



Welcome to the webinar!  
We'll begin momentarily



# NEHA is:

- **4,800** members
- **7** credentials and **6,200** credential holders in all 50 states and 2 territories
- **80** years of JEH publication, distributed to over **6,000** individuals
- Over **3,500** professionals trained through webinars
- Over **200** educational sessions at the AEC



# 2018 NEHA AEC & EXPO AND HUD HEALTHY HOMES CONFERENCE



Hundreds of educational  
sessions on relevant and  
**emerging EH issues**



## NEHA 2018 AEC and HUD Healthy Homes Conference

Anaheim • California • June 25-28, 2018

Register today to join us in Anaheim, CA!  
[neha.org/news-events/aec-annual-educational-conference-0/register](http://neha.org/news-events/aec-annual-educational-conference-0/register)



*A healthier environment for healthier hearts*

# ***Air Pollution and Cardiovascular Health***

***Wayne Cascio MD, FACC***

***Acting Director***

***National Health and Environmental Effects Research Laboratory***

***Office of Research and Development***

***US EPA***

***NEHA Webinar***

***Research Triangle Park, NC  
February 28, 2018***



# *Air Pollution: A Leading Cause of the Global Burden of Disease*

**In 2015 ambient  $PM_{2.5}$  was the fifth-ranking global mortality risk factor -**

***Exposure to  $PM_{2.5}$  caused:***

- 4.2 million deaths
- 103.1 million disability-adjusted life-years (DALYs)

***Between 1990-2015 deaths increased in association with  $PM_{2.5}$  from:***

- 3.5 million to 4.2 million

**Ozone exposure contributed to morbidity and mortality -**

***In 2015 ozone exposure is estimated to have accounted for:***

- 254,000 deaths
- 4.1 million DALYs from chronic obstructive pulmonary disease





# *U.S. Air Pollution Continues to Impact Population Health*

## *Air Pollution Remains a Significant U.S. Public Health Concern*

- Estimated excess mortality **125,000 deaths/year**
- Over **20 million school days and work days lost**
- Over **1 million life-years lost**
- **122.5 million people living in counties with one or more pollutants exceeding the NAAQS in 2016**





# Air Pollution Related Deaths Over Time

## Fraction of All-Cause Deaths Attributed to PM

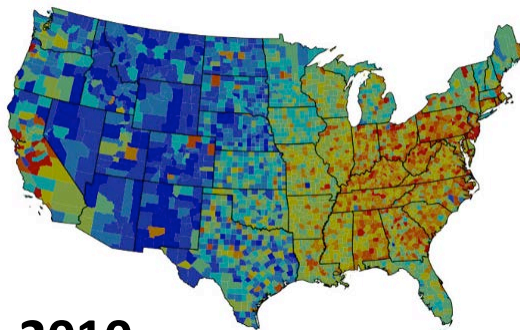
*After the implementation of local, state, and federal air quality policies*

- PM<sub>2.5</sub> precursor emissions declined over the course of several decades

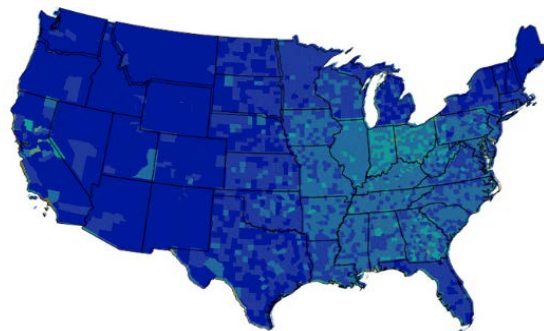
*Between 1980 - 2010, PM<sub>2.5</sub> exposures fell by about half, and estimated excess deaths decreased by about a third*

- California, Virginia, New Jersey, and Georgia had some of the largest estimated reductions in PM<sub>2.5</sub>-attributable deaths

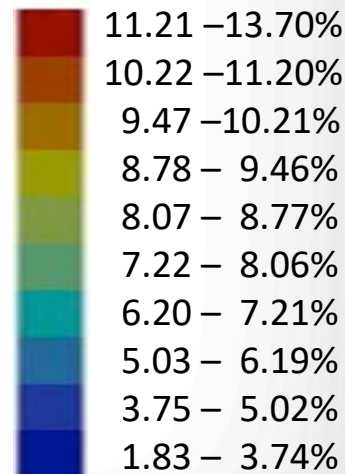
1980



2010



**% of Total All-Cause Deaths Due to PM<sub>2.5</sub> Between 1980 & 2010**

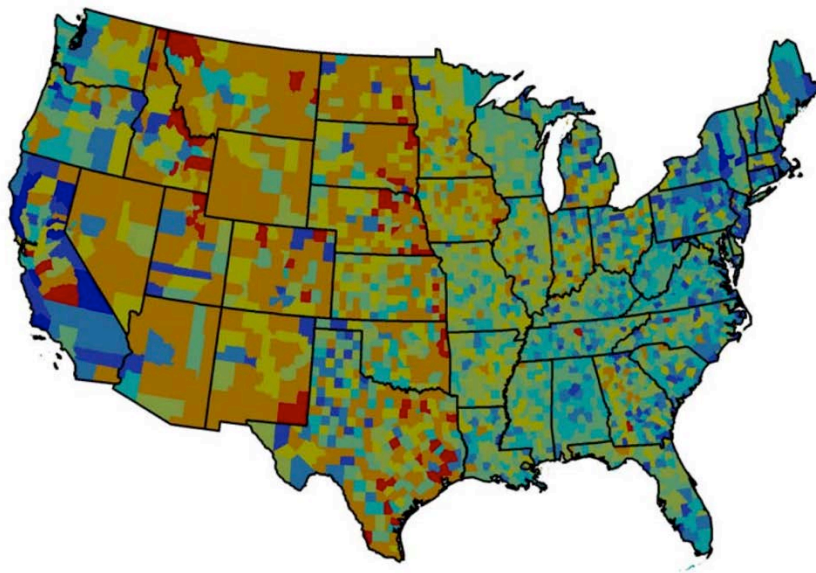
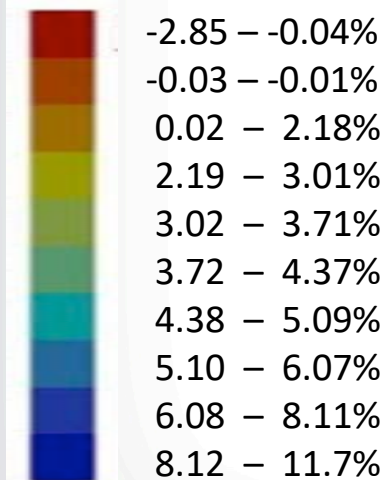




# Air Pollution

## Public Health Benefits of Decreasing PM<sub>2.5</sub> 1980-2010

Change in the %  
of Death Due to PM<sub>2.5</sub>  
Between 1980 - 2010



*Relative to a  
hypothetical population  
with exposures held  
constant at 1980 levels*

- people born in 2050 would live about 1 year longer
- there would be a cumulative gain of 4.4 million life years among adults ≥30 years of age



