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Relations of income inequality and family income to chronic medical conditions and mental health disorders: national survey in USA

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Editorial by
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BMJ 2002;324:20-3

Abstract

Objectives To analyse the relation between geographical inequalities in income and the prevalence of common chronic medical conditions and mental health disorders, and to compare it with the relation between family income and these health problems.

Design Nationally representative household telephone survey conducted in 1997-8.

Setting 60 metropolitan areas or economic areas of the United States.

Participants 9585 adults who participated in the community tracking study.

Main outcome measures Self report of 17 common chronic medical conditions; current depressive disorder or anxiety disorder assessed by clinical screeners.

Results A strong continuous association was seen between health and education or family income. No relation was found between income inequality and the prevalence of chronic medical problems or depressive disorders and anxiety disorders, either across the whole population or among poorer people. Only self reported overall health, the measure used in previous studies, was significantly correlated with inequality at the population level, but this correlation disappeared after adjustment for individual characteristics.

Conclusions This study provides no evidence for the hypothesis that income inequality is a major risk factor for common disorders of physical or mental health.

Introduction

The “income inequality hypothesis” says that disparities in income among members of a community affect their health and, specifically, that economically egalitarian communities or societies have better health outcomes than more unequal communities.¹⁻³ Some proponents argue that inequality in incomes is a stronger determinant of health than the income of individuals or families.¹

Initial support for the income inequality hypothesis came from aggregate level studies of total mortality or cause specific mortality.¹⁻⁴⁻¹⁰ More recent studies show mixed results once individual characteristics are included in the analysis.¹¹⁻¹⁷ This study re-examines the income inequality hypothesis with measures of health that reflect the presence or absence of 17 chronic physical conditions and specific disorders of mental health, by using data from a survey carried out in 1997-8 in 60 metropolitan or economic areas across the United States.

Methods

Sources of data

“Healthcare for Communities” is a household telephone survey clustered in 60 randomly selected metropolitan areas or economic areas of the United States; it was carried out in 1997-8.¹⁸ This analysis focuses on 8235 respondents living in the 60 sites for which measures of income inequality are available (1337 respondents lived outside the 60 sites).

Outcome measures

For comparability with previous studies we analysed the self reported general health status of respondents and created an indicator for a response of poor or fair.¹³⁻¹⁴⁻¹⁷ Our measure of mental health considered four psychiatric disorders—major depressive disorder, dysthymic disorder, panic disorder, and generalised anxiety disorder—which we assessed by using the composite international diagnostic interview, short form, plus role limitation for panic disorder.¹⁹⁻²¹

We assessed physical health from answers to questions about 17 chronic health conditions: asthma; diabetes; hypertension; arthritis; a physical disability; trouble breathing; cancer; a neurological condition; stroke or paralysis; angina, heart failure, or coronary artery disease; chronic back problems; stomach ulcer; chronic liver disease; migraine or chronic severe headaches; chronic bladder problems; chronic gynaecological problems (women only); and unspecified chronic pain. We report results for the overall number of conditions and for the more common individual conditions or conditions that may have psychosocial components.

Income inequality, individual income, and other independent variables

We calculated income inequality at site level from the community tracking study. The results shown are based on the Gini coefficient,²²⁻²⁴ which ranges from 0.38 to 0.54 across the 60 communities. This is higher than the 0.27-0.35 range found in a British mental health study, indicating higher levels of inequality.²⁵ Income at the individual level was measured as family income, which includes earnings from work, transfer income, and other sources.

Analyses

We grouped respondents by fifths of family income and by community level inequality and calculated a weighted mean for the prevalence of each condition in each group. We tested the association between prevalence of medical conditions and family income or inequality by using individual level logistic regressions with an indicator of a health condition as the dependent variable. We tested the association both with and without adjustment for other individual level socio-demographic variables such as age, sex, race or ethnicity, and size of family.

Results

The prevalence of most conditions decreased continuously across most of the income range (fig 1). However, the magnitude of the drop in the prevalence of health problems tended to be largest from the lowest fifth to the next fifth. The association between family income and prevalence was highly significant for almost all conditions (table 1).

Consistent with previous studies, we found a highly significant ($P < 0.01$) association between high income inequality and the probability that a person reports being in poor or fair health, although the finding was not robust to adjustment for other sociodemographic factors (table 2) Except for this self reported health measure, however, there was no discernible pattern in health outcomes by income inequality (fig 2). A third of the conditions were most prevalent in communities with average income inequality, and three health problems (depression, chronic pain, and asthma) were most prevalent in communities with low income inequality (bottom two fifths). With the exception of chronic gynaecological problems, we found no significant association between any specific health condition—chronic, mental, or otherwise—and income inequality (including conditions not shown). Even the significant result for gynaecological problems disappeared when individual sociodemographic variables were taken into account. In contrast, the highest prevalence for every condition occurred in one of the two poorest fifths as stratified by family income.

