Income inequality, the psychosocial environment, and health: comparisons of wealthy nations

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Summary

Background The theory that income inequality and characteristics of the psychosocial environment (indexed by such things as social capital and sense of control over life's circumstances) are key determinants of health and could account for health differences between countries has become influential in health inequalities research and for population health policy.

Methods We examined cross-sectional associations between income inequality and low birthweight, life expectancy, self-rated health, and age-specific and cause-specific mortality among countries providing data in wave III (around 1989–92) of the Luxembourg Income Study. We also used data from the 1990–91 wave of the World Values Survey (WVS). We obtained life expectancy, mortality, and low birthweight data from the WHO Statistical Information System.

Findings Among the countries studied, higher income inequality was strongly associated with greater infant mortality (r=0·69, p=0·004 for women; r=0·74, p=0·002 for men). Associations between income inequality and mortality declined with age at death, and then reversed among those aged 65 years and older. Income inequality was inconsistently associated with specific causes of death and was not associated with coronary heart disease (CHD), breast or prostate cancer, cirrhosis, or diabetes mortality. Countries that had greater trade union membership and political representation by women had better child mortality profiles. Differences between countries in levels of social capital showed generally weak and somewhat inconsistent associations with cause-specific and age-specific mortality.

Interpretation Income inequality and characteristics of the psychosocial environment like trust, control, and organisational membership do not seem to be key factors in understanding health differences between these wealthy countries. The associations that do exist are largely limited to child health outcomes and cirrhosis. Explanations for between-country differences in health will require an appreciation of the complex interactions of history, culture, politics, economics, and the status of women and ethnic minorities.

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Introduction

There has been great interest in understanding links between income inequality and health.[1–4] Some studies have examined income inequality in relation to between-country health differences,[5,6] while others have analysed associations of income inequality and health within countries.[7,8] Two distinct questions have been raised. First, for a given average income, is the extent of inequality in the distribution of income associated with differences in average population health between countries or between regions (eg, states) within a country? As an extension of this question, it has been proposed that the quality of the psychosocial environment—characterised by such things as social capital and sense of control over life—is the main explanatory mechanism for such associations.[1,6,9] Although there is evidence at the individual level that psychosocial factors, like distrust,[10] control,[11] and the quality of interpersonal relationships[12] affect health, little is known about whether population level analogues of these psychosocial factors explain health differences between countries. Such psychosocial indicators have been shown as unimportant in understanding between country differences in self-rated health.[13] The second question is that if an association does exist between income inequality and health at the population level, to what extent is that association the mathematical result of the underlying association between income and health at an individual level.[14,15] Several within USA studies have investigated aspects of this.[15–16] The present analyses investigate the first question.

The theory that income inequality, and its potential effect on aspects of the psychosocial environment, can account for international health differences has become influential for interpreting health inequalities and in a number of countries has been embraced in policy documents focused on strategies to improve population health.[3] Interest in the health effects of unequal income distribution was generated by the observation that income inequality was strongly associated with life expectancy among nine Organisation for Economic Co-operation and Development (OECD) nations.[5] These data from the late 1970s and early 1980s showed that more economically unequal countries like the USA and UK had lower life expectancy than more egalitarian Nordic countries. After publication of this provocative idea, concerns were raised about accuracy of the income data, and contrary findings were published.[17–21] Despite the fact that these studies produced inconsistent findings, the theory that income inequality and its psychosocial effects are critical determinants of population health continues to be generally accepted and widely promoted.[22–24]

Important questions remain about the underlying empirical evidence to support claims that countries with more income inequality and poorer psychosocial environment have worse population health. Previous research has been based on small numbers of countries and limited health indicators, such as life expectancy—a

synthetic, overall measure of population health which can mask differences in the age and cause of death structure between countries. Across Europe, between country differences in the cause of death structure have been shown to be important in interpreting differences in the extent of within country health inequalities.[25]

