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11 Social inequalities in oral health – towards targeted health policy interventions

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- ▶ Oral diseases belong to the most common chronic diseases worldwide and there are substantial oral health inequalities both within and between countries
 - ▶ Tooth status is a relevant marker of health and a useful measure to detect pathways between socioeconomic status, health, and general well-being, particularly in older adulthood
 - ▶ The number of natural teeth exhibits strong pro-rich inequalities with respect to income and deprivation
 - ▶ Inequalities in oral health appear partially attributable to dental non-attendance due to treatment costs – more so in some countries, less so in others. No clear geographical pattern or clustering according to welfare state regime could be detected
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11.1 Oral health and socioeconomic status

Oral health remains an essential element of people's health and well-being. As measured by the recent Global Burden of Disease Study, oral diseases continue to be among the most common diseases affecting human mankind. Globally, 3.9 billion people suffer from common oral conditions along with tooth loss (Marcenes et al. 2013). Dental caries is still the most common chronic disease worldwide and affects large parts of the global population in both child- and adulthood. The high prevalence of oral diseases and their treatment places considerable economic burden on the society and individuals. Moreover, oral health status is a relevant determinant of general health as it is associated with diet and nutrition. Not least, tooth loss has been shown to have a significant detrimental impact on people's quality of life and well-being and to affect them functionally, psychologically and socially. Oral health may thus be considered an important determinant of general health and well-being.

From a clinical perspective, oral diseases are largely preventable. The main causes of dental caries – the most common oral condition – relate to behavioural risk factors, most importantly high consumption of sugary food and poor oral hygiene. As such, oral diseases share common behavioural risks with other major non-communicable health conditions such as overweight, diabetes, and cardiovascular disease. Yet oral health is multi-faceted with its current manifestation

mirroring disease experience over the entire previous life course. There are many ways and components to measure oral health, including self-reported outcomes; oral health related quality of life, clinical measures for diseases such as caries, periodontitis, congenital deformities such as cleft lip and palate, oral cancer, as well as number of teeth. With regard to the latter, tooth loss has been suggested to be a good measure in older age as it provides a ‘big picture’ of various risks accumulated over the previous life course and their aggregated impacts on oral health (Steele et al. 2015).

Similar to general health, there is vast empirical evidence on the existence of social inequalities in oral health, characterised by worse oral health at the lower end of the socioeconomic scale (Steele et al. 2015). In addition, oral health behaviours such as oral hygiene, sugar consumption and smoking are often found to be socially patterned (Sheiham et al. 2011). The literature to date documents social gradients in virtually all types of oral health outcomes and oral health measures. Yet there is a continuing debate about the existence and nature of a social gradient, that is, an incremental reduction in oral health when moving from rich to poor along the socioeconomic scale. While the so far evidence implies that the extent of such a gradient depends crucially on the specific measures used, the overall magnitude of oral health inequalities is substantial and depends on cohort as well as age (Steele et al. 2015).

Recent literature examining pathways through which policy might influence oral health inequalities has focused mainly on the role of welfare state regimes and on the role of dental coverage. Social gradients in oral health were found in various European welfare state regimes and – in line with recent literature on general health – were not systematically smaller in Scandinavian countries and did not exhibit a consistent pattern of health inequalities across welfare regimes (Guarnizo-Herreño et al. 2013). In addition, there is a continuing debate about the extent to which more comprehensive dental coverage may allow to reduce inequalities in oral health and care. Not least, health and dental care use have been described to be determined by a multitude of various different factors, only part of them relating to cost risks carried by the patient (Listl et al. 2014a).

This chapter presents first results based on a newly introduced oral health measure in SHARE Wave 5. Previous waves of SHARE contained information on people’s eating difficulty (Listl et al. 2014b), denture wearing (Listl 2012), and dental attendance (Listl 2011), whereas SHARE Wave 5 now includes information on tooth loss which may be highly relevant at age 50+. In what follows, particular attention will be given to social inequalities in number of natural teeth within and between countries.

