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## Insights

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*In this issue Insights publishes two papers that discuss the conjectured relationship between the degree of income inequality in a society and the diminution of health status in the population. The first of the two papers, by Jennifer M. Mellor and Jeffrey D. Milyo, doubts that the relationship exists. The second, by Michael Marmot, argues for the reality of the relationship. Marmot's paper is an extension of his comments received through the referee process, and was solicited by the editors. We thought JPAM readers would appreciate seeing the two viewpoints side-by-side, with the arguments concisely stated.*

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### INCOME INEQUALITY AND HEALTH

Jennifer M. Mellor and Jeffrey D. Milyo

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### INTRODUCTION

It has long been recognized that there is a negative statistical association between income inequality and aggregate health outcomes across countries (e.g., Le Grand, 1987; Rodgers, 1979; Waldmann, 1992). More recently, this relationship has been found across the United States (e.g., Kaplan et al. 1996; Kennedy, Kawachi, and Prothrow-Stith, 1996). These repeated observations are the basis for Richard G. Wilkinson's (1996) argument that income inequality *causes* poorer health outcomes, all else constant. This intriguing hypothesis has generated many follow-up studies, the bulk of which appear in medical journals or journals of public health. The empirical evidence presented in many of these studies has emboldened prominent health policy researchers to declare that income inequality is a public health concern (e.g., Kawachi et al., 1997; Kennedy et al., 1998).

## THE INCOME INEQUALITY HYPOTHESIS

The assertion that income inequality exerts an independent and causal effect on individual health is certainly controversial, and for many economists, not intuitive. Admittedly, the income inequality hypothesis had its origins as an ad hoc explanation for a repeated empirical observation; only recently have attempts been made to describe the causal pathways by which income inequality adversely affects individual health; we describe these, below.

### Psychosocial Effects of Inequality

Wilkinson (1996) argues that humans are envious creatures who become agitated when made aware of the existence of others who are more well-to-do. This negative shock to the psyche increases stress, which in turn may contribute to the onset or progression of either cardiovascular disease or depression. This implies that income inequality is a cause of health problems among the poor. Moreover, stress and depression may lead some individuals to “acting out” behaviors that have negative externalities. For example, motor vehicle accidents, violent crime, and substance abuse have all been suggested as pathways by which the mental condition of one individual may have serious external effects on the health of others. Consequently, the effects of income inequality may be made manifest in the health of all members of a community, not just the poor.

The argument that economic conditions influence both stress and health has been made in other contexts; for example, unemployment is associated with reduced psychological well-being and higher mortality (e.g., Guest, Almgren, and Hussey, 1998; Theodossiou, 1998). However, the income inequality hypothesis asserts that it is not the incidence or the level of economic distress that affects health—it is instead the variation in economic circumstances in one’s community that results in stress and poor health. In other words, communities that exhibit more heterogeneity in income levels have worse health outcomes.

### Inequality and Social Capital

Kawachi and Kennedy (1999) posit a more indirect causal connection between income inequality and health; they suggest that inequality hinders the formation of social capital, which in turn is thought to have profound implications for health outcomes. The primary evidence for this argument is that state-level measures of inequality are negatively associated with state-level measures of social capital, while the latter are positively associated with aggregate health measures.

The causal link from inequality to deprivation of social capital to poor health is thought to work in the following manner: inequality highlights actual or perceived differences in interests across individuals; this reduces trust and hampers cooperation among individuals; and this breakdown in community cohesion affects the political distribution of resources in a manner which reinforces social inequality. Consequently, income inequality produces communities in which there is little social provision for the well-being of the poor. This affects the health of the poor directly, through the provision of health care, and indirectly, by producing an unjust social climate that has its own negative psychosocial consequences. Again, this explanation suggests that the detrimental consequences of inequality should be most apparent in the health of the poor, though there may also be non-trivial spill-over effects to the well-being of all members of the community.

## OTHER REASONS FOR THE ASSOCIATION BETWEEN INCOME INEQUALITY AND HEALTH

Several other explanations for the frequently observed correlation between income inequality and health do not imply a causal relationship. We summarize these below.

