Jørgen T. Lauridsen, Terkel Christiansen and Astrid R. Vitved

7 Dynamic changes in determinants of inequalities in health in Europe with a focus on retirement

► Equity in health at older ages is an important policy objective in Europe.
► Inequality in health among the elderly in Europe increased from 2004 to 2017.
► Retirement is substantially associated with inequality in health.

7.1 Introduction

Equity in health and healthcare is an important health policy objective in most European countries (OECD, 2017), but a number of empirical studies have shown the existence of inequities. Access to international comparative data from European countries allows a comparative study of the determinants of income-related inequalities in a population's health. Of particular interest are the contributions to socioeconomic inequality in health from being retired because retirees most often have lower income and lower health status relative to their working peers. Demographic changes in an ageing society add further to the importance of investigating inequalities in health among the retired. The present study contributes to the literature on the association between retirement and income-related health inequality by using SHARE data from the 11 countries that participated in Waves 1 and 7. Our focus is on a comparison of contributions from three age groups of retired individuals (younger than 65 years; 65–74 years; 75 years and older).

7.2 Methods and data

Similar to the standard Lorenz curve, which shows how income is concentrated across income classes, the concentration curve (Figure 7.1) shows how health is concentrated across income classes. The x-axis shows the percentage of households ranked by income, and the y-axis represents the corresponding share of cumulated health. Hence, the concentration curve shows the joint distribution of two variables in contrast to the Lorenz curve.
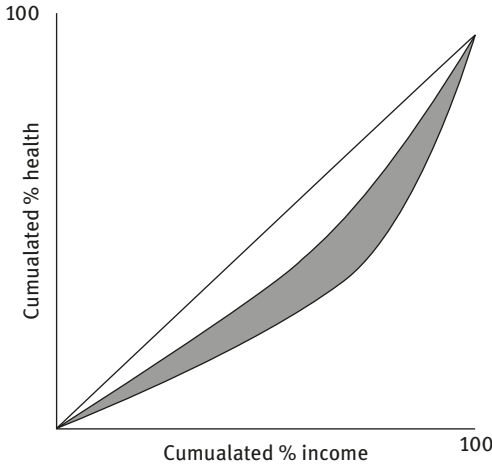
Figure 7.1: Concentration curve and its decomposition into explained and non-explained inequality.

If health is concentrated among the 'wealthy' (i.e. those with relatively high income), then the curve is located below the equity line (diagonal). The concentration index (C) is calculated as twice the area between the curve and the equity line. Typically, part of the inequality can be explained by socioeconomic and demographic determinants (the shaded area), whereas another part remains unexplained (the white area). A simple linear relationship applies, and C can be written as:

$$C = \sum_{(k=1)}^{K} \frac{\beta_k \bar{x}_k C_k}{\mu} + C_\varepsilon = \hat{C} + C_\varepsilon. \tag{7.1}$$

This equation shows how C can be expressed as a sum of an explained ($\hat{C}$) and an unexplained part. (C_ε) The explained part, $\hat{C}$ is the sum of K contributions: is β_k the regression coefficient of the k-th determinant in a linear regression explaining health, $\bar{x}_k$ is the mean of the determinant, C_k its concentration index for the determinant and μ is the mean of health.

Given that health is measured by self-assessed health on a cardinal 5-point scale, we use interval regression as suggested by Kakwani et al. (1997) and van Doorslaer and Koolman (2004). The determinants of health considered include gender-specific age dummies (50–59, 60–69, 70+), employment dummies (employed or self-employed, unemployed, homemaker, disabled), three retirement dummies by age (younger than 65, 65–74, 75 and older), current income,

educational attainment dummies (basic, secondary and higher education), civil status (single or married / cohabitated) and a dummy for being born in a different country. Intuitively, one may be tempted to interpret the division of retired into three age groups as an interaction between retirement status and age. However, the intention of the paper is not to provide such an interpretation, which would only be consistent if a full interaction between age and employment status were included. Specifically, the aim of the division is to quantify the degree to which each retired age group contributes to inequality.

Data included were respondents from the 11 countries that participated in both Wave 1 and Wave 7. All results were estimated based on individual-level data. We only excluded respondents with missing values on the variables needed for the study. Finally, to ensure representative and comparative results, sampling weights were applied.

