SPECIAL ARTICLE

Socioeconomic Inequalities in Health in 22 European Countries

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ABSTRACT

BACKGROUND

Comparisons among countries can help to identify opportunities for the reduction of inequalities in health. We compared the magnitude of inequalities in mortality and self-assessed health among 22 countries in all parts of Europe.

METHODS

We obtained data on mortality according to education level and occupational class from census-based mortality studies. Deaths were classified according to cause, including common causes, such as cardiovascular disease and cancer; causes related to smoking; causes related to alcohol use; and causes amenable to medical intervention, such as tuberculosis and hypertension. Data on self-assessed health, smoking, and obesity according to education and income were obtained from health or multipurpose surveys. For each country, the association between socioeconomic status and health outcomes was measured with the use of regression-based inequality indexes.

RESULTS

In almost all countries, the rates of death and poorer self-assessments of health were substantially higher in groups of lower socioeconomic status, but the magnitude of the inequalities between groups of higher and lower socioeconomic status was much larger in some countries than in others. Inequalities in mortality were small in some southern European countries and very large in most countries in the eastern and Baltic regions. These variations among countries appeared to be attributable in part to causes of death related to smoking or alcohol use or amenable to medical intervention. The magnitude of inequalities in self-assessed health also varied substantially among countries, but in a different pattern.

CONCLUSIONS

We observed variation across Europe in the magnitude of inequalities in health associated with socioeconomic status. These inequalities might be reduced by improving educational opportunities, income distribution, health-related behavior, or access to health care.

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Inequalities in health among groups of various socioeconomic status (as measured by education, occupation, and income) constitute one of the main challenges for public health,[1] but it is unknown to what extent such inequalities are modifiable. Because international comparative studies can help identify opportunities for reducing inequalities in health, we conducted a study aimed at measuring variations in the magnitude of inequalities in health among 22 European countries and at identifying some of the immediate determinants of these variations.

Europe offers excellent opportunities for this type of research because of the intercountry variety of political, cultural, economic, and epidemiologic histories and because good data on inequalities in health are often available.[2] In a previous study, we compared socioeconomically based inequalities in mortality and morbidity among 10 countries in western Europe during the 1980s.[3-7] We now report a study of the magnitude of inequalities in health in a much larger number of countries in both western and eastern Europe during the 1990s and early 2000s. The inclusion of eastern Europe allows us to determine whether countries that have gone through a turbulent period of political, economic, and health care reform[8-12] have larger inequalities in health than countries elsewhere in Europe.

METHODS

We obtained data on mortality according to age, sex, cause of death, and indicators of socioeconomic status from mortality registries (Table 1). The data were based on 3.5 million deaths in 16 countries among more than 54 million persons ranging in age from 30 to 74 years at the beginning of the study. The data were drawn from national populations, except for the United Kingdom, with data from England and Wales only; Italy, with data from Turin only; and Spain, with data from Madrid, Barcelona, and the Basque country only. With regard to the mortality data from England and Wales, this article has received clearance from the Office for National Statistics Longitudinal Study (reference number 20037C). We performed two analyses of the data on death according to cause; one analysis focused on common causes of death (cancer, cardiovascular disease, and injuries), and the other focused on more specific causes of death (smoking-related causes, alcohol-related causes, and causes amenable to medical intervention, such as tuberculosis and hypertension[13,14]). Code numbers of the causes of death according to the ninth and tenth revisions of the *International Classification of Diseases, Clinical Modification* (ICD-9-CM and ICD-10-CM) are given in Table 1 in the Supplementary Appendix, available with the full text of this article at www.nejm.org.

Data on self-assessed health and risk factors for disease (e.g., smoking and obesity) according to age, sex, and indicators of socioeconomic status were obtained from national health or multipurpose surveys that also included self-reported socioeconomic data (Table 1). The data came from 19 countries and almost 350,000 respondents who ranged in age from 30 to 64 years in some surveys and from 30 to 69 years in others. All data are nationally representative. For self-reported illness, our study focused on the single-item question on self-assessed health ("How is your health in general?"), which has five possible answers, ranging from "very good" to "bad." In order to make use of the full range of levels of self-assessed health, we gave quantitative weights to each level (i.e., a multiplicative factor of 1.85 for each level worse than "very good") that were derived from the average number of chronic conditions in each level[15] (details of the calculation are given in the legend to Fig. 2). The only risk factors for disease for which data were available in a form that enabled them to be compared across countries were current tobacco smoking and obesity, defined as a body-mass index (the weight in kilograms divided by the square of the height in meters) greater than 30.

Socioeconomic status was measured by education, occupation, and income. Education levels were categorized as no education or primary education (up to approximately 6 years of education), lower secondary education (up to approximately 9 years), higher secondary education (up to approximately 11 years), and tertiary education (bachelor's degree or higher). Data on education level were available in a comparable form for most countries from both mortality registries and health interviews or multipurpose surveys. Occupations were classified as "manual" (considered the lower level) or "nonmanual." Data on occupation were available from mortality registries for middle-aged men in a limited number of countries only. Income was categorized in approximate quintiles of equivalent net household income. The self-reported

Table 1. Countries Included in the Analysis and Sources of Data.

