

The State of Health in the United States

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In the mid-1970s, John Knowles assembled a group of leading health thinkers whose essays were published in *Daedalus* and then released as a book entitled *Doing Better and Feeling Worse: Health in the United States*.¹ In the decade between 1965 and 1975, health expenditures in the United States had more than tripled, from \$39 billion (5.9% of gross domestic product) to \$119 billion (8.3% of gross domestic product). The premise of the book, as Knowles explained in his introduction, was that "... there was a profound national concern that, despite a massive increase in health expenditures ... the nation's health has improved less than was promised or expected. The benefits have not appeared to justify the costs."

In this issue of *JAMA*, the landmark report by the US Burden of Disease Collaborators² demonstrates in stark, quantitative terms that the US dilemma in health care remains strikingly unaltered from what Knowles described. **Despite a level**



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of health expenditures that would have seemed unthinkable a generation ago, the health of the US population has improved only gradually and has fallen behind the pace of progress in many other wealthy nations. In fact, by every measure including death rates, life expectancy, and diminished function and quality of life as assessed by the authors, the US standing compared with 34 Organisation for Economic Co-operation and Development countries declined between 1990 and 2010.

These results on the state of health in the United States derive from a massive study of the burden of disease in 187 countries.³ In the current report,² results for the United States are presented in detail for the first time. **The study depicts both the burden of disease and the contributions of a range of risk factors associated with the identified diseases. Importantly, the core measure of disease burden (disability-adjusted life-years) incorporates both a component of premature mortality (years of life lost due to premature mortality) and of diminished quality of life (years lived with disability). This combined measure of mortality and morbidity sets this study apart from other international comparisons that rely solely on mortality or life expectancy.** At the same time, measurement of morbidity, although extremely important as an increasing fraction of the overall burden of disease between 1990 and 2010, is intrinsically more subjective and methodologically demanding than counting deaths. It nevertheless remains valuable to track morbidity because the main sources of diminished function and quality of life (such as musculoskeletal conditions and mental illness) differ from the most prominent causes of death (such as heart disease and cancer) and may receive less attention in policy and research than they warrant in terms of their overall contribution to the burden of disease.

Computing the global burden of disease has been a herculean task, calling on the active participation of hundreds of investigators in scores of countries and relying on an array of adapted and newly crafted methods. These include, for example, algorithms to detect and correct for coding errors on causes of death; a Bayesian metaregression method (DisMod-MR) designed to integrate descriptive epidemiological studies despite such problems as missing data, inconsistency, and methodological variation; surveys (some web-based) using multiple pairwise comparisons to generate a scale for various intermediate states between perfect health and absence of health; comparison of the current distribution of a risk factor exposure to a theoretical minimum risk counterfactual distribution (TMRED) to estimate the contribution of each risk factor to premature deaths; and simulation modeling with sampling to produce confidence intervals around estimated effects.

This is an arcane and complex process, and despite the authors' best efforts to explain their methods and make data available, few readers will fully understand how the results are derived. At the same time, how many understand how a construct as familiar as life expectancy is actually calculated? More telling, perhaps, is that few experts who have not been directly involved in the global burden of disease exercise will believe that they completely comprehend the methods. Over time, as the methods are fully described, others may gain experience with their use and limitations, perhaps add refinements or create improvements, and contribute to the laudable goals of the exercise. **Whatever concerns may exist about the specific methods, the value cannot be disputed in having a consistent and accurate metric of the burden of disease in every country to measure progress over time and in comparison with others. Seeking to improve health in the absence of such metrics would be like flying through a storm without instruments and hoping to arrive at the intended destination.**

The authors' determination to generate consistent data across a range of national settings and to focus on specific diseases as causes of death are a source of strength and of limitations to the study. The strength is the capacity to compare in a consistent way. The limitation is reliance on data types that are universally available and on analyses that relate to specific disease conditions rather than to overall mortality. The most glaring omission in the assessment of risk factors, as the authors acknowledge, is the role of social factors such as income and inequality as a risk of premature death and disability. The authors include what they call distal socioeconomic factors in their theoretical construct of risk factors, but they exclude them from the analysis largely because much of the literature relates these factors to overall mortality rather than to disease-specific mortality, as required for the burden of dis-

ease calculations. This omission should not be allowed to mislead policy makers because differences in socioeconomic status and other social circumstances are strongly related to differences in mortality, as has been emphasized in a recent, comprehensive assessment by the National Research Council and the Institute of Medicine on US health in comparison with other countries.⁴

The component of the study dealing with risk factors is problematic in other ways. For instance, for mortality, there is a natural sum of all disease-specific deaths; namely, the total number of deaths. No such natural limit restricts the sum of risk factor contributions from studies of relative risk, and the authors acknowledge that these may add to more than 100%. In the case of dietary risk factors, 14 components of diet have been treated as independent risk factors. Although this is a tribute to the richness of the literature about specific dietary exposures and risk of premature death, this approach overlooks likely codependence among at least some of the dietary components and, thus, tends to overstate the relationship between diet and mortality. Nevertheless, even taking these calculations with a pinch of salt, the potential for dietary changes to improve health in the United States is impressive.

Risk factor analyses will become more useful over time as epidemiologists, statisticians, biologists, and other scientists are able to map the several layers of causal factors onto the expression of illness and its consequences. In this way, genetic, metabolic, physiologic, behavioral, environmental, and social factors will be traced through defined pathways to disease and premature mortality. This is a huge undertaking, the epidemiologic equivalent of the grand unified theory of forces in particle physics. Even partial elucidation of these epidemiologic interactions promises to reveal powerful ways to prevent disease and premature mortality. Importantly, this integrative research objective requires lines of inquiry at both the

social and biological levels. Trying to understand the causation of disease using only one of these lines of research is like trying to clap with one hand.

Notably, in this time of government austerity, these calculations of the US burden of disease stand on a foundation of surveys and data sets compiled by agencies of the US government. The same may be said of virtually every analysis of health status in the United States. If the goal is to set sensible priorities aimed at reducing the burden of illness, it would be difficult to overstate the loss from mindless reductions in the capacity of data-gathering agencies, such as the National Center for Health Statistics and the Centers for Disease Control and Prevention.

A great virtue of this monumental construction of the US burden of disease is that it is scalable up and down—up to global regions and the world and down to states, counties, and municipalities. The overall US health status may mask important variation and inequities within smaller geographic regions, as, indeed, an earlier analysis showed that in 4 of every 10 US counties, life expectancy for women declined between 1992 and 2006.⁵ If, as some have suggested,⁶ local government will be even more consequential in the immediate future, understanding local health status in comparison with other municipalities and counties can pay valuable health dividends.

Setting the United States on a healthier course will surely require leadership at all levels of government and across the public and private sectors and actively engaging the health professions and the public. Analyses such as the US Burden of Disease can help identify priorities for research and action and monitor the state of progress over time. If all constituents do their parts, the apt subtitle for the next generation's analysis of US health will be not “doing better and feeling worse (still)” but “getting better faster than ever.”

ARTICLE INFORMATION

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