

Science Spotlight

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Global Burden of Disease Update Reveals Major Risk Factors for Death and Disability

By Sara Mishamandani

Modifiable risk factors explain more than half of global deaths and more than one-third of global disability-adjusted life years (DALYs), according to a recent update to the Global Burden of Disease Study (called GBD 2013, as this is the most recent year for which the data were analyzed). A [study](#) published recently in the *Lancet* provides new insights into the attribution of the burden of disease to behavioral, environmental and occupational, and metabolic risk factors.

In 2013, the six most important risk factors for disease burden globally were dietary risks, high systolic blood pressure, child and maternal malnutrition, tobacco, air pollution, and high body mass index (a measure of body fat). This set of risks reflects a general shift toward behavioral and metabolic risks. Of environmental factors, occupational risks and unsafe water, sanitation, and hygiene are among the top 12 overall risk factors.

“The big focus of the Global Burden of Disease enterprise is to make the best health evidence available so that decision-makers can make informed decisions to improve health,” said [Theo Vos, Ph.D.](#), Professor of Global Health at the Institute for Health Metrics and Evaluation at the University of Washington and key member of the research team for the GBD study. “The GBD study helps decision-makers compare the impact caused by conditions in a wide range of areas, things as different as lung cancer and hepatitis and depression, using a single metric that allows for apples to apples comparisons.”

The GBD 2013 study assesses overall burden of disease using total deaths and DALYs, a measurement of the cumulative number of years lost due to ill-health, disability, and early death. DALYs are calculated by adding together years of life lost to death and a portion of the years of life lived with a disability, weighted depending on the severity of the disability.

Identifying Risk Factors for Disease and Disability

The GBD 2013 notes the contribution of different risk factors to patterns of disease and injury across countries. Researchers estimated attributable deaths, years of life lost, years lived with disability, and DALYs for 79 risk factors in 188 countries between 1990 and 2013. The risk factors in the GBD 2013 were identified through systematic reviews of scientific literature as well as census, satellite, and survey data.

Because the global pattern masks regional variation in risk profiles, researchers also assessed disease burden and attributable risks by country. For example, household air pollution is a leading risk factor in South and Southeast Asia—and the top risk factor for women in Cambodia. In Southeast Asia, the use of

inefficient indoor stoves to cook daily meals using solid fuel is common. These traditional cookstoves contribute to this increase in risk from household air pollution in Southeast Asia, with women and young children the most affected.

For the first time, the researchers also looked at the role that socio-demographic status plays in determining health loss. They found that socio-demographic status accounts for more than half of the differences seen between countries and over time for certain leading causes of disease burden, including maternal and neonatal disorders.

“In the next GBD update, we will be grouping countries according to their sociodemographic level and benchmarking their health performance,” Vos said. “By looking at the top performing countries in each sociodemographic group, their peer countries can learn from them and replicate their success.”

Burden of the Environment in the GBD

In GBD 2013, air pollution accounts for 5.5 million deaths and 141.5 million DALYs. According to the study, deaths from household air pollution and ambient particulate matter pollution were roughly equal. But more DALYs were attributable to household air pollution (81 million) than ambient particulate matter pollution (about 70 million). The data also revealed variation in air pollution burden by country.

“While we hear a lot about China’s air pollution in the media, ambient air pollution in India is much higher and a larger burden of disease per person in India is attributable to air pollution,” said Vos. “In addition, air pollution is the second highest risk factor for disease burden in India with no significant improvement since 1990.”

Occupational risks are also top risk factors in the overall burden of disease. Lead exposure accounted for an increased number of deaths in 2013 as compared with 1990—853,000 compared with 668,000. Occupational carcinogens caused 304,000 deaths globally in 2013 and 5.8 million DALYs, and asbestos exposure accounted for nearly two-thirds of the burden of all occupational carcinogens. In total, occupational exposures accounted for about 55 million DALYs, which includes occupational ergonomic factors, injury, and noise, as well as exposures to asbestos, polycyclic aromatic hydrocarbons, silica, sulphuric acid, trichloroethylene, arsenic, benzene, beryllium, cadmium, chromium, diesel exhaust, second-hand smoke, formaldehyde, nickel, asthmagens, and particulate matter, gases and fumes.

Refining Environmental Risk Factors

The next update, GBD 2015, improves on two environmental risk factors, water and sanitation and household air pollution. The GBD research team has incorporated more detailed descriptions of access to water and sanitation and is incorporating information from growing literature that quantifies exposure to particulate matter from solid fuel use.

Moving forward, more environmental risks such as those from soil and water contamination will be incorporated as new studies showing links between these environmental factors and risk become available. Researchers also recognize the contributions to risk of genes, the microbiome, public health and medical care interventions, and other social and economic factors, but these factors are currently beyond the scope of the study. In future iterations of the GBD, researchers intend to broaden the analysis.

