LUND UNIVERSITY

Social inequalities in health- do they diminish with age? Revisiting the question in Sweden 1999.

Merlo, Juan; Gerdtham, Ulf; Lynch, John; Beckman, Anders; Norlund, Anders; Lithman, Thor

[Link to publication]

Research

Social inequalities in health- do they diminish with age? Revisiting the question in Sweden 1999

Juan Merlo*[1], Ulf-G Gerdtham[1], John Lynch[2], Anders Beckman[1], Anders Norlund[3] and Thor Lithman[4]

Address: [1]Department of Community Medicine, Malmö University Hospital, Lund University, Malmö, Sweden, [2]Department of Epidemiology, Center for Social Epidemiology and Population Health, and Institute for Social Research, University of Michigan, Ann Arbor, USA, [3]SBU – The Swedish Council on Technology Assessment in Health Care and [4]Regional Office, Skåne County Council, Lund, Sweden

Email: Juan Merlo* - Juan.Merlo@smi.mas.lu.se; Ulf-G Gerdtham - Ulf.Gerdtham@luche.lu.se; John Lynch - wlynch@umich.edu; Anders Beckman - Anders.Beckman@smi.mas.lu.se; Anders Norlund - Norlund@sbu.se; Thor Lithman - Thor.Lithman@skane.se

* Corresponding author

Abstract

Background: Individuals with low income have poorer health and should, therefore, have higher health expenditure than people with high income particularly in countries with a universal health care system. However, it has been discussed if social inequities in health diminish with age and we, hence, aimed to analyse this question.

Methods: We performed an age stratified cross-sectional analysis using averages, logistic and linear regression modelling of health care contacts, health care expenditures and mortality in relation to individual income in five groups by quintiles. The population consisted of all the 249,855 men aged 40 to 80 years living in the county of Skåne, Sweden during 1999.

Results: For working-age people (40-59 year old) we find a clear socioeconomic gradient with increasing probability of health care contact, relative expenditure and mortality as income decreased. The point estimations for 1st (highest)-2nd-3rd-4th and 5th (lowest) income groups were: (1.00-1.13-1.21-1.42 and 1.15), (1.00-1.16-1.29-1.69 and 1.89) and (1.00-1.35-1.44-2.82 and 4.12) for health care contact, relative expenditure and mortality respectively. However, in the elderly (75-80 year old) these point estimates were (1.00-0.83-0.59-0.61 and 0.39), (1.00-1.04-1.05-1.02 and 0.96) and (1.00-1.06-1.30-1.33 and 1.49).

Conclusions: As expected among working-age individuals, lower income was associated with higher health care contact, relative expenditure and mortality. However, the existence of opposite socioeconomic gradients in health care utilisation and mortality in the elderly suggests that factors related to a high income might condition allocation of resources, or that current medical care is ineffective to treat determinants of income differences in mortality occurring earlier in the lifecourse.

Background

Sweden has a universal health care system that supports both public and private health care. The Swedish system is directed by the principle of equity, [1] that aims to

allocate health care resources on the basis of need rather than of socioeconomic position (e.g., income). For many reasons, low income is strongly associated with poor health [2]. In Sweden, therefore, people with low income should have the highest health expenditure. On the other hand, it has been argued that social inequities in health diminish with age [3] and we, therefore, aimed to analyse this question in the county of Skåne, at the southernmost part of Sweden.

Participants, Methods

Study population and variables
We studied all 249,855 men aged 40 to 80 years living in the country of Skåne, Sweden during 1999. We study health expenditure expressed in Swedish Crowns (SEK), and we defined health care contact as having some expenditure. The analysis is based on the register for Resource Allocation in the county of Skåne 1999. This dataset includes information on age, gender, and all individual direct health expenditure (i.e., all primary and all inpatient health care) except for out-patient pharmaceutical agents and nursing homes that has been responsibility of the municipalities since 1993. Individual patient expenditures were calculated as a function of the patient's own healthcare utilization, and every contact within a specific department generated a specific expenditure amount. Different departments had different health care costs that were calculated from the 1999 total county financial result. The expenditure for hospitals was related to Diagnosis Related Groups, and when this is not available (oncologic and psychiatric wards), cost were calculated as a function of the total cost per day at the ward. For outpatients, the cost is generated from visits rather than per day, using differentiated weights based upon the category of visit. These data have also been linked to pre-tax personal income data from the National Income Tax Statistics. Pre-tax personal income consists of income from capital, income from employment and business and all income transfers (e.g., pension payments, unemployment benefits, paid sick-leave, etc.). As we have information on personal rather than on household income we limited the study to the population of men. The register also contains information on vital status (i.e., death or alive) for each individual.

