CEHC FACT SHEET: Particulate Matter

What is particulate matter?
Particulate matter is the term used for microscopic airborne particles. The amount of particulate matter in the air is a major indicator of overall air quality. Dust, soot, smoke and cigarette fumes, in addition to byproducts of gas combustion such as sulfur dioxide and nitrogen dioxide, are all components of particulate matter. Together, these components are more generally known as outdoor air pollutants.

How are children exposed to particulate matter?
Children are exposed to particulate matter through inhaling pollutants in the air. Major sources of particulate matter include emissions from motor vehicles and factories. Formation of particulate matter can also occur as a result of fires, work on construction or demolition sites, and through natural erosion. The level of exposure to particulate matter depends on proximity of the child’s home and school to major sources including factories, major roadways, and diesel bus stations. In general, cities tend to have higher levels of particulate matter than suburban areas. Levels can also fluctuate with the time of day and overall weather patterns. During rush hour, traffic and congestion on the roads leads to increased vehicle emissions. High winds promote the spread of particulate matter. Also, outdoor particulate matter is more likely to reflect the degree of indoor air pollution in warmer seasons when there is increased ventilations of homes and schools due to open windows and doors.

Why are children more sensitive to particulate matter?
Children are particularly sensitive to air pollutants for several reasons. First of all, children breathe more rapidly than adults, allowing for the inhalation of more pollutants per pound of body weight. Children also spend more time playing outdoors close to the ground, increasing the likelihood of being exposed to outdoor air pollutants. In addition, both fine and coarse particles are associated with health risks in children. The diverse sources of particulate matter result in a wide range of particle sizes, from fine particles of 2.5 micron in diameter (PM2.5) to particles of 10 micron in diameter (PM10) and greater. Fine particles less than 2.5 microns can only be seen with the aid of a microscope. For comparison, the width of a hair is 75 microns. Children tend to breath by their mouths, bypassing the body’s natural defense mechanisms, which prevent particles larger than 10 microns from passing through the nose. Normally, only particles 5 microns and smaller can clear the nasal passages and get inhaled into the lungs.

What are the health effects of exposure to particulate matter?
Acute exposure to particulate matter may irritate the eyes, ears, nose, throat and lungs. Respiratory symptoms such as coughing, wheezing and shortness of breath may be seen as well. The symptoms vary from person to person and depend on the particular components of the pollutants. Usually the symptoms resolve once the exposure is removed. Long-term health effects are unlikely to result from short-term exposures. Children with chronic illnesses however may experience increased symptoms from exposure. For example, children with asthma may experience an asthma exacerbation when exposed to high levels of particulate matter. Studies have shown increased rates of asthma
hospitalizations associated with elevated levels of air pollution and proximity to major roadways. Children with heart disease may also experience chest pain and shortness of breath when exposed to particulate matter.

Exposure to air pollution during pregnancy has been linked to premature birth, low birth weight, Sudden Infant Death Syndrome (SIDS) and heart defects. These exposures included carbon monoxide and ozone in addition to particulate matter.

**How is exposure diagnosed?**
There is no test recommended to assess the degree of exposure to particulate matter.

**How can exposure be treated?**
There is no known treatment to reduce the levels of particulate matter already inhaled into the body. Most importantly, your family should minimize further exposures to particulate matter. Local TV news and newspapers provide health alerts for high pollutants days. Decreasing your child’s time outside on these days and keeping your home’s windows and doors shut will help minimize your child’s exposures. Treatment is tailored to the symptoms present in your child. If your child exhibits signs of wheezing or shortness of breath, he/she should be seen by a pediatrician to determine if allergy or asthma medications are needed.

**How can exposure to particulate matter be prevented?**
The mainstay of treatment is to minimize any further exposure to particulate matter. The Environmental Protection Agency (EPA) has made the following recommendations:

- Outdoor air pollutant alerts are provided on the local TV news and in newspapers. If outdoor levels are high, keep windows and doors closed to prevent further circulation of particles into the home.
- Limit time outdoors on high alert days for sensitive populations such as children and elderly.
- Have your ventilation system filter inspected and changed regularly.
- If outdoor air quality is good, open your doors and windows to increase ventilation in the home.
- Reduce indoor sources of particles such as propane and wood burning stoves and furnaces, natural gas stoves and ovens, and gas logs.
- Avoid smoking or burning candles in the home, both of which greatly increase the particle levels in the home.
- When vacuuming areas with large amounts of dust, consider using a hepa-vacuum, which prevents particles from being re-circulated into the air.
- Wipe floors and hard surfaces with a damp mop or cloth that will retain the dust, rather than re-circulate it into the air.