

# Measuring global health<sup>1</sup>

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October 2012. The final version of this paper has been published in Patti Tamara Lenard and Christine Straehle (eds.), *Global Justice and Health Inequalities* (Edinburgh: Edinburgh University Press, 2012), pp. 139-156.

## 1. Introduction

Summary measures of population health combine information about morbidity and premature mortality within a single ‘metric’. Particularly prominent at the international level is the Global Burden of Disease (GBD) study, which uses disability-adjusted life-years (DALYs) to quantify the disease burden resulting from different health conditions across the world. The study aims to provide an objective assessment of the state of global health, capturing not only premature mortality but also the burden of non-fatal health conditions. Moreover, the measure can – and was explicitly designed to – inform policy decisions relating to global health, particularly about priority-setting and resource allocation. For example, the Disease Control Priorities Project uses GBD data to make health policy recommendations for developing countries.

From the beginning of the project, the salience of normative questions in designing an appropriate measure of global health was apparent. These questions were addressed explicitly in the development of the GBD approach and were the focus of much of the criticism voiced against the GBD and its methodology. This chapter focuses on the influence that concerns about the effects of global health measures on health policy have had on the development of the GBD methodology. The GBD researchers emphasise that when health indicators gain prominence, they inevitably have an influence on policy debates and decisions. It is incumbent upon those developing such indicators to recognise this ‘normative shadow’ and to design health measures in such a way that their influence on policy is unproblematic. In particular, we must anticipate how health measures could lead to unfair decisions with respect to resource allocation or priority-setting, and attempt to prevent such effects. This chapter outlines how such concerns have influenced different aspects of the GBD methodology. Designing health measures so that they reflect concerns about fairness may, however, create conceptual tensions and distort our understanding of the burden of disease; the chapter assesses the significance of this conceptual problem for the GBD project. Finally, I consider different strategies for enhancing the DALY’s role as a tool in policy decisions and outline the direction implicit in recent revisions of the GBD methodology.

## 2. The Global Burden of Disease (GBD) project

The Global Burden of Disease project was initiated in the early 1990s. Two primary aims were pursued through this project. First, there was concern about the fact that health policy was informed primarily by information about mortality rates, particularly among children, and did not pay due attention to the effects of disability and non-fatal disease. The GBD project set out to combine information about both mortality and morbidity into a single measure to provide a fuller picture of the state of global health (Murray 1996). Thus, the GBD allows for comparisons across very different conditions (both fatal and non-fatal) that would otherwise not be readily comparable. A second objective was to provide a measurement method that could be used both to capture the state of global health and to guide policy

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<sup>1</sup> I would like to thank Sam Harper, Nicholas King, Patti Lenard, Christine Straehle and Garrath Williams for helpful comments on earlier drafts of this paper.

decisions, particularly through the use of the measure in cost-effectiveness analyses (Murray 1996). Thus, the results from the project would allow us to identify the conditions that cause the greatest burden of disease across the world, providing important information for decisions about appropriate priorities for health interventions.

A central feature of the GBD is the metric in which disease burdens are expressed: the ‘disability-adjusted life-year’ (DALY). DALYs combine life-years lost due to premature mortality and years lived with certain disabilities or health conditions, weighted by the severity of the condition (Murray 1996; Lopez et al. 2006). For example, 30 DALYs could represent one person’s loss of 30 fully healthy life-years, or her living for 60 years with a disability with a severity weight of 0.5. DALYs are also aggregated across individuals; for example, 30 DALYs could also represent 30 individuals losing one fully healthy year of life, or 60 individuals living for one year with a disability weighed at 0.5 for its severity.

First results from the GBD study, depicting the burden of disease in 1990, were published in 1996, followed by updates in subsequent years (World Health Organization 2002; Mathers et al. 2008). The methodology of the GBD is currently being revised; the GBD 2010, expected to become available in 2012, will estimate the disease burden in 1990 and 2005 and provide projections for 2010.<sup>2</sup> Full details of the new methodology have yet to be published; one major change, however, that has already been announced concerns the derivation of disability weights, which I discuss briefly in section 5 below.