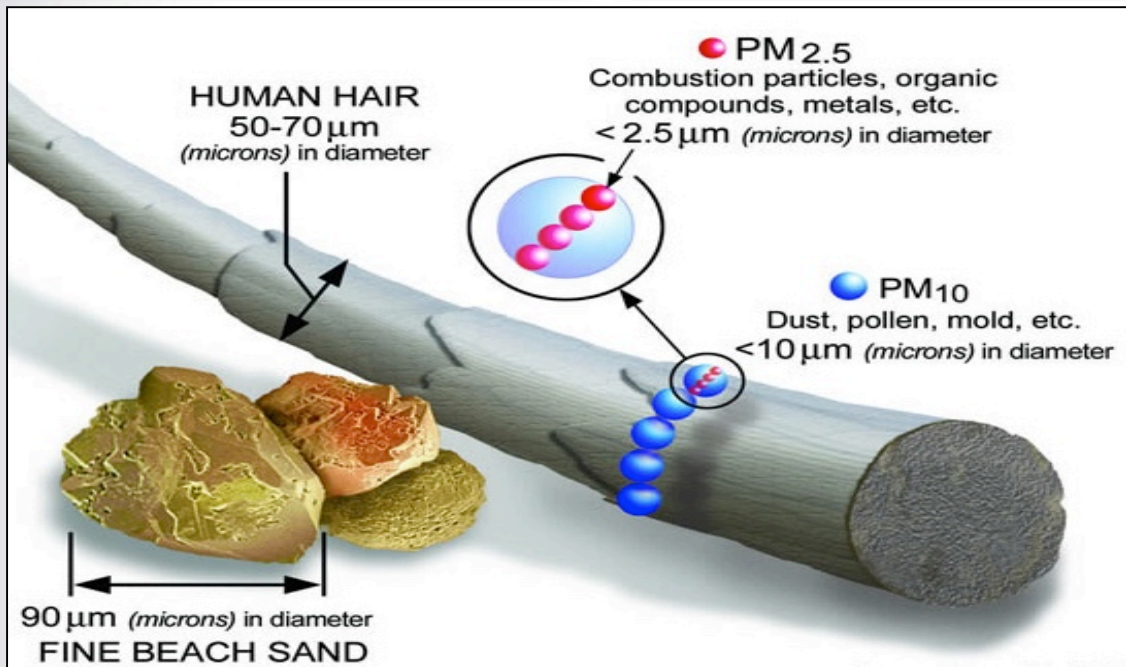


# Ambient Particulate Matter

## Definitions and Composition

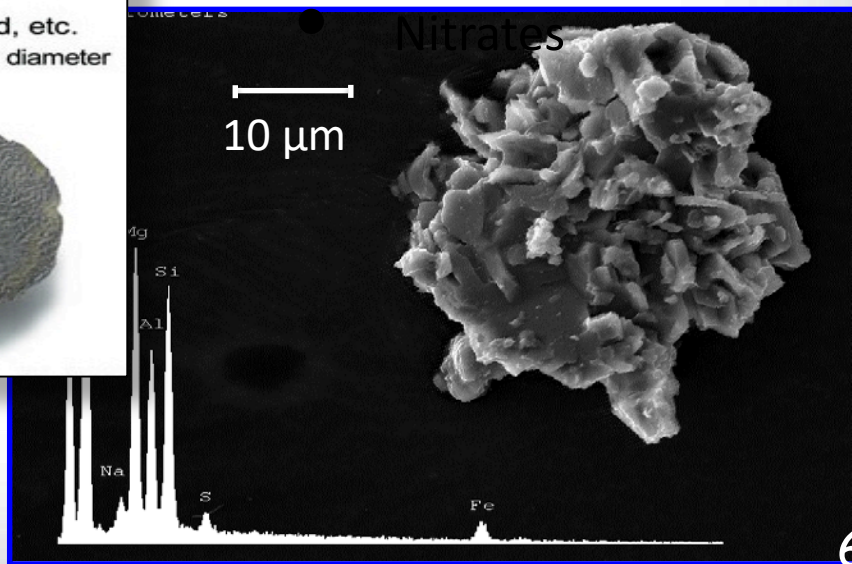
### Composition

- Elemental carbon
- Organic carbon
- Metals
- Sulfates
- Nitrates



### Aerodynamic diameter

- <10  $\mu\text{m}$  (PM<sub>10</sub>)
- <2.5  $\mu\text{m}$  (PM<sub>2.5</sub>)





# Daily Variability of $PM_{10}$ & $PM_{2.5}$

Chapel Hill, NC 1995-96

Daily  $PM_{2.5}$  changes (BLUE arrows)

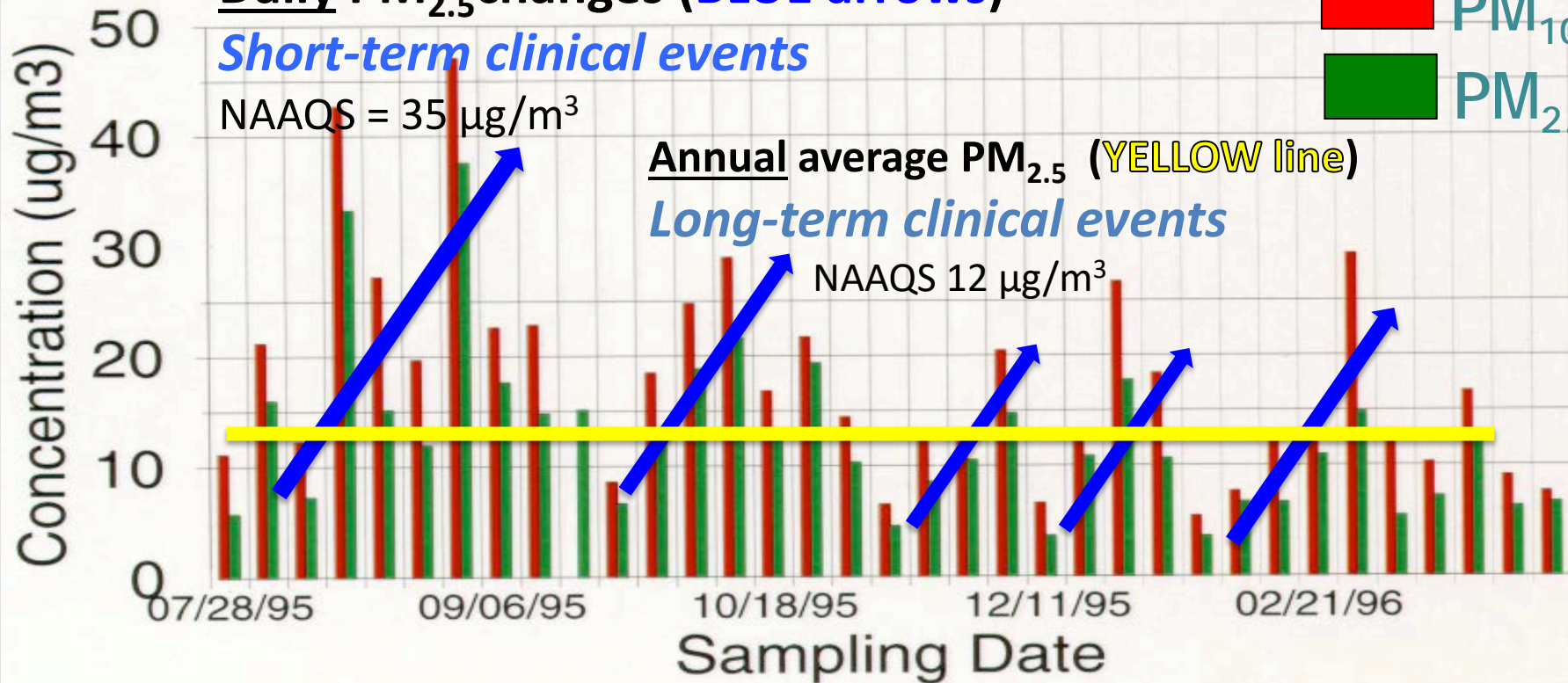
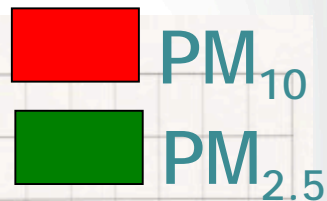
*Short-term clinical events*

