

Development of health inequalities indicators for the Eurothine project

Anton Kunst
Erasmus MC Rotterdam
2008

1. Background and objective

The Eurothine project has made a main effort in furthering the description of health inequalities within the European Union. Teams from several countries have joined their efforts and prepared a large number of separate studies on inequalities in different health indicators, including for example cancer mortality, smoking cessation and the use of preventive services.

This common effort was guided by a common understanding of the concept of health inequalities, and of the best ways to measure these inequalities with the available data. At the start of the project, the principles underlying health inequalities indicators have been briefly reviewed by the Eurothine team, taking into account the experiences in previous projects by the same networks¹. Our general consensus on the concepts and measurement of health inequalities was reinforced during the Eurothine project. At the same time, new experiences in this project, e.g. related to the application to new health indicators such as health care utilization, stimulated us to further refine the measurement of health inequalities in European countries.

The purpose of this document is to define the generally agreed principles underlying the measurement of health inequalities, taking into account the new experiences obtained in the Eurothine project. We will focus especially on the definition of “health inequality indicators” as they have been applied, although not in a very explicit way, in the Eurothine project. The section below will start with a definition and description of the concepts of “health inequalities” and “health inequalities indicators”, while later sections will focus on measurement issues.

2. Definition and general properties of health inequalities indicators

“Health inequalities indicators” are measures of “health inequalities”, with the latter the being defined as systematical variations between socioeconomic groups in the occurrence of a health indicator.

¹ Kunst AE, Bos V, Mackenbach JP. Measuring socio-economic inequalities in health in the European Union: guidelines and illustrations A report for the Health Measuring Program of the European Commission. Rotterdam: Erasmus University, 2000.

The health indicator may be any indicator that is relevant for research and measuring in public health, and may include measures of health status, health care utilization and health determinants. Health inequalities indicators should not be *a priori* restricted to some specific health indicators (e.g. life expectancy) but they should be used to identify inequalities in all potentially relevant public health indicators.

Socioeconomic groups are defined in relationship to indicators such as educational level, occupational class and income level. These are complementary measures that together determine people's "socioeconomic status (SES)", i.e. their hierarchical place in the social stratification systems or the "social hierarchy". Other measures, such as race, immigrant status or place or residence, are not socioeconomic measures per se but might be used as proxy measures when the core measures are not available.

Health inequalities indicators do not merely measure the occurrence of health indicator in individual socioeconomic groups, but in addition quantify the degree of variation between socioeconomic groups. Even though the health of lower socioeconomic groups is important in its own right, health inequalities indicators are primarily concerned with the "gap" or "difference" between these groups and groups higher up in the social hierarchy.

3. The measurement of health inequalities indicators

The experience within the Eurothine project confirmed that the measurement of health inequalities indicators is highly variable. The choice of the indicators used in practice largely depends on health outcomes of interest, the data sources that can be accessed, and the socioeconomic information that is available. Our experience in Eurothine stresses that health inequalities indicators take very different shapes depending on whether life expectancy, hypertension prevalence, cumulative smoking cessation rates, or physician visits are the outcome indicators of interest.

Therefore, the measurement of health inequalities indicators requires some flexibility. This is best achieved by defining core guidelines that can be modified in specific situations. Below, we define the general guidelines that have guided the research in the Eurothine project, and that have been applied in a flexible way within different sub-projects.

3.1. Selection of sources of data.

When nationally representative, individual-level data are available on mortality according to socio-economic indicators, these data should be used to monitor socio-economic inequalities in health in general. Mortality registries are an

important source of data in most EU member states. Especially when a link can be made between individual death certificates and records of the population censuses, these registries have few or no serious drawbacks. Main advantages are (a) the possibility to distinguish causes of death, (b) the availability of data for most age groups, (c) the coverage of long time periods and (d) the 'hard' nature of this health indicator. Unlike many other data sources, mortality registries cannot be biased by, for example, factors affecting self reporting of health (a problem to health surveys) or factors affecting health care utilization (a problem to facility-based registries).

An equally important source of data are health interview, multi-purpose and similar surveys at national or international levels. When nationally representative data are available from these surveys, they should be used to monitor socio-economic inequalities in self-reported morbidity, health-related behaviour and health care utilisation. Health interview and similar surveys are a rich and up-to-date source of information on socio-economic inequalities in these outcome measures. Nationally representative surveys are held at regular intervals in nearly every member state of the EU.

When nationally representative from mortality registries or health surveys are not available, regional or local studies may be used under the condition that the restriction to specific regions or areas is recognised explicitly. This possibility is illustrated in the mortality analysis, where data on socio-economic inequalities in mortality were not available for Italy at large, but where data were obtained from the Turin longitudinal study. Also, the data on Spain were restricted to the three cities or regions because Spain as a whole lacked accurate data on mortality by educational level or occupational class in about 2000.