The results of the GBD study are presented in vast tables listing DALYs lost, broken down by the health condition by which they are caused, or according to geographic region. The results indicate, for example, that non-communicable diseases, such as cancers, heart and cerebrovascular disease, are major contributors to the burden of disease across the world (Lopez et al. 2006). The GBD also brought attention to non-fatal conditions, such as neuropsychiatric conditions; in particular, unipolar depressive disorders have emerged as the third leading cause of the burden of disease worldwide (Mathers et al. 2008). DALYs have also been linked to specific risk factors such as various nutrient deficiencies, low fruit and vegetable intake, unprotected sex and urban air pollution (Ezzati et al. 2006).

Results from the GBD project can inform or influence policy in a number of different ways. Perhaps most prominently, the Disease Control Priorities Project, informed by GBD data, identifies appropriate priorities for global health interventions in developing countries (Jamison et al. 2006). This includes, for example, estimates of the cost-effectiveness of a host of different interventions in terms of DALYs averted per dollar spent. For example, voluntary testing and counselling to address HIV is estimated to cost between US\$14 and US\$261 per DALY averted, whereas anti-retroviral treatment is estimated at US\$350 to US\$500 per DALY averted (Laxminarayan et al. 2006). This information is sometimes also expressed in terms of how many DALYs can be averted by one million US\$ invested in particular treatments. For example, spending this sum on the provision of bypass surgery is estimated to avert fewer than 40 DALYs; using this money to extend immunization coverage with standard child vaccinations could avert 50,000–500,000 DALYs (Jamison 2006: 25). Such estimates can inform decisions among different types of interventions addressing a particular health condition (e.g. provision of free condoms versus education campaigns to prevent the spread of HIV) but also choices among interventions that address different conditions (e.g. free condoms to prevent the spread of HIV versus bednets to prevent the spread of malaria). One global health organisation, Population Services International (PSI), explicitly measures the impact of its work in terms of DALYs averted.<sup>3</sup> Information

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<sup>2</sup> See [www.globalburden.org](http://www.globalburden.org); [http://www.who.int/healthinfo/global\\_burden\\_disease/en/](http://www.who.int/healthinfo/global_burden_disease/en/).

<sup>3</sup> See [www.psi.org](http://www.psi.org).

about the global disease burden has also been used to criticise the current allocation of global health aid, which remains focused on infectious diseases despite the finding that, even in low-income countries, the greatest burden of disease results from non-communicable disease (Stuckler et al. 2008). The GBD researchers have also used a measure similar to DALYs – disability- or health-adjusted life-expectancy (HALE) – to assess the performance of health care systems, and variation in HALE across individuals has been proposed a measure of health inequality (Murray and Evans 2003).

### 3. The ‘normative shadow’ and the ‘restricted information requirement’

As the GBD researchers explain, their project was meant to provide data that could inform global health policy. However, the inclusion of this objective appears to reflect not only the project’s ambitions but also the recognition that any health measure would *inevitably* affect health policy (Murray 1996). Experience with indicators such as child mortality rates and the Human Development Index suggests that such measures are used by policy-makers, for example to set policy goals and assess their performance against them. Thus, in developing health measures, we must take into account how such measures may come to be used in policy decisions and allow these considerations to affect the methodology on which the health measure is based. As Christopher Murray, one of the leading figures in the GBD project, explains,

if a measure is used, it will influence policy debate, permeate the thinking of decision-makers and become part of the culture of the subject. In other words, an indicator that is widely used will soon become normative through its use. The infant mortality rate, life expectancy and, to the extent they are adopted, DALYs, are used normatively and thus become normative measures. The normative aspects of indicators should be recognized clearly in the design of an indicator. This is not to suggest that the proponent of a new indicator bears responsibility for all intended or unintended uses of the measure *in perpetuo*. Rather, it is prudent to recognize the normative shadow that health measures cast and to try to reason carefully about their likely normative uses and the implications of such uses for the design of health indicators. (Murray 1996: 3)

