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Social inequalities in tooth loss: A multinational comparison

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Abstract

Objectives: To conduct cross-national comparison of education-based inequalities in tooth loss across Australia, Canada, Chile, New Zealand and the United States.

Methods: We used nationally representative data from Australia's National Survey of Adult Oral Health; Canadian Health Measures Survey; Chile's First National Health Survey Ministry of Health; US National Health and Nutrition Examination Survey; and the New Zealand Oral Health Survey. We examined the prevalence of edentulism, the proportion of individuals having <21 teeth and the mean number of teeth present. We used education as a measure of socioeconomic position and measured absolute and relative inequalities. We used random-effects meta-analysis to summarize inequality estimates.

Results: The USA showed the widest absolute and relative inequality in edentulism prevalence, whereas Chile demonstrated the largest absolute and relative social inequality gradient for the mean number of teeth present. Australia had the narrowest absolute and relative inequality gap for proportion of individuals having <21 teeth. Pooled estimates showed substantial heterogeneity for both absolute and relative inequality measures.

Conclusions: There is a considerable variation in the magnitude of inequalities in tooth loss across the countries included in this analysis.

KEYWORDS
disparities, education, epidemiology, public health, tooth loss

1 | INTRODUCTION

Most chronic dental diseases are irreversible and cumulative. Untreated dental decay or severe periodontal disease can progress, render a tooth unrestorable and make dental extraction the only treatment option. Although alternative treatments may be possible in some instances, evidence suggests that many individuals from less advantaged groups receive extractions. Consequences of tooth loss differ, depending on its severity and intra-oral location. Aesthetic concerns, difficulty in chewing and eating (and its effect on nutrition and general health),[1] and negative impacts on social life and poor oral health-related quality of life have all been associated with missing teeth.[2]

Preliminary findings from this research were presented at the International Association of Dental Research meeting in Boston, 2015.

Globally, according to findings from a recent systematic review,[3] it was estimated that there were 158 million edentate people in 2010. Despite evidence suggesting a decline in the prevalence of tooth loss in the last decade, Slade et al.[4] projected that by 2050 there will still be 8.6 million edentulous individuals in the USA alone. Previous research has demonstrated that the reduction in tooth loss is unequally distributed within populations, with a higher burden consistently reported among disadvantaged groups.[5-7]

Among oral health indicators, important aspects of tooth loss are edentulism, the presence or absence of a functional dentition (defined by the World Health Organization as having at least 20 teeth),[8] and the number of remaining teeth present. A number of international studies have examined socioeconomic inequalities in tooth loss using nationally representative data and a range of measures of socioeconomic position. In the USA, for example, an analysis of socioeconomic trends in edentulism revealed a persistent inequality gap between 1972 and 2001.[6] In Australia, an investigation of socioeconomic inequality in tooth loss found that adults in less advantaged income groups had higher numbers of missing teeth than more affluent groups.[9] Similar social gradients in tooth loss have been documented in Canada,[5,10] Japan,[11] the UK,[12] Sweden and Brazil.[7] However, much of the focus of previous investigations has been on inequality within countries. Very few studies have extended comparisons to other countries for international contrast.[5,7,13] In addition, most of prior research did not use measures that capture the association across the entire range of socioeconomic position to permit cross-national comparisons of the magnitude of inequality. Accordingly, the objective of this study was to estimate the magnitude of social inequality in adult oral health across Australia, Canada, Chile, New Zealand and the USA, using education as an indicator of social position. The five countries included in this study have different healthcare systems, with Australia, New Zealand and Chile having a mixed system that is a combination of public and private provision. Canada, on the other hand, has a universal public (social) insurance plan, and the USA has a noncomprehensive health coverage system through Medicare for individuals ages 65 years and older and Medicaid for disadvantaged individuals. Nevertheless, none of those five countries has comprehensive dental insurance coverage, and dental expenses are heavily paid out of pocket. Despite some notable differences, the comparability of oral health care among these countries permits relevant comparisons of the magnitude of oral health disparities across their populations.

2 | METHODS

2.1 | Data sources

We used nationally representative data from Australia, Canada, Chile, USA and New Zealand. For Australia, we utilized data from Australia's National Survey of Adult Oral Health (NSAOH), conducted between 2004 and 2006. The NSAOH used a three-stage, stratified clustered sampling frame and comprised a telephone interview followed by a clinical dental examination component. The survey interviewed 14123 adults aged 15 years and older and examined 5505 respondents. Comprehensive dental examinations were conducted by 30 trained dentists and collected detailed information on tooth loss, dental caries experience and periodontal condition.[14]

For comparison with Canada, we used data from the Canadian Health Measures Survey (CHMS), conducted between 2007 and 2009. The CHMS used a multistage stratified sampling design and examined a total of 5586 child and adult participants. Data were collected through individual household interviews and an examination that was conducted in a mobile examination centre. The latter included clinical measurements such as blood assays and physical fitness, in addition to a detailed oral examination using standard oral epidemiological techniques.[15]

For Chile, we analysed data from Chile's First National Health Survey (NHS), in which 3619 adults aged 17 years and older were examined in 2003. The NHS had a three-stage sampling procedure, which consisted of geographic clusters, households and an adult randomly selected from each household. Nurses, who were trained by Chile's Ministry of Health Dental Health Unit, conducted a limited dental examination. The collected oral health data included information on edentulism, the number of teeth present and the number of decayed teeth.[16]