We aimed to assess associations between income inequality and low birthweight, life expectancy, self-rated health, and age-specific and cause-specific mortality among countries providing data in wave III of the Luxembourg Income Study (LIS). The LIS is widely regarded as the premier study of income distribution in the world.[26] We have also examined how aspects of the psychosocial environment such as distrust, belonging to organisations, volunteering (all proposed as measures of social capital,[27] and perceived control over one's life circumstances were associated with between-country variations in health. We have also included data on belonging to trade unions and the proportion of women elected to national government, as indicators of class relations within the labour market and broader sociopolitical participation of women.[28]

Methods

Country selection

Wave III (1989–92) of the LIS provides the most recent, complete income inequality data available and includes 23 countries—Taiwan, Czech republic, Hungary, Israel, Poland, Russia, Slovak republic, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, UK, and USA. Taiwan was excluded because health data were not available. We first examined income inequality and life expectancy among the remaining 22 countries. However, all subsequent analyses were limited to 16 countries after excluding Russia, Poland, Hungary, Slovak and Czech republics, and Israel. We limited the sample because the period under study witnessed the break-up of the Soviet Union, collapse of other eastern bloc governments, and the continuing struggles in Israel. Such social instability may directly affect both income inequality and measures of the psychosocial environment thus making comparisons with countries having more stable political, economic, and social institutions difficult to interpret. There is clearly much to be learned from studing population health in the transition economies of eastern Europe. It is not that the population health experiences in these ex-Soviet countries are not informative—it is that they may not be directly comparable with countries with relatively stable economies, governments, and social institutions. We were interested in understanding how income inequality and the psychosocial environment affected population health in a subset of countries variously characterised in the literature as being wealthy, democratic, market-based economies. If the goal was to generalise transition economies or countries undergoing civil strife, economic, political, or institutional turmoil then inclusion of other countries may be appropriate. In this case, these countries were excluded because they are not in the target population to which both theoretical and policy-relevant generalisations have been and continue to be made. There is no doubt that understanding the population health effects of civil strife or transition from one kind of political economy to another is of great importance, but it is another question what implications that might have for the population health effects of income inequality and the psychosocial environment as they currently exist in stable, western democracies.

Assessment of income inequality

We used the Gini coefficient, based on equivalised household disposable income, as our measure of income inequality. This is a standard measure providing an overall estimate of inequality that ranges from 0 to 1—higher values mean greater inequality. We also examined the ratios of the 90th and 50th income percentiles to the 10th as indicators of inequality, but using these did not substantially alter results.

Assessment of the psychosocial environment

We used data from the 1990–91 wave of the World Values Survey (WVS)[29] to generate measures of the quality of the psychosocial environment. The WVS was conducted through face-to-face interviews of nationally representative samples in 43 countries and collected data on political, cultural, economic, and civic beliefs, and other aspects of life. All measures were weighted to generate valid national estimates. "Distrust" was measured by the question "generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people." "Belonging to organisations" and "volunteering" was the mean number of organisations to which respondents reported belonging and doing unpaid work. Both these questions were asked in regard to a variety of organisations—social welfare, religious, education/cultural, political, local community, third world development/human rights, conservation/environment, professional, youth, recreation, women's groups, peace, animal rights, health-related, or other groups. Mean perceptions of "control" were assessed from a question on how much "freedom of choice and control you feel you have over the way your life turns out". "Belonging to a trade union" was the % of respondents reporting trade union membership. We had a priori distinguished "belonging to trade unions" from belonging to other types of organisations because of the specific role trade unions play in affecting socioeconomic policies and in mediating social class relations. We also included an additional social indicator from the UN Human Development Report—"females in government"—which represents the % of elected seats in national government held by women.[30]

