

As we watch the news of the horrific wildfires raging in California, we should understand that, in addition to the risks of loss of life and property, there are real risks of long-term health consequences from exposure to ash and other fallout particles. Several studies show that fine particles, like soot spewed out by automobiles, heating units, power plants, incinerators, and fire particulates, are responsible for the death toll of roughly 60,000 Americans every year.

This means that any increase in fine particles in the atmosphere can result in fatalities. A mere rise above ordinary levels of air pollutants increases the death rate. People have known for a long time that particles in the air can kill. In 1952, dense smog killed 4,000 people in one week in London, and since then, no one has doubted the cause-and-effect relationship. The question, therefore, isn't whether airborne particles can harm humans, but rather how much pollution causes how much damage. Secondly, is there a threshold – an amount below which no effects are seen?

"Fine particles," such as those found in smoke and haze, have diameters smaller than 2.5 micrometers. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air. The U.S. Environmental Protection Agency (EPA), in 1987, established more stringent standards for these airborne particles. The 1987 standard, which continues to hold true, is expressed in terms of particulate matter, or tiny particles, that measure approximately 10 micrometers in diameter (PM10). Current U.S. standards state that ambient air may contain no more than 50 micrograms of PM10 particles per cubic meter of air as an annual average, and the average daily intake should not exceed 150 micrograms per cubic meter more than once in a year.

A study of people in Detroit showed that a 6 percent increase in the death rate was associated with each increase of 100 micrograms per cubic meter of total suspended particles (of which PM10 makes up half). There was no evidence of a threshold. Sulfur dioxide levels were not significantly associated with increases in the death rate.



Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of issues, including increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; decreased lung function; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease.

A remarkable consistency was observed in all these studies: an additional 100 micrograms per cubic meter of PM10 was always associated with an 8 to 17 percent increase in the mortality rate. Joel Schwartz, the only member of the EPA ever to be given a "genius award" by the MacArthur Foundation, analyzed the data from London's 1952 killer smog and found that the death rate increased by 6.4 percent for every 100 micrograms per cubic meter of total suspended particles, or about 13 percent for each 100 micrograms per cubic meter increase in PM10 pollutants. This is still consistent with other studies. The consistency is indeed remarkable. The earth's atmosphere is filled with particles –



visible and invisible – that are hazardous to the health of plants, animals, and humans alike. These substances are products of either natural or human activities. Air pollutants are substances that are not naturally found in the atmosphere or are present at far greater concentrations than considered 'normal.' Keeping this in mind, there are steps everyone can take to prevent exposure, mitigate risks, and even heal over time.

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