

Air Quality and Asthma Promotores Training

Vickie Leonard, RN, FNP, PhD

Program Coordinator

Western States Pediatric Environmental Health Specialty Unit

University of California, San Francisco



What is air pollution?

Air pollution is the addition of gas, particles or odors to our atmosphere.

Air pollution comes from



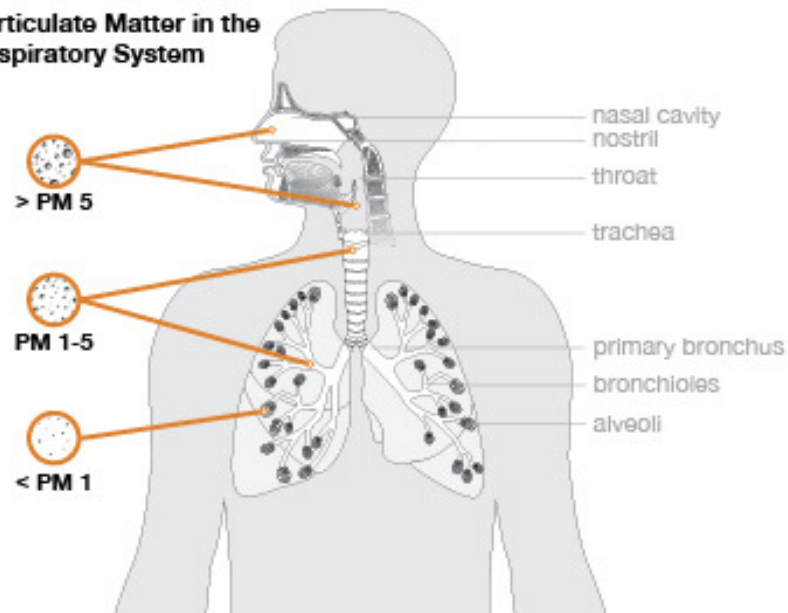
Some causes of air pollution are natural, like:

- Wildfires
- Volcanoes



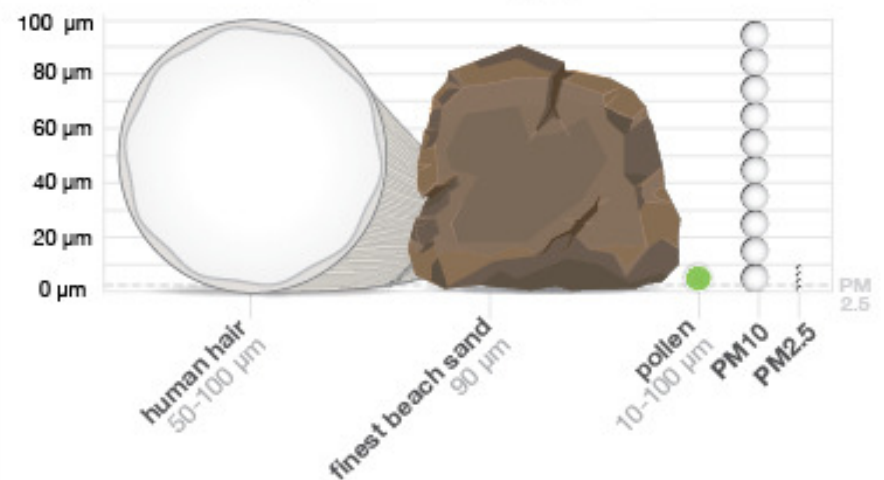
What is particulate matter?