NAAQS =  $35 \mu\text{g}/\text{m}^3$

Annual average  $PM_{2.5}$  (YELLOW line)

*Long-term clinical events*

NAAQS  $12 \mu\text{g}/\text{m}^3$





# *What are the Facts?*

## Air Pollution and Population Health

### *Key Facts*

- High attributable health burden
- Vulnerable populations are at higher risk
- Short-term exposure can trigger heart attack, stroke, arrhythmia and worsen heart failure
- No established threshold level for safe long-term exposure
- Mechanisms of health effects are now known
- Decreased long-term air pollutant exposures associated with improved cardiovascular outcomes

<http://sedac.ciesin.columbia.edu/data/set/sdei-global-annual-avg-pm2-5-2001-2010>



# Personal Health Care Spending in U.S. for Chronic Disease is High

COPD	\$ 53.8 billion
Asthma	\$ 32.5 billion
Pneumonia	\$ 37.1 billion
Lung cancer	\$ 13.1 billion
Ischemic heart disease	\$ 88.1 billion
High blood pressure	\$ 83.9 billion
Stroke	\$ 43.8 billion
Heart failure	\$ 28.5 billion
Atrial fibrillation	\$ 27.7 billion
Peripheral vascular disease	\$ 2.7 billion
Diabetes	\$101.4 billion
Preterm birth	\$ 4.9 billion

***½ Trillion  
Dollars  
in  
2013***

Dieleman JL et al.  
JAMA 2016

***Air Pollutant Exposure is a Risk Factor in Each***



*Who is  
the most  
vulnerable?*







# *Populations At-Risk Are Known*

## *Populations At-Risk from PM<sub>2.5</sub>*

### *Susceptible populations include –*

- those with pre-existing cardiovascular disease
- those with pre-existing respiratory disease
- older adults
- those with lower socio-economic status
- children & the developing fetus

### *Populations suspected to be at greater risk –*

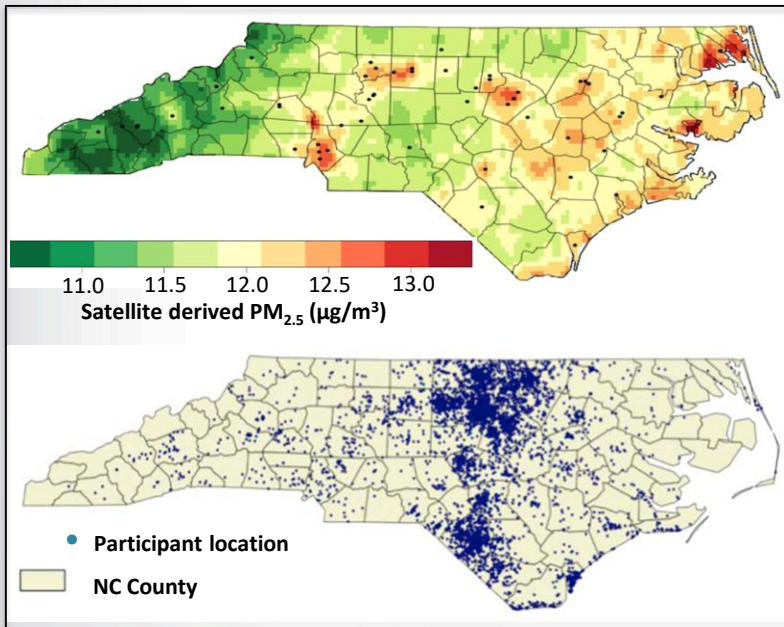
- those with chronic inflammatory diseases (e.g., diabetes, obesity)
- those with specific genetic polymorphisms (e.g., GSTM1)



# Health and Long-term Air Pollution Exposure

## Association between PM and Coronary Artery Disease

***5,679 patients who underwent coronary angiography at Duke University between 2002–2009 and resided in North Carolina\****



\*McGuinn LA, et al. *Environ Res* 2016

\*\*Hartiala J, et al. *J Am Heart Assoc* 2016

***1 µg/m<sup>3</sup> increase in annual average PM<sub>2.5</sub> was associated with an:***

- 11.1% relative increase in the odds of significant coronary artery disease
- 14.2% increase in the odds of having had a heart attack during the previous year

***6,575 Ohio residents undergoing elective diagnostic coronary angiography\*\****

***1 µg/m<sup>3</sup> increase in annual average PM<sub>2.5</sub> was associated with an:***

- 17% relative increase in the odds of 1-2 vessel, and a 24% increase in ≥ 3 vessel coronary artery disease
- 14% increase in the odds of having a heart attack within 3 years



# Air Pollution and Mortality

## PM, Survival and Subsequent Clinical Events

Zanobetti A & Schwartz J.  
*Environ Health Perspect* 2007

Mortality  
CHF hospitalization  
MI hospitalizations

Koton *et al.*  
*Prev Med* 2013

MI, CHF, Stroke  
Mortality

Tonne *et al.*  
*Eur Heart J* 2013

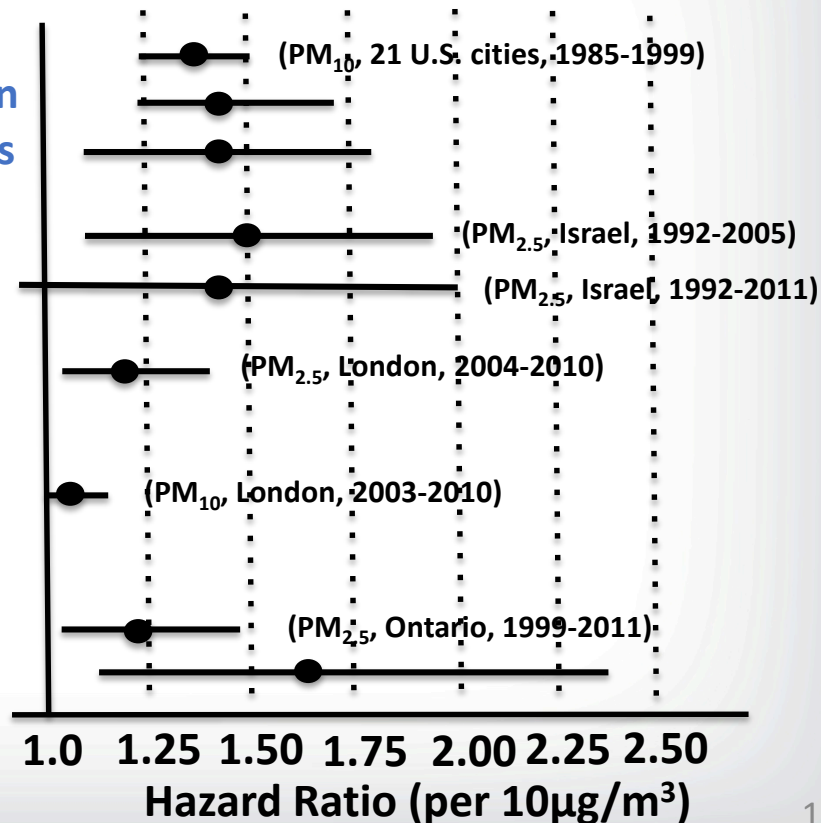
Mortality

Tonne *et al.*  
*Int J Hyg Envir Health* 2016

Mortality

Chen *et al.* *EHP* 2016  
*Environ Health Perspect* 2016

Mortality  
MI Mortality



- **Air pollution adversely affects:**
  - Health, Longevity, Healthcare Resource Utilization and Public Welfare (e.g. effects on visibility, vegetation, and ecosystems)
- **Most healthcare professionals & patients at-risk know of air pollution's adverse health effects**

