Measuring health inequalities in Europe

Methodological issues in the analysis of survey data

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Summary: This article discusses methodological issues confronted in measuring health inequalities in Europe. It is presumed that the aim is to compute measures of inequality that are comparable across European countries and attention is restricted to the analysis of survey data. After identifying the main data sources, three issues are considered in relation to the analysis of these data: (i) improving the comparability of health indicators across individuals and countries; (ii) measurement of inequality suited to the properties of the health indicators; and (iii) extending health inequality analysis to a dynamic and life-cycle perspective. These issues are among the most recent methodological developments in the field.

Keywords: health inequalities, measurement, data, surveys, Europe

Data sources
The main advantage of survey data over administrative data and mortality records is that they allow health disparities to be examined in relation to a number of dimensions of socioeconomic status. Further, survey data contain indicators of general health and are not restricted to a specific health outcome, such as mortality. There are three main Europe-wide surveys suitable for analysis of health inequalities – the European Community Household Panel (ECHP), its successor the EU Survey of Income and Living Conditions (EU-SILC) and the Survey of Health, Ageing and Retirement in Europe (SHARE). Coverage of these three surveys is summarised in Table 1.

ECHP and SHARE are panels containing longitudinal information. EU-SILC is both an annual cross-section and a smaller rotating panel (usually over four years). The health module of EU-SILC constitutes the Minimum European Health Module (MEHM) of the European Health Survey System (EHSS). The latter is an initiative of the DG SANCO and Eurostat to improve the comparability of health survey data within the EU. In addition to the MEHM, it will conduct periodic European Special Health Interview Surveys and is compiling a database of Health Interview Surveys and Health Examination Surveys. These will be valuable resources for future analysis of health inequalities in Europe.

Table 1: Coverage of Europe-wide surveys containing health data

<table>
<thead>
<tr>
<th>Survey</th>
<th>Population</th>
<th>Countries</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHP</td>
<td>Non-institutionalised</td>
<td>Austria&lt;sup&gt;a&lt;/sup&gt;, Belgium, Denmark, France, Finland&lt;sup&gt;b&lt;/sup&gt;, Germany&lt;sup&gt;c&lt;/sup&gt;, Greece, Ireland, Italy, Luxembourg&lt;sup&gt;c&lt;/sup&gt;, the Netherlands, Portugal, Spain, Sweden&lt;sup&gt;d&lt;/sup&gt;, UK&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1994–2001</td>
</tr>
<tr>
<td>EU-SILC</td>
<td>Non-institutionalised</td>
<td>EU 27 plus Norway&lt;sup&gt;f&lt;/sup&gt;, Iceland&lt;sup&gt;g&lt;/sup&gt;, Switzerland&lt;sup&gt;h&lt;/sup&gt;, Turkey&lt;sup&gt;i&lt;/sup&gt;</td>
<td>2004–</td>
</tr>
<tr>
<td>SHARE</td>
<td>50+ and partners non-institutionalised in wave 1</td>
<td>Austria, Belgium, Denmark, France, Germany, Greece, Ireland&lt;sup&gt;b&lt;/sup&gt;, Israel, Italy, the Netherlands, Spain, Sweden, Switzerland, Czech Republic&lt;sup&gt;j&lt;/sup&gt; and Poland&lt;sup&gt;&amp;&lt;/sup&gt;</td>
<td>2004, 2006–07, 2008–09</td>
</tr>
</tbody>
</table>

Notes: a 1995–2001; b 1996–2001; c Data derived from national surveys; d Cross-sectional data from national survey; e joined in 2005; f joined in 2006; g from wave 2 (2006–07); h wave 1 in 2005/6.

Table 2: Health indicators available from Europe-wide surveys

<table>
<thead>
<tr>
<th>Health indicator</th>
<th>ECHP</th>
<th>EU-SILC</th>
<th>SHARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most subjective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-assessed health (very good,…very bad)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chronic illness/condition</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Limited activities</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Depression scale</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Activities of Daily Living</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Diagnosed conditions</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Body Mass Index (reported)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical measurements (grip strength, walking speed)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most objective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1998–2001 only and not for France, Germany, Luxembourg, The Netherlands and the UK.