Particulate Matter in the Respiratory System



Particles Visible to the Human Eye

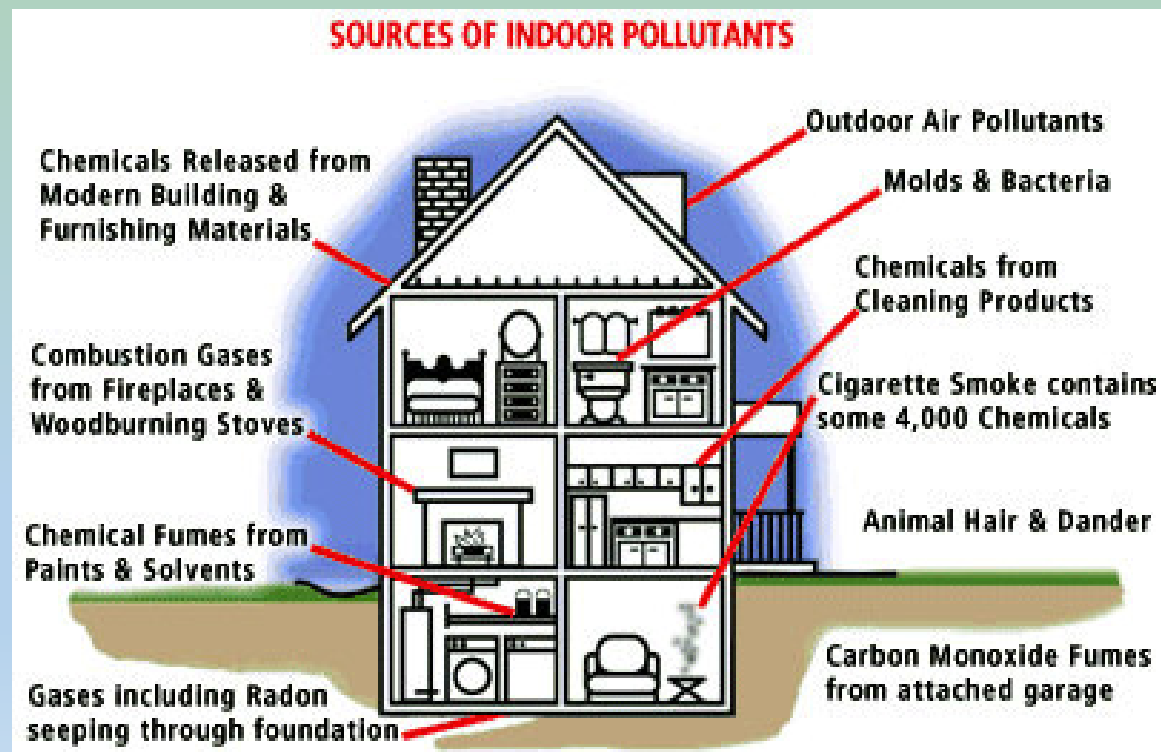
Greater than or equal to 10 microns (μm)



Images from <http://www.alencorp.com/pages/everything-you-need-to-know-about-airborne-particulate-matter>

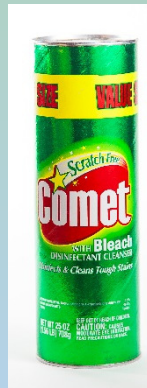
Pollution also affects indoor air

- The air quality inside our homes can be up to **10 times** more polluted than outside



Indoor air quality

Things we use inside that can cause poor air quality:



Why are we concerned about air quality?

We breathe over 3,000 gallons of air each day. Children breathe more per pound of body weight than adults.

