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Low-level ozone exposure found to be lethal over time

From the Los Angeles Times

An 18-year study shows an increased annual risk of death from respiratory illnesses, depending on the pollution level. It goes beyond studies that linked brief ozone spikes to short-term effects.

By Thomas H. Maugh II

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Ozone pollution is a killer, increasing the yearly risk of death from respiratory diseases by 40% to 50% in heavily polluted cities like Los Angeles and Riverside and by about 25% throughout the rest of the country, researchers reported today.

Environmental scientists already knew that increases in ozone during periods of heavy pollution caused short-term effects, such as asthma attacks, increased hospitalizations and deaths from heart attacks.

But the 18-year study of nearly half a million people, reported today in the New England Journal of Medicine, is the first to show that long-term, low-level exposure to the pollutant can also be lethal.

Current standards for ozone pollution cover only eight-hour averages of the colorless gas, but even with that relatively relaxed rule, 345 counties with a total population of more than 100 million people are out of compliance.

The Environmental Protection Agency "has already said that it will revisit the current ozone standards in the country," said Dan Greenbaum, president of the Boston-based Health Effects Institute, one of the study's sponsors.

"Undoubtedly, when it happens these results are going to be a very important part of that review," said Greenbaum, who was not involved in the study.

The EPA may need to implement an annual standard, said University of Ottawa environmental health scientist Daniel Krewski, one of the paper's authors.

Coauthor Michael Jerrett of UC Berkeley said the findings could have profound implications because they show that ozone worsens conditions that already kill a large number of people.

Deaths from respiratory diseases, such as chronic obstructive pulmonary disease, emphysema and pneumonia, account for about 8.5% of all U.S. deaths, an estimated 240,000 each year. Worldwide, such conditions account for 7.7 million deaths each year.

Ozone is what is known as a secondary pollutant. It is not formed directly by the burning of fossil fuels. Rather, nitrogen oxides produced by such combustion react in the presence

of sunlight to form ozone. It is thus the biggest problem in areas that are sunny and hot, Jerrett said.

As an oxidizing agent, ozone reacts with virtually anything it comes into contact with. In particular, it reacts with cells in the lungs, causing inflammation and a variety of other effects that lead to premature aging.

Jerrett and his colleagues studied 448,850 people over age 18 in 96 metropolitan regions who enrolled in the American Cancer Society Cancer Prevention Study II in 1982 and 1983. The subjects were tracked for an average of 18 years. During that follow-up period, there were 48,884 deaths, 9,891 of them from respiratory diseases.

The researchers found that every increase of 10 parts per billion (ppb) in average ozone concentrations was associated with about a 4% increase in dying from respiratory causes.

Riverside had the highest ozone average (104 ppb), and the risk of dying from respiratory causes was 50% greater than it would have been if there were no ozone.

Los Angeles had the second-highest ozone level and a 43% increase in risk.

In contrast, San Francisco had the lowest average ozone level (33 ppb) of the 96 regions studied and only a 14% increased risk, probably because of the fog and prevailing winds, which reduce ozone formation. The Pacific Northwest also had low levels of ozone, again because of rain and cool weather.

Cities in the East like New York and Washington had an average increased risk of about 25% to 27%.

The researchers found no increase in deaths from cardiovascular disease associated with ozone levels -- those deaths are caused primarily by the fine particulates present in air pollution.

They also found no increase in overall mortality, suggesting that ozone is causing deaths in people who were probably going to die in another year or two anyway, according to epidemiologist Joel Schwartz of the Harvard School of Public Health, who was not involved in the study.

"We do know that ozone is particularly dangerous for people living with existing asthma or lung disease," Jerrett said. And it didn't matter what someone's weight, income or education was. "It seems to affect a lot of people relatively equally."