

## THEORY AND METHODS

## A framework for measuring health inequity

Yukiko Asada

*J Epidemiol Community Health* 2005;59:700–705. doi: 10.1136/jech.2004.031054

**Background:** Health inequality has long attracted keen attention in the research and policy arena. While there may be various motivations to study health inequality, what distinguishes it as a topic is moral concern. Despite the importance of this moral interest, a theoretical and analytical framework for measuring health inequality acknowledging moral concerns remains to be established.

**Study objective:** To propose a framework for measuring the moral or ethical dimension of health inequality—that is, health inequity.

**Design:** Conceptual discussion.

**Conclusions:** Measuring health inequity entails three steps: (1) defining when a health distribution becomes inequitable, (2) deciding on measurement strategies to operationalise a chosen concept of equity, and (3) quantifying health inequity information. For step (1) a variety of perspectives on health equity exist under two categories, health equity as equality in health, and health inequality as an indicator of general injustice in society. In step (2), when we are interested in health inequity, the choice of the measurement of health, the unit of time, and the unit of analysis in health inequity analysis should reflect moral considerations. In step (3) we must follow principles rather than convenience and consider six questions that arise when quantifying health inequity information. This proposed framework suggests various ways to conceptualise the moral dimension of health inequality and emphasises the logical consistency from conception to measurement.

Correspondence to:  
Dr Y Asada, Department of  
Community Health and  
Epidemiology, Faculty of  
Medicine, Dalhousie  
University, 5790 University  
Avenue, Halifax, NS, B3H  
1V7, Canada;  
yukiko.asada@dal.ca

Accepted for publication  
29 March 2005

Researchers and policymakers worldwide have demonstrated longstanding interest in health inequality. Why are they interested in health inequality? Just as in any other scientific pursuit, some of them may simply be interested in describing how health is distributed. Others may be interested in understanding the mechanism of health inequality so they can improve population health.

The interest in health inequality, however, is not always limited to describing and understanding it. Some health inequalities are of moral concern because of the value we place on health.<sup>1–3</sup> This moral concern distinguishes health inequality as a topic of both policy and ethical inquiry. The moral or ethical dimension of health inequality is generally termed health inequity, although no consensus on a precise definition of health inequity exists.<sup>4</sup>

Given the importance of moral concern in health inequality, it is surprising that a comprehensive conceptual framework for measuring health inequality capturing moral concern has yet to be developed. Although philosophers have long discussed equality and justice, until recently they have rarely addressed health in their discussion.<sup>2–5</sup> This is primarily because of the assumption that health distribution is beyond human control. Bioethics has concentrated on individual patient-physician issues and, until recently, has failed to address ethical issues at the population level.<sup>2–6–8</sup>

In the multidisciplinary health sciences field, measuring differences in health by group, for example, income, education, or race/ethnicity, has become the standard method for health inequality analysis. The World Health Organisation recently challenged this standard method by proposing individuals, instead of groups, as the unit of analysis.<sup>9–10</sup> The WHO researchers asked: why should you not measure health inequality across individuals, irrespective of individuals' group affiliations, in much the same way as income inequality? The WHO approach has caused much controversy<sup>9–11–16</sup> but evidently stimulated discussion on why and how we measure health inequality.

This paper responds to the current growing interest in and need for developing a framework for measuring health inequality sensitive to relevant moral and quantitative concern. The proposed framework suggests various ways to think morally about health inequality and emphasises the logical consistency from conception to measurement.

## TERMINOLOGY

Health sciences researchers have increasingly distinguished health inequity from health inequality.<sup>3–4–17</sup> However, confusion over the terminology still persists, especially when researchers with different disciplinary training assemble to collaborate. In addition, words that seem to suggest similar meanings, for example, difference, disparity, heterogeneity, and injustice, aggravate the confusion.

