Global variations in health: Evaluating Wilkinson's income inequality hypothesis using the World Values Survey

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ABSTRACT

This international comparative study analyses individual-level data derived from the World Values Survey to evaluate Wilkinson's [(1996). *Unhealthy societies: The afflictions of inequality*. London: Routledge; (1998). Mortality and distribution of income. Low relative income affects mortality [letter; comment]. *British Medical Journal, 316*, 1611–1612] income inequality hypothesis regarding variations in health status. Random-coefficient, multilevel modelling provides a direct test of Wilkinson's hypothesis using micro-data on individuals and macro-data on income inequalities analysed simultaneously. This overcomes the ecological fallacy that has troubled previous research into links between individual self-rated health, individual income, country income and income inequality data. Logic regression analysis reveals that there are substantial differences between countries in self-rated health after taking account of age and gender, and individual income has a clear effect in that poorer people report experiencing worse health. The Wilkinson hypothesis is not supported, however, since there is no significant relationship between health and income inequality when individual factors are taken into account. Substantial differences between countries remain even after taking account of micro- and macro-variables; in particular the former communist countries report high levels of poor health.

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Introduction

There has been much recent interest in the macro-determinants of health. Although this is not new – for example, Ancel Keys planned his ground-breaking Seven Countries Study, the first to examine systematically the relationships among lifestyle, diet, and the rates of heart attack and stroke in contrasting populations, in the late 1950s (Keys et al., 1980) – it has recently received increased attention as the effectiveness of an individual 'lifestyle' approach to health promotion has been questioned (Shy, 1997). A major proponent of the argument that it is not the characteristics of the individuals themselves but of the society in which they live that determine their health status is Richard Wilkinson, particularly in his 1996 book *Unhealthy societies* and in the 2001 follow-up *Mind the gap* (Wilkinson, 1996, 2001).

The key to understanding Wilkinson's argument is to distinguish between absolute income and relative income: the former relates to how much income an individual receives; the latter is the degree of inequality in a society or a place. A number of studies of developed economies have indicated that the higher an individual's income the better their health; that is the 'absolute income

hypothesis' (Adler, Boyce, Chesney, Folkman, & Syme, 1993; Ben-Shlomo, White, & Marmot, 1996; Pritchett & Summers, 1996). Wilkinson's (1996, 1998) hypothesis is that in developed economies it is not individual income that is a main determining factor of health but rather the degree of income inequality within a society. He provided empirical support for this argument that inter-country variations in health are significantly linked to intra-country variations in income, but he did so by using data that had been aggregated to the country level. There are now literally hundreds of articles supporting, developing and criticising his work. (Major reviews are provided by Kawachi & Kennedy, 1999; Lynch et al., 2004; Macinko, Shi, Starfield, & Wulu, 2003; Wagstaff & van Doorslaer, 2000; Wilkinson & Pickett, 2006).

Wilkinson's aggregate analysis is potentially flawed for when there is a non-linear relationship between individual income and mortality a spurious aggregate relation will probably be found between, for example, mean mortality as a measure of health status, and the within-country inequality in income. Gravelle (1998a, 1998b), for example, argued conceptually that the inequality effect, the cornerstone of the Wilkinson hypothesis, is potentially an artefact of aggregating data from such a non-linear individual-level relation between income and health. However, Gravelle does not provide a way of transcending the ecological fallacy as for him the analysis is either individual or it is aggregate. Jen, Jones, and Johnston (2008) built on his insight by showing that

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individual data are necessary to distinguish between the absolute income and income inequality hypotheses using both simulated data and Wave Three World Values Survey data for twelve OECD countries. A multilevel approach was applied to analyse regression-like relationships simultaneously at the individual and place level with results sustaining Gravelle's case, emphasising the role of compositional, individual rather than contextual variables in accounting for inter-country variation in health status.

Three important issues stand out from a review of the large literature evaluating Wilkinson's arguments using individual data. Firstly, except for Elgar, Roberts, Parry-Langdon, and Boyce's (2005), Jen et al.'s (2008) and Mansyur, Amick, Harrist, and Franzini's, (2008) studies, none uses both multiple countries and individual-level health outcome data to evaluate Wilkinson's hypothesis at the scale he developed it; 'societies' in his income inequality hypothesis are defined operationally as countries. Secondly, although some studies have used panel data which might be ideal for finding the causal relationship over a period of time, this has only been reported at the region level only such as in England and Norway (Dahl, Elstad, Hofoss, & Martin-Mollard, 2006; Gravelle & Sutton, in press; Jones & Wildman, 2008). To date, no study examines the hypothesis over an extended period of time across a wide range of countries. Thirdly, although some studies provide support for the income inequality hypothesis the remainder suggest that income inequality is associated with poor health in the United States only.

