Workshop Goals & Objectives: Why We are Here

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Why We're Here Today

- **Focus on preventing air pollution-related cardiopulmonary illnesses**
- **Identifying new opportunities**
  - transitions in health care and
  - new developments in data and technology
- **Tapping diverse disciplines to collaborate**
  - moving environmental evidence into health care practice
- **Initial steps underway at EPA**
- **Workshop goals and objectives**

Who is Here?

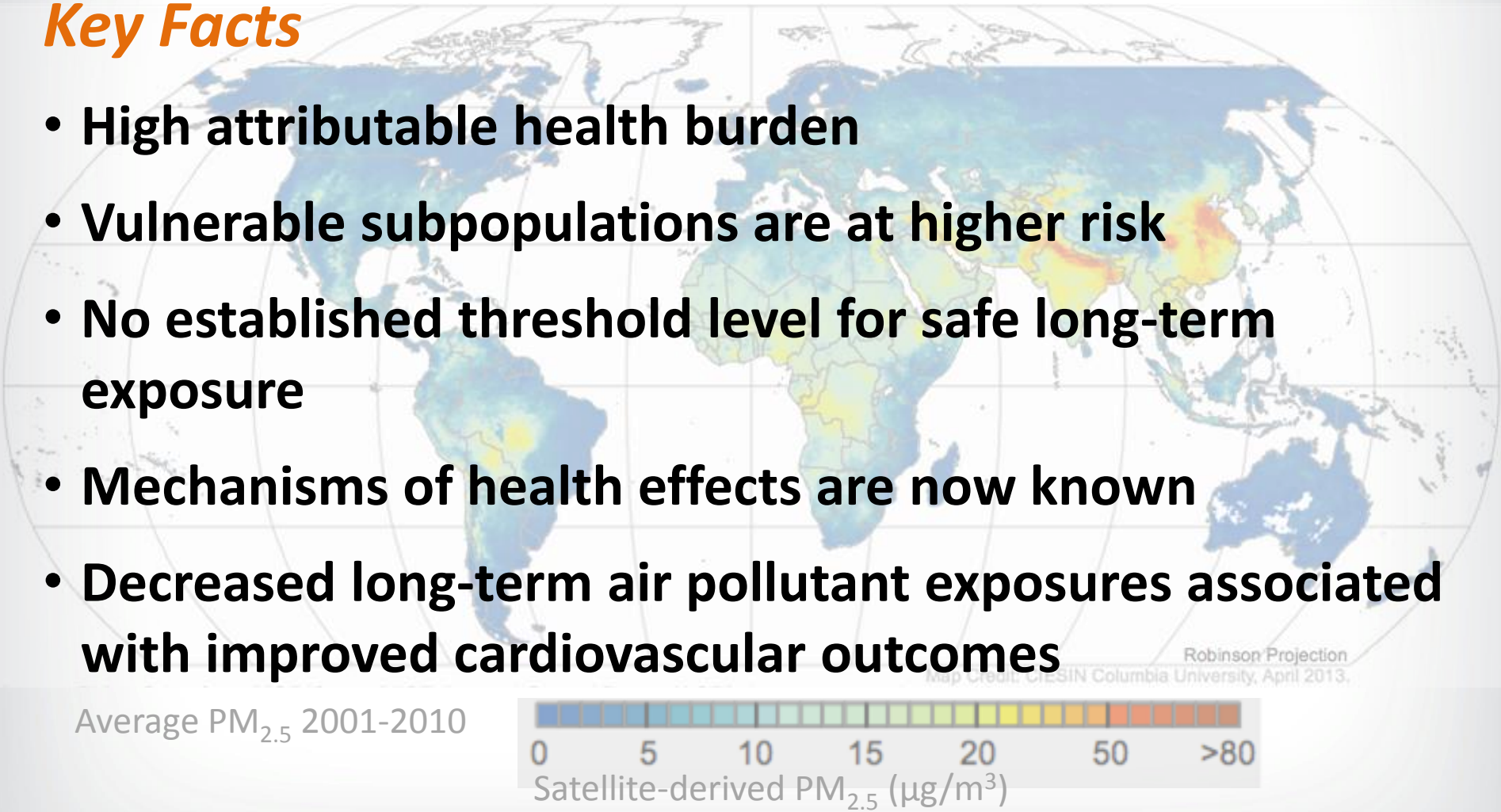
Shared Mission of Many Stakeholders

Trans-disciplinary Collaborations to Improve Health