7.3 Results

We report only a subset of the calculated results that relate to the role of retirement in explaining health inequality; the full set of calculations are reported in Lauridsen et al. (2018).

Table 7.1 shows calculations from Wave 1 of the mean and the concentration index for the outcome variable. Given that health is an unobserved latent variable, these figures are reported for health as predicted from the interval regression. Furthermore, regression coefficients, means, concentration indices and contributions are reported for the three indicators: Retired, 64 years or younger; Retired, 65–74 years; and Retired, 75 years and older. The reference group for retirement is defined as those not retired and, thus, is heterogenous because it is made up of different groups. This definition implies that we can interpret the contribution from retirement because it compares only with the non-retired and not with any specific group.

From Table 7.1, the positive concentration indices for predicted health ($\hat{C}$) show that health is better for the economically wealthier. These measures vary across countries: they are overall highest in Israel, Germany, Denmark and Greece, and lowest in Austria, Switzerland and Belgium. For the three groups of retired individuals, the means show the proportions of the populations being retired in the age group considered. Thus, the proportion of retired aged 64 or younger is highest in Austria (23.1%) and lowest in Switzerland (4.8%), whereas the proportion of retired aged 65 to 74 is highest in Germany (25.5%) and lowest in Israel (16.6%), and the proportion of retired aged 75 or older is

Table 7.1: Selected results for Wave 1.

	SE	DK	DE	BE	FR	CH	AT	ES	IT	GR	IL
Mean of predicted health	0.858	0.847	0.790	0.833	0.804	0.878	0.819	0.775	0.782	0.826	0.776
$\hat{C}$ for predicted health	0.020*	0.024*	0.029*	0.010*	0.019*	0.009*	0.005*	0.016*	0.020*	0.022*	0.032*
Means:											
RETIRED –64	0.075	0.131	0.100	0.112	0.119	0.048	0.231	0.068	0.178	0.111	0.084
RETIRED 65–74	0.231	0.200	0.255	0.224	0.232	0.207	0.225	0.161	0.226	0.221	0.166
RETIRED 75+	0.236	0.198	0.188	0.198	0.206	0.215	0.198	0.132	0.162	0.146	0.161
Regression coefficients:											
RETIRED –64	–0.118*	–0.093*	–0.041*	–0.022*	–0.019*	–0.022*	–0.056*	–0.073*	–0.032*	–0.027*	–0.022*
RETIRED 65–74	–0.021*	–0.062*	–0.039*	–0.033*	–0.013*	–0.029*	–0.055*	–0.039*	–0.046*	–0.036*	–0.035*
RETIRED 75+	–0.041*	–0.096*	–0.099*	–0.045*	–0.065*	–0.030*	–0.081*	–0.073*	–0.059*	–0.070*	–0.058*
Concentration indices:											
RETIRED –64	–0.070*	0.010	0.001	0.088*	0.067*	–0.031	0.111*	0.182*	0.162*	0.173*	0.221*
RETIRED 65–74	–0.092*	–0.263*	–0.109*	–0.013*	–0.029*	–0.055*	0.085*	0.007*	–0.042*	–0.078*	–0.009
RETIRED 75+	–0.398*	–0.474*	–0.248*	–0.088*	–0.127*	–0.225*	0.001	–0.138*	–0.149*	–0.283*	–0.063*
Contributions (%):											
RETIRED –64	3.60*	–0.59	–0.02	–2.63*	–1.01*	0.41	–36.50*	–7.20*	–5.78*	–2.77*	–1.71*
RETIRED 65–74	2.57*	16.30*	4.67*	1.15*	0.59*	4.22*	–26.55*	–0.36*	2.68*	3.35*	0.21
RETIRED 75+	22.01*	45.09*	19.73*	9.64*	11.04*	18.10*	0.05	10.68*	8.90*	15.71*	2.41*

Note: Significance at the 5%-level is indicated by a star (*).

highest in Sweden (23.6%) and lowest in Spain (13.2%). The mean of a binary indicator should be noted as equal to the proportion of the sample assuming the value of 1 on the indicator and, thus, an estimate of the population proportion assuming the value of 1. Thus, the mean of the indicator 'Retired 75 and older' is the proportion of the full population (not the proportion of the population 75 years and older) who is retired. This figure is the mean needed to provide an estimate of the contribution from this group of retired to the overall societal inequality in health.

