42)	2.01 (1.9, 2.12)	(10.7)
Ontario	1.75 (1.66, 1.85)	1.83 (1.76, 1.9)	1.83 (1.73, 1.93)	1.78 (1.67, 1.89)	1.75 (1.68, 1.82)	0.0
Manitoba	1.96 (1.75, 2.19)	2.01 (1.79, 2.25)	1.81 (1.49, 2.2)	1.95 (1.78, 2.13)	1.76 (1.68, 1.85)	(10.2)
Saskatchewan	1.79 (1.72, 1.86)	1.58 (1.47, 1.7)	1.75 (1.58, 1.94)	1.73 (1.52, 1.96)	1.81 (1.66, 1.97)	1.1
Alberta	1.73 (1.52, 1.96)	1.75 (1.58, 1.94)	1.58 (1.47, 1.7)	1.79 (1.72, 1.86)	1.53 (1.49, 1.58)	(11.6)
British Columbia	1.8 (1.71, 1.9)	1.68 (1.54, 1.83)	1.74 (1.57, 1.93)	1.76 (1.63, 1.9)	1.57 (1.48, 1.67)	(12.8)
Slope Index of Inequality (SII) ^b	CCHS 2005	CCHS 2007-2008	CCHS 2009-2010	CCHS 2013-2014	CCHS 2015-2016	Change % ^a
Newfoundland and Labrador	63.1 (53, 72.8)	64.1 (58, 70.5)	64.1 (57, 70.9)	54.9 (52, 57.6)	57.4 (55, 59.9)	(9.0)
Prince Edward Island	61 (49, 73)	63.1 (63, 63.1)	54.5 (55, 54.5)	61.2 (61, 61.2)	41.7 (41.7, 41.7)	(31.6)
Nova Scotia	61.2 (59, 63.1)	58.1 (53, 63.4)	60.1 (56, 64.2)	57.7 (53, 62.4)	53.7 (49.2, 58.2)	(12.2)
New Brunswick	52.3 (42, 62.4)	57.2 (52, 62.7)	53.7 (44, 63.4)	47.8 (39, 57)	58.6 (53.3, 63.9)	12.0
Quebec	45 (42, 48.4)	46.4 (43, 49.3)	51.9 (50, 54.2)	49.2 (46, 52.2)	44.8 (41.5, 48)	(0.5)
Ontario	40.6 (37, 44)	42.9 (40, 45.4)	44.5 (41, 48.2)	42.4 (38, 46.6)	40.8 (38.6, 43)	0.4
Manitoba	33.4 (32, 35)	41 (35, 47)	42.4 (38, 46.5)	42.4 (37, 47.8)	39.1 (36.5, 41.8)	17.1
Saskatchewan	37.3 (31, 43.9)	40 (36, 44.2)	35.7 (22, 49.2)	39.3 (34, 44.5)	36.4 (31.6, 41.2)	(2.4)
Alberta	36.2 (32, 40.3)	29.7 (26, 33)	36.1 (28, 44.1)	32.9 (24, 41.4)	29.7 (27.4, 32)	(17.9)
British Columbia	39.6 (36, 43.1)	35.2 (30, 40)	38.7 (32, 45.2)	39.6 (35, 44.4)	33 (29, 37)	(16.6)

^a Percentage change in the magnitude of relative inequality between the CCHS 2005 and CCHS 2015-2016; Values in parentheses () indicate decrease.

^b All inequality indices were statistically significant at *** p<0.001

Table 4. Proportion of dental visits in Canadian provinces and inter-provincial inequality.

Jurisdictions	Survey Years						
	CCHS 2000-2001	CCHS 2003	CCHS 2005	CCHS 2007-2008	CCHS 2009-2010	CCHS 2013-2014	CCHS 2015-2016
Newfoundland and Labrador	40.6	44.0	45.1	50.4	48.9	53.7	62
Prince Edward Island	56.3	61.2	57.5	59.5	65.1	61	68
Nova Scotia	55	58.4	57.4	57	63.4	61.2	63.7
New Brunswick	49.9	50.3	52.4	51.9	57.8	58.2	60.1
Quebec	50.1	54.1	54.8	57.8	59.1	59.8	64.1
Ontario	65.1	67.7	68.3	67.7	69.8	70.4	69.7
Manitoba	56.2	58.5	58.5	59.7	61.1	61.5	66
Saskatchewan	47.2	51.6	54.3	53.3	56.2	57.1	59.5
Alberta	53.7	60.4	59.4	61.5	60.7	59.9	69
British Columbia	61.4	65.5	63.4	64.1	65.8	67	69.9
Canada	57.8	61.5	61.6	62.5	64.3	64.8	67.4
Inequality indices							
Range (Max-Min)	24.5	23.7	23.2	17.3	20.9	16.7	10.4
Highest to lowest ratio	1.60	1.54	1.51	1.34	1.43	1.31	1.18
Absolute difference (multiplied by 100)	6.52	5.9	5.64	4.41	4.7	4.95	2.81
Theil Index (multiplied by 1000)	7.42	5.73	5.13	3.28	3.27	3.2	1.17