### Ecological Fallacy

If the relationship between individual income and individual health outcomes exhibits diminishing marginal returns, then measures of variance in incomes across regions will be negatively correlated with health outcomes (Rodgers, 1979). Several cross-sectional studies support the existence of a concave relationship between individual income and overall individual health outcomes (e.g., Mellor and Milyo, 1999). Consequently, there is some reason to expect that measures of population health will be negatively associated with the variance in individual incomes. This suggests that the income inequality hypothesis must be tested using individual data and controlling for the nonlinear relationship between individual income and health.

### Population Characteristics

Most studies reporting results in support of the income inequality hypothesis do so using area-level measures of population health and income inequality. The existence and subsequent omission of other population attributes, correlated with both health and income inequality, may be responsible in part for findings that suggest a causal effect of income inequality. In fact, several studies have asserted a causal effect on the basis of correlation coefficients partially adjusted for median income or the area's poverty rate. When regression analysis has been used, the list of explanatory variables typically includes median income and the poverty rate, and sometimes includes the prevalence of smoking. Typically however the list does not include measures of population education, racial composition, urban/rural composition, and the prevalence of other risk factors.

If at least some health care services are provided collectively and if this collective provision is a function of population characteristics—such as education—then it is possible to construct several scenarios in which income inequality is either positively or negatively associated with health outcomes. For example, the quality and quantity of health care may increase with the level of education in a community; to the extent that inequality is negatively (positively) associated with average education, then income inequality will be associated with worse (better) health outcomes. A similar argument can be made about the omission of factors representing the prevalence of unhealthful behaviors in a community. Finally, the endogenous location decisions of either health care consumers or producers may influence regional population health (e.g., Schwartz et al., 1980). In either case, income inequality is not itself a cause of poor health outcomes, but is instead only associated with poor outcomes.

## NEW QUANTITATIVE EVIDENCE

The existence of these and other explanations for a significant association between income inequality and health has prompted some economists to reexamine the empirical evidence in favor of the income inequality hypothesis. For example, two recent studies explicitly address the possibility of the ecological fallacy by including controls for individual-level income. Mary C. Daly and colleagues (1998) estimate models of mortality risk using data from the Panel Study of Income Dynamics, and

Mellor and Milyo (1999) examine self-reported health status using the Current Population Survey. In both cases, the inclusion of controls for individual income attenuates but does not always eliminate the association between inequality and health. These two studies provide further evidence to challenge supporters of the income inequality hypothesis. Neither study finds support for the income inequality hypothesis that is robust across inequality measures (e.g., the coefficient of variation in income or the share of income to the top 50 percent of income earners), and neither study finds the association between income inequality and health to be more apparent among the poor. In fact, just the opposite is true.

These findings stand in contrast to previous area-level studies, though as noted, most previous studies do not adequately control for other population characteristics. Mellor and Milyo (forthcoming) challenge the robustness of area-level studies by adding controls for population education, race, and urban/rural composition in single-year and pooled cross-sectional regressions of mortality. In addition, models of 10- and 20-year differences in mortality by cause are estimated from a panel of state-year observations across four decades. As a result of adding controls for additional demographic factors and time-invariant area characteristics, Mellor and Milyo (forthcoming) show that the frequently observed correlation between income inequality and health across the United States is not robust. Perhaps most surprising is the finding that greater inequality is associated with *lower* rates of death from cardiovascular disease, liver disease, suicide, and accidents.

Angus Deaton and Christina Paxson (forthcoming) break with previous studies by estimating a structural model of the relationship between income inequality and health. However, their work also deviates from the previous literature by examining inequality across birth cohorts, rather than geographic units. They do not find support for a causal link from inequality and health, but it is unclear whether this is attributable to their unique choice of reference group.

## DISCUSSION

Only a handful of social and behavioral scientists have discussed the income inequality hypothesis, but already serious doubt has been raised about what has fast become a conventional wisdom in other disciplines. The association between income inequality and health is not manifested primarily among the poor. It is not observed in health outcomes like cardiovascular disease and suicide that are most plausibly linked to stress and depression. Furthermore, contrary to previous claims the association is not robust to inequality measures, or the inclusion of relevant control variables. Consequently, public health researchers' heretofore exuberant embrace of the income inequality hypothesis has been premature.

Nevertheless, some caution is in order. Income inequality may not be a good proxy for relative deprivation. Further, relative deprivation is perhaps more appropriately measured across units other than countries or states. Future work should explore whether better measures of relative deprivation bear any relation to the well-being of individuals.

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