Concerns about this ‘normative shadow’ have affected the GBD methodology in a number of respects. First, the particular health state valuation method used – the person trade-off – appears to have been chosen because it constructs disability weights from individuals’ preferences about how health resources should be allocated between groups of individuals with different conditions. Second, if GBD data affect decisions, it is essential that we treat ‘like as like’ when evaluating the burden associated with particular health conditions; the only pieces of information affecting the measurement of the burden should be age and sex (the ‘restricted information’ requirement). Age and sex are reflected through the use of age-weighting and different life expectancies for men and women. Information that is *excluded* from the GBD measure includes differences in life expectancies in different countries as well as environmental factors that shape individuals’ experience of particular health conditions.

#### 3.1. Disability weights and the ‘person trade-off’

Central to health measurement – not just for DALYs but also for other health measures, such as quality-adjusted life-years (QALYs)<sup>4</sup> – is the ability to compare very different health states within a single ‘currency’. This requires that ‘disability weights’ be attached to different health states so that time lived with that condition can be weighed accordingly. These disability weights, ranging from 0 to 1, express the deviation of a life-year lived in this state from a life-year lived in full health, with 0 being

<sup>4</sup> The underlying principle of adjusting life-years depending on disability is similar to the construction of quality-adjusted life-years (QALYs). However, while QALYs express health *gains*, DALYs represent health *losses*. 1 QALY represents one life-year lived in full health, while 1 DALY represents one fully healthy life-year lost.

the weight attached to fully healthy life years and higher numbers reflecting increasingly severe disabilities. It is only through the ‘valuation’ of different health states that information on non-fatal health experience and information on mortality can be combined into a single measure, making this a crucial element of health measures (Salomon et al. 2003).

Different methods exist for health state ‘valuation’, i.e. the procedure through which disability weights are assigned to particular health conditions. Most of these methods ask individuals to respond to different hypothetical choice scenarios that involve different health conditions. For example, we might find out how many fully healthy years participants consider equivalent to a longer time period lived with a particular disability or disease. Disability weights can then be calculated from these responses.<sup>5</sup>

The disability weights of the original GBD study were based on the ‘person trade-off’ (PTO) method. Whereas other health valuation methods ask respondents to consider different scenarios in which they themselves experience certain health states, in the PTO respondents assume the perspective of a decision-maker who must choose among different interventions that prevent deaths or disease for different groups of individuals. Thus, as Murray notes, ‘by its construction the PTO methods appears to include some element of distributional preference in the estimated magnitude of health state preference’ (Murray 1996: 29). Although this is somewhat ambiguous in the GBD researchers’ own arguments, Nord (2002) suggests that PTO was used in the GBD methodology *precisely for this reason*: given that DALYs would be used in resource allocation decisions, disability weights that are influenced by distributional preferences were thought to be particularly suitable. The decision in favour of PTO over other health valuation methods thus seems to reflect the anticipated ‘normative’ use of the GBD data in resource allocation decisions.

One strand of criticism of the DALY focuses on the particular version of the PTO used for the GBD project. The GBD used two different PTO questions. The first asked respondents to consider a scenario in which they could either extend the lives of a certain number of healthy individuals or extend the lives of a certain number of individuals in a particular health state (PTO1). For instance, they have to choose between (A) extending the lives of 1000 healthy individuals for one year and (B) extending the lives of 2000 blind individuals for one year. In the second scenario (PTO2), participants choose between extending the lives of healthy people and curing individuals of the health state under consideration. For example, they may have to choose between (A) extending the lives of 1000 healthy individuals for one year or (B) giving perfect vision to 2000 blind individuals (who will live for one year subsequently) (see Murray 1996). With both questions, the number of individuals concerned is varied to the point where participants are indifferent between the two options A and B. From these numbers, disability weights can be generated. For example, if respondents are indifferent between extending the lives of 1000 non-disabled people for one year and extending the lives of 5000 blind individuals (PTO1), then this would result in a disability weight of 0.8 ( $1 - [1000/5000]$ ) (see Arnesen and Nord 1999). PTO1 and PTO2 were considered to be equivalent and participants had to resolve any inconsistencies in their responses to the two scenarios.