Assessment of health outcome

Life expectancy at birth (1991–93) was taken from the WHO's statistical information system.[31] Mortality rates were calculated from age-specific and sex-specific numbers of deaths and population counts from the WHO mortality database.[32] All-cause death rates were standardised in 5-year age groups using the new European Standard populations for men and women.[33] We calculated rates for all ages combined and age groups <1, 1–14, 15–44, 45–64, and 65 years plus. Standardised mortality rates were also computed for the following causes of death: coronary heart disease (ICD-9 Basic Tabulation List code=37), stroke (29), lung cancer (101), breast cancer (113), prostate cancer (124), diabetes (181), infectious (01–07), chronic obstructive pulmonary disease (323, 324, and 325), cirrhosis (347), unintended injury (E47 and E560), and homicide (E55). We calculated age-specific rates of unintentional injury mortality because of the heterogeneity in the underlying causes of these deaths. Infant unintentional deaths might include suffocation or burns whereas unintentional deaths among older groups are dominated by motor vehicle accidents. The WHO mortality database contains ICD-9 cause of death coding for all countries except Denmark and Switzerland. Cause-specific rates for these countries were calculated from the

corresponding ICD-8 A list codes. We compared mortality rates for 1989–92 for all countries except Germany, where only 1990–92 data were available. Rates of low birthweight (<2500 g) were obtained from WHO's statistical information system and were available for 1991–93 for all study countries except Canada and the USA (for which 1989–90 rates were used). Low birthweight data were not available for the Netherlands. Self-rated poor health was taken from the WVS, and represents the % of the population reporting their health to be "fair, poor, or very poor". All outcomes were calculated from pooled rates for the years described above except for self-rated health which was based on point prevalence for the 1990–91 group of the WVS survey.

Statistical analyses

We calculated Pearson correlation coefficients for associations between income inequality, measures of social capital, and health outcomes. All analyses were weighted by population size and adjusted for gross domestic product, using the Penn World Tables purchasing power parity.

Results

We first examined data on income inequality and life expectancy for 22 countries in the wave III LIS database, As we have argued elsewhere, when data points are few, the selection of countries can be crucial to interpretation of results.[34] Thus, we have presented data from all available countries in figure 1, which shows that income inequality was strongly and negatively associated with life expectancy (p=0·0001). However, this association was largely induced by the data point for Russia, where the level of income inequality vastly exceeded all other countries. For the reasons explained above all subsequent analysis excluded Russia, Poland, Hungary, Czech and Slovak republics, and Israel.

Table 1 shows sex-specific associations of income inequality with mortality by age and cause, and with life expectancy, for 16 countries. Higher income inequality was strongly associated with greater mortality among infants, and more moderately associated with mortality among those aged 1–14 years in both sexes. Associations between income inequality and mortality declined with age at death, and then reversed, so that among those aged 65 years or older, higher income inequality was moderately, but not conventionally significantly,

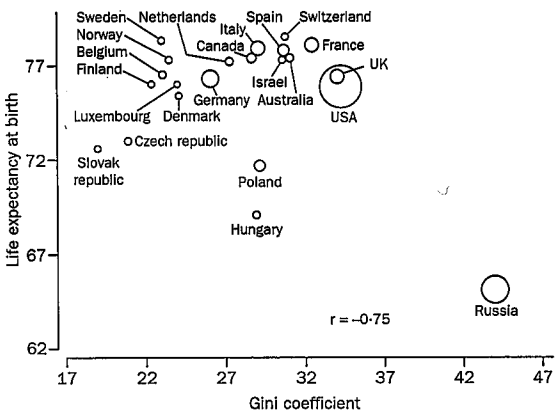

Figure 1: **Income inequality (gini coefficient) and life expectancy for all 22 countries reporting to the Luxembourg Income Study, for the period 1989–91**
Circles represent country population size.

