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Changes in income-related inequalities in oral health status in Ontario, Canada

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TITLE

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ABSTRACT

Objectives: Oral health inequalities impose a substantial burden on society and the health care system across Canadian provinces. Monitoring these inequalities is crucial for informing public health policy and action towards reducing inequalities, however trends within Canada have not been explored. The objectives of this study are: (i) To assess trends in income-related inequalities in oral health in Ontario, Canada's most populous province, from 2003 to 2014; and (ii) to determine if the magnitude of such inequalities differ by age and sex.

Methods: Data representative of the Ontario population aged 12 years and older was sourced from the Canadian Community Health Survey (CCHS) cycles 2003 (n = 36,182), 2007/08 (n = 36,430), and 2013/14 (n = 41,258). Income-related inequalities in poor self-reported oral health (SROH) were measured using the Slope Index of Inequality (SII) and Relative Index of Inequality (RII) and compared across surveys. All analyses were sample-weighted and performed with STATA 15.

Results: The prevalence of poor SROH was stable across the CCHS cycles, ranging from 14.1% (2003 cycle) to 14.8% (2013/14 cycle). SII estimates did not change (18.7-19.0), while variation in RII estimates was observed over time (2003 = 3.85; 2007/08 = 4.47; 2013/14 = 4.02); differences were not statistically significant. SII and RII was lowest among 12-19 year olds and gradually higher among 20 to 64-year olds. RII was slightly higher among females in all survey years.

Conclusion: Absolute and relative income-related inequalities in SROH have persisted in Ontario over time and are more severe among middle-aged adults. Therefore, oral health inequalities in Ontario require attention from key stakeholders, including governments, regulators, and health professionals.

INTRODUCTION

Socioeconomic inequalities in oral health and dental care are well-recognized globally, in which individuals of lower socioeconomic position have poorer oral health and more limited access to dental care than individuals of higher socioeconomic position.[1,2] Compared with other developed nations, Canada in particular, experiences similar inequalities in oral health, but more inequalities in dental care use.[3–6]

The Canadian healthcare system excludes oral health care from its national system of universal health insurance. Unlike physician and hospital care, oral health care is almost entirely privately financed and delivered. Only about 5.5% of the Canadian population, predominately low-income groups, is covered by public dental insurance offered through programs funded by federal, provincial, and territorial governments.[7,8] Compared with other developed nations, in 2009, Canada ranked second last in the percentage of dental care paid for by government.[8] The majority of Canadians pay for dental care through private insurance or out-of-pocket spending,

constituting 94% of all dental expenditure in the country.[7,8] This also applies to children and youth in Canada as the majority of publicly funded dental programs for children only cover basic dental care for children less than 18 years old from low income families.[9] Consequently, the probability and rate of visiting the dentist is heavily influenced by income and insurance, with affluent and privately insured groups visiting more often.[10]

As individuals of lower socioeconomic status experience greater difficulty accessing dental care, they arguably become more vulnerable to oral diseases and conditions, thereby exacerbating inequalities in oral health. A 2014 report by the Canadian Academy of Health Sciences explains that "those with the highest levels of oral health problems are also those with the greatest difficulty accessing oral health care".[10] Studies using data from the Canadian Health Measures Survey 2007-2009 demonstrate that Canadians from lower-income households experience significantly worse oral health outcomes than those from higher income households; such as the number of decayed and missing teeth, periodontal disease, and oral pain.[8,10,11] Further, the concentration of oral disease in lower-income groups is much greater than the concentration of general health conditions, such as obesity and high blood pressure.[10]

In 2012, Canada expressed a commitment towards reducing health inequalities by endorsing the Rio Political Declaration on Social Determinants of Health.[12] Progress in this area is uncertain though, as little monitoring of health inequalities appears to occur. Yet, the 2008 World Health Organization Commission of Social Determinants of Health recommended " that routine monitoring systems for health equity and the social determinants of health [be] in place, locally, and internationally".[13] These ideas have been reinforced by Canadian governing bodies and public health agencies,[10,14] given that the monitoring of inequalities can help identify priority areas for action and the effectiveness of publicly funded dental programs in reducing inequalities.[15,16]

Despite this, there is currently little research quantifying the magnitude of oral health-related inequalities in Canada over time. Most studies in the Canadian and international literature have measured inequalities in dental care, such as number of dental visits rather than oral health status. As a result, this study assesses income-related oral health inequalities over time in Ontario, Canada's most diverse and populous province. Specifically, it measures the magnitude of income-related inequality in self-reported oral health status between 2003 and 2014 using the Slope (SII) and Relative Index of Inequality (RII), and evaluates differences by age and sex.

