Int J Public Health (2012) 57:855–858
DOI 10.1007/s00038-012-0386-5

HINTS & KINKS

Inequalities of health indicators for policy makers: six hints

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Received: 9 April 2012 / Accepted: 11 June 2012 / Published online: 30 June 2012

Monitoring health inequalities has now become an increasingly important challenge and priority for public health surveillance. When policy makers decide to monitor inequalities in health, they will have to select one or more measures of inequality, hopefully based on scientific advice or reviews (Wagstaff et al. 1991; Mackenbach and Kunst 1997; Regidor 2004a, b; Asada 2005; Harper et al. 2008). Because different indicators can have different interpretations and their computation can result in different conclusions (Harper et al. 2010), policy makers should be aware of the consequences of a specific choice in favor of one indicator over another in order to provide an optimal application of the results toward policy action (Petticrew et al. 2004; Whitehead et al. 2004). This Hints and Kinks paper suggests a minimal background for policy makers needed when selecting measures of health inequality and discussing with their equity analysts. We identify six concerns related to the choice of measures of health inequality (Harper and Lynch 2005; Speybroeck et al. 2012):

1. *The choice between absolute versus relative measures*

Inequality is by definition a relative (i.e., relational) concept. Measures of health inequality, however, may be ratio based or difference based. In ratio-based analyses, one divides measures of health in one group by the level of health in a reference group to estimate the magnitude of inequality. In difference-based approaches, absolute measures of inequality are based on subtraction, not division, to estimate the magnitude of inequality. The consequences of choosing one measure over another can be illustrated by examples where inequalities have been declining on the absolute scale, but widening on the relative scale (Ramsay et al. 2008; Regidor et al. 2009). Using different indicators in isolation can thus result in different interpretations of inequality (King et al. 2010). Unlike a measure like the odds ratio, the relative risk related to a health problem is not the reciprocal of the relative risk related to not having the health problem. This is appreciated when studying a rare disease, with respective mortalities of 1 and 2 % in the rich and the poor, giving a relative risk of 2. The relative risk of surviving approaches 1. A relative indicator becomes large when the denominator (often related to the average level) becomes small, e.g., the ratio between 1 and 2 % is large but between 49 and 50 % is small despite the same absolute difference. This also has implications for ranking countries (e.g., Vågerö and Erikson 1997) or health outcomes (Keppel 2007) using only a single measure of inequality. Figure 1 is based on data on the levels of malnutrition in India (2006) and Namibia (2006). The proportions of malnutrition in the lowest and highest income quintiles in India and Namibia were 46, 21 % (India) and 11, 3 % (Namibia). The Figure shows how the inequities in malnutrition between the poorest and the

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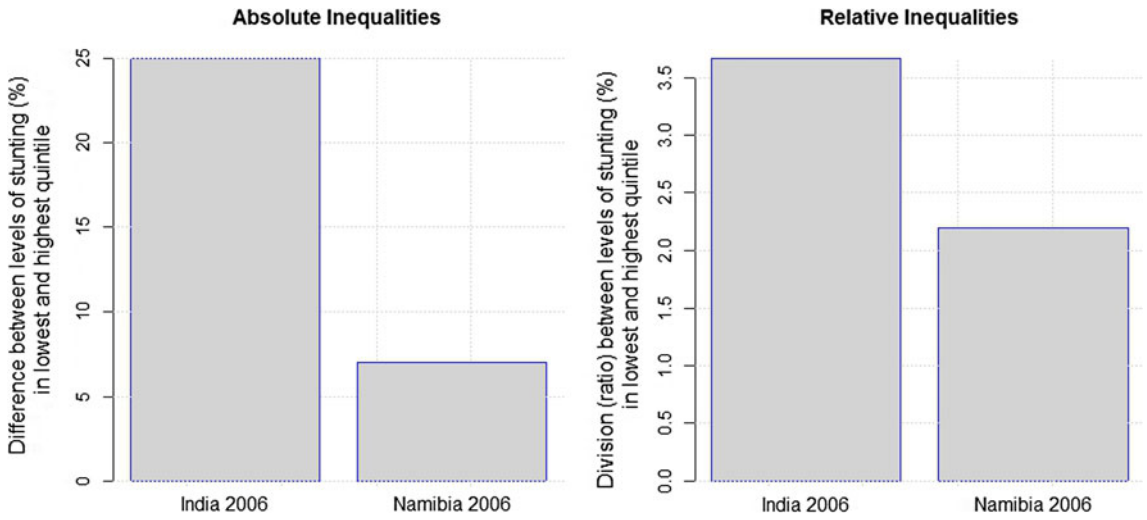