What are the Facts?
Air Pollution and Population Health

Key Facts

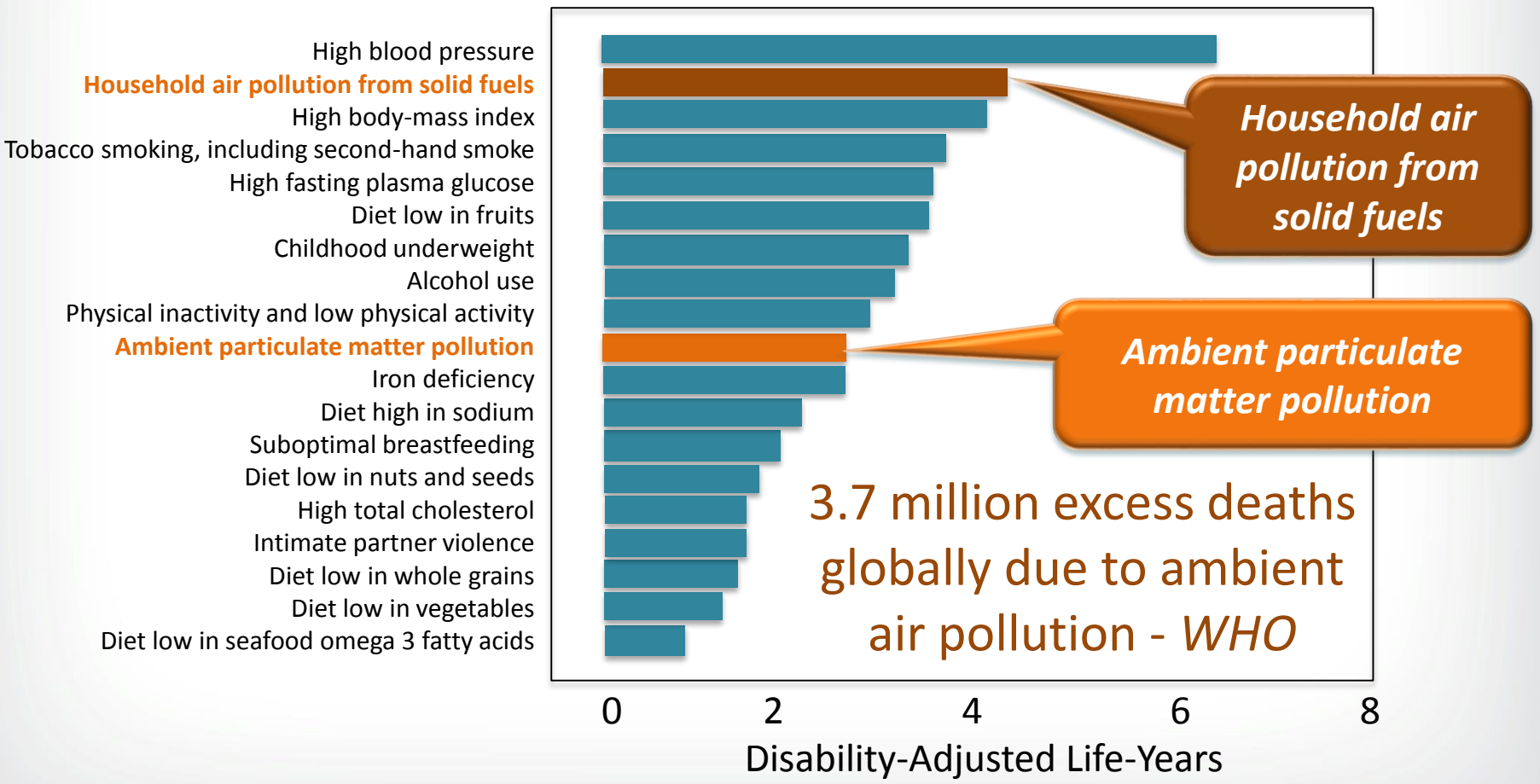
- **High attributable health burden**
- **Vulnerable subpopulations are at higher risk**
- **No established threshold level for safe long-term exposure**
- **Mechanisms of health effects are now known**
- **Decreased long-term air pollutant exposures associated with improved cardiovascular outcomes**



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

Giles LV et al. *Environmental Health Perspectives* 2011

Indoor (#2) and Outdoor (#10) Air Pollution Contributes to Disability



The Global Air Pollution Problem Is a U.S. Problem Too!