METHODS

Data source

Three public use datasets of the Canadian Community Health Survey (CCHS) were used in this study: 1) CCHS cycle 2.1, 2003; 2) CCHS 2007-2008, and 3) CCHS 2013-2014. The CCHS is a nationally representative cross-sectional survey initiated in 2001 by Statistics Canada, collecting self-reported information related to the health status, health care utilization, and health determinants of the Canadian population aged 12 years or older who are living in private

dwellings. The CCHS statistically represents 98% of the Canadian population aged 12 years or older from all ten provinces and three territories, excluding individuals living on Indian Reserves and Crown Lands, institutional residents, children aged 12 to 17 living in foster care, full-time members of the Canadian Forces, and residents of certain remote regions. The methodology and sampling used in the CCHS are described elsewhere.[17]

The CCHS comprises a series of questions asked to all respondents (core content) and questions only asked to respondents within select regions varying from year to year (optional content). The 'oral health 1' module in which self-reported oral health status was collected was only included in the CCHS for certain years and provinces/territories, thereby only permitting analysis to the three aforementioned survey cycles.

Outcome variable

Self-reported oral health (SROH) was used as the outcome variable from the CCHS. Participants provided SROH status by answering the question: "In general, would you say the health of your teeth and mouth is:" according to a 5-point scale (1 = excellent, 2 = very good, 3 = good, 4 = fair, and 5 = poor). For the purpose of this study, we dichotomized respondents who reported "excellent", "very good", or "good" SROH into "good" SROH, and respondents who reported "fair" or "poor" into poor SROH. For large epidemiological surveys, SROH serves as a cost-effective, valid, and reliable measure of oral health status in individuals and populations.[18,19] Clinical oral health measures are much more expensive and difficult to conduct in large populations and thus are often unfeasible. Nonetheless, SROH has been reported to be associated with various extents with numerous clinical indicators of oral health such as number of decayed teeth, missing teeth, future tooth loss, and periodontal health status.[18–22]

Exposure variable

Total annual household income was used as the socioeconomic variable. Alternative indicators of socioeconomic status such as educational attainment and occupational status tend to be stable or provide little variation among adults, potentially masking substantial socioeconomic variation in health outcomes.[11] Income also appears to be the strongest contributor towards dental care inequalities among OECD countries.[5] The CCHS adjusted total household income for household size in all three datasets used in this study and additionally adjusted for community size in the CCHS 2007-2008 and CCHS 2013-2014. In the CCHS 2007-2008 and CCHS 2013-2014, total household income was categorized into income deciles based on the provincial income distribution. In the CCHS 2003, total household income was instead categorized into a 5-point income adequacy variable with '1' being the lowest income group and '5' the highest income group. For consistency purposes, we recategorized total household income in CCHS 2007-2008 and CCHS 2013-2014 into income quintiles. Since 2011, missing values for the total household income variable due to either respondent refusal or respondent's lack of knowledge of household income were imputed by Statistics Canada using a nearest neighbor imputation method.[17,23]

Data analysis

All analyses were sample-weighted using values provided in the CCHS datasets to derive estimates for the Ontario population. Respondents with missing income data were excluded from analysis. There was no significant difference in reporting self-reported oral health status between respondents with reported and unreported income. Final percentages of included cases were n=36,182 (84.6%) in the CCHS 2003, n=36,430 (82.9%) in the CCHS 2007-2008, and n=41,258 (97.0%) in the CCHS 2013-2014. Age-standardized proportions and odds ratios of poor SROH by income, age, and sex were calculated. The datasets were age-standardized to the 2011 Canadian Census, Ontario subcomponent. Income-related inequality in SROH was measured using two complex, regression-based measures of inequality, the Slope (SII) and Relative Index of Inequality (RII).