European Region	Country	Mortality Data				Morbidity Data		
		Type of Study*	Years	Person-years of Follow-up	No. of Deaths	Survey	Years	No. of Respondents
North	Finland	National, longitudinal, census-linked mortality study	1990–2000	25,874,201	269,781	Finbalt Health Monitor — National Public Health Institute, Helsinki	1994, 1998, 2000, 2002, 2004	16,963
	Sweden	National, longitudinal, census-linked mortality study	1991–2000	43,537,681	404,151	Swedish Survey of Living Conditions — Statistics Sweden, Stockholm	2000–2001	9,918
	Norway	National, longitudinal, census-linked mortality study	1990–2000	19,956,767	213,022	Norwegian Survey of Living Conditions — Statistics Norway, Oslo	2002	5,918
	Denmark	National, longitudinal, census-linked mortality study	1996–2000	13,926,291	136,065	Danish Health and Morbidity Survey — Danish National Institute of Public Health, Copenhagen	2000	14,503
West	United Kingdom	National, longitudinal, census-linked mortality study for a representative sample of 1% of the population of England and Wales	1991–1999	2,295,029	21,234	Health Survey for England — Department of Health, London	2001	13,960
	Ireland	Not available				Living in Ireland Panel Survey — Economic and Social Research Institute, Dublin	1995–2002	5,294
Continental	The Netherlands	Not available				General Social Survey — Statistics Netherlands, Voorburg	2003–2004	13,782
	Belgium	National, longitudinal, census-linked mortality study	1991–1995	24,861,015	283,349	Health Interview Survey — Institute of Public Health, Brussels	1997–2001	16,268
	Germany	Not available				German National Health Examination and Interview Survey — Robert Koch Institut, Berlin	1998	6,403
	Switzerland†	National, longitudinal, census-linked mortality study	1990–2000	27,910,587	255,251	Not available		
	France‡	National, longitudinal, census-linked mortality study for a representative sample of 1% of population	1990–1999	2,404,246	20,465	French Health, Health Care and Insurance Survey — Institut de Recherche et Documentation en Economie de la Santé, Paris	2004	14,727
South	Italy	Urban, longitudinal, census-linked mortality study for the city of Turin	1991–2001	4,873,109	50,621	Health Conditions and Use of Health Services — National Institute of Statistics, Rome	1999–2000	102,832
						Multipurpose Family Survey, Aspects of Daily Living — National Institute of Statistics, Rome	2000	43,011

	Spain	Urban, longitudinal, census-linked mortality study for the city of Barcelona	1992–2001	8,151,810	77,101	National Health Survey — Ministry of Health and Consumption, Madrid	2001	17,517
		Regional, longitudinal, census-linked mortality study for the region of Madrid	1996–1997	3,663,333	22,585			
		Regional, longitudinal, census-linked mortality study for the Basque country	1996–2001	6,098,485	41,704			
	Portugal	Not available				National Health Survey — Instituto Nacional de Saude Dr. Ricardo Jorge, Lisbon	1998–1999	34,840
East	Slovenia	National, longitudinal, census-linked mortality study	1991–2000	9,647,452	101,557			
	Hungary	National, unlinked, cross-sectional mortality study	1999–2002	21,031,348	363,508	National Health Interview Survey Hungary — National Public Health and Medical Officer Service, Budapest	2000–2003	9,179
	Czech Republic	National, unlinked, cross-sectional mortality study	1999–2003	25,759,210	344,973	Health Interview Survey — Institute of Health Information and Statistics of the Czech Republic, Prague	2002	2,028
	Slovakia	Not available				Health Monitor Survey — Public Health Institute of the Slovak Republic, Bratislava	2002	1,200
	Poland	National, unlinked, cross-sectional mortality study	2001–2003	54,883,245	717,743	Not available		
Baltic	Lithuania	National, unlinked, cross-sectional mortality study	2000–2002	5,156,703	78,399	Finbalt Health Monitor — National Public Health Institute, Helsinki	1994, 1998, 2000, 2002, 2004	10,336
	Latvia	Not available				Finbalt Health Monitor — National Public Health Institute, Helsinki	1998, 2000, 2002, 2004	6,779
	Estonia	National, unlinked, cross-sectional mortality study	1998–2002	3,435,255	60,794	Health Behavior among Estonian Adult Population — National Institute for Health Development, Tallinn	2002, 2004	3,525
Total	Europe			303,540,302	3,462,053			348,983

* In longitudinal, census-linked, follow-up studies of mortality, socioeconomic status as determined during a census is linked to mortality data during a follow-up period after the census. In unlinked, cross-sectional studies of mortality, socioeconomic data mentioned on death certificates and elicited during the census have been used to classify the numerator and denominator of mortality, respectively.

† Non-Swiss nationals are excluded.