A study is therefore needed whereby an appropriate measure of health is related both to income at the individual level and simultaneously to both average income and income inequality in the individuals' societies, thus combining both compositional and contextual data. Given Wilkinson's argument, it is crucial to examine a variety of countries with wide ranges of average income and income inequality. Moreover, as the Wilkinson argument implies that once countries reach a certain stage of development (which he operationalizes as GNP US$5000 per capita in 1990; also called Wilkinson's threshold) inequality takes over from per capita income as the primary determinant of health, it is important that the hypothesis is examined over time to take account of development trajectories.

There are two important objectives in this study. First, we analyse how people's health status is related to income at an individual level after taking account of individual social-demographic characteristics such as age, sex and marital status. This is to determine whether the first element of Gravelle's (1998a) critique of Wilkinson's hypothesis is supported over a period of time over a range of countries (not only those that are developed); in particular, we evaluate whether there is a non-linear relationship between income and health. Second, we then examine whether individual health status is related to a country's wealth and inequality once individual income is taken into account to see if, as Gravelle claims, the income inequality hypothesis is an artefact of aggregate data analysis.

For these tasks we use individual data for a range of countries derived from the World Values Survey (WVS). Such data sets invariably are cross-sectional rather than longitudinal and so do not contain information on mortality; researchers thus have to deploy alternative measures of health status, such as morbidity and – as in the current case – self-rated health. The data set has been assembled from 69 country cohorts with coverage across 4 waves: 1981, 1990, 1995–1997 and 1999–2001. The WVS not only includes a range of variables about individual health and feelings such as self-rated health and happiness, but also has information on personal social-demographic characteristics and individual income. Consequently, the main question to be addressed using the WVS data is whether income at the individual level and income inequality at the national level are both related to the self-rated health of individuals. In addition, we test whether the relationship

between income and self-rated health is stronger in more equal countries than in unequal ones. This is a cross-level interaction between individual and country characteristics.

The specific research goals are:

- To assess between-country and between-wave differences in self-rated health;
- To evaluate the effect of both social-demographic characteristics and social-economic indicators on self-rated health;
- To examine the form of the relationship between individual income and health to assess if it is linear;
- To examine the relationship between country average income and self-rated health for countries above and below US$5000 in GDP per capita in 1990 separately; this tests the so-called absolute income hypothesis, because Wilkinson argues in that in developed countries above the threshold there is no relation between health and GDP;
- To estimate the relationship between self-rated health and income inequality for countries above and below US$5000 in GDP per capita in 1990; this tests the so-called relative income hypothesis; Wilkinson argues in that in developed countries above the threshold there is strong relation between health and inequality with unequal countries having the worst health.
- To estimate whether the individual income effects on self-rated health are influenced by the income inequality of the countries;
- To consider the remaining between-country variation after taking account of individual income, country income, and income inequality and to evaluate the hypothesis that there are unhealthy communities (defined as countries) as well as unhealthy individuals.

Data

In these analyses, we are interested in the relationships between income and health status at both the aggregate and the individual scale. Regarding the former, we are testing hypotheses that health status varies according to both the overall average wealth of a country – which is measured in constant US$ – and the degree of income inequality there (measured as discussed below); are people healthier in richer and/or more equal countries? Regarding the latter, we are interested in whether there are variations within countries according to respondents' income; are, for example, affluent people (relative to the national norm) healthier than poorer people, and also healthier in richer and more equal countries?. For this, we take total income (all wage, salary, pension and other sources before tax and other deductions), with each national distribution categorised into quintiles (measured as discussed below). These individual income data allow us to test whether within any country self-reported health status varies by relative individual income, independent of differences between countries in average incomes and income inequality. Interactions among these three – as specified below – allow us to test whether a relationship between health and individual income differs according to both the average income in a respondent's country and the income inequality there.

The World Value Survey: individual-level data

The World Value Survey (WVS), which provides individual records, meets our data requirements. Wilkinson mainly used mortality statistics to evaluate his hypothesis. Indeed, mortality statistics are the most specific indicator for monitoring the health of a general population (Alderson, 1988), especially across nations (Shaw, Dorling, & Mitchell, 2002, p. 87). However, death records are