The framework in this paper refines the terminology common among health sciences researchers. The most frequently cited clarification of terminology in the health sciences literature is that of Whitehead and Dahlgren: health inequalities that are avoidable and unfair are health inequities.<sup>18</sup> Since they proposed this classification in 1991, a consensus has emerged among health sciences researchers as schematically explained in figure 1. Suppose we select a population of interest, for example, a country or province, and the unit of analysis, either the individual or group. Health distribution is a way in which health is spread among the unit of analysis in the population. Health equality is the health distribution in which health is spread equally to every unit of analysis in the population, and health inequality is all health distributions that are otherwise. Reducing health inequality is the same as increasing health equality. Despite the different connotation of each word, terms such as difference, disparity, and heterogeneity have the same meaning here as inequality. Some health distributions are of moral concern, and the moral dimension of health distribution is health inequity.

Within a population of concern (for example, country, county), among the unit of analysis (individual or group)

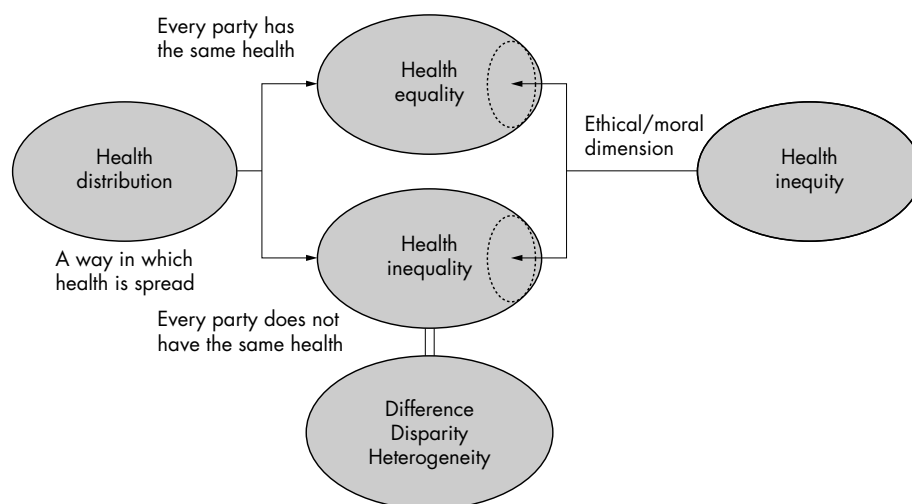


Figure 1 Terminology.

## A FRAMEWORK FOR MEASURING HEALTH INEQUITY

I propose to consider that measuring health inequity entails three steps: (1) defining when a health distribution becomes inequitable, (2) deciding on measurement strategies to operationalise a chosen concept of equity, and (3) quantifying health inequity information. Steps 1 and 2 extract the information concerning health inequity from the health distribution and allow us to draw such figures as those in figure 2. Quantifying the extent of health inequity by means of a single number (step 3) is a strategy to facilitate examination, comparison, and understanding of the health inequity in question. All three steps ask distinct questions, and a decision made at one step does not always guide a decision at another step.

### Step 1: defining health inequity

A variety of perspectives on health equity exist. They can be loosely categorised as: health equity as equality in health, and health inequality as an indicator of general injustice in society. No perspective is free from conceptual challenges. Yet, identifying a perspective on health equity that motivates measurement is an inevitable task.

### Health equity as equality in health

Perspectives in the first group derive the moral significance of health distributions from the value of health. The simplest view in the first group is the perspective on health equity as strict equality of health outcome for all persons. If we believed that health is to some degree special, equality of health outcome among everyone, just as equality of political liberty among everyone, might seem to be the most straightforward criterion for health equity. Strict equality for all, however, is not an attractive view for various reasons. For example, it denies personal choice. It would be unrealistically expensive. Moreover, it would be unachievable because some determinants of health are beyond human control. Unlike political liberty, strict equality in health for all would not be a feasible nor agreeable goal. Accordingly, popular accounts of health equity relax the strictness in one way or another.