‡ Residents of overseas territories, members of the military, and students were excluded.

after-tax incomes of all household members, including benefits, were added, and the total was corrected for household size by dividing it by the total number of persons in the household to the power of 0.36. Income data were available from surveys in a limited number of countries only. Tables 2, 3, and 4 in the Supplementary Appendix show the distribution of study populations according to education level, occupational classification, and income level. The proportion of the population with less education tended to be large in the southern and eastern regions, whereas inequalities in income were large in England and Wales and in Portugal.

All measures were adjusted for age. Because both relative and absolute measures of inequalities in health are important, we have presented both the relative index of inequality and the slope index of inequality[16,17] for each country separately. Both indexes are regression-based measures that take into account the whole socioeconomic distribution and that remove variability in the size of socioeconomic groups as a source of variation in the magnitude of inequalities in health.[17] In the regression analysis, mortality, morbidity, or risk-factor prevalence was related to a measure of the rank of education, occupation, or income, in which the rank was calculated as the mean proportion of the population having a higher level of education, occupation, or income.

The relative index of inequality is the ratio between the estimated mortality, morbidity, or risk-factor prevalence among persons at rank 1 (the lowest education, occupation, or income level) and rank 0 (the highest level). The relative index of inequality was calculated with the use of Poisson regression analysis, which also generated 95% confidence intervals. The slope index of inequality measures absolute differences in rates (e.g., in deaths per 100,000 person-years) between the lowest and the highest ends of the socioeconomic scale. The slope index of inequality is derived from the relative index of inequality and the age-adjusted overall mortality rate according to the following formula: slope index of inequality = 2 × mortality rate × (relative index of inequality − 1) ÷ (relative index of inequality + 1).[16] Because the slope index of inequality depends on the overall mortality rate in the population, we have presented these overall mortality rates together with the slope indexes of inequality.