Methods used to quantify the magnitude of health inequalities are termed 'summary measures of health inequality', which, at the most basic level, can be categorized into simple and complex measures.[16] Simple measures make pairwise comparisons in a health outcome between two subgroups, such as the most and least wealthy. Simple measures are typically easier to understand and have historically been the dominant measurement used in inequality monitoring. However, simple measures only make comparisons between two subgroups at once, and overlook other subgroups of the population, thus may be inadequate in capturing the whole picture of inequality.[16] Recently, there has been growing interest in complex measures. Complex measures such as the SII and RII produce a single weighted value that describes the absolute and relative amount of inequality among all subgroups in a population, while accounting for the proportion of the population each subgroup reflects.[15,16] As the sociodemographic distribution of a population may change over time, it is important that summary measures are sensitive to these changes. Thus, the SII and RII are summary measures recommended when making comparisons over time or across different populations.[15,16]

In this study, the SII estimates the absolute difference in the prevalence of reporting poor SROH between those with the highest and lowest level of income, while taking into consideration the distribution of poor SROH in all income groups.[15,16] Positive SII values indicate that poor SROH is more prevalent in lower income groups. We multiplied the coefficients of SII and corresponding confidence intervals by 100 for interpretation of SII as a difference in percentage points. For example, an SII value of 25 in this study indicates a 25-percentage point increase in the prevalence of poor SROH from the very top of the income distribution to the very bottom. Negative SII values indicate a larger prevalence of poor SROH in higher income groups and an SII value of 0 indicates virtually no inequality. The RII is an analogous measure except it estimates the relative difference in inequality.[15,16] It is calculated in the same manner as the SII, except the predicted values of the health outcome at the highest and lowest income group in the regression model are divided rather than subtracted. Therefore, an RII value greater than 1 indicates higher prevalence of poor SROH in the lowest income group.

Obtaining the SII and RII involves calculating the prevalence of poor SROH status in each income group and then transforming ranked income levels in each survey into weighted ridit scores scaled from zero (highest income level) to one (lowest income level).[15,16] The ridit score is the midpoint of the income group's range in cumulative proportion of the total population. For

instance, if the highest income group comprises 30% of the total population, the range of individuals in this group is assigned a ridit score of 0.15 (0.3/2), and if the second highest income group comprises 20% of the population, this group is assigned a value of 0.4 (0.3 + [0.2/2]), and so forth. The ridit scores are then incorporated as the exposure variable into the regression models of poor SROH status to calculate the SII and RII. In accordance with the literature, generalized linear models (log-binomial regression) were used with an identity link function to calculate the SII and with a logarithmic link function to calculate the RII.[24]

Sex and age stratified analyses were also performed to assess differences in inequalities between males and females and across age groups. Age categories were collapsed into 5 age groups: 12-19 years, 20-34 years, 35 to 49 years, 50 to 64 years, and 65 years and older. All data analyses were performed using STATA/IC version 15.1. Findings were considered significantly different if two parameter estimates did not overlap in their 95% confidence intervals.

RESULTS

Sample characteristics

The sample comprised an equal proportion of males and females, with similar distribution of age and sex across the three CCHS surveys (Table 1). As previously mentioned, the distribution of income in the CCHS 2003 was different from the CCHS 2007-2008 and CCHS 2013-14 due to changes in reporting and classifying income. The prevalence of reporting poor SROH in Ontario was stable over time at 14.5% in the CCHS 2003, 13.9% in the CCHS 2007-2008, and 14.8% in the CCHS 2013-2014. These values were similar to the age-standardized proportions presented in Table 2.

Age-standardized proportions and odds-ratios

Each survey demonstrated a higher prevalence of poor SROH with lower income (Table 2). For instance, in the CCHS 2007-2008, individuals in the lowest income category were at 3.90 times greater odds of experiencing poor SROH than those in the highest income category. Even individuals of the middle-income category had almost twice the odds of experiencing poor SROH than individuals in the highest income category. The proportion of individuals with poor SROH was generally higher with age and was also significantly higher in males than females across all three surveys. There were no significant changes in proportions and odds-ratios by age group and sex across the three surveys.

