15th European Public Health Conference (EUPHA), 10 to 12 November 2022

Reducing educational inequalities in mortality: a comparative risk assessment approach

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THE LANCET

ARTICLES | VOLUME 349, ISSUE 9066, P1655-1659, JUNE 07, 1997

Socioeconomic inequalities in morbidity and mortality in western Europe

Prof Johan P Mackenbach, PhD • Anton E Kunst, MA • Adriënne EJM Cavelaars, MSc • Feikje Groenhof, MA • José JM Geurts, MSc EU Working Group on Socioeconomic Inequalities in Health

Published: June 07, 1997 • DOI: https://doi.org/10.1016/S0140-6736(96)07226-1

(Relative) socio-economic inequalities in mortality a problem everywhere, even in advanced Nordic welfare states.

"These findings challenge conventional views on the between-country pattern of inequalities in health in western European countries"

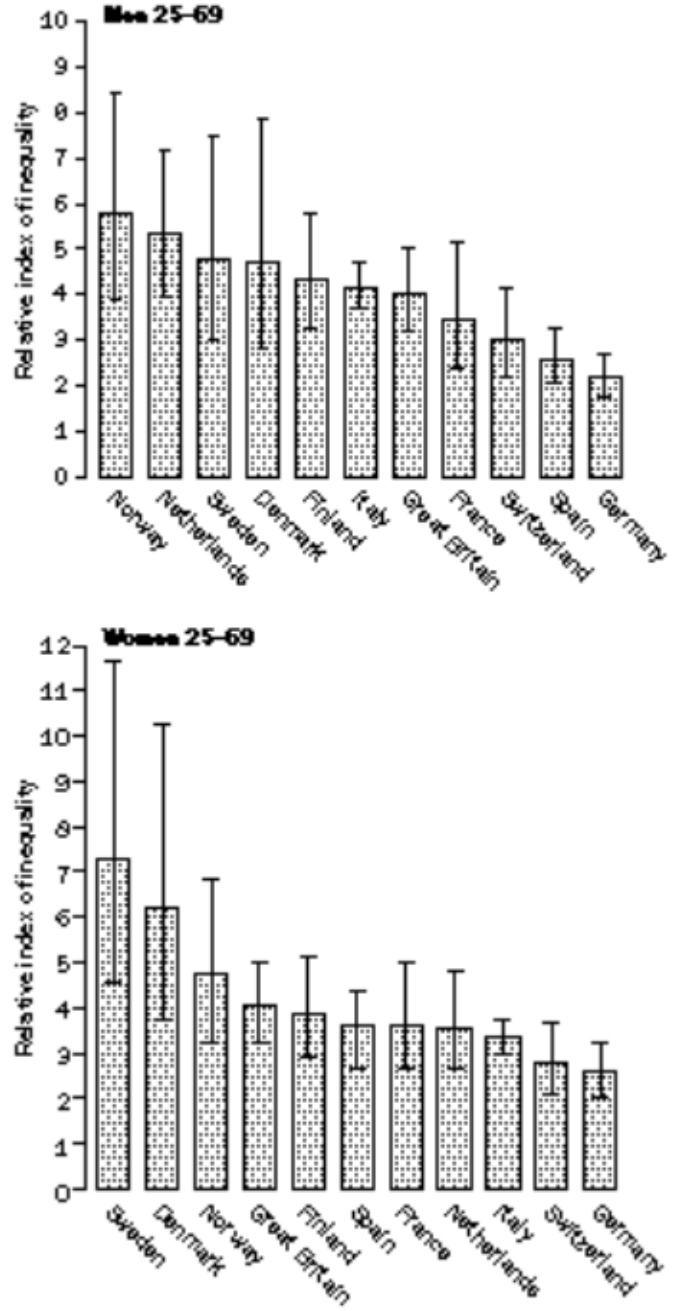


Figure 1: **Relative index of inequality for perceived general health by level of education (95% CI)**

