Webinars
Series of scientific webinars that provide a forum for discourse on scientific issues.
Live and On-Demand
Case Conferences
Journal Clubs
Grand Rounds
CE Available

Online Courses
Evidence-based online courses on a variety of children’s environmental health topics.
Interactive and Self-Paced
CE Available

Resource Catalog
Fact sheets, journal publications, reports, and other resources for parents, community members, patients and healthcare professionals
Topics included:
Air Quality, Pesticides, Natural Disasters, BPA, Mold, Lead, Mercury

www.pehsu.net/nationalclassroom.html
Mitigating the Health Impact of Wildfire Smoke
Guidance for Health Professionals
Ana Rappold PhD
Susan Lyon Stone MS
Wayne E. Cascio MD, FACC
Moderator: Marissa Hauptman, MD, MPH
This presentation is dedicated in memory of Dr. James M. Seltzer of the Western States (Region 9) PEHSU and the first responders and others who have responded to and been affected by wildfires in their community.

This presentation was supported by the American Academy of Pediatrics and the American College of Medical Toxicology and funded (in part) by the cooperative agreement award number FAIN: U61TS000237 and UG1TS000238 from the Agency for Toxic Substances Disease Registry (ATSDR). The U.S. EPA supports the PEHSU by providing funds to ATSDR under Inter-Agency Agreement number DW-75-92301301.

Neither U.S. EPA not ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications. Support for this presentation (Dr. Hauptman) was provided by the National Institute of Environmental Health Sciences, National Institutes of Health grant number P30ES000002-53S2.

Stock Photos downloaded from pexels.com free for personal and commercial use under the Creative Commons Zero (CC0) license.
Learning Objectives

1) To identify scope of wildfires in the U.S. and identify interagency resources available.

2) To describe health impacts of wildfires and identify populations of concern.

3) To learn risk communication strategies to address wildfire smoke for health professionals.
Wildfire Smoke and Public Health

Where is it? What can we do?

Ana Rappold
Overview

- Health effects of wildland fire smoke – Rappold
- AirNow website – Stone, Cascio

- Smoke tools
  - Fires: Current Conditions web page
  - Wildfire Smoke: Guide for Public Health Officials

- Health tools
  - PM Web course
  - Ozone web course, fact sheets
Health effects of smoke

_Daily Counts of Asthma ED Visits; Pocosin Lakes NC 2008_

First day of flaming

3 days of high exposure

![Graph showing daily counts of asthma ED visits with marked days of flaming and high exposure.]
Percent change in cumulative RR by discharge diagnosis category for exposed and referent counties in NC during 3-day period of high exposure compared with the entire 6-week study period.

Rappold AG et al. Environ. Health Perspectives 2011
• Reviewed 61 peer reviewed journal articles on the topic of forest fire/wildfire smoke and health, published between 1 January 1986 and 30 May 2014.

Health effects known or suspected to be caused by wildland fire smoke:

- All-cause mortality
- Asthma & COPD exacerbations
- Bronchitis & pneumonia
- Childhood respiratory disease
- Cardiovascular outcomes
- Adverse birth outcomes
- Symptoms such as: eye irritation, sore throat, wheeze and cough

Source: Studies reviewed in Liu et al 2015.
Who is at risk?

- **Susceptible populations include** –
  - Pregnant women and fetuses
  - Children
  - Older populations
  - Populations with pre-existing respiratory disease
  - Populations with pre-existing cardiovascular disease
  - Populations with lower socio-economic status

- **Populations suspected to be at greater risk** –
  - Populations with chronic inflammatory diseases (e.g., diabetes, obesity)
  - Populations with specific genetic polymorphisms (e.g. GSTM1) that mediate physiologic response to air pollution
### AIR QUALITY INDEX CHART

