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EDITORIAL

Reducing risks to health: what can we learn from the Global Burden of Disease 2010 Study?

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Debates about health priorities are likely to be better informed if there is a reasonable understanding among policy makers of the comparative importance of various diseases and injuries in the population, at different ages, and how this pattern of health loss is changing over time. Indeed, provided such a description of the epidemiological profile of a population is sufficiently comprehensive, and every effort has been made to ensure comparability of measurement across diseases and injuries, the results can provide a meaningful accounting of the relative importance of different conditions in causing premature death and disability, and hence, guide the need for various intervention strategies. This was the basis for undertaking the first Global Burden of Disease (GBD) Study in the early 1990s which was commissioned and used by the World Bank to help define intervention packages designed to maximize population health gains for countries at different levels of health development (World Bank 1993; Murray and Lopez 1996).

While a contemporary, comprehensive and comparable description of disease and injury contributions to health loss in a population is undoubtedly of value for tempering and guiding public policy, one might argue that health strategies and policies would be better served by a similarly complete and comparable understanding of the *causes* of various diseases and injuries, particularly those that account for substantial health loss in populations. We all know that tobacco is harmful to health, but it is more compelling for public policy to understand just *how* much disease burden it causes, and how that health loss compares to other, largely avoidable exposures that are known to be harmful to health such as raised blood pressure, occupational risks or various environmental exposures. Public policy can reasonably be expected to respond to established and substantial causes of disease and injury burden in a population, especially where these are known to be largely preventable, but it is much more difficult, often confusing to expect efficient policy responses to control disease or injuries where the underlying causes are multifactorial, or their comparative importance is unknown. This might well lead to policy inaction: for example, a key tactic of the tobacco industry for many years has been to highlight the many causes of vascular mortality, or cancer, only one of which is tobacco use. The challenge is how to adequately capture and quantify the full disease burden from risk factor exposures in a comprehensible and readily interpretable way so that policy discussions can be reliably informed by the outcomes, and thus respond appropriately.

Despite the obvious policy benefits, quantifying risk factor disease burden is unusually complex and challenging. Rules and procedures for the categorical attribution of each death to a single underlying cause, as set out for diseases and injuries under the International Classification of Diseases (World Health Organisation 1992), is clearly impossible for risk factor attribution since deaths are often due to multiple exposures and there is no convention, indeed no scientific consensus or even framework, to adequately assign them to a single risk factor. To circumvent this challenge, Murray and Lopez (1999) proposed to quantify disease burden from risk factor exposures using counterfactual analysis, with a theoretical minimum

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population distribution of exposure being defined for each risk factor to enhance comparability across different exposures. This does not avoid the problem of additivity across risk factors, however, since disease burden is estimated assuming that population exposures are uncorrelated across risks, and that risks act independently of one another, something we know to be untrue. Nevertheless, such assumptions are necessary to compute and compare the health effects of different risks, but prudence is necessary when interpreting the findings. Data on populations exposed to various levels of different risk factors are also sparse, and often biased, and statistical methods are required to turn this often fragmentary exposure data into detailed population distributions of exposure. For this reason, the GBD2010 Study, for the first time, provides uncertainty intervals around all estimated parameters, including population distributions of exposure to risk factors and population level health effects (Murray et al. 2012; Lim et al. 2012).

Notwithstanding these caveats, what were the leading risk factors in terms of their contribution to the global burden of disease in 2010, and how important were environmental exposures among them? Of the 67 risk factors or clusters of risk factors quantified, high blood pressure was the leading cause, accounting for 7 % of disease burden worldwide in 2010, followed by tobacco (6.3 %), and alcohol (5.5 %). This reflects considerable change since 1990 when childhood underweight (7.9 %), household air pollution from solid fuels (7.0 %) and tobacco (6.1 %) were the three leading global risks. Of the seven environmental risks quantified in GBD2010, the greatest contributions to global disease burden were from household air pollution (4.5 %, and ranked fourth globally), ambient particulate matter pollution (3.1 %; 9th rank), followed by unimproved sanitation, and lead exposure. These findings confirm the rapid risk factor transition being observed in most parts of the world, from exposures primarily affecting children to exposures primarily affecting adults, the single exception being sub-Saharan Africa.

Risk factor quantification is a powerful and compelling tool to support calls for policy action to improve health. While the latest findings from the Global Burden of Disease Study constitute an important evidence base to guide global health development strategies, more research effort and more investment are needed. In particular, there is an urgent need to quantify important risks for major disease and injury outcomes not well covered by the current set of risk factors, including risks affecting mental health outcomes, and to expand the list of risk factors being investigated, including emerging environmental factors that are likely to significantly affect population health.

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