Critics, however, have argued that PTO1 and PTO2 are not in fact equivalent and that this version of the PTO implies that respondents should attach lesser value to saving the lives of disabled people than to saving the lives of non-disabled individuals (see Arnesen and Nord 1999). When considering PTO1, respondents may indicate that they do not wish to discriminate against disabled individuals by indicating indifference between A and B when the number of individuals in each is equal. This, however, would result in a disability weight of 0, implying that the disability in question is

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For an account of different health valuation methods and their implications, see, for example, Salomon and Murray (2004).

*no worse* than full health. Further, respondents had to resolve discrepancies in their responses to PTO1 and PTO2, implying that responses are inconsistent if participants do not discriminate between disabled and non-disabled individuals in PTO1. In addition to concerns about the judgements implicit in this methodology, the requirement that participants make their responses to PTO1 and PTO2 consistent with each other may skew the resulting disability weights (Arnesen and Nord 1999).

This is, of course, a significant worry about the original GBD methodology. (The discrepancies between disability weights generated from PTO1 and PTO2 vary by condition; see Murray, 1996: 39, for details.) It should be noted, however, that in more recent work, the GBD researchers used variants of PTO2 to describe the person trade-off method (e.g. Salomon and Murray 2004). For the forthcoming GBD 2010 study, PTO has been abandoned completely for a different valuation method, as I explain in more detail below. Most significant for present purposes is the fact that PTO seems to have been chosen in part because it is influenced by respondents' distributive preferences, with a view to the influence that GBD data is likely to have on resource allocation decisions.

### **3.2. DALYs and the 'restricted information' requirement**

One implication of the 'normative shadow' is the GBD researchers' insistence that only age and sex should affect the calculation of the burden of disease. This section begins by discussing how age and sex are taken into account in constructing DALYs, particularly in relation to the use of age-weights and different life expectancy standards for men and women. I then go on to discuss two elements that are explicitly excluded from affecting DALY measurements: differences in life expectancy across countries and the effects of contextual factors on individuals' experience of health states. These methodological decisions reflect, in different ways, concerns about the role of GBD results in policy decisions.

#### *Age-weighting*

DALYs lost due to premature mortality are calculated as the shortfall from a specified life expectancy. A death at an early age would lead to more life-years – and therefore more DALYs – lost than a death at a later age. However, controversially, the GBD project also applied non-uniform age-weights in its calculations, giving lower weights to DALYs lost in children and older adults. To illustrate the impact of age weighting in the standard DALY, Arnesen and Kapiriri calculate that the number of DALYs lost would be equal if 185 newborns, seventeen 6-month-olds, five 2-year-olds, one 25-year-old, two 67 year-olds or three 83 year-olds suffered the same condition for one month (Arnesen and Kapiriri 2004).

Two explanations for this move appear in the original exposition of the GBD methodology. First, empirical studies suggest that people prefer to save lives of young adults over young children, and those of young over older adults; this motivates Murray to incorporate age-weights into the GBD. Second, these preferences can be seen as reflecting the different 'social value' of different life stages, as both children and old adults are dependent on young and middle-aged adults (Murray 1996: 55; Murray 1994: 434-435). While this move has been criticised (e.g. Bognar 2008), it appears to be based on the idea that the GBD approach should cohere with people's preferences about distributions of health benefits across individuals at different ages; this move, then, again reflects concerns about the role of GBD data in resource allocation decisions.

#### *Male vs. female life expectancy*

The second factor that DALYs are supposed to reflect is sex. In calculating how many life years have been lost due to a particular disease, we have to decide what we consider the full life expectancy from which shortfalls can be calculated. In the vast majority of countries, women tend to live longer, on

average, than men. To what extent, if at all, should this difference should be reflected in our health measure?