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

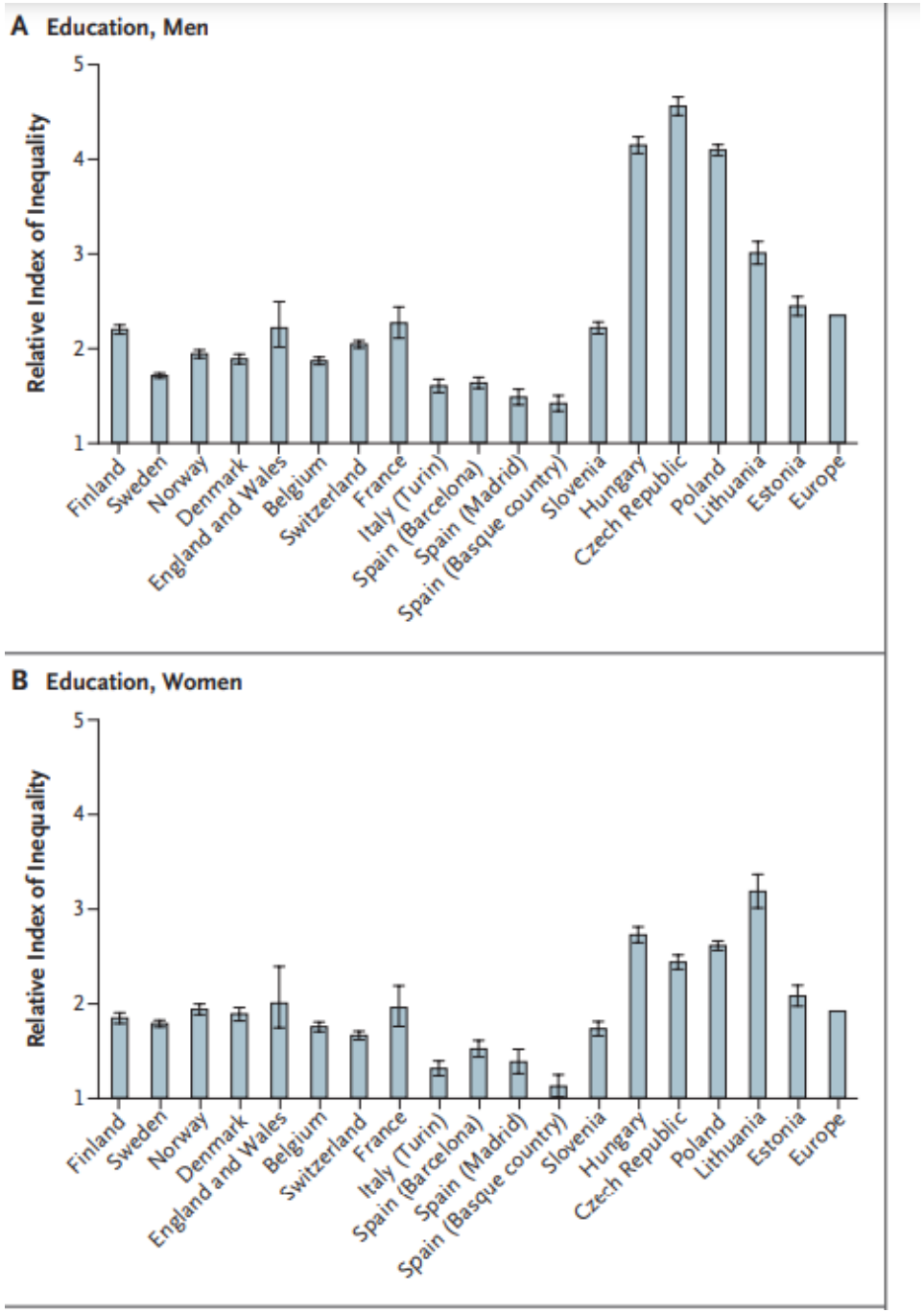
Socioeconomic Inequalities in Health in 22 European Countries

Johan P. Mackenbach, Ph.D., Irina Stirbu, M.Sc.,
Albert-Jan R. Roskam, M.Sc., Maartje M. Schaap, M.Sc.,
Gwenn Menvielle, Ph.D., Mall Leinsalu, Ph.D., and Anton E. Kunst, Ph.D.,
for the European Union Working Group
on Socioeconomic Inequalities in Health*

Socioeconomic variations in mortality still observed across Europe.