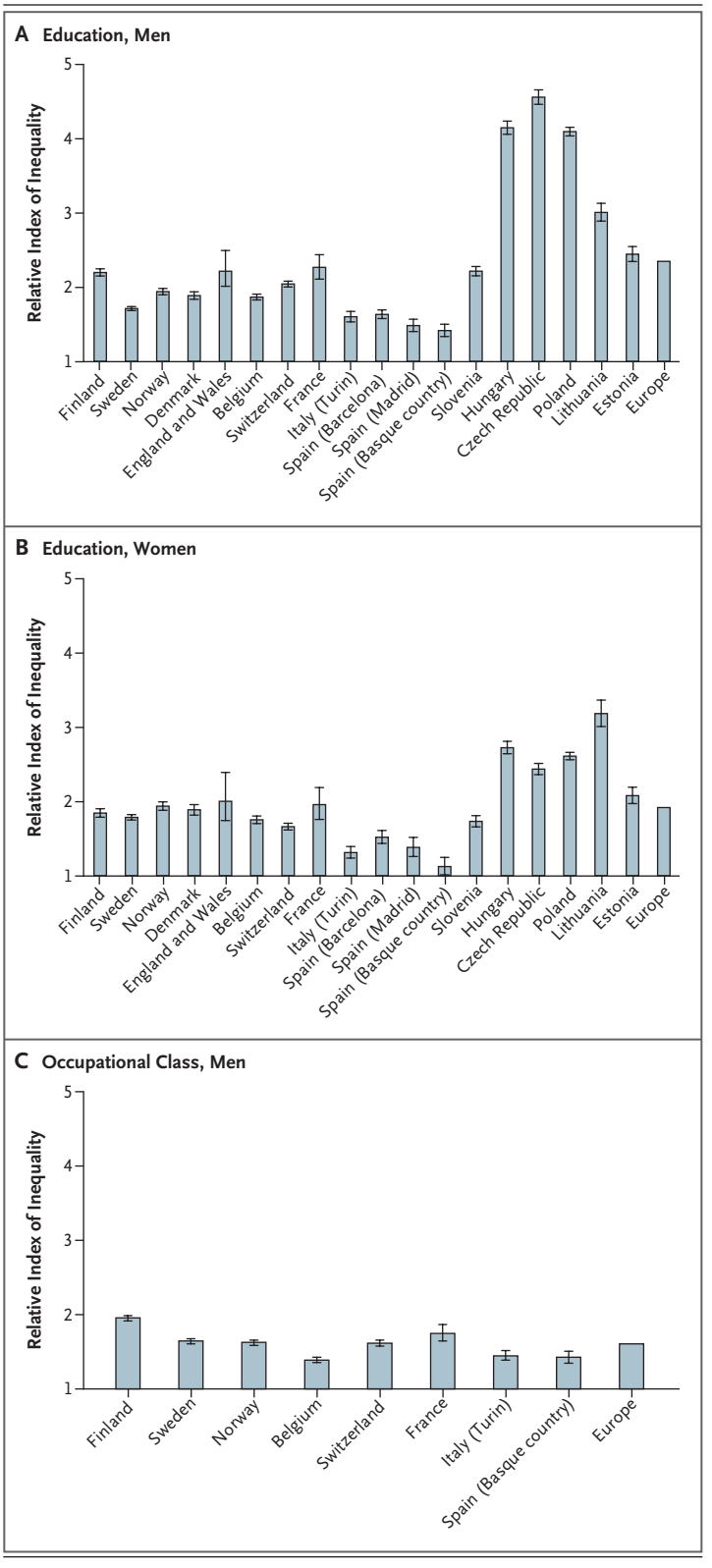
RESULTS

Figures 1A and 1B show relative inequalities in the rate of death from any cause according to education level. The relative index of inequality is greater than 1 for both men and women in all countries, indicating that, throughout Europe, mortality is higher among those with less education. The magnitude of these inequalities varies substantially among countries. For example, in Sweden, the relative index of inequality for men is less than 2, indicating that mortality among those with the least education is less than twice that among those with the most education; on the other hand, in Hungary, the Czech Republic, and Poland, the relative index of inequality for men is 4 or higher, indicating that mortality differs by a factor of more than 4 between the lower and upper ends of the education scale. The smallest inequalities for both men and women are found in the Basque country of Spain, whereas the largest inequalities are found in the Czech Republic and Lithuania. Education-related inequalities in mortality are smaller than the average for Europe in all southern European populations included in this analysis and larger than average in most countries in the eastern and Baltic regions. Data on occupation-related inequalities in mortality among middle-aged men (Fig. 1C) confirm that relative inequalities in mortality tend to be smaller in southern European populations.

Table 2 shows that the international pattern observed for relative education-related inequalities in mortality also generally applies to absolute education-related inequalities in mortality, as indicated by the slope index of inequality. In Europe as a whole, persons with less education have higher rates of death from all causes except breast cancer, as indicated by a negative slope index of inequality for this cause of death. Inequalities in the rate of death from cardiovascular disease account for 34% of education-related inequalities in the rate of death from any cause among men (451 of 1333 deaths per 100,000 person-years) and 51% of those among women (251 of 492 deaths per 100,000 person-years). Although death from almost any cause is more frequent among those with less education than among those with more education, the range of variation for a single cause of death sometimes includes both "reverse" inequalities (higher mortality in groups with higher

Figure 1. Relative Inequalities in the Rate of Death from Any Cause.

Panel A shows inequalities between men with the lowest level of education and those with the highest, and Panel B shows education-related inequalities for women. Panel C shows inequalities between men in the lower and higher occupational classes. Economically inactive men whose last occupation was unknown were excluded from the analysis. Because exclusion of these men may lead to underestimation of mortality differences between occupational classes, we applied an adjustment procedure that was developed and tested in a previous European comparative study of inequalities in mortality; the procedure is based on national estimates of the proportion of economically inactive men in each occupational class and of the mortality rate ratio of inactive as compared with active men in each occupational class.[18]



education) and "regular" inequalities (higher mortality in groups with lower education).

These data help to explain how smaller education-related inequalities in the rate of death from any cause in southern European populations and larger inequalities in the eastern and Baltic regions arise. Among men and women, smaller inequalities in the rate of death from any cause in the southern region are due mainly to smaller inequalities in the rate of death from cardiovascular disease. For example, among men in the Basque country, where the education-related inequality in the rate of death from any cause is below the European average, death from cardiovascular disease accounts for 46% of this difference (i.e., [451−16 deaths per 100,000 person-years] ÷ [1333−384 deaths per 100,000 person-years]). Larger inequalities in the rate of death from cardiovascular disease make an important contribution to larger inequalities in the rate of death from any cause in the eastern and Baltic regions as well; however, important contributions are also made by cancer in the eastern region and injuries in the Baltic region.

In Europe as a whole, inequalities in mortality from smoking-related conditions account for 22% of the inequalities in the rate of death from any cause among men and 6% of those among women (Table 2). Inequalities in smoking-related mortality tend to be larger in the eastern and Baltic regions (among men only) and smaller (or even "reverse") in the southern region. In Europe as a whole, inequalities in alcohol-related mortality account for 11% of inequalities in the rate of death

Table 2. Absolute Inequalities in Overall and Cause-Specific Mortality Rates between Persons with the Lowest and Those with the Highest Level of Education.*

Country	Average Rate of Death from Any Cause†	Slope Index of Inequality According to Cause of Death											
		All Causes	All Cancer-Related Causes	Breast Cancer‡	Lung Cancer	All Cardiovascular Disease	Ischemic Heart Disease	Cerebrovascular Disease	Injuries	All Other Diseases	Alcohol-Related Causes§	Smoking-Related Causes¶	Causes Amenable to Medical Intervention‖
		deaths/100,000 person-years											
Men													
Finland	1673	1255	213		135	533	393	94	143	347	101	215	88
Sweden	1188	625	90		37	309	229	50	52	175	50	71	26
Norway	1529	980	169		95	434	307	78	70	305	62	166	49
Denmark	1344	828	126		75	235	157	39	89	363	23	60	44
United Kingdom (England and Wales)	1124	862	225		141	401	284	67	19	157	28	241	NA
Belgium	1510	915	274		179	233	99	55	64	340	36	302	28
Switzerland	1475	1012	283		136	401	132	61	91	348	117	260	61
France	1241	1044	333		71	232	67	68	109	357	196	204	114
Italy (Turin)	1377	639	232		107	140	57	52	23	243	63	177	24
Spain (Barcelona)	1370	662	230		90	88	26	40	38	304	77	218	36
Spain (Madrid)	1355	530	181		56	38	−16	11	26	278	75	170	34
Spain (Basque country)	1108	384	107		39	16	−6	3	63	177	46	107	24
Slovenia	1902	1439	303		124	405	67	219	203	482	224	327	83
Hungary	2110	2580	666		260	1003	482	385	222	671	420	508	66
Czech Republic	1664	2130	676		247	825	472	259	138	489	146	364	73
Poland	1804	2192	589		260	750	295	223	187	637	145	408	75
Lithuania	2531	2536	383		197	807	505	159	643	677	304	424	195
Estonia	2799	2349	355		191	929	610	263	436	618	286	323	162
Europe total	1635	1333	328		153	451	233	131	147	425	141	288	72