The most common way to depart from strict equality in health outcome is to look at health determinants. We can define health inequalities caused by certain determinants as

inequitable.<sup>2-3</sup> Inequalities in health associated with socioeconomic status (SES), for example, to many people present an intuitive moral concern.<sup>17-19</sup> The WHO researchers consider determinants more broadly than SES<sup>20</sup> and propose to view health inequality caused by factors amenable to human interventions as inequitable.<sup>12</sup> Le Grand and Whitehead define health inequity as health inequality by factors beyond individual control.<sup>3-21</sup>

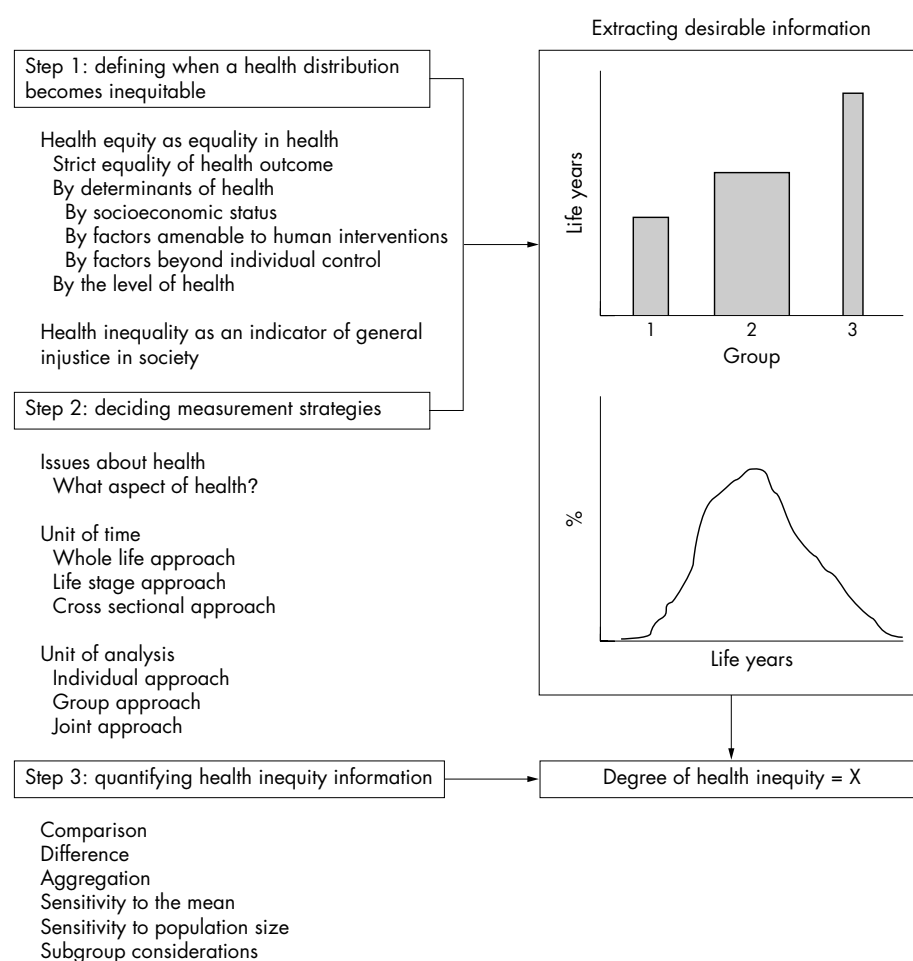
Measurement strategy would differ depending on the choice of determinants of health as well as the reason for the choice. There are, for example, various reasons why health inequality associated with SES is inequitable. We might extend the theory of justice as fairness proposed by John Rawls<sup>22</sup> and include health as a social primary good along with income and wealth, offices, and the bases of self respect. Should we measure health inequity based on the extended Rawlsian framework, we would look at the average health of the worst off group, for example, life expectancy of the lowest quintile income group. If, on the other hand, we adopted a view that systematic, pervasive, or structural inequalities are inequitable,<sup>17-19-23-24</sup> the focus would be on the correlations between health and such other factors as SES and sex.

Another way to define health equity as equality in health is to focus on the level of health. This approach is based on the idea of the minimally adequate level of health, a multi-purpose resource that is useful for any life plan. Society would be concerned about whether each person satisfies the minimally adequate level of health regardless of how each person realises her health. Society would not be concerned about health above this level as it accepts that people may trade off health with other goods depending on their preferences and conceptions of good life. In other words, adopting this view we would not measure health inequalities above this level.