	Women	p value	Men	p value
Mortality by age				
<1 year	0·69	0·004	0·74	0·002
1–14 years	0·53	0·04	0·60	0·02
15–44 years	0·46	0·09	0·45	0·09
45–64 years	0·35	0·20	0·09	0·75
>65 years	−0·41	0·12	−0·47	0·08
All ages	−0·28	0·32	−0·26	0·34
Mortality by cause				
Coronary heart disease	0·03	0·93	−0·04	0·88
Stroke	−0·46	0·09	−0·56	0·03
Lung cancer	0·65	0·01	0·21	0·44
Breast cancer	0·04	0·89	..	..
Prostate cancer	..	..	−0·16	0·57
Diabetes	−0·21	0·45	−0·05	0·85
Infectious	0·50	0·06	0·47	0·08
Chronic obstructive pulmonary disease	0·63	0·01	0·12	0·68
Cirrhosis	−0·31	0·26	−0·32	0·25
Unintentional				
<1 years	0·48	0·07	0·46	0·08
1–14 years	0·35	0·20	0·49	0·06
15–44 years	0·44	0·10	0·34	0·22
45–64 years	0·23	0·41	0·07	0·79
>65 years	−0·35	0·20	−0·20	0·47
Suicide	−0·49	0·07	−0·28	0·31
Homicide	0·66	0·01	0·65	0·01
Life expectancy	0·04	0·89	−0·11	0·70

Table 1: **Correlation weighted by population size between income inequality (gini coefficient) with mortality and life expectancy OECD among 16 countries (1989–92), adjusted for gross domestic product per capita**

associated with lower all-cause mortality. Income inequality was not related to life expectancy differences. In analyses not shown, exclusion of the USA substantially diminished the associations between income inequality and child mortality (eg, female infant mortality from r=0·69 to r=0·26).

Income inequality was inconsistently associated with specific causes of death. Among women, higher inequality was at least moderately associated with higher rates of homicide, lung cancer, chronic pulmonary obstructive disease, infectious disease, and unintentional deaths under age 1 year. However, it was also moderately associated with lower stroke and suicide rates among women. For men, higher inequality was associated with high rates of homicide, infectious disease, and unintentional death from ages 0–14 years, but it was also associated with lower stroke mortality. Income inequality was not associated with CHD, breast or prostate cancer, cirrhosis or diabetes. Exclusion of the USA removed associations between income inequality and deaths from unintentional injury, infectious disease, and homicide (data not shown).

Low birthweight and poor self-rated health were available only for both sexes combined. Higher income inequality was strongly associated with a greater proportion of low birthweight infants (r=0·79, p=0·001). This association was reduced with exclusion of the USA. Income inequality was only moderately associated with poorer self-rated health (r=0·46, p=0·12).

Table 2 shows that belonging to organisations, distrust, and control were unrelated to mortality at any age. However, countries that had greater trade union membership and political representation by women had better child mortality profiles. For instance, lower male infant mortality was associated with greater trade union membership and female political representation. Similar but weaker patterns emerged for mortality between ages 1–14 years. No social indicators were strongly related to mortality at higher ages, except volunteering, which was related to lower mortality among elderly people.