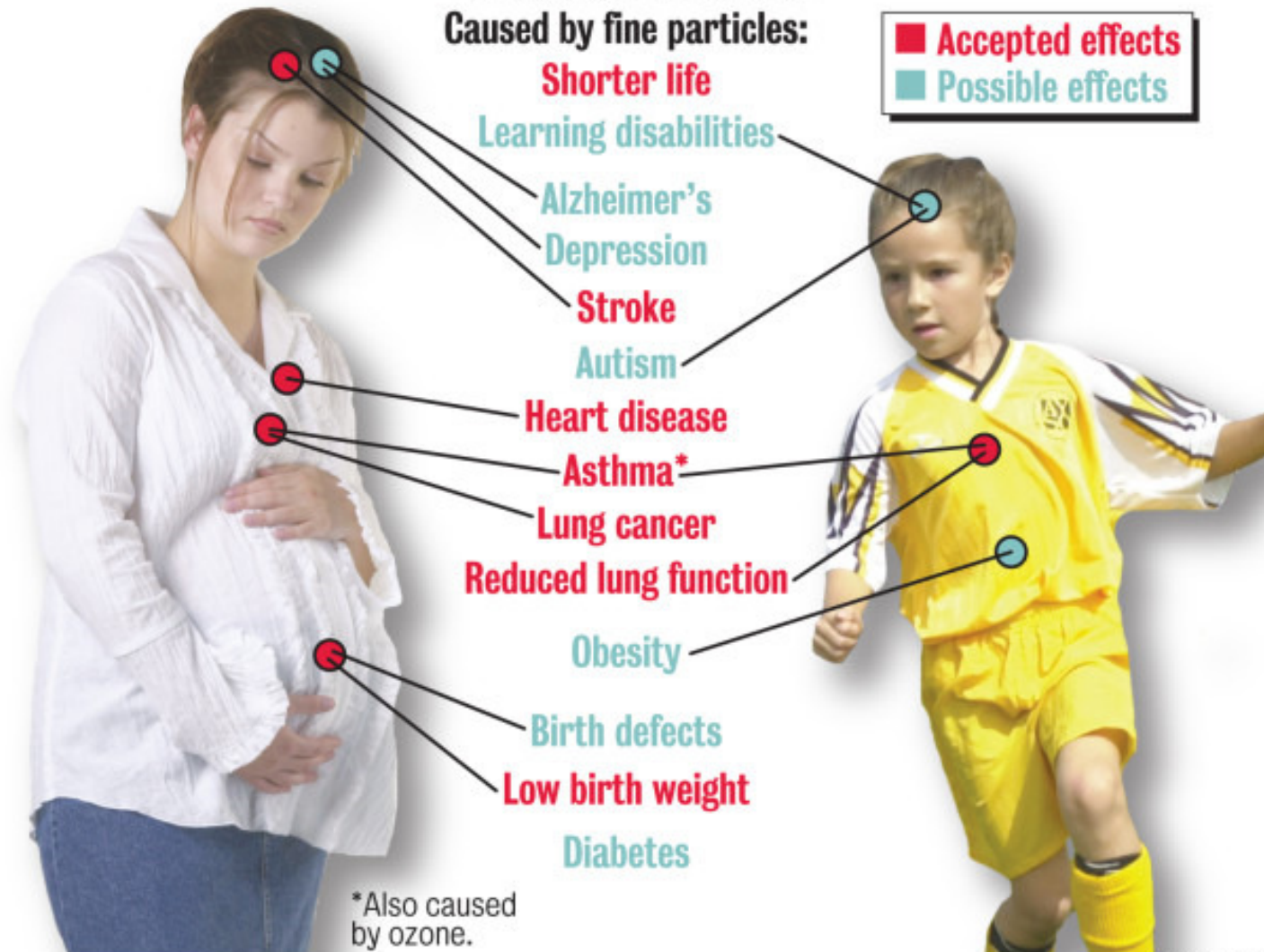


POLLUTION MATTERS

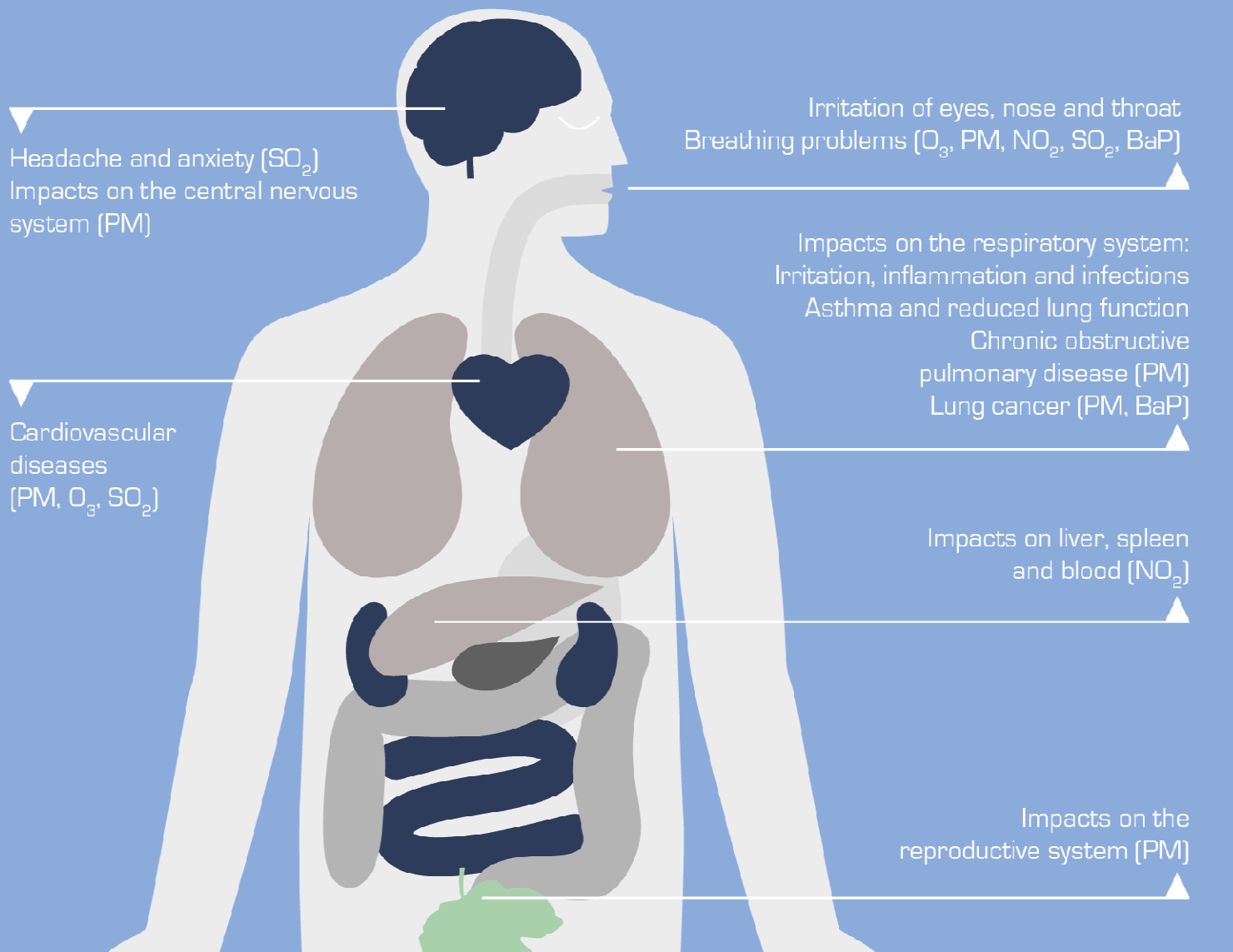
Thousands of studies have shown how air pollution can harm people, causing heart attacks, lung problems and other ailments, and shortening lives. New research is finding possible links between certain pollutants and autism, birth defects and childhood obesity, among other conditions.