Norman Daniels's normal species functioning<sup>5</sup> and the capability approach<sup>25-26</sup> are examples of the idea of the minimally adequate level of health. The right to health perspective, popular in international health circles,<sup>27</sup> is also compatible with this view.

### Health inequality as an indicator of general injustice in society

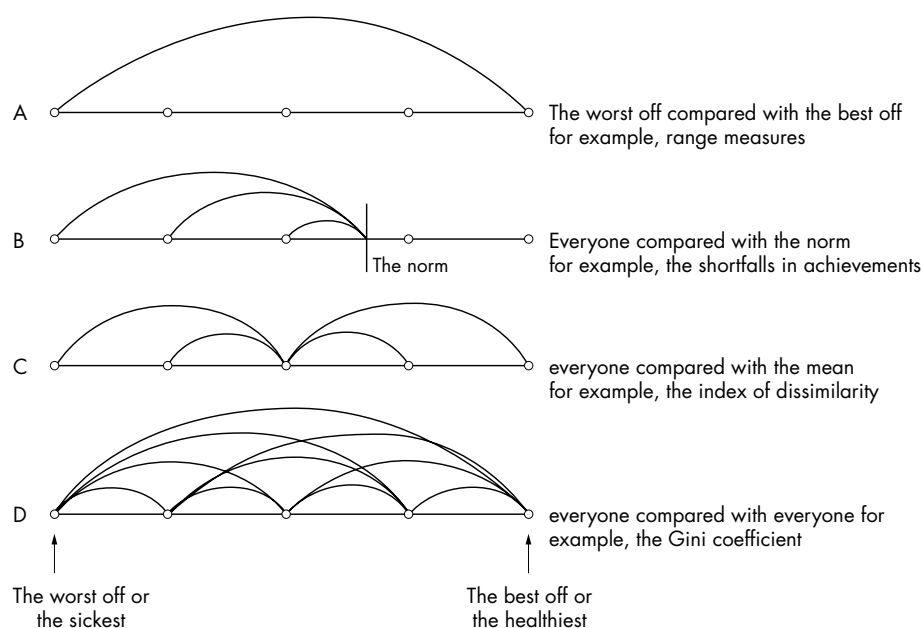
Perspectives in the second group emphasise relations between health and other important goods. Multiple factors



**Figure 2** Three steps for measuring health inequity.

directly or in complex combination determine health. The exact mechanism of health production is beyond our understanding. But health is an ultimate outcome of how society distributes multiple determinants of health. We can regard

health inequality as an indicator of general injustice in society.<sup>2</sup> Amartya Sen, for example, suggests mortality as a supplement to the conventional economic indicators.<sup>28</sup> Daniels *et al* are intrigued by a coincidence that the social



**Figure 3** Comparison.

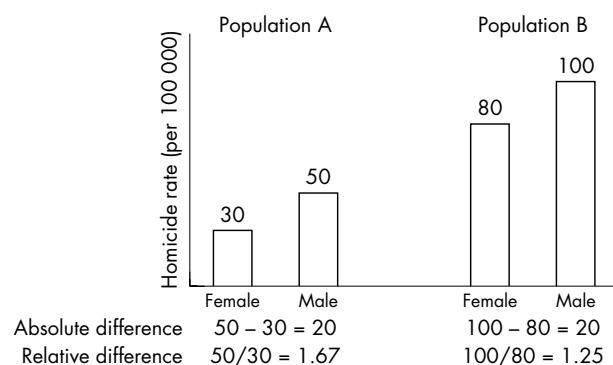


Figure 4 Absolute and relative differences.

primary goods that Rawls suggests in his theory of justice<sup>22</sup> happen to be important determinants of health. "Social justice is good for our health"<sup>27</sup> they therefore claim. In this view, the primary concern is just distribution of social primary goods. Extended, we may use the distribution of health as an indicator of a just society.

### Step 2: deciding on measurement strategies

To operationalise an equity perspective as a measurement strategy, we need to consider further issues, namely, issues about health, the unit of time, and the unit of analysis. Empirically, these are measurement questions based on data availability. When measuring health inequality, moral considerations should also guide measurement strategy.