Women	Distrust (n=14)	p value	Belonging to organisations (n=13)	p value	Volunteering (n=12)	p value	Control (n=14)	p value	Belonging to trade union (n-14)	p value	% women in government (n=16)	p value
Mortality by age												
<1 years	0·07	0·82	−0·21	0·51	0·25	0·47	0·14	0·64	−0·56	0·04	−0·63	0·01
1–14 years	0·12	0·70	0·13	0·70	0·23	0·49	0·32	0·29	−0·52	0·07	−0·41	0·13
15–44 years	0·36	0·22	−0·10	0·76	0·05	0·89	0·10	0·75	−0·38	0·20	−0·37	0·18
45–64 years	−0·33	0·28	0·24	0·45	−0·31	0·36	0·40	0·18	0·15	0·62	−0·19	0·50
>65 years	−0·33	0·28	0·19	0·56	−0·59	0·06	0·28	0·35	0·40	0·17	0·43	0·11
All ages	−0·33	0·27	0·20	0·53	−0·59	0·06	0·33	0·27	0·36	0·23	0·33	0·24
Mortality by cause												
CHD	−0·61	0·03	0·30	0·35	−0·14	0·67	0·63	0·02	0·46	0·11	0·16	0·56
Stroke	−0·29	0·33	0·02	0·95	−0·55	0·08	0·23	0·45	0·31	0·29	0·44	0·10
Lung cancer	−0·44	0·13	0·17	0·59	0·53	0·10	0·54	0·06	−0·06	0·84	−0·46	0·08
Breast cancer	−0·21	0·49	0·37	0·23	−0·22	0·51	−0·10	0·75	0·20	0·50	−0·12	0·68
Diabetes	−0·08	0·78	−0·04	0·91	−0·13	0·69	−0·02	0·95	−0·26	0·39	0·19	0·51
Infectious	0·26	0·39	0·01	0·96	0·33	0·32	0·11	0·71	−0·39	0·19	−0·38	0·16
Chronic obstructive pulmonary disease	−0·32	0·29	0·18	0·57	0·13	0·70	0·42	0·15	−0·16	0·61	−0·51	0·05
Cirrhosis	0·50	0·08	−0·58	0·05	−0·66	0·03	−0·37	0·22	−0·28	0·35	0·16	0·57
Unintentional												
<1 years	0·63	0·02	−0·33	0·29	0·10	0·76	−0·15	0·64	−0·59	0·03	−0·46	0·08
1–14 years	0·21	0·49	0·02	0·94	0·30	0·38	0·23	0·44	−0·40	0·18	−0·30	0·27
15–44 years	0·34	0·25	−0·28	0·37	0·37	0·27	0·18	0·55	−0·54	0·06	−0·42	0·12
45–64 years	0·42	0·16	−0·31	0·34	0·42	0·20	−0·09	0·77	−0·28	0·35	−0·24	0·38
>65 years	0·53	0·06	−0·33	0·29	−0·25	0·46	−0·78	0·002	0·07	0·82	0·18	0·52
Suicide	0·34	0·26	−0·04	0·89	−0·38	0·25	−0·45	0·12	0·45	0·13	0·39	0·15
Homicide	−0·03	0·93	−0·01	0·98	0·40	0·22	0·37	0·22	−0·42	0·16	−0·45	0·09
Life expectancy	0·45	0·12	−0·33	0·29	0·41	0·20	−0·44	0·13	−0·31	0·30	−0·14	0·62
Low birthweight (both sexes combined)	0·07	0·84	0·13	0·70	0·22	0·55	0·22	0·49	−0·57	0·05	−0·71	0·005
Self-rated poor health (both sexes combined)	0·47	0·11	−0·36	0·25	−0·80	0·003	−0·29	0·33	−0·17	0·58	0·29	0·34
Men												
Mortality by age												
<1 years	0·20	0·51	−0·23	0·47	0·19	0·58	−0·02	0·95	−0·58	0·04	−0·73	0·002
1–14 years	0·13	0·67	0·01	0·98	0·23	0·50	0·32	0·28	−0·57	0·04	−0·48	0·07
15–44 years	0·39	0·18	−0·31	0·33	0·23	0·50	0·13	0·67	−0·52	0·07	−0·34	0·21
45–64 years	0·41	0·16	−0·21	0·51	b0·39	0·24	−0·04	0·88	−0·15	0·63	−0·05	0·87
>65 years	−0·32	0·28	0·34	0·29	−0·51	0·11	0·11	0·73	0·48	0·10	0·43	0·11
All ages	−0·06	0·84	0·17	0·59	−0·53	0·09	0·13	0·67	0·25	0·42	0·27	0·33
Mortality by cause												
CHD	−0·63	0·02	0·36	0·25	−0·11	0·74	0·55	0·05	0·53	0·06	0·23	0·41
Stroke	−0·15	0·62	−0·08	0·81	−0·60	0·05	0·04	0·90	0·31	0·30	0·50	0·06
Lung cancer	−0·07	0·83	0·33	0·30	0·27	0·43	−0·19	0·52	−0·34	0·26	−0·39	0·15
Prostate cancer	−0·16	0·60	0·48	0·12	0·07	0·84	−0·003	0·99	0·52	0·07	0·22	0·43
Diabetes	−0·23	0·44	−0·01	0·97	−0·02	0·95	0·12	0·70	−0·25	0·41	0·09	0·74
Infectious	0·30	0·32	−0·06	0·85	0·24	0·48	0·13	0·68	−0·42	0·16	−0·33	0·12
Chronic obstructive pulmonary disease	−0·40	0·18	0·41	0·18	−0·11	0·74	0·34	0·25	−0·02	0·94	−0·16	0·58
Cirrhosis	0·56	0·05	−0·58	0·05	−0·71	0·01	−0·31	0·31	−0·30	0·31	0·19	0·49
Unintentional												
<1 years	0·67	0·01	−0·33	0·30	0·13	0·70	−0·22	0·48	−0·64	0·02	−0·47	0·08
1–14 years	0·12	0·71	−0·04	0·90	0·32	0·33	0·38	0·20	−0·52	0·07	−0·40	0·14
15–44 years	0·33	0·26	−0·36	0·26	0·33	0·31	0·21	0·49	−0·55	0·05	−0·30	0·27
45–64 years	0·28	0·35	−0·33	0·29	0·46	0·16	0·06	0·84	−0·22	0·47	−0·002	0·99
>65 years	0·47	0·10	−0·32	0·31	0·11	0·74	−0·60	0·03	−0·02	0·95	0·11	0·70
Suicide	0·35	0·25	−0·13	0·68	−0·08	0·81	−0·25	0·40	0·29	0·33	0·23	0·41
Homicide	−0·04	0·89	−0·07	0·84	0·40	0·23	0·28	0·36	−0·46	0·11	−0·45	0·09
Life expectancy	−0·14	0·65	−0·07	0·82	0·28	0·40	−0·21	0·49	0·13	0·68	0·06	0·82