Turning to the contributions to health inequality from the three retirement groups, it should be kept in mind (cf. Formula 7.1) that a positive figure indicates that the determinant increases inequality, whereas a negative figure indicates the opposite. Thus, for most countries, early retirement (younger than 65 years of age) reduces health inequality. A possible explanation could be that retired individuals who are younger than 65 years are economically better off than the employed population (as indicated by the positive concentration indices) but are at the same time in worse health (as indicated by the negative regression coefficients for health). An exception is Sweden, where a significantly positive contribution occurs because both the regression effect and the concentration index are negative.

Similarly, the contributions for normal retirement age (65–74 years) are positive for most countries, thus indicating that this age group increases the health inequality. For these countries, the positive contribution occurs from a combination of a negative regression coefficient and a negative concentration index, indicating that low income and ill-health are concentrated in this group. An exception is represented by Austria, where a negative contribution occurs due to a positive concentration index (i.e., the group is economically better off than the employed).

Finally, for the older retirees (75 years and older), the significant contributions are uniformly positive, caused by negative regression coefficients and negative concentration indices; that is, ill-health and low income are concentrated in this group. The magnitude of the contributions for this group is considerably larger than for the group aged 65–74 years, thus indicating that the major contribution to inequality from retirement stems predominantly from the elder (aged 75 and older) group and less from the younger (aged 65–74) group.

Table 7.2 provides similar results for Wave 7, together with the changes in the per cent contribution since Wave 1.

Table 7.2 shows that health is still distributed in favour of the economically better off. The concentration indices vary across countries in a pattern much similar to that found for Wave 1. However, for most countries, the concentration indices have increased from Wave 1 to Wave 7, thus confirming that socioeconomic inequality in health has increased over time.

Table 7.2: Selected results for Wave 7.

	SE	DK	DE	BE	FR	CH	AT	ES	IT	GR	IL
Mean of predicted health	0.802	0.817	0.712	0.773	0.747	0.829	0.760	0.704	0.737	0.772	0.756
$\hat{C}$ for predicted health	0.034*	0.026*	0.050*	0.022*	0.027*	0.015*	0.028*	0.029*	0.029*	0.027*	0.052*
Means:											
RETIRED –64	0.027	0.048	0.047	0.077	0.111	0.024	0.186	0.038	0.053	0.061	0.035
RETIRED 65–74	0.273	0.253	0.224	0.260	0.258	0.216	0.231	0.182	0.190	0.155	0.165
RETIRED 75+	0.246	0.221	0.279	0.209	0.232	0.208	0.242	0.174	0.251	0.257	0.139
Regression coefficients:											
RETIRED –64	–0.117*	–0.137*	–0.058*	–0.019*	–0.018*	0.026*	–0.064*	–0.020*	–0.018*	–0.018*	–0.028*
RETIRED 65–74	–0.054*	–0.040*	–0.024*	–0.015*	–0.059*	–0.019*	–0.060*	–0.044*	–0.032*	–0.032*	–0.027*
RETIRED 75+	–0.097*	–0.085*	–0.032*	–0.036*	–0.092*	–0.043*	–0.094*	–0.106*	–0.085*	–0.115*	–0.075*
Concentration indices:											
RETIRED –64	–0.077	0.075*	–0.068*	0.082*	0.153*	0.005	–0.017*	0.144*	0.168*	0.282*	0.282*
RETIRED 65–74	–0.107	–0.194*	–0.035*	–0.062*	0.075*	–0.069*	–0.012*	0.119*	0.103*	0.141*	0.006
RETIRED 75+	–0.418	–0.439*	–0.130*	–0.233*	–0.099*	–0.170*	–0.100*	–0.117*	–0.138*	–0.160*	–0.086*
Contributions (%):											
RETIRED –64	0.90*	–2.29*	0.53*	–0.70*	–1.50*	0.03	0.98*	–0.53*	–0.75*	–1.55*	–0.71*
RETIRED 65–74	5.87*	9.20*	0.54*	1.44*	–5.66*	2.41*	0.81*	–4.63*	–2.88*	–3.39*	–0.07
RETIRED 75+	37.08*	38.64*	3.26*	10.35*	10.56*	12.54*	10.73*	10.47*	13.59*	23.22*	2.28*
Change in % of contribution Wave 1 to 7:											
RETIRED –64	–2.70*	–1.69*	0.55*	1.92*	–0.49*	–0.38	37.48*	6.67*	5.03*	1.22*	1.00*
RETIRED 65–74	3.30*	–7.11*	–4.13*	0.30	–6.25*	–1.81*	27.36*	–4.28*	–5.56*	–6.74*	–0.27
RETIRED 75+	15.08*	–6.45	–16.47*	0.72	–0.49	–5.57*	10.68*	–0.21	4.69*	7.52*	–0.13

Note: Significance at the 5%-level is indicated by a star (*).

