

Socioeconomic inequalities in older adults' dentition and the role of dental service use

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Background

- Oral health is an integral part of overall health and important to quality of life
- Oral disease is the most common chronic disease worldwide
- Oral disease is expensive to treat
- Socioeconomic inequalities in oral health remains a major concern worldwide
- Few studies have examined the extent of inequalities in oral health and even less is known about the extent to which such inequalities may be attributable to potentially modifiable risk factors such as dental service use

Research questions & aim

- Questions to answer:
 - What is the extent of oral health inequalities? How do they compare across different European countries?
 - How do different socioeconomic factors contribute to oral health inequalities?
 - What is the contribution of dental service use to oral health inequalities after controlling for socioeconomic factors?
- Aims:
 - To examine socioeconomic inequalities in oral health in the 50+ populations across 14 European countries and Israel
 - To separate out the extent to which such inequalities are attributable to dental service use

Data

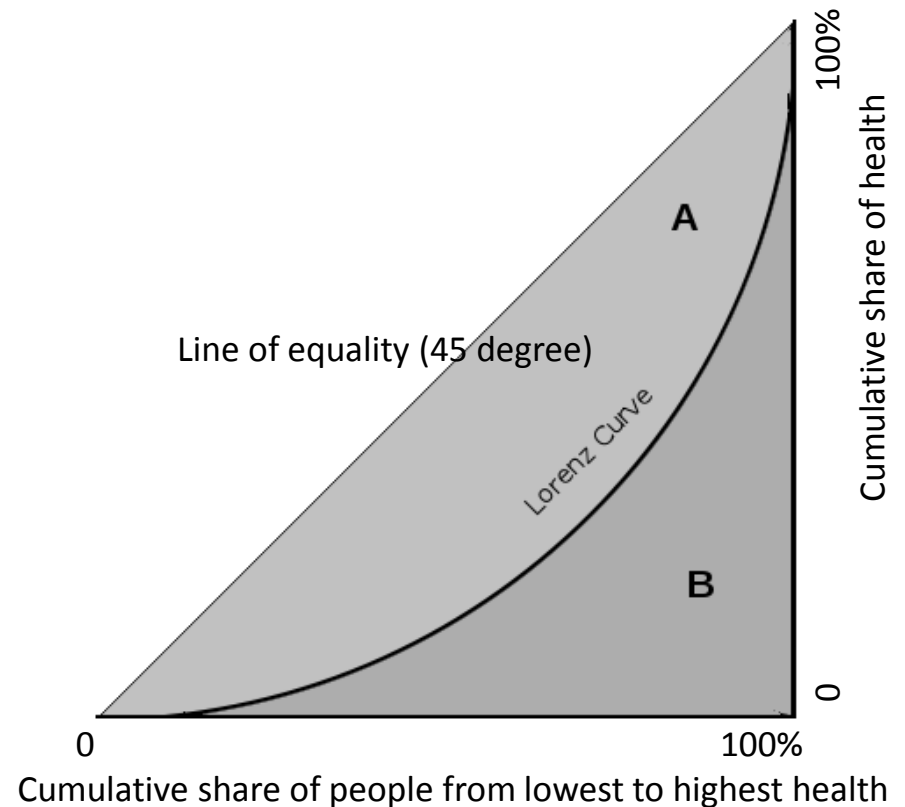
- SHARE Wave 5 Release 1.0.0 (as of March 31st 2015)
 - Individual level data on health, socioeconomic status and social and family networks
 - Individuals born in 1962 or earlier, and their spouse/partner
 - 14 European countries (Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Italy, Luxembourg, Netherlands, Slovenia, Spain, Sweden, and Switzerland) and Israel
- New variable – number of natural teeth (0-28)
 - An objective marker of the cumulative lifetime damage to oral health
 - Ability to compare the levels of oral health inequalities across countries with internationally harmonised data

Methods (1)

- Gini index – pure oral health inequality
- Concentration index (CI) – socioeconomic factors related oral health inequality
 - Income related oral health inequality
 - Education related oral health inequality
- Adjusted Gini and CI by methods suggested by Erreygers (2009)

Inequality measures

- Based on Lorenz curve
- Range from 0 to 1: the larger the more unequal
- Twice the area between the curve and the 45 degree line
- Cumulative share of people ranked by their **health** against cumulative share of their **health**
- Cumulative share of people ranked by their **income/education** against cumulative share of their **health**



Methods (2)

- Decomposition of CI
 - A linear regression capturing associations between the health variable and co-variants.
 - Co-variants include: age, gender, marital status, economic status, self-assessed health, long standing illness, income, education and dental visit
 - Shows the levels of contributions of different socioeconomic factors to oral health inequalities measured by CI