Absolute inequalities are also presented, and found to be substantial.

*These inequalities **might be reduced** by improving educational opportunities, income distribution, health-related behavior, or access to health care.*



EURO-GBD-SE

The potential for reduction of health inequalities in Europe

Aim:

To quantify the **potential for reduction** of health inequalities in Europe.

This has remained a problem due to

- Data availability
- No standardized methods identified.
- Evidence of causality is limited

Solution:

Combine **mortality** data from national registers with **risk factor** data collected from survey data, and apply **relative risks** collected from the literature (or from register data).

Aggregate and stratify estimates by **age** group, **educational** attainment, **sex** and **causes of death** by **country**.

Develop a **new method,** relying on the comparative risk assessment approach.

Identification of **counterfactual scenarios**

The potential impact of a social redistribution of specific risk factors on socioeconomic inequalities in mortality: illustration of a method based on population attributable fractions

Rasmus Hoffmann,[1] Terje Andreas Eikemo,[1] Ivana Kulhánová,[1] Espen Dahl,[2] Patrick Deboosere,[3] Dagmar Dzúrová,[4] Herman van Oyen,[5] Jitka Rychtaříková,[6] Bjørn Heine Strand,[2] Johan P Mackenbach[1]

We conclude that the approach is promising for estimating the extent to which health inequalities can be potentially reduced by interventions on specific risk factors. This reduction is likely to differ substantially between countries, risk factors and genders.

J Epidemiol Community Health 2013;67:56–62.
doi:10.1136/jech-2011-200886

Box 1 Population Attributable Fraction

$$PAF = \frac{\sum_{i=1}^{n} P_i RR_i - \sum_{i=1}^{n} P_i' RR_i}{\sum_{i=1}^{n} P_i RR_i} \quad (1)$$

n = number of exposure categories
P_i = proportion of population currently in the ith exposure category
P_i' = proportion of population in the ith exposure category in the counterfactual scenario
RR_i = RR of disease-specific mortality for the ith exposure category
Many diseases are caused by multiple risk factors. In order to estimate the combined impact of more than one risk factor on the occurrence of mortality, equation 2 is used to calculate an attributable fraction that takes into account multicausality.[17]

$$PAF = 1 - \prod_{i=1}^{n} (1 - PAF_i) \quad (2)$$

PAF_i = the proportion of the disease preventable by reducing exposure to the ith risk factor.
The product of all $(1 - PAF_i)$ represents the fraction of disease not preventable through interventions on any of the n risk factors.

Counterfactual scenarios

Shows what would happen if the prevalence of (a) risk factor(s) is reduced to the level currently seen among the highest educated.

The scenario is first analysed for its impact on mortality and consequently in terms of its impact on educational differences in mortality in order to 1) show the usefulness of the proposed method and 2) the potential for reduction of health inequalities.

DATA

To illustrate our approach, we use data collected for the Eurothine project.

We differentiate by gender, five age groups (30-44, 45-59, 60-69, 70-79 and 80+ years), three educational groups (ISCED 0-2, ISCED 3-4 and ISCED 5-6), all-cause mortality and three causes of death (ischaemic heart disease, cerebrovascular disease and lung cancer) for Norway, Belgium and the Czech Republic.