We used publicly accessible data from the National Health and Nutrition Examination Survey (NHANES), conducted annually in the United States since 1999. In this study, we used the 2003-2004 module in which 7072 people were examined. NHANES uses stratified multistage probability samples of the civilian noninstitutionalized population of the USA and contains data about nutrition, health conditions and oral health.[17]

Finally, we used the New Zealand Oral Health Survey (NZOHS), conducted from February to December 2009; it examined 3196 children and adults. Participants in the NZOHS were individuals who participated in the previous New Zealand 2006/2007 health survey and agreed to be contacted for future surveys. The original 2006/2007 sample was representative of the noninstitutionalized adult population and used a multistage, stratified, probability proportional to size sample design. 84% of those who participated in the 2006/2007 survey agreed to be contacted for the later survey. The weighted response rate for adults was 70% to the interview and 84% for the dental examination.[18]

In addition to the oral examination component, all five surveys collected detailed demographic data (which included information on socioeconomic position) and other health conditions.

2.2 | Variables

Our outcome variables included the prevalence of edentulism ("yes," "no"), the prevalence of <21 teeth ("yes," "no"), and the mean number of teeth present. For consistency across the five surveys, we excluded wisdom teeth and all analyses were based on a maximum of 28 teeth. The exception was Chile where third molars were unable to be excluded from our analysis because the oral disease

data were recorded at participant level rather than at tooth or surface level.

We used education as the measure of socioeconomic position. Educational attainment has been used in previous studies to demonstrate the association between socioeconomic position and health and in cross-national comparative analyses of health inequalities.[19-22] Education is a marker of individuals' socioeconomic status; it reflects early life circumstances and is a strong determinant of future occupation and income. Therefore, higher levels of education could lead to better access to resources and greater health awareness that shapes individuals' lifestyles and behaviours.[20,23]

Education was measured as the highest level of education completed, using different categories of certification in each country. When estimating the prevalence of each outcome, we collapsed education groups into four comparable ordinal categories across the five surveys based on approximate years of education achieved so that "lowest" category would include primary or elementary education, "secondary" includes secondary school or high school, "postsecondary" includes college certificates that are less than Bachelor degree and "tertiary" includes bachelor or university degrees and higher degrees. However, when estimating absolute and relative indices of inequality, we used all of the original categories of education reported by each survey, that is eight categories in Canada, five in the USA, 10 in Australia, six in Chile and six in New Zealand.

2.3 | Statistical analysis

We estimated absolute and relative inequality using the Slope Index of Inequality (SII) and the Relative Index of Inequality (RII), respectively.[24,25] Unlike other measures of inequality, that compare only extreme groups, the SII and RII are regression-based measures of inequality that take into account the entire distribution of the socioeconomic variable being used. To calculate the SII, social groups are ranked from lowest to highest, and then, each category is given a score based on the mid-point of its weighted cumulative distribution. For example, if the lowest ranked social group accounts for 10% of the population, it is given a score of 0.05. If the next group is also 10% of the population, it represents the 10th to the 20th percentile of the cumulative distribution and is given a score of 0.15. Each outcome is then regressed against the mid-point of its cumulative distribution, and the coefficient on the mid-point is the SII. The RII (ratio) is calculated by dividing the predicted coefficient of the health outcome at the bottom of the social distribution by the predicted value at the higher social group.[26,27] In addition, we used random-effects meta-analysis to pool SII and RII estimates across the five countries based on the method of Der Simonian and Laird.[28]

We limited analyses to adults aged 25 years and older in order for there to have been sufficient time for individuals' educational attainment. Additionally, when estimating inequality for the prevalence of edentulism we restricted the sample to individuals aged 35 years and older because, in some surveys, there were very small number or no events in the 25-35 year age group. We also restricted the sample to dentate individuals when describing the prevalence of <21 teeth and the mean number of teeth present. We adjusted for age and gender when estimating prevalence, SII and RII. We analysed each data set separately, and all analyses were age-adjusted to the average age distribution of the five surveys combined. In addition, to be able to make population inferences, we utilized the appropriate survey weights to account for the complex survey designs that were used. We used Stata statistical software (version 13.1) (StataCorp LP, College Station, Texas, USA) for all analyses.[29]

An approval from institutional review board of McGill University Faculty of Medicine and Harvard School of Public Health that includes all five countries was obtained. In addition, ethical approval for the original studies was obtained from the respective ethics board for Chile, New Zealand and Australia. Access to New Zealand data used in this study is provided by Statistics New Zealand under conditions designed to keep individual information secure in