11.2 Data and descriptives

For the first time in SHARE, Wave 5 now contains information on respondents' tooth status, i.e. whether they still have all natural teeth. Respondents were first asked the question “Do you still have ALL your natural teeth (except wisdom teeth)?” and could reply with either “yes” or “no”. Respondents who answered “no” to the aforementioned question, were additionally asked: “About how many natural teeth are you missing?”. Based on the two aforementioned survey items, computation of respondents' remaining number of natural teeth is straightforward. The usual number of natural adult teeth is 28, whereby wisdom teeth are not counted.

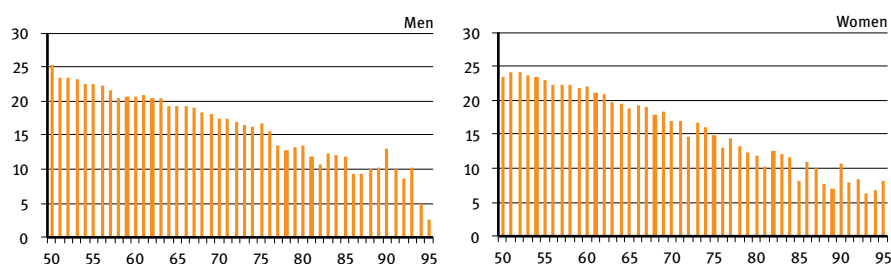


Figure 11.1: Average number of natural teeth, by age and sex

Notes: N=61,987

Source: SHARE Wave 5 release 0, authors' own calculations

On average across all SHARE Wave 5 countries, respondents' number of teeth was 17.8 (women: 17.8; men: 17.9). Figure 11.1 shows the proportion of average number of natural teeth by age and sex and highlights a relatively consistent decline in number of teeth as people get older. Yet as shown in Figure 11.2, there also are substantial cross-country differences in oral health, with the highest proportion of people who still have all their natural teeth being found for Sweden and the lowest proportion for Estonia.

11.3 Cross-national association between deprivation and oral health

Figure 11.2, Panel A, shows the cross-national association between average material deprivation and the average number of natural teeth (associations between average *social* deprivation and the average number of teeth are slightly weaker but

look similar). The measure for deprivation used is the multidimensional index of deprivation as introduced in chapter 5 in this volume. A larger value of the index indicates a higher level of deprivation. Sweden, Switzerland, and Denmark are characterised by a relatively low level of deprivation and a high average number of teeth. On the other hand, Estonia is found on the bottom right of Figure 11.2, Panel A, and has the lowest average number of teeth alongside the highest level of deprivation. Despite the association between level of deprivation and average number of teeth being less consistent for other countries, the depicted snapshot nevertheless is in support of a tendency towards fewer teeth in countries with higher levels of material deprivation.

Any interpretation of social inequalities (in health) should bear in mind the respective underlying socioeconomic measure. For example, income may be relevant with respect to affordability of care, which in turn can influence oral health outcomes. Education may link to health literacy, i.e. understanding and processing information that can influence oral health behaviours, hence influencing oral health outcomes through other pathways than income. In contrast, the findings presented above are based on a multidimensional index of deprivation which combines various different measures into a composite measure. As such, multiple mechanisms may be mirrored in the respective inequalities which include but also go beyond aspects of income and education. For example, inequalities in number of teeth by (composite) deprivation may also reflect the preferences and values of various population groups and this goes beyond aspects of affordability of care or health literacy.