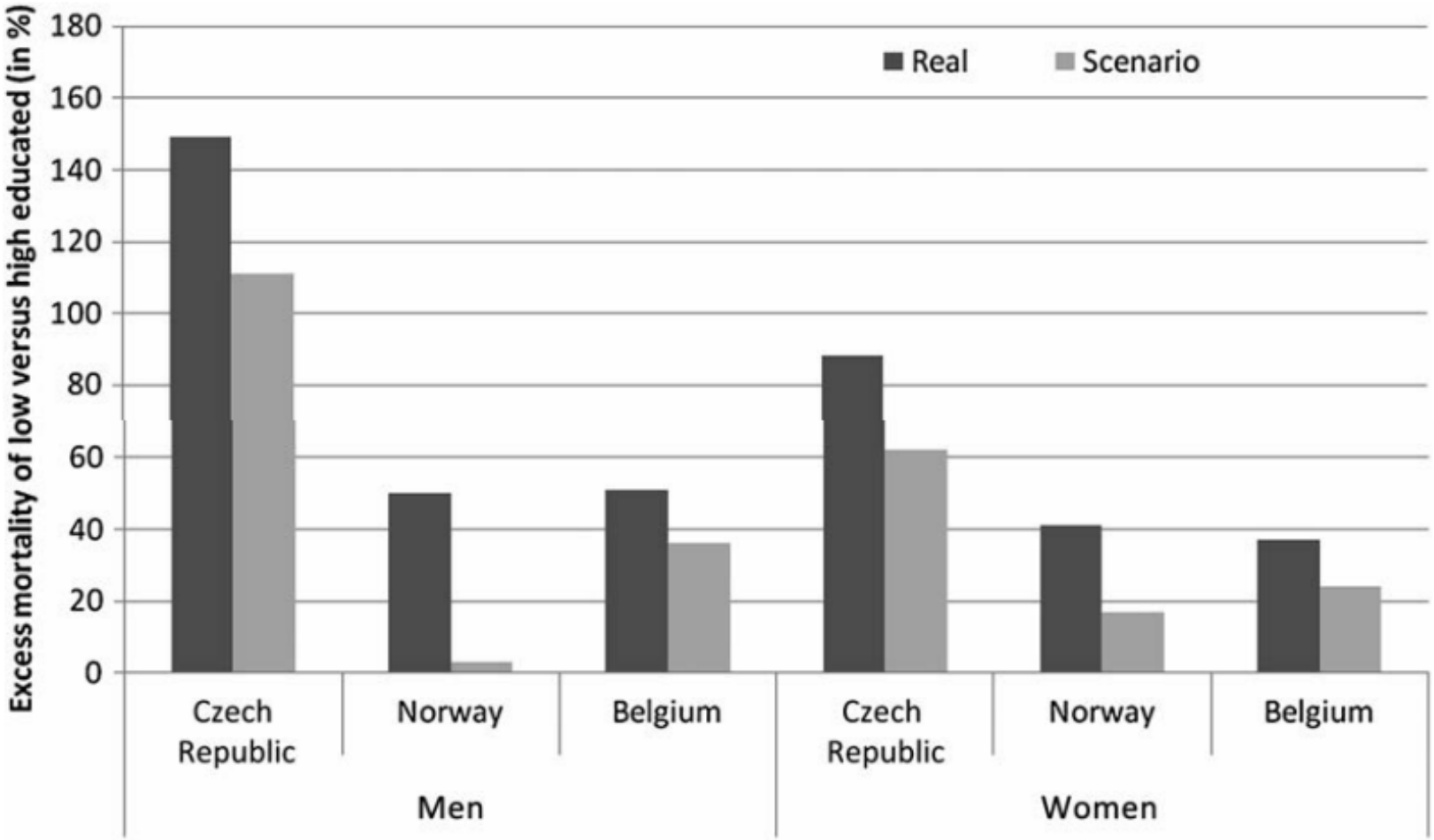


Figure 1 The potential reduction of health inequalities given the scenario that all educational groups have the same behaviour as the higher educated in terms of physical activity, alcohol consumption, smoking and body mass index.

