Commentary: The convoluted story of international studies of inequality and health

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Content and context

Rodgers’ paper on income inequality as a determinant of population health started, like so much else, from Preston’s paper on international patterns of income and health, published in the same journal four years previously. Preston showed that life expectancy increased with income across countries, but at a rate that became progressively lower as income increased—there are diminishing health returns to income—and noted that, if similar relationships between income and health held within countries, a country with a more equal distribution of income would have higher life expectancy, other things being equal. Rodgers tested Preston’s conjecture using a sample of 56 (unnamed) developed and developing countries, and found, indeed, that the Gini coefficient of income inequality had a significant negative effect in a (non-linear) relationship between average income and life expectancy (and infant mortality). In the life-expectancy regressions, the coefficient on the Gini coefficient varied with the specification, but was around −0.40. This estimate would imply a difference in life expectancy of 12 years between two countries with identical mean income but with Ginis of 0.6 and 0.3, which are about the extremes that we observe.

The theoretical framework for Rodgers’ analysis comes from the notion that there is a non-linear causal relationship running from income to health, and that the relationship is steeper at low income levels than at high income levels. According to this story, income inequality has no effect on health comes from the averaging of the population health. Indeed, and as is sometimes overlooked in the health inequalities literature, it is necessary that the Preston curves be non-linear if such redistribution is to improve average

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health. If life expectancy were linear in income, and there were no effect of income inequality on individual health, then no matter how extreme the inequality of income, and how wide the associated health inequalities, income redistribution will have no effect on population health. In looking for evidence of the effects of income inequality, Rodgers was tackling an extremely important policy issue.

The fame of Rodgers’ work has been much enhanced by the later literature, particularly the work of Wilkinson, who developed the notion that income inequality is not simply a summary of the balance of income between rich and poor, but is an individual health risk in its own right. Wilkinson, like Rodgers, found a relationship between life expectancy and income inequality among rich countries, both in levels and in differences over time, but assigned to income inequality a direct role in creating stress and harming individual health. Indeed, he saw the degree of income inequality as the crucial indicator of the extent to which the social and institutional environment is harmful to health. The international evidence was supported by a relationship between income inequality and age-adjusted mortality rates across states and cities in the US. Because the US possesses large-scale national survey data (from the National Longitudinal Mortality Study) that allow us to estimate the relationship between income and mortality at the individual level, it is possible to replace Rodgers’ hypothetical calculation by an actual one, and to work out exactly how much of the relationship between inequality and mortality at the state or city level is accounted for by the curvature in the individual relationship. The answer is not very much, so that something else must be going on, either because income inequality is a risk factor for individual health, as postulated by Wilkinson, or because some unaccounted third factor is at work.

Data problems: are the results reliable?

Discussions of data quality are often tedious and it is easy to pay them insufficient attention. Even so, international comparisons of income inequality are especially difficult. Nor are comparisons of life expectancy much easier. Many, perhaps most, developing countries lack a complete vital registration system, so that adult mortality rates are poorly measured. For infant and child mortality, and child health, by contrast, household surveys, especially the system of Demographic and Health Surveys, often provide adequate measures of mortality rates. Estimates of life expectancy must therefore rely on the extrapolation of mortality among children to calculate life expectancy, using the ‘model’ life tables drawn up by demographers. In consequence, the life expectancy estimates for most poor countries are effectively functions of measured child mortality (at least until the AIDS pandemic forced a change in practice). Such extrapolations would be adequate if current health transitions in poor countries recapitulate the earlier health transitions from which the model tables were constructed. However, this is unlikely because current health environments in poor countries are quite different from those that once prevailed in now rich countries. The transmission from rich to poor countries of antibiotics, vaccines, and smoking habits makes it improbable that current health transitions will look much like those of the past.

