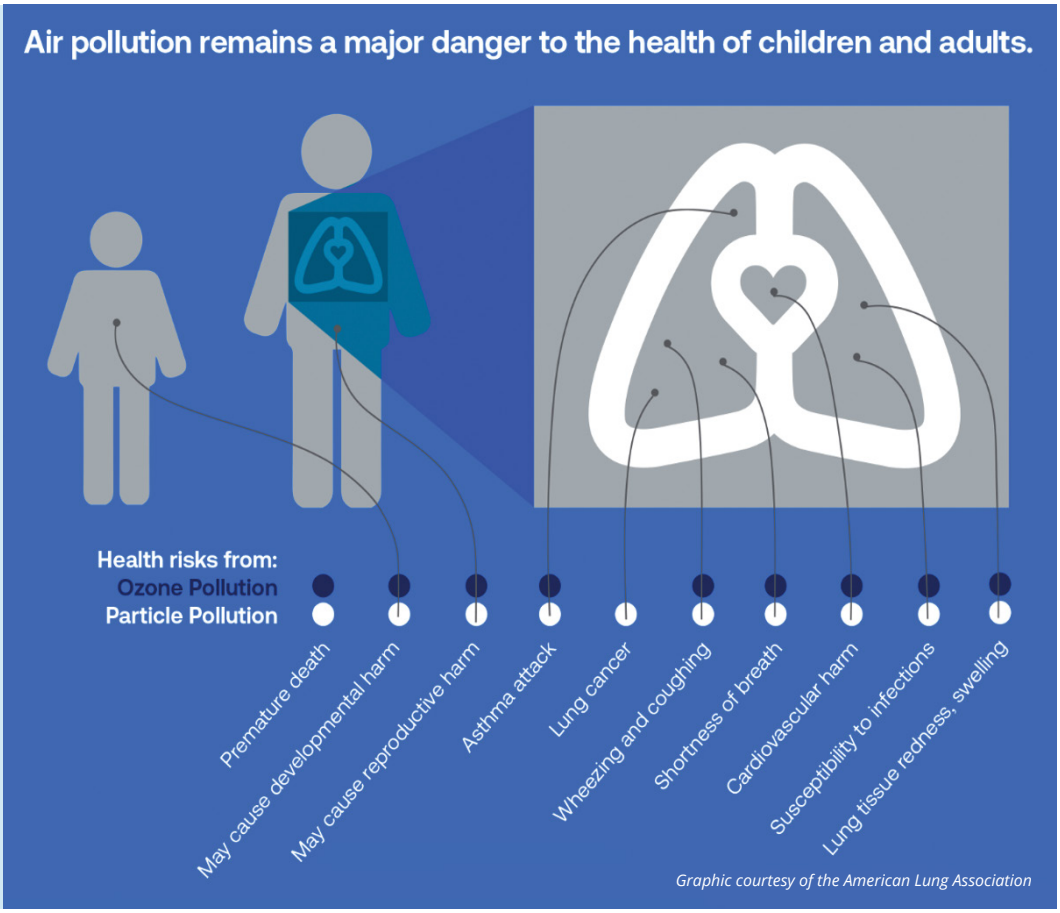
EHP ENVIRONMENTAL HEALTH PROJECT
SOUTHWEST PENNSYLVANIA

Infectious Lung Disease and Air Pollution

Flu, COVID-19

Air pollution, visible or invisible, can leave a big imprint on human health. Long-term exposure to air pollution contributes to the development of chronic cardiac and respiratory illnesses, like coronary heart disease, lung cancer, chronic obstructive pulmonary disease (COPD), and asthma. These illnesses increase the severity and the risk of dying from respiratory infections.



AIR POLLUTION IMPACTS SEVERITY OF INFECTIOUS LUNG DISEASES SUCH AS FLU OR COVID-19

Exposure to air pollution may or may not increase the chances of catching an infectious lung disease, but prolonged (or persistent) exposure will make it more difficult for the body to ward off infectious disease.