For the original GBD study, Murray argued that DALYs should reflect that portion of the difference between male and female life expectancy that is the result of biological or genetic rather than behavioural or environmental factors. The GBD researchers estimated this difference to be 2.5 years, i.e. 4.5 years less than the *actual* life expectancy gap of around 7 years (Murray 1996). At the same time, however, the GBD researchers suggest that this approach is open to challenge on equity grounds as ‘a male death at age 40 should count as the same duration of life lost as a female death at age 40’ (Murray 1996: 17) and that future revisions of the GBD may use the same life expectancy for both men and women.

It is not clear why the GBD researchers chose to integrate an estimate of the biologically determined differences in life expectancy in their measure if they believed this move to be open to challenge. One consideration Murray mentions is that, while it is not currently possible to redress such biological differences directly, they may become amenable to interventions in the future. These concerns are reminiscent of Margaret Whitehead’s approach to health inequality, which has been highly influential in the global health context. She suggests that health disparities due to natural or biological variation would not generally be regarded as unjust; further, health disparities can be unjust only if they were avoidable (Whitehead 1991). Murray’s willingness to adapt this aspect of the GBD methodology in the future may then be based on the assumption that once technological progress makes even the biologically determined portion of the survival gap amenable to intervention, it would be *unfair* not to set the same life expectancy standard for both men and women. Importantly, even if amenability is a criterion in assessing the unfairness of inequalities,<sup>6</sup> it seems irrelevant when calculating how many life years were lost when someone dies at a particular age. If it is indeed such concerns that shaped the GBD methodology at this point, this aspect of the DALY too reflects concerns about the ‘normative shadow’ of health measures.

#### *Ideal standard of life expectancy*

A further issue in choosing appropriate life expectancies to calculate life-years lost is whether they should reflect the vast disparities in average life expectancies that we find across the world. Following the ‘restrictive information’ principle, the GBD uses a ‘hypothetical norm’ (Michaud et al. 2001: 535), or an ‘ideal standard’ (Murray 1996: 14), of life expectancy to calculate the numbers life-years lost, irrespective of local life expectancies. The GBD study relies on a single life expectancy (82.5 years for women, 80 years for men), irrespective of where a premature death occurs.

As critics have pointed out (e.g. Williams 1999) – and as the GBD researchers fully acknowledge (Murray and Lopez 2000) – this move is motivated by concerns about equality:

We articulate a principle of treating like health outcomes as like. For example, the premature death of a 40-year-old woman should contribute equally to estimates of the global burden of disease irrespective of whether she lives in the slums of Bogota or a wealthy suburb of Boston. [...] Community-specific characteristics such as local levels of mortality should not change the assumptions incorporated into the indicator design. (Murray 1994: 431)

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<sup>6</sup> Norheim and Asada (2009) suggest an argument along these lines. However, others have argued that the avoidability or amenability of particular health inequalities should not affect our assessment of whether or not such inequalities are *unfair*; see, for example, Braveman and Gruskin (2003) and Segall (2010). Segall explicitly challenges the idea that differences in male and female life expectancy are not unfair.

The adoption of a single, ‘aspirational’ (Williams 2000: 85) life expectancy was to ensure that ‘deaths at the same age in all communities attribute equally to the burden of disease so that like outcomes are treated as like’ (Murray 1996: 16). Again, the underlying concern is to ensure that the use of DALYs in decision-making does not generate unfairness, even if – as critics have argued – this could make the DALY a less accurate measure of the disease burden across countries. The use of a single life expectancy means that when, say, a 30-year-old in a wealthy country dies of cancer, this leads to the same loss of DALYs as the cancer death of a 30-year-old in a poor country, even though average life expectancies in those countries would suggest that, without the cancer, the former would have gone on to live for a greater number of years than the former. Designing a health measure such that both deaths lead to the same DALY loss arguably leads to distortions because the number of life-years lost *due to the cancer* are not, in fact, the same. Instead, ‘the burden that is measured by DALYs is the burden of disease and underdevelopment, and not that of disease alone’ (Anand and Hanson 1997: 690).

*Context: ‘disability’ vs. ‘handicap’*

A further, important implication of the ‘restricted information’ requirement is that information about the context in which individuals live should not affect the measurement of the burden associated with their conditions. In the terminology of the WHO’s *International Classification of Impairments, Disabilities and Handicaps* (ICIDH), to which the early GBD work refers, DALYs should capture disability (e.g. loss of motor function) not handicaps (i.e. the impact of the disability on the individual, given her particular social context) (Murray 1996: 33).