### Issues about health

We cannot measure health equity without measuring health. In deciding the measurement of health in health equity analysis, we must consider a fundamental question: why does health distribution cause moral concern? Two widely shared views exist. Firstly, health in itself is one component of welfare. Secondly, health is a multi-purpose good that is useful for any life plan. These characteristics of health form the fundamental basis for moral interests in health distribution.

These fundamental values of health support functionality as the aspect of health to consider, thereby, the use of health related quality of life measures. In the understanding of health as one component of welfare and a multi-purpose

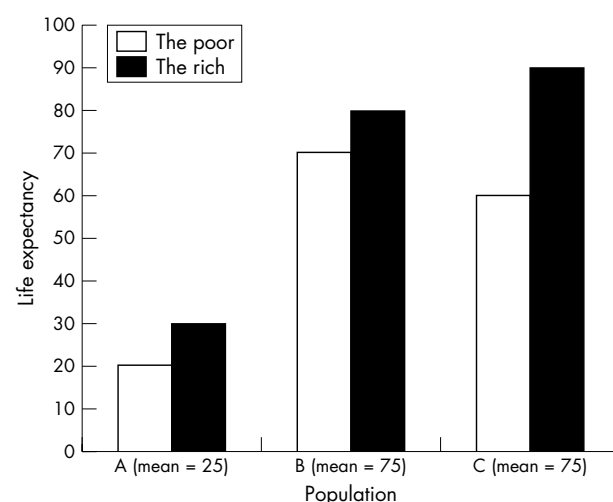


Figure 5 Sensitivity to the mean.

resource, what is relevant is what a person can or cannot do or whether a person exhibits general symptoms such as pain or anxiety. A different disease category in itself does not affect the level of health related welfare or the potential use of health as a multi-purpose resource.

### Unit of time

To decide the unit of time in health inequality analysis, you must ask: within what time period should health equity be sought? Three approaches exist.<sup>29–30</sup> The whole life approach looks at the entire health experiences of people from birth to death. The life stage approach compares health experiences of people within the same age group. The cross sectional approach takes a snapshot of health experiences of people at a certain time all together, irrespective of their life stages.

Which of these three approaches is the most appropriate time unit in health equity analysis? To examine this question, it is once again useful to recall why we seek health equity. In the understanding of health as a resource, it is reasonable to think that we appreciate opportunities that health brings differently at different stages of life. The same good health, for example, may bring more opportunities in youth than in senescence. Furthermore, empirical studies show that good health in earlier life stages is in itself an opportunity for good health in later life stages.<sup>4–31</sup>

The understanding of health as a multi-purpose resource endorses the life stage approach and rejects the whole life and cross sectional approaches. By focusing on the overall health experience, the whole life approach loses important information on when and in what way a person is healthy in life. The cross sectional approach, although perhaps most commonly used in health inequality analysis, is too crude as it neglects the age distribution of a population. "Age weight" is necessary properly to combine different life stages as the whole life experience or as the snapshot of health experiences of a population. The issue of relative value of each life stage is controversial.<sup>32–34</sup> Until we resolve the question of age weight, the life stage approach best reflects our fundamental value of health while leaving the unsettled issues open.

### Unit of analysis

Three key issues distinguish the individual and group approach. The first and the most fundamental question is among whom—individuals or groups—you wish to seek health equity. The second issue relates to comparability of health inequality analysis. The individual is the ultimate unit of analysis, while an unlimited number of group choices are possible, and group definitions vary.<sup>9–35</sup> The third issue concerns the use of the average in the group approach. What does the average of a group represent? Should we be

### What this paper adds

- This paper refines classification of such words as health inequality, health inequity, difference, disparity, and heterogeneity.
- This paper proposes a framework for measuring the moral dimension of health inequality where important moral and quantitative questions are identified and other significant questions can be further built upon, rather than defending one particular measurement based on a certain normative position.
- The framework suggests various ways to think morally about health inequality and emphasises the logical consistency from conception to measurement.



worried about the information neglected by the use of the average?

