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Should the GBD risk factor rankings be used to guide policy?

See **Comment** pages 2053, 2054, 2055, 2058, 2062, and 2063

See **Special Report** page 2067

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The Global Burden of Disease Study 2010 (GBD 2010) estimates provide important new insights. Alongside estimates of health burden attributable to 291 diseases and injuries,[1] Stephen Lim and colleagues[2] estimate the health burden associated with 67 risk factors, organised into a hierarchy of clusters. So as to distinguish real changes in global burden and risk factors from changes in methods, they not only estimated the burden and risk factor ranking for 2010, but also recalculated estimates for 1990. This study represents the work of several expert working groups, who led systematic reviews of the health effects and prevalence of each risk factor.

In such a complex and ambitious exercise, trade-offs between rigour and policy relevance are inevitable. Judgment calls have to be made when data are not reliable or consistent, and these will sometimes be contentious. In the long term, the work's value will depend on whether the findings are internally consistent, complete, and supported by scientific consensus.

Although many of the rankings of disease burden and risk factors are internally consistent, discrepancies exist because of the incompleteness of risk factors analysed. For example, diarrhoea and HIV/AIDS are leading causes of global disability-adjusted life years (DALYs), but their associated risk factors do not feature strongly (figure). For diarrhoea, in 2010 the associated risk factors of sanitation and unsafe water only ranked 26 and 33, respectively, and estimates for poor hygiene were not included.[2] For HIV, unsafe sex was not included as a risk factor, by contrast with the previous Global Burden of Disease analysis (GBD 2006).[3]

More generally, the 1990–2010 comparison of risk factors suggests that alcohol, tobacco smoking, and several dietary factors have moved up the rankings, whereas others, such as being underweight, suboptimal breastfeeding, poor sanitation, vitamin A deficiency, zinc deficiency, and unsafe water, have decreased in importance.[2] These changes portray real demographic

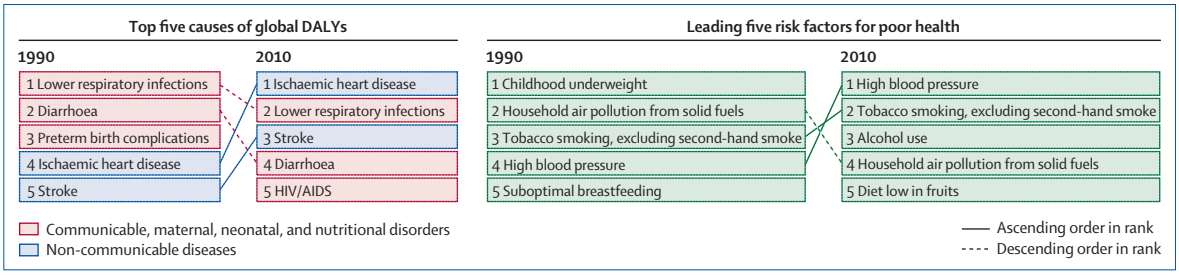

Figure: **Main causes of global DALYs and top five risk factors for poor health in 1990 and 2010**
Data from Murray and colleagues[1] and Lim and colleagues.[2] DALYs=disability-adjusted life years.

and health transitions, and reductions in age-specific mortality and morbidity.[1] They might also be due to methodological issues that require further interrogation.

For analysis of each risk factor, the investigators made a quantitative estimate of the health effect of excess exposure. For this, a baseline counterfactual exposure was chosen (eg, for tobacco smoking, the baseline exposure was no smoking), and the additional health risk associated with increased exposure was estimated. For the inclusion of each health effect, and for the choice of counterfactual exposure, evidence was needed from various longitudinal and intervention studies. This high standard of evidence establishes causality but might result in the omission of plausible health effects. For example, some health outcomes (eg, alcohol misuse and sexually transmitted infections) proposed by the Expert Working Group on Interpersonal Violence for exposure to intimate partner violence were not included in the final analysis, despite their previous inclusion in a country-level GBD analysis.[4] Longitudinal research is expensive, and this standard might therefore skew the analysis away from risk factors that are difficult to study, or towards risk factors affecting wealthier countries.

The risk factor rankings equally depend on the estimates of global exposure. For most risk factors, systematic reviews were used to compile available exposure data. Complex Bayesian statistical methods were often then used to project national exposures by age group. This remains largely a so-called black box step in the process, and ultimately the reliability of these inputs is difficult to assess, as is whether the exposures used are strongly extrapolated or evidence-based for each risk factor and region.

The issue of what is or is not included in the final risk factor analysis is not minor in terms of policy relevance. For example, hygiene promotion and effective contraceptive use are both cost effective,[5] but neither poor hygiene nor poor contraceptive use was included in the present estimates, despite being included previously.[2,3] More broadly, other important determinants of ill health might be methodologically complex to include, but nevertheless merit consideration, in view of their policy significance.[6]

The complexities of the task have been compounded by inadequate consultation. Much work was done by the expert groups on a goodwill basis. However, they could not influence the overall analytical framework, and were not provided with opportunities to interrogate the comparative results. Thus, although the findings portray the work of numerous experts, the rankings made do not show the scientific consensus of all those involved.

How can the work be strengthened? Christopher Murray,[1] Lim,[2] and colleagues should be congratulated for their impressive achievements, but the concerns mentioned here mean that the risk factor rankings should be interpreted with caution. The results are an important starting point, but the process for future global assessments needs to be revisited.

Fundamentally, a ranking cannot work if important risk factors for major health burdens are omitted. More broadly, a clearer consensus is needed on the criteria for inclusion of risk factors and health effects, and on strategies to overcome important data gaps.

A stronger process of engagement would help increase transparency and buy-in for the findings. Bearing in mind the importance and the contention surrounding current projections, attention paid to achieving scientific consensus would greatly improve future assessments.

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