HEALTH FACTS

Gasping for Air: Toxic Pollutants Continue to Make Millions Sick and Shorten Lives

Forty years of Clean Air Act programs have brought steady and life-saving improvements to our air quality. Despite this important progress, however, many fossil fuel power plants, boilers, and cement plants continue to treat our skies like sewers. From soot to toxic heavy metals, dirty coal and fossil fuel smoke stacks emit vast quantities of dangerous pollutants that are well known to cause disease and death. Hazardous air pollutants (HAPs) such as mercury, benzene, and dioxins have the greatest impact on people located within a mile of power plants, but with smokestacks that reach up to 1,000 feet high, some of these toxic chemicals can travel far, causing regional and even global impacts many thousands of miles away.[1] Each year in the United States alone, pollution from coal power plants is responsible for more than 13,000 premature deaths and 20,000 heart attacks, and hundreds of thousands of asthma attacks.[2] The total cost of these health impacts ("monetized value of adverse health impacts") is more than $100 billion per year. Until stronger standards to reduce toxic emissions from coal and fossil fuel burning industries are implemented, harmful toxic chemicals will continue to be released into the air of our communities, threatening public health.

MAJOR POLLUTANTS RELATED TO COAL AND FOSSIL FUEL COMBUSTION

Soot, Smog, and Acid Rain

More than 500 large coal power plants and tens of thousands of other industrial fossil fuel sources constitute a major public health hazard through the complex mixture of air pollutants regularly released during combustions: fine particulate matter (PM), nitrogen oxides (NOx), volatile organic compounds (VOCs), sulfur oxides (SOx), and a wide range of toxic air emissions. Numerous studies have documented a wide range of adverse health impacts from exposure to particulate matter, including increased rates of:

- cardiovascular disease, such as atherosclerosis
- heart attacks
- respiratory illness, such as asthma
- emergency room visits
- premature death

Exposure to particulate matter has also been linked to birth defects, low birth weights, and premature births.[3]

Nitrogen oxides can have a toxic effect on the airways, leading to inflammation, asthmatic reactions, and worsening of allergies and asthma symptoms.[4] In addition, nitrogen oxides react with VOCs in the sunlight to form ozone—also known as smog. This layer of brown haze contributes to decreased lung function, increased respiratory symptoms, asthma, emergency room visits, hospital admissions, and premature deaths.[5] Ozone can also cause irreversible changes

Air Pollution and Asthma

According to the most recent data from the Center for Disease Control and Prevention, ten percent of children—and in all, almost 25 million Americans—are suffering from asthma. Asthma attacks send millions to emergency rooms each year and air pollution is known to be one of the culprits. Air pollution can even contribute to the development of asthma in previously healthy people.

Source: Center for Disease Control and Prevention. *Vital Signs: Asthma Prevalence, Disease Characteristics, and Self-Management Education—United States, 2001 to 2009.* May 3, 2011 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm60e0503a1.htm?s_cid=mm60e0503a1_e&source=govdelivery

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A Toxic Toll on Infants and Children

Nearly 37 million children live in areas with unhealthy air due to ozone smog or soot pollution.[a] Many illnesses associated with pollution have been on the rise. Over the past three decades the rates of mortality from childhood cancers have decreased dramatically—indicating that we are doing a better job treating and curing children—yet the rates of cancer incidence among children have increased 30 percent during that period.[b]

It is well known that children and infants are uniquely at risk from air pollution both because of physiological susceptibility and greater relative exposure.[c] For instance, compared to adults, children, on a body-weight basis, ingest more dust and soil and breathe more air. Also, children play outside and toddlers mouth toys. And, since their bodies are immature and still developing, children are more susceptible to the health impacts of pollutants, particularly certain cancers and reproductive problems, and they have a longer expected lifetime in which to develop illness after an exposure.[d]

A recent slate of clean-up measures from the Environmental Protection Agency (EPA) covering power plants, boilers, and cement plants, would go a long way toward protecting the health of children and vulnerable populations. To learn more, visit: http://www.nrdc.org/air/cleanairact/.

[a] American Lung Association. *State of the Air*. 2011. http://www.stateoftheair.org (accessed June 2011).
[b] U.S. Environmental Protection Agency. America's Children and the Environment, Measure D5: Cancer Incidence and Mortality, 2010. http://www.epa.gov/envirohealth/children/child_illness/d5-graph.html (accessed June 2011).
[c] National Institute of Environmental Health Standards. http://www.niehs.nih.gov/health/topics/population/children/ (accessed June 2011).
[d] Ritz B, Wilhelm W. *Air Pollution on Infants and Children*. UCLA Institute of the Environment and Sustainability. Fall 2008. http://www.environment.ucla.edu/reportcard/article.asp?parentid=1700 (accessed June 2011).

in lung structure, eventually leading to chronic respiratory illnesses, such as emphysema and chronic bronchitis.[6] Other serious air pollutants produced by burning fuels that contain high levels of sulfur, such as coal, are sulfur oxides. These react in the air to create acids that irritate the airways, often causing severe respiratory symptoms in asthmatics.[7]

Mercury Emissions: A Mental Assault[8]

Coal-fired power plants, boilers, and cement factories contribute to half of all the mercury air emissions in the United States. Mercury is a highly neurotoxic contaminant that gets deposited in oceans, lakes, and streams where it accumulates in fish, other wildlife, and humans when we eat contaminated foods such as tuna.[9] Nearly every state—48 out of 50—has measured mercury contamination in fish, recording unsafe levels that have prompted health advisories.[10] Health effects of mercury include neurological, developmental, and behavioral problems, such as lower IQ, attention deficit hyperactivity disorder (ADHD), and impaired memory and motor skills.[11] Cardiovascular effects including increased risks of heart attacks, increased blood pressure, and thickening of arteries are also associated with elevated mercury levels.[12]