Slope and Relative Indices of Inequality

The SII and RII were statistically significant in all surveys, indicating a persistent presence of absolute and relative inequalities where poor SROH was disproportionately present among individuals of lower income (Table 3). Since the CCHS 2003, there was very little change in the SII, ranging from 18.7 to 19.0 indicating approximately a 19 percentage point difference in poor SROH between the top and bottom of the income distribution. In terms of relative inequality, the RII increased from 3.85 in the CCHS 2003 to 4.47 in the CCHS 2007-2008 and then decreased to 4.02 in the CCHS 2013-2014. These differences were not statistically significant.

Table 3 also presents the inequality analysis stratified by age and sex. These findings are also graphically represented in Figure 1 and Figure 2. In each CCHS survey, the SII and RII values were statistically significant across all age groups and in both males and females. All the SII and RII values were positive and larger than 1 respectively, indicating a higher prevalence of poor SROH in lower income groups, regardless of age or sex. In each CCHS survey, the SII increased with each subsequent age group up to the 50-64 age group and then decreased with the 65 and older age group. Additionally, SII values in the 12-19 age group were significantly lower than in older age groups across all CCHS cycles. Similarly, RII findings were lowest in the age group of 12-19 year olds, and highest in the middle age groups. From the CCHS 2003, the SII and RII decreased among adolescents and young adults but increased among older individuals over time. These differences were not statistically significant. The SII values were fairly similar between males and females in each survey and did not change significantly over time. The RII was slightly greater among females in each survey and increased from the CCHS 2003 to CCHS 2007-2008, then decreased in the CCHS 2013-2014 but differences were again not statistically significant.

DISCUSSION

This study quantified and compared the magnitude of inequalities in reporting poor SROH in Ontario by using the complex measures of inequality (SII and RII). While it is important to monitor inequalities in dental care utilization, it is also vital to assess how socioeconomic inequalities may translate to actual differences in oral health outcomes. This study revealed a persistent presence of income-related inequalities in poor SROH in Ontario, Canada's most diverse and populous province. Since 2003, individuals in lower income groups have experienced a noticeably higher prevalence of reporting poor SROH. Our findings also suggested that the severity of this inequality has not improved over the course of ten years. Additionally, income-related inequalities in SROH exist across all ages, and amongst both males and females. Findings also suggested that age groups from 20-64 years old experience a greater magnitude of inequality in SROH than 12-19 year olds.

Explanations for oral health inequalities in Ontario and Canada have been discussed in the literature. Studies propose variation in oral health behaviours, dental service utilization, and psychosocial factors as possible pathways leading to inequalities in oral health status between income groups.[25–27] Due to the lack of available data on these factors, there is no way to assess the role of each in the inequalities in this study. Yet, as previously mentioned, dental care in Canada is almost wholly privately financed via employer-provided insurance plans or out-of-pocket payments. Similar to other high-income countries, higher income groups and those with private insurance coverage visit the dentist significantly more often in Canada, especially for preventive dental services, thereby such populations generally have better oral health, which may play a role in explaining the inequalities this study has observed.[28]

A previous study assessing the Canadian Health Measure Survey reported greater magnitude of income-related inequalities in terms of decayed and missing teeth among women.[11] Contrarily, this study did not find significant differences in absolute or relative inequality between males and females for reporting poor SROH. A study by Wamala et al. on the Swedish population also did

not find sex differences when evaluating inequalities in self-reported oral health between men and women.[26] Research on other aspects of health however generally suggests that inequality is greater among men.[29–31] Potential mechanisms explaining differences in health inequalities between sexes such as differences in lifestyle, employment status, and access to oral health care services have been proposed, however, the mechanisms remain unclear.[3] Further investigation in the contribution of sex to the magnitude of oral health inequality is merited.

The magnitude of income-related inequalities in this study also increased with age with the exception of the RII in the CCHS 2003. It could be that, for children and adolescents, parents and guardians without private dental insurance are more willing to spend out-of-pocket for their child's dental care needs rather than their own even when their income and available expenditure is lower. Additionally, prior to 2016, Ontario had six provincially funded dental programs for children and youth from low income families, constituting a significant portion of all public dental expenditure in the province.[32] In 2016, Ontario amalgamated these programs into one program for children and youth 0 to 17 years old from low income families.[33] Consequently, publicly funded programs might help reduce the magnitude of oral health inequality in the youth/adolescent population. For individuals over 17 years of age, Ontario operates the Ontario Works and the Ontario Disability Support Program, but these programs only cover individuals on social assistance and disability assistance, and constitute a relatively minor share of all dental expenditure in Ontario. Beyond the publicly funded dental program available to children, there is very limited public coverage for adults Ontario.