TABLE 1 Sociodemographic characteristics of the five surveys

Variables	Australia N (%)[a]	Canada N[b] (%)[a]	Chile N (%)[a]	New Zealand N (%)[a]	US N (%)[a]
Gender					
Male	2016 (49.8)	(49.1)	1359 (48.4)	793 (48.2)	2200 (48)
Female	3057 (50.2)	(50.9)	1667 (51.6)	1248 (51.9)	2368 (52)
Education					
Lowest	1196 (22.8)	(12.8)	1573 (52.0)	467 (19.8)	1366 (18.6)
Secondary	478 (10.9)	(17.6)	1175 (38.8)	307 (16.4)	1134 (26.9)
Postsecondary	1521 (32.0)	(42.1)	84 (2.8)	800 (40.0)	1189 (30.4)
University	1634 (34.4)	(27.5)	194 (6.4)	444 (23.3)	865 (24.2)
Age					
Mean±SD	49.5±14.7	47.9±12.4	45.9±20	48.2±14.8	48.9±13.0
Range	25-91		25-97	25-94	25-85

N.B, All numbers are based on individuals 25 years of age and older.
[a]Weighted proportions.
[b]The Canadian Health Measures Survey (CHMS) authorities do not release sample size information when weighted proportions are released.

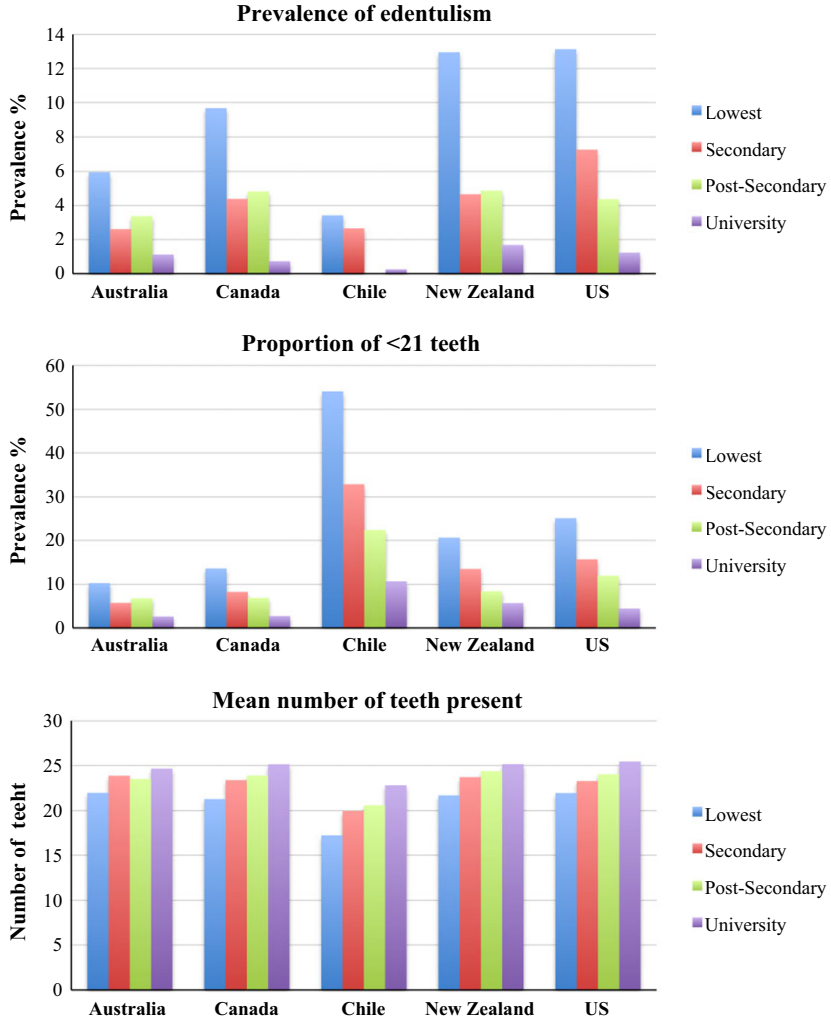
accordance with requirements of the Statistics Act 1975. The opinions presented are those of the authors and do not necessarily represent an official view of Statistics New Zealand.

3 | RESULTS

The sample sizes included in our analysis for individuals who underwent oral examination and were 25 years and older were 5073 for Australia, 3026 for Chile, 2041 for New Zealand, 4568 for the USA and 3278 for Canada. For reasons of confidentiality, the CHMS authorities do not release sample size information when weighted proportions are released. Weighted analysis showed very similar distributions of most demographic characteristics across the five countries (Table 1), but the population distribution across the education categories differed.

Figure 1 presents age- and gender-adjusted prevalence estimates for edentulism, the proportion of <21 teeth and the mean number of teeth present by education category (point estimates and 95% confidence intervals (CI) are presented in Appendix S1). Overall, for individuals aged 35 years and older, the USA demonstrated the highest adjusted prevalence of edentulism, while Chile had the lowest prevalence across all education categories. In contrast, for the distribution of the proportion of individuals with fewer than 21 teeth, Chile had the highest adjusted prevalence across all education categories. A very similar education gradient was observed across the five countries in the mean number of teeth present, although Chile had the most pronounced gradient.

Forest plots for the prevalence of edentulism for SII and RII, respectively, are shown in Figure 2. For edentulism, the USA demonstrated the largest absolute inequality (SII=14.69; 95% CI=7.27, 22.12), indicating that moving from the highest to the lowest



NB:

-Data are age and gender adjusted.

