

Income Inequality and Social Dysfunction

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health, social problems, social stratification, equality, relative deprivation

Abstract

Population health tends to be better in societies where income is more equally distributed. Recent evidence suggests that many other social problems, including mental illness, violence, imprisonment, lack of trust, teenage births, obesity, drug abuse, and poor educational performance of schoolchildren, are also more common in more unequal societies. Differences in the prevalence of ill health and social problems between more and less equal societies seem to be large and to extend to the vast majority of the population. Rather than referencing all the literature, this paper attempts to show which interpretations of these relationships are consistent with the research evidence. After discussing their more important and illuminating characteristics, we conclude that these relationships are likely to reflect a sensitivity of health and social problems to the scale of social stratification and status competition, underpinned by societal differences in material inequality.

WHAT HAS TO BE EXPLAINED

Better Health in More Equal Societies

The first evidence of a tendency for societies with lower income inequality to have better health came from an international cross-sectional analysis of 56 rich and poor countries. Life expectancy and infant mortality were regressed against national income per capita and the Gini coefficient of income distribution (Rodgers 1979). The paper concluded that

[t]he most striking result is the consistent significance of the income distribution variable. This is a very robust conclusion which holds across a variety of specifications. . . . The results for life expectancy at birth suggest that the difference in average life expectancy between a relatively egalitarian and relatively inegalitarian country is likely to be as much as five to ten years (p. 350).

There are now as many as 200 analyses of the nature of this relationship, and a number of reviews have been published (Lynch et al. 2004, Macinko et al. 2003, Subramanian & Kawachi 2004, Wilkinson & Pickett 2006).

The first large review covered 98 studies (Lynch et al. 2004). Of these, 42% were classified as wholly supportive (all measures of association showed statistically significant relationships between smaller income differences and better health); a further 25% were classified as only partially supportive (some, but not all associations were in the expected direction and statistically significant); and the remaining 33% provided no support (no statistically significant supportive relationships).

A more recent paper reviewed 168 analyses and classified them using the same criteria (Wilkinson & Pickett 2006). Of these, 87 (52%) were wholly supportive, 44 (26%) were partially supportive, and 37 (22%) provided no support. Eight studies reported one or more significant associations between better health and greater inequality, compared with 131 reporting significant associations between better health and less

inequality. In both reviews, results were classified after the use of whatever control variables the original authors thought relevant. Of the 37 studies classified in the second review as unresponsive, 21 found significant supportive associations before the use of control variables. Overall, just over 90% of analyses produced some significant confirmation of the hypothesized relation before the use of control variables. Because the distinction between confounders and mediators depends on theory, it is not possible to assess the quality of studies before deciding how the causal pathways should be theorized. The same applies to assumptions about reference groups that affect whether inequality should be measured in larger or smaller areas.

Fewer Social Problems in More Equal Societies

The studies of health in relation to income inequality need to be understood in the context of a wider body of evidence that suggests that a broad range of social problems may also be more common in more unequal societies. A review of 34 studies concluded that the tendency for homicides to be more common in more unequal societies was robust (Hsieh & Pugh 1993). In a later paper analyzing data for the 50 U.S. states, Kaplan et al. (1996) reported strong associations (adjusted for median state incomes) between greater state income inequality and higher rates of low birth weight, homicide, violent crime, and imprisonment and worse educational outcomes for schoolchildren. In addition to morbidity and mortality, Wilkinson & Pickett (2007) brought together evidence suggesting that inequality was also associated with rates of obesity, teenage birth, mental illness, homicide, low levels of trust, low social capital, hostility, racism, poor educational performance among schoolchildren, imprisonment, drug overdose mortality, and low social mobility. Outcomes were always significantly worse in more unequal, rich, developed countries and, almost always, in the more unequal of the 50 U.S. states as well. Since then, the list of social problems associated with inequality has

Table 1 Associations of social problems with income inequality^a

Outcome	International comparison	U.S. state comparison	Key sources
Homicide—adults	+	+	Hsieh & Pugh 1993, Kaplan et al. 1996, Kennedy et al. 1996
Homicide—juvenile	n.a.	+	Pickett et al. 2005b
Violent crime	+	+	Hsieh & Pugh 1993, Kaplan et al. 1996, Krohn 1976
Property crime	~	~	Krohn 1976, Kelly 2000
Conflict—children	+	n.a.	Pickett et al. 2005b
Obesity—adults	+	+	Pickett et al. 2005a, Wilkinson & Pickett 2009
Overweight—children	+	+	Pickett & Wilkinson 2007
Math and reading scores	+	+	Kaplan et al. 1996, Pickett & Wilkinson 2007
School drop-out rate	n.a.	+	Kaplan et al. 1996, Pickett & Wilkinson 2007
Racism	n.a.	+	Kennedy et al. 1997
Smoking	~	~	Diez-Roux et al. 2000, Pampel 2002
Suicide	~	~	Lester 1987, Andres 2005, Kowalski et al. 1987
Teenage births	+	+	Gold et al. 2001, Pickett et al. 2005b
Child well-being	+	n.a.	Pickett & Wilkinson 2007
Drug abuse	+	n.a.	Wilkinson & Pickett 2009
Drug overdose deaths	n.a.	+	Wilkinson & Pickett 2007
Alcohol abuse	~	~	Henderson et al. 2004, Elgar et al. 2005
Mental illness—adults	+	~	Wilkinson & Pickett 2007, 2009
Mental illness—children	n.a.	+	Pickett et al. 2005b
Imprisonment rate	+	+	Kaplan et al. 1996, Wilkinson & Pickett 2007
Social capital	n.a.	+	Kawachi et al. 1997
Social mobility	+	n.a.	Wilkinson & Pickett 2007
Status of women	+	+	Kawachi et al. 1999, Wilkinson & Pickett 2009
Trust	+	+	Kawachi et al. 1997, Uslaner 2002

^aAbbreviations: +, worse outcomes significantly associated with greater inequality; −, better outcomes significantly associated with greater inequality; ~, no statistically significant association; n.a., data not available.

lengthened to include women’s status, juvenile homicides, child conflict, children overweight, and drug abuse (Wilkinson & Pickett 2009).

Table 1 provides a summary of all 24 variables for which we have been able to find published measures of association with income inequality internationally or among the 50 U.S. states, together with the key sources. Associations between inequality and 14 of the outcomes have been measured in both settings, 6 only internationally, and 4 only among the U.S. states.

Of the 38 measures of association between inequality and an outcome in either setting, 29 showed significantly worse outcomes with greater inequality. Only smoking, suicides, alcohol abuse, and property crime (in contrast to

violent crime) were not related to inequality in either setting. Although mental illness in adults was related to inequality internationally, the relationship was only found among women and children in the 50 states.