*Despite Knowledge of the Risks  
the Healthcare System is Not Engaged*

- **Few healthcare professionals discuss the risks with their patients**
- **At-risk patients don't take action to reduce exposure**



# Healthy Heart Tool Kit and Research

[www.epa.gov/healthyheart](http://www.epa.gov/healthyheart)

## Goal:

- Narrow the knowledge-gap of healthcare professionals and patients at higher risk from air pollution regarding the relationship between air pollution and cardiovascular health
- Promote health protective behaviors and the avoidance of air pollutant exposures on poor air quality days

## Approach:

- Provide an environmental health information for patients who at high-risk for adverse cardiopulmonary outcomes from air pollutant exposure to limit exposure to PM
- Encourage adherence to primary and secondary preventions guidelines

## Impact:

- Decrease vascular and arrhythmic events, improve overall cardiovascular health and wellbeing and lower healthcare resource utilization







# Engaging the Public Examples of Products



Related Topics: [Air Research](#)

## Healthy Heart Toolkit and Research: Steps You Can Take

### Steps You Can Take to Reduce Health Effects from Air Pollution

Studies show that air pollution can trigger heart attacks and strokes. If you have exposure to high levels of air pollution.

When are air pollution levels high?

- Any time of year
- When weather is calm
- Near busy roads
- In urban areas
- In industrial areas
- When there is a fire



American Heart Association | American Stroke Association

## Heart Disease, Stroke, and Outdoor Air Pollution

### 1 Did you know that air pollution can trigger heart attacks, stroke, and other health effects?

Medical studies show that air pollution can trigger heart attacks, stroke, and irregular heart rhythms—especially in people who are already at risk for these conditions. Also, for people with a medical condition called heart failure, air pollution can further reduce the ability of the heart to pump blood the way that it should. Very small particles are the pollutants of greatest concern for triggering these effects. Particle pollution is found in haze, smoke, and dust—and sometimes in air that looks clean. This fact sheet tells you how you can:

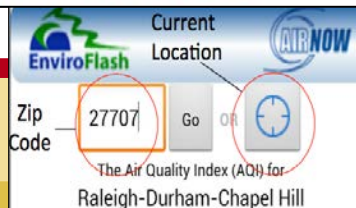
- Get up-to-date information about your



### 3 How can you protect your health?

## Particle Pollution and Your Patients' Health

Helps health care providers advise their patients about particle pollution exposure.



Current  
2/6/2013  
8:00 PM EST

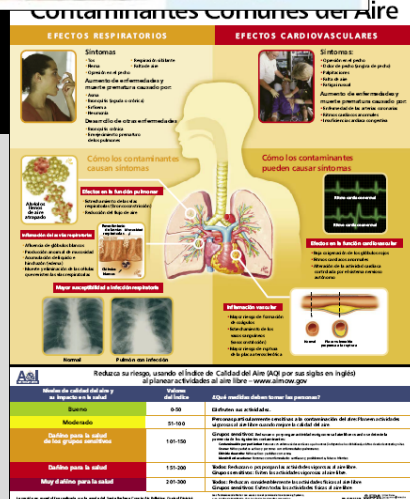
Pollutant:  
PM2.5

40  
Good

Current  
2/6/2013  
8:00 PM EST

Pollutant:  
OZONE

23  
Good





# Thank you

Wayne E. Cascio, MD, FACC, FAHA  
Acting Director,  
National Health and Environmental Effects Research Laboratory  
ORD/U.S. Environmental Protection Agency  
Email: [cascio.wayne@epa.gov](mailto:cascio.wayne@epa.gov)

*No conflicts of interest*

*The presentation represents the opinions of the speaker and does not necessarily represent the policies of the US EPA*



# *Air Quality Index and AirNow for Health Professionals*

*Susan Lyon Stone, MS*


*Senior Environmental Health Scientist*

*US EPA*





## AQI Categories and Health Messages

Category Descriptor	Index Value	Message	
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.	
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.	
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.	
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects.	
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.	



# Air Quality Index

- Pollutant-specific health effects and cautionary statements address question “who will be affected”
- Based on health information supporting the National Ambient Air Quality Standards
  - Controlled human exposure, epidemiological studies exposure/risk assessments used to set breakpoints
  - Epidemiological studies useful for identifying risk factors and more serious effects
  - Controlled human exposure studies useful for identifying proportion of healthy population affected, symptoms, mechanisms of effects, genetic variability

How to use the AQI to lower the dose of inhaled pollution:

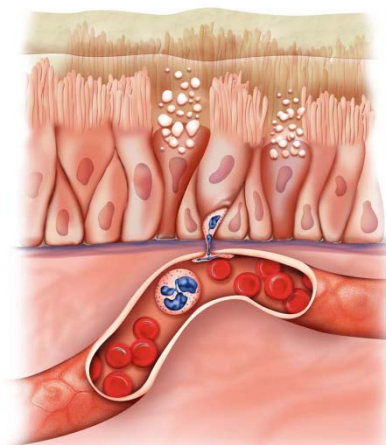
**Dose = Concentration x Ventilation rate x Time**

C - be active outdoors when air quality is better

V - take it easier when active outdoors

T - spend less time being active outdoors


**Since people respond differently - PAY ATTENTION TO SYMPTOMS!**








# PM Web Course for Healthcare Professionals

 United States  
Environmental Protection  
Agency

Environmental Topics    Laws & Regulations    About EPA


Search EPA.gov 

## Particle Pollution and Your Patients' Health

Share    Contact Us

An evidence-based training course for healthcare providers that:

- Describes the biological mechanisms responsible for the cardiovascular and respiratory health effects associated with particle pollution exposure.
- Provides education tools to help patients understand how particle pollution exposure can affect their health and how they can use the Air Quality Index to protect their health.



This course is designed for family medicine physicians, internists, pediatricians, occupational and rehabilitation physicians, nurse practitioners, nurses, asthma educators, pulmonary specialists, cardiologists, and other medical professionals.

[Start the Course](#)

[Course developers](#)

[Start the Course](#)    [Course developers](#)

[Contact Us](#) to ask a question, provide feedback, or report a problem.