Caused by fine particles:

■ **Accepted effects**
■ **Possible effects**



STAFF ARTIST



▼

Headache and anxiety (SO_2)
Impacts on the central nervous system (PM)

This infographic features a stylized human silhouette with internal organs highlighted. White lines connect specific organs to text boxes describing health impacts from air pollution. The background is a solid blue color, and the entire image is framed by a green border at the top and bottom.

▼

Cardiovascular diseases
(PM, O_3 , SO_2)

Irritation of eyes, nose and throat
Breathing problems (O_3 , PM, NO_2 , SO_2 , BaP)

▲

Impacts on the respiratory system:
Irritation, inflammation and infections
Asthma and reduced lung function
Chronic obstructive pulmonary disease (PM)
Lung cancer (PM, BaP)

▲

Impacts on liver, spleen and blood (NO_2)

▲

Impacts on the reproductive system (PM)

▲

Why are we concerned about air quality?

Toxic air pollutants cause or are suspected of causing

- cancer
- damage to the immune system
- birth defects
- reproduction problems



Why are we concerned about air quality?

Air pollution isn't just a threat to our health, it also damages our environment.

Air pollution is a major cause of climate change.



<http://www.niu.edu/clasep/conferences/newideas/nis020813/index.shtml>

Those most at risk from air pollution

- Elderly people



- Children



- Pregnant women



- People with chronic heart and lung diseases



Effects of Common Air Pollutants

RESPIRATORY EFFECTS



Symptoms:

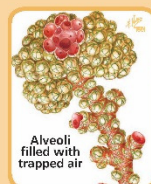
- Cough
- Phlegm
- Chest tightness
- Wheezing
- Shortness of breath

Increased sickness and premature death from:

- Asthma
- Bronchitis (acute or chronic)
- Emphysema
- Pneumonia

Development of new disease

- Chronic bronchitis
- Premature aging of the lungs



How Pollutants Cause Symptoms

Effects on Lung Function

- Narrowing of airways (bronchoconstriction)
- Decreased air flow

Airway Inflammation

- Influx of white blood cells
- Abnormal mucus production
- Fluid accumulation and swelling (edema)
- Death and shedding of cells that line airways



Increased Susceptibility to Respiratory Infection

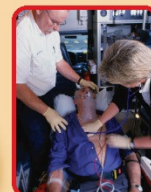


Normal



Lung with respiratory infection

CARDIOVASCULAR EFFECTS



Symptoms:

- Chest tightness
- Chest pain (angina)
- Palpitations
- Shortness of breath
- Unusual fatigue

Increased sickness and premature death from:

- Coronary artery disease
- Abnormal heart rhythms
- Congestive heart failure

How Pollutants May Cause Symptoms

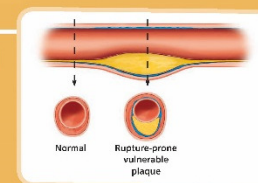


Effects on Cardiovascular Function

- Low oxygenation of red blood cells
- Abnormal heart rhythms
- Altered autonomic nervous system control of the heart

Vascular Inflammation

- Increased risk of blood clot formation
- Narrowing of vessels (vasoconstriction)
- Increased risk of atherosclerotic plaque rupture

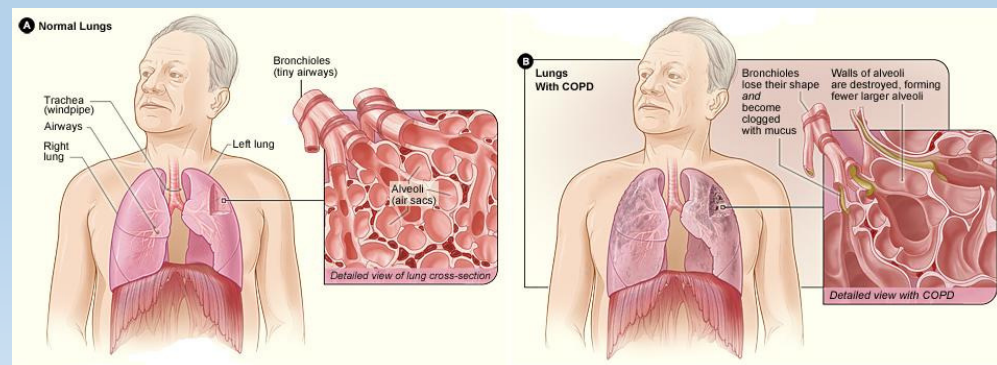
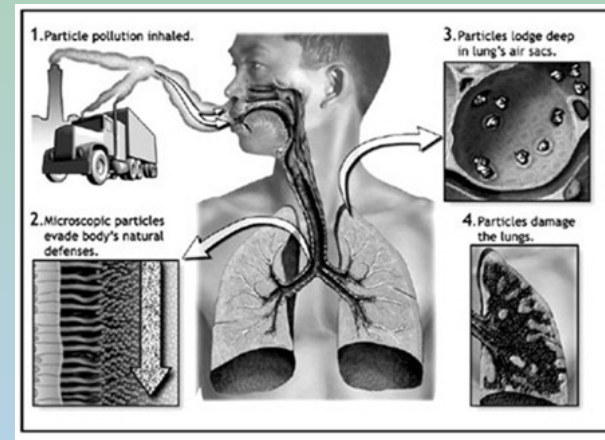


Reduce your risk by using the Air Quality Index (AQI) to plan outdoor activities – www.airnow.gov

AQI Levels of Health Concern	AQI Values	What Action Should People Take?
Good	0-50	Enjoy Activities
Moderate	51-100	People unusually sensitive to air pollution: Plan strenuous outside activities when air quality is better
Unhealthy for Sensitive Groups	101-150	Sensitive Groups: Cut back or reschedule strenuous outside activities Particle Pollution: People with heart or lung disease (including diabetics), older adults, and children Ozone: Active children and adults and people with lung disease Sulfur Dioxide: Active children and adults with asthma Carbon Monoxide: People with heart disease and possibly fetuses and infants
Unhealthy	151-200	Everyone: Cut back or reschedule strenuous outside activities Sensitive groups: Avoid strenuous outside activities
Very Unhealthy	201-300	Everyone: Significantly cut back on outside physical activities Sensitive groups: Avoid all outside physical activities

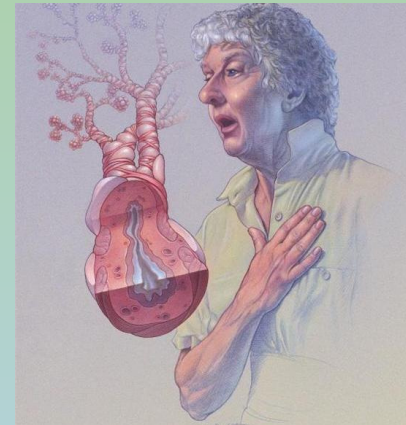
How does air pollution affect breathing?