Fig. 1 Absolute (difference between levels in lowest and highest quintile) and relative inequalities (division between levels in lowest and highest income quintile) in malnutrition (stunting) in India (2006) and Namibia (2006). Source: Demographic and Health Surveys

richest quintile are greater in Namibia than in India when using the relative inequality ($11/3 = 3.7$ vs. $46/21 = 2.2$), but greater in India when using an absolute measure ($11 - 3 = 8$ vs. $46 - 21 = 25$). Policy makers may therefore want to consider both absolute and relative measures of inequality to assess health inequalities. Globally, this is also the approach considered in the World Health Statistics reports published annually by the World Health Organization (WHO World Health Statistics 2011).

2. *The reference group or norm against which differences are measured* Inequality may be measured against a benchmark (i.e., an "optimal" level of health), but many summary measures (e.g., concentration index, slope index of inequality) use the population average. For example, scientists may be interested in using the concentration index because it allows an advanced investigative analysis (Konings et al. 2010; Speybroeck et al. 2010), but policy makers should be aware that achieving a concentration index of 0 (complete equality) implies redistributing health from individuals in the richest half to individuals in the poorest half of the population (Koolman and Van Doorslaer 2004). The use of the population average as the reference point is largely a consequence of utilizing measures of economic inequality for measuring health inequality, but it is hard to imagine mechanisms through which a "healthy" person can directly transfer her health to someone who is less healthy, much less a willingness to sacrifice the health of richer populations for the sake of equity. This is why most favor a policy of "leveling up", rather than attaining equality in the strict sense.

3. *The level of aggregation when the unit of observation is the geographical area* Inequality measures change if larger or smaller groupings of a population are chosen—inequalities are in general more accentuated when described across smaller geographical divisions (Murray et al. 2001). We illustrate the problem with an example (Speybroeck et al. 2012). In Fig. 2a, a geographical distribution is shown in an area with 16 cells—here called districts—assuming equal population in each. The mean value is $\mu = 7.5$, and the relative inequality of the best to the worst off area is $12/2 = 6$. In Fig. 2b, these data are aggregated into larger units, districts, by merging neighboring cells. The value in each cell is the average health level derived by aggregating the data in Fig. 2a. This averaging leads to the same mean value, as well as to a smaller relative inequality for the aggregated rates. Repeating this operation results in no inequality at all (Fig. 2c). This means that the value of a given inequality measure can change for the same population, depending upon whether it is measured by comparing people grouped at, say, the state or province level, or at some more local level of government. Therefore, a comparison of geographical inequalities between countries may not be possible, but measuring health disparities across smaller geographic and administrative units within a country can be more informative (de Savigny et al. 2005). This "aggregation" issue creates a problem, irrespective of the health inequality indicator used, but is not always articulated as such.

4. *The gradient* Some inequality measures include information from all social groups, i.e., a gradient from poor to rich, but many studies compare only the extreme groups (e.g., the lowest vs. highest income group). The latter measures are simpler to interpret, but ignore the health status of other groups and may only reflect the

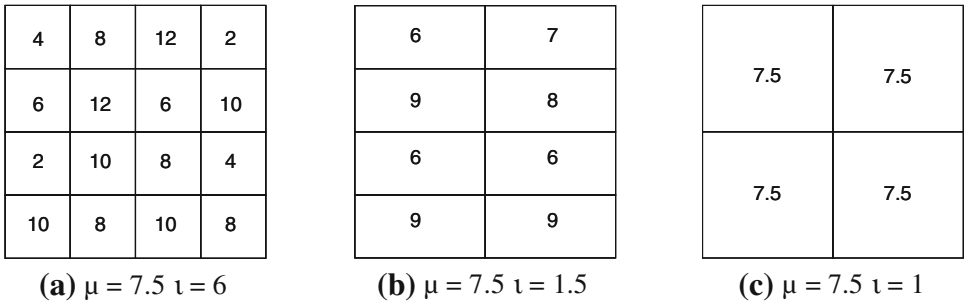

Fig. 2 Effects of areal aggregation on the average health level (μ) and health inequality (ι = highest health level/lowest health level)