Women													
Finland	811	483	49	−8	14	262	168	72	25	161	31	28	42
Sweden	673	381	73	−6	20	172	104	44	8	128	15	39	18
Norway	811	518	103	−14	44	239	141	62	5	169	16	79	30
Denmark	830	511	103	−12	63	160	90	42	22	230	9	70	27
United Kingdom (England and Wales)	672	462	111	−22	59	236	154	31	1	96	7	103	NA
Belgium	761	417	47	−11	11	198	77	55	11	163	6	29	10
Switzerland	676	337	53	−3	10	158	74	46	5	120	10	21	22
France	536	375	50	35	6	130	33	44	36	163	30	17	82
Italy (Turin)	721	197	15	−17	−9	94	34	34	−3	94	8	−4	11
Spain (Barcelona)	569	236	7	−12	−14	103	36	34	5	126	7	−14	12
Spain (Madrid)	543	175	−12	−29	−17	96	30	29	−1	94	−3	−17	9
Spain (Basque country)	422	51	−76	−19	−20	56	23	17	7	74	3	−24	2
Slovenia	853	459	−13	−21	−18	263	62	127	28	180	44	−3	33
Hungary	1023	948	120	−17	20	511	237	216	51	258	82	61	26
Czech Republic	868	726	144	10	17	356	182	134	26	203	23	33	32
Poland	840	750	139	6	10	356	117	142	29	222	23	28	27
Lithuania	1053	1099	130	7	7	535	297	162	178	251	87	39	51
Estonia	1213	851	7	−5	4	493	273	187	109	252	101	16	48
Europe total	778	492	55	−9	10	251	120	85	30	172	30	28	27

* Code numbers of the causes of death according to the 9th and 10th revisions of the *International Classification of Diseases, Clinical Modification* (ICD-9-CM and ICD-10-CM) are given in Table 1 of the Supplementary Appendix. The slope index of inequality is a regression-based measure of absolute differences in mortality rates between the lowest and the highest ends of the socioeconomic scale. NA denotes not available.

† Age-standardized rates of death for all educational groups are given.

‡ Rates of death from breast cancer among men are not given.

§ Alcohol-related causes are accidental poisoning by alcohol and alcoholic psychosis, dependence, abuse, cardiomyopathy, and cirrhosis of the liver and pancreas.

¶ Smoking-related causes are chronic obstructive pulmonary disease and cancer of the buccal cavity, pharynx, esophagus, larynx, trachea, bronchus, and lung.

‖ Causes amenable to medical intervention are tuberculosis and other infectious and parasitic diseases, cervical cancer, breast cancer, Hodgkin's disease, leukemia, hypertension, cerebrovascular disease, pneumonia or influenza, appendicitis, hernia, peptic ulcer, cholelithiasis and cholecystitis, and complications of childbirth.

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from any cause among men and 6% of those among women. Larger inequalities in alcohol-related mortality contribute to larger inequalities in the rate of death from any cause in Hungary (among men and women) and the Baltic region (among men only). In Europe as a whole, deaths from conditions amenable to medical intervention account for 5% of inequalities in the rate of death from any cause. However, these inequalities are larger than the European average in Lithuania and Estonia, where they contribute to the larger inequalities in the rate of death from any cause (among men only).

Figure 2 shows the relative inequalities in the prevalence of poorer self-assessed health (weighted on the basis of the burden of chronic disease) according to education and income level. The relative index of inequality is greater than 1 in all countries, indicating worse health in groups of lower socioeconomic status throughout Europe. The variation of this measure among countries is considerably less than that of inequalities in the rate of death from any cause, and the international pattern also tends to be different from that of death from any cause. In Italy and Spain, education-related inequalities in self-assessed health are smaller than average, a finding that mirrors the smaller education-related inequalities in the rate of death from any cause observed in Turin, Barcelona, Madrid, and the Basque country. In the Baltic region, on the other hand, education-related inequalities in self-assessed health are smaller than average, whereas education-related inequalities in death from any cause are larger. Income-related inequalities in self-assessed health are not larger in the eastern and Baltic regions than in other parts of Europe and are remarkably large in the northern and western regions, particularly England and Wales, where income inequalities are also large (see Table 4 in the Supplementary Appendix).