All available data have been used but sample sizes differ because some questions in the WVS were not asked in some countries.

Table 2: **Correlations between mortality, life expectancy, low birthweight, self-rated health, and distrust, organisation membership, volunteering, control, trade union membership, and the % of women elected to national government among OECD countries (1989–92), adjusted for gross domestic product per capita and weighted by population size**

Measures of the quality of the psychosocial environment showed generally weak and somewhat inconsistent associations with cause-specific mortality. Greater distrust was associated with lower CHD mortality among both women and men. Since distrust and control were strongly negatively correlated, higher levels of perceived control were also significantly correlated with higher CHD mortality in both men and women. Distrust was also moderately associated with greater cirrhosis and unintentional injury deaths under 1 and above 65 years of age. Belonging to organisations was associated with lower cirrhosis among men and women. The amount of volunteering was negatively associated with stroke and cirrhosis mortality. Associations with measures of social capital were unchanged by excluding the USA. Greater trade union membership and having more women in government were both moderately associated with lower unintentional injury death, especially among the young.

None of the psychosocial indicators were associated with female or male life expectancy. Only trade union membership and % women in government were

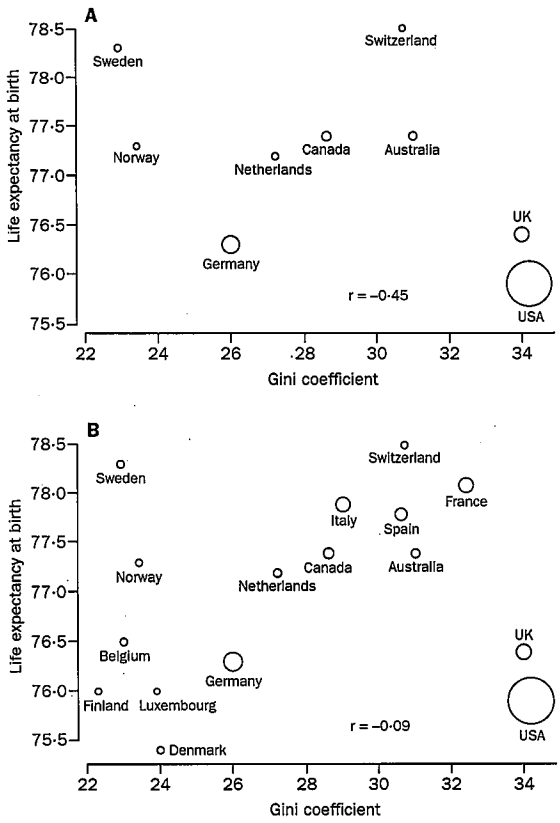

Figure 2: **Income inequality and life expectancy**
A: for the same nine countries reported by Wilkinson (1992),[11] but with information updated to 1989–91. B: after adding the other seven countries for which income inequality data is now available in the Luxembourg Income Study, for the period 1989–91. Circles represent country population size.

associated with reduced rates of low birthweight. Poor self-rated health was only associated with volunteering.