Potential reduction (in %) of relative educational inequalities in all-cause mortality between low and high educated, upward levelling scenario, by risk factor, country and sex

	Lifestyle risk factors						Social and economic risk factors					
	Smoking		Over-weight		Physical inactivity		Social participation		Low income		Economic inactivity	
Population	M	W	M	W	M	W	M	W	M	W	M	W
Finland	17	8	2	8	2	1	3	9	20	10	19	17
Sweden	18	11	6	9	na	na	4	10	20	8	14*	15*
Norway	26	18	6	8	4	5	6	9	17	12	20*	18*
Denmark	19	9	9	10	6	11	11	9	17	10	na	na
England &W	26	16	6	12	na	na	10	11	21	14	14	16
Scotland	22	20	5	4	na	na	na	na	20	11	na	na
Netherlands	13	7	8	12	2	9	5	9	20	13	na	na
Belgium	8	2	8	15	6	19	9	4	20	13	na	na
France	6	2	9	16	na	na	8	16	18	17	na	na
Switzerland	9	2	8	18	8	17	na	na	18	14	19*	18*
Austria	11	2	12	20	na	na	6	21	na	na	17	27
Barcelona	8	2	8	25	8	11	14	8	na	na	na	na
Basque C	9	4	5	34	9	17	17	13	na	na	18	82
Madrid	8	2	9	29	9	13	17	9	na	na	19*	40*
Turin	5	2	10	42	3	16	9	11	na	na	25*	57*
Tuscany	4	1	9	24	3	9	8	7	na	na	na	na
Hungary	na	na	2	11	na	na	8	5	16	15	25	31
Czech R	19	5	6	10	2	3	na	na	12	8	na	na
Poland	21	5	1	12	na	na	8	4	20	10	na	na
Lithuania	14	3	2	4	6	13	na	na	na	na	na	na
Estonia	14	6	0	10	3	5	na	na	na	na	na	na
Europe#	15	7	6	13	5	10	8	10	18	12	19/20*	25/35*

Notes:* economically inactive include unemployed. Na: not available. # European average (arithmetic mean). M=men, W=women. Yellow: reduction of educational inequalities in all-cause mortality by 0 – 5 %. Light green: reduction of educational inequalities in all-cause mortality by 6 – 19 %. Green: reduction of educational inequalities in all-cause mortality by at least 20 %.

Source: EURO-GBD-SE final report

The EURO-GBD-SE project showed how the PAF approach can be used to calculate the impact of changes in the social distribution of proximate risk factors, first on mortality and second on the magnitude of socioeconomic inequalities in mortality in different countries.

Implications

We demonstrate that the PAF can be used to quantify the impact on health inequalities of modifying the social distribution of risk factors.

Our results suggest that this impact is substantial, and we show that the proposed method can be used to produce valuable information for priority setting in health policy and for the formulation of realistic quantitative targets for the reduction of health inequalities.

The results are similar to a conventional regression, but the data requirements are much easier to meet (by combining information from different sources), which facilitates comprehensive comparative studies across many countries.

Social Science & Medicine
Volume 117, September 2014, Pages 142-149

Assessing the potential impact of increased participation in higher education on mortality: Evidence from 21 European populations