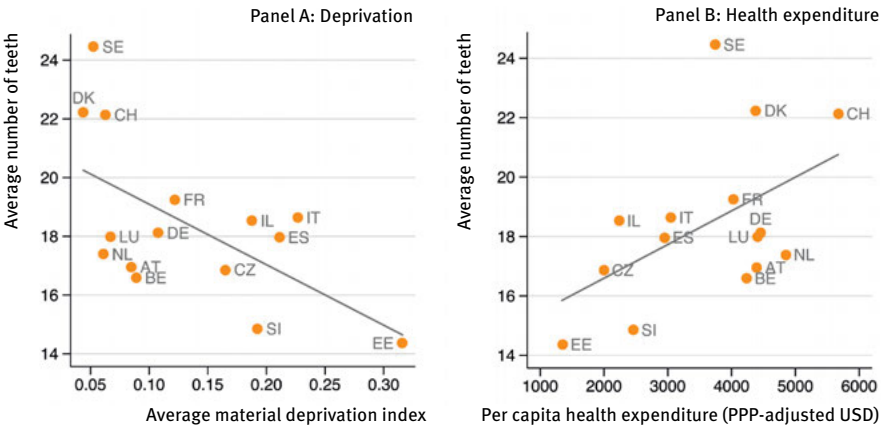


Figure 11.2: Cross-national association between average material deprivation, per capita health expenditure and the average number of natural teeth

Notes: N=61,987

Source: SHARE Wave 5 release 0, authors' own calculations

Panel B of Figure 11.2 shows the cross-national association between per capita total health expenditure in U.S. dollars (adjusted for differences in living costs, source: OECD) and dental health. There is a clear positive (and statistically significant) relationship. Assuming that the proportion of expenses on dental care is similar in all countries, this result mirrors findings in the literature on the link between health expenditures in general and broader measures of population health, such as life expectancy (e.g. OECD 2010). However, one should bear in mind that we compare contemporaneous health expenditure with a measure of health that largely reflects past health investments; hence the conclusions that can be drawn are limited. Moreover, Figure 11.2, Panel B, also highlights that there are large cross-national differences in dental health conditional on health care expenditures. Especially in the group of countries that spent around 4,000 USD per capita per year (Benelux, Germany and Austria, France, and Nordic countries), there is a wide range, with Swedes having about eight more natural teeth than Belgians. Such findings are clearly worth continued research effort using the SHARE data.

11.4 Poor-rich differences in oral health and dentist visits

Panel A in Figure 11.3 shows, for each country, the absolute difference in number of teeth between richest and the poorest ten percent of the sample, i.e. between those in the first and tenth country-specific decile of net annual household income. Such quantile differences (or ratios) are commonly used measures of absolute and relative inequality, respectively. Rich-poor differences in dental health are found for all countries. Israel is the country with the highest observed level of inequality, where the difference between the poorest and the richest sample members is eight teeth. The lowest level of inequality is found for Slovenia (which is also the only country in which the differences are not significant at the 95 % level), where the richest ten per cent of the sample have only about one tooth more than the poorest ten per cent. It is interesting to note that there is no clear geographic pattern or clustering according to welfare state regime. Even Denmark as a Scandinavian country with a more generous welfare state exhibits large poor-rich differences in the average number of natural teeth. Although perhaps somewhat unexpected, this is in line with recent findings based on the Eurobarometer survey (Guarnizo-Herreño et al. 2013).