The GBD researchers emphasise that health must be kept conceptually distinct from its effects on other, more subjective concepts, such as utility, quality of life or well-being, many of which are mediated by the environments in which people live (e.g. Chatterji et al. 2002; Salomon et al. 2003). A health metric that would allow for environments to influence our assessment of disease burdens would have the counterintuitive result that individuals become ‘healthier’ as a result of environmental changes that make a particular condition less burdensome; health should be regarded as an ‘attribute of individuals rather than environments’ (Salomon et al. 2003: 304).

In addition to these conceptual arguments, however, this move also again reflects fairness considerations. Murray notes that ‘allocating resources to avert handicap as opposed to disability could exacerbate inequalities’ (Murray 1996: 33). A cognitive impairment, for example, would be less of a disadvantage for those living in a remote rural community than for those living in urban areas:

Pursuing handicap could, and probably would, lead us to invest in avoiding mental retardation in the rich and well educated but not in the poor. To avoid the obvious problems with such an approach, one must focus on disability rather than handicap. (Murray 1996: 33)

This aspect of the GBD methodology has been criticised heavily. One major concern is that, despite the GBD researchers’ arguments, this move actually contributes to *inequality*. In the global context, the implications of living in countries with different income levels or levels of development is particularly salient. Allotey et al. (2003) illustrate the importance of this point by exploring the vast discrepancies in the effects of paraplegia on individuals in Cameroon compared to Australia. In Cameroon, paraplegics suffer serious, sometimes even fatal, pressure sores; they may not have access to a wheelchair; they may not be able to maintain personal hygiene because they lack access to running water; they may become isolated from their communities. Allotey et al. argue that there is a ‘development gradient’: the severity of living with a particular health condition decreases the more developed the country is. Thus, the use of DALYs as they are constructed within the GBD study could exacerbate health inequalities between low- and high-income countries, as the GBD methodology

underestimates the disease burden in less developed areas (Allotey et al. 2003). This concern has led some to argue that the disability weights attached to particular health states should vary depending on environmental and developmental differences between countries (Reidpath et al. 2003).

The concern then, both among GBD researchers and their critics, has been that our health measure should not disadvantage those in less developed communities vis-à-vis citizens of wealthier countries. Despite disagreement about the effects of excluding contextual factors from DALY calculations (Murray focusing on a condition that would be *less* burdensome in low-income countries, critics on conditions that would be *more* burdensome), implicit in this debate is again the concern that health measures must not contribute or lead to unfair policy decisions and that the underlying methodology should be designed to avoid such effects.

#### **4. Fairness considerations implicit in the GBD: does it matter?**

The previous sections illustrated various aspects of the GBD methodology that were influenced by concerns about the ‘normative shadow’, i.e. the ways in which health measures might influence health policy. Through the ‘restricted information’ requirement, the DALY methodology aims to exclude considerations that should not affect resource allocation decisions. This section begins by discussing the conceptual problems raised when the methodology used to derive health measures reflects considerations of fairness. From a more practical perspective, however, the limitations of available health measurement methods blur this conceptual distinction and, it has been argued, there may be good pragmatic reasons for not insisting on conceptual clarity in this case.

Murray argues for the ‘restricted information’ requirement with the following scenario:

Imagine a situation where two patients arrive at an emergency room both in a coma from meningitis, but there is only enough antibiotic to treat one of them. The two patients are totally identical in every respect except that one is rich and the other is poor. [...] I argue through the restricted information proposition that we should be completely indifferent to treating one over the other. The income of the patients has no bearing on who should receive the life saving intervention. (Murray 1996: 7)

Similarly, in response to the suggestion that individual characteristics, such as a person’s ability to adapt to a particular condition, should be reflected in burden of disease calculations, he argues:

the notion that we should count a given health outcome [...] as more important in an individual who has a lower capacity to adapt psychologically than in an individual who has a higher capacity to adapt psychologically would appear to be manifestly unfair. (Murray 1996: 7)

Thus, he concludes, DALYs have a ‘strongly egalitarian flavor’ (Murray 1996: 7).