- Tissue and animal studies indicate that exposure to air pollution may directly increase susceptibility to infectious lung diseases by interfering with the lungs' ability to fight disease (SWPA Environmental Health Project, 2020).
- Human population studies indicate that when air pollution spikes, more people go to the hospital with respiratory infections, like pneumonia or bronchitis, the following week.
  - Nhung et al. (2017) reviewed the relationship between daily levels of ambient air pollution and hospital visits (ER visits and hospital admissions) for pneumonia in children under 18. They found positive associations between short-term exposure to all pollutants considered ($PM_{2.5}$, PM_{10}, SO_2, NO_2, and O_3) and pediatric hospital visits due to pneumonia. That is, a few days after an area experienced poor air quality, more children went to the hospital with pneumonia.
  - Croft et al. (2018) found that increased ER visits and hospitalizations for pneumonia and influenza were associated with increased $PM_{2.5}$ concentrations during the previous week. Li et al. (2017) found that $PM_{2.5}$, PM_{10}, NO_2, SO_2, and CO exposures were associated with increased outpatient visits for acute bronchitis and pneumonia.
- Research studies have shown a connection between air pollution and respiratory epidemic deaths.
  - Epidemiologists from Harvard looked at long-term $PM_{2.5}$ averages and mortality rates from COVID-19 for 3,000 U.S. counties (98% of U.S. population) up to April 22, 2020. In a not-yet peer-reviewed paper (Wu et al., 2020), the researchers calculate that each 1 μg/m3 increase in the 17-year average $PM_{2.5}$ level for a given county is associated with an 8% increase in the COVID-19 death rate.

AIR POLLUTION

In the U.S., particulate matter (PM) and ground-level ozone (O_3) are two of the most prevalent forms of pollution impacting lung health. The American Lung Association found that 150 million people live in counties in the U.S. where monitors show unhealthy levels of one or both (ALA, 2021).

Graphic courtesy of the American Lung Association

Particulate matter (PM) consists of tiny liquid and solid particles in the air we breathe. PM comes from a wide range of sources – dirt, pollen, animals, fires, cooking, and transportation and industrial sources. However, most is produced by using fossil fuels (EPA, 2020). PM exists in various sizes. $PM_{2.5}$, for instance, refers to particulates that are 2.5 micrometers in size (that's about 30 times *smaller* than a human hair). The smaller the particle, the deeper it can travel into the lungs, affecting lung function and increasing the potential for health impacts. For more information on PM, check out EHP's handout: **What Is PM and Why Should You Be Concerned?**

Ground-level ozone (O_3) is a primary component of "smog." O_3 is formed when sunlight reacts with nitrogen oxides (NO_x) and volatile organic compounds (VOCs) from vehicle and industry emissions. Ozone inflames and damages airways and makes the lungs more susceptible to infection (EPA, 2021).

WHAT CAN YOU DO?

Recognize when you or your family are at higher risk of exposure to air pollution and take action.

- Close windows when air is still and temperatures are dropping.
- Avoid tracking pollution into the house and stirring up dust by removing shoes and coat before entering the house. Clean often, and use an indoor air filter/purifier.
- Talk to your health care provider; keep a health symptom diary.
- Monitor AirNow.gov, hosted by the Environmental Protection Agency (EPA), which shows current regional air quality. Be aware that EPA air monitors are sparsely placed and may not pick up localized pollution.
- Contact your local and/or state health and environmental agencies. Let them know what you are experiencing and advocate for stricter pollution controls.

RECOMMENDED INDOOR AIR FILTER

There are many types of air filters for use in the home. EHP recommends the Austin Air HealthMate. It removes PM and chemicals as well as odors and dust from inside air. This filter is designed to clean rooms rather than an entire house and is portable.

Reducing Outdoor Contaminants in Indoor Spaces (ROCIS) offers a do-it-yourself, lowcost fan/filter to remove particles in the air. *If people with a respiratory infection enter your home, avoid using fans as doing so may contribute to pathogen spread.*

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