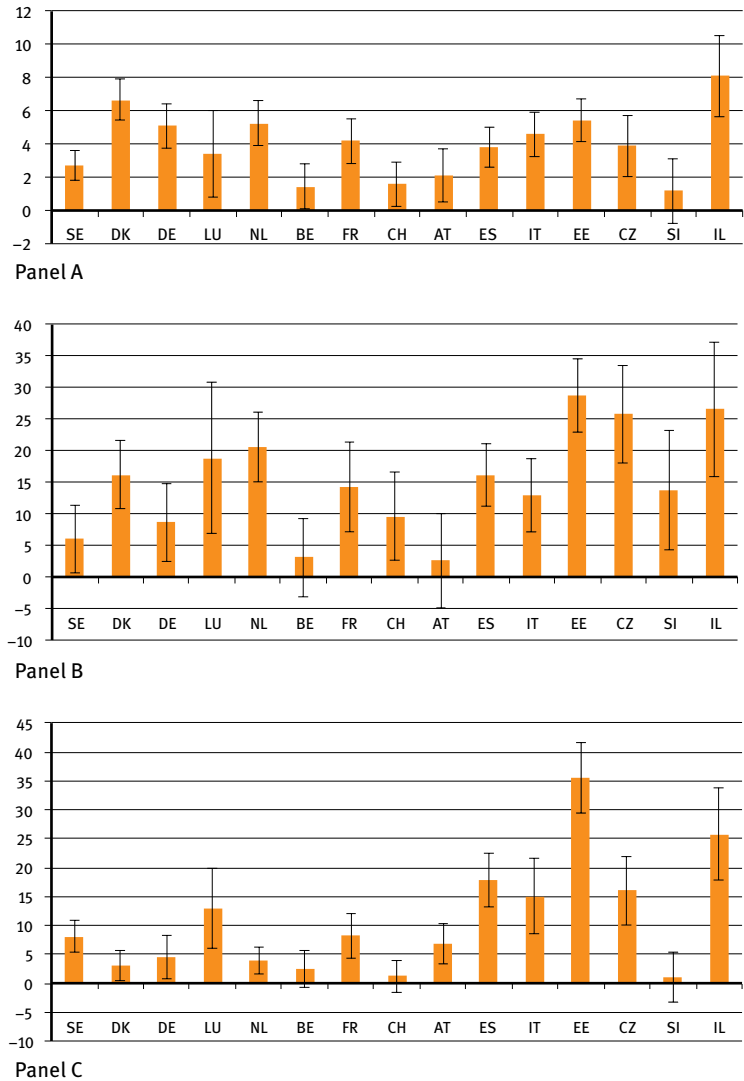


Figure 11.3: Poor-rich differences dental health, dental care use, and unmet dental care need. Each bar shows the within country difference - between the first and tenth household income decile - in the average number of natural teeth (Panel A), the proportion of respondents who have visited a dentist in the last twelve months (Panel B), and the proportion of respondents who have postponed a dentist visit because of cost (Panel C)

Notes: N=11,534

Source: SHARE Wave 5 release 0, authors' own calculations

One potential behavioural determinant of inequalities in oral health is dental care use. Panel B in Figure 11.3 shows the absolute difference in the likelihood of having had a dentist visit within the past year between richest and the poorest ten per cent of the sample. Significant rich-poor differences are found for all countries except Belgium and Austria. Estonia is the country with the highest observed level of inequality. Here, the richest decile is nearly 30 percentage points more likely to have visited a dentist in the past year than the poorest decile. In contrast, in Austria and Belgium, the difference is below five percentage points. Similar to Panel A, there is no clear geographic pattern or clustering according to welfare regime. Moreover, the ranking of countries differs between Panels A and B, suggesting that rich-poor variations in dentist care use (in the past year) may at most partially explain rich-poor variations in number of teeth at age 50+.

If inequalities in dentist visit at least partially explain inequalities in tooth status, it is important to understand whether such inequalities are driven by costs that need to be borne by the patient. Panel C in Figure 11.3 shows the rich-poor difference in the proportion of respondents who have postponed dentist visits due to costs. The pertaining survey question reads “Have you postponed visits to the dentist in the last twelve months to help you keep living costs down?” and it is also part of the composite deprivation index. As before, we compare the richest and poorest ten per cent within each country. Significant inequalities are found for all countries except Belgium, Switzerland, and Slovenia. In decreasing order of inequality, countries rank as follows: Estonia, Israel, Spain, Czech Republic, Italy, Luxembourg, France, Sweden, Austria, Germany, Netherlands, Denmark, Belgium, Switzerland, Slovenia. Countries rank similar as in Panel B above (inequalities in dentist visit); exceptions include Netherlands and Italy. These findings could be interpreted in the sense that inequalities in oral health are partially attributable to inequalities in dental attendance and the latter themselves are partly cost-related.

The cross-national associations between rich-poor differences in postponing dentist visits due to cost, rich-poor differences in the number of dentist visits and rich-poor differences in dental health are illustrated in Figure 11.4:

- Panel A of Figure 11.4 suggests that social inequality in the number of natural teeth is associated with social inequality in dentist attendance.
- Panel B of Figure 11.4 indicates that social inequality in dentist attendance is partly rooted in cost-related postponement of attendance.
- Panel C of Figure 11.4 shows the association between social inequality in number of teeth and cost-related postponement of dental attendance.