Measures of income inequality are derived from household surveys in which respondents are asked to provide information on their incomes from various sources over a specified ‘reference’ or ‘recall’ period. In some countries, the surveys collect data on total household expenditures rather than income; the distinction is important because expenditures are more equally distributed across households than are incomes. Most household surveys are not designed to measure inequality; instead, most were originally set up to measure means, often the mean expenditures on various items to be used in the construction of consumer price indexes. Surveys that accurately measure means will often do a poor job of measuring dispersion. For example, people tend to forget events as time passes, so that short reference periods are desirable for accurate measures of mean income or expenditure. But because many people will spend or receive nothing over, for example, the last few days, short reference periods will overstate true dispersion. Accurate measurement of income or expenditure over longer periods, such as a year, which is desirable for good measurement of living standards, requires multiple visits, and is likely to be prohibitively expensive. Other issues of survey design matter too. Asking a single question about income or expenditure typically produces lower responses than asking detailed questions about components. Questionnaires sometimes ask people to report their income in a series of ‘ranges’ or ‘intervals’ and the choice of these matters, especially if there is an open-ended interval at the top. Yet there is no international standardization of these issues; every country’s survey is different.

A dramatic example of what can go wrong is provided by recent measures of income inequality in the US where, between 1992 and 1993, there was a very large increase (of about 4 percentage points) in the Gini coefficient for family and household income. On this one jump hinges the question of whether there was any increase in income inequality in the US in the 1990s. (There is no similar question about the increase in the 1980s, though the questionable increase between 1992 and 1993 is as large as the total increase for that decade.) It is currently unknown (and probably unknowable) how much of the increase was real, and how much was due to changes in questionnaire design and the switch to computer-aided interviewing techniques. This non-comparability occurred within a single country with one of the world’s best statistical services and within an otherwise broadly comparable set of surveys. Non-comparability across countries is a great deal worse.

When Rodgers wrote, there were very few sources of international data on income inequality, and for many years, there were only two possibilities, Paukert’s International Labor Organization (ILO) data (which Rodgers used) and a World Bank compilation by Jain. These authors made no secret of the deficiencies of their data. In more recent years, matters have improved in two ways. The Luxembourg Income Study (LIS) provides access to unit record data for a number of years for a range of wealthy countries, so allowing researchers to construct measures of income inequality. Even though the surveys are far from fully comparable, they have been well-studied, and their strengths and weaknesses are well understood, so that the LIS now provides the best data on income inequality for the (25) countries that are included. The World Bank has also made available a much larger compilation of more than 2600 observations on Gini coefficients for more than 100 rich and poor countries. These data have been widely and mostly uncritically used, mostly by economists for other purposes, but also
to examine international patterns of health and inequality. However, recent careful reworking has shown that the World Bank data suffer from many of the problems of the earlier data compilations, even for the more developed Organization for Economic Co-operation and Development (OECD) countries. The non-comparability problems are almost certainly a good deal worse for developing countries.

The inadequacies of the inequality data are currently such as to prevent us from discovering the true cross-country relationship between health and income inequality. But we do know that the earlier results are not robust to use of the new data sets. The cross-country relationships for wealthy countries estimated by Rodgers and Wilkinson do not show up in the LIS data, nor can Rodgers original regressions be replicated on the international data from the World Bank. Although Wilkinson’s original negative relationship is present in the LIS data for the countries he used, the correlation disappears when a few more countries are added. The city and state relationship between inequality and mortality in the US also turns out to be a result of confounding and disappears once we control for racial composition. Across states in 1990, the relationship also disappears once we control for education. As of the time of writing, little appears to remain of the whole enterprise. For developing countries, this must be a tentative verdict that might well be reversed with better data on life expectancy and on income inequality. For the countries in the LIS, and for the states and cities of the US, the data are good enough and comparable enough (extremely good and fully comparable within the US) for us to be reasonably sure the relationship does not exist in any simple or clear form.

Was Rodgers wrong? Where to from here?

In spite of all the negative results, Rodgers’ (or rather Preston’s) theoretical case is strong, and I would be very surprised if at least some part of the story were not to be eventually validated. Beyond that, I would argue that research on the health effects of inequality have been too narrowly focused on income inequalities.