However, critics have challenged this line of argument: it does not follow from the fact that a particular criterion ought not be relevant in health resource allocation decisions that this criterion should not be relevant in health *measurement* (Bognar 2008; Broome 2002). Rather, Broome argues, examples such as these show that claims about fairness must be kept distinct from claims about ‘goodness’, i.e. the good done by reducing disease. Maximising a desired outcome such as health or goodness may lead us to choose one patient over the other; this consideration, however, is outweighed by fairness, which requires us to be impartial between the two patients: ‘Once we see that fairness is a distinct consideration from goodness, we will not need to try and incorporate considerations of fairness into our measure of goodness’; allowing fairness considerations to influence our health measure in the way implicit in the GBD approach ‘distorts’ our measurement (Broome 2002: 99).

How significant are these conceptual worries in the context of the GBD? In practice, the limitations of available measurement instruments may lead to various deviations from the ‘information restriction’ requirement. In deriving disability weights, for example, respondents in the original GBD study were asked to assume that health conditions were affecting individuals living in the ‘average social response or milieu’ (Murray 1996: 38). Thus, preferences about health states reflect assumptions about the environment and about how this environment interacts with health states to affect individuals. Murray admits that this allows for some ambiguity within the GBD approach with respect to whether what is actually measured is ‘disability’ or ‘handicap’. Although the GBD aims to measure disability rather than handicap, what its methods *actually* capture is a ‘construct somewhere between disability and handicap’, or an ‘average level of handicap’ (Murray 1996: 33-34). Preferences among different health states will also reflect a host of other considerations that affect how ‘bad’ respondents perceive a particular condition to be. For example, disability weights seem to be somewhat higher when respondents believe that a condition is subject to stigmatisation (Üstün et al. 1999).

There may also be pragmatic reasons to tread carefully in distinguishing fairness and goodness in defining DALYs, given the context in which such measures are employed. Brock explains:

A measure that seems to have the evident and straightforward implication that saving lives and, for example, preventing AIDS in developing countries does less good and has less value than doing so in developed countries—that the lives of the rich are of more value than those of the poor—would obviously be subject to and would no doubt receive serious attack in political and policy contexts. Insisting that although the good produced by saving a life in the developing world is indeed less than in the developed world, on grounds of fairness we do not want to give priority to the latter over the former, might do little to deflect that attack in a world marked by deep sensitivity and suspicion by many in the developing countries about inadequate concern in the developed countries for them and their problems. If there are good reasons of fairness, and perhaps other reasons as well, for ignoring other non-health differences in the goodness of lives across countries, pragmatic policy or political considerations may support not strictly separating all fairness concerns from the burden of disease measure. (Brock 2002: 119)

In designing health measures, researchers must determine how and to what extent, if at all, such considerations should influence the methodology adopted.

## **5. The GBD and health policy**

The previous sections outlined how the GBD study has been shaped by concerns about how its results would influence global health policy. This, the critics argue, distorts the data gained from the project. Further, the assumptions implicit in DALY measurements are not necessarily uncontroversial. For example, age-weights, which were included in the GBD study to reflect ‘social preferences’ for resource allocation among individuals in different age groups, may well be considered unfair.

Moreover, DALYs cannot capture, and may even mask, fairness considerations that will be highly relevant when making policy decisions. For example, policy-makers may be interested in pursuing not just the improvement of health but also the reduction of health inequalities; again, such considerations are not reflected in DALY measures. Furthermore, we may want to give some priority to those with the most severe conditions. However, since DALYs are aggregated across individuals, it is not clear to what extent a certain number of DALYs reflects the severity of a particular condition rather than its prevalence (Arnesen and Kapiriri 2004). A high number of DALYs can result from a mild but very common condition or from a rarer but very severe disease. Advocates of the GBD project can respond that their aim is to provide a summary measure of health and that the severity of particular diseases can be gauged from descriptions of the health states in question. It should be noted, however,

that at least some presentations of GBD results lend themselves to less nuanced interpretations of the data. For example, when considering lists of the costs of different policy interventions in terms of DALYs averted per dollar spent, policy-makers may be tempted to focus on those interventions that promise the most ‘value for money’, rather than evaluating the data in the context of other relevant considerations.