As we discuss below, the outcomes related to inequality tend to be those with the steepest social gradients that accumulate at the bottom of society. The lack of relationships (**Table 1**) with suicide (in both settings) and with mental illness in the 50 states may reflect the lack of social gradients in these outcomes. Although in some countries suicide is more common among those with lower social status, this is not universal. A social gradient in suicide has emerged in Britain only since 1970. A seminal paper on

death rates in Harlem, New York, reported that suicide was the only cause of death that was not more common there than in the rest of the United States (McCord & Freeman 1990). Similarly, although mental illness is widely associated with lower social status internationally, the United States may be an exception to this pattern. Mental illness is less prevalent in ethnic minority populations than among white Americans, despite minorities' generally lower socioeconomic status (Centers for Disease Control and Prevention 2004). Whether the same is true of property crime is less clear. White collar crimes—including fraud, computer crime, and embezzlement—will reduce the social gradient in property crime.

Smoking has a strong social gradient in most countries, yet it appears not to be related to inequality (Diez-Roux et al. 2000, Kelly 2000, Krohn 1976, Pampel 2002, Wilkinson et al. 1998). We are unaware of any explanation of why smoking might be an exception to what seems to be a tendency for outcomes with social gradients to be more common in more unequal societies.

Because comparison is prevented by the use of different measures of income distribution and the inclusion of different numbers of countries and states, measures of association are not included in **Table 1**. However, Wilkinson &

Pickett (2009) estimate 10 of these relationships on a consistent basis. They included all countries among the 50 richest in terms of gross national product per capita, with populations of at least 3 million (to exclude tax havens) and with income distribution data in the UN Human Development Reports (2003, 2004, 2005, 2006). **Figure 5** (discussed further below) shows the 23 countries that met these criteria. The measure of income distribution used was the ratio of incomes of the poorest to the richest 20% of the population in each country. The U.S. analyses used the Gini coefficient of household income from the U.S. Census Bureau (2000, *Summary File 3*). **Table 2** shows the correlation coefficients and p-values from these analyses.

Measures of association in two independent settings provided a check on their reliability. With the exception of mental illness among the 50 U.S. states, all measures of association show a significant tendency for worse outcomes to be associated with greater income inequality in both settings. Correlation coefficients range from 0.4 to 0.9. Given that we are dealing with differences in prevalence of outcomes in whole populations, the strength, significance, and consistency of the associations in these two independent settings suggest that these relationships deserve careful attention.

Table 2 Health and social problems in relation to income inequality and average income

Outcome	Rich countries				50 U.S. states			
	Inequality		Average income		Inequality		Average income	
	r	p	r	p	r	p	r	p
Trust	-0.66	<0.001	0.49	0.02	-0.70	<0.001	0.25	0.11
Mental illness	0.59	0.04	0.38	0.20	0.18	0.20	-0.03	0.84
Life expectancy	-0.44	0.04	0.01	0.95	-0.45	<0.001	0.43	0.002
Infant mortality	0.42	0.04	0.02	0.92	0.43	0.002	-0.40	0.004
Obesity	0.57	0.007	-0.08	0.74	0.47	<0.001	-0.33	0.02
Educational performance	-0.45	0.04	0.43	0.05	-0.47	<0.001	0.35	0.01
Teenage births	0.73	<0.001	0.18	0.43	0.46	<0.001	-0.44	0.001
Homicides	0.47	0.02	0.13	0.56	0.42	0.003	-0.14	0.35
Imprisonment	0.67	<0.001	0.21	0.34	0.48	<0.001	-0.12	0.39
Social mobility	0.93	<0.001	0.26	0.53	—	—	—	—
Index of health and social problems	0.87	<0.001	-0.05	0.82	0.59	<0.001	-0.36	0.01

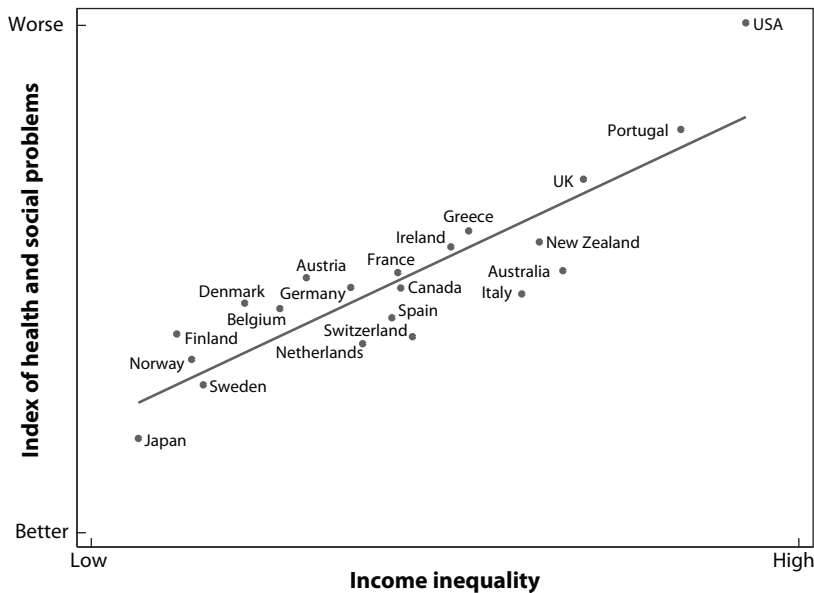


Figure 1

Index of Health and Social Problems in relation to income inequality in rich countries. Income inequality is measured by the ratio of incomes among the richest compared with the poorest 20% in each country. The index combines data for the 10 outcomes listed in **Table 2**. Raw scores for each variable were converted to z-scores and each country given its average z-score. Source: Wilkinson & Pickett 2009.

An Index of Health and Social Problems

Wilkinson & Pickett (2009) combined the 10 outcomes listed in **Table 2** into a single Index of Health and Social Problems (last row of table) by calculating z-scores for each outcome in each setting and then taking the z-score for each country or state averaged across all the variables.

The Index of Health and Social Problems has a correlation coefficient of almost 0.9 with inequality among rich countries and almost 0.6 among U.S. states (see **Figures 1** and **2**).

These associations do not reflect an unrepresentative selection of outcomes. Pickett & Wilkinson (2007) also examined relationships between inequality and the UNICEF Index of Child Well-Being in rich countries (UNICEF Innocenti Research Centre 2007). This index combines 40 components, chosen to reflect child well-being in rich countries, which include material well-being, quality of family life, education, health, peer relationships, risk

behaviors, violence, and psychosocial well-being. As one component (the proportion of children in families on less than half the national average income) is, by definition, closely related to income inequality, the index was recalculated on the basis of the remaining 39 components. The recalculated UNICEF index is closely correlated with income inequality ($r = -0.64$, $p < 0.001$). As well as using measures of inequality in society as a whole, they also found that the proportion of children in each country in families on less than 60% of the national median income was very closely correlated with child well-being ($r = -0.79$, $p < 0.001$).