Statistical and epidemiological methods
For every specific year of age we define five groups by quintiles of the income distribution. Then we calculate the five-year of age moving average of mortality and health expenditure in each income group and plotted it against age.

We also categorised age in five groups: 40–59, 60–64, 65–70, 71–74 and 75–80. Using logistic regression we calculated the 5-year age stratified odds ratios (OR) and 95%

confidence interval (95%CI) of death in the five income groups having the groups with highest income as reference in the comparisons. In a similar way, we calculated the OR of having at least one health care contact. Using linear regression with the logarithm of positive health expenditure as dependent variable, we calculated the relative expenditure (RE) and 95%CI in the population with at least one contact with the Health Care system in 1999. The expenditure ratio can be interpreted as the relative difference between the expenditure in an income group and the expenditure in the reference category (i.e., highest income).

Results
Overall, the percentage of people with at least one health care contact, the mean health expenditure and the mortality rate were 73%, SEK 12954 and 130 deaths/10,000 inhabitants, respectively. The corresponding figures for the five income groups were 1st (71, 14699 and 190), 2nd (76, 12923 and 147), 3rd (74, 10751 and 128), 4th (74, 9834 and 100) and 5th (72, 8619 and 89) respectively.

At all ages, mortality revealed a marked socioeconomic gradient with increased mortality in the low income group. Of course, relative income gradients diminished with age as the absolute death risk increased in all income groups (Figure 1a).

Among the age group 40–59, compared to the highest income group, more men in the lower income groups had at least one health care contact. Even if there was not a dose response association between income and health care contact, in the age group 60–64 the low income group presented a lower OR. Thereafter, the socioeconomic gradient become clear and reversed within the age groups 71–74 and 75–80 with *lower* probability of contacting the health care system as the income decreased (Figure 1b).

For people in the working-age we find a clear socioeconomic gradient with higher expenditure for the lower income groups. However, around the retirement ages (i.e., 65 in Sweden) the health expenditure of the higher income groups *increase* considerably and both the absolute and relative gradients became reduced in age group 65–70, and disappeared in the ages groups 71–74 and 75–80 (Figure 1c).