-There are no stratum specific estimates in Chile at post-secondary education for edentulism due to sparse cells; therefore this stratum was collapsed into the university category

FIGURE 1 Distribution of edentulism, functional dentition and number of teeth present by education

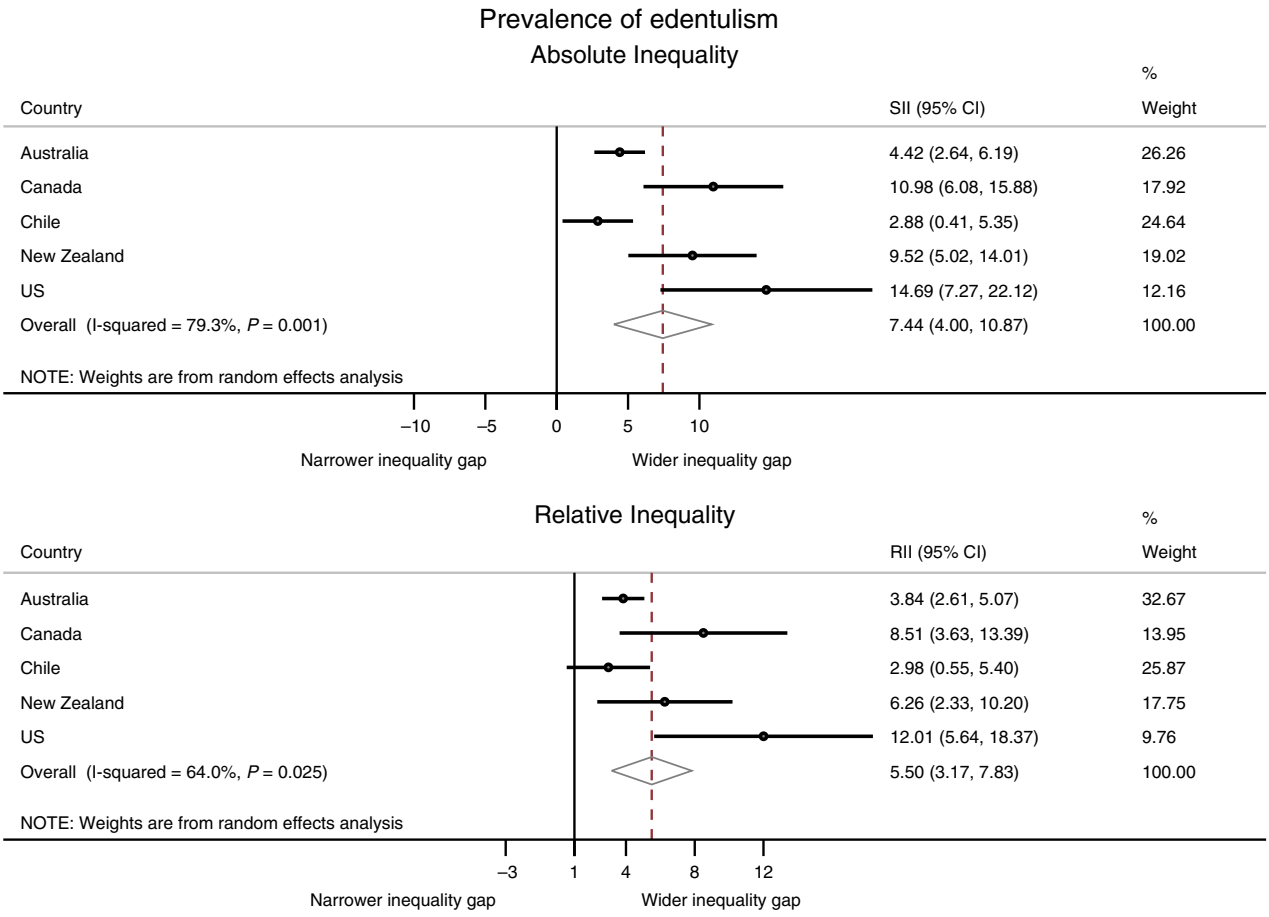


FIGURE 2 Forest plots for the prevalence of edentulism for the Slope Index of Inequality and the Relative Index of Inequality

education category would be associated with an absolute increase of 14.7 in edentulism prevalence. A very similar pattern was seen on the relative scale: the USA showed the widest relative inequality (RII=12.01; 95% CI=5.64, 18.37) so that moving from the top to the bottom of the education distribution was associated with 12-fold increase in edentulism.

For the proportion of individuals having fewer than 21 teeth (Figure 3), Chile demonstrated the widest absolute inequality (SII=52.2; 95% CI=42.76, 61.63) and the USA had the largest relative inequality (RII=6.25; 95% CI=3.65, 8.86). Australia, on the other hand, showed the smallest inequality gap on both absolute and relative inequality scales (SII=8.21; 95% CI=6.29, 10.13; RII=3.76; 95% CI=2.92, 4.6), indicating that there would be an absolute increase of 8.2 percentage points and a relative increase of 3.8 times in the prevalence of having fewer than 21 teeth when moving down the education distribution.

There were minor variations presented across countries in the mean number of teeth present (Figure 4). The absolute inequality gap ranged from an SII of 2.96 (95% CI=2.38, 3.54) in Australia to one of 6.7 (95% CI=5.4, 8.01) in Chile. The relative inequality ranged from an RII of 1.14 (95% CI=1.11, 1.16) in Australia and in New Zealand (RII=1.14; 95% CI=1.10, 1.19) to one of 1.41 (95% CI=1.33, 1.52) in Chile.