Offers CE credit from CDC to physicians, nurses and health educators  
(<https://www.epa.gov/pmcourse>)



## What Is It? Who Is It For?

*Particle Pollution and Your Patients' Health* is an evidence-based training course that:

- Describes the biological mechanisms responsible for the cardiovascular and respiratory health effects associated 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 they can use the Air Quality Index to protect their health

*Particle Pollution and Your Patients' Health* is designed for family medicine physicians, internists, pediatricians, occupational and rehabilitation physicians, nurse practitioners, nurses, asthma educators, pulmonary specialists, cardiologists, and other medical professionals who counsel patients about lung, heart or vascular disease

*Offers Continuing Education Credits* to physicians, nurses, health educators

– Continuing education for clinicians is required for continued licensure in many states



# Why a Course for Clinicians?

- Part of CDC's Behavioral Risk Factor and Surveillance System of health related telephone surveys
  - In 2005 six states included questions about how environmental factors and the AQI affect people's activity levels
  - The states: Colorado, Florida, Indiana, Kansas, Massachusetts, and Wisconsin
- Results highlights:
  - People with lifetime asthma were almost twice as likely to report a change in activity based on an air quality alert if they had been advised by a healthcare professional to do so (Wen XJ, Balluz L, Mokdad A. 2009. J Community Health. 34(1):40-6.)
  - People *without* asthma were than three times as likely to report such a change, if they had been advised by a healthcare professional to do so. (Wen et al., 2009)
  - In Kansas, people were almost four times as likely to change outdoor activity levels if they were advised by a healthcare professional.
  - BUT: only a small percentage of people in groups considered to be at increased risk from particle pollution reported that healthcare professionals had advised them to pay attention to the AQI. (Kansas Department of Health and Environment, 2006).



# PM Web Course Outreach Materials

Free CME, CNE, and CEU  
Training for healthcare professionals

## Particle Pollution and Your Patients' Health Web Course

An extensive body of scientific evidence shows exposure to fine particle pollution may lead to a range of adverse health effects, including heart and lung effects, and even premature death. This course will provide health professionals with knowledge they can share with patients to help reduce overall risk of particle pollution-related health effects, particularly in individuals with heart and lung disease.



## Particle Pollution and Your Patients' Health Web Course

Free evidence-based training  
for healthcare professionals



[www.epa.gov/pmcourse](http://www.epa.gov/pmcourse)

Learn about the health risks of exposure to ambient particle pollution and how to reduce your patients' exposure using the Air Quality Index.



**Cardiovascular effects of particle pollution:** can cause a heart attack, irregular heartbeat, stroke, exacerbation of heart failure, and early death in people with heart disease.



**Respiratory effects of particle pollution:** can trigger an asthma attack, aggravate other lung diseases, and impact lung development in children.

 United States  
Environmental Protection  
Agency

[https://www.airnow.gov/index.cfm?action=health\\_providers.index](https://www.airnow.gov/index.cfm?action=health_providers.index)



# Ozone Web Course for Healthcare Professionals

 United States  
Environmental Protection  
Agency

Environmental Topics    Laws & Regulations    About EPA

Search EPA.gov

**Ozone Pollution and Your Patients' Health**    CONTACT US  
SHARE    

[Course Home](#)  
**About this Course**  
[What is Ozone?](#)  
[Health Effects in the General Population](#)  
[Health Effects in Patients with Asthma](#)  
[Patient Exposure and the Air Quality Index](#)  
[Clinical Scenarios](#)  
[Frequent Questions](#)  
[Course Outline & Key Points](#)  
[Review Questions](#)  
[Course Evaluation](#)  
[Patient Education Tools](#)  
[References](#)  
[Participation Certificate](#)

## 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

#### Clinical Scenarios



The Clinical



<https://www.epa.gov/ozone-pollution-and-your-patients-health> - Does not offer Continuing Education credits at this time





# Downloadable Factsheets for Heart and Lung Disease

In English and Spanish



## 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.

- 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 mites. If you are more sensitive than usual to indoor asthma triggers, it could be due to air pollution outdoors.

► **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.



## Heart Disease, Stroke, and Outdoor Air Pollution

**1 Did you know that air pollution can trigger heart attacks, stroke, and other health effects?**

Medical studies show that air pollution can trigger heart attacks, stroke, and irregular heart rhythms—especially in people who are already at risk for these conditions. Also, for people with a medical condition called heart failure, air pollution can further reduce the ability of the heart to pump blood the way that it should. Very small particles are the pollutants of greatest concern for triggering these effects. Particle pollution is found in haze, smoke, and dust—and sometimes in air that looks clean. This fact sheet tells you how you can:

- Get up-to-date information about your local air quality.
- Protect your health when particle pollution is at unhealthy levels.

**2 Are you at higher risk?**

Older adults and people with risk factors for heart disease or stroke may be at greater risk. You are at greater risk if you:

- Have had a heart attack, angina, bypass surgery, angioplasty with or without a stent, a stroke, blockages in the neck or leg arteries, heart failure, heart rhythm problems, diabetes, or chronic obstructive lung disease.

You may be at greater risk of heart disease or stroke (and therefore at greater risk from particle pollution) if any of these apply:

- You are a man 45 years or older, or a woman 55 years or older.
- You have a family history of stroke or early heart disease (father or brother diagnosed before age 55; mother or sister diagnosed before age 65).
- You have high blood pressure or high blood cholesterol.
- You are overweight or not physically active.
- You smoke cigarettes.

**3 How can you protect your health?**


Regular exercise is important for staying healthy, especially if you have heart disease. By adjusting when and where you exercise, you can lead a healthier lifestyle and help reduce your risk of heart problems or stroke triggered by air pollution. In addition:

- If you have heart disease or have experienced a stroke, check with your health care provider about the best ways to protect your health when the air quality is unhealthy.
- If you're at risk of heart disease or stroke and plan to exercise more than usual, discuss this with your health care provider.

► **Know when and where particle pollution levels may be unhealthy.**

Particle pollution levels can be high any time of year. Particle levels can also be high:

- Near busy roads, in urban areas (especially during rush hour), and in industrial areas.
- When there is smoke in the air from wood stoves, fireplaces, burning vegetation, or forest fires.




<https://www3.epa.gov/airnow/asthma-flyer.pdf>

<https://www3.epa.gov/airnow/heartflyer.pdf>

## Effects of Common Air Pollutants

### RESPIRATORY EFFECTS



**Symptoms:**

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


**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



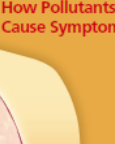
**Symptoms:**

- 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
- Stroke

**How Pollutants Cause Symptoms**



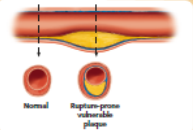
**Effects on Cardiovascular Function**

- 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](http://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	<b>Sensitive Groups:</b> Cut back or reschedule strenuous outside activities <i>General:</i> People with lung disease, children and older adults and people who are active outdoors <i>Particle Pollution:</i> People with heart or lung disease (including diabetes), older adults and children <i>Carbon Monoxide:</i> People with heart disease and possibly infants and fetuses <i>Nitrogen Dioxide:</i> People with lung disease, children and older adults <i>Sulfur Dioxide:</i> Active children and adults with asthma
Unhealthy	151-200	<b>Everyone:</b> Cut back or reschedule strenuous outside activities <b>Sensitive groups:</b> Avoid strenuous outside activities
Very Unhealthy	201-300	<b>Everyone:</b> Significantly cut back on outside physical activities <b>Sensitive groups:</b> Avoid all outside physical activities