Air pollution is a significant U.S. public health problem

- Estimated excess mortality **134,700 deaths/year**
- Over **1.1 million life years lost**

Fann et al. *Risk Analysis* 2011

- Impacts are worsening **with global climate change**

Public Health Action Needed along with EPA Standards

- EPA's air pollution standards for particulate matter provide the **largest health benefits of any federal regulation**
- EPA regularly evaluates the standards, health risks, and issues stricter standards when needed
- Health risks remain – and need to be addressed through **integrated efforts** of public health, health care, environmental health, individual & community action
  - *Disproportionate air pollution impacts on overburdened communities*

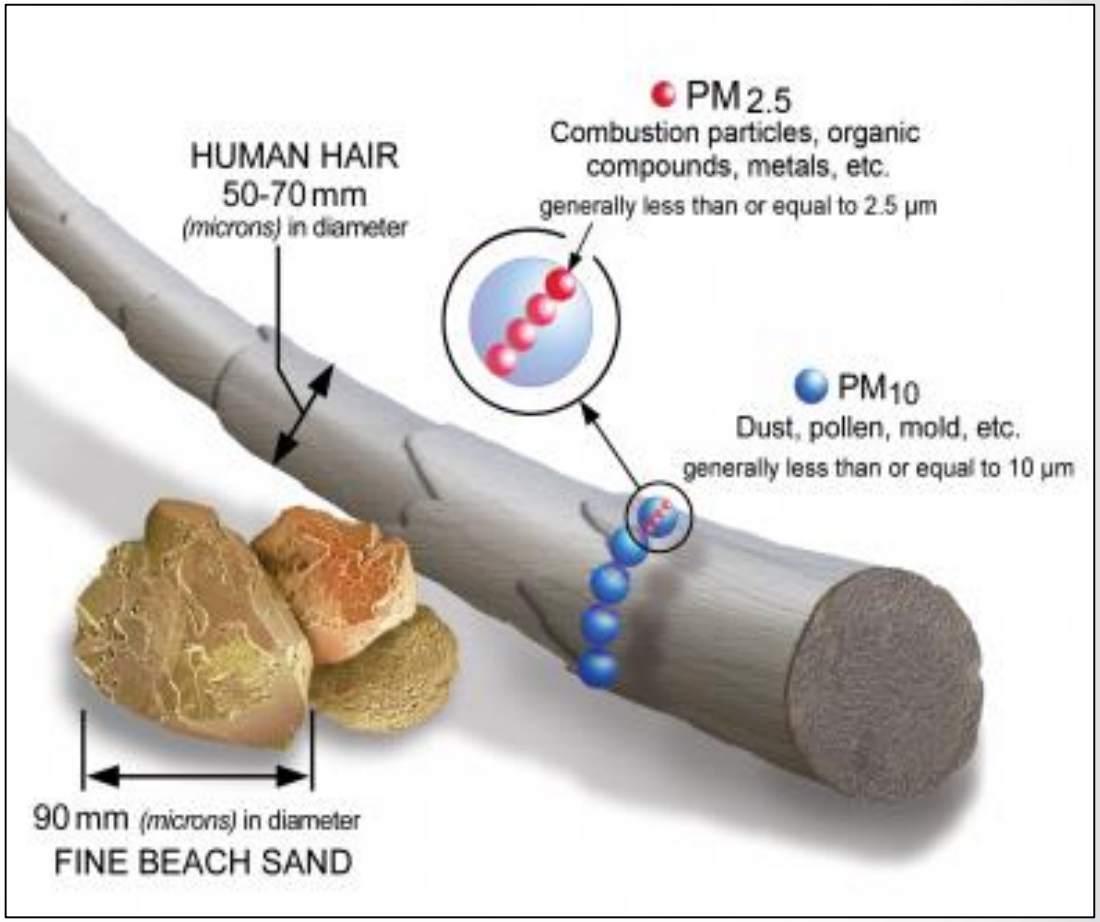
Air Pollution 101
Particulate Matter

Particulate matter (PM) – "soot"