Turning to the contributions to the inequality in health from the determinants, the retired in the two older age groups were generally confirmed (although with exceptions) as contributing to increased inequality in health, whereas the pattern is more mixed for the younger group under age 65. Thus, for Spain, Italy, France, Denmark, Greece, Belgium and Israel, the retired younger than 65 years reduces health inequality through a negative contribution. As in Wave 1, the reason for this phenomenon appears to be that the retired younger than 65 years are economically better off than the employed population (as indicated by the positive concentration indices, cf. Formula 7.1) but are simultaneously in worse health (as indicated by the negative regression coefficients for health, cf. Formula 7.1). For Austria, Germany and Sweden, a significantly positive contribution occurs because the regression effect and the concentration index are both negative.

Similarly, for the retired (65–74 years), the contributions are seen as positive for several countries, thus indicating that this age group increases inequality in health. For these countries, the positive contribution occurs from a combination of a negative regression coefficient and a negative concentration index, indicating that low income and ill-health are concentrated in this group. For other countries, negative contributions occur due to the combination of a positive concentration index and a negative coefficient for health (i.e., the group is economically better off but in less good health than the employed).

Next, for the elder retired (75 and older), the pattern from Wave 1 is confirmed; that is, the age group contributes to increased inequality in health given a combination of negative regression coefficients and negative concentration indices. Again, the magnitude of the contributions for this group is considerably larger than for the group aged 65–74 years.

Finally, considering development from Waves 1 to 7, a quite mixed pattern with increases and decreases is seen. For Austria and to some extent Belgium, all three age groups have increased their contributions to health inequality. The increase for Austria is caused by a shift in the sign of the concentration indices for retirement for all three groups from positive to negative, indicating increased inequality over time. For Denmark and to some extent France and Belgium, all three age groups have decreased their contributions. The decrease for Denmark is caused by improved concentration indices for all three groups because the index for the group younger than 65 years shifted from zero to significantly positive, whereas the magnitude of the negative indices for the two elder groups declined. For Germany and to some extent Spain and Israel, a mixed pattern is found because the contribution to inequality has risen for the group younger than 65 years and has fallen for the two older groups. In Germany, the increase for the group younger than 65 years is especially connected

to an increase in the concentration index for this group from zero to significantly negative, whereas the reductions for the elder groups are related to reductions in the magnitude of their negative indices. An opposite pattern, with reduced contribution for the group younger than 65 years and increased contribution for the two elder groups, is found for Sweden. Turning next to Italy and Greece, both the younger than 65 and older than 75 groups increased their contributions to inequality, whereas the intermediate group reduced its contribution.

7.4 Conclusion

The present study confirms that health is distributed in favour of the wealthy across European countries and adds evidence that this inequality is increasing over time. Retirement is shown to be a significant contributor to income-related health inequality, especially regarding the 75 and older age group. The development over time is mixed because the contributions increased for some countries and reduced for others. This mix is important because it calls for different policy initiatives in different countries. See Lauridsen et al. (2019) for a discussion of the shortcomings of a joint specification implying a joint European policy.

References

Kakwani N, Wagstaff A, van Doorslaer E. 1997. Socioeconomic inequalities in health: Measurement, computation, and statistical inference. *Journal of Econometrics* 77(1): 87–103.
Lauridsen J, Christiansen T, Vitved AR. 2019. Dynamic Changes in Determinants of Inequalities in Health in Europe with Focus on Retirement. *SHARE Working Paper Series* (forthcoming)
OECD. 2017. *Inequalities in health*. Paris: OECD. http://www.oecd.org/health/inequalities-in-health.htm.
van Doorslaer E, Koolman X. 2004. Explaining the differences in income-related health inequalities across European countries. *Health Economics* 13(7): 609–628.