Measurement of health

The health indicators available from the three datasets are listed in Table 2. SHARE is by far the richest survey with respect to information on health but it covers only the population aged 50+ and has smaller samples from each country. The health indicators are ordered in the table appropriately from the most to the least subjective. The three most subjective variables that comprise the MEHIM are available in all three datasets, a reflection of the ease of fielding them in large scale surveys. The advantage of these subjective indicators is that they provide a global assessment of health in general that is informative for all populations. The obvious disadvantage is that subjectivity limits interpersonal, and possibly inter-country, comparability. While more objective indicators are more readily comparable, their relevance is restricted to certain health conditions and populations. For the foreseeable future, it is likely that survey analyses of health inequalities in the population will continue to rely heavily on subjective measures of general health.

Whether the subjective nature of the health indicators biases the measurement of health inequality depends on whether the reporting of health differs systematically by socioeconomic status. For example, if there are peer effects in health reporting, then one would expect health inequalities to be underestimated. Higher socioeconomic groups may have higher expectations of what constitutes good health and so, for a given condition, rate their health more severely than lower socioeconomic groups. One method that has been used to purge subjective measures of reporting differences that may bias the measurement of health inequality is to use only the variation in these measures that is predicted from more objective indicators. But this effectively throws away any additional information contained in the subjective measures. This is unfortunate since self-assessed health does appear to contain additional information on health. For example, it has repeatedly been proven to predict mortality even conditional on physiological measures of health.

A promising alternative is to anchor an individual’s assessment of her own health on her rating of a vignette description of a health state that is fixed for all respondents. Since the vignette is fixed, variation in its rating identifies reporting differences and these can then be purged from the individual’s subjective assessment of her own health. The vignettes instrument is included in SHARE. Using these data, Bagu d’Uva et al find that the reporting of health differs significantly by education. Higher educated older Europeans are generally more likely to rate a given health state negatively. Consequently, correcting for these differences generally increases health inequalities, and often makes them apparent where they were previously obscured by differences in reporting styles. This suggests that measured health inequalities by education are often underestimated, and may even go undetected, if no account is taken of reporting differences.

Measurement of inequality

The term ‘health inequality’ may refer to the total variation in health in a population, or to that part of the variation that is systematically related to socioeconomic status. Interest generally centres on the latter, which is widely considered to reflect social injustice. Measurement of socioeconomic-related health inequality in public health has relied mostly on range measures, such as an odds ratio or relative risk ratio. But health economists have proposed the concentration index as an alternative measure, pointing out that this simultaneously captures the socioeconomic dimension of inequality, reflects the experiences of the entire population and is sensitive to changes in the distribution of the population across socioeconomic groups.

The concentration index is derived from the concentration curve, two hypothetical examples of which are presented in Figure 1. Both curves plot the cumulative proportion of health against the cumulative proportion of the population ranked by socioeconomic status, starting with the lowest socioeconomic position. Curve 1 shows inequality to the advantage of the better-off, while curve 2 shows inequality that favours the worse-off. Note that the concentration curve is sensitive only to relative inequality; equi-proportionate changes in health leave socioeconomic inequality unchanged. The concentration index equals twice the area between the concentration curve and the diagonal. The bounds of this measure are -1 and 1 with a negative (positive) value representing inequality favouring the worse-off (better-off).

Applying the concentration index to the 1996 wave of the ECHP, van Doorslaer and Koolman find significant inequalities in self-assessed health favouring the rich in all 13 EU countries analysed, with inequality being particularly marked in Portugal and (to a lesser extent) in the UK and in Denmark. Inequality is estimated to be much lower in the Netherlands and Germany, and also in Italy, Belgium, Spain Austria and Ireland. There is a positive correlation with income inequality but the relationship is much weaker than was found in an earlier analysis.

The concentration index is often used to measure income-related health inequality but since it is derived from a ranking of the population by socioeconomic status (SES) any ordinal measure of the latter is sufficient. It could be education level, or even an occupation-based measure provided the groups can be ranked from low to high.
The measurement properties required of the health variable to which the concentration index is applied have only recently been identified. Since it is a measure of relative inequality, the index is only strictly applicable to variables measured on a ratio scale since the scale of any other variable is identified only up to a positive linear transformation to which the concentration index is not invariant. So, while the index can be applied to life expectancy or BMI, it is not strictly suitable for any of the other variables listed in Table 2. For example, SAH has sometimes been transformed onto a cardinal scale (of utility) before applying the concentration index. But use of an alternative (arbitrary) location of the scale would lead to a different index value.