- It can cause immediate effects
- It can cause problems that don't show up for years



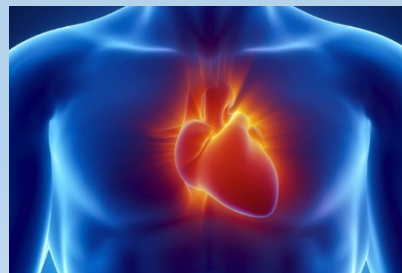
How does air pollution affect the heart?

- When there are increases in pollutants and particulate matter in the air, there are more:



<http://topnews.net.nz/content/221449-airflow-obstruction-can-lead-heart-failure>

- Air pollution increases inflammation in the heart and blood vessels.



How does air quality affect pregnant women?

Air pollution can cause infants to be born :



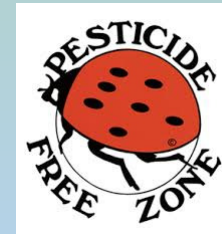
- with certain birth defects

Growth and developmental delays *in utero* may also increase the risk for heart disease and diabetes *in adulthood*.

How does air quality affect asthma?

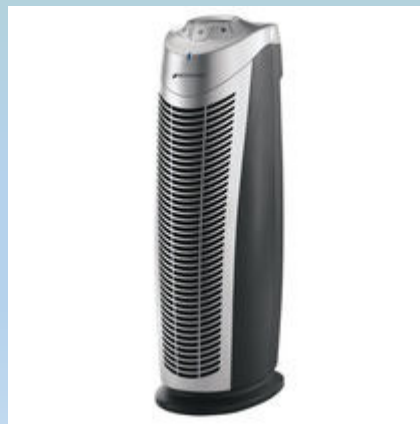
Asthma is major health problem in the United States. Poor air quality is an important cause of asthma.

It is difficult to control the air quality outside, but you can do things inside to improve the air quality:



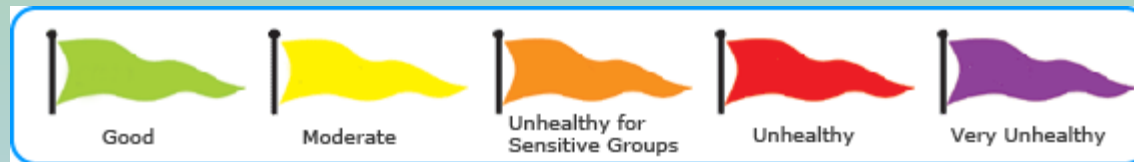
What can we do about air pollution?

- If removing or reducing sources of pollution is not enough:
 - Sensitive individuals may benefit from using a central air filter or a good air cleaner in one or more rooms of the house.
 - Only purchase air cleaners approved by the California Air Resources Board
<http://www.arb.ca.gov/research/indoor/aircleaners/certified.htm>.



Implement an Air Quality Flag Program

Here's how it works: each day your organization raises a flag that tells people how clean or polluted the air is.



On unhealthy days, you can use this information to adjust physical activities to reduce exposure to air pollution, while still keeping people active.



Acknowledgements

- This presentation was supported by the American College of Medical Toxicology (ACMT) and funded (in part) by the cooperative agreement FAIN: U61TS000238 from the Agency for Toxic Substances and Disease Registry (ATSDR).
- Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number DW-75-92301301. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications



Resources

- **Air Quality Index (AQI) Basics**

<http://airnow.gov/index.cfm?action=aqibasics.aqi>

- **Improving Air Quality by Reducing the Use of VOC Containing Products**

<http://www.ct.gov/deep/cwp/view.asp?a=2684&q=452814&depnaveGID=1619>

- **California Air Review Board Certified Air Cleaning Devices**

www.arb.ca.gov/research/indoor/aircleaners/certified.htm

Small Group

Please take 20 minutes to discuss any or all of the following questions below. Assign someone in your group to take notes of your ideas or conclusions and someone to present them to the general group.

1. What measures are your community, organization, or home taking to address air quality concerns?
2. How can you implement the ideas discussed today to improve your health and the health of your family and community?
3. In addition to what was discussed today, what other actions are you doing or can do to address air quality concerns?
4. What additional resources or information do you need to address air quality concerns in your home and community?