Some commentators have suggested that such considerations could, to some extent, be integrated into health measures. For example, Nord and colleagues propose that health measures be coupled with weights that reflect the priority that those with the most severe conditions should receive. These weights would be based on estimates of the population’s preferences about distributions; the measure would then be more accurately described as a measure of ‘health-related societal value’ (Nord et al. 1999; see also Nord 2002). Similarly, Williams suggests that health measures could be combined with weights that reflect concerns about intergenerational equity (Williams 1997). Such weighted measures could provide a more appropriate tool for policy-makers in that they integrate a broader range of relevant considerations; policies that try to minimise these weighted DALYs then automatically give some weight to such concerns.

Other critics of the GBD have recommended a very different approach, arguing that the normative assumptions of the GBD data should be made as transparent as possible, by presenting information on disability weights, age groups affected by particular conditions and their prevalence separately, rather than aggregating all this information within DALYs (Arnesen and Kapiriri 2004).

While the GBD study is unlikely to go as far as Arnesen and Kapiriri recommend, recent developments suggest that the project has begun to change its stance on how best to respond to the ‘normative shadow’. There now appears to be a clearer focus on providing an accurate measure of the burden of disease and a greater emphasis on the limitations of the role that such a measure can play in policy decisions.

With respect to health state valuation, recent work by GBD researchers emphasises that commonly used valuation methods elicit preferences not just about health but also about other factors (in the case of the PTO, preferences about distributions) and that while this may be appropriate for certain contexts, it is undesirable when aiming to provide a measure that allows comparisons of health levels in different populations (Salomon and Murray 2004). In fact, rather than relying on disability weights derived from PTO, the forthcoming GBD 2010 will apply a new method, which asks respondents to indicate which of two individuals in different health states is ‘healthier than’ the other; disability weights are then derived from the results of these pairwise comparisons (Salomon 2010). This suggests that instead of allowing distributive preferences to affect disability weights, the focus is on the relative severity of different health conditions.

In recent publications, the GBD researchers have also been more explicit about the limitations of DALYs in informing policy decisions. Murray et al. note that

Many authors have rightly focused on a range of values relevant to the allocation of scarce resources that may enhance individuals’ health. However, many of these considerations bring us far from the common-sense statement that one population is healthier than another. At least for the purposes of comparative statements on health it may be necessary to distance the development of summary measures from the complex values that have to be considered in the allocation of scarce resources. In other words, we can quite reasonably choose to measure population health in one way and conclude that scarce resources should not be allocated strictly to maximize population health as so measured. (Murray et al. 2000: 986, references omitted)

GBD data are now also commonly presented with different versions of the DALY (e.g. with uniform and non-uniform age-weights) and sensitivity analyses are provided to determine the effects of particular elements of the methodology on the overall results. This enhances the transparency of GBD data and gives users greater discretion over which aspects of the GBD methodology they wish to accept and which elements they find problematic.

## 6. Conclusion

Results from the GBD study have been prominent in global health. The GBD study aims to provide a systematic and objective assessment of the global burden of ill health and the contributions of different conditions and risk factors to that burden. As I highlight in this chapter, the DALY methodology was designed with the influence of health measures on health policy in mind: DALYs should not lead to unfair policy decisions, particularly in relation to health priorities and resource allocation. Critics have been concerned that allowing concerns about fairness to shape what is supposed to be a measure of health is conceptually flawed and could distort the results obtained from the project. Recent revisions of the GBD methodology suggest a greater emphasis on the primary role of DALYs as a measure of the burden of disease and the limitations that must be borne in mind when using GBD data in policy decisions. These developments may lead to a more accurate description of global health but they also place a greater burden on policy-makers to find an appropriate role for GBD data in their decisions.

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