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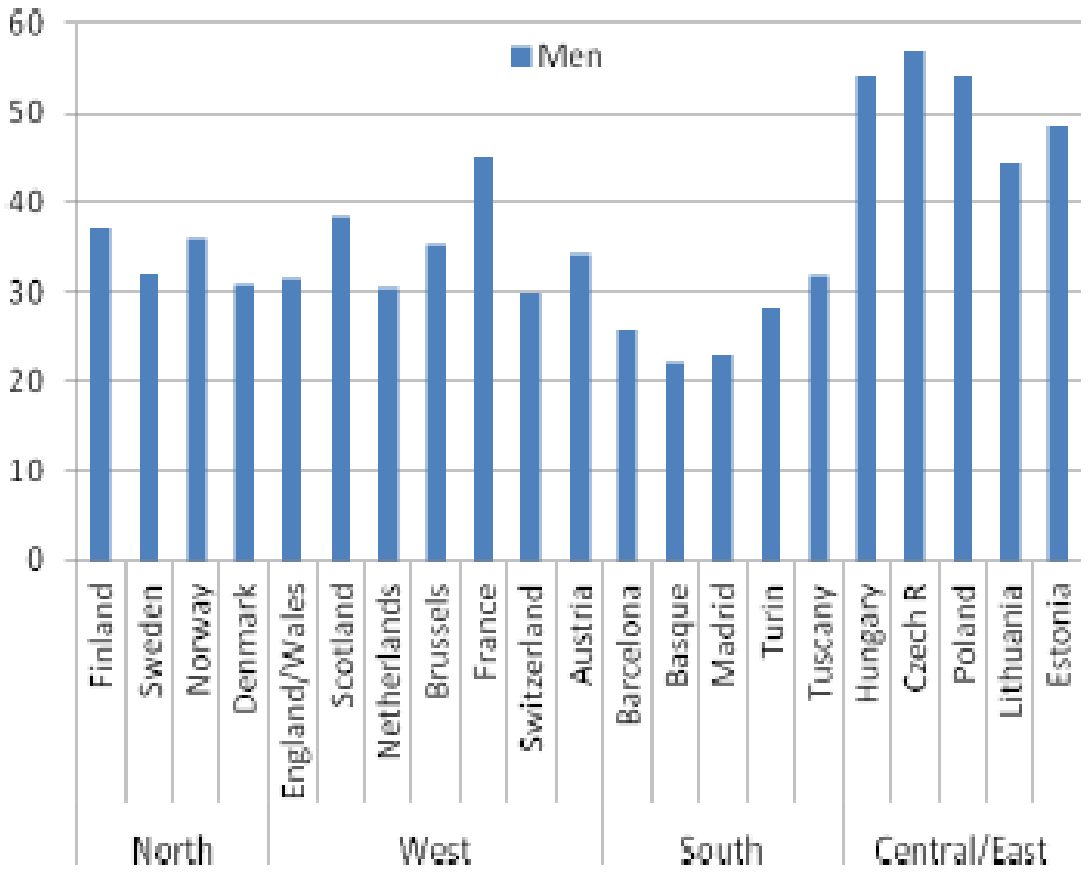
The impact of equalizing the distribution of education