All cross-national correlations are highly significant.

attendance rates that are *attributable to cost* (i.e. poor-rich difference in unmet need). Additionally, we show in the last column (D) the ratio of inequality in dental attendance due to cost divided by the total inequality.

Table 11.1: Parameters for potential health policy prioritisation

	Rich-poor difference in average number of teeth	Total rich-poor difference in dental atten- dance rates (percentage points)	Rich-poor difference in dental atten- dance due to cost (percentage points)	Proportion of difference in dental care use due to cost (%)
	(A)	(B)	(C)	(D)=(C)/(B)
Israel	8.1	27	26	97 %
Denmark	6.7	16	3	18 %
Estonia	5.4	29	35	124 %
Netherlands	5.3	21	4	19 %
Germany	5.1	9	5	53 %
Italy	4.6	13	15	116 %
France	4.2	14	8	57 %
Czech Rep.	3.9	26	16	62 %
Spain	3.8	16	18	110 %
Luxembourg	3.4	19	13	69 %
Sweden	2.7	6	8	135 %
Austria	2.1	3	7	260 %
Switzerland	1.6	10	1	12 %
Belgium	1.4	3	2	79 %
Slovenia	1.2	14	1	8 %

Notes: N=11,534

Source: SHARE Wave 5 release 0, authors' own calculations

For example, the rich-poor difference in oral health is largest in Israel, so there is both the necessity and the scope for comparatively large improvements. Would an intervention that reduced out-of-pocket cost for dental care among the poor be useful? Probably yes, because the large rich-poor difference in dental attendance can almost completely be “explained” by unequal attendance patterns related to cost. In contrast, in Denmark, only a small proportion of the difference in dental attendance can be attributed to cost. Thus most of the rich-poor difference in dentist visits is “behavioural” and other interventions than reducing cost may be prioritized. Arguing along similar lines, Table 11.1 suggests that there are three groups of countries:

- for countries such as Spain, Italy, Israel, Estonia, and Sweden cost-related difference in attendance explains virtually all of the social inequality in dental care use; health policy interventions targeting dental coverage may be a powerful policy tool.
- for countries such as Netherlands, Denmark, Switzerland, and Slovenia cost-related aspects seem to play less of a role; hence, health policies centred around cost-risks for poor patients may be less relevant in these countries than other interventions such as oral health promotion and raising awareness of the importance of good oral health.
- for other countries, about half of the social inequalities in dental care use seem attributable to treatment costs; here, a mixture of both treatment-cost-related policies and of oral health promotion may be expedient.

In addition, it is relevant to consider the potential magnitude of inequality reduction in each respective country. Interventions are likely to have higher impact in countries with larger levels of oral health inequality such as measured by the poor-rich difference in the number of natural teeth. Relatively large scope for reducing inequalities in number of teeth seems to exist in Israel, Denmark, Estonia, the Netherlands, and Germany.

11.6 The value of measuring oral health

In survey research, oral health may substantiate a very sensible marker for social deprivation and associated health disparities. Asking persons about their number of teeth entails unique advantages as tooth status is arguably easy to measure and comparably independent of expert diagnosis as well as emotionally influenced subjective ratings. Not least, due to the cumulative nature of tooth loss over time, number of teeth can be considered a highly relevant oral health measure in older adulthood. Over and above, due to its importance for people's diet, nutrition, and quality of life, tooth status provides a highly sensible marker for general health and well-being.

On basis of data from SHARE Wave 5, our findings suggest that the self-reported number of respondents' teeth (1) decreases steadily with age, (2) differs substantially across countries, (3) varies across countries with respect to level of average deprivation, and (4) varies within countries according to household income. Furthermore (5), inequalities in number of teeth are partially attributable to treatment costs and associated dental attendance patterns, to a large extent in some countries, to a lesser extent in other countries.

There are many possible paths between socioeconomic position and oral health that need to be unravelled, particularly against the background of varying social contexts. However, while increasing resources for treatment services may provide benefits, recent findings also suggest such interventions might not always have large impacts on reducing inequalities and aspects of health literacy and health promotion need also be taken into account (Listl et al. 2014a, Steele et al. 2015).

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