TOWARD A CONSISTENT EXPLANATION

Inequality is Related to Outcomes with Social Gradients

Rather than thinking of the effect of income inequality as a previously unknown determinant of population health, could inequality work

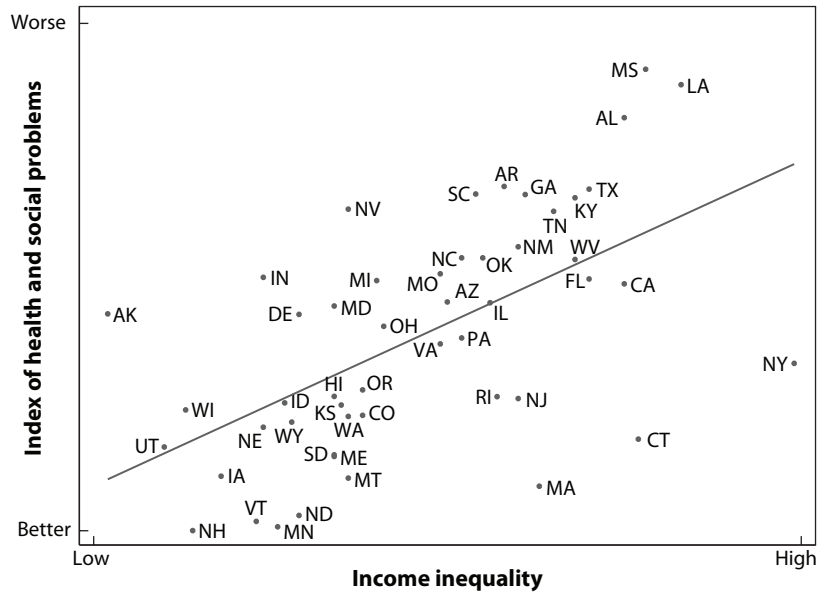


Figure 2

Index of Health and Social Problems in relation to income inequality among the 50 U.S. states. Income inequality was measured by the Gini coefficients taken from the U.S. Census Bureau. Source: Wilkinson & Pickett 2009.

through the same social processes that give rise to social gradients in so many health and social outcomes? To test this hypothesis, we selected 10 death rates known to have widely differing social gradients—some weak and some strong—and collected median income and the death rates for all 3139 counties of the United States (Wilkinson & Pickett 2008). For example, breast and prostate cancer were chosen because they usually show little or no tendency to be associated with low social status, and homicide and all-cause mortality among working-age men and women were chosen as death rates known to have strong social gradients. We found, as predicted, a strong tendency for those death rates that were most strongly associated with median county household income to be those most strongly associated (in multi-level models) with state income inequality ($r = -0.81$; $p = 0.004$).

Confounding by Absolute Income?

Could these relationships between income inequality and so many health and social

outcomes reflect confounding by absolute material standards? As well as associations with inequality, **Table 2** shows associations with average income (measured internationally by gross national income per capita at purchasing power parities), and by median household income per capita among the 50 states (Wilkinson & Pickett 2009). Internationally, only trust and—marginally—educational performance (math and literacy scores) are related to average income. All associations are stronger with inequality than with average income, and, in most cases, controlling for average income strengthens the associations with inequality. Among the 50 states, five outcomes are significantly related to average income: life expectancy, infant mortality, obesity, educational performance, and teenage births. In each case, these associations are weaker than those with inequality, and controlling for average income does not attenuate the associations with inequality. If Washington, DC, had been included, associations with inequality would have been strengthened and, with average income, weakened in every case.

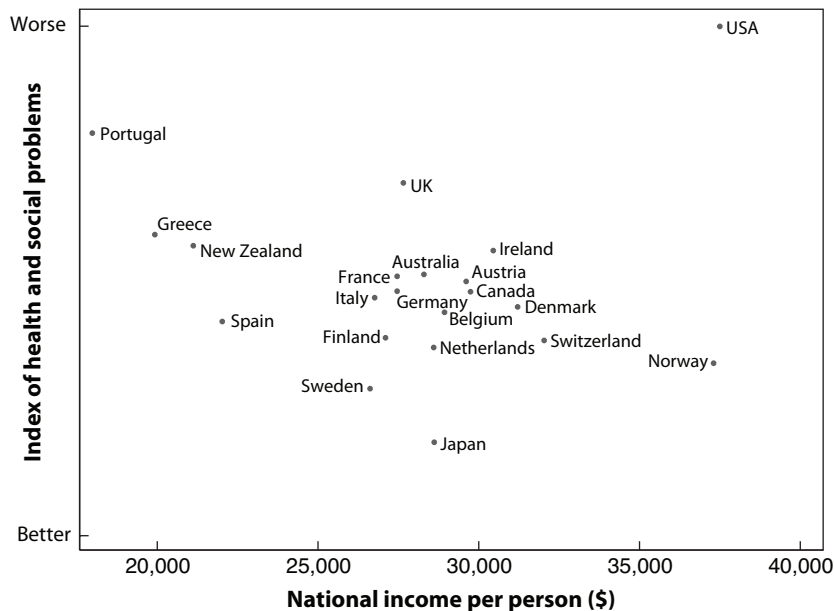


Figure 3

Index of Health and Social Problems in relation to average income in rich countries. Average income is measured by gross national income per capita at purchasing power parity. Source: Wilkinson & Pickett 2009.

As **Figures 3** and **4** demonstrate, the Index of Health and Social Problems was unrelated to average income internationally, but was weakly related among the 50 states. The UNICEF Index of Child Well-Being in rich countries was unrelated to average living standards ($r = 0.15$, $p = 0.50$) (Pickett & Wilkinson 2007).

The United States is both the wealthiest and the most unequal among this group of rich countries, but the poor performance of the nation as a whole on most health and social outcomes is predicted by its inequality (**Figure 1**), not by its high average income. Inequality trumps average income. A possible explanation for the association among the U.S. states between average incomes and some social problems is that average state income may serve as an indicator not of absolute material standards but of relative income or social status within the United States as a whole—as **Figures 1** and **3** suggest. The evidence points strongly to the conclusion that these outcomes are related to inequality rather than to differences in real incomes between societies.

Relative or Absolute Income?

Leaving aside the association between better health and greater equality, it appears that relative income or social position may be a better predictor of the social gradient in health within rich countries than are absolute material living standards. Although differences in health may sometimes have purely material causes with no affective component, there can be no doubt that many of the social problems related to inequality also involve psychosocial processes.

Over the course of long-term economic development, the international relation between income and life expectancy is curvilinear. Life expectancy rises rapidly as poor countries begin to develop but then gradually flattens out until, among the richest countries, it seems unaffected by further economic growth (Preston 1975, World Bank 1993). Among poorer countries, economic development makes an important contribution to health, but gains to further growth diminish during the epidemiological transition and cease among the richest.