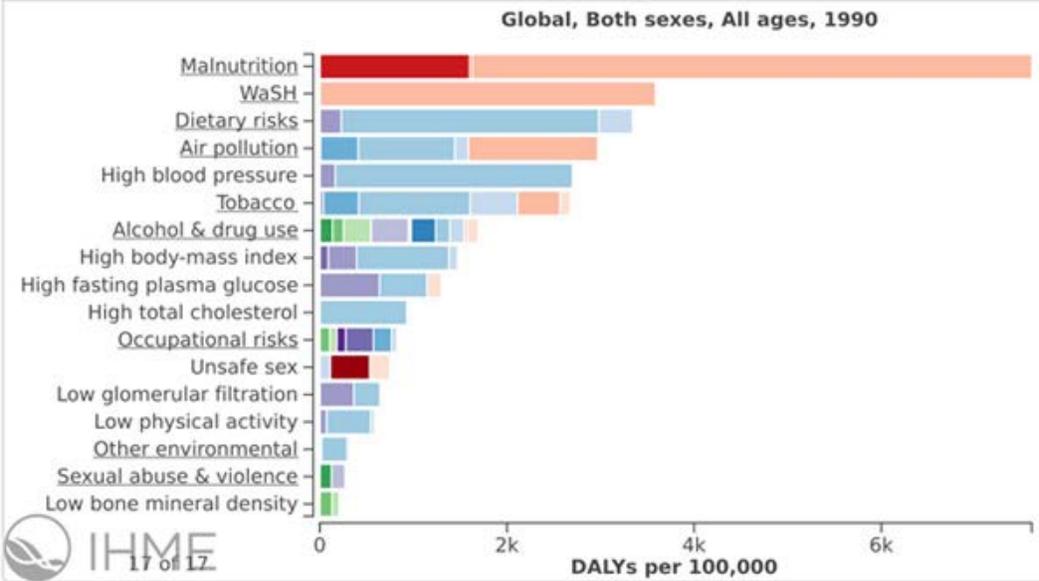
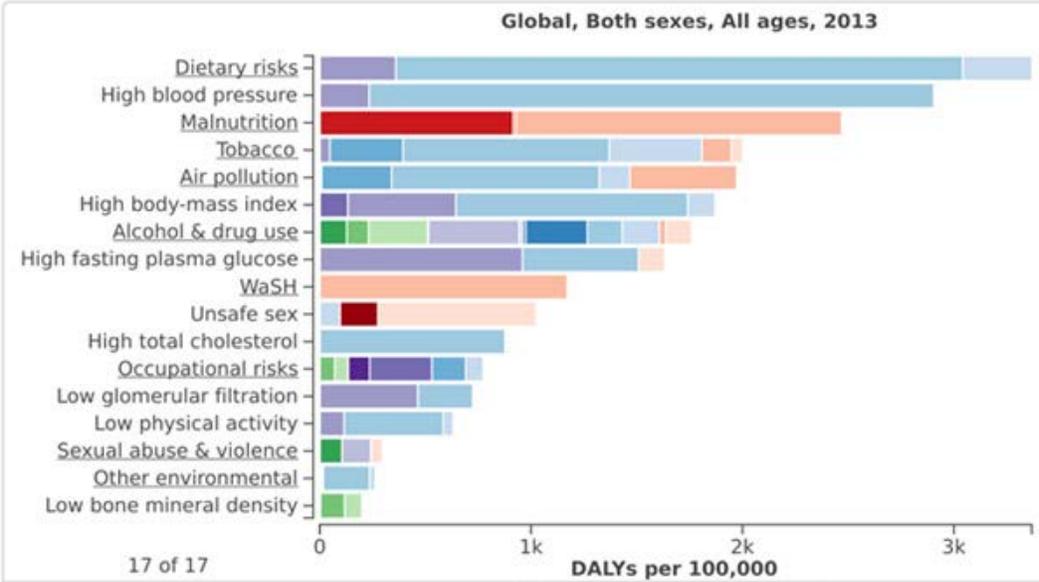
“Our collaborators have suggested adding a variety of environmental risk factors such as food safety, waste water treatment, toxic waste materials, heavy metals, and water quality,” said Vos. “We are consulting with experts and selecting new environmental risk factors to include based on data availability and strength of evidence about the distribution of risk and possible health outcomes.”

