

Air Pollution and Children's Health



A fact sheet by
Cal/EPA's Office of Environmental Health Hazard Assessment and
The American Lung Association of California.



In the past 30 years, state and federal air-quality programs have made great progress in reducing air pollution. However, there has been an increasing awareness in recent years that children may be more susceptible than adults to the harmful effects of air pollutants.

The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) assesses health risks from environmental contaminants. OEHHA currently is reviewing whether the state's ambient air quality standards are adequate to protect the health of infants and children and is working to identify toxic air contaminants that may cause infants and children to be especially susceptible to illnesses. The American Lung Association of California (ALAC) and its 15 local associations work to prevent lung disease and promote lung health. Since 1904, the American Lung Association has been fighting lung disease through education, community service, advocacy and research.

This fact sheet by OEHHA and ALAC provides information on air pollution and children's health.

Why may children be at greater risk than adults from air pollution?

In many cases, children may have greater exposure than adults to airborne pollutants. Infants and children generally breathe more rapidly than adults, which increases their exposure to any pollutants in the air. Infants and children often breathe through their mouths, bypassing the filtering effect of the nose and allowing more pollutants to be inhaled. Children generally spend significantly more time outdoors than adults, especially during summer months when smog levels are highest.

Children are often more susceptible to the health effects of air pollution because their immune systems and developing organs are still immature. For example, lead that is inhaled is more easily deposited in the fast-growing bones of children. Irritation or inflammation caused by air pollution is more likely to obstruct their narrower airways. It may also take less exposure to a pollutant to trigger an asthma attack or other breathing ailment due to the sensitivity of a child's developing respiratory system. Exposure to toxic air contaminants during infancy or childhood could affect the development of the respiratory, nervous, endocrine and immune systems, and could increase the risk of cancer later in life.

What are the major kinds of air pollutants and their impacts on children?

"Criteria" Air Pollutants

Several common air pollutants are regulated under the state and federal Clean Air Acts and are known as "criteria" air pollutants. Two of the most widespread criteria pollutants are particulate matter (PM) and ozone. PM consists of microscopic particles less than one-seventh the width of a human hair. These particles come from a variety of both manmade and natural sources, such as diesel engines, smoke from fireplaces as well as forest and agricultural fires, and dust from tilled farmland. PM can bypass the body's natural defenses and penetrate deep into the lungs. The elderly, children and people with existing respiratory or cardiac diseases are considered to be especially sensitive to the harmful effects of PM. Recent studies suggest that PM may exacerbate asthma and cause coughs and other respiratory symptoms in children. Recent studies also suggest that prolonged exposure to PM may also affect the growth and functioning of children's lungs. Researchers found that as children grow up in smoggier areas, there is a notable lag in lung function growth.

Ozone is the major component of urban smog. It is formed by chemical reactions in the atmosphere involving sunlight and various gases in motor vehicle exhaust and industrial emissions. Ozone is a powerful respiratory irritant that can cause lung inflammation, transient decreases in lung function, shortness of breath, chest pain, wheezing, coughing and exacerbation of respiratory illnesses such as asthma. Long-term and repeated ozone exposures may lead to chronically reduced lung function.

OEHHA provides detailed analyses of health information on PM, ozone and other common pollutants to the California Air Resources Board (ARB), which sets ambient air quality standards for those pollutants. These air quality standards have been established at levels that are intended to protect the health of all Californians. Unfortunately, PM and ozone levels in most urban areas of California frequently exceed the ambient air quality standards. ARB and local air districts operate regulatory programs under state and federal requirements to reduce airborne levels of these pollutants to the ambient air quality standards.

Other "criteria pollutants" include nitrogen dioxide, carbon monoxide, lead, sulfur dioxide, sulfates and hydrogen sulfide.

ARB is sponsoring a major 10-year study of the effects of air pollution on children's health. Information on this study is available at ARB's web site at <http://www.arb.ca.gov/research/abstracts/98-320.htm>.

Toxic Air Contaminants

California also regulates the emissions of other pollutants, known as toxic air contaminants, which may pose a present or potential hazard to human health or contribute to an increase in deaths or serious illnesses. OEHHA provides assessments of the health risks from various toxic air contaminants to ARB, which can enact control measures designed to reduce the exposure of Californians to these contaminants. More than 200 chemicals are currently listed as toxic air contaminants in California.

