

## Asthma and Outdoor Air Quality

Outdoor air pollution is a serious problem in most urban areas as well as in many rural areas of the United States and California. The problem affects low-income and minority communities disproportionately because these groups tend to live in the areas where air pollution is worst. Every year, millions of pounds of dangerous chemicals, gases, and particles are released into the air by vehicles, power plants, and factories. Air pollution can have long-term effects on our health and can contribute to the development of respiratory tract infections, asthma, and lung cancer. The incidence and prevalence of lung diseases such as these have been growing rapidly over the past decade.<sup>1</sup>

### Where Does Outdoor Air Pollution Come From and What Health Effects Does It Produce?

- Point sources such as power plants produce sulfur dioxide (SO<sub>2</sub>) or acid sulfate particles. Sulfur dioxide (SO<sub>2</sub>) is formed by burning sulfur containing fuels such as coal and oil. Steel mills and pulp and paper mills also cause of SO<sub>2</sub> pollution. *Health Impacts: Breathing problems and lung damage, especially for those with asthma, bronchitis, and emphysema.*
- Area sources, such as oil refineries or petrochemical industry facilities, produce toxic and organic gases that cause ozone. Ozone air pollution forms when emissions from motor vehicles, power plants and industry react with sunlight. *Health Impacts: Ozone damages lung tissue and causes breathing problems, including asthma, coughing, sneezing, and chest pain. Ozone can suppress the body's immune system.*
- Mobile sources such as cars, buses, and trucks with engines operated on gasoline or diesel fuel, and line sources such as freeways, produce particulates and nitrogen dioxide (NO<sub>2</sub>).
  - Particulates are tiny particles suspended in the air that, when inhaled, can cause lung damage. These tiny particles come from the burning of fuels or dust from construction, mining, and agricultural activities. The particles can also include dirt, soot, smoke, and even liquid droplets (aerosols) emitted from factory smokestacks and other sources. *Health Impacts: While the nose and mouth filter out larger particles, smaller particles are inhaled, causing lung damage, breathing problems, and triggering asthma.*
  - Nitrogen dioxide (NO<sub>2</sub>) is a brownish, acidic gas that also reacts with other gases to form ozone. Fuel emissions from automobiles, trucks, and power plants are sources of NO<sub>2</sub>. *Health Impacts: NO<sub>2</sub> irritates the lungs, causing bronchitis and pneumonia.*

### How Do Outdoor Air Pollutants Related to Childhood Asthma?

Scientific studies conducted in California and throughout the U.S., as well as in other countries around the world, have found the following strong relationships between four outdoor air pollutants (NO<sub>2</sub><sup>2-20</sup>, particles<sup>4, 6, 10, 13, 15-16, 22-45</sup>, ozone<sup>5, 10, 13, 15-16, 25-26, 28, 35, 39, 46-60</sup>, and SO<sub>2</sub><sup>2, 5, 9, 11, 15, 31, 38, 56, 61-68</sup>) and asthma-related outcomes in young school children<sup>2-14, 16-20, 22-29, 31-33, 35-36, 38-43, 45-48, 50-54, 56-65, 69</sup> and adolescents<sup>2-4, 6-8, 10-11, 13, 16, 18-19, 27, 33, 35, 42, 46-49, 51, 54-58, 64, 66-68</sup>.

- Increased asthma prevalence;
- Asthma symptoms like wheezing, coughing, and decreased lung function;
- Increased medication use for asthma, such as rescue inhalers;
- Increased number of doctor's office and emergency room visits for asthma; and

- Increased number of school absences.

For example, the University of Southern California's long-term study more than 3,000 children in 12 southern California communities reported statistically significant relationships between:

- Ozone and decreased lung function measures<sup>10</sup>;
- NO<sub>2</sub> with increased wheezing<sup>36</sup> and phlegm<sup>35</sup>; and
- NO<sub>2</sub> and particles with increased bronchitis symptoms<sup>6, 46</sup>.

In addition, the study has found that children playing three or more team sports in high ozone areas have an increased risk for newly diagnosed asthma.<sup>48</sup>

### **WHAT CAN BE DONE ABOUT OUTDOOR AIR POLLUTION?**

Community Action to Fight Asthma (CAFA) is a network of asthma coalitions in California working to shape local, regional, and state policies to reduce the environmental triggers of asthma for school-aged children where they live, learn, and play. A few examples of local and state policy include efforts to:

- Institutionalize and enforce diesel emissions reduction policies and procedures.
- Reduce exposure to harmful particulate matter through the adoption of wood burning ordinances.
- Shape policies around California's Goods Movement, reducing pollution at the ports, on truck routes, and in communities across the state.
- Replace the worst polluting school buses to reduce children's exposure to diesel exhaust.

Please go to our website at [www.calasthma.org](http://www.calasthma.org) to learn more about Community Action to Fight Asthma, connect with local coalitions, locate asthma resources across California, and sign up for our newsletter.

### **9 OF THE 10 MOST OZONE-POLLUTED COUNTIES IN THE U.S. ARE WITHIN CALIFORNIA.**

—*American Lung Association State of the Air Report*<sup>70</sup>

### **Footnotes**

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