Pooled estimates from meta-analysis showed substantial heterogeneity among countries for both absolute and relative inequality measures. I-squared statistics suggest significant heterogeneity for all outcomes across countries with the exception of relative inequality for functional dentition.

4 | DISCUSSION

Using population-representative estimates from Australia, Canada, Chile, USA and New Zealand, we examined absolute and relative educational inequalities in oral health. Our findings demonstrate a social gradient in tooth loss with a considerable variation in the inequality gradient across those countries. For the number of teeth present and having a functional dentition, Australia showed the narrowest absolute and relative inequalities, while Chile fared best for the prevalence of edentulism only.

Our findings revealed large disparities in edentulism, and these were most pronounced in the USA. Although direct comparison with previous research is limited because of differences in the inequality metrics or socioeconomic indicators used, the social gradient observed in this study was still consistent with those documented in previous reports. Using three waves of NHANES data, Cunha-Cruz

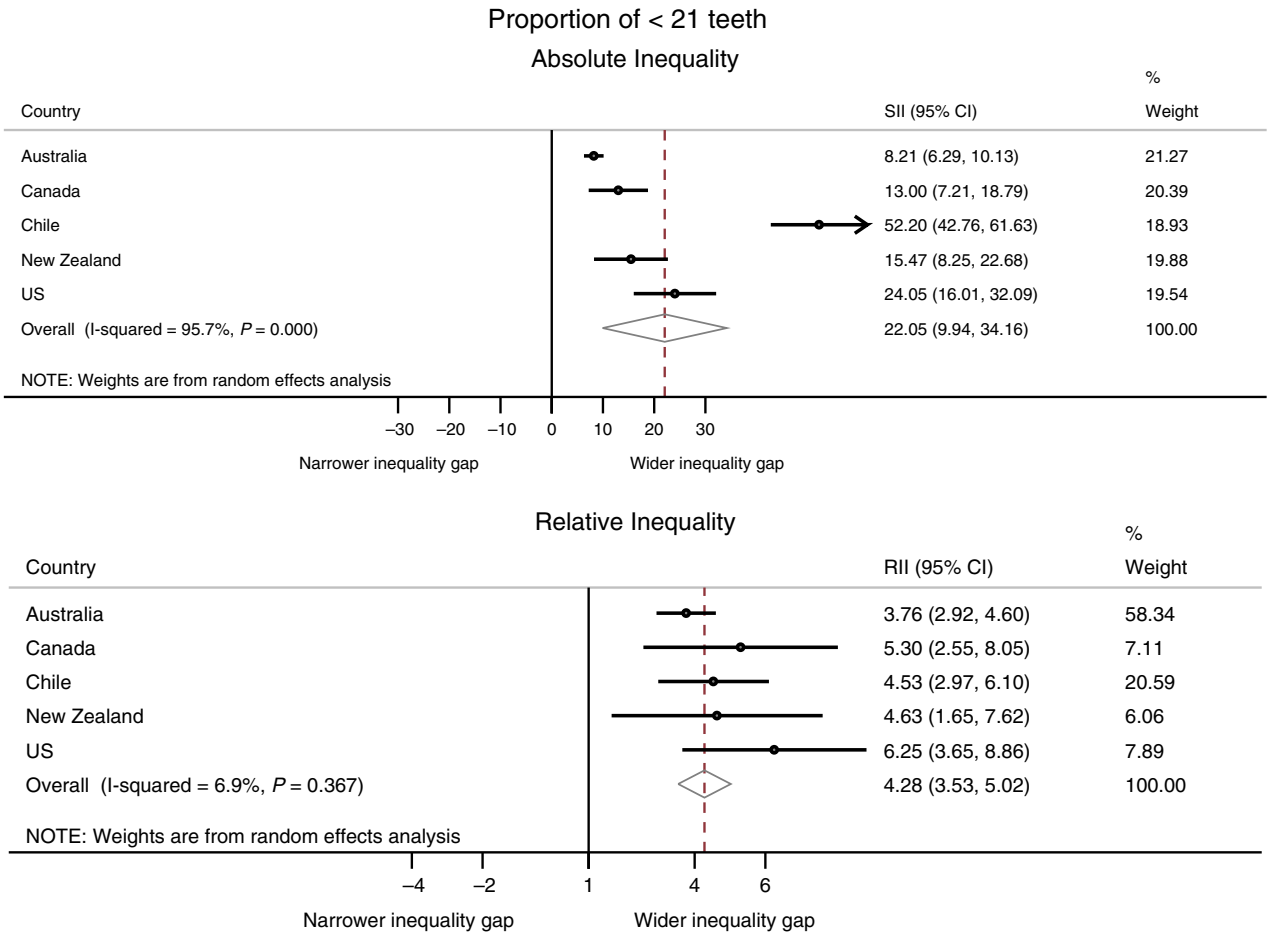


FIGURE 3 Forest plots for the proportion of individuals having fewer than 21 teeth for the Slope Index of Inequality and the Relative Index of Inequality

et al. demonstrated a persistent socioeconomic gap between 1972 and 2001, whereby individuals from less advantaged groups had consistently higher edentulism prevalence.[6] In a more recent study, trends in the prevalence of edentulism were also compared across five decades in the USA and despite the observed overall decline in prevalence over time—from 18.9% in the 1950s to 4.9% in 2012—the socioeconomic differential did not improve.[4]