Discussion

There are inherent limitations in interpreting associations based on sixteen, or fewer observations. To illustrate this point, in figure 2A we have selected the nine countries that were used in the 1992[5] study which reported a correlation of r=0·86 between more equal income distribution and life expectancy from data for the late 1970s and early 1980s. When we used these same nine countries but analysed data for 1989–92, higher income inequality was associated with lower life expectancy, albeit more weakly. However, as figure 2B shows, now that data have become available for Italy, Spain, France, Belgium, Finland, Luxembourg, and Denmark, when these countries were added to the analysis, there was no longer an association between income inequality and life expectancy. Thus, the discrepancy between our results and those of the previous study,[5] is simply that we had the advantage of being able to include more countries as data became available.

Adding these particular countries highlights the problems surrounding apparently universal explanations of variations in population health among rich nations. Although not directly comparable with the current analyses because they were based on within-country differences, Kunst and colleagues' findings,[25] clearly show how deciphering variation in the extent of within-country socioeconomic health inequalities across Europe is complicated by between-country differences in the cause-of-death structure, particularly the north-south differences in rates of CHD. Three of the countries we added in figure 2B—Spain, Italy, and France are typical of the pattern in southern Europe—higher life expectancy due largely to lower rates of CHD. The countries added from northern Europe—like Denmark and Finland—have lower inequality, but higher CHD rates and lower life expectancy. Assuming that these north-south CHD and life expectancy differences did not emerge between the 1970s and 1990s, and if the data had been available, it seems likely that earlier studies[5] would also have reported little association between income inequality and life expectancy for this expanded set of countries.

Cognizant of the dangers of overinterpretation, what can we reasonably conclude from these patterns of findings? It seems there is a fairly strong and consistent pattern of associations between income inequality and child health outcomes. Higher income inequality was associated with higher infant mortality, low birthweight, and mortality in people aged 1–14 years in both sexes. For a country of such vast wealth, the USA has very high income inequality and poor child health. Associations with infant and early-life mortality largely disappeared when the USA was excluded from analyses (data not shown), but an association with low birthweight remained due to high levels of both income inequality and low birthweight in the UK. Associations with mortality above age 65 were the opposite of that predicted by the theory that higher income inequality is automatically bad for health. These negative associations were largely driven by the fact that higher inequality countries like the USA and France have relatively low mortality above age 65, especially for CHD, compared with countries like Finland, Denmark, Luxembourg, and Germany. The age-specific pattern of associations between income inequality and mortality may be consistent with time lags. It is widely recognised that income inequality within many of these countries generally narrowed after the second world war, but increased markedly after the 1970s, and so it is possible that the current associations reported with child health outcomes could be reflected in differences in adult health in the future, as populations exposed to this period of increasing inequality age. Long-term data on changes in inequality and health are needed to explore this hypothesis.

Some of the strongest arguments in support of the theory that greater income inequality produces worse population health have come from analyses of homicide. In some ways, homicide has been the quintessential example of a cause-of-death that is plausibly affected by the extent of income inequality,[34] and the breakdown of social cohesion and the negative emotions of distrust and hostility, it is theorised to engender in individuals.[1] Although income inequality was reasonably strongly correlated with homicide, these associations were almost entirely induced by the USA data point.

According to the psychosocial environment theory, income inequality is associated with health through two main pathways—behaviour and stress.[1] Income inequality was associated with lung cancer, but only among women. On the other hand, it was not associated with cirrhosis—an outcome with a clearly identifiable behavioural component. Nor was income inequality associated with CHD or diabetes—outcomes linked to both behaviour and psychoneuroendocrine stress mediation.