Researchers often consider the choice of the unit of analysis as dichotomous. Should both individual and group data be available, however, researchers could examine health equity across individuals as well as groups.<sup>16</sup> By simultaneously measuring health equity across individuals and groups, researchers can identify what proportion of the overall health inequity is attributable to a particular group characteristic and, among many group characteristics, which one contributes most to the overall health inequity. Recent studies have increasingly used this approach.<sup>36–38</sup>

While this approach is promising, it does not resolve all the three issues mentioned above. Researchers still need to examine the philosophical question of among whom they wish to seek health equity and the issue of comparability.

### Step 3: quantifying health inequity information

To quantify the degree of health inequity, various measures are available, for example, the range measures,<sup>39</sup> the concentration index,<sup>40–41</sup> and the Gini coefficient.<sup>35–42</sup> How can researchers choose among them? Convenience, rather than principle, often drives this decision. But different measures can conclude different degrees of health inequity even when used for the same health distribution.<sup>41</sup> Among the issues discussed in the so called axiomatic approach in the income inequality literature,<sup>39–43</sup> philosophical work by Larry Temkin,<sup>30</sup> and small but pioneering work in the health sciences field,<sup>20–41–44–47</sup> the following six questions deserve significant thought when quantifying health inequity information.

### Comparison

How many units are to be compared, and what is the basis of comparison? Figure 3 illustrates four different ways to make comparisons. In figure 3 a small circle represents a person or a group, placing it horizontally from the sickest to the healthiest or the worst off to the best off, and arcs between them represent the comparisons we make. Concept A considers the range between the highest and the lowest, the extremes of the distribution. Concept B compares everyone to an established norm and considers differences as shortfalls in achievement. Concept C compares every unit against the mean. In concept D every individual or group is compared with each other. Obviously, these four choices are not exhaustive and are intended only to illustrate the discussion points.

### Absolute or relative differences

Do we look at differences absolutely or relatively? In figure 4 absolute sex differences in homicide are the same in these two populations, but population A has greater relative difference than population B. While nothing is wrong in expressing differences absolutely or relatively, it is not clear which provides a better expression of health inequity.

### Aggregation

How do we aggregate differences at the population level? Imagine that small circles in each of A, B, C, and D in figure 3 represent income quintile group and their life expectancies are 55, 60, 65, 70, and 75 years old from the lowest to the highest group. Should all five year differences between the successive income groups be considered the same? Or might we wish to “value health differently along the distribution,”<sup>44</sup> for example, providing a greater weight to the five year difference at the lower tail?

## Policy implications

- Without clearly defining health inequity and logically consistently applying the chosen concept to measurement, no one can move onto effective policymaking for health equity.
- This paper helps researchers and policymakers to define health inequity and points to key questions that they need to address when applying the chosen concept to measurement of health inequity.

### Sensitivity to the mean

Should the assessment of health inequity be sensitive to the population's mean health? In other words, is health inequity worse in a sicker population?<sup>30</sup> Figure 5 illustrates three populations, each of which presents life expectancies of the poor and the rich. Population B and C have the same mean. Both the poor and the rich in population B have 50 years more than the poor and the rich in population A. Life expectancies of both the poor and the rich in population C are three times those of the poor and the rich in population A. Is health inequity worse in population A than population B and C? So called mean independent measures, such as the concentration index and the Gini coefficient, judge that health inequity in population A and C is the same while health inequity is worse in population A than B. Whether this is the right judgment for health inequity is a moot point requiring philosophical investigation.

### Sensitivity to population size

Should the assessment of health inequity be sensitive to the population size? Most inequity comparisons do not take this into account. But the same shortfall of 10% of the total population below a certain norm, for example, makes up a different number of people in populations with different sizes: 10 persons below the norm in the population of 100 people, and 1000 persons in the population of 10 000. If you were concerned about suffering from health inequity, you might judge that health inequity is worse in a larger population.<sup>30</sup>

### Subgroup considerations

How should overall inequity of a population correspond to inequities between and within subgroups? Suppose overall health distributions are identical in population A and B. However, these same overall distributions are made up from very different subgroup contributions. In population A the rich are healthy and the poor sick, while health is not correlated with income in population B. Are population A and B the same in terms of health inequity?