Discussion

The relation between income inequality and health has been at the centre of a substantial amount of research, but the measures of health status that have been analysed to date have largely been limited to self reported health status or mortality in the case of physical health, and depressive symptoms or psychological distress for mental health. To our knowledge, this study is the first to explore the association between income inequality and several specific physical conditions as well as particular mental health disorders. Although our data confirm the association between income inequality and poor or fair self reported health, no similar relation exists between income inequality and

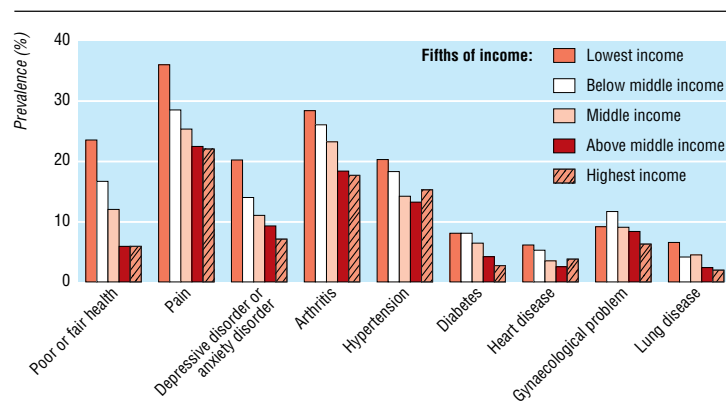


Fig 1 Adjusted prevalence of chronic conditions by fifths of family income

depressive disorders or anxiety disorders or any of the medical conditions assessed, either at the population level or among people with lower incomes, wealthier people, women, or men. On the other hand, family income and education, which may reflect rank in the social hierarchy, are strongly related to health. Their effects are not confined to differences between the lowest income group and other groups (which would point towards material deprivation as an explanation) but show a gradient that flattens well above the median income level. This finding is similar to that of the Whitehall studies of British civil servants, where social gradients in morbidity and mortality ran from the bottom to the top of the hierarchy.^{26–28}

The sample size of this study provides good statistical power to detect differences between fifths of inequality up to 75% smaller than the estimated differences between fifths of family income. Smaller inequality effects (that is, more than 75% smaller than the estimated differences between fifths of income) may not be detectable, however. Measurement error in the site level inequality measure could also bias estimates downward, but the results were unchanged for alternative inequality measures at the state level.

Although we found no empirical support for the hypothesis that income inequality affects mortality or self rated health status through higher rates of specific medical conditions, the results do not necessarily

Table 1 Health status by fifths of income. Values are means (SD), given as percentages, unless stated otherwise

Health status	Poorest fifth (n=2139)	Below middle fifth (n=1834)	Middle income fifth (n=1590)	Above middle fifth (n=1468)	Highest income fifth (n=1204)	P value for income gradient	
						Unadjusted	Adjusted*
Self reported poor or fair health	27.8 (44.8)	17.5 (38.0)	11.6 (32.0)	5.2 (22.2)	5.2 (22.2)	<0.001	<0.001
Mean (SD) No of chronic conditions	1.80 (1.97)	1.32 (1.56)	1.03 (1.40)	0.87 (1.23)	0.87 (1.22)	<0.001	<0.001
Prevalence of chronic conditions:							
Depressive disorder or anxiety disorder	18.2 (38.6)	13.2 (33.9)	11.2 (31.6)	10.0 (30.0)	7.4 (26.1)	<0.001	0.002
Depressive disorder	14.9 (36.6)	10.6 (30.8)	8.3 (27.6)	8.5 (27.8)	5.5 (22.7)	<0.001	0.003
Pain condition (including back pain, chronic headache, other non-specified chronic pain problem)	35.4 (47.8)	28.3 (45.1)	25.4 (43.6)	22.7 (41.9)	22.5 (41.7)	0.019	0.055
High blood sugar or diabetes	10.3 (30.4)	8.2 (27.4)	6.2 (24.0)	3.6 (18.5)	2.3 (15.0)	0.001	0.026
Hypertension or high blood pressure	25.0 (43.8)	18.9 (39.2)	13.2 (33.8)	11.5 (31.9)	13.2 (33.8)	0.002	>0.1
Arthritis or rheumatism	33.8 (47.3)	26.4 (44.1)	21.1 (40.9)	16.0 (36.7)	16.1 (36.7)	<0.001	<0.001
Trouble breathing, emphysema, or chronic lung disease	7.6 (26.5)	4.0 (19.7)	3.8 (19.2)	2.0 (14.1)	1.7 (12.8)	<0.001	0.001
Angina, heart failure, or coronary heart disease	8.2 (27.4)	5.5 (22.8)	2.9 (16.7)	1.9 (13.7)	3.2 (17.6)	0.004	0.082
Chronic gynaecological problem, such as severe cramps or heavy bleeding (women only)	7.8 (26.8)	11.4 (31.9)	9.1 (28.8)	9.0 (28.7)	7.0 (25.5)	>0.1	0.018