Discussion
As expected, health expenditure increased with age as needs do. Our study also corroborates that younger people with low income have worse health and more care needs than people with high income, [2] which may suggests Skåne has achieved some income equity in resource allocation according to individual needs. This finding is
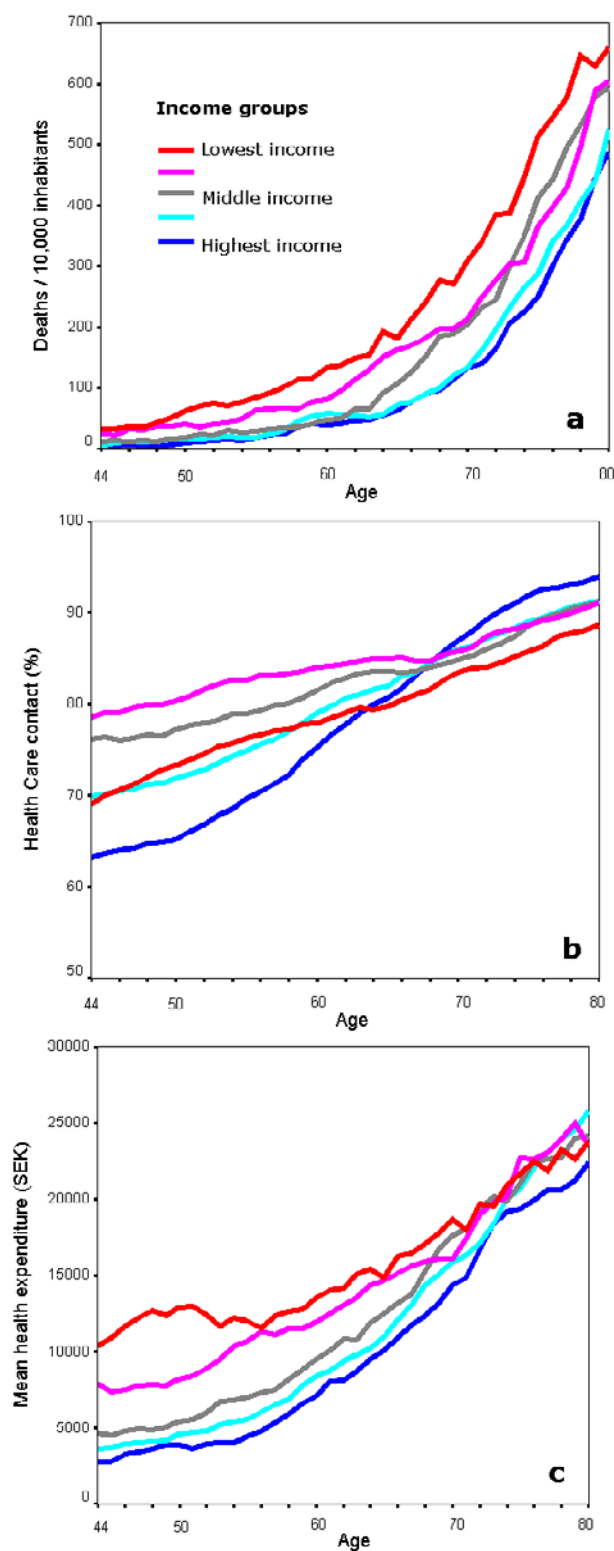
Figure 1
Mortality (a), health care contact (b), and health care expenditure (c) in relation to income groups (i.e., quintiles) among the 249,855 men aged 40 to 80 years living in the country of Skåne, Sweden during 1999. Values are five-year age moving average in the ages 40 to 80.

Table 1: Odds ratios (OR) of having some expenditure, relative expenditure (RE) and mortality OR in relation to income groups (i.e., quintiles) among the 249,855 men aged 40 to 80 years living in the country of Skåne, Sweden during 1999. The group with the highest income is use as reference in the comparisons.

Age group		Contact Health Care system (yes vs. no)				Relative Expenditure				Death (yes vs. no)			
		% of men	OR (95% CI)				RE (95% CI)				OR (95% CI)		
40–59		67											
	Age (one year)		1.03	1.03	1.03		1.02	0.94	1.11		1.10	1.08	1.11
	Income quintiles												
	1st (highest income)	66	1.00				1.00				1.00		
	2nd	71	1.13	1.09	1.17		1.16	1.16	1.16		1.35	0.94	1.93
	3rd	67	1.21	1.17	1.25		1.29	1.25	1.33		1.44	1.01	2.06
	4th	66	1.42	1.37	1.47		1.69	1.64	1.74		2.82	2.05	3.87
	5ve (lowest income)	63	1.15	1.11	1.18		1.89	1.84	1.95		4.12	3.04	5.59
60–64		78											
	Age (one year)		1.04	1.02	1.06		1.04	0.41	2.61		1.17	1.08	1.27
	Income quintiles												
	1st (highest income)	74	1.00				1.00				1.00		
	2nd	79	1.11	1.02	1.22		1.14	1.12	1.15		1.03	0.62	1.71
	3rd	79	1.10	1.00	1.20		1.23	1.15	1.32		1.67	1.06	2.63
	4th	79	1.10	1.00	1.20		1.36	1.27	1.45		2.79	1.84	4.25
	5ve (lowest income)	77	0.83	0.76	0.91		1.49	1.39	1.59		3.59	2.39	5.39
65–70		83											
	Age (one year)		1.08	1.06	1.10		1.05	0.46	2.37		1.11	1.06	1.17
	Income quintiles												
	1st (highest income)	77	1.00				1.00				1.00		
	2nd	82	0.97	0.87	1.07		1.14	1.13	1.15		1.09	0.78	1.50
	3rd	83	0.85	0.76	0.94		1.14	1.07	1.21		1.57	1.17	2.13
	4th	85	0.76	0.68	0.84		1.12	1.05	1.20		1.68	1.25	2.25
	5ve (lowest income)	86	0.57	0.52	0.63		1.25	1.18	1.34		2.32	1.75	3.08
71–74		87											
	Age (one year)		1.10	1.06	1.14		1.06	0.20	5.64		1.10	1.02	1.18
	Income quintiles												
	1st (highest income)	81	1.00				1.00				1.00		
	2nd	86	0.66	0.56	0.78		1.02	1.00	1.05		1.18	0.88	1.59
	3rd	88	0.61	0.52	0.72		0.97	0.90	1.05		1.63	1.24	2.15
	4th	89	0.52	0.45	0.61		1.00	0.92	1.08		1.37	1.03	1.82
	5ve (lowest income)	92	0.36	0.31	0.42		1.05	0.97	1.14		2.02	1.55	2.64
75–80		91											
	Age (one year)		1.05	1.02	1.08		1.04	0.38	2.88		1.08	1.04	1.12
	Income quintiles												
	1st (highest income)	86	1.00				1.00				1.00		
	2nd	91	0.83	0.71	0.98		1.04	1.03	1.06		1.06	0.87	1.29
	3rd	90	0.59	0.50	0.69		1.05	0.98	1.12		1.30	1.08	1.57
	4th	93	0.61	0.52	0.71		1.02	0.95	1.09		1.33	1.11	1.60
	5ve (lowest income)	94	0.39	0.33	0.45		0.96	0.90	1.03		1.49	1.24	1.78