Differences in the magnitude of income-related inequalities in oral health by age group may also partially be explained by the inverse relationship between the retention of teeth and increasing age and diminishing income.[3,34] As older adult populations retire, the cost of dental care also becomes a larger barrier to care due to loss of employment-based insurance and reduction in income.[35–38] Our findings reinforce the need for age-specific analyses of oral health inequalities to better understand what might influence the increasing magnitude of oral health inequalities.

This study should also be interpreted within its limits. The confidence intervals were relatively broad and overlapping, therefore, potential differences in inequalities might not have been captured. Further, as SROH data is not included in each cycle of the CCHS nor for every province, there was a less than optimal number of data points to assess changes in inequality in Ontario or Canada over time. Additionally, self-reported measures are heavily subjective to personal beliefs, education, and societal and cultural factors to varying degrees between individuals.[39,40] Patients may also be less likely to adequately assess the presence of caries and periodontal disease than they are the number of teeth and restorations.[19,41–43] As more data regarding oral health outcomes and status is collected in Canada, a more comprehensive analysis of changes in inequality will be permitted.

Ultimately, this study demonstrates a lack of improvement in oral health-related inequality in a Canadian population over time. Using the SII and RII along with other measurement tools of inequality can allow for identification of the most inequitable areas of health and populations experiencing the greatest severity of inequality. This can help inform policymakers in regard to decision-making around the allocation of resources to areas and populations in greatest need.

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TABLES

Table 1. Sample population characteristics; frequency counts and non-standardized proportions (%)

	CCHS 2003	**CCHS 2007-2008**	**CCHS 2013-2014**
	n=36,182	n=36,430	n=41,258
	n (%)	n (%)	n (%)
Age (years)			
12 to 14	1,805 (4.4)	1,496 (4.5)	1,554 (3.6)
15 to 19	2,484 (6.7)	2,290 (6.8)	2,825 (7.4)
20 to 24	1,722 (8.1)	1,745 (7.5)	2,258 (8.2)
25 to 29	2,419 (7.8)	2,204 (8.2)	2,226 (8.0)
30 to 34	3,005 (8.6)	2,660 (8.0)	2,128 (7.5)
35 to 39	3,292 (10.6)	2,998 (9.2)	2,402 (7.6)
40 to 44	3,061 (11.6)	3,115 (10.8)	2,506 (8.5)
45 to 49	2,743 (9.3)	2,723 (9.5)	2,135 (8.4)
50 to 54	2,933 (8.4)	3,051 (8.5)	3,073 (9.3)
55 to 59	2,904 (7.0)	3,295 (8.2)	3,809 (8.3)
60 to 64	2,441 (5.1)	2,938 (5.7)	3,976 (6.9)
65 to 69	2,220 (4.1)	2,384 (4.5)	3,973 (5.8)
70 to 74	1,989 (3.4)	2,015 (3.4)	2,995 (4.2)
75 to 79	1,670 (2.8)	1,685 (2.6)	2,403 (3.1)
80 and up	1,494 (2.2)	1,831 (2.5)	2,995 (3.2)
Sex			
Male	16,833 (49.9)	16,832 (49.8)	18,255 (48.8)
Female	19,349 (50.1)	19,598 (50.2)	23,003 (51.2)
Income			
Richest	12,930 (43.1)	7,629 (20.1)	8,561 (20.2)
2nd	12,629 (32.9)	7,050 (20.2)	8,498 (20.2)
3rd	7,070 (16.8)	7,476 (20.1)	8,519 (19.4)
4th	2,492 (4.9)	6,791 (19.8)	8,538 (19.9)
Poorest	1,061 (2.4)	7,304 (19.8)	7,142 (19.8)
SROH			
Good	30,844 (85.6)	31,320 (86.1)	35,191 (85.2)
Poor	5,338 (14.5)	5,110 (13.9)	6,067 (14.8)

Table 2. Age-standardized proportions (%) and odds ratios for poor self-reported oral health by income level, age, and sex