Edentulism is an important indicator in oral epidemiology, and it has been extensively investigated; however, it is also the "end state"[30] of oral disease and its exclusive use in such studies could mask important differences in incremental tooth loss among those who are not edentulous. In this study, we found that Chile had the narrowest inequality gradient for edentulism (and the lowest prevalence of that condition); however, it had the most pronounced inequalities in the other two indicators of tooth loss; the presence of a functional dentition and the mean number of teeth present. Conceptually distinct from the more common incremental loss of teeth which occurs haphazardly across adult life, the transition to edentulism involves opting for complete removal of the remaining dentition in a single operation. Because that usually involves the removal of intact, functioning teeth, that the decision to become edentulous is as much a social decision as it is a clinical one. The reasons for edentulism are thus both disease-related and sociocultural.[30] Moreover, this finding underlines the importance of using multiple indicators of oral health when examining social inequalities given that the magnitude and pattern of disparity may differ according to which aspect of oral health is being investigated.

Our study findings are also consistent with those of investigations that have used similar inequality indices to assess the magnitude of disparity in tooth loss. For example, income inequalities in functional dentition were investigated across Australia, Brazil and the USA.[13] In that comparative study, the authors demonstrated a decline in absolute inequalities over time in Australia and Brazil, with an increase in the relative inequalities. Inequalities in the USA, however, remained unchanged. In another study in Australia, the SII for income was −15.5 (SE=3.7), indicating that moving from the bottom to the top of the income distribution would be associated with a 15.5% fewer missing teeth. That SII differ from the SII for education in our current findings, as the outcome was the missing component of the DMFT index (essentially teeth missing due to caries, with the exception of ages 45 and over where it was "due to pathology"), and the analysis included individuals 15 years and older, as well as