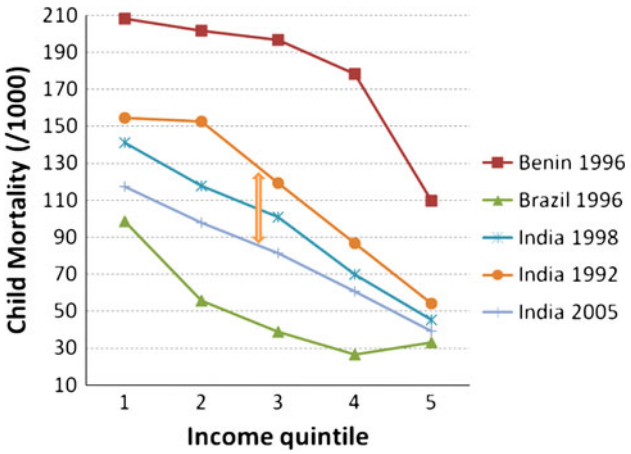

Fig. 3 Under-5 mortality rates across income quintiles for Benin (1992), India (1992, 1998, 2005) and Brazil (1996). Source: Demographic and Health Surveys

disparity between two very small population groups. There are good reasons for focusing attention on specific population groups, but it is also of interest to quantify the amount of inequality across an entire social group category such as ethnicity or geography. Graphs can be useful for providing an intuitive, yet overall assessment of the inequalities that summary measures may mask. For example, Fig. 3 shows levels of under-5 mortality for different socioeconomic status quintiles in three different countries in the mid-1990s. In Benin, socioeconomic inequality in child mortality could be characterized as "mass health deprivation"—most of the population has equivalent but high mortality, while a small privileged class is much better off. A second pattern (India in 1998), could be described as "queuing"—overall mortality is lower than in the previous pattern, but richer population groups are better off than the poor. A third potential pattern (Brazil 1996) is one of "exclusion" where mortality is lower overall, but higher especially in the poorest quintile. In India, the pattern was closer to mass deprivation in 1992 and gradually moved away from queuing in 2005. From a policy point of view, such graphs illustrate the potential for different policy responses to health inequalities. Countries with an exclusion pattern may consider targeting policies at the poor. In contrast, in many poor countries with mass deprivation, focusing on the general population may be more effective in a first stage, even if it temporarily widens inequalities (Mechanic 2002).

5. *The size of population groups across which inequality is measured* Inequality measures are also sensitive to whether individuals or social groups are weighted equally when measuring inequality, as can be seen in debates about whether global economic inequality is rising or falling (Ravallion 2004). Similar arguments may apply when measuring health inequalities across social groups that vary widely in population size. Weighting social groups equally implies weighting individuals unequally, whereas we typically weight all individuals equally when measuring average health. For example, US geographic inequalities in life expectancy may be increasing when counties are weighted equally (Ezzati et al. 2008), but decreasing when weighing counties by population size (Harper et al. 2010). Similar issues may arise when measuring the magnitude of inequality across ethnic or socioeconomic groups that vary in population size. This distinction may matter for assessing whether or not policies aimed at reducing social inequalities in health are successful.

6. *Transparency/interpretability* More sophisticated summary measures such as the concentration index may make communicating health inequalities to the community and policy makers potentially more difficult. If a simple indicator is more easily integrated in policy decisions, this may be preferable from a policy perspective. However, choosing simpler measures may be more difficult to justify if interpretations are not robust to this choice.

In conclusion, policy makers and scientists alike need to consider certain potential pitfalls when selecting measures of health inequality. Monitoring levels of social inequality in health is crucial for understanding the impact of current and future policy decisions aimed at improving health equity. Policy makers should be aware of the consequences of the choice of certain measures, so that the evidence base to test what works in reducing health inequalities is used in such a way that it reflects the political goal.

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