Other data sources are not recommended for measuring inequalities in health in general terms. This also applies to 'ecological' studies in which mortality or morbidity indicators can be linked to socio-economic indicators at the level of small areas. One problem with these analyses is that, due to problems known under the name of "ecological fallacy", results from ecological analyses cannot be used to estimate the magnitude of socio-economic differences in health at the individual level. Another problem with ecological analyses is their poor international comparability. Ecological estimates of health inequalities are strongly sensitive to specific local circumstances. It would require a considerable effort to make these ecological estimates comparable between countries.

3.2. Measurement of socio-economic status

In general, at least two of the three core indicators of socio-economic status (education, occupation and income) should be measured in relation to an health indicator. Several socio-economic variables determine the place of persons in the

social hierarchy. The classic three core variables are educational level, occupational class and income level. The different indicators emphasize the different dimensions of SES, i.e. the different types of resources that are involved. Educational level relates to differences between people in terms of access to information and the proficiency in benefiting from new knowledge, whereas income relates to differences in access to scarce material goods. Occupational class includes both these aspects and adds to them benefits accruing from the exercise of specific jobs, such as prestige, privileges and power.

In Eurothine, we recognised the complementary nature of these three indicators. Generally speaking, no indicator is theoretically superior to any other. In specific situations, however, specific socio-economic indicators may however be preferred over another. For example, income may be preferred as socio-economic indicator when the aim of analysis is to assess the potential effect of changes in tax policies.

Important is the gradient nature of SES. Differences in health related to SES are found at all levels of the society, and not only between the most deprived and the rest of the population. It is therefore important to look at inequalities in health across the entire social hierarchy. This gradient approach, which is central to the most of the Eurothine projects, is complementary to an emphasis on specific disadvantaged groups.

Educational level should be measured by means of a hierarchical classification of the population according to their completed educational level. Part-time education and vocational training are thereby taken into account. A distinction is made between at least four categories similar to elementary, lower secondary, upper secondary, and tertiary. This recommendation is taking into account two conflicting requirements. On the one hand, the groups should be small enough to give a good impression of the size of inequalities. On the other hand, they should be large enough to have a sufficient number of cases per socio-economic group. In practice, the recommended 4-level scheme is found to be a good compromise.

Income level should be measured by means of a classification of the population according to household equivalent income. This implies that, where possible, (a) the income of all household members are summed, (b) their net (instead of gross) income is measured and (c) an adjustment is made for household size. The population is classified into groups of about equal population size, preferably income quintiles. The quintile approach implies ordering the respondents according to the relative position at the income hierarchy, i.e. in terms of the percentage of all people who have a higher income. This 'relative' approach is recommended as it greatly facilitates comparisons both over time and across countries, since all classifications are (nearly) identical in these relative terms.

Information on occupations is used to group subjects into 'occupational classes'. In this approach, distinctions are made between people who have structurally different positions in the labour market and who, as a result, differ in terms of income, privileges, and life styles. The occupational class should be determined on the basis of the individual's current or last occupation. However, if many persons are not economically active, a classification on the basis of the occupation of the 'head of household' may be considered. The resulting groups of people are usually referred to as 'occupational classes' or 'social classes'. A distinction should at least be made between non-manual classes, manual classes, farmers and other self employed. If possible, the new European Socioeconomic Classification is used, which we exemplified in some of the subprojects of Eurothine.

3.3. The measurement of health indicators by socio-economic variables

Before health inequalities are summarized into one single measures that approximate the desired "health inequalities indicators", tabulations should be made of the occurrence of health indicators according to socioeconomic groups. In these tabulations, people are divided into groups (or strata or classes) according to a socio-economic indicator. Data are presented on the population size of these groups, and thus on inequalities in education, income or any other socio-economic indicator. Further, data are presented on the occurrence of the health problem per socio-economic group.

For each socio-economic group, information is given on the absolute occurrence of the health problem in each country. There are basically two possibilities to give information on health indicators per socio-economic group: (a) to present their occurrence in terms of absolute rates or probabilities or (b) to present their occurrence relative to that in other socio-economic groups. Of course, data can be presented in both respects. However, in practice this would often produce an overwhelming amount of data, and therefore it would be highly convenient to present only one type of measure. As a standard, in Eurothine, we presented absolute occurrence rates. The advantage is that these basic figures allow not only for the comparison between socio-economic groups (per country), but also for the comparison between countries (per socio-economic group).