In Europe as a whole, both smoking and obesity are more common among people of lower education level; education-related inequalities in smoking are larger among men, and education-related inequalities in obesity are larger among women (Fig. 3). There are striking differences among countries in the magnitude and even the direction of these inequalities, however. Large education-related inequalities in smoking are seen in the northern, western, and continental regions; small inequalities (and, among women, even reverse inequalities, in which smoking rates are higher in groups with more education) are seen in the southern region. In the eastern and Baltic regions, the pattern is unclear. Large education-related inequalities in obesity are seen in the southern region, particularly among women, for whom the relative indexes of inequality are above 4, indicating that the prevalence of obesity among those with the least education is more than four times higher than that among those with the most education. By contrast, education-related inequalities in obesity tend to be smaller than average in the eastern and Baltic regions.

DISCUSSION

As compared with our study of inequalities in mortality and morbidity related to socioeconomic status in 10 western European countries during the 1980s,[3] the present, more extensive study of the situation during the 1990s and early 2000s found much larger among-country variability in the magnitude of inequalities in health. Inequalities in mortality from selected causes suggest that some variations may be attributable to socioeconomic differences in smoking, excessive alcohol consumption, and access to health care. We also found among-country variations in the magnitude of inequalities in self-assessed health, but in a different pattern, precluding a generalization from inequalities in mortality to inequalities in overall health.

Our study had several limitations. International comparability of data on socioeconomic inequalities in health is still imperfect, and the degree of comparability is likely to decline with increasing geographical coverage. There are differences among countries in various aspects of data collection, and some of these might affect the size of inequalities in health, as we have shown previously.[18] We found smaller inequalities in mortality in some urban, relatively prosperous southern European populations that are not necessarily representative of the whole of Italy or Spain. Some studies have shown, however, that inequalities in health tend to be larger in urban than in rural areas.[19] Our previous study in the 1980s, which used national data for Italy and Spain from methodologically less-refined sources, also showed smaller inequalities in mortality in these countries.[4,5] We found larger inequalities in mortality in the eastern and Baltic regions. All these coun-