<table>
<thead>
<tr>
<th>Air Quality Index (AQI) Values</th>
<th>Levels of Health Concern</th>
<th>Colors</th>
<th>AQI Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>When the AQI is in this range:</td>
<td>...air quality conditions are:</td>
<td>...as symbolized by this color:</td>
<td>% of AQI codes on clear days</td>
</tr>
<tr>
<td>0 to 50</td>
<td>Good</td>
<td>Green</td>
<td>89.50%</td>
</tr>
<tr>
<td>51 to 100</td>
<td>Moderate</td>
<td>Yellow</td>
<td>9.15%</td>
</tr>
<tr>
<td>101 to 150</td>
<td>Unhealthy for Sensitive Groups</td>
<td>Orange</td>
<td>1.26%</td>
</tr>
<tr>
<td>151 to 200</td>
<td>Unhealthy</td>
<td>Red</td>
<td>0.08%</td>
</tr>
<tr>
<td>201 to 300</td>
<td>Very Unhealthy</td>
<td>Purple</td>
<td>0.01%</td>
</tr>
<tr>
<td>301 to 500</td>
<td>Hazardous</td>
<td>Maroon</td>
<td>0.08%</td>
</tr>
</tbody>
</table>

### Daily Air Quality Index, 2006-2013

How often do fires impact air quality?

https://airnow.gov/index.cfm?action=particle_health.index
Air Quality Impacts of Wildland Fires

How much does smoke contribute to air quality and how often does it lead to exceeding daily standard?

Health protective standards
Annual - 12 μg/m³ daily average
Daily – 35 μg/m³
We simulated *forecast-based interventions in population* using forecast predictions of PM$_{2.5}$ from NOAA’s Smoke Forecasting System and asked

“If we reduced exposures according to the forecasts would we observe a corresponding reduction in health effects?”

Rappold et al. Environmental Sci & Technology 2014
**Other Forms of Interventions**

Current research and other activities focus on reducing the impacts on health in the affected communities.

- Workshop on Wildfire Smoke and Health Risk Communication, RTP, Sept 2016 was organized to improve health risk communication and management.

- Improving Air Quality Awareness through Message Content and Delivery Mechanism - Identified among the 5 key gaps in workshop.

**Smoke tools**

Air Quality Flag Program
Fires: Current Conditions web page
Wildfire Smoke: Guide for Public Health Officials

**Health tools**

PM Web course
Ozone web course, fact sheets

<table>
<thead>
<tr>
<th>Air Quality Index</th>
<th>Outdoor Activity Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>green (GOOD)</td>
<td>Great day to be active outside!</td>
</tr>
<tr>
<td>yellow (MODERATE)</td>
<td>Students who are unusually sensitive to air pollution could have symptoms. *</td>
</tr>
<tr>
<td>orange (UNHEALTHY FOR SENSITIVE GROUPS)</td>
<td>It's OK to be active outside, especially for short activities such as recess and physical education (PE). For longer activities such as athletic practice, take more breaks and do less intense activities. Watch for symptoms and take action as needed. * Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.</td>
</tr>
<tr>
<td>red (UNHEALTHY)</td>
<td>For all outdoor activities, take more breaks and do less intense activities. Consider moving longer or more intense activities indoors or rescheduling them to another day or time. Watch for symptoms and take action as needed. * Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.</td>
</tr>
<tr>
<td>purple (VERY UNHEALTHY)</td>
<td>Move all activities indoors or reschedule them to another day.</td>
</tr>
</tbody>
</table>

Air Quality and Outdoor Activity Guidance for Schools

www.airnow.gov/flag
Wildfire Smoke and Public Health Information

Susan Lyon Stone
Fires: Current Conditions Page

- Current Smoke Map generated by NOAA HMS
- Current Advisories – State/Local/Tribal agency blogs and Wildland Fire Air Quality Response Program

Current Conditions Map - May 9, 2016

Current Advisories

CA Smoke Blog

USFS Wildland Fire Air Quality Response Program
How Smoke from Fires Can Affect Your Health

Updated January 2017

Smoke may smell good, but it’s not good for you

While not everyone has the same sensitivity to wildfire smoke, it’s still a good idea to avoid breathing smoke if you can help it. And when smoke is heavy, such as can occur in close proximity to a wildfire, it’s bad for everyone.