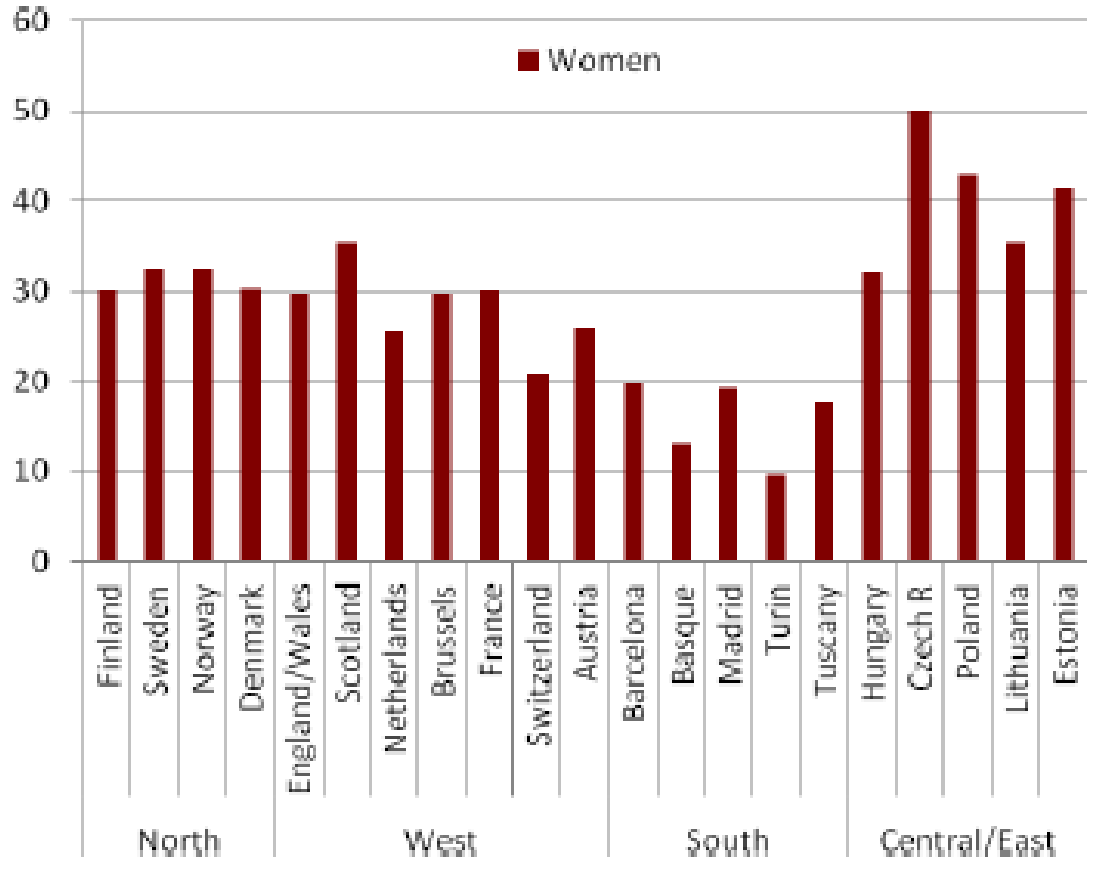


Figure 7.4.1
Percentage of all-cause mortality that would be prevented if all persons in the population had the mortality rate of the highest educated.

Source: EURO-GBD-SE final report

Acknowledgements

We thank the EURO-GBD-SE international project partners who supplied the mortality data: Annibale Biggeri (Tuscany, Italy), Matthias Bopp (Switzerland), Carme Borrell (Barcelona, Spain), Lynsey Brown (England and Wales), Giuseppe Costa (Turin, Italy), Patrick Deboosere (Belgium), Chris Dibben (Scotland), Santiago Esnaola (Basque Country, Spain), Domantas Jasilionis (Lithuania), Johannes Klotz (Austria), Katalin Kovacs (Hungary), Anita Lange (Denmark), Mall Leinsalu (Estonia), Olle Lundberg (Sweden)

Limitations

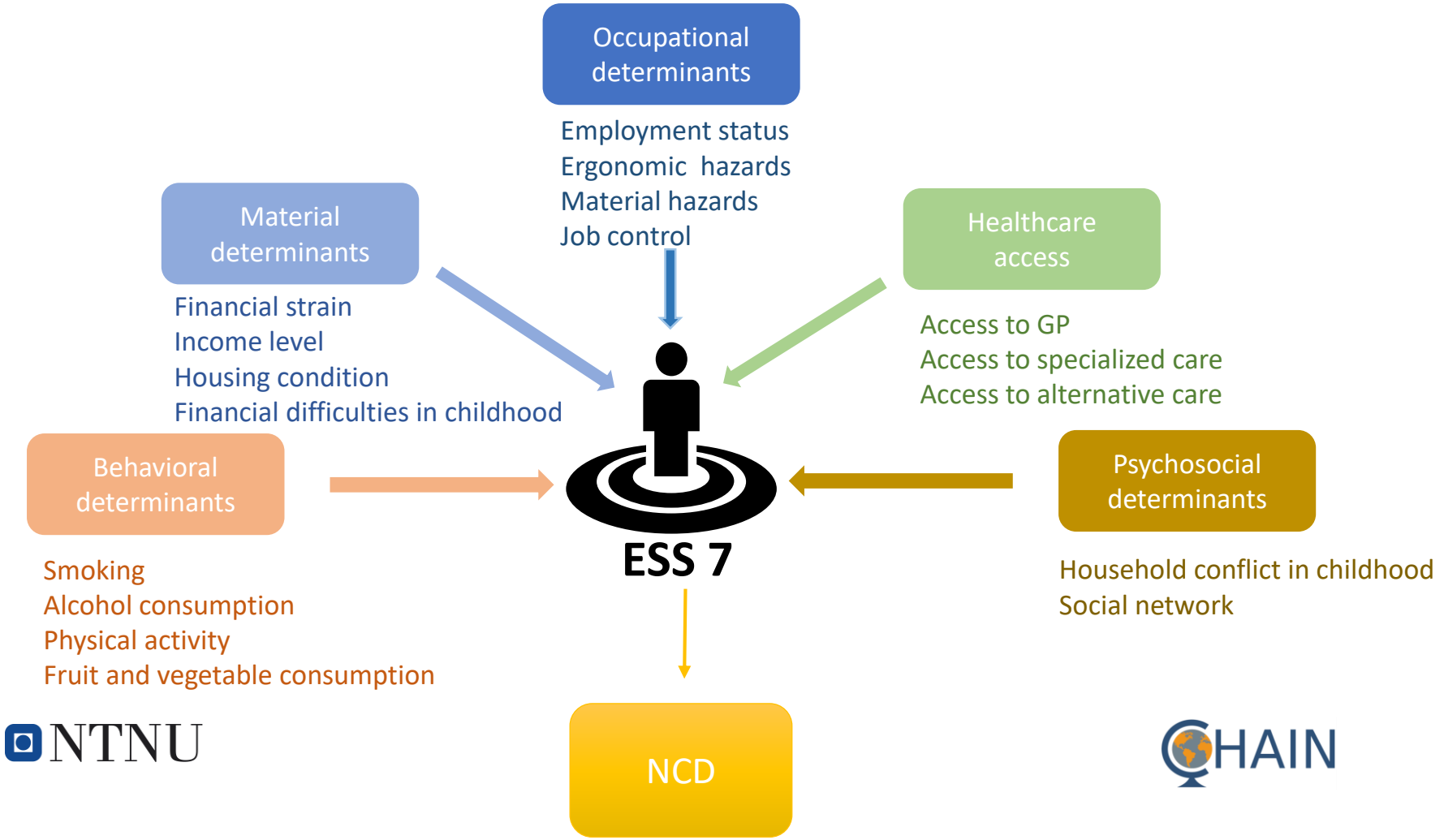
Combining data from different sources to examine the extent to which educational inequalities can be reduced is a very useful, but still sub-optimal strategy.

