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One million premature deaths linked to ozone air pollution

New research links long-term exposure to ozone air pollution with one million premature deaths per year due to respiratory diseases, which is more than double previous estimates.

A new article to be published today in the journal Environmental Health Perspectives quantifies the global impact of long-term ozone exposure on respiratory mortality. It finds that in 2010, long-term outdoor exposure to ozone air pollution contributed to about 1 million premature respiratory deaths globally – or approximately one in five of all respiratory deaths. This is substantially larger (125%) than previous estimates of the global health impacts of ozone (~0.4 million premature respiratory deaths).

"This study highlights that exposure to ozone may make a substantially greater contribution to the global burden of disease than previously thought," said Chris Malley, lead author of the study and researcher at Stockholm Environment Institute at the University of York.

Findings from this study were based on results from a recent US analysis of the association of long-term ozone exposure and respiratory mortality in 670,000 adults, with a substantially larger number of included study participants and observed deaths than a previous estimate published seven years earlier, on which previous global ozone health impacts calculations have been based.

The largest contribution to global ozone-attributable respiratory deaths was from Asia, which accounted for about 79% of the total one million global estimated deaths. India alone accounted for about 400,000, and China for about another 270,000. Africa, Europe and North America each had between 50,000 and 60,000 ozone-attributable deaths, with fewer in Latin America and Oceania.

"There is a degree of uncertainty in these estimates because the concentration-response function we used is based on analysis from the United States," Malley said. "We don't know whether the relationship is the same in other regions, such as in India and China, where the prevalence of other risk factors for respiratory diseases varies considerably. We also estimated people's ozone exposure using a global atmospheric chemistry transport model, which means that we could not account for differences in ozone exposure at small geographic scales."

The analysis grew out of SEI's Initiative on Low Emission Development Pathways, which includes the development of a "benefits calculator" to help policy-makers and planners assess the potential benefits of undertaking measures that reduce air pollution.

SEI's Initiative on Low Emission Development Pathways is contributing to the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC), where SEI is working with UNEP and other organisations to support more than 20 developing countries in Africa, Asia and Latin America in developing plans to reduce emissions leading to formation of ground-level ozone.

"Our colleagues from countries such as Ghana, Peru, Nigeria and Bangladesh have highlighted the importance of air pollution impacts on health as a motivation for reducing emissions," said SEI's Policy Director Johan C.I. Kuylenstierna, co-author of the study and a member of the CCAC Scientific Advisory Panel. "Knowing that reducing outdoor air pollution, including ozone, could make an even larger contribution to improving health, provides a compelling new reason to invest in actions reducing emissions."

So, what could be done to reduce ozone exposure? Given that many people, particularly in the poorest and most vulnerable populations, cannot easily relocate, the key is to address the sources of pollution, Malley and Kuylenstierna stressed. Ozone is not directly emitted but is formed in the atmosphere from emissions of pollutants like nitrogen oxides from vehicles, organic compounds from solvent use, and methane from agriculture. Once formed, ozone can stay in the atmosphere for a few weeks and travel long distances from the emission sources, across countries and continents.

"To reduce ozone pollution, you need to control emissions of different precursors from many different sources," Kuylenstierna said. "This includes emissions from road transport, household energy use, as well as methane emissions from agriculture."

"It is important to realize that action needs to be taken on all the major sources," Kuylenstierna added. "The long-range transport of ozone means that to reduce ozone, action is needed on local, national, regional and global scales. That means that regional cooperation often is needed to solve the problem."

Read the journal article in Environmental Health Perspectives:
Updated Global Estimates of Respiratory Mortality in Adults ≥30 Years of Age

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Additional information:

More about SEI's Initiative on Low Emission Development Pathways

More about outdoor air pollution from the World Health Organization

More about the Climate and Clean Air Coalition

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