Smoke is made up of a complex mixture of gases and fine particles produced when wood and other organic materials burn. The biggest health threat from smoke is from fine particles. These microscopic particles can penetrate deep into your lungs. They can cause a range of health problems, from burning eyes and a runny nose to aggravated chronic heart and lung diseases. Exposure to particle pollution is even linked to premature death.

Some people are more at risk

It’s especially important for you to pay attention to local air quality reports during a fire if you are

- a person with heart or lung disease, such as heart failure, angina, ischemic heart disease, chronic obstructive pulmonary disease, emphysema or asthma.
- an older adult, which makes you more likely to have heart or lung disease than younger people.
- caring for children, including teenagers, because their respiratory systems are still developing. They breathe more air (and air pollution) per pound of body weight than adults; they’re more likely to be active outdoors, and they’re more likely to have asthma.
- a person with diabetes, because you are more likely to have underlying cardiovascular disease.
- a pregnant woman, because there could be potential health effects for both you and the developing fetus.

How to tell if smoke is affecting you

High concentrations of smoke can trigger a range of symptoms.

- Anyone may experience burning eyes, a runny nose, cough, phlegm, wheezing and difficulty breathing.
- If you have heart or lung disease, smoke may make your symptoms worse.
  - People with heart disease might experience chest pain, palpitations, shortness of breath, or fatigue.
  - People with lung disease may not be able to breathe as deeply or as vigorously as usual, and may experience symptoms such as coughing, phlegm, chest discomfort, wheezing and shortness of breath.

Protect yourself!

It’s important to limit your exposure to smoke - especially if you are at increased risk for particle-related effects. Here are some steps you can take to protect your health:

Prepare for fire season if you live in a fire-prone area

If you have heart, vascular or lung disease, including asthma, talk with your health care provider about enjoying outdoor activities during times when air quality is high. Here are some tips to help you protect yourself:

- If the air quality is unhealthy, take steps to reduce your exposure to smoke.
- If you spend a lot of time outdoors, take some breaks inside during low-quality days.
- Limit your exposure to smoke by staying indoors, avoiding outdoor physical activity when possible, and keeping windows and doors closed.
- If you have heart disease, it may be especially important to stay indoors during days when air quality is unhealthy.
- If you have lung disease, it may be especially important to follow your kidneys' advice about staying home indoors during days when air quality is unhealthy.

https://airnow.gov/index.cfm?action=smoke.index
Wildfire Guide 2016

- Primarily a federal/California document; housed on AirNow website
- Updated air quality and health information
- Evidenced-based exposure reduction measures
- Entirely new section on communicating air quality
  - Uses “Current PM” levels from AirNow
  - Uses satellite information on Fires: Current Conditions page
  - Visual range information updated
- PEHSU fact sheets about children’s health, 2011
- Information about new interagency Wildland Fire Air Quality Response Program

https://www3.epa.gov/airnow/wildfire_may2016.pdf
Wildfire Guide 2017

- Updated look
- Addition of ozone
- Smoke vs urban particles
- Add sections
  - PM web course
  - Sensors
  - Ash clean-up
- Stand-alone fact sheets
  - Children
  - Older adults
  - Pets/livestock
  - Preseason preparedness
  - Exposure reduction
  - Respirator use
  - Ash clean-up
  - Know when to evacuate
If you live in an area that is regularly affected by smoke or where the wildfire risk is high, be prepared for this season! Know how to get ready before a wildfire. Know how to protect yourself and your family during a wildfire.

Being prepared for fire season is especially important for the health of children, older adults, people with heart or lung disease.

Prepare Before a Wildfire

- Stock up so you don’t have to go out when it’s smoky. Have several days of medications on hand. Buy groceries that do not need to be refrigerated or cooled, because cooking can add to indoor particle levels.
- Create a “clean room” in your home. Choose a room with as few windows and doors as possible, such as a bedroom. Use a portable air cleaner and avoid indoor sources of pollution.
- Buy a portable air cleaner before there is a smoke event. High-efficiency particulate air (HEPA) filter air cleaners, and electrostatic precipitators that do not produce ozone, can help reduce indoor particle levels.
- Understand how you will receive alerts and health warnings, including air quality reports and public service announcements, from local offices.
- If you have heart, lung, or respiratory disease, check with your doctor about what you should smoke events.
- If you have asthma or lung disease, use respiratory medications as necessary.
- Have a supply of N95 (a high-quality) face mask for indoor use. Wear a mask when exposed to smoke.