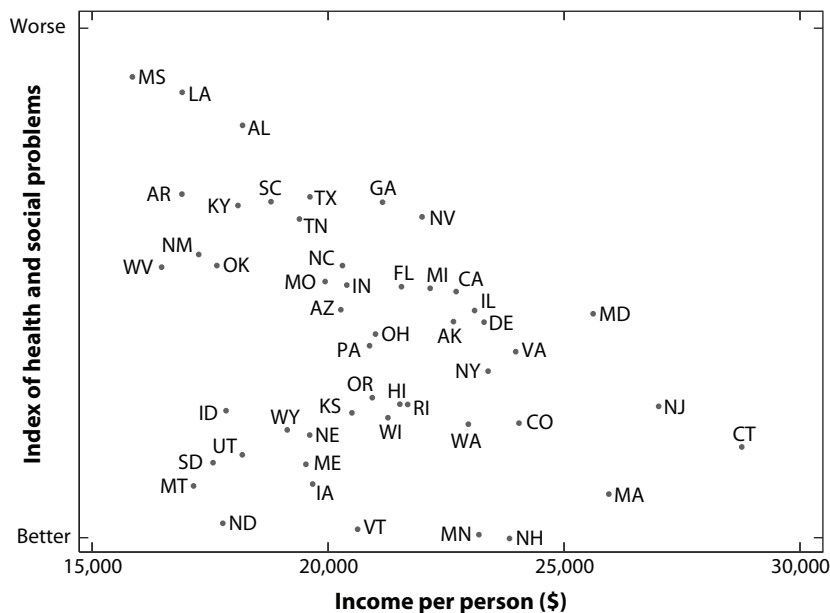


Figure 4

Index of Health and Social Problems in relation to per capita income in the 50 U.S. states. Source: Wilkinson & Pickett 2009.

Figure 5 shows the lack of association between average income and life expectancy among the rich countries (Wilkinson & Pickett 2009). Currencies have been converted at purchasing power parities to reflect real differences in material living standards in each country. The assumption that health is determined by material living standards is so ubiquitous that it is worth pointing out that **Figure 5** shows not simply a lack of a statistically significant relation with life expectancy, but no relation whatsoever. Average real incomes can be almost twice as high in some developed countries as in others without consequences for life expectancy. As the data in **Figure 5** are for whole populations, this can have nothing to do with sampling errors.

However, this lack of relation between income and health when looking at differences between rich countries contrasts sharply with what is found within each country. Within countries, health is finely graded by income right across society. As an example, **Figure 6** shows mortality rates of white men in the United States according to the median income

of the zip code area in which they lived (Smith et al. 1996). Social gradients in health of varying steepness have been found in all developed societies for which there are data (Elo 2009). Rather than distinguishing simply between the health of the poor and the rest of society, these health gradients run right across society as in **Figure 6**.

Together, **Figures 5** and **6** present a paradox. Health in rich nations is strongly graded by income within societies but is unrelated to the differences in average income between them. If individual income within societies is highly predictive of health but differences in the average incomes of whole populations are not, this implies that what matters may be social position, or income relative to others, rather than material living standards regardless of others.

The Role of Individual Income

It need not concern us here how much or how little the social gradient in health (or social problems) within societies may result from

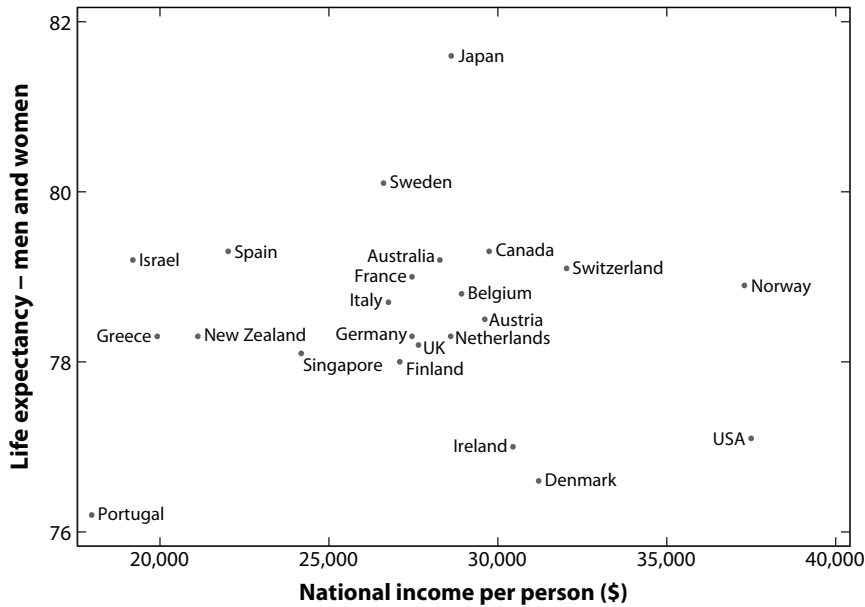


Figure 5

Population health is unrelated to average income in rich countries. Male and female life expectancy at birth in rich countries by gross national income per head. The lack of relation shown here contrasts sharply with the strong income-related gradient in health within countries shown in Figure 2.