The most important piece of empirical evidence in support of the idea that social capital is an important determinant of population health came from a study of 38

US states.[9] That cross-sectional study showed that the degree of distrust and the extent of organisational membership mediated the within-country association between income inequality and mortality. Although we used very similar indicators of social capital to those used in the US study, we failed to find any consistent associations with between-country differences in age-specific or cause-specific mortality. In fact, one of the stronger correlations noted in our study was the association between higher distrust and lower CHD among both men and women. This finding is the exact opposite of what the current income inequality-psychosocial environment theory would predict and is inconsistent with findings of a small within-country study of ten US cities.[35] An examination of the data plots revealed that people in France, Italy, and Spain (with a lower CHD) reported the highest degree of distrust, while those in Finland, Sweden, and Norway (with a higher CHD rate) reported the lowest distrust. One could speculate over the reasons for these international differences in the tendency to report distrust, but they are probably the product of quite particular historical, social, and cultural factors. It is also possible that the general practice of aggregating individual responses to characterise the psychosocial environment of a place may be inappropriate for between-country comparisons because of their cultural specificity. Additionally, the individual level correlates of distrust could vary across countries.

These results do not offer much support for a psychosocial environment theory as a general explanation for health differences between rich countries. Higher perceived control over life circumstances was actually substantially associated with higher CHD—the opposite of what would be predicted by the psychosocial environment theory and the opposite of what would be inferred from studies of individuals. It seems difficult to sustain the theory that income inequality and indicators of the quality of the psychosocial environment explain between-country health differences among these stable, wealthy nations. What theoretically consistent associations do exist are largely limited to child health outcomes and cirrhosis. Does this mean we think economic inequality is not an important determinant of health? No—clearly there is abundant evidence that within countries, lower income is a powerful determinant of poorer health. In addition, the extent of unequal income distribution has been associated with health within some countries. Does it mean that we think that psychosocial factors are not important in understanding health? No—there is certainly evidence that within populations, psychosocial factors are associated with poorer health. Our results show that neither an income inequality nor psychosocial environment theory of health is universally applicable to understanding why some countries have better population health than others.

Our findings seem consistent with a previous study that compared the USA and Canada.[36] Although the extent of inequality was strongly related to health differences between US metropolitan areas, there was no association between income inequality and mortality across such areas in Canada. Evidence comparing states and cities within the USA has been used extensively to support the income inequality psychosocial environment theory of population health. It seems likely that the USA is the exception, not the rule, and it is possible that evidence drawn from studies within the USA has less direct applicability to other wealthy nations. Higher income inequality within the USA is overwhelmingly associated with more unequal distribution of many powerful determinants of health. This may not be the case in other wealthy countries where there has been more widespread and more evenly distributed social investments in public health relevant goods and services. As we have argued elsewhere,[3] there is no necessary association between income inequality and population health—it may depend on the distribution of other health-relevant resources and exposures that exist within a country. For example, low CHD in southern Europe may be related to high prevalence and low social inequality in healthy diets, while the relatively low life expectancy of Danish women is likely related to the historical patterns of relatively high prevalence and low social inequality in smoking. Understanding how different countries generate particular patterns and trends in population health is likely to be historically and culturally contextualised. It may not be income inequality or the quality of the psychosocial environment that drives population health in these stable healthy nations. Rather, what may be most important are the current and historical links between income inequality and the distribution of health relevant resources and exposures, and how these links have played out over the lifecourse of different birth cohorts.[37] Levels of health within a country are the product of complex interactions of history, culture, politics, economics, and the status of women and ethnic minorities. These complex interactions might not be adequately described by current levels of income inequality or aggregate indicators of the psychosocial environment.

Contributors

John Lynch and George Davey Smith contributed to the idea, design, analysis, and interpretation of the data. Marianne Hillemier, Mary Shaw, and Trivellore Raghunathan contributed to the design, analysis, and interpretation of the data. All authors contributed to the writing of the manuscript.

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