A significant fraction of the U.S. population already has elevated levels of mercury in their bodies, with an estimated 8 percent of women having mercury levels considered unsafe.[13] Further, each year in the United States, more than 300,000 newborns may be over exposed to mercury in utero, increasing their risk of neuro-developmental effects.[14] This mercury contamination is associated with between 115 and 2,675 excess cases per year of cognitive impairment at a level that would be considered mental retardation.[15] The cost of caring for these children has been estimated between $28 million and $3.3 billion each year.[16]

Health Impacts of Organic Chemicals[17]

Located across all fifty states, thousands of industrial plants continue to burn coal and other dirty fossil fuels, releasing toxic organic compounds such as benzene, formaldehyde, polycyclic aromatic hydrocarbons (PAHs), acid gases, chlorinated organics—such as dioxins, and a long list of other dangerous chemicals (See table 1 for a summary of the health impacts from these chemicals).[18] Some of these pollutants are particularly toxic to infants and young children.

PAHs are known human mutagens, carcinogens, and developmental toxicants.[19] Infants and children are especially susceptible to the hazards of PAHs. Greater lifetime cancer risks result from exposure to carcinogens at a young age, as these substances are known to cross the placenta to harm the unborn fetus, contributing to fetal mortality, increased cancer risk and birth defects.[20] Prenatal exposure to PAHs may also be a risk factor for the early development of asthma-related symptoms and can adversely affect children's cognitive development, with implications for diminished school performance.[21] Exposure of children to PAHs at levels measured in polluted areas can also adversely affect IQ.[22]

SUPPORT STRONGER MEASURES TO REDUCE TOXIC EMISSIONS

Polluting energy sources cost the country billions of dollars in health costs due to illnesses, lost work, and school days. Even worse, excess pollution causes premature death. Reducing dangerous pollution is imperative to protecting our children's health now and into the future. Modern emission controls that we know are cost-effective would dramatically reduce dangerous pollution and are readily available at a cost that is far less than the health costs shouldered by the public.[23] NRDC supports U.S. EPA measures to curb emissions from major industrial polluters. **Visit our website to learn the latest actions that you can take to save these important public health protections: http://www.nrdc.org/air/cleanairact/.**

Table 1. Health Impacts of Industrial Fossil Fuel Pollution

Pollutant	Health Effects	Environmental Effects
Acid Gases (Hydrogen chloride & Hydrogen fluoride)	Eye, skin, nose, and throat irritation; respiratory problems.	Contribute acid rain; damage to crops and forests.
Benzene & Other Aromatics	Known carcinogens; irritation to eyes, skin, and respiratory tract; central nervous system effects (e.g., drowsiness, dizziness, headaches, depression, nausea, irregular heartbeat); reproductive (spontaneous abortion), developmental, and immune effects.	Contribute to ozone-smog formation.
Dioxins	Known/probable carcinogens (soft-tissue sarcomas, lymphomas, stomach carcinomas); developmental and immune effects; reproductive problems; interference with hormones.	Deposit in ecosystems; taken up by fish and wildlife; accumulated in the food chain.
Formaldehyde & Other Aldehydes	Known carcinogen (lung and nasopharyngeal cancer); eye, skin, nose and throat irritation; respiratory symptoms.	Contribute to ozone-smog formation.
Heavy Metals (Arsenic, beryllium, cadmium, chromium, manganese, nickel)	Carcinogens (lung, bladder, kidney, skin); affects the nervous, cardiovascular, dermal, gastro-intestinal, immune, respiratory and reproductive systems.	Accumulate in soil and sediment; can contaminate water.
Lead	Anemia; high blood pressure; brain and kidney damage; neurological disorders; cancer; lowered IQ; behavioral problems; immune effects; reproductive hazards (lower sperm count, spontaneous abortion).	Affects animals, plants, and aquatic ecosystems.
Mercury	Damage to brain, nervous system, kidneys and liver; causes neurological and developmental birth defects (including lower IQ), behavioral problems such as attention deficit hyperactivity disorder, and cardiovascular effects (heart attacks, increased blood pressure and thickening of arteries).	Carried around the globe; taken up by fish and wildlife; accumulates in sediment and the food chain.
Nitrogen Oxides (NO_x)	Increased susceptibility to respiratory infections; irritation of the lung and respiratory symptoms (e.g., cough, chest pain, difficulty breathing).	Contributes to the formation of smog, acid rain, water quality deterioration, global warming, and visibility impairment.
Ozone (O_3) (Secondary Formation Of)	Eye and throat irritation; coughing; respiratory tract problems; asthma; bronchitis; lung damage; premature death.	Damage to crops, vegetation, and ecosystems.
Particulate Matter (PM)	Asthma; bronchitis; lung damage; cancer; heavy metal poisoning; cardiovascular effects including heart attack and premature death.	Visibility impairment; atmospheric deposition; aesthetic damage.
Polycyclic Aromatic Hydrocarbons (PAH)	Known and probable carcinogens (lung); developmental toxicants; birth defects; associated with lower IQs; affects the immune system and skin.	Can accumulate in soil and sediment and potentially contaminate water.
Sulfur Dioxide (SO_2)	Eye irritation; wheezing; chest tightness, shortness of breath; lung damage.	Contributes to the formation of acid rain; visibility impairment; plant and water damage; aesthetic damage.

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