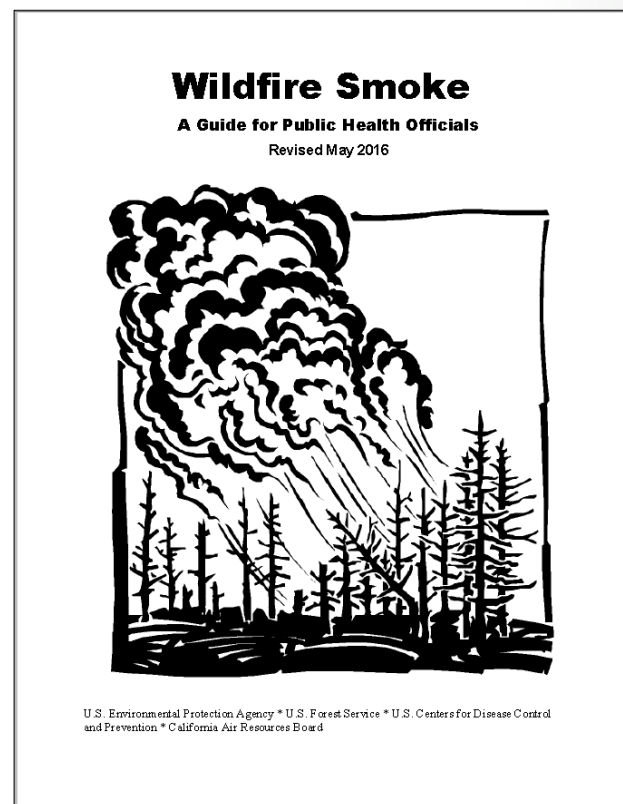
EPA-400-F-17-002



# Wildfire Smoke

## A Guide for Public Health Officials (2016)

- Revised by EPA/CDC and NIOSH/USFS/California Agencies
- Updated air quality and health information
- Exposure reduction measures incorporate stronger evidence base
- 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
- New fact sheets about children’s health





[https://www3.epa.gov/airnow/wildfire\\_may2016-revised.pdf](https://www3.epa.gov/airnow/wildfire_may2016-revised.pdf)



# Coming Soon - Wildfire Guide Fact Sheets

- Prepare for Fire Season
- Reduce Your Smoke Exposure
- Children's Health and Wildfires
- Indoor Air Filtration
- Protect Yourself from Ash
- Respiratory Protection from Wildfire Smoke and Ash



### Children's Health and Wildfires

**Background**

- Children are especially vulnerable during wildfires because their lungs are still developing and they are dependent on adults for care.
- If your child has asthma, allergies, heart or lung conditions, wildfire smoke can be an even bigger problem.
- Wildfire concerns include the fire itself, the smoke, and the chemicals from burning materials.
- Smoke can travel hundreds of miles downwind from a fire. Pay attention to local air quality during fire season, even if no fire is nearby.

**Health Effects from Wildfires**

- Inhaling smoke may cause chest tightness or pain, shortness of breath, wheezing, coughing, nose, throat or eye irritation, dizziness, lightheadedness and other symptoms.
- Children with asthma, allergies, heart or lung conditions may have more serious effects, especially more breathing issues, than usual.
- Stress and mental health effects of air disasters, including wildfires, are serious concerns for children.

**Preparing for Wildfires**

- Pay attention to local air quality reports. Stay alert to smoke-related news coverage or health warnings.
- Find the Air Quality Index (AQI) for your area on the Airflow web site. As smoke gets increases so do the steps you should take to protect your child. AQI advisories can help.
- Sign up for EnviroFlash – visit AirNow to find out if EnviroFlash is available for your area.
- Create a "clean air room" in your home, one with as few windows and doors as possible, to prevent exposure to outdoor smoke coming indoors, especially if you have a child with health conditions.

**During**

- Buy a portable and el prod levels.
- Stock up essential.
- Evacuate prepare.
- Keep ch closed the fire keep a.
- If you in windo rears, unattr
- If your c excess any ot expos attent
- Childre condit relate action
- Use the during
- Keep th small bundl ozone power
- Humidit may b inhala

### WILDFIRE SMOKE FACTSHEET


## Prepare for Fire Season

If you live in an area that is regularly affected by smoke or where the wildfire risk is high, take steps to prepare for fire season. Know how to get ready before a wildfire. Know how to protect yourself from smoke exposure during a wildfire.

Being prepared for fire season is especially important for the health of children, older adults, and 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 cooked, because cooking can add to indoor or 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 officials.
- **If you have heart or lung disease**, check with your doctor about what you should do during smoke events.
- **If you have asthma or another lung disease**, update your respiratory management plan.
- **Have a supply of N95 masks** and learn how to use them. They are sold at many home improvement stores and online.
- **Organize** your important items ahead of time and know where to go in case you have to evacuate.



### WILDFIRE SMOKE FACTSHEET: Filtration

Fiberglass filter that is 1" thick. Simply replacing this filter with a medium efficiency filter (MERV 8-12) can significantly improve the air quality in your home. Higher efficiency filters (MERV 13-16) will perform even better, and a true high efficiency filter (MERV 16) in the central system can reduce PM by as much as a 95%. However, these filters can also provide more resistance to air flow, which may increase the energy used by the blower motor for the system. You may wish to consult with a local HVAC technician or the manufacturer of your central air system to confirm that the system can handle a high efficiency filter. If you are not able to upgrade to a more efficient filter, simply running the system continuously by switching the thermostat from "Auto" to "On" has been shown to reduce PM concentrations by as much as 24%.

**Portable Air Cleaners**

Portable air cleaners are self-contained air filtration appliances that can be used alone or in concert with enhanced central filtration to effectively remove particles. Their effectiveness in reducing PM depends on several factors such as the size of the air cleaner, the filter efficiency, how frequently the unit is turned on and at what fan speed. Portable air cleaners fitted with high efficiency filters can reduce indoor PM concentrations by as much as 85% or more.

**Portable Air Cleaners: How to Choose**

There is a wide variety of air cleaners on the market, ranging in price from about \$50 to \$3,000. However, air cleaners under about \$200 typically do not clean the air well and would not be helpful in a wildfire situation.

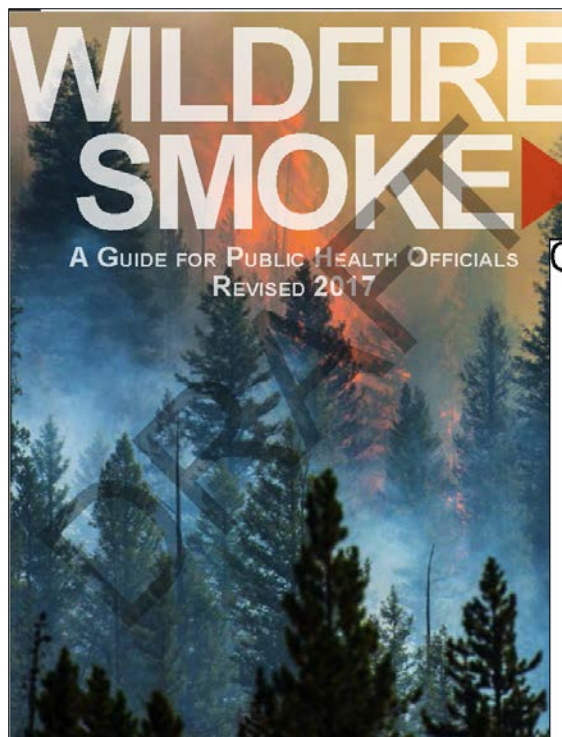
**Types of Air Cleaners**

Most air cleaners fall under two basic categories: mechanical and electronic. Mechanical air cleaners



