



PERGAMON

Social Science & Medicine 55 (2002) 1561–1570

SOCIAL  
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MEDICINE

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# A note on the use of a single inequality index in testing the effect of income distribution on mortality

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## Abstract

A new literature has recently emerged which suggests that among the developed economies, at least in terms of health status, the distribution of income may be more important than its absolute level. In this literature, the effect of income inequality, in particular, relative inequality on health status is tested by examining the relationship between aggregate mortality and a single measure of inequality (such as the Atkinson Index). In this paper we look at whether a single measure of income inequality, even augmented by a measure of representative income can at the aggregate level, distinguish between the effects of relative as opposed to absolute income. An alternative approach that uses disaggregated income to distinguish between the effects of changes in relative and absolute income levels is applied to data from the 1990 US Census and mortality figures from the National Centre for Health Statistics. Our results indicate that the rate of mortality is sensitive to absolute, but not relative poverty and therefore suggest that to improve the health of the poor the focus must be on raising their absolute standard of living. The results also indicate that government supported programs may have important health enhancing effects and may therefore represent a key policy tool to improve the health of those at the bottom of the income distribution. © 2002 Elsevier Science Ltd. All rights reserved.

*Keywords:* Income inequality; Relative poverty; Absolute poverty; Inequality indices; Mortality; United States

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## Introduction

That income plays a role in the determination of health is a longstanding hypothesis, with considerable support in the epidemiology, health sociology and health economics literature. Historically, the focus was on the impact of the absolute level of income (Pritchett & Summers, 1996), but recent work has suggested that, within the developed economies, the distribution of income may be more important than its absolute level (Wilkinson, 1990; Kennedy, Kawachi, & Prothrow-Stith, 1996). Often cited as supporting the relativist view is the fact that measures of population health (e.g. mortality rates, life expectancy) are more closely associated with the distribution of income within developed countries than differences in absolute income

between them (Wilkinson, 1992, 1994). Wilkinson (1996, p. 34) notes that “once countries have reached some threshold level of income (around \$5000 per capita in 1990), life expectancy plateaus out and further increases in GNPPc are no longer associated with increases in life expectancy”. In other words, what concerns the individual in the developed economy is not so much his absolute standard of living as his rank in the distribution of earnings.

The pathways through which relative deprivation is translated into poorer health outcomes are said to be psycho-social in nature (Kawachi & Kennedy, 1997a; Kawachi, Kennedy, & Lochner, 1997c; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997d). One hypothesis is that greater inequality in income leads to increased levels of stress which has detrimental health consequences. It has also been argued that a growing income gap between the rich and the poor may lead to less social cohesion and a disinvestment in social capital

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(Kawachi & Kennedy, 1997a). Kawachi et al. (1997d, p. 1491) define social capital as “the features of social organization, such as civic participation, norms of reciprocity, and trust in others, that facilitate cooperation for mutual benefit”. In support of their view, the authors cite a literature linking the strength of social networks to various health outcomes (Wilkinson, 1994).

While socio-economic status is more than simply position in the income distribution, there is evidence that relative income may have a strong effect on health status, independent of absolute income and separate from the effects of other aspects of socio-economic status (SES), and inequality of income distribution is often used as a proxy for socio-economic status in general. The relative income strand of the SES literature typically relates some measure of health to some measure of income distribution: at the aggregate level, which we shall be considering here, the literature relates some aggregate measure of population health (mortality risk, life expectancy) to one of a number of inequality indices (Gini, Atkinson etc.) to measure relative inequality, once median income and/or some measure of poverty is controlled for. Kawachi and Kennedy (1997b) in a cross-sectional study of the United States, test six different income inequality measures and report a strong positive correlation between each measure and aggregate age-adjusted mortality. Their results are not affected appreciably when income is adjusted for taxes, transfers and household size. Judge, Mulligan, and Benzeval (1998) identify a number of methodological problems with studies using a single inequality index. Many exclude other relevant explanatory variables and arbitrarily select the inequality measures used in their analyses. Judge et al. (1998) “find very little support for the view that income inequality is associated with variations in average levels of national health in rich industrial countries” (p. 567). However, they employ the same general econometric methodology as Kawachi and Kennedy (1997b).

Typically in this literature, greater income inequality, as measured by increases in the inequality index, are associated with worse population health: age-adjusted mortality tends to be higher when the degree of income inequality is higher. Because these equations also include a measure of central tendency of the distribution of income to control for the general level of income, the finding that greater inequality is associated with higher mortality is typically taken to indicate that relative inequality has an independent effect on mortality. Specifically, it is taken to mean that, in developed countries, relative poverty is as important as absolute poverty in the determination of overall mortality.

Gravelle (1998) presents an alternative explanation for the association between income distribution and population health. He argues that

If mortality declines with income, but at a decreasing rate, transferring income from the poor to the rich will increase the mortality risk of the poor more than it reduces the mortality risk of the rich. Overall population mortality increases when inequality increases, even though every individual's risk of mortality depends only on their own income level and not on the income level of anyone else (Gravelle, 1998, p. 383).

This view is consistent with what we refer to as the Absolute income hypothesis, and there is some evidence to suggest that there is a non-linear relationship between income and measures of population health (Ecob & Davey Smith, 1999; Chapman, 1996). Wilkinson (1998), on the other hand, argues that Gravelle's argument requires the existence of a strongly convex relation between mortality and absolute income within developed countries, and suggests that empirical data tend to support the existence of a linear, rather than curved, relation. At the individual level, however, Wolfson, Kaplan, Lynch, Ross, and Backlund (1999)<sup>1</sup> suggest that a nonlinear relation might be appropriate, and the empirical results of Backlund, Sorlie, and Johnson (1996), based on American data from the National Longitudinal Mortality Study, tend to support this. It seems, then, that the possibility that the relation between mortality and absolute income is curved, even in developed countries, should still be treated as a testable hypothesis.

Gravelle points out that “both the absolute and relative income hypotheses predict that a reduction in inequality in income can improve the health of the population” (p. 384). However, these hypotheses have quite different policy implications. To take an extreme position, the Absolute income hypothesis implies that to improve population health, income must be transferred from the rich to the poor whereas the Relative income hypothesis suggests that taxation of the rich without redistribution to the poor can achieve the same objective. At a more practical level, the Relative income hypothesis suggests that redistribution of income from rich to poor can have a double effect on mortality: any benefits which followed from raising the absolute standard of living of the lower income groups would be augmented by the effects of their relative gains. It is important therefore to distinguish empirically between the Absolute and Relative income effects.

One further issue is raised by Wagstaff and van Doorslaer (2000), who argue that only individual-level, and not aggregate-level studies have the potential to distinguish between the absolute income hypothesis and different versions of the relative income hypothesis. If

<sup>1</sup>See also comments by Gravelle (1999) and Wilkinson (1999).

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