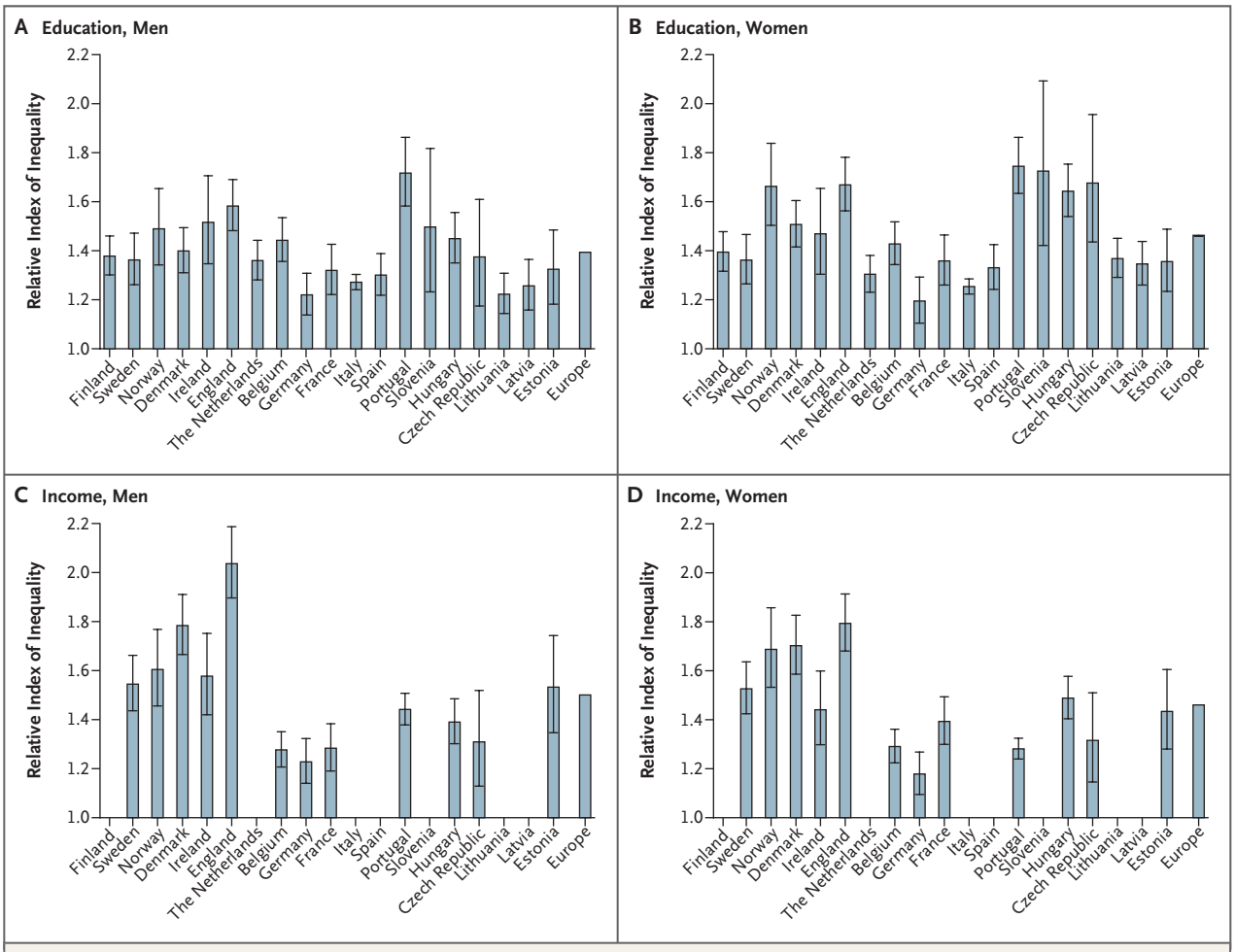

Figure 2. Relative Inequalities in the Prevalence of Poorer Self-Assessed Health.

Panels A and B show inequalities between persons with the lowest and those with the highest level of education for men and women, respectively. Panels C and D show inequalities between persons with the lowest and those with the highest level of income for men and women, respectively. In order to make use of the full range of levels of self-assessed health, we calculated the estimated burden of disease associated with each level on the basis of the number of chronic conditions reported by respondents to these surveys. Relative differences in self-reported chronic conditions between answer categories of the self-assessed health question were remarkably similar between countries and varied only marginally around a multiplicative factor of 1.85 (i.e., each step down on the self-assessed health scale was found to be associated with 1.85 times more chronic conditions). On the basis of this analysis, we assigned a weight for burden of disease to each category of answer to the question "How is your health in general?" "Very good" was assigned a weight of $1.85^0=1$, "good" a weight of $1.85^1=1.85$, "fair" a weight of $1.85^2=3.42$, and "poor" or "very poor" a weight of $1.85^3=6.33$. Sensitivity analyses showed that the ranking of countries according to the magnitude of inequalities in self-assessed health did not change when these weights were varied within the range of observed values.[15]

tries except Slovenia, which has smaller inequalities in mortality, provided data from cross-sectional, non-census–linked studies. Although this may suggest bias,[20] it is also possible that Slovenia, which is close to Italy, shares some of the favorable characteristics of the southern region.

Internationally comparable data on inequalities in specific determinants of mortality and morbidity are scarce, and we could study only smoking and obesity. The contribution to inequality of other factors, such as alcohol consumption, use of health care, working and housing conditions, and psychosocial stressors, could not be studied directly.

Both smoking and obesity have been shown to contribute to inequalities in health related to socioeconomic status in studies of individual persons in some countries.[21-23] Obesity, however, is unlikely to be a major contributor to international variations in inequalities in health, because in-