Drawing Conclusions

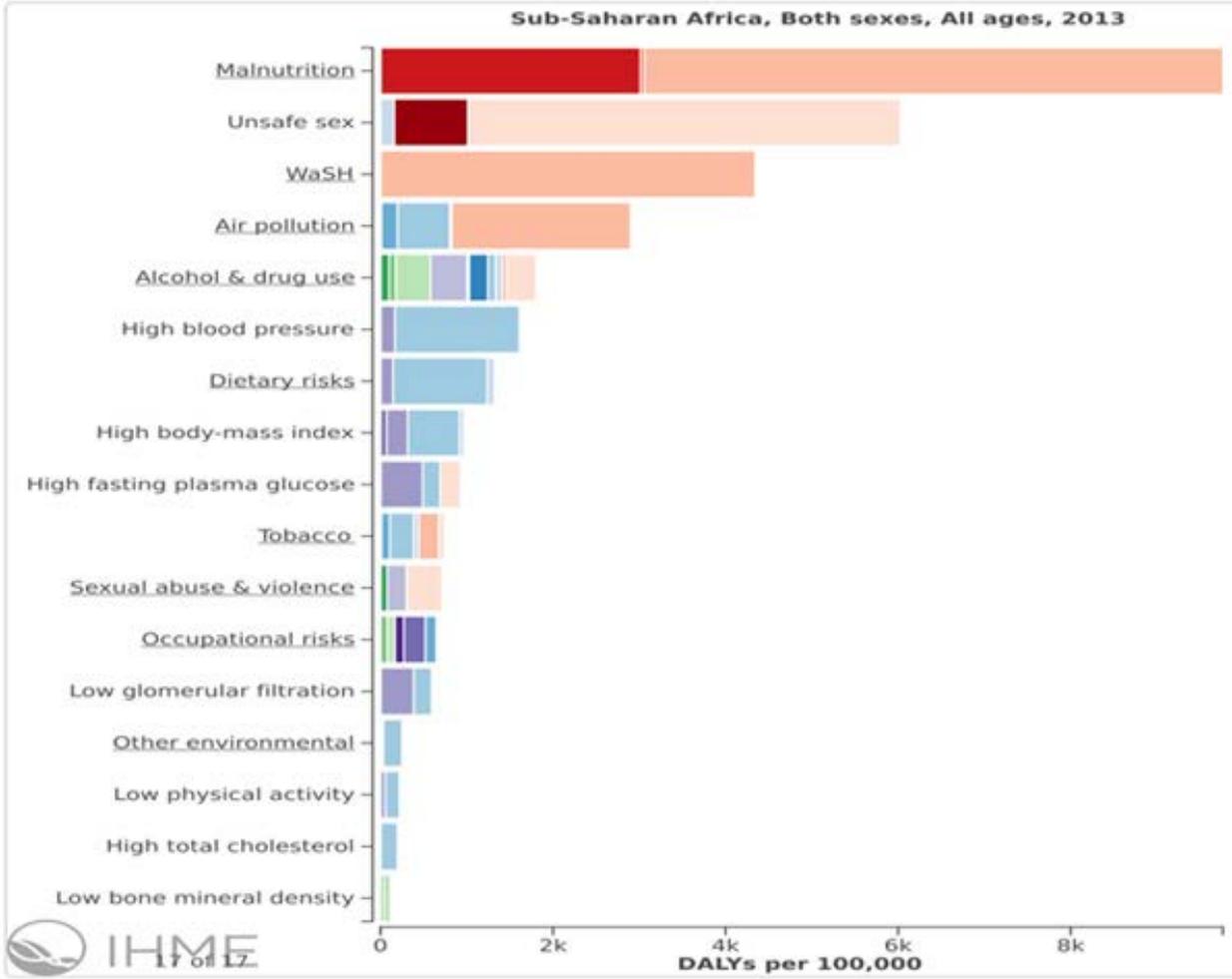
This comprehensive assessment helps focus prevention programs for certain risk factors on areas with the greatest need and where social and behavioral modification can have major effects on health. According to the study authors, the challenge for governments and the health development community is to use this comparative risk information to develop more effective health policies.

GBD 2013 data are already being used by decision-makers to inform planning and policymaking around the world. For example, when the GBD study revealed that household air pollution from solid fuel combustion was a leading cause of disease burden in Rwanda, the government initiated a program to distribute 1 million clean fuel cook stoves to vulnerable households.

“We are actively partnering with individuals and governments all over the world to disseminate results to decision-makers,” said Vos. “The GBD can help health systems sort out what is really going to make the biggest difference in improving health.”



Global DALYs attributed to risk factors in 2013 (top) and in 1990 (bottom) for both sexes combined. This comparison highlights the drastic shift in the global risk factors between 1990 and 2013. Red indicates communicable, maternal, neonatal, and nutritional diseases. Blue and purple indicate noncommunicable diseases. Green indicates injuries. (Image from GBD Compare available at <http://vizhub.healthdata.org/gbd-compare>)



The DALYs attributable to risk factors in sub-Saharan Africa for both sexes in 2013 shows a much different picture than the global DALYs, highlighting the need for targeted approaches for prevention in certain regions of the world. (Image from GBD Compare available at <http://vizhub.healthdata.org/gbd-compare>)