

Estimating the Global Risk and Burden of Particulate Air Pollution Exposure: Issues and Challenges

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Estimates from the Global Burden of Disease (GBD) project place ambient and household air pollution among the leading global risk factors for premature mortality from non-communicable diseases. Ambient and household PM_{2.5} ranked 5th among global mortality risk factors in 2017, following high blood pressure, smoking, high fasting plasma glucose and high total cholesterol. The Integrated Exposure Response function, or IER, was essential to making these estimates, combining information on the mortality risk from exposure to diverse sources of combustion-derived PM air pollution, including cigarette smoking, to estimate the burden of disease attributable to PM_{2.5} exposure in ambient and household environments at levels that had not been directly studied epidemiologically. But the IER rests on a range of strong assumptions and is a main source of uncertainty in the GBD estimates and those made by WHO, the World Bank, and a large number of academic researchers who have adopted it.

Since its introduction in GBD 2010 the IER has evolved to keep pace with new scientific evidence and continuing technical challenges. The increasing number of air pollution cohort studies over the last decade, including recent Chinese studies, have provided an opportunity to formulate approaches to estimation of the exposure-response relationship of PM with mortality based in epidemiological data that avoid the underlying assumptions of the IER. Consequently, there is now an ongoing discussion regarding the way forward for air pollution risk estimation for the quantification of disease burden. This symposium will discuss critical issues concerning methods to estimate the exposure-response relationship for mortality due to long-term exposure to fine particulate matter over the global concentration range for ambient and household exposure, and critically explore options for the future.

The proposed symposium addresses directly the conference theme "On Airs, Waters, Places." Air pollution is the leading global environmental health risk factor and a leading cause of disease burden, whose magnitude varies over time in places across the world. Over the past 20 years epidemiologists have developed methods which have made it possible to quantify that burden. These methods, and their historical and future evolution, are of critical importance to continuing progress in quantifying and reducing the burden of disease due to air pollution.