## CONCLUSIONS

Researchers and policymakers in various fields have increasingly recognised health equity as an important issue. Despite the growing recognition, what health inequity means is still often unclear, and how best the moral consideration can be brought into the measurement needs further investigation. Aiming to fill this gap, this paper proposed a framework for measuring health inequity consisting of three steps. Health inequity implies social responsibility and calls for policy action. Without clearly defining health inequity and logically consistently applying the chosen concept to measurement, no one can move onto effective policymaking for health equity.

This paper admittedly raised more questions than it answered. Given the excitingly multidisciplinary nature of the topic of measuring health inequity, future work

examining the questions left open will be only possible through a dynamic, collaborative effort by researchers from different disciplines.

## ACKNOWLEDGEMENTS

I am indebted to Professors David Kindig, John Mullahy, Patrick Remington, Alberto Palloni, and Daniel Hausman, and Daniel Wikler for their general assistance for my dissertation, from which this study was derived. I am also grateful to Professor Nuala Kenny for comments on an earlier version of the manuscript.

Funding: this project was supported by grant number 1 R03 HS 13116 from the US Agency for Healthcare Research and Quality, and the Canadian Institute of Health Research Training Program for Ethics and Health Policy and Research.

Conflicts of interest: none declared.

## REFERENCES

- 1 Marchand S, Wikler D, Landesman B. Class, health, and justice. *Milbank Q* 1998;**76**:449–67.
- 2 Peter F, Evans T. Ethical dimensions of health equity. In: Evans T, Whitehead M, Diderichsen F, et al, eds. *Challenging inequalities in health: from ethics to action*. New York: Oxford University Press, 2001:25–33.
- 3 Whitehead M. The concepts and principles of equity and health. *Int J Health Serv* 1992;**22**:429–45.
- 4 Kawachi I, Subramanian SV, Almeida-Filho N. A glossary for health inequalities. *J Epidemiol Community Health* 2002;**56**:647–52.
- 5 Daniels N. *Just health care*. Cambridge: Cambridge University Press, 1985:56.
- 6 Brock DW. Broadening the bioethics agenda. *Kennedy Institute of Ethics Journal* 2000;**10**:21–38.
- 7 Daniels N, Kennedy B, Kawachi I. *Is inequality bad for our health?* Boston: Beacon Press, 2000:3–33.
- 8 Wikler D. Bioethics, human rights, and the renewal of health for all: an overview. In: Bankowski Z, Bryant JH, Gallagher J, eds. *Ethics, equity and the renewal of WHO's health-for-all strategy*. Geneva: CIOMS, 1997:21–30.
- 9 Murray CJL, Gakidou EE, Frenk J. Health inequalities and social group differences: what should we measure? *Bull World Health Organ* 1999;**77**:537–43.
- 10 World Health Organisation. *The World Health Report 2000: health systems: improving performance*. Geneva: World Health Organisation, 2000:215.
- 11 Almeida C, Braveman P, Gold MR, et al. Methodological concerns and recommendations on policy consequences of the World Health Report 2000. *Lancet* 2001;**357**:1692–7.
- 12 Asada Y, Hedemann T. A problem with the individual approach in the WHO health inequality measurement. *International Journal for Equity in Health* 2002;**1**:1–5. <http://www.equityhealthj.com/content/1/1/2> (accessed 22 Oct 2004).
- 13 Braveman P, Krieger N, Lynch J. Health inequalities and social inequalities in health. *Bull World Health Organ* 2000;**78**:232–3.
- 14 Braveman P, Starfield B, Geiger HJ. World Health Report 2000: how it removes equity from the agenda for public health monitoring and policy. *BMJ* 2001;**323**:678–81.
- 15 Hausman D, Asada Y, Hedemann T. Health inequalities and why they matter. *Health Care Analysis* 2002;**10**:177–91.
- 16 Wolfson M, Rowe G. On measuring inequalities in health. *Bull World Health Organ* 2001;**79**:553–60.