*Adjusted for age, sex, race or ethnicity, and family composition.

Table 2 Health status by fifths of inequality. Values are means (SD), given as percentages, unless stated otherwise

Health status	Lowest inequality (n=2137)	Second lowest inequality (n=1678)	Middle inequality (n=1559)	Above middle inequality (n=1538)	Highest inequality (n=1323)	P value for income gradient	
						Unadjusted	Adjusted*
Self reported poor or fair health	13.6 (34.3)	9.4 (29.1)	14.6 (35.3)	14.0 (34.7)	17.5 (38.0)	0.006	>0.1
Mean (SD) No of chronic conditions	1.28 (1.66)	1.05 (1.40)	1.27 (1.53)	1.07 (1.56)	1.30 (1.53)	>0.1	>0.1
Prevalence of chronic conditions:							
Depressive disorder or anxiety disorder	12.1 (32.6)	12.7 (33.3)	12.8 (33.3)	10.6 (30.8)	11.9 (32.4)	>0.1	>0.1
Depressive disorder	9.2 (28.9)	10.3 (30.4)	10.2 (30.2)	8.4 (27.7)	10.3 (30.4)	>0.1	>0.1
Pain condition	28.9 (45.3)	23.3 (42.2)	27.0 (44.4)	27.5 (44.7)	28.4 (45.1)	>0.1	>0.1
Asthma	7.6 (26.6)	5.3 (22.3)	7.4 (26.2)	6.4 (24.4)	7.0 (25.5)	>0.1	>0.1
High blood sugar or diabetes	6.8 (25.1)	6.0 (23.8)	6.8 (25.1)	4.3 (20.3)	7.4 (26.1)	>0.1	>0.1
Hypertension or high blood pressure	17.1 (37.7)	14.8 (35.6)	20.0 (40.0)	13.2 (33.9)	19.4 (39.5)	>0.1	>0.1
Arthritis or rheumatism	24.2 (42.8)	22.4 (41.7)	25.4 (43.5)	20.1 (40.1)	21.9 (41.4)	0.095	>0.1
Trouble breathing, emphysema, or chronic lung disease	3.9 (19.4)	3.6 (18.7)	5.3 (22.5)	2.9 (16.7)	3.9 (19.4)	>0.1	>0.1
Angina, heart failure, or coronary heart disease	5.0 (21.9)	3.8 (19.1)	5.6 (23.0)	3.8 (19.1)	3.6 (18.5)	>0.1	>0.1
Chronic gynaecological problems, such as severe cramps or heavy bleeding (women only)	8.7 (28.2)	8.4 (27.8)	7.7 (26.7)	9.4 (29.2)	10.8 (31.0)	0.045	>0.1

*Adjusted for age, sex, race or ethnicity, and family composition.

contradict previously reported associations between income inequality and self rated health status or mortality. Factors linking income inequality to health may include the severity of disorder, the probability that a person receives a diagnosis conditional on having a disorder, and the way in which having a disorder determines people's perceptions of their health. But some of these factors are likely to be influenced by environmental factors other than income inequality, including state policies and healthcare infrastructure, that may be unrelated to income distribution. It seems premature to conclude that income inequality itself is an important risk factor for poor health, and the results highlight the need to better understand the psychological and physiological pathways through which the social environment affects health.

We thank Michael Schoenbaum and Jürgen Unützer for comments, Jennifer Mellor and Jeff Milyo for providing their measures of income inequality, and Lingqi Tang and Fuan-Yue Kung for assistance with programming.

Funding: Robert Wood Johnson Foundation, which funded the healthcare for communities survey, and the National Institute of Mental Health (R01-MH62124).

Competing interests: None declared.

