THE GBD APPROACH TO TRACKING HEALTH PROGRESS AND CHALLENGES

For decision-makers striving to create evidence-based policy, the GBD approach provides numerous advantages over other epidemiological studies. These key features are further explored in this report.

A CRITICAL RESOURCE FOR INFORMED POLICYMAKING

To ensure a health system is adequately aligned to a population's true health challenges, policymakers must be able to compare the effects of different diseases that kill people prematurely and cause ill health. The original GBD study's creators developed a single measurement, disability-adjusted life years (DALYs), to quantify the number of years of life lost as a result of both premature death and disability. One DALY equals one lost year of healthy life. DALYs will be referred to as "years of healthy life lost," and as "years lost due to premature death and disability" throughout this publication. Decision-makers can use DALYs to quickly compare the impact caused by very different conditions, such as cancer and depression, since the conditions are assessed using a single, comparable metric. Considering the number of DALYs instead of causes of death alone provides a more accurate picture of the main drivers of poor health. Information about changing disease patterns is a crucial input for decision-making, effective resource allocation, and policy planning.

The hierarchical GBD cause list (available on IHME's website at http://ihmeuw.org/gbdcauselist) has been designed to include the diseases, injuries, and sequelae that are most relevant for public health policymaking. To create this list, researchers reviewed epidemiological and cause of death data to identify which diseases and injuries resulted in the most ill health. Inpatient and outpatient records were also reviewed to understand the conditions for which patients sought medical care.

GBD was created in part due to researchers' observations that deaths estimated by different disease-specific studies added up to more than 100% of total deaths when summed. The GBD approach ensures that deaths are counted only once. First, GBD counts the total number of deaths in a year. Next, researchers work to assign a single cause to each death using a variety of innovative methods (see Annex). Estimates of cause-specific mortality are then compared to estimates of deaths from all causes to ensure that the cause-specific numbers do not exceed the total number of deaths in a given year. Other components of the GBD estimation process are interconnected with similar built-in safeguards, such as for the estimation of impairments that are caused by more than one disease.

Beyond providing a comparable and comprehensive picture of causes of premature death and disability, GBD also estimates the disease burden attributable to different risk factors. The GBD approach goes beyond risk factor prevalence, such as the number of smokers or heavy drinkers in a population. With comparative risk assessment, GBD incorporates both the prevalence of a given risk factor as well as the relative harm caused by that risk factor. It counts premature death and disability attributable to high blood pressure, tobacco and alcohol use, lack of exercise, air pollution, poor diet, and other risk factors that lead to ill health. Risk-outcome pairs were selected if they passed the test for "convincing or probable evidence" according to World Cancer Research Fund (WCRF) criteria.

The role of social determinants such as income, education, and inequality were not assessed in this study. The lack of inclusion of socioeconomic factors in the analysis does not mean that these factors are unimportant, but rather that the body of evidence about their impacts on health does not meet WCRF criteria of convincing or probable evidence for the effects of a risk factor on a specific cause of death or disability. Given that the impact of social determinants on all-cause mortality are well established in the literature, these factors would have been included in this study if the study's criteria had only required evidence of risk factors' effects on all-cause mortality. Also, studies of socioeconomic factors report varying degrees of impact on health, known as effect sizes, and WCRF criteria require consistency of effect sizes across studies. Nonetheless, experts in the field contend that studies demonstrate that social determinants play a crucial role in determining population health. Future revisions of GBD should consider modifying inclusion criteria for risk factors, and even more rigorous studies on social determinants of health should be carried out. Despite the limitation of not assessing the impact of socioeconomic factors on health, studies have shown that addressing the behavioral, environmental, and metabolic risk factors measured in GBD have substantial benefits across socioeconomic groups.

The flexible design of the GBD machinery allows for regular updates as new data are made available and epidemiological studies are published. Similar to the way in which a policymaker uses gross domestic product data to monitor a country's economic activity, GBD can be used at both the global and national levels to understand health trends over time.