	CCHS 2003		CCHS 2007-2008		CCHS 2013-2014	
	Prop. [95% CI]	Odds Ratio [95% CI]	Prop. [95% CI]	Odds Ratio [95% CI]	Prop. [95% CI]	Odds Ratio [95% CI]
Income [a]						
Richest	9.7 [8.9, 10.6]	1	7.8 [6.8, 8.8]	1	8.2 [7.1, 9.4]	1
2	15.0 [14.0, 16.0]	1.71 [1.52, 1.92]	9.7 [8.7, 10.8]	1.35 [1.13, 1.61]	9.9 [8.9, 11.1]	1.29 [1.07, 1.56]
3	21.7 [19.9, 23.5]	2.62 [2.30, 2.99]	12.2 [11.1, 13.4]	1.73 [1.47, 2.04]	14.1 [12.7, 15.7]	1.90 [1.58, 2.28]
4	28.9 [25.6, 32.4]	3.77 [3.14, 4.53]	17.5 [15.9, 19.2]	2.67 [2.26, 3.15]	17.9 [16.2, 19.8]	2.48 [2.07, 2.97]
Poorest	23.3 [19.8, 27.3]	2.89 [2.19, 3.81]	24.8 [22.9, 26.8]	3.90 [3.32, 4.59]	25.7 [23.7, 27.9]	3.65 [3.06, 4.36]
Age (years)						
12 to 14	7.6 [5.8, 09.9]	1	7.3 [5.7, 9.4]	1	8.8 [6.8, 11.2]	1
15 to 19	7.8 [6.4, 09.6]	1.04 [0.72, 1.50]	6.3 [5.1, 7.8]	0.85 [0.60, 1.21]	7.8 [6.2, 9.8]	0.89 [0.61, 1.29]
20 to 24	10.8 [8.7, 13.4]	1.48 [1.01, 2.17]	11.3 [9.3, 13.7]	1.61 [1.14, 2.29]	13.9 [11.6, 16.4]	1.68 [1.19, 2.36]
25 to 29	11.8 [10.0, 13.9]	1.63 [1.16, 2.31]	11.7 [9.9, 13.9]	1.68 [1.20, 2.34]	14.5 [12.4, 17.0]	1.77 [1.28, 2.47]
30 to 34	13.5 [11.8, 15.4]	1.91 [1.37, 2.66]	10.8 [9.3, 12.5]	1.53 [1.11, 2.11]	11.8 [9.6, 14.3]	1.39 [0.97, 1.98]
35 to 39	13.6 [12.0, 15.5]	1.93 [1.39, 2.68]	12.1 [10.4, 13.9]	1.73 [1.26, 2.39]	12.6 [10.3, 15.2]	1.50 [1.05, 2.14]
40 to 44	14.8 [13.0, 16.8]	2.12 [1.53, 2.95]	14.5 [12.5, 16.8]	2.14 [1.55, 2.96]	14.7 [12.2, 17.7]	1.80 [1.26, 2.56]
45 to 49	16.1 [14.1, 18.5]	2.35 [1.68, 3.28]	15.8 [13.6, 18.4]	2.37 [1.71, 3.30]	13.6 [11.0, 16.6]	1.64 [1.14, 2.36]
50 to 54	19.6 [17.4, 22.0]	2.97 [2.14, 4.12]	16.8 [14.7, 19.2]	2.56 [1.86, 3.51]	19.5 [16.3, 23.2]	2.53 [1.78, 3.59]
55 to 59	16.9 [14.9, 19.2]	2.49 [1.79, 3.47]	16.6 [13.4, 20.5]	2.51 [1.73, 3.66]	18.5 [16.1, 21.1]	2.36 [1.71, 3.26]
60 to 64	17.8 [15.7, 20.1]	2.65 [1.91, 3.68]	18.6 [16.3, 21.1]	2.88 [2.09, 3.95]	16.1 [14.2, 18.2]	2.00 [1.46, 2.73]
65 to 69	17.8 [15.6, 20.2]	2.64 [1.90, 3.68]	17.8 [15.3, 20.6]	2.73 [1.97, 3.80]	18.4 [16.1, 21.0]	2.35 [1.71, 3.24]
70 to 74	16.4 [14.3, 18.8]	2.40 [1.72, 3.35]	19.3 [16.7, 22.3]	3.03 [2.18, 4.20]	17.3 [14.5, 20.5]	2.18 [1.55, 3.08]
75 to 79	20.2 [17.2, 23.6]	3.09 [2.17, 4.40]	18.6 [15.5, 22.2]	2.88 [2.03, 4.10]	17.8 [15.1, 20.9]	2.26 [1.61, 3.17]
80 or more	17.3 [14.7, 20.3]	2.56 [1.80, 3.64]	18.9 [16.1, 22.0]	2.94 [2.11, 4.12]	19.3 [16.8, 22.1]	2.50 [1.81, 3.45]
Sex						
Male	16.1 [15.3, 17.0]	1	15.7 [14.7, 16.7]	1	16.4 [15.4, 17.5]	1
Female	13.2 [12.4, 13.9]	0.80 [0.73, 0.88]	12.5 [11.7, 13.2]	0.76 [0.68, 0.84]	13.1 [12.3, 14.0]	0.78 [0.70, 0.87]
Overall	14.6 [14.1, 15.2]	-	14.1 [13.5, 14.7]	-	14.8 [14.1, 15.5]	-