- 17 Braveman P, Gruskin S. Defining equity in health. *J Epidemiol Community Health* 2003;**57**:254–8.
- 18 Dahlgren G, Whitehead M. *Policies and strategies to promote social equality in health*. Stockholm: Institute of Future Studies, 1991.
- 19 Starfield B. Basic concepts in population health and health care. *J Epidemiol Community Health* 2001;**55**:452–4.
- 20 Gakidou EE, Murray CJL, Frenk J. Defining and measuring health inequality: an approach based on the distribution of health expectancy. *Bull World Health Organ* 2000;**78**:42–54.
- 21 Le Grand J. *Equity and choice: an essay in economics and applied philosophy*. London: HarperCollins Academic, 1991:62–126.
- 22 Rawls J. *A theory of justice*. Cambridge, MA: Harvard University Press, 1971:194.
- 23 Walzer M. *Spheres of justice*. New York: Basic Books, 1983:3–30.
- 24 International Society for Equity in Health (ISEqH). Working definitions. <http://www.iseqh.org/en/workdef.htm> (accessed 4 Feb 2005).
- 25 Nussbaum MC. *Women and human development: the capabilities approach*. Cambridge: Cambridge University Press, 2000:110.
- 26 Sen A. *Inequality reexamined*. Cambridge, MA: Harvard University Press, 1992:207.
- 27 Mann JM. Medicine and public health, ethics and human rights. *Hastings Center Report* 1997;**27**:6–13.
- 28 Sen A. Mortality as an indicator of economic success and failure. *Economic Journal* 1998;**108**:1–25.
- 29 McKlerie D. Equality and time. *Ethics* 1989;**99**:475–91.
- 30 Temkin LS. *Inequality*. Oxford: Oxford University Press, 1993:308.
- 31 Power C, Matthews S, Manor O. Inequalities in self-rated health: explanations from different stages of life. *Lancet* 1998;**351**:1009–14.
- 32 Tsuchiya A. QALYs and ageism: philosophical theories and age weighting. *Health Econ* 2000;**9**:57–68.
- 33 Williams A. Intergenerational equity: an exploration of the 'fair innings' argument. *Health Econ* 1997;**6**:117–32.
- 34 Daniels N. *Am I my parents' keeper?* Oxford: Oxford University Press, 1988:176.
- 35 Illsley R, Le Grand J. Measurement of inequality in health. In: Williams A, ed. *Health in economics*. London: Macmillan, 1987:12–36.
- 36 van Doorslaer E, Koolman X. Explaining the differences in income-related health inequalities across European countries. *Health Econ* 2004;**13**:609–28.
- 37 Wagstaff A, van Doorslaer E. Overall versus socioeconomic health inequality: a measurement framework and two empirical illustrations. *Health Econ* 2004;**13**:297–301.
- 38 Clarke PM, Gerdtham U-G, Connelly LB. A note on the decomposition of the health concentration index. *Health Econ* 2003;**12**:511–16.
- 39 Sen A. *On economic inequality*. Oxford: Oxford University Press, 1997:46.
- 40 Koolman X, Van Doorslaer E. On the interpretation of a concentration index of inequality. *Health Econ* 2004;**13**:649–56.
- 41 Wagstaff A, Paci P, van Doorslaer E. On the measurement of inequalities in health. *Soc Sci Med* 1991;**33**:545–57.
- 42 Le Grand J. Inequality in health: some international comparison. *European Economic Review* 1987;**31**:182–91.
- 43 Cowell FA. Measurement of inequality. In: Atkinson AB, Bourguignon F, eds. *Handbook of income distribution*. Vol. 1. Amsterdam: Elsevier, 2000:89–166.
- 44 Anand S, Diderichsen F, Evans T, et al. Measuring disparities in health: methods and indicators. In: Evans T, Whitehead M, Diderichsen F, et al, eds. *Challenging inequalities in health: from ethics to action*. New York: Oxford University Press, 2001:49–67.
- 45 Mustard CA, Etches J. Gender differences in socioeconomic inequality in mortality. *J Epidemiol Community Health* 2003;**57**:974–80.
- 46 Mackenbach JP, Kunst AE. Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc Sci Med* 1997;**44**:757–71.
- 47 Manor O, Matthews S, Power C. Comparing measures of health inequality. *Soc Sci Med* 1997;**45**:761–71.