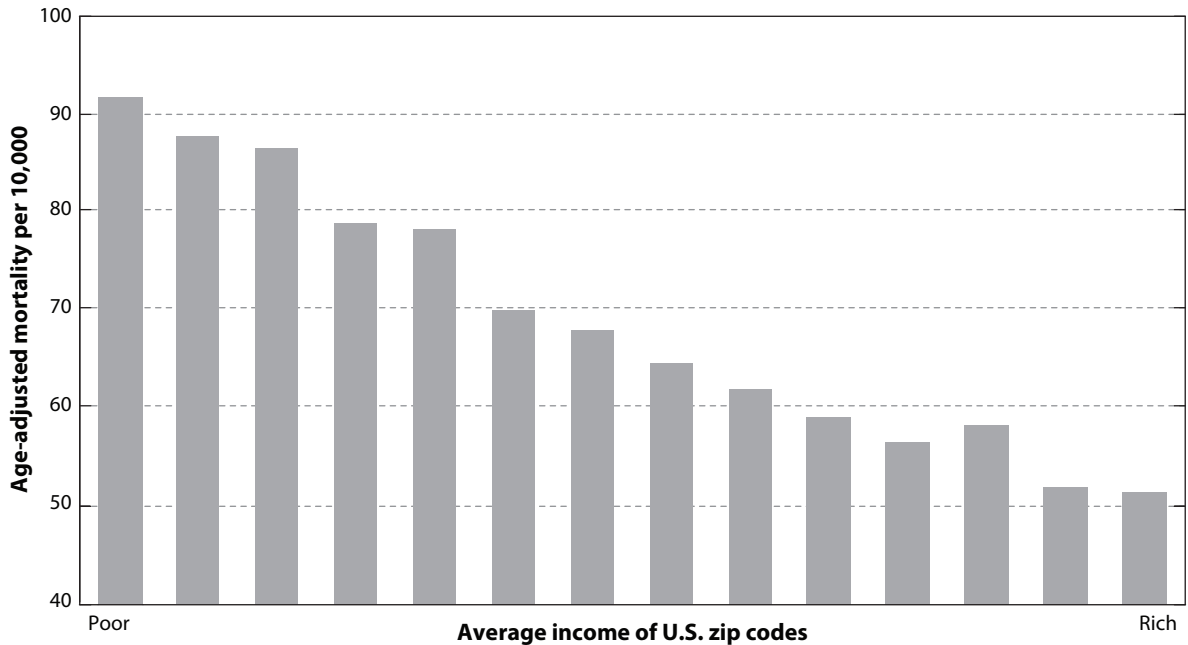


Figure 6

Individual health is closely graded by income within rich societies. Mortality of white men classified by median income of zip code areas. Redrawn from Smith et al. 1996.

selective social mobility as the healthy improve their social status relative to the sick: No amount of social mobility could explain why the total burden of poor health (or social problems) is greater in more unequal societies.

The relation with income distribution was initially interpreted as a reflection of a curvilinear relation between individual income and health (Gravelle 1998, Rodgers 1979, Wilkinson 1992). If income redistribution from rich to poor enabled the poor to buy better food, housing, heating, etc., while the loss of that income to the better-off led merely to the choice of cheaper holiday destinations, then each \$100 transferred from rich to poor might be expected to improve the health of the poor by more than it harmed the health of the rich. Redistribution would then improve average health through the health-purchasing power of individual income rather than through any process inherently to do with inequality or where people's income placed them in relation to others. Note, however, that this model assumes that individual income influences health primarily through material rather than psychosocial pathways and does not address the importance of relative income.

Could more unequal societies have worse health because their populations include a higher proportion of less well-off people—less

well-off in absolute, not just relative terms? To check whether this could explain the association between greater income equality and better health, studies using multilevel methods have been used to control for the effect of individual income on health. However, before discussing these, we describe another major feature of the associations with inequality.

The Effect of Inequality on Health Varies by Size of Area

Some studies of inequality and health have measured inequality at the local level, using census tracts, counties, neighborhoods, or parishes. Others have used larger areas, such as cities, states, or regions, and still others used whole countries. Using data from a review of 168 analyses (Wilkinson & Pickett 2006), **Figure 7** shows, by size of the units of observation, the proportion of analyses that were wholly supportive of an association and the proportion that were unsupportive (44 studies classified as having mixed results are excluded from **Figure 7**). Looking across **Figure 7** from studies of whole nations to studies of small areas, the proportion of wholly supportive studies falls from 83% to 45%, and the proportion that was unsupportive rises from 17% to 55%. A similar pattern was reported by others (Franzini et al. 2001) and in reviews of the relations between inequality and homicide (Hsieh & Pugh 1993) and inequality and health (Subramanian & Kawachi 2004).

We have now seen that the strength of two relationships varies in opposite directions by the size of the area analyzed. Differences in average income are not related to population health as it varies from one rich society to another (**Figure 5**), but income remains a powerful predictor of health in small areas within each country (**Figure 6**). In contrast, the opposite is true of income inequality. When inequality is measured across whole societies, it is predictive of health, but when it is measured in small areas, it is much less likely to be. At the national level, inequality is highly predictive of health, but average income is not. But in small

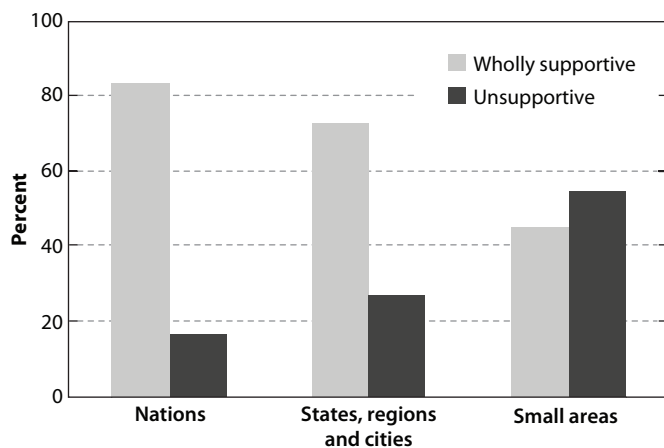


Figure 7
Inequality and health: results by size of area. Source: Wilkinson & Pickett 2006.

areas, the opposite is true—average incomes are highly predictive of health, but inequality is not.

This pattern has received little attention in the literature. What does it tell us? Two contrasting interpretations of the effect of income inequality on health are (a) that it hinges on social comparisons between better- and worse-off people of a kind that might be expected to be most salient in face-to-face encounters between neighbors, or (b) that it reflects the importance of social class stratification and the scale of social distances in society as a whole.

If inequality within small areas is less important than inequality across the whole society, perhaps what we are seeing is a reflection less of social comparisons between neighbors than of the effects of the extent of social class differentiation in society as a whole.

Measures of societal income inequality can be disaggregated into inequality between areas and inequality within those areas (Lobmayer & Wilkinson 2002). Differences in the average incomes of local areas and neighborhoods may be predictive of health because they reflect the residential segregation of rich and poor in society. The reason a small, deprived neighborhood within a rich nation is likely to have poor health is not because of the inequality within that neighborhood, but because the neighborhood is deprived in relation to the rest of society. Its low socioeconomic status in relation to the rest of society is indicated by its relatively low average income.

Thus, income inequality measured across whole societies may be predictive of population health because it serves as a measure of the overall burden of stratification relative to others within each society.

Multilevel Analyses

Multilevel studies of inequality and health were reviewed by Subramanian & Kawachi (2004). However, most of the multilevel studies reviewed used data for areas too small to provide a proper test of the effect of inequality itself. Studies that were conceived as tests of whether an apparent inequality effect could be explained

in terms of a curvilinear effect of absolute income may, if the actual processes instead involved the effects of social status differentiation, have overcontrolled for social status.

In a later review, Wilkinson & Pickett (2006) found no international multilevel studies that controlled for individual income—presumably because of the lack of data sources. At the large subnational level (regions, states, metropolitan areas), there were six wholly supportive multilevel studies, six partially supportive, and three unsupportive (classified from models including all controls). Of the three unsupportive studies, one was of mental health among the U.S. states for which there is no relation with inequality even before controlling for individual income (Tables 1 and 2). This study therefore never had the potential to shed light on why other aspects of health (and mental health internationally) are related to inequality. The modeling techniques used in the two other unsupportive multilevel studies were criticized by Subramanian & Kawachi (2004), who demonstrated that if the appropriate model had been used, the expected relationships would have been shown. They concluded, “These findings suggest that, while individual race, educational attainment, and income attenuate the baseline effect of state income inequality, they do not fully account for the observed association between self-rated poor health and state income inequality in the United States” (Subramanian & Kawachi 2004, p. 85).