- from combustion sources
- mixture of solid particles and liquid droplets found in the air

National Ambient Air Quality Standards (NAAQS)

- 35 µg/m^3 - 24 hours
- 12 µg/m^3 - annual average



Air Pollution 101
Other Major Air Pollutants

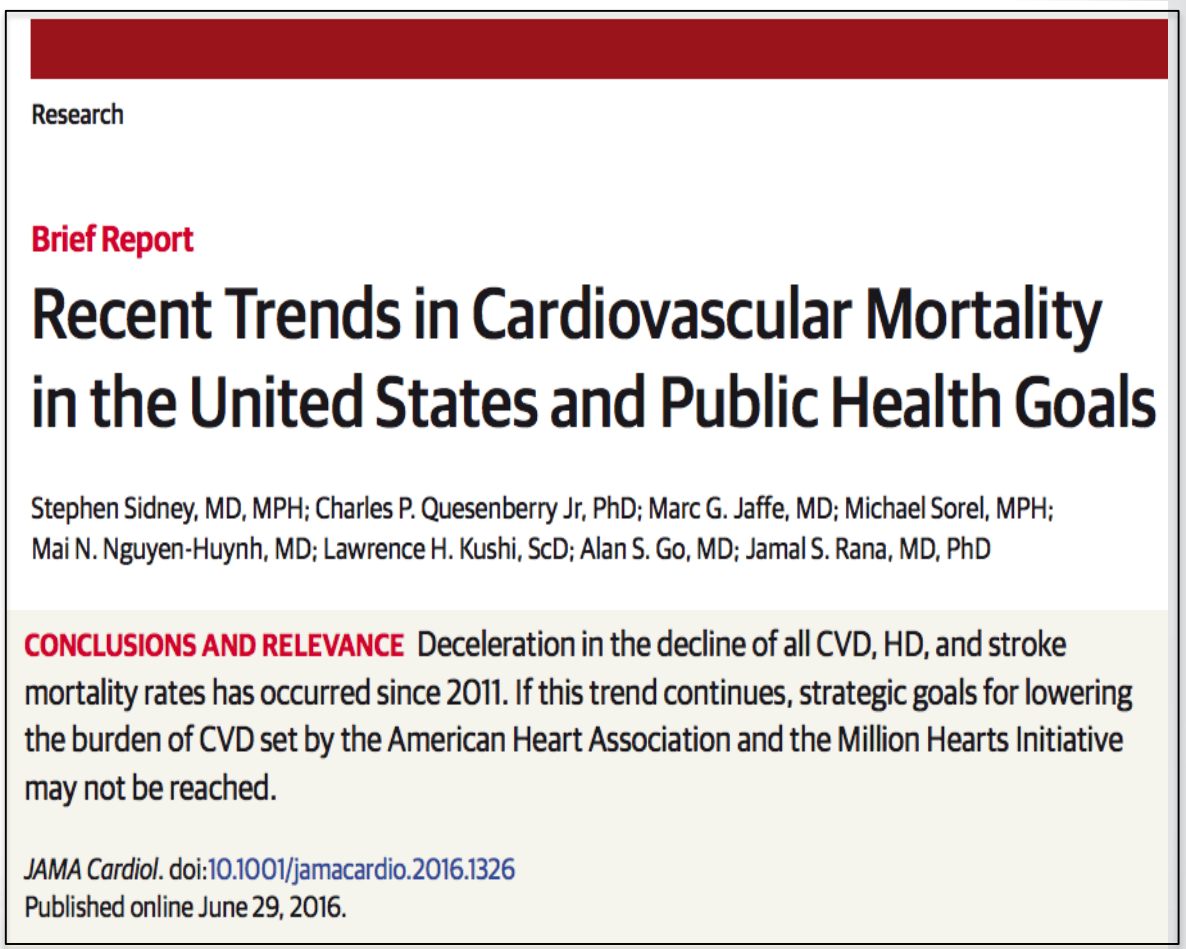
- **Ozone**
  