also consistent with a recent study based on data from 10 European countries and the US.[4] However, the high probability of health care contact and the sharply increase in health expenditure for older people with high income is noteworthy, as it is not accompanied by a reduction in the socioeconomic mortality gradient.

It has been argued that social inequalities in health diminish with age [3], and has been discusses that biological and social factors associated with aging affects higher income groups more intensively, and this evens out socioeconomic gradients in health. It is known that mortality rates among elderly low income groups tends to decrease because of selective survival preventing the sicker individuals in those groups reaching high ages, whereas mortality in the high income group is not being expressed until later ages (i.e. a relatively higher disease burden at later ages) reaching a comparable level to those in the low income

groups. If this is true, then the increased health care consumption by the higher income groups at older ages could in fact be equitable in a cross-sectional perspective. Moreover, as nursing care is organized by the municipalities we did not include it in our calculation of health care expenditure, since data were not available on an individual level. If there is a selection of retired people from low income groups to nursing homes, an underestimation of health care expenditure for those low income groups may exist in our calculations.

On the other hand, in spite of selective survival we found a socioeconomic gradient in mortality that in combination with the opposite socioeconomic gradient in the probability of having a health care contact, suggests that factors related to a high socioeconomic position (i.e., high income) rather than to needs, might condition allocation of resources in the elderly. Alternatively, this phenomenon could put across the inability of medical care to affect the determinants of income differences in mortality, especially at younger ages if some of those determinants occurred earlier in the lifecourse [5].

The relative mortality gradient among the oldest group was lower than among the younger men, since absolute mortality risk increases sharply with age in all the income groups. For reasons of information validity we limited our study to the population of men. However, it is possible that gender modifies the association between low income and health care utilisation in different ages.

Age related socioeconomic gradients in mortality may be different for different diseases. It is possibility that men with low income die at younger ages of "more expensive" diseases, so that by the time the remainder of their cohort reaches older age, the diseases they die of just aren't as expensive to treat. In this way, inequities at younger ages would still be present, and the lower expenditures at older ages in low income men would reflect past inequities, not current health-system inequities.

However, in Sweden, and probably in other European countries and the US, the apparent increased equality in access to health care resources for the elderly may be a fallacy as it, in fact, could express channelling of resources to high income groups, and this question deserves a deeper understanding.

References
1. Swedish National Committee for Public Health **Health on equal terms – national goals for public health** *Scand J Public Health Suppl* 2001, **Suppl 57:**1-68
2. Lynch J **Social position and health.** *Annals of Epidemiology* 1996, **6:**21-3
3. Jefferys M **Social inequalities in health – do they diminish with age?** *Am J Public Health* 1996, **86(4):**474-5
4. van Doorslaer E, Wagstaff A and van der BH **Equity in the delivery of health care in Europe and the US.** *J Health Econ* 2000, **19(5):**553-83
5. Ben-Shlomo Y and Kuh D **A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives.** *Int J Epidemiol* 2002, **31(2):**285-93