Organize your important items ahead of time and know where to go in case you have to evacuate.

Exposure to Particle Pollutants

Indoor sources of particulate matter (PM) can come from combustion events such as smoking, candle burning, cooking, and wood burning. During a wildfire event, outdoor PM can increase indoor PM levels and affect the health of those nearby. As outlined in the Guide, reducing indoor sources of PM is a major step to lower the concentrations of PM indoors. Further reductions in indoor PM can be achieved using one of the filtration options discussed below.

Filtration Options

There are two effective options for improving air filtration in the home: upgrading the central system filter, or using high efficiency portable air cleaning appliances. Before discussing filtration options, it is important to understand the basics of filter efficiency.

Filter Efficiency

The most widely used standard for filter efficiency is known as the Minimum Efficiency Reporting Value (MERV) rating. The MERV scale for residential filters ranges from 1-12. The higher the MERV rating, the greater the percentage of particles captured as the air passes through the filter media. Higher MERV (higher efficiency) filters are especially effective at capturing very small particles that can cause health effects.

Central Air System Filter

The filter used in the central heating/cooling system of the home can effectively reduce indoor PM. A home typically will have a low MERV (1-4) filter, which is generally designed to provide good comfort and mechanical efficiency and is not designed to capture very small particles.

Indoor Air Filter

A portable high-efficiency filter that is designed to capture a medium to high percentage of particles and is designed to capture particles as small as those found in PM2.5. Indoor air filters are designed to reduce indoor PM concentrations.

Children

- Children are at a critical period of development when toxic exposures can have profound negative effects, and their respiratory system is especially vulnerable during wildfires.
- Children are exposed to smoke from fires burning near homes, schools, and other indoor sources of pollution.
- Exposure to smoke can affect the health of children.

Recommendations

- Planning Ahead
  - Stock up so you don’t have to go out when it’s smoky. Have several days of medications on hand.
  - Buy groceries that do not need to be refrigerated or cooled.
  - Make sure your air conditioning is working.
  - If you have an air conditioner, turn it on with the fresh air intake closed.

- Smoke-Free Home & Car
  - Stay indoors with the door and windows closed.
  - Do not add outdoor smoke from a wildfire.

- Health Effects from Smoke
  - Wildfire smoke can cause small particulate liquid droplets, which can irritate the eyes and lungs.
  - Symptoms include burning eyes, watery eyes, runny nose, coughing, sneezing, 怒 horns (using of air supplements, coughing, nose, and eye irritation, breathing, chest pain, tightness of heart, and other symptoms)
  - Children with allergies and asthma may have more symptoms than usual.

- The Risk of Developing cancer from short-term exposure to smoke is relatively small.

Wildfire Factsheets Under Development.

Original PEHSU Wildfire Factsheet available at: http://www.pehsu.net/cgi/page.png/resources.html
Health Providers Page

Health Tools

Wayne E. Cascio
Particle Pollution and Your Patients’ Health

Applied for continuing education credit from CDC for physicians, nurses, and health educators

https://www.epa.gov/pm-and-your-patients-health/patient-education-tools
What Is It? Who Is It For?

*Particle Pollution and Your Patients’ Health* is a short, evidence-based training course that:

- Describes the biological mechanisms for cardiovascular and respiratory health effects with particle pollution exposure
- Helps health-care providers advise their patients about particle pollution exposure
- Provides practical education tools to help patients understand how particle pollution exposure can affect their health and how to use Air Quality Index to protect health

*Particle Pollution and Your Patients' Health* is designed for:

- Diverse range of physicians
- Nurses and nurse practitioners
- Asthma educators
- Other medical professionals who counsel patients about lung, heart or vascular disease
What is Particle Pollution?