Despite using other measures of status as controls, the remaining 12 studies of larger areas that we reviewed found that the association between worse health and greater inequality could not be explained on the assumption that a given level of individual income bought the same amount of health regardless of inequality. More unequal areas do not seem to have worse health simply because they have more poor people.

Individual income is now more often assumed to be related to health for inherently contextual reasons: as a determinant and marker of social position (Marmot 2004). The initial assumption—that multilevel studies distinguish

between direct material effects of individual income and a stranger, contextual psychosocial effect of inequality—is now highly dubious. As **Figures 5** and **6** show, in rich countries it is the differences in relative income between people within each country that matter.

The hypothesis that inequality is associated with health because of a curvilinear relation between individual income and health has other weaknesses. First, it fails to explain why inequality measured in smaller areas is less clearly related to health. Second, as discussed below, the proportion of the population that benefits from reduced income differentials is too large, and the effect on population health too big, to be explained by what happens to the least well-off alone. Third, that inequality has psychosocial effects is now confirmed by the evidence that inequality is also associated with social problems that are inherently behavioral.

Material Inequality and Status Differentiation

We need to explain why a wide range of health and social problems tend to be more common in more unequal societies. As the evidence indicates both that the health and social problems related to inequality are those with marked social gradients and that inequality is best measured at the societal level to reflect the scale of social differentiation across the whole societal pyramid, or onion, then this suggests a coherent picture. The obvious interpretation is that health and social problems whose frequency is affected by social status are made worse by increased status differentiation. This view also accords with the evidence that the control variables that most attenuate relationships with inequality are those that capture related aspects of social status differentiation. Subramanian & Kawachi (2004) have reviewed studies that examine possible confounding by education, individual income, race, and regional effects. Deaton & Lubotsky (2003) reported that in the United States controlling for the proportion of the population that is black removed any effect of inequality. Ethnicity is of course a powerful

marker for status differentiation, and a larger proportion black is associated with bigger income differences between black and white populations and higher death rates in both groups. However, Ash & Robinson (2009) replicated Deaton & Lubotsky's study and found a coding error that, when corrected, reinstated the independent effect of income inequality. The primacy of income inequality over ethnicity was also shown by Ram (2005). Lastly, ethnic differences do not explain the international association between income inequality and population health (Ram 2006).

Although sociologists might think it desirable to replace income inequality in the research we have described with some other metric of status differentiation, there are two reasons this has not been done. First, social classifications usually provide only nominal or ordinal scales, rather than interval or ratio scales. This means that even if comparable measures were available internationally they would not allow us to see whether the whole stratification system was more stretched out, with bigger social distances, in one society compared with another. Second, if the psychological salience of social status differentiation is part of our evolved makeup, then differential access to scarce resources (and so material inequalities) may be constitutive. The scale of material inequality in a society (which would ideally include differences in property and wealth if comparable international data were available) may provide the skeleton, or framework, around which all the cultural aspects of status differentiation develop. Crude differences in wealth gradually become overlaid by differences in clothing, aesthetic taste, education, sense of self, and other markers of social position, as Bourdieu (1984) has described.

Status and Stress

The view that social status itself matters to health finds some corroboration in studies of the physiological effects of low social status among nonhuman primates (Sapolsky 2005, Sapolsky 2004). Low social status among baboons studied in the wild has been shown to lead

to higher levels of the central stress hormone cortisol. Among macaques studied in captivity, the effects of social status have been observed under strict experimental conditions. Social status has been manipulated by moving animals between groups, and material conditions have been kept the same by feeding all animals the same diets and keeping them in the same compounds. Under these conditions animals that moved down the dominance hierarchy were more likely to suffer a number of conditions, including higher levels of stress hormones and a much more rapid buildup of atherosclerosis (Shively & Clarkson 1994).

The recognition of the importance of psychosocial factors working through chronic stress is one of the most important developments in our understanding of the social determinants of health in recent decades (Brunner & Marmot 2006, Sapolsky 2005). It has led to much greater attention to the social environment—particularly to low social status, a difficult early childhood, and weak friendship networks—as sources of chronic stress and determinants of health (Berkman & Glass 2000, Marmot 2004, Marmot & Wilkinson 2006). Exposure to chronic stress shifts physiological priorities: Processes that are not essential when responding to immediate threat or danger—such as tissue maintenance and repair, digestion, growth, and reproductive functions—are all downregulated in favor of processes that improve reaction times and provide energy for muscular activity. If the stress is over quickly, no harm is done. If it lasts more than about an hour, immunity is also downregulated. When we worry about things for weeks and months, the effects, including wear on the cardiovascular system, are so widespread that we become more vulnerable to a wide range of health problems.

Who Benefits From Greater Equality?

When comparing more and less equal societies, there are two surprising, but closely connected, features that add substantially to the importance of the issues we have discussed.

First, the differences in the prevalence of health and social problems associated with inequality are very large: Related to inequality, there are threefold differences in rates of mental illness, two- or threefold differences in obesity and homicide rates, and even bigger differences in the proportion of the population imprisoned (Wilkinson & Pickett 2007, 2009). Second, although greater equality seems to make most difference to rates of problems among the least well-off, rates also seem to be reduced among a large majority of the population, including the top tertiles or quartiles by education or income. It looks as if the vast majority benefit from greater equality.

These two features are linked because such large differences in the total population prevalence rates could not easily be produced if inequality affected only a small minority of the population. For instance, if the three- or four-year difference between countries in average life expectancy were produced simply by health differences confined to the poorest 10% of the population, their life expectancy would have to be 30 or 40 years shorter in the most unequal societies than the poorest in a more equal society. That benefits of greater equality are spread across society is also consistent with the fact that health inequalities are not distinctions between the health of the poor and the rest of society but form a gradient right across society.

