Link between ozone air pollution and premature death confirmed

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Short-term exposure to current levels of ozone in many areas is likely to contribute to premature deaths, says a new National Research Council report, which adds that the evidence is strong enough that the U.S. Environmental Protection Agency should include ozone-related mortality in health-benefit analyses related to future ozone standards. The committee that wrote the report was not asked to consider how evidence has been used by EPA to set ozone standards, including the new public health standard set by the agency last month.

Ozone, a key component of smog, can cause respiratory problems and other health effects. In addition, evidence of a relationship between short-term -- less than 24 hours -- exposure to ozone and mortality has been mounting, but interpretations of the evidence have differed, prompting EPA to request the Research Council report. In particular, the agency asked the committee to analyze the ozone-mortality link and assess methods for assigning a monetary value to lives saved for the health-benefits assessments.

Based on a review of recent research, the committee found that deaths related to ozone exposure are more likely among individuals with pre-existing diseases and other factors that could increase their susceptibility. However, premature deaths are not limited to people who are already within a few days of dying.

In addition, the committee examined research based on large population groups to find how changes in ozone air concentration could affect

mortality, specifically to determine the existence of a threshold -- a concentration of ozone below which exposure poses no risk of death. The committee concluded that if a threshold exists, it is probably at a concentration below the current public health standard. As people have individual susceptibilities to ozone exposure, not everyone may experience an altered risk of death if ozone air concentration also changes. Further research should explore how personal thresholds may vary and the extent to which they depend on a person's frailty, the committee said.

The research on short-term exposure does not account for all ozone-related mortality, and the estimated risk of death may be greater than if based solely on these studies, the committee noted. To better understand all the possible connections between ozone and mortality, future research should address whether exposure for more than 24 hours and long-term exposure -- weeks to years -- are associated with mortality, including how ozone exposure could impact life expectancy. For example, deaths related to short-term exposure may not occur until several days afterward or may be associated with multiple short-term exposures.

Additionally, EPA should monitor ozone during the winter months when it is low and in communities with warmer and cooler winters to better understand seasonal and regional differences in risk. More research could also look at how other pollutants, such as airborne particulate matter, may affect ozone and mortality risk.

EPA, like other federal agencies, is required to carry out a cost-benefit analysis on mitigation actions that cost more than $100 million per year. EPA recently used the results of population studies to estimate the number of premature deaths that would be avoided by expected ozone reductions for different policy choices, and then assigned a monetary value to the avoided deaths by using the value of a statistical life (VSL).

The VSL is derived from studies of adults who indicate the "price" that they would be willing to pay -- i.e. what benefits or conveniences someone would be willing to forgo -- to change their risk of death in a given period by a small amount. The monetary value of the improved health outcome is based on the value the group places on receiving the health benefit; it is not the value selected by policymakers or experts.

EPA applies the VSL to all lives saved regardless of the age or health status. For instance, a person who is 80 years old in poor health is estimated to have the same VSL as a healthy 2-year-old. To determine if an approach that accounts for differences in remaining life expectancy could be supported scientifically, EPA asked the committee to examine the value of extending life. For example, EPA could calculate VSL to estimate the value of remaining life, so a 2-year-old would have a higher VSL than an 80-year-old. It is plausible that people with shorter remaining life expectancy would be willing to devote fewer resources to reducing their risk of premature death than those with longer remaining life expectancy. In contrast, if the condition causing the shortened life expectancy could be improved and an acceptable quality of life can be preserved or restored, people may put a high value on extending life, even if they have other health impairments or are quite elderly.

The committee concluded that EPA should not adjust the VSL because current evidence is not sufficient to determine how the value might change according to differences in remaining life expectancy and health status. However, the committee did not reject the idea that such adjustments may be appropriate in the future. To move toward determining a value of remaining life, alternative approaches should be explored in sensitivity analyses, and further research should be conducted to answer the questions raised about the validity of EPA's current approach.

Source: The National Academies