There is a great deal of evidence that infant mortality in poor countries is associated with low incomes, that poorer couples are more likely to have children that die, and that increasing their incomes (as well as their level of education, and their access to remedial health services) will save children’s lives. Redistribution of income in poor countries will therefore reduce child mortality among the poor by more than it raises it among the rich, so that even if we make an allowance for deadweight loss—that it costs something to transfer a rupee from a richer to a poorer person—greater income equality will improve the national rates of infant and child mortality. Which is, of course, precisely Preston’s and Rodgers’ argument. That the prediction is not transparently true I take to be a reflection of the poor quality of the data, especially on income inequality though, as we shall see below, there are other explanations. In the rich country data, using the LIS, some relationship between income inequality and child health often shows up. Similar arguments for adult mortality are harder to make, if only because we know so much less about the shape of the relationship between income and adult mortality in developing countries.

On the broader issues of the social determinants of individual health, and the role of inequality in particular, the search needs to look beyond income inequality. In the US, the relationship between income inequality and mortality is a mask for the effects of race; whites die younger in cities and states where there is a larger fraction of the population that is black. While we do not understand the mechanisms, the plausible candidates all involve some kind of inequality. The stress and lack of trust mechanisms that are frequently cited as a consequence of income inequality apply with as much plausibility to racial inequalities in the US. Empirical analysis across cities shows that trust is lower where income inequality is higher, and where the fraction of blacks in the population is high, but when both variables are added to the regression, only racial composition matters. The quality of health care provision is also conditioned by race, so that another possible mechanism is that whites are more likely to die of heart disease if they are unfortunate enough to experience an acute myocardial infarction near a relatively under-equipped hospital in a predominately black area.

In developing countries, other inequalities exert negative effects on health. The denial of education to girls relative to boys compromises women’s health and that of their children. Political inequalities, the de facto or de jure disenfranchizement of some groups relative to others, prevents collective action in the interests of the disenfranchized and may slow down or prevent the construction of public health projects, even when economic growth provides the resources to do so. Income inequality is important, but other inequalities may play a larger role in population health.

One final suggestion is that the literature pay more attention to mechanisms that depend, not exclusively on income causing health, but on a fuller recognition of the mutual dependency between health and the ability to earn an income, especially but not exclusively in developing countries. In most of the world, where there is no earnings insurance for people who cannot work, poor health, by depriving some people of the ability to work, is an important cause of income inequality. Better health, better insurance against disability, or a fuller system of income insurance against disability would limit the effects of poor health on income, and limit its consequences for income (and health) inequalities. In this case, ‘reverse’ causality, from health to income, generates a mechanism through which a policy that improves health will reduce inequalities in income.

References

Commentary: Income inequality and health: The end of the story?

John Lynch and George Davey Smith

Over the last 10 years, there are few issues that have captured the imagination of public health researchers and advocates, as has the question, whether income inequality drives population health. This was indeed a ‘big idea’ that attracted contributions from scholars motivated by the humanitarian potential of showing how health could be improved through greater equity and social justice. The question facing us now is whether this idea has had its 15 minutes of academic fame? Our own work prompted an editorial comment by Johan Mackenbach that ‘... evidence for a correlation between income inequality and health will produce an apparent

although these issues had been raised in Preston’s seminal paper 4 years earlier. Rodgers’ overall concern was to try to understand the determinants of mortality change, especially in regard to developing countries, and he presaged many of the issues which have since occupied researchers in this field. He recognized that specific factors like clean water, sanitation, food supply and health care—aspects of social infrastructure investment—were important but empirically difficult to disentangle because they tend to be highly collinear with each other and with income. That realization certainly remains salient today. He noted that disentangling their specific contributions was important for policy formulation, but not ‘critical for a description of mortality changes in the process of development’ (p. 343).

It is therefore timely, that the International Journal of Epidemiology has revisited Rodgers’ study as it was the first to directly examine links between income inequality and health,