Information is also given on the distribution of the population per socio-economic group, and on country variations in population distributions. Information on population distributions had to be presented because estimates of health indicators per socio-economic group cannot be interpreted properly without information on the size of these groups. In addition, this information gives an impression of the size of inequalities in socio-economic terms. For example, when income was used as the socio-economic indicator, information on income

distributions helped to determine the size of income inequalities and variations between countries in these income inequalities.

When the purpose of the analysis is to quantify the magnitude of health inequalities, this magnitude should be assessed by means of summary indices. These summary indices express the magnitude of the health differences between advantaged and disadvantaged sections of the population. One of the main advantages of such a summary index is that it facilitates comparisons over time or between countries.

A non-exhaustive overview of possible summary indices is given in the table below. In this table, twelve different measures are distinguished which are distinct from each other in one or more conceptual orientations. In order to be able to choose the most appropriate measures, there are several conceptual decisions to be made. These decisions are listed below.

- 1) Whether **or** not take into account population distributions (i.e. inequalities in socio-economic indicators) when measuring the magnitude of health inequalities
 - a) If population distributions are *not* taken into account, compare only two socio-economic groups (simple measures) **or** make comparisons across all groups (sophisticated measures).
 - i) If comparisons are made between only two groups, chose extreme groups **or** broad groups.
 - ii) If comparisons are made across all groups, define each group's position in terms of 'absolute' socio-economic resources (e.g. income less than 10,000 euros) **or** in terms of 'relative' rank in the total population (e.g. the lowest income quintile).
 - b) If population distributions are taken into account, decide what to consider as the reference situation of 'no inequalities': all people have the same *high* socio-economic status (the PAR perspective) **or** all people have the same *average* status (the ID perspective).
- 2) Express the occurrence of the health indicator in 'absolute' terms (e.g. rates) **or** in 'relative' terms (e.g. ratios that compare each group to a reference group).

Table. Overview of summary indices

		Summary index (with example of an interpretation)	
		On the 'absolute' occurrence of health problems	On the 'relative' occurrence of health problems
Indices that compare two contrasting groups	Compare extreme groups	Rate Difference e.g. the absolute difference in mortality between professionals unskilled manual workers	Rate Ratio idem, but the <i>proportional</i> mortality difference
	Compare broad groups	Rate Difference e.g. the absolute difference in mortality between non-manual and manual classes	Rate Ratio idem, but the <i>proportional</i> mortality difference
Regression-based indices that take into account all groups separately	Based on 'absolute' SES	'Absolute effect index' e.g. the absolute increase in health associated with an income increase of 1000 Euro	'Relative effect index' idem, but the <i>proportional</i> increase in health
	Based on 'relative' SES	'Slope Index of Inequality' (SII) e.g. the health difference between the top and bottom of the income hierarchy	'Relative Index of Inequality' (RII) idem, but the <i>proportional</i> health difference
"Total impact" indices that explicitly take into account population distributions	The PAR perspective (equality by levelling up)	Population Attributable Risk (PAR) e.g. the total number of cases that would be avoided in the hypothetical situation that all people would have (the rate of those with) tertiary education	PAR (%) idem, but as a <i>proportion</i> of all cases (of death, disease, etc) in the total population
	The ID perspective (equality by redistribution)	Index of Dissimilarity (ID) e.g. the total number of cases to be redistributed between groups in order to obtain the same average rate for all groups	ID (%) idem, but as a <i>proportion</i> of all cases (of death, disease, etc) in the total population

The general approach in most of the Eurothine project has been as follows. In most analyses, the magnitude of health differences was summarised by rate ratios that compare two contrasting groups. In additional analyses, where feasible, these rate ratios were complemented by rate differences (i.e. a measure on absolute instead of relative differences). Finally, other summary indices were applied as a complement (instead of substitute) to these rate ratios and rate differences. For example, more sophisticated measures like the Relative Index of Inequality were applied to increase international comparability. Moreover, when the distribution of the population over socio-economic groups substantially differed between countries, measures of 'total impact' were sometimes applied to check whether taking these variations into account would lead to other conclusions.

Finally, in the Eurothine project, summary indices were used to complement instead of to replace the basic description of health inequalities. The estimates from summary measures were usually checked against the basic data on occurrence of health indicators by socioeconomic groups. We thus assessed whether the summary index, being the most concise "health inequalities indicator", adequately represented the observed variation between socio-economic groups in health indicators. Similarly, variations between countries (or changes over time) that were identified by using summary indices were checked against the patterns that are visible in the basic tabulations.

This report was produced by a contractor for Health & Consumer Protection Directorate General and represents the views of the contractor or author. These views have not been adopted or in any way approved by the Commission and do not necessarily represent the view of the Commission or the Directorate General for Health and Consumer Protection. The European Commission does not guarantee the accuracy of the data included in this study, nor does it accept responsibility for any use made thereof.