Summary statistics

	N (%)	Mean Number of teeth (SD)	Mean annual household net income in Euro (SD)	Age in years (SD)	Dental visit in the past year (% of respondents)	Men (% of respondents)	Longstanding illness (% of respondents)
Austria	3629 (6.37)	17.15 (10.48)	31650 (21432)	65.73 (10.20)	59.61	46.19	47.68
Germany	4928 (8.65)	18.24 (9.73)	32971 (21318)	65.74 (10.61)	78.26	46.87	60.71
Sweden	4099 (7.19)	24.57 (6.32)	42593 (20681)	65.93 (10.09)	81.04	47.95	50.06
Netherlands	3718 (6.53)	17.59 (11.39)	33917 (17957)	64.60 (10.08)	71.45	47.81	48.22
Spain	5578 (9.79)	18.05 (10.09)	21415 (17279)	65.70 (10.82)	26.94	46.28	52.38
Italy	4121 (7.23)	18.45 (10.05)	24716 (18820)	66.57 (10.87)	28.33	45.71	38.81
France	3820 (6.70)	19.17 (9.20)	31715 (20137)	66.18 (10.40)	51.09	45.70	43.71
Denmark	3782 (6.64)	22.37 (8.74)	45604 (23324)	65.12 (9.91)	82.39	48.11	50.01
Switzerland	2337 (4.10)	22.24 (8.70)	54279 (28131)	65.53 (10.04)	73.31	47.45	33.54
Belgium	4801 (8.43)	16.84 (10.39)	32665 (18661)	65.09 (10.81)	56.11	47.13	45.75
Israel	1933 (3.39)	18.90 (11.02)	34460 (20647)	64.11 (10.12)	40.54	47.13	43.61
Czech Republic	5100 (8.95)	17.01 (10.63)	14498 (15639)	64.96 (9.50)	61.12	45.48	47.59
Luxembourg	1142 (2.00)	17.88 (10.24)	58504 (29659)	64.22 (9.91)	69.90	48.26	45.98
Slovenia	2629 (4.61)	14.88 (10.26)	19279 (17466)	64.94 (10.34)	43.81	45.97	41.87
Estonia	5357 (9.4)	14.39 (9.80)	12025 (12541)	65.95 (10.14)	36.32	39.15	69.08
Total	56974 (100)	18.59 (9.92)	29886 (21107)	65.83 (10.55)	54.16	46.39	49.15

Results: Gini

Ranking	Gini		Gini adjusted	
1	Sweden	0.109794	Sweden	0.385302
2	Switzerland	0.179893	Switzerland	0.571499
3	Denmark	0.183272	Denmark	0.585625
4	France	0.254986	France	0.698214
5	Israel	0.279164	Germany	0.739874
6	Germany	0.284016	Israel	0.753914
7	Italy	0.29099	Italy	0.767146
8	Luxembourg	0.311166	Estonia	0.793692
9	Spain	0.319452	Luxembourg	0.794723
10	Belgium	0.331685	Belgium	0.798044
11	Austria	0.33531	Austria	0.821621
12	Netherlands	0.343005	Spain	0.823787
13	Czechia	0.350721	Slovenia	0.833545
14	Estonia	0.386132	Czechia	0.852452
15	Slovenia	0.392108	Netherlands	0.862029

Results: CI by income

Ranking	CI by income		CI by income adjusted	
1	Sweden	0.04081	Sweden	0.143225
2	Switzerland	0.05559	Luxembourg	0.16771
3	Luxembourg	0.06567	Estonia	0.169951
4	Italy	0.07268	Switzerland	0.176618
5	Spain	0.0728	Spain	0.187744
6	France	0.07569	Italy	0.191603
7	Czech	0.08243	Czech	0.20034
8	Estonia	0.08268	Slovenia	0.204452
9	Germany	0.08587	France	0.207261
10	Austria	0.08647	Austria	0.211876
11	Denmark	0.08866	Germany	0.2237
12	Israel	0.09504	Israel	0.256678
13	Slovenia	0.09618	Netherlands	0.267157
14	Netherlands	0.1063	Belgium	0.277831
15	Belgium	0.11547	Denmark	0.283301

Results: CI by education

Ranking	CI by education		CI by education adjusted	
1	Sweden	0.0398043	Sweden	0.139686
2	Switzerland	0.0599768	Luxembourg	0.1819651
3	Denmark	0.0711346	Germany	0.1893714
4	Luxembourg	0.0712467	Switzerland	0.1905394
5	Germany	0.0726941	Czech	0.1930998
6	Italy	0.0782089	Italy	0.2061848
7	Czech	0.0794463	Denmark	0.2273021
8	France	0.0891921	Slovenia	0.2385333
9	Israel	0.0941552	Estonia	0.2418664
10	Austria	0.1001445	France	0.2442303
11	Spain	0.1107959	Austria	0.2453872
12	Slovenia	0.1122084	Israel	0.2542768
13	Estonia	0.1176682	Spain	0.2857148
14	Belgium	0.1191274	Belgium	0.2866245
15	Netherlands	0.1220568	Netherlands	0.306749