The evidence that the benefits of greater equality are indeed widespread by socioeconomic status comes mainly from health research. Two early studies compared social gradients in adult male mortality and infant mortality in Sweden and in England and Wales (Leon et al. 1992, Vagero & Lundberg 1989). To facilitate comparisons, a large sample of Swedish deaths was classified according to the British occupational class classification system. The findings are shown in **Figures 8** and **9**. Sweden, as the more equal of the two countries, has lower mortality rates across all occupational classes. For both infant and adult mortality, the differences are greatest in the lowest classes (class IV semiskilled, and class V unskilled manual occupations) but are

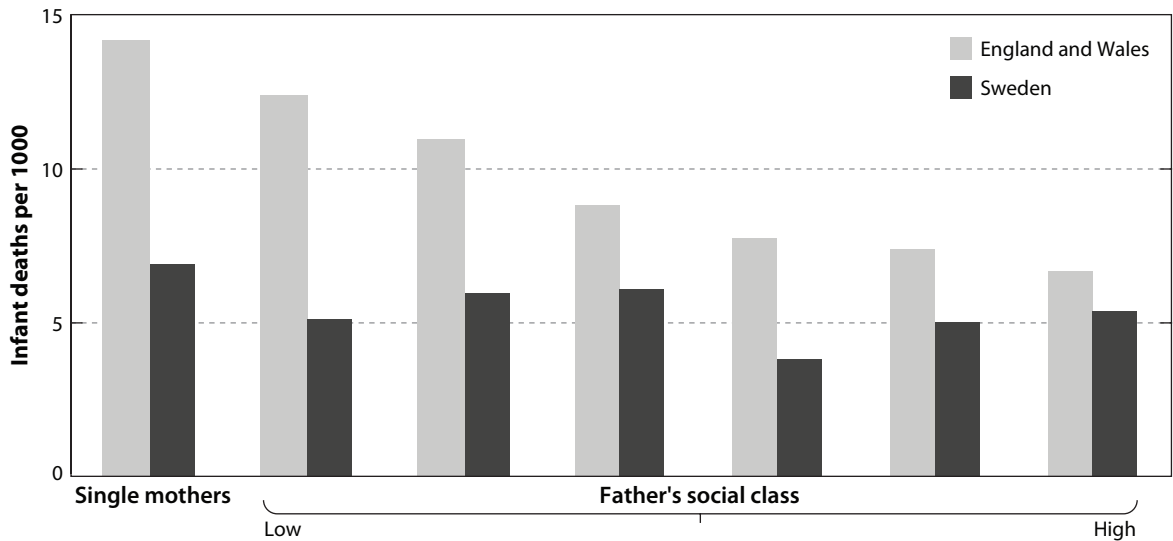


Figure 8

Infant mortality by occupational class of father in Sweden compared with England and Wales. Sweden had lower infant mortality in all classes and a shallower social gradient than England and Wales. Redrawn from Leon et al. 1992.

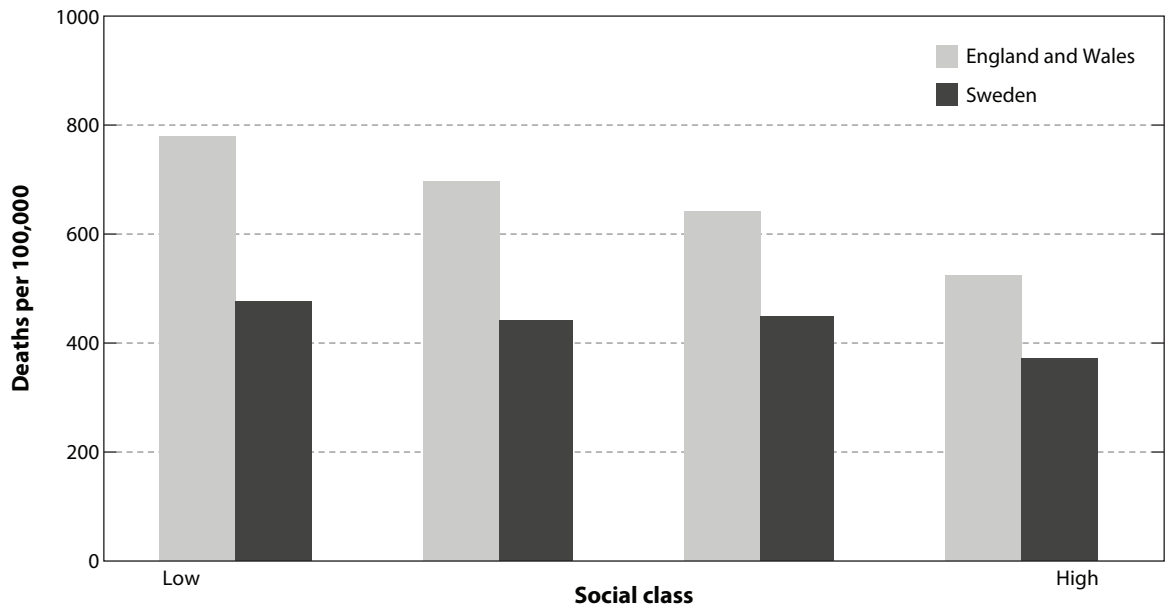


Figure 9

Mortality of working-age men by occupational class in Sweden compared with England and Wales. Note that as well as having smaller income differences, Sweden has lower mortality in all classes and that the social gradient is less steep than in England and Wales. Redrawn from Vagero & Lundberg 1989.

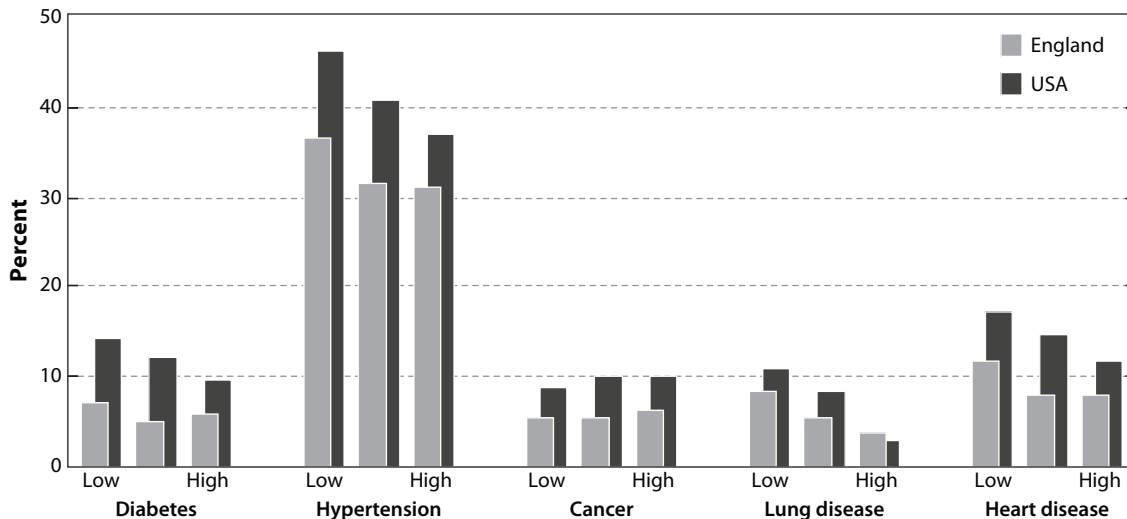


Figure 10

Morbidity rates (diabetes, hypertension, cancer, lung disease, and heart disease) by tertiles of education comparing whites aged 55–64 in the United States and England. Note that morbidity rates are lower in England even in the top educational tertile for all morbidities except lung disease. Data source: Banks et al. 2006.

also apparent even in the highest class (class I professional occupations).