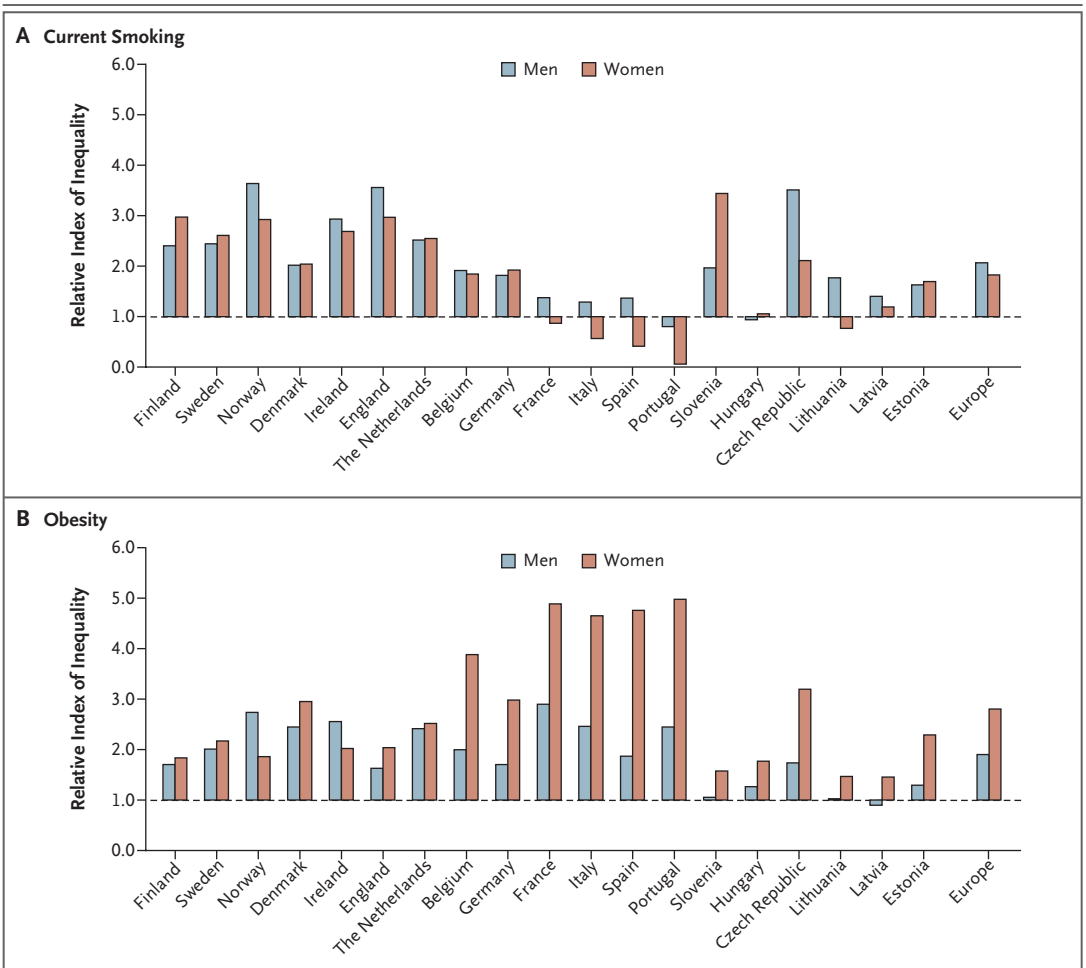

Figure 3. Relative Inequalities in the Prevalence of Current Smoking (Panel A) and Obesity (Panel B) between Persons with the Lowest and Those with the Highest Level of Education, According to Sex.

equalities in obesity related to socioeconomic status are large where inequalities in mortality related to socioeconomic status, particularly mortality from cardiovascular disease, are small (i.e., in the southern region). Smoking, on the other hand, does appear to be a major explanatory factor. It has been well documented that countries in the southern region are in an earlier stage of the smoking epidemic than countries in the northern, western, and continental regions.[24,25] We still found reverse inequalities in smoking among women and small inequalities among men, findings that are consistent with the smaller inequalities in mortality in the southern region, particularly from conditions related to smoking. The history of the smoking epidemic is much less well documented for the eastern and Baltic regions,[26,27] and it is therefore difficult to determine why inequalities in mortality from smoking-related conditions are large, whereas inequalities in smoking are often small.

The role of hazardous drinking (daily consumption of large amounts of alcohol-containing beverages, binge drinking, or consumption of surrogate alcohols) in generating high mortality rates in eastern Europe, particularly among men, has been well documented.[28-30] We have not been able to find comparable survey data on inequalities in alcohol consumption related to socioeconomic status in eastern Europe, but our analysis of cause-specific mortality suggests that rates of hazardous drinking are substantially higher in the lower than in the higher socioeconomic groups, particularly among men. Low levels of social support, lack of control over one's life, and material hardship, combined with a culture that approves of exces-

sive alcohol consumption, are likely to be involved.[8,9]

Although the role of deficiencies in health care in the high mortality rates of eastern Europe has been pointed out before,[31,32] our study demonstrates the magnitude of inequalities in mortality related to socioeconomic status from conditions amenable to medical intervention in this part of Europe. Our results suggest that inequalities in access to good-quality health care have a role in generating inequalities in mortality. Inequalities in access to health care leading to inequalities in survival from chronic conditions may also partly explain the discrepancy between our results for mortality and those for self-assessed health. Inequalities in the prevalence of poorer self-assessed health are the result of inequalities in both the incidence and the duration of health problems, which may be shortened by lower survival rates among less-educated persons in eastern Europe.

Smoking, obesity, excessive alcohol consumption, and deficiencies in health care represent only some of the immediate determinants of inequalities in health, and both lifestyle choices and patterns of use of health care are likely to be constrained by inequalities in general living conditions, as structured by political, economic, social, and cultural forces. Within western Europe, there is little evidence that among-country variations in the magnitude of inequalities in health are related to variations in political factors. For example, Italy and Spain have welfare policies that are less generous and less universal than those of northern Europe,[33,34] but they appear to have substantially smaller inequalities in mortality, perhaps partly because of cultural factors, such as the Mediterranean diet and the reluctance of women to take up smoking.[35,36] Cultural factors seem to have prevented differences in access to material and other resources in these populations from translating into inequalities in lifestyle-related risk factors for mortality.

We also found no evidence for systematically smaller inequalities in health in countries in northern Europe. This is surprising, because these countries have long histories of egalitarian policies, reflected by, among other things, welfare policies. These policies provide a high level of social-security protection to all residents of the country, resulting in smaller income inequalities and lower poverty rates.[33,34,37] Our results suggest that although a reasonable level of social security and public services may be a necessary condition for smaller inequalities in health, it is not sufficient. Lifestyle-related risk factors have an important role in premature death in high-income countries[38] and also appear to contribute to the persistence of inequalities in mortality in the northern region.[39]

Our study shows that although inequalities in health associated with socioeconomic status are present everywhere, their magnitude is highly variable, particularly for inequalities in mortality. This result implies that there is opportunity to reduce inequalities in mortality. Developing policies and interventions that effectively target the structural and immediate determinants of inequalities in health is an urgent priority for public health research.[40]

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APPENDIX

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