An additional problem is that health variables are often bounded to lie in a certain range. This is true of binary indicators of health outcomes, and also of life expectancy. Then, one could examine either inequality in health (for example, absence of a condition), or in ill-health (for example, presence of a condition), and one would hope that the measure of inequality would be invariant to such a choice. But this is not true of the concentration index. Fortunately, a corrected concentration index that removes these deficiencies has recently been proposed. This amounts to transforming the concentration index by the mean and the bounds of the health variable. The fact that the transformation depends on the mean derives from the fact that without the correction the concentration index will depend on the mean, and this can confound comparisons of health inequality across time or countries. However, this is not always the case. For example, the findings of the examination of income-related inequality in SAH in 13 EU countries referred to above are robust to the correction.

Health inequality over the life cycle and time
The measures of health inequality referred to above are static, reflecting the correlation between health and SES at a given age. This provides a very incomplete impression of the extent of health disparities over the life course. It does not tell us whether health declines more rapidly for some groups than others, and if so, by how much. The increasing availability of panel and repeated cross-section data makes it possible to take a life-cycle perspective to the analysis of health inequalities with potentially high pay-offs for understanding of the nature and causes of those inequalities.

Van Doorslaer et al. show that in the Netherlands the income gradient in health widens until middle age and narrows thereafter (see Figure 2). This pattern is very similar that found in the US. The consistency of the evidence suggests a common mechanism, and there is at least circumstantial support for one operating through work status. In Figure 3 it is apparent that health differences by work status at first rise with age, perhaps as ill-health becomes more of an impediment to work, and then fall as voluntary retirement becomes the dominant reason for stopping work. Restricting attention to employed individuals, there is next to no difference by income in the health-age profile (Figure 4), which is supportive of the hypothesis that the impact of health on work is driving the changing income gradient in health.
by age. For non-workers (Figure 5), the widening and then narrowing gap with age persists, which is consistent with some impact of income (or a correlated socioeconomic determinant) on health for this group. But it could also be that low income non-workers are more likely to be inactive for health reasons in middle age.

With longitudinal data it is possible to examine not only how the socioeconomic gradient in health varies with age, but also how health and SES co-vary over time. Jones and López-Nicolás18 show that inequalities in health assessed against long-run indicators of SES will differ from those measured against short-run indicators if individuals who are upwardly mobile in socioeconomic status differ in their initial health from those who are downwardly mobile. Health inequality measured on the basis of a long-run measure of SES will be larger (smaller) than health inequality in the short-run if upwardly (downwardly) mobile individuals are healthier. This approach has been used to compare long-run health inequality in Europe using the ECHP.19 Another analysis questions the relevance of the index of ‘health-related income mobility’ to the formation of health policy and proposes an alternative index of ‘income-related health mobility’ that measures the extent to which changes in health over time are related to initial levels of income.20

Conclusion
Methodological research on health inequalities is rising to the opportunities and challenges created by increasingly rich survey datasets available at the European level. Instruments are being developed to improve the comparability of health indicators. Inequality measures are being refined to make them better suited to the properties of the health indicators. Analyses are being extended and indices introduced to examine the dynamics of health inequalities – how they change over the life cycle and how health and socioeconomic status move together over time.

References


### CEE countries

**Data availability and methodological issues**

**Martin Bobak**

**Summary:** The societal transformation in Central and Eastern Europe (CEE) and former Soviet Union (FSU) was not carried out uniformly across the region. Some countries fared better, some were less successful. However, if there is one experience common to all former communist countries, it is the emergence, or increase, in income inequalities and, subsequently, in social inequalities in health after 1989. The public health importance of this phenomenon is enormous, but the investigation of social inequalities in health in CEE/FSU has been often slow and unsystematic. The reasons for the persisting incompleteness of our understanding of health inequalities in CEE/FSU are complex, as described in this article.

**Keywords:** Former Soviet Union, Central and Eastern Europe, health inequalities, data

The societal transformation in Central and Eastern Europe (CEE) and former Soviet Union (FSU) was not carried out uniformly across the region. Some countries fared better, some were less successful. However, if there is one experience common to all former communist countries, it is the emergence, or increase, in income inequalities and, subsequently, in social inequalities in health after 1989. The increase in educational differentials in mortality was first reported from Russia by Vladimir Shkolnikov, who used unlinked data from a mini-census and vital registration. As more data became available, a similar pattern emerged from all countries where such studies were conducted, and affected both fatal and non-fatal outcomes, and appeared in both individual-based and ecological data.

While the increase in social inequalities in health after 1989 is undisputed, there are uncertainties about the speed and magnitude of such changes. The public health importance of this phenomenon is enormous, but the investigation of social inequalities in health in CEE/FSU has been often slow and unsystematic. The reasons for the persisting incompleteness of our understanding of health inequalities in CEE/FSU are complex, with ten key factors described in more detail below.

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