On this page:

- What is particle pollution and what types of particles are a health concern?
- Where does particle pollution come from?
- Where and when is particle pollution a problem?

What is particle pollution and what types of particles are a health concern?

Particle pollution is airborne pollutants that can be made up of many different substances, including gases, particles, and liquid droplets. These pollutants can be naturally occurring (such as dust, dirt, and pollen) or man-made (such as chemicals, soot, and smoke). The air we breathe can be contaminated with these粒子, and when they enter the body, they can cause severe health problems.

The air we breathe can contain particles of all sizes, from very small to very large. Some particles are so small that they can only be measured in micrometers (μm) or nanometers (nm). These particles can cause problems in the respiratory system, as they can be inhaled deep into the lungs and might cause irritation and disease. Other particles are larger and might not cause as much harm, but they can still affect the respiratory system.

Your patients who live in an area with high levels of particle pollution should be concerned about the effects of these pollutants. It is important to take necessary precautions to avoid the harmful effects of particle pollution.

Once inhaled, these particles can travel deep into the lungs and cause respiratory problems. They can also be absorbed into the bloodstream, potentially leading to other health issues.

https://airnow.gov/index.cfm?action=aqibasics.particle
Cardiovascular Effects

Particle Pollution and Your Patients' Health

Cardiovascular Effects

On this page:

- Why is particle pollution a cardiovascular health concern?
- How does particle pollution affect the cardiovascular system?
- What are the cardiovascular effects?
- What are the acute exposure effects?
- What are the chronic exposure effects?

Why is particle pollution a cardiovascular health concern?

Cardiovascular disease accounts for the greatest number of deaths in the United States. One in three Americans has heart or blood vessel disease. In every three deaths is a cardiovascular disease and 17 percent die of these diseases.

Traditional risk factors for cardiovascular disease include high blood pressure, high cholesterol, and diabetes. Particle pollution is also a significant risk factor for cardiovascular disease and acts independently or in combination with other cardiovascular risk factors to increase the risk of cardiovascular disease. The adverse effects on cardiovascular health are multifaceted, including the development of cardiovascular disease (Newby DE, et al., 2014). Exposure to particle pollution over a long period of time increases the risk of both fatal and nonfatal events and that the risk increases with the concentration of pollution (Newby DE, et al., 2010). While the risk of cardiovascular disease is raised by many other well-established risk factors, such as smoking, particle pollution sets off a host of events, such as acute coronary events.
Respiratory Effects

Particle Pollution and Your Patients' Health

Respiratory Effects

On this page:

- Why is particle pollution a respiratory health concern?
- How does particle pollution affect the respiratory system?
- What are the respiratory effects of acute exposure?
- What are the respiratory effects of chronic exposure?
- How does particle pollution affect people with asthma?
- What are the health disparities for asthma?
- How does particle pollution affect people with COPD?
- What is the role of fine particles in lung cancer incidence and mortality?

Why is particle pollution a respiratory health concern?

Studies have linked particle pollution exposure to a variety of respiratory health effects, including:

- Respiratory symptoms including cough, phlegm, and wheeze
- Acute, reversible decrement in pulmonary function
- Inflammation of the airways and lung (this is acute and neutrophilic)
- Bronchial hyperreactivity
- Acute phase reaction
- Respiratory infections
- Respiratory emergency department visits
- Respiratory hospitalizations
- Decreased lung function growth in children

https://airnow.gov/index.cfm?action=health_providers.index
https://airnow.gov/index.cfm?action=aqibasics.particle
Patient Exposure and the Air Quality Index

On this page:

- Should I recommend that my patients reduce their exposure to particle pollution?
- What is the Air Quality Index (AQI)?
- Where can I find daily air quality reports?
- What can I advise my patients to do when air quality is poor?
- How can my patients reduce particle pollution exposure?
- How effective are air quality notifications in reducing exposure?
- What education materials are available?

Should I recommend that my patients reduce their exposure to particle pollution?

Yes. All people should be educated about the health effects of particle pollution and how to reduce exposure.