Results:

Decomposition of CI by income

Variables/Country	Austria	Germany	Sweden	Netherlands	Spain	Italy	France	Denmark	Switzerland	Belgium	Israel	Czech	Luxembourg	Slovenia	Estonia
Age	26.35%	33.02%	40.31%	26.82%	40.32%	43.68%	22.48%	36.44%	44.78%	30.09%	22.95%	33.95%	24.71%	42.04%	42.04%
Male	-0.64%	-1.31%	-2.58%	-0.35%	-2.64%	0.30%	-1.61%	0.29%	-2.10%	-1.53%	-1.20%	-1.56%	0.03%	-0.89%	-0.89%
Income	29.27%	26.11%	39.95%	31.72%	9.37%	19.42%	34.47%	14.38%	25.14%	24.84%	19.43%	4.89%	25.22%	24.71%	24.71%
Economic status (reference: retired)															
Employed	3.07%	0.06%	-0.85%	4.79%	6.35%	8.40%	-0.51%	3.32%	-6.00%	3.48%	-3.29%	10.19%	7.15%	3.81%	3.81%
Unemployed	0.10%	1.73%	-0.04%	-1.03%	-1.04%	0.87%	0.75%	0.00%	0.61%	-0.66%	0.91%	0.37%	0.27%	-0.26%	-0.26%
Sick	-0.84%	0.80%	-0.35%	-0.67%	0.16%	-1.40%	-0.41%	0.11%	1.25%	1.10%	-1.61%	-0.09%	3.03%	0.54%	0.54%
Home maker/other	1.27%	0.18%	0.00%	-0.13%	1.62%	-5.39%	0.82%	0.34%	0.12%	0.57%	4.20%	0.03%	-0.29%	3.49%	3.49%
Self-assessed health (reference: excellent)															
Very good	-1.91%	-0.19%	0.00%	-0.58%	1.29%	2.56%	0.06%	-0.33%	-0.10%	-3.65%	4.79%	2.89%	0.02%	2.72%	2.72%
Good	1.57%	-1.16%	0.13%	0.30%	-0.72%	2.04%	-0.48%	0.42%	1.63%	0.91%	0.50%	1.47%	-0.07%	-0.19%	-0.19%
Fair	7.86%	7.02%	8.47%	1.61%	3.77%	1.60%	5.22%	2.49%	5.16%	5.44%	4.46%	-0.42%	1.56%	0.24%	0.24%
Poor	4.56%	4.95%	2.99%	0.84%	6.96%	6.12%	3.28%	2.69%	2.32%	2.39%	8.21%	0.10%	3.64%	1.73%	1.73%
Longstanding illness	-0.12%	1.95%	0.55%	1.04%	2.39%	2.18%	2.08%	1.25%	0.48%	0.31%	7.33%	5.59%	0.66%	0.77%	0.77%
Education attainment* (reference: primary)															
Secondary	-4.63%	-7.87%	-1.62%	-5.17%	5.90%	5.11%	1.30%	-9.04%	-9.84%	-4.03%	-3.08%	-1.28%	4.74%	-2.06%	-2.06%
Post-secondary and tertiary	18.72%	20.67%	19.60%	23.79%	12.41%	14.32%	20.51%	29.05%	23.22%	25.06%	21.98%	8.06%	13.61%	16.00%	16.00%
Marital status (reference: married)															
Single	-2.91%	-1.01%	-13.74%	-24.35%	2.87%	-5.19%	-10.03%	1.96%	-5.08%	-2.63%	-6.14%	1.77%	-1.97%	-5.87%	-5.87%
Sep/div	0.13%	-0.17%	4.32%	3.80%	0.55%	0.10%	1.51%	0.47%	-0.14%	0.88%	3.59%	0.33%	-2.84%	0.48%	0.48%
widow	1.83%	4.67%	5.12%	6.24%	9.00%	9.41%	6.12%	2.92%	4.88%	0.22%	4.10%	7.61%	-0.32%	5.69%	5.69%
Visit dentist	14.77%	9.55%	5.16%	36.01%	-1.48%	-1.09%	8.22%	13.15%	12.71%	18.10%	2.16%	22.39%	18.39%	7.11%	7.11%

Results:

Decomposition of CI by education



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Variables/Country	Austria	Germany	Sweden	Netherlands	Spain	Italy	France	Denmark	Switzerland	Belgium	Israel	Czech	Luxembourg	Slovenia	Estonia
Age	16.78%	21.90%	26.65%	16.44%	33.95%	34.78%	26.18%	19.56%	32.29%	16.49%	32.19%	13.30%	22.96%	31.89%	24.91%
Male	-0.80%	-3.33%	0.63%	-0.30%	-1.39%	0.36%	-1.33%	0.11%	-2.63%	-0.74%	-0.69%	-1.58%	0.04%	-0.80%	0.60%
Income	6.36%	9.39%	14.62%	10.56%	2.09%	4.52%	11.26%	6.50%	6.31%	8.53%	7.65%	0.92%	7.88%	6.27%	2.44%
Economic status (reference: retired)															
Employed	1.87%	0.04%	-0.50%	2.28%	4.59%	5.90%	-0.41%	1.61%	-4.59%	1.81%	-3.32%	4.99%	6.00%	2.98%	8.13%
Unemployed	0.00%	0.25%	-0.01%	-0.49%	0.51%	0.02%	-0.44%	-0.02%	0.36%	-0.21%	0.12%	0.45%	0.10%	-0.06%	-0.01%
Sick	-0.16%	1.23%	0.02%	-0.18%	0.18%	-1.35%	-0.17%	0.15%	0.86%	0.67%	-1.66%	-0.23%	2.05%	0.35%	0.46%
Home maker/other	1.61%	0.39%	-8.28E-06	-0.09%	0.83%	-4.64%	0.72%	0.34%	0.28%	0.44%	5.24%	-0.03%	-0.56%	3.73%	0.12%
Self-assessed health (reference: excellent)															
Very good	-1.79%	-0.17%	6.68E-06	-0.53%	1.00%	2.43%	0.05%	-0.32%	-0.08%	-3.64%	4.15%	3.13%	0.02%	4.64%	-0.07%
Good	0.47%	-1.58%	0.16%	0.08%	-0.71%	1.44%	-0.89%	0.43%	2.59%	0.98%	0.43%	0.50%	-0.04%	-0.13%	-3.46%
Fair	8.62%	6.52%	6.08%	1.48%	3.36%	0.66%	5.71%	2.01%	3.69%	4.75%	1.48%	-0.39%	1.80%	0.30%	2.59%
Poor	3.77%	5.22%	1.43%	0.32%	6.61%	6.32%	2.63%	1.88%	0.40%	1.98%	8.39%	0.07%	2.65%	1.76%	8.49%
Longstanding illness	-0.11%	1.70%	0.31%	0.70%	1.95%	2.73%	1.88%	0.74%	0.18%	0.24%	5.65%	3.18%	0.50%	0.64%	-0.02%
Education attainment* (reference: primary)															
Secondary	-13.53%	-25.12%	-21.51%	-9.44%	11.94%	20.32%	3.85%	-40.84%	-33.86%	-11.17%	-22.34%	-4.19%	9.44%	-5.49%	-13.82%
Post-secondary and tertiary	54.50%	64.44%	59.71%	41.50%	18.30%	28.65%	39.24%	91.95%	72.63%	57.10%	64.38%	27.72%	31.45%	39.06%	43.55%
Marital status (reference: married)															
Single	-0.58%	-0.31%	-2.62%	-5.56%	0.65%	-1.77%	-2.49%	0.40%	-1.39%	-0.34%	-2.50%	0.52%	-0.63%	-2.30%	-0.56%
Sep/div	-0.03%	0.01%	0.09%	0.20%	-0.81%	-0.12%	-0.66%	-0.09%	0.01%	-0.16%	-0.96%	-0.03%	-0.28%	-0.19%	-0.49%
widow	1.39%	3.42%	2.41%	2.78%	4.84%	6.01%	4.49%	1.67%	3.34%	0.10%	3.91%	3.80%	-0.23%	3.82%	3.10%
Visit dentist	15.48%	8.73%	4.17%	32.19%	-1.22%	-1.49%	8.70%	14.63%	12.40%	16.58%	3.04%	22.45%	18.92%	6.74%	13.78%

Conclusions

- Strength of the study – the first to investigate oral health inequalities across countries using an objective measure on such large scale.
- Sweden consistently remained the best performing country for all inequality measures
- No single country performed the worst for all three inequality measures, degree of inequalities vary significantly across countries.
- Some western European countries (e.g. the Netherlands and Belgium) had higher degrees of inequalities compared to eastern European countries (e.g. Estonia and Slovenia)
- Some countries' performances were more robust than others (the Netherlands and Denmark).
- Income and education are important contributors to socioeconomic inequalities in oral health after controlling for age
- Considerable proportions of inequalities were attributable to dental attendance, even after controlling for income and education (Netherlands, Austria, Belgium, the Czech Republic, Luxembourg, Denmark and Switzerland)

Discussion

- What can we learn from the varying degrees of inequalities between countries?
- Why countries with similar welfare regime perform differently?
- Through what mechanism does dental service use contribute separately to oral health inequalities, after controlling for socioeconomic factors?
- Implications for policy

Thank you & enjoy your dinner!

