# Air pollution exposure may hasten death, even at levels deemed 'safe,' study says

<http://www.latimes.com/science/sciencenow/la-sci-sn-air-pollution-death-20170628-story.html>

Even at levels considered safe by the Environmental Protection Agency, the fine particulates and ozone in air pollution were associated with premature risk of death, according to a new Harvard study. (Allen J. Schaben / Los Angeles Times)

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At a time when the Trump administration is moving to delay and dismantle air quality regulations, a new study suggests that air pollution continues to cut Americans’ lives short, even at levels well below the legal limits set by the [U.S. Environmental Protection Agency](http://www.latimes.com/topic/environmental-issues/u.s.-environmental-protection-agency-ORGOV000048-topic.html).

The nationwide study of more than 60 million senior citizens linked long-term exposure to two main smog pollutants — ozone and fine particulate matter — to an increased risk of premature death.

The analysis found no sign of a “safe” level of pollution, below which the risk of dying early tapered off.

[Harvard University](http://www.latimes.com/topic/education/colleges-universities/harvard-university-OREDU0000180-topic.html) scientists who conducted the study calculated that reducing fine particle pollution by 1 microgram per cubic meter nationwide would save about 12,000 lives each year. Another 1,900 lives would be saved annually by lowering ozone pollution by 1 part per billion, they found.

The [study](http://www.nejm.org/doi/full/10.1056/NEJMoa1702747) appears in Thursday’s edition of the New England Journal of Medicine.

Fine particulate matter is composed of tiny health-damaging specks of pollution that can lodge deep in the lungs and are linked to cardiovascular disease. Ozone, the lung-searing gas in warm-weather smog, triggers asthma and other respiratory illnesses. Both pollutants build up in the air largely as a result of emissions from vehicles, power plants and other major combustion sources.

For the analysis, researchers developed a new computer model that uses on-the-ground air-monitoring data and satellite-based measurements to estimate pollution levels across the continental U.S., breaking the country up into 1-square-kilometer zones. They paired that information with health data contained in Medicare claims records from 2000 to 2012 for all beneficiaries in the 48 contiguous states, a group that represents about 97% of the population ages 65 or older.

The high-resolution data allowed scientists to estimate the health effects of air pollution at levels far below the federal limits. For fine particulate matter, which has a legal limit of 12 micrograms per cubic meter or air, they found that seniors faced an increased risk of premature death when exposed to as little as 5 micrograms per cubic meter, the lowest amount they measured. For ozone, which has an EPA limit of 70 parts per billion, they detected increased mortality at levels as low as 30 ppb, also the smallest concentration they measured.

The researchers calculated that when the concentration of particulate matter rose by 10 micrograms per cubic meter, the chances that a senior citizen would die during the study period rose by 7.3%. And when the ozone concentration rose by 10 ppb, the chances of early death rose by 1.1%. In both cases, the researchers controlled for factors like smoking behavior, weight and income, which are also likely to affect a senior’s risk of premature death.

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The findings suggest that even though federal limits on the nation’s most widespread air pollutants are updated periodically based on scientific reviews required under the Clean Air Act, they are not strong enough to fully protect the public.

Critics may claim that stronger standards would offer diminishing returns, but the study results provide new evidence that they would actually increase health benefits, with fewer people getting sick and dying from dirty air, said [Francesca Dominici](https://www.hsph.harvard.edu/francesca-dominici/), a data scientist at the Harvard T.H. Chan School of Public Health and the study’s principal investigator.

“We are seeing that the air that we are breathing right now is harmful, it's toxic,” Dominici said.

An [editorial](http://www.nejm.org/doi/full/10.1056/NEJMe1706865) that accompanies the study said the findings “stress the need for tighter regulation of air-pollutant levels” and stricter limits on fine particulate matter.

“Despite compelling data, the Trump administration is moving headlong in the opposite direction,” the editorial said, citing the president’s recent steps to dismantle emissions-cutting rules, withdraw from the Paris climate accord and slash the EPA’s budget. “The increased air pollution that would result from loosening current restrictions would have devastating effects on public health.”

The findings have important implications for California, where millions of people breathe the nation’s highest levels of ozone and fine particulate matter. Despite decades of improvement, the air in Southern California and the San Joaquin Valley remains far from meeting federal health standards.

The new study adds to a [robust body of research](http://www.latimes.com/local/lanow/la-me-pollution-deaths-20160810-snap-story.html) going back to the [early 1990s](http://www.nejm.org/doi/full/10.1056/NEJM199312093292401#t=article) associating fine-particle pollution with shortened lives. But most of those studies were limited to populations in wealthier and well-monitored urban areas, the researchers said.

The enormous sample size — encompassing nearly all Americans over 65 — allowed scientists to examine air quality differences across all parts of the country, including small cities and rural areas, and among various ethnic and socioeconomic groups.

The researchers found that men, blacks, Asians, Latinos and lower-income seniors all faced higher risks of premature death from fine particulate matter. Black seniors were three times as likely as seniors overall to die prematurely.

Under the Clean Air Act, the EPA must review national air quality standards for six major pollutants every five years and adjust them if necessary to reflect the latest science.

The 12-micrograms-per-cubic-meter standard for fine particulate matter was last updated in 2012. The federal standard for ozone was last strengthened in 2015 and is now being reexamined by the Trump administration.

This month, EPA Administrator Scott Pruitt [announced a one-year delay](http://www.latimes.com/local/lanow/la-me-ozone-delay-20170607-story.html) in implementing the federal ozone standard, citing “increased regulatory burdens, restrictions on infrastructure investment, and increased costs to businesses.” The decision allows California and other states with ozone levels above the current standard to postpone the adoption of emissions-cutting measures.

Pruitt, who in his previous job as attorney general of Oklahoma made a career of suing to block EPA regulations, is also moving to reshape the agency’s science advisory boards. These include the committee that makes recommendations on federal air quality standards.

Environmentalists and health advocates fear Pruitt will replace academic experts with representatives of regulated industries.