Your patients with heart or lung diseases, older adults, and those with lower SES are more likely to be affected by particle pollution. Exposure reduction measures. The American Heart Association (Brook et al., 2010), concluded that all patients with cardiovascular disease should be educated about the cardiovascular risks posed by air pollution.

In your patient education, you should encourage aware of air quality reports through weather broadcasts, on websites, or through the use of a mobile app (airnow.gov) has forecasts as well as links to the eastern recommendations for reducing exposure by basing activities.
High Particle Pollution Events

Consistent with Wildfire Smoke: Guide for Public Health Officials

Photo Courtesy of California Department of Public Health
Clinical Scenarios

Balanced, evidence-based responses to these scenarios:

- Man (75 yr) with a history of hypertension, hyperlipidemia, diabetes, & atherosclerotic coronary artery disease has shortness of breath and chest pain when walking.

- Woman (68 yr) with heart failure appears to be volume overloaded with increased central pressures.

- Man (57 yr) with a five-year history of coronary artery disease, received a shock from his ICD for sustained and rapid ventricular tachycardia.

- Elderly gentleman, complains of frequent cough with phlegm, which he has developed in the recent months.

- Boy (6th grade) with asthma, has wheeze.

- Woman (35 yr), non-smoker who has seasonal allergy symptoms (rhinitis, conjunctivitis) that she cannot control with the over-the-counter medication.
Ozone Web Course for Health Professionals

Ozone Pollution and Your Patients' Health

Ozone and Your Patients' Health: About this Course

Ozone and Your Patients’ Health is designed for family practice doctors, pediatricians, nurse practitioners, asthma educators, and other medical professionals who counsel patients about asthma, air pollution, or exercise. Patients and their families may also use this material to learn the science behind ozone’s effect on respiration and how to manage their respiratory health using the Air Quality Index.

Course Objectives

Upon completion of this course, you will be able to:

- Describe how ozone is formed and where it is found
- Identify the effects that exposure to ozone has on the general population
- List the different effects of ozone at varying exposure concentrations and durations
- Identify the effects that ozone has on asthma patients
- Explain the purpose and use of the Air Quality Index
- Identify common sources of information about the Air Quality Index
- Address typical patient questions and clinical scenarios relating to ozone exposure

Does not offer CME at this time

Asthma

**Asthma and Outdoor Air Pollution**

1. **Air pollution can make asthma symptoms worse and trigger attacks.**
   
   If you or your child has asthma, have you ever noticed symptoms get worse when the air is polluted? Air pollution can make it harder to breathe. It can also cause other symptoms, like coughing, wheezing, chest discomfort, and a burning feeling in the lungs.

   Two key air pollutants can affect asthma. One is ozone (found in smog). The other is particle pollution (found in haze, smoke, and dust). When ozone and particle pollution are in the air, adults and children with asthma are more likely to have symptoms.

2. **You can take steps to help protect your health from air pollution.**
   
   - **Get to know how sensitive you are to air pollution.**
   - **Notice your asthma symptoms when you are physically active.** Do they happen more often when the air is more polluted? If so, you may be sensitive to air pollution.

   - **Know when and where air pollution may be bad.**
   - Ozone is often worst on hot summer days, especially in the afternoons and early evenings.
   - Particle pollution can be bad any time of year, even in winter. It can be especially bad when the weather is calm, allowing air pollution to build up. Particle levels can also be high:
     - Near busy roads, during rush hour, and around factories.
     - When there is smoke in the air from wood stoves, fireplaces, or burning vegetation.
     - Also notice any asthma symptoms that begin up to a day after you have been outdoors in polluted air. Air pollution can make you more sensitive to asthma triggers, like mold and dust miles. If you are more sensitive than usual to indoor asthma triggers, it could be due to air pollution outdoors.

Cardiovascular Disease – February 2016

**Enfermedades del corazón, ataques cerebrales y contaminación del aire**

1. **¿Sabía que la contaminación del aire puede provocar ataques al corazón, ataques cerebrales y otros problemas de salud?**
   
   Según estudios médicos, la contaminación del aire puede provocar ataques al corazón, ataques (derrames) cerebrales y aритмия, sobre todo en personas que están en situación de riesgo de padecer estas afecciones. Además, en las personas con una afección llamada insuficiencia cardíaca, la contaminación del aire puede reducir aún más la capacidad del corazón de bombar la sangre de la forma que necesita hacerlo. Las partículas muy pequeñas son los contaminantes más preocupantes que provocan estos efectos. La contaminación por particulíes se encuentra en la neblina, el humo y el polvo, y a veces en el aire que parece limpio. Esta hoja informativa te explica cómo puede:
   - **Conservar información actualizada sobre la calidad local del aire.**
   - **Proteger su salud cuando la contaminación por particulíes se encuentra en niveles inadecuados.**

2. **¿Cómo proteger su salud?**
   
   Hacer ejercicio con regularidad es importante para tener buena salud. Muchas personas con enfermedades del corazón, ajoerías y diabetes deben hacer ejercicio para mantenerse saludables. Hacer ejercicio regular puede mejorar el rendimiento de su corazón, y reducir el riesgo de padecer problemas del corazón o ataques cerebrales provocados por la contaminación del aire. Además:
   - **Si padece de enfermedades del corazón o ha sufrido un ataque cerebral, consulte con su proveedor de atención médica sobre las mejores formas de proteger su salud cuando la calidad del aire es insuficiente.**
   - **Hable con su proveedor de atención médica sobre el riesgo de padecer enfermedades del corazón o un ataque cerebral y planea hacer más ejercicio físico del habitual.**

3. **¿Cómo puede proteger su salud?**
   
   Hacer ejercicio con regularidad es importante para tener buena salud. Muchas personas con enfermedades del corazón, ajoerías y diabetes deben hacer ejercicio para mantenerse saludables. Hacer ejercicio regular puede mejorar el rendimiento de su corazón, y reducir el riesgo de padecer problemas del corazón o ataques cerebrales provocados por la contaminación del aire. Además:
   - **Si padece de enfermedades del corazón o ha sufrido un ataque cerebral, consulte con su proveedor de atención médica sobre las mejores formas de proteger su salud cuando la calidad del aire es insuficiente.**
   - **Hable con su proveedor de atención médica sobre el riesgo de padecer enfermedades del corazón o un ataque cerebral y planea hacer más ejercicio físico del habitual.**

   Se pide que se hagan los mismos pasos para las personas que viven en los países con niveles altos de contaminación del aire. Los niveles de contaminación por particulíes pueden ser elevados en cualquier época del año. También es importante:
   - **Cerca de vías muy transitadas, en zonas urbanas (sobre todo en horas pico) y en zonas industriales.**
   - **Cuando hay humo en el aire proviene de cocinas de leña, chimeneas, quema de vegetación o incendios forestales.**

---

[www3.epa.gov/airnow/asthma-flyer.pdf](www3.epa.gov/airnow/asthma-flyer.pdf) (English)
[www3.epa.gov/airnow/heartflyer.pdf](www3.epa.gov/airnow/heartflyer.pdf) (English)
Key Resources

• **AirNow**
  • **Air Quality Flag Program**
  • **Current Conditions**
  • **Health Providers Page**
  • **Wildfire Smoke and Health**
  • **Wildfire Smoke: Guide for Public Health Officials**
  • **Wildfire Trends**
• **California Air Resources Board Resources**
• **CDC Wildfire Factsheets**
• **PEHSU Wildfire Fact Sheet**
• **Wildland Fire Air Quality Response Program**
Webinars
Series of scientific webinars that provide a forum for discourse on scientific issues.
Live and On-Demand
Case Conferences
Journal Clubs
Grand Rounds
CE Available

Online Courses
Evidence-based online courses on a variety of children’s environmental health topics.
Interactive and Self-Paced
CE Available

Resource Catalog
Fact sheets, journal publications, reports, and other resources for parents, community members, patients and healthcare professionals
Topics included: Air Quality, Pesticides, Natural Disasters, BPA, Mold, Lead, Mercury