More recent research compared health among non-Hispanic white men aged 55–64 years classified by income and education in the United States and England (Banks et al. 2006). Comparisons covered morbidity from different conditions; biological indicators including blood pressure, cholesterol, and C-reactive protein (a chronic stress marker); and mortality. The differences in morbidity rates by tertiles of education are shown in **Figure 10**. England, as the less unequal country, was found to have lower morbidity rates in all tertiles. In further analysis of the same data, the authors said:

[T]here exists a steep negative health gradient for men in both countries where men at the bottom of the economic hierarchy are in much worse health than those at the top. This social health gradient exists whether education, income, or financial wealth is used as the marker of one’s SES status. While the negative social gradient in male health characterizes men in both countries, it appears to be steeper in the

United States. These conclusions are maintained even after controlling for a standard set of behavioral risk factors such as smoking, drinking, and obesity and are equally true using either biological measures of disease or individual self-reports (Banks et al. 2007, p. 27).

Other studies of who is affected by inequality have used data for the U.S. states. Papers from Subramanian & Kawachi (2006) and from Wolfson et al. (1999) found that the health benefits associated with greater equality among the more equal states were widespread. Subramanian & Kawachi concluded that “income inequality exerts a comparable effect across all population subgroups” whether people are classified by education, race, or income—so much so that the authors suggested that inequality acted like a pollutant spread throughout society. Wilkinson & Pickett (2008) found in a comparison of county mortality rates for men and women in the 25 more equal and the 25 less equal U.S. states that mortality rates were higher at all levels of county median income and that the gradient was steeper in the

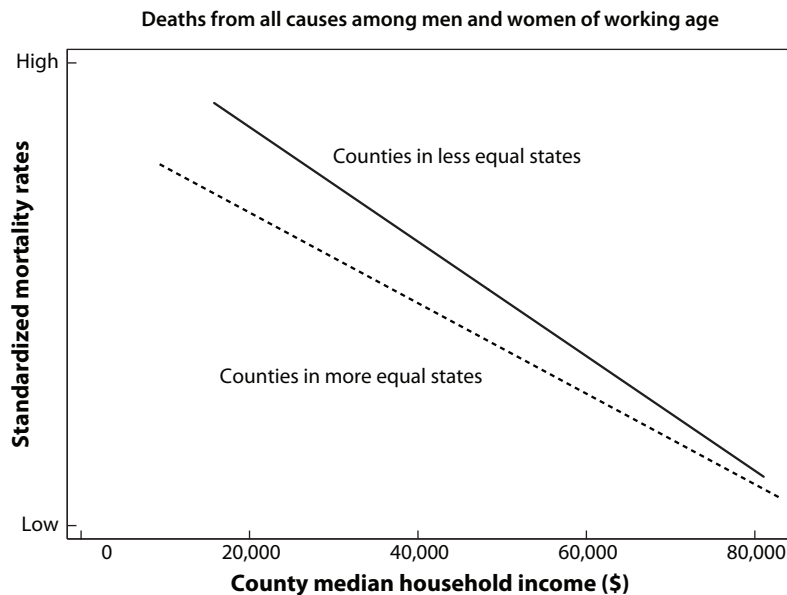


Figure 11

The relation between median county income and county death rates among working-age people according to whether the counties were in the 25 more equal or the 25 less equal states. Note that mortality rates are higher at all levels of county median income in the more unequal states and that the social gradient is steeper. Source: Wilkinson & Pickett 2008.

more unequal states (see **Figure 11**). Like the international comparisons, this suggests that greater equality may benefit all groups but that the absolute difference is likely to be bigger lower down the social scale.

Although there is little evidence of this kind outside health, the scale of the international differences in health and social problems related to inequality is so large that it is unlikely that they are predominantly reflections of differences in rates confined to a poor minority in each country. A paradoxical implication of the widespread nature of the benefits is that narrower income differences do less to narrow health inequalities than they would if only the least well-off benefited. This may explain why health inequalities when expressed in relative terms (for instance as the death rates in low-status groups divided by that in high-status groups) do not show a consistent tendency to be smaller in more equal societies, even though they may be smaller in absolute terms (as expressed for example by the death rate in low-status groups minus the

death rate in high-status groups) (Mackenbach et al. 1997). If even the better-off groups enjoy some reduction in death rates, then this would mean that the impact on health inequalities (expressed in relative terms) would be less than if the better-off were unaffected.

We have discussed elsewhere (Wilkinson & Pickett 2009) the social processes through which wider income differences might affect the majority of the population. The evidence of increased violence, reduced trust, and a weakening of community life suggests that wider income differences damage the quality of social relations as affiliative social strategies give way to increased status competition.

SUMMARY AND FUTURE ISSUES

Given that the wide range of health and social problems related to inequality tend to be those with social gradients, it would be a mistake to imagine that the scale of income inequality influences social outcomes through hitherto

unknown processes running parallel to social status differentiation. It is much more plausible that it works through all the processes of social status stratification that have been central to the social sciences for so long, including the ways in which so many marks of social position become imprinted on us from early childhood onward.

The fact that health is worse and social problems are more prevalent in more unequal societies does, however, tell us something fundamental about those processes. Although opinions vary as to how much the social gradients in health and other outcomes result from social selection, selection is essentially a sorting process, acting on a given prevalence of a problem. No amount of selective mobility could, of itself, produce major differences in the prevalence of social problems from one society to another. Nor could it explain why the prevalence is systematically higher in more unequal societies.

Several important conclusions suggest themselves. First, income inequality serves as a measure that allows us to compare the scale or importance of social stratification in different societies. Second, because it is problems with social gradients that are related to inequality, this is probably a reflection of their sensitivity,

on the one hand, to the existing status differentiation and, on the other, to the size and importance of the status differences as they vary from one society to another. Third, the forms of social dysfunction associated with greater inequality are not confined to the poor but extend to almost all sections of society. Fourth, the most plausible explanation of the effects of income inequality is that material inequality serves as a determinant and measure of the scale of social status differentiation in society. The ability to compare income distribution in different societies may therefore show the costs of different degrees of status differentiation. Fifth, standards of health and social well-being in rich societies may now depend more on reducing income differences than on economic growth without redistribution.

Future research should measure inequality in whole societies or across large populations and should avoid adjusting for variables that remove some of the effects of social status differentiation. Important areas for further research are likely to include the psychosocial processes that connect the scale of social stratification to the various social problems associated with inequality.

DISCLOSURE STATEMENT

The authors are not aware of any biases that might affect the objectivity of this review, but they have recently established The Equality Trust (<http://www.equalitytrust.org.uk>) as a not-for-profit organization intended to make the evidence outlined in this review better known.

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