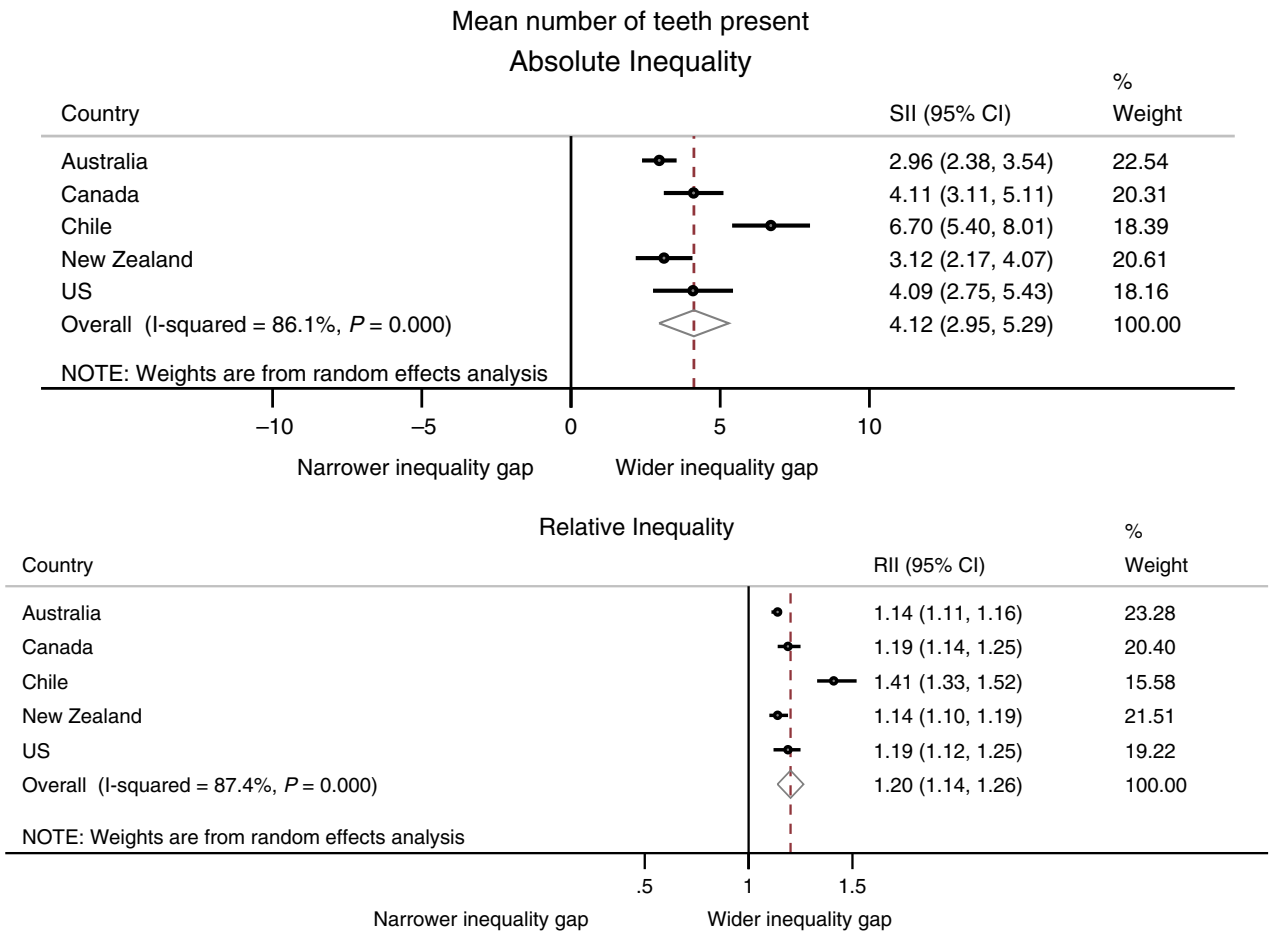


FIGURE 4 Forest plots for the mean number of teeth present for the Slope Index of Inequality and the Relative Index of Inequality

including wisdom teeth and excluding edentulous individuals. In addition, our analysis standardized for age and gender across all surveys for comparisons, and the earlier study adjusted only for age and gender within the models.[31]

We recognize that this study has a number of limitations. First, we used education as the sole indicator of socioeconomic position because it is the only such indicator to be used consistently across the five surveys. However, one must recognize the differences in education systems across countries included in this analysis. These regional variations could include differences in the quality of education received; thus, the influence of each level of education on health may not be exactly similar across countries.[20] In addition, it is possible that there would be greater misclassification of education in countries with fewer education groups, although it is not clear which direction this might move the estimates in. That said, while education has weaknesses as a marker of socioeconomic position, it is also less susceptible to reverse causation compared to occupation or income (both of which are likely to change following the experience of illness). Education level offers a stable representation of socioeconomic position, and captures a wide range of resources including knowledge, skills, and health literacy, but also prestige, opportunities in the labour market and earnings potential. We therefore contend that it is a robust marker of socioeconomic position, particularly for international comparisons.

Additionally, our exclusion of wisdom teeth from our analysis (with the exception of Chile) might have underestimated the number of missing teeth in our findings. However, third molars are naturally missing in some individuals and extraction is often their treatment of choice when they are decayed. As a sensitivity analysis, we ran the analyses using the data from Australia and New Zealand with and without the wisdom teeth, and only minor differences in the inequalities were observed; this suggests that excluding third molars did not affect the overall findings. Finally, the five surveys we used were conducted at slightly different times. Despite these limitations, using nationally representative estimates from Australia, Canada, Chile, New Zealand and the USA, we have documented that the social gradient in tooth loss exists irrespective of the outcome examined. In this study, we have used three indicators of tooth loss to better capture the disparity pattern for that outcome. Additionally, using rigorous statistical methods we examined both absolute and relative inequalities with indices that enable us to estimate and compare disparities across those countries; although the edentulism results for Chile should be interpreted cautiously because some age- and education-specific cells were small, leading to large changes between

unstandardized and standardized estimates. These absolute and relative measures of disparity could be distorted by nonmonotonic patterns across ordered categories such as education,[32] but this does not apply to our findings. Furthermore, all outcomes included in this analysis were clinically assessed by trained examiners; this strengthens the case for asserting the validity of our findings.

There is clear evidence from this study that there is a consistent social gradient in tooth loss across the five nations investigated. Future investigations of the differences (and similarities) in dental care systems in those countries could assist in interpreting (and acting upon) the findings, but that is beyond the scope of the current paper. In addition, the variations in inequality across those countries suggest the need for further research to explore the broader sociocultural determinants of oral health. This study, by comparing tooth loss across five countries with relatively similar dental care systems, points out the need to explore mechanisms and structural determinants to explain the educational inequalities observed in tooth loss. Efforts to reduce these inequalities should not only address inequalities in schooling within each country (such as encouraging high school completion, and expanding college access), but also address the inequalities in access to resources experienced by disadvantaged groups—such as expanding access to and availability of oral health services, or intervening to mitigate the socioeconomic consequences of tooth loss. Strategies aimed at preventing tooth loss also need to be considered. Tackling inequalities in oral health through a range of different mechanisms should be a fundamental health policy approach.

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CONFLICT OF INTEREST

We declare we have no competing interest.

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SUPPORTING INFORMATION

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Appendix S1: Adjusted prevalence, adjusted prevalence difference “PD", absolute “SII” and relative “RII” inequalities in 3 indicators of tooth loss by education