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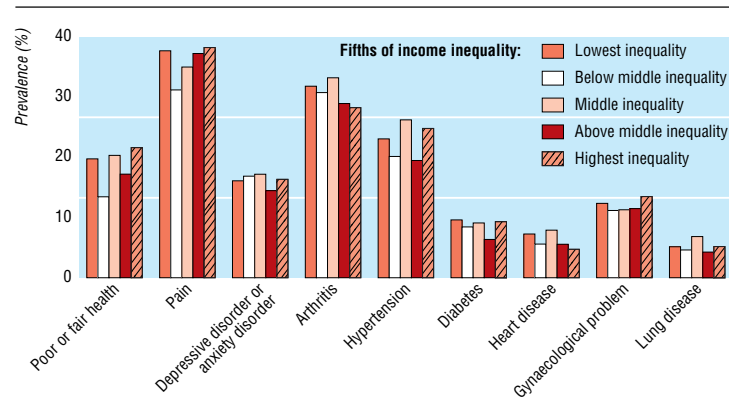


Fig 2 Adjusted prevalence of chronic conditions by fifths of income inequality

What is already known on this topic

Several studies have found a relation between income inequality and self reported health or mortality

What this study adds

There is a strong social gradient in health, as measured by the prevalence of chronic medical conditions and specific mental health disorders, by income or education

No such association is seen between income inequality and health

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(Accepted 17 September 2001)

Education, income inequality, and mortality: a multiple regression analysis

Andreas Muller

Abstract

Objective To test whether the relation between income inequality and mortality found in US states is because of different levels of formal education.

Design Cross sectional, multiple regression analysis.

Setting All US states and the District of Columbia (n = 51).

Data sources US census statistics and vital statistics for the years 1989 and 1990.

Main outcome measure Multiple regression analysis with age adjusted mortality from all causes as the dependent variable and 3 independent variables—the Gini coefficient, per capita income, and percentage of people aged ≥ 18 years without a high school diploma.

Results The income inequality effect disappeared when percentage of people without a high school diploma was added to the regression models. The fit of the regression significantly improved when education was added to the model.

Conclusions Lack of high school education accounts for the income inequality effect and is a powerful predictor of mortality variation among US states.

Introduction

Several recent studies have reported a positive relation between income inequality and mortality.¹⁻³ The relation remains intact when different measures of income inequality are used, but how should this be interpreted?

Three competing interpretations have been advanced. Wilkinson believes that income inequality produces psychosocial stresses for individuals placed at lower ranks of the socioeconomic hierarchy.⁴⁻⁶ Continuous stress due to deprivation of status will lead to deteriorating health and higher mortality over time. The fact that median or per capita household income cannot account for the relation has been taken as evidence that “relative income,” or income inequality, is more important than absolute income for human health and longevity.

The correlation between income inequality and mortality may be artefactual in part, as there is a negative, curvilinear relation between income and the prob-

ability of dying for individuals.⁷ It seems, however, that the individual relation between income and mortality cannot fully account for the aggregate relationship.⁸

The “neo-material” interpretation asserts that income inequality reflects individual and community forms of absolute deprivation. Poorer individuals disproportionately experience health taxing events and lack of resources throughout their lives.⁹ They live in deprived communities characterised by “underinvestment” in the social and physical infrastructure. Both forms of deprivation produce cumulative wear and tear. The experience depletes health, resulting in higher mortality for those in lower socioeconomic strata. The aggregate effect is that societies with increasing income inequality will experience higher mortality than they would otherwise. Such material conditions may be sufficient in explaining the relation between income inequality and mortality.⁹

The neo-material interpretation gives only a broad indication of which material circumstances are important. An analysis of US states, however, suggests some potential answers²: income inequality is significantly correlated with certain risk factors (homicide rates and unemployment rates), social resources (food stamps and lack of health insurance), and measures of human capital (educational attainment). The substantial correlations with some measures of human capital imply that income inequality may not have a direct effect on mortality. Instead, income inequality may reflect the effects of other socioeconomic variables that are also related to mortality. Among those variables, the contribution of formal education deserves most attention since it typically precedes, and predicts, work and income.¹⁰ It is also related to mortality.¹¹⁻¹⁴

Therefore, the association between income inequality and mortality found in aggregate studies may be partially the result of variation in educational attainment. I tested this hypothesis using data for the US states, which have shown substantial associations between measures of income inequality measures and age adjusted mortality.

Data and methods

The study is based on a cross sectional analysis of US census statistics and vital statistics for the years 1989 and



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BMJ 2002;324:23-5