[a]In CCHS 2003, income was categorized by the CCHS into five income adequacy groups. In CCHS 2007-2008 and 2013-2014, income was categorized by provincial income distribution.

Table 3. Slope Index of Inequality and Relative Index of Inequality for poor self-reported oral health

	CCHS 2003		CCHS 2007-2008		CCHS 2013-2014		
	Estimate [95% CI]	% Change from previous survey	Estimate [95% CI]	% Change from previous survey	Estimate [95% CI]	% Change from previous survey	% Change between first and last survey
Slope Index of Inequality							
Age							
12 to 19	10.2 [5.5, 14.8]	-	2.8 [-0.8, 6.4]	-72.4	4.2 [-0.7, 9.0]	48.8	-58.9
20 to 34	19.5 [15.1, 23.9]	-	16.0 [12.5, 19.6]	-17.7	15.2 [10.7, 19.8]	-4.9	-21.8
35 to 49	20.5 [16.3, 24.7]	-	21.5 [17.8, 25.2]	5.0	22.4 [17.8, 27.0]	4.2	9.3
50 to 64	23.0 [18.1, 28.0]	-	26.5 [21.1, 31.9]	15.0	27.8 [22.5, 33.1]	5.1	20.9
65 and over	15.6 [10.7, 20.6]	-	20.4 [15.7, 25.2]	30.7	18.8 [14.0, 23.6]	-8.1	20.2
Sex							
Male	19.0 [15.8, 22.3]	-	20.8 [17.5, 24.0]	9.1	19.3 [15.8, 22.8]	-7.1	1.4
Female	20.0 [17.3, 22.7]	-	17.8 [15.5, 20.0]	-11.1	19.8 [17.0, 22.6]	11.3	-1.0
Overall	18.9 [16.8, 21.0]	-	18.7 [16.7, 20.7]	-1.2	19.0 [16.8, 21.3]	1.8	0.6
Relative Index of Inequality							
Age							
12 to 19	4.44 [2.28, 8.64]	-	1.51 [0.89, 2.57]	-65.9	1.67 [0.93, 2.97]	9.9	-62.5
20 to 34	5.28 [3.64, 7.65]	-	4.29 [3.03, 6.09]	-18.7	3.37 [2.35, 4.83]	-21.5	-36.2
35 to 49	4.11 [3.11, 5.42]	-	5.55 [4.13, 7.45]	35.1	6.09 [4.14, 8.96]	9.8	48.4
50 to 64	3.63 [2.77, 4.77]	-	6.45 [4.46, 9.33]	77.6	5.76 [4.13, 8.03]	-10.7	58.6
65 and over	2.47 [1.85, 3.28]	-	3.36 [2.52, 4.48]	36.0	3.20 [2.33, 4.39]	-4.7	29.7
Sex							
Male	3.44 [2.80, 4.23]	-	4.37 [3.46, 5.52]	27.0	3.58 [2.82, 4.53]	-18.1	4.0
Female	4.81 [3.89, 5.96]	-	5.22 [4.18, 6.51]	8.5	5.01 [3.93, 6.39]	-4.0	4.1
Overall	3.85 [3.32-4.46]	-	4.47 [3.80, 5.26]	16.1	4.02 [3.39, 4.75]	-10.1	4.4