CHAIN is currently working on meeting this data limitation through the European Social Survey (ESS) and the Global Burden of Disease Study (GBD).

The health module of ESS 7 (2014) and ESS11 (2024) exemplify how regression-based approaches can be used, applying the same data source (but not for mortality).

ESS11 Team →

ESS7 – Health Module



European Sociological Review Advance Access published May 16, 2016
European Sociological Review, 2016, 1–17
doi: 10.1093/esr/jcw019
Original Article

The First Pan-European Sociological Health Inequalities Survey of the General Population: The European Social Survey Rotating Module on the Social Determinants of Health

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Submitted August 2015; revised March 2016; accepted March 2016

Abstract

The European Social Survey (ESS) is a biennial, academically driven, cross-sectional, pan-European social survey that charts and explains the interactions between Europe's changing institutions and the attitudes, beliefs, and behaviour patterns of its diverse populations. As part of the seventh round of the ESS, we successfully developed a rotating module that provides a comprehensive and comparative pan-European data set on the social determinants of health and health inequalities. In this article, we present the rationale for the module, the health outcomes, and social determinants that were included, and some of the opportunities that the module provide for advancing research into explaining the distribution and aetiology of social inequalities in health in Europe. Thus far, no health survey has had sufficient data on the stratification system of societies, including rich data on living conditions, and there is no sociological survey with sufficient variety of lifestyle factors and health outcomes. By including unhealthy lifestyle behaviours, childhood conditions, housing conditions, working conditions, and variables describing access to healthcare, together with an extensive set of mental and physical health outcomes, the ESS has strengthened its position tremendously as a data source for sociologists wanting to perform European cross-national analyses of health inequalities.

Timeline

February 2023 - start the data collection
December 2023 - end of data collection
April 2024 - first data available
October 2024- final data release

CHAIN – IHME collaboration aiming at integrating socioeconomic factors into the Global Burden of Disease Study

- Has resulted in global RRs between parental education and under 5-child mortality (Balaj, M. et al. 2021, Lancet)
- RRs between all-cause and cause specific mortality and education among adults upcoming
- These RRs can be applied in PAF analyses, as demonstrated in this presentation.
- They will also support the integration of education as the first “social risk factor” into the GBD.
- This will enable us to identify the contribution of low education as a risk for mortality (among children and adults), as compared to other and more proximate risk factors.

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