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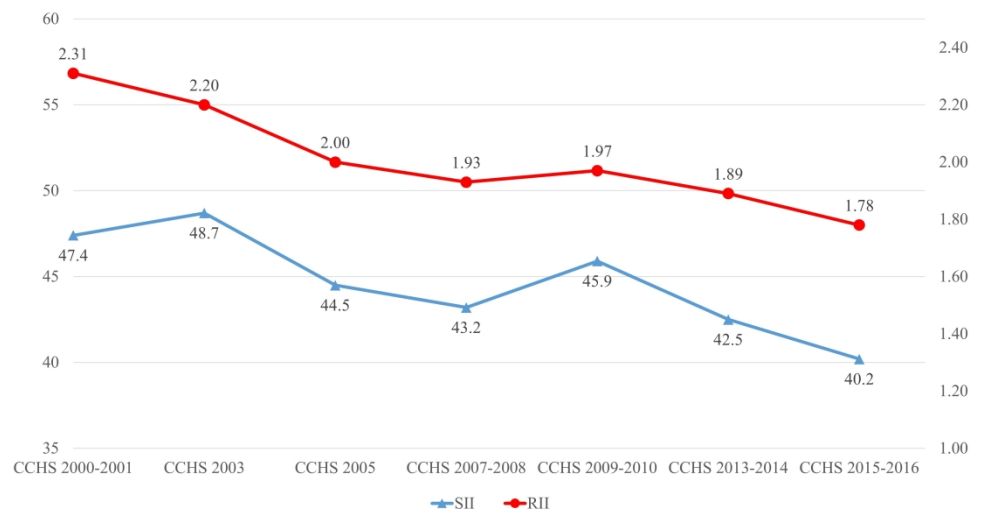


Figure 1. Summary measures of income-related inequalities in dental visit in Canada across seven surveys (2001-2016)

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Supplemental table. Macroeconomic indicators that could be associated with income-related inequality in dental visits in Canada and its provinces.

Indicator		2000	2005	2010	2015
Real gross domestic income per capita (CAD) ^a	Canada	41,521.8	46,085.2	46,636.2	48,237.3
	British Columbia	38,576.0	43,925.1	44,049.7	47,516.5
	Alberta	59,614.9	74,249.5	68,900.3	68,143.7
	Saskatchewan	40,088.2	48,109.1	55,893.0	57,666.3
	Manitoba	35,375.4	38,385.1	41,242.4	43,775.1
	Ontario	43,971.9	45,982.6	46,001.0	47,976.9
	Quebec	35,391.4	38,185.6	39,844.5	40,714.3
	New Brunswick	32,096.8	35,766.5	38,223.8	38,240.3
	Nova Scotia	31,698.6	35,710.1	37,075.5	37,623.7
	Prince Edward Island	28,941.8	32,400.6	34,866.7	35,755.8
	Newfoundland and Labrador	30,558.1	45,125.1	51,964.0	48,508.0
Gini coefficient (adjusted after-tax income) ^b	Canada	0.317	0.317	0.315	0.314
	British Columbia	0.312	0.325	0.322	0.312
	Alberta	0.312	0.303	0.320	0.324
	Saskatchewan	0.295	0.325	0.311	0.303
	Manitoba	0.290	0.298	0.296	0.300
	Ontario	0.325	0.321	0.320	0.318
	Quebec	0.294	0.296	0.286	0.285
	New Brunswick	0.291	0.293	0.279	0.273
	Nova Scotia	0.295	0.293	0.292	0.298
	Prince Edward Island	0.285	0.257	0.258	0.279
	Newfoundland and Labrador	0.302	0.302	0.308	0.314
Unemployment rate ^c	Canada	6.8	6.8	8.1	6.9
	British Columbia	7.2	5.9	7.6	6.2
	Alberta	5.0	4.0	6.6	6.0
	Saskatchewan	5.1	5.1	5.2	5.0
	Manitoba	5.0	4.7	5.4	5.6
	Ontario	5.7	6.6	8.7	6.8
	Quebec	8.5	8.2	8.0	7.6
	New Brunswick	10.0	9.7	9.2	9.8
	Nova Scotia	9.1	8.4	9.6	8.6
	Prince Edward Island	12.0	10.9	11.4	10.4
	Newfoundland and Labrador	16.6	15.2	14.7	12.8

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^a Statistics Canada. Table 36-10-0229-01 Long-run provincial and territorial data. <https://doi.org/10.25318/3610022901-eng>

^b Statistics Canada. Table 11-10-0134-01 Gini coefficients of adjusted market, total and after-tax income. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1110013401>

^c Statistics Canada. Table 14-10-0106-01 Employment and unemployment rate, annual, population centres and rural areas. Statistics Canada Labour Force Survey. <https://www.stats.gov.nl.ca/Statistics/Labour/PDF/UnempRate.pdf>

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