Policymakers in Australia, Brazil, China, Colombia, Indonesia, Mexico, Norway, Saudi Arabia, Turkey, and the United Kingdom are in the process of adopting different aspects of the GBD approach. Box 3 contains decision-makers' and policy influencers' reflections about the value of using GBD tools and results to inform policy discussions.

For the first time in the history of GBD research, IHME has developed many free data visualization tools that allow individuals to explore health trends for different countries and regions. The tools, which can be found on the IHME website, allow users to interact with the results in a manner not seen in past versions of the study.

Box 3: Views on the value of GBD for policymaking

"I want us to be up there with the best in Europe when it comes to tackling the leading causes of early death, starting with the five big killer diseases – cancer, stroke, heart, respiratory, and liver diseases. But the striking picture of our health outcomes across these major causes of early death published in *The Lancet* recently shows that we have a long way to go before we are confident that we can achieve this aspiration."
Jeremy Hunt, *Secretary of State for Health, United Kingdom*

"The launching of these tools is important, because they will allow us to understand who we are in matters of public health and to compare ourselves with ourselves, what is important across time, and also to compare ourselves with what happens in the region and in other regions. It's not a simple new tool; it's a revolution. It's like the first landing on the moon."
Agnes Binagwaho, *Minister of Health of Rwanda*

"We think we know where the burdens are in our society, but I bet you when we have another look at it from this frame we'll find things we didn't know. And then we'll tackle them."
Jane Halton, *Secretary, Australian Department of Health and Ageing*

"The Global Burden of Disease Study 2010 (GBD 2010) in *The Lancet* represents an unprecedented effort to improve global and regional estimates of levels and trends in the burden of disease. Accurate assessment of the global, regional, and country health situations and trends is critical for evidence-based decision-making for public health."
Margaret Chan, *Director-General, World Health Organization*

Users report that the visualization tools provide a unique, hands-on opportunity to learn about the health problems that different countries and regions face, allowing them to explore seemingly endless combinations of data. The following list illustrates the range of estimates that can be explored using the GBD data visualization tools:

- Changes between 1990 and 2010 in leading causes of death, premature death, disability, and DALYs as well as changes in the amount of health loss attributable to different risk factors across age groups, sexes, and locations.
- Rankings for 1990 and 2010 of the leading causes of death, premature death, disability, and DALYs attributable to risk factors across different countries and regions, age groups, and sexes.
- Changes in trends for 21 cause groups in 1990 and 2010 in different regions, sexes, and metrics of health loss.
- The percentage of deaths, premature deaths, disability, or DALYs in a country or region caused by myriad diseases and injuries for particular age groups, sexes, and time periods.
- The percentage of health loss by country or region attributable to specific risk factors by age group, sex, and time period.

The visualization tools allow users to view GBD estimates through hundreds of different dimensions. Only a few examples are explored in the figures throughout this document. We encourage you to use the GBD data visualization tools and share them with others.

In addition to promoting understanding about the major findings of GBD, these visualization tools can help government officials build support for health policy changes, allow researchers to visualize data prior to analysis, and empower teachers to illustrate key lessons of global health in their classrooms.

To use the GBD data visualization tools, visit www.ihmeuw.org/GBDcountryviz.

THE EGALITARIAN VALUES INHERENT IN GBD

When exploring the possibility of incorporating GBD measurement tools into their health information systems, policymakers should consider the egalitarian values on which this approach is founded.

The core principle at the heart of the GBD approach is that everyone should live a long life in full health. As a result, GBD researchers seek to measure the gap between this ideal and reality. Calculation of this gap requires estimation of two different components: years of life lost due to premature death (YLLs) and years lived with disability (YLDs).

To measure years lost to premature death, GBD researchers had to answer the question: "How long is a 'long' life?" For every death, researchers determined that the most egalitarian answer to this question was to use the highest life expectancy observed in the age group of the person who died. The Annex contains more information about the estimation of YLLs.

In order to estimate years lived with disability, or YLDs, researchers were confronted with yet another difficult question: "How do you rank the severity of different types of disability?" To determine the answer, researchers created disability weights based on individuals' perceptions of the impact on people's lives from a particular disability, everything from tooth decay to schizophrenia.