	% Edentulism		% Fewer than 21 teeth		Mean number of teeth present	
	Prevalence	**PD**	**Prevalence**	**PD**	**Prevalence**	**PD**
	95% CI	**95% CI**	**95% CI**	**95% CI**	**95% CI**	**95% CI**
Canada						
Lowest	9.68	8.95	13.57	10.87	21.26	-3.87
	5.94, 13.42	5.32, 12.58	8.54, 18.61	6.16, 15.58	20.31, 22.22	-4.91, -2.83
Secondary	4.38	3.65	8.23	5.53	23.37	-1.77
	2.24, 6.52	1.57, 5.73	4.89, 11.57	2.37, 8.68	22.76, 23.97	-2.46, -1.08
Post-secondary	4.82	4.09	6.83	4.13	23.88	-1.26
	2.91, 6.74	2.23, 5.95	4.60, 9.06	2.10, 6.16	23.49, 24.27	-1.74, -0.77
University	0.73	Ref	2.70	Ref	25.14	Ref
	0.14, 1.32		1.37, 4.03		24.77, 25.50	
SII	10.98 (6.08, 15.88)		13.0 (7.21, 18.79)		4.11 (3.11, 5.11)	
RII	8.51 (3.63, 13.39)		5.30 (2.55, 8.05)		1.19 (1.14, 1.25)	
US						
	n= 489		n= 904		n= 4,076	
Lowest	13.13	11.90	25.07	20.67	21.93	-3.52
	6.27, 19.99	5.40, 18.41	16.93, 33.22	12.53, 28.80	20.78, 23.08	-4.78, -2.26
Secondary	7.24	6.01	15.67	11.26	23.27	-2.18
	4.13, 10.34	3.82, 8.19	12.83, 18.51	8.74, 13.78	22.78, 23.76	-2.81, -1.55
Post-secondary	4.37	3.15	11.93	7.52	24.04	-1.41
	2.86, 5.89	1.59, 4.70	8.74, 15.12	4.64, 10.40	23.60, 24.48	-1.98, -0.84
University	1.23	Ref	4.41	Ref	25.45	Ref
	0.12, 2.33		2.79, 6.02		25.06, 25.83	
SII	14.69 (7.27, 22.12)		24.05 (16.01, 32.09)		4.09 (2.75, 5.43)	
RII	12.01 (5.64, 18.37)		6.25 (3.65, 8.86)		1.19 (1.12, 1.25)	
Chile						
	n=397		n=1,326		n=2,628	
Lowest	3.42	3.17	54.04	43.42	17.21	-5.59
	1.77, 5.07	1.57, 4.77	48.85, 59.23	35.80, 51.05	16.70, 17.72	-6.77, -4.41
Secondary	2.66	2.41	32.81	22.19	19.93	-2.87

	1.27, 4.04	1.05, 3.76	28.15, 37.48	14.91, 29.48	19.38, 20.49	-3.96, -1.78
Post-secondary	XX*	XX	22.36	11.73	20.57	-2.24
			8.03, 36.68	-3.72, 27.18	19.49, 21.65	-3.61, -0.86
University	0.25	Ref	10.62	Ref	22.80	Ref
	-0.08, 0.58		4.99, 16.26		21.73, 23.88	
SII	2.88 (0.41, 5.35)		52.20 (42.76, 61.63)		6.70 (5.40, 8.01)	
RII	2.98 (0.55, 5.40)		4.53 (2.97, 6.10)		1.41 (1.33, 1.52)	

Australia

	n= 1,261		n= 817		n= 5,073	
Lowest	5.94	4.82	10.22	7.61	21.96	-2.70
	3.98, 7.89	3.14, 6.50	8.30, 12.13	5.91, 9.31	21.55, 22.38	-3.20, -2.19
Secondary	2.61	1.49	5.70	3.09	23.87	-0.79
	1.62, 3.61	0.63, 2.36	4.23, 7.17	1.74, 4.44	23.48, 24.26	-1.20, -0.37
Post-secondary	3.37	2.25	6.76	4.15	23.50	-1.16
	2.26, 4.47	1.39, 3.11	5.57, 7.96	3.10, 5.21	23.18, 23.82	-1.50, -0.82
University	1.12	Ref	2.61	Ref	24.66	Ref
	0.64, 1.59		1.97, 3.25		24.39, 24.92	
SII	4.42 (2.64, 6.19)		8.21 (6.29, 10.13)		2.96 (2.38, 3.54)	
RII	3.84 (2.61, 5.07)		3.76 (2.92, 4.60)		1.14 (1.11, 1.16)	

New Zealand

	n=369		n=327		n=2,837	
Lowest	12.95	11.27	20.62	14.98	21.67	-3.49
	7.96, 17.94	6.26, 16.27	12.63, 28.62	6.70, 23.25	20.56, 22.79	-4.67, -2.30
Secondary	4.66	2.98	13.46	7.81	23.71	-1.45
	2.77, 6.56	0.83, 5.14	9.08, 17.83	2.48, 13.13	23.14, 24.29	-2.12, -0.78
Post-secondary	4.87	3.19	8.35	2.70	24.38	-0.78
	3.25, 6.49	1.22, 5.15	5.99, 10.71	-1.06, 6.47	24.0, 24.76	-1.31, -0.25
University	1.68	Ref	5.65	Ref	25.16	Ref
	0.43, 2.93		2.67, 8.63		24.74, 25.58	
SII	9.52 (5.02, 14.01)		15.47 (8.25, 22.68)		3.12 (2.17, 4.07)	
RII	6.26 (2.33, 10.20)		4.63 (1.65, 7.62)		1.14 (1.10, 1.19)	

NB:

-All based on ages 25 years and older except "%Edentulism" based on 35 years and older

-Data adjusted for age and gender

*There are no stratum specific estimates in Chile at post-secondary education for edentulism due to sparse cells; therefore this stratum was collapsed into the university category