Many toxic air contaminants are present in motor vehicle exhaust and industrial emissions, and are formed from the combustion of other chemicals. Among these byproducts of combustion are dioxins and polycyclic organic matter (POM), which may

affect the development of the fetus and increase cancer risks later in life. Particles found in diesel exhaust may make children more susceptible to allergies and asthma. Other toxic contaminants have numerous sources. Acrolein, which may exacerbate asthma, is found in motor vehicle exhaust, tobacco and wood smoke, some industrial emissions, and is also formed in the atmosphere from chemical reactions involving other pollutants. Some toxic air contaminants, such as lead, are naturally occurring in the environment. Lead has been banned as an additive in gasoline and household paint but is present in some industrial emissions. It can cause developmental problems and harm the central nervous system.

What is California doing to improve health protection for children?

The Legislature in 1999 approved the Children's Environmental Health Protection Act (Senate Bill 25), authored by Senator Martha Escutia, which seeks to ensure that California's air quality programs protect the health of infants and children. The Act requires ARB, in consultation with OEHHA, to review all ambient air quality standards to determine whether they adequately protect the health of the public, including children. The Act also requires OEHHA to identify toxic air contaminants that may cause infants and children to be especially susceptible to illness, and it requires ARB to determine the adequacy of existing control measures for toxic air contaminants or the need for new control measures to protect the health of the public, particularly infants and children.

The initial stage of the ambient air quality standards review was completed in December 2000. ARB and OEHHA concluded that PM and ozone may cause health effects in children even at levels meeting the state's ambient air quality standards. The amount of time children play outdoors and their higher breathing rates are some of the reasons why children may be more sensitive to these pollutants than adults. The review also found evidence that levels of nitrogen dioxide (a pollutant in motor vehicle exhaust and many kinds of industrial emissions) that meet the ambient air quality standard may harm asthmatic children.

OEHHA completed a detailed review of the PM standards in May 2002. Based on this review, OEHHA recommended, and ARB adopted, stricter new PM standards in June 2002. (The report containing the results of the PM review and the new standards can be accessed at www.oehha.ca.gov/air/toxic_contaminants/PM10notice.html#may). OEHHA is conducting a detailed review of the ozone standard and is developing recommended revisions to the standard for ARB's consideration. After this is completed, OEHHA will review the nitrogen dioxide standard.

ARB and local air districts may have to develop new regulations to reduce emissions and ultimately reduce airborne levels of these pollutants to comply with the new PM standards and any future new standards for ozone and nitrogen dioxide.

The Act also requires OEHHA to identify toxic air contaminants that may cause infants and children to be especially susceptible to illnesses. ARB will review and, if necessary, revise or adopt any control measures needed to reduce the public's exposure to these contaminants. The Act required OEHHA to identify up to five contaminants in 2001. These contaminants - dioxin, lead, POM, diesel exhaust particles, and acrolein - are briefly discussed in the previous section. More detailed information is available at www.oehha.ca.gov/air/toxic_contaminants/SB25finalreport.htm.

OEHHA is developing guidelines for use in evaluating the adequacy of existing air toxics regulations. Beginning in 2004, OEHHA will annually evaluate selected toxic air contaminants and identify unhealthful levels of exposure to these contaminants. OEHHA will use these evaluations beginning in 2005 to annually update the list of toxic air contaminants that impact infants and children.

The Act also requires ARB to evaluate the adequacy of its current air-quality monitoring program to determine children's exposure to air pollutants, and it created the Children's Environmental Health Center within the California Environmental Protection Agency to coordinate Cal/EPA's activities and provide advice to the Governor and Cal/EPA Secretary on matters of children's environmental health.

In addition to complying with the requirements of the Children's Environmental Health Protection Act, OEHHA is taking two other steps in the area of children's health protection. OEHHA is developing improvements to scientific methods used to gauge cancer risks that children may face from exposure to contaminants in the environment. Also, OEHHA is refining methods to assess health risks from contaminants that may conceivably exist at proposed and existing school sites. These two projects are intended to improve the ability of scientists and regulators to make decisions that protect children from contaminants in the air, water, soil and food as well as elsewhere in the environment.

These efforts represent a commitment by the State of California to ensure that children have the opportunity to grow up in a healthy environment.

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