# Wildfire Guide – Next Revision

- Updated look
- Health effects section
  - Addition of ozone
  - Multi-day exposure
  - Heat and smoke
  - Smoke vs urban particles
- Add sections
  - PM web course for health professionals
  - Sensor use
  - Ash clean-up
- Additional fact sheets
  - Older Adults
  - Pets
  - Livestock
  - After the Fire







# AirNow ([www.airnow.gov](http://www.airnow.gov))

**Local Air Quality Conditions**  
Zip Code:  Go State:  Go

**Today's AQI Forecast**  
Monday, April 25, 2016

**Forecast** | **Current AQI** | **AQI Loop** | **More Maps**

**Canada**

**Alaska** | **Hawaii** | **Monterrey Mexico City** | **Puerto Rico**

Generated: 2016-04-25 11:46:57Z

**Highest 5:**  
About the Highest 5

Today's Forecasts	Tomorrow's Forecasts	Current AQI
Yuma, AZ		130
Imperial Valley, CA		123
Coachella Vly, CA		101
Nipomo, CA		98
Cincinnati, OH		95

**Apps** | **EnviroFlash Email** | **Facebook** | **Widgets** | **Webcams** | **RSS** | **Videos** | **Twitter** | **AirNow on Google Earth** | **Developer Tools**

**Popular Links**

Coming soon →

**AirNow** | About AirNow | AQI & Health | Fires | Maps & Data | Education | International | Related

84°F

Zip Code or City:  **Sacramento, CA**

**Current Air Quality**  
Updated 8 AM PDT  
136 AQI | PM2.5 Particle Pollution

**Unhealthy for Sensitive Groups**

**Primary Pollutant**  
This pollutant currently has the highest AQI in the area.  
PM2.5 Particle Pollution 136 Unhealthy for Sensitive Groups

**Other Pollutants**

Pollutant	AQI	Category
PM10 Particle Pollution	59	Moderate
Ozone	38	Good

**Unhealthy for Sensitive Groups Particle Pollution 136 AQI**

People with heart or lung disease, older adults, and children:

- Do lighter activities so you don't have to breathe as hard.
- Try a walk instead of a run.
- Shorten the amount of time that you're active.
- Try a shorter run or take more breaks.
- Be active outdoors during times when air quality is better.

**Trend | Sacramento, CA**

Day Week Month

1 Sep 4 AM 8 AM 12 PM 4 PM 6 PM



# Thank you!

Susan Lyon Stone  
Office of Air Quality Planning and Standards  
Office of Air and Radiation  
U.S. Environmental Protection Agency  
Email: [stone.susan@epa.gov](mailto:stone.susan@epa.gov)

# Air Pollution and Cardiovascular Health

*The Role of Million Hearts 2022*

National Environmental Health Association

February 28, 2018

Janet Wright MD, FACC

Executive Director, Million Hearts





# Million Hearts<sup>®</sup> 2022

- **Aim:** Prevent 1 million—or more—heart attacks and strokes in the next 5 years
- National initiative co-led by
  - Centers for Disease Control and Prevention (CDC)
  - Centers for Medicare & Medicaid Services (CMS)
- Partners across federal and state agencies and private organizations and individuals

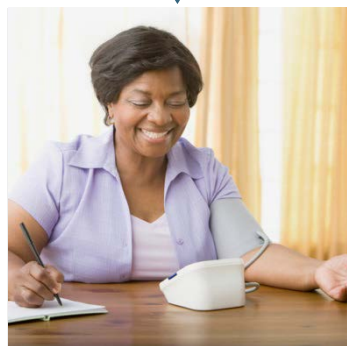


# Opportunities in U.S. Adults to Prevent Cardiovascular Disease

Blood Pressure

34 M

Uncontrolled



Cholesterol

35M/42M

Unmanaged



Sodium

215M

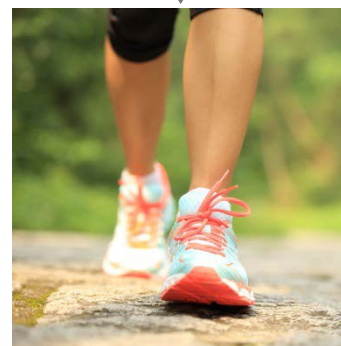
Overconsume



Physical Activity

124 M

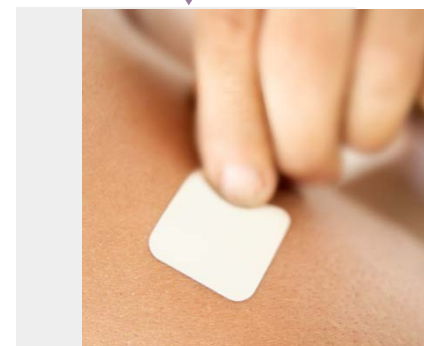
Underexert



Tobacco Use

36.5 M

Smoke



**We Know What Works**





# Million Hearts<sup>®</sup> 2022

*Aim: Prevent 1 Million Heart Attacks and Strokes in 5 Years*

Keeping People Healthy

Optimizing Care

COMMUNITY



Priority Populations



# Million Hearts<sup>®</sup> 2022

## *Priorities and Objectives*

### Keeping People Healthy

Reduce Sodium Intake

Decrease Tobacco Use

Increase Physical Activity

### Optimizing Care

Improve ABCS\*

Increase Use of Cardiac Rehab

Engage Patients in  
Heart-healthy Behaviors

### Improving Outcomes for Priority Populations

Blacks/African Americans

35- to 64-year-olds

People who have had a heart attack or stroke

People with mental illness or substance use disorders



\*Aspirin use when appropriate, Blood pressure control, Cholesterol management, Smoking cessation



# Keeping People Healthy

Goals	Effective Public Health Strategies
<b>Reduce Sodium Intake</b> Target: 20%	<ul style="list-style-type: none"><li>• Enhance consumers' options for lower sodium foods</li><li>• Institute healthy food procurement and nutrition policies</li></ul>
<b>Decrease Tobacco Use</b> Target: 20%	<ul style="list-style-type: none"><li>• Enact smoke-free space policies that include e-cigarettes</li><li>• Use pricing approaches</li><li>• Conduct mass media campaigns</li></ul>
<b>Increase Physical Activity</b> Target: 20% (Reduction of inactivity)	<ul style="list-style-type: none"><li>• Create or enhance access to places for physical activity</li><li>• Design communities and streets that support physical activity</li><li>• Develop and promote peer support programs</li></ul>



# Optimizing Care

Goals	Effective Health Care Strategies
<b>Improve ABCS*</b> Targets: 80%	<i>High Performers Excel in the Use of...</i> <ul style="list-style-type: none"><li>• <b>Teams</b>—including pharmacists, nurses, community health workers, and <b>cardiac rehab professionals</b></li><li>• <b>Technology</b>—decision support, patient portals, e- and default referrals, registries, and algorithms to find gaps in care</li><li>• <b>Processes</b>—treatment protocols; daily huddles; ABCS scorecards; proactive outreach; <b>finding those with</b> undiagnosed high BP or cholesterol, tobacco use, <b>particulate matter exposure</b></li><li>• <b>Patient and Family Supports</b>—training in home blood pressure monitoring; problem-solving in medication adherence; counseling on nutrition, <b>physical activity</b>, tobacco use, <b>risks of particulate matter; referral to community-based physical activity programs and cardiac rehab</b></li></ul>
<b>Increase Use of Cardiac Rehab</b> Target: 70%	
<b>Engage Patients in Heart-healthy Behaviors</b> Targets: TBD	



\*Aspirin use when appropriate, BP control, Cholesterol management, Smoking cessation



# Improving Outcomes for Priority Populations

- ✓ Disparate outcome
- ✓ Effective interventions
- ✓ Well-positioned partners

Priority Population	Objectives	Strategies
Blacks/African Americans	<ul style="list-style-type: none"><li>Improving hypertension control</li></ul>	<ul style="list-style-type: none"><li>Implement tailored protocols</li><li>Problem-solve in med adherence</li></ul>
35-64 year olds	<ul style="list-style-type: none"><li>Improving HTN control and statin use</li><li>Increasing physical activity</li></ul>	<ul style="list-style-type: none"><li>Implement tailored protocols</li><li>Increase access to and participation in community-based activity programs</li></ul>
People who have had a heart attack or stroke	<ul style="list-style-type: none"><li>Increasing cardiac rehab referral and participation</li><li><b>Avoiding exposure to particulate matter</b></li></ul>	<ul style="list-style-type: none"><li>Use opt-out referral and CR liaison visits at discharge; ensure timely enrollment post-discharge</li><li><b>Increase use of Air Quality Index</b></li></ul>
People with mental illness or substance abuse disorders	<ul style="list-style-type: none"><li>Reducing tobacco use</li></ul>	<ul style="list-style-type: none"><li>Integrate tobacco cessation into behavioral health treatment</li><li>Institute tobacco-free policy at mental health and substance use treatment facilities</li><li>Tailored quitline protocols</li></ul>





# Air Quality Awareness

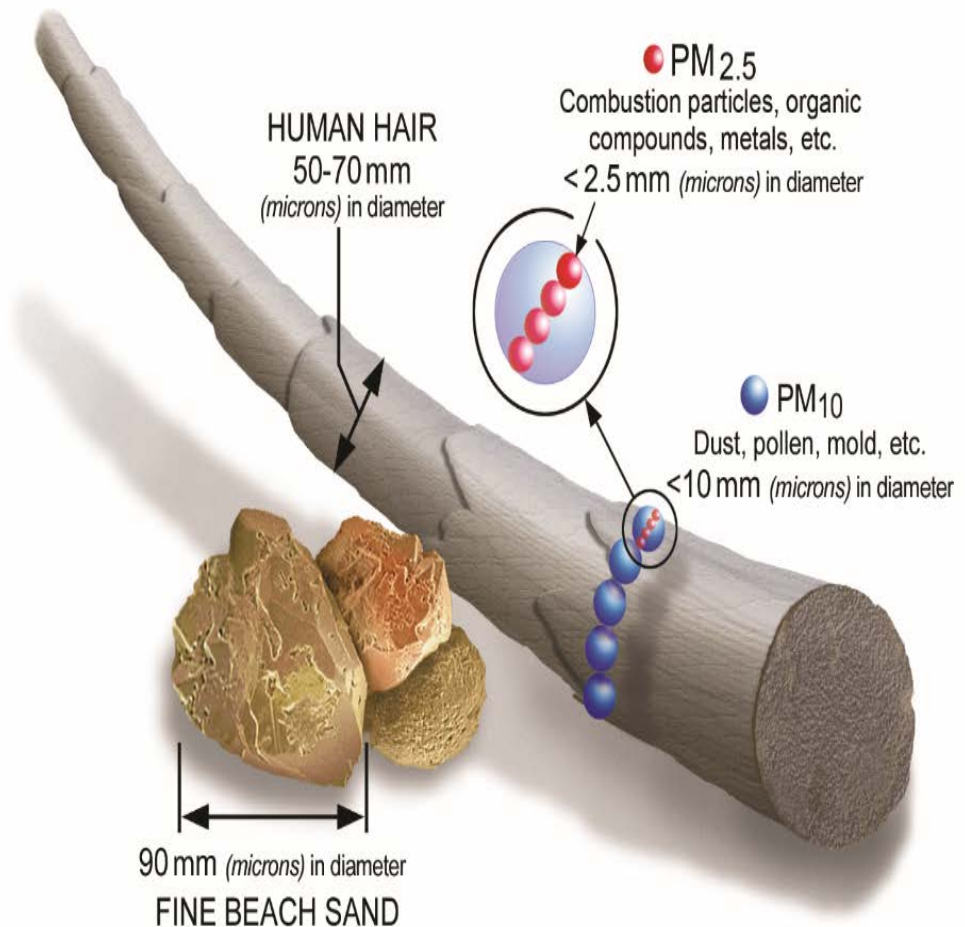
- Among people with known heart disease:
  - Are they aware of air quality alerts?
  - Have they discussed with a health professional strategies to reduce air pollution exposure?
  - Do they avoid busy roads to reduce air pollution exposure?
- ConsumerStyles survey, 2014-16

Mirabelli MC, Boehmer TK, Damon SA, Sircar KD, Wall HK, Yip FY, Zahran HS, Garbe PL. Air quality awareness among U.S. adults with respiratory and heart disease. Am J Prev Med 2018; in press.



# Particle Pollution

- PM<sub>2.5</sub> refers to particulate matter of 2.5 micrometers or less in diameter
- Exposure is linked to an increase in risk of heart attacks, strokes, and rhythm disorders
- <https://millionhearts.hhs.gov/tools-protocols/tools/particle-pollution.html>



# Air Quality Index (AQI)

AQI Values	Levels of Health Concern	Meaning
0-50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk.
51-100	Moderate	Air quality is acceptable; may be a moderate health concern for people who are unusually sensitive to air pollution.
101-150	Unhealthy for sensitive groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
151-200	Unhealthy	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
201-300	Very unhealthy	Health alert: everyone may experience more serious health effects.
301-500	Hazardous	Health warnings of emergency conditions. The entire population is more likely to be affected.

The AQI can be found:

- On the web:  
[www.airnow.gov](http://www.airnow.gov)
- On Facebook and Twitter
- Through EnviroFlash email alerts
- With the free AirNow App for iPhones and Android





# Key Actions to Protect Your Health From Air Pollution

- Know when and where particle pollution levels may be unhealthy
  - Busy roads
  - Rush hour traffic
  - Smoke from fires
- Plan activities when and where pollution levels are lower
  - Delay activity until air is cleaner or move activity indoors

- Check the Air Quality Index, which provides forecasts of daily air quality



- Change your activity level
  - Reduce activity (ex: walk instead of jog)
- Reduce overall risk of heart disease or stroke
- Know the warning signs of heart attack or stroke





# Million Hearts Family Priority Actions

- Raise awareness among those at-risk, their families, and **the clinicians who care for them**
- Encourage health professionals to take EPA's web-based course: [Particle Pollution and Your Patients' Health](#)
- Educate at-risk patients about mitigation behaviors
- Incorporate messages about air quality into cardiac rehab program curriculum
- Encourage adoption of EPA's Air Quality Flag Program among hospitals, employers, health systems, others
- Disseminate PM<sub>2.5</sub> content via Million Hearts channels





# Thank you

- More information about Million Hearts 2022 at [www.millionhearts.gov](http://www.millionhearts.gov)
- Reach me at [janet.wright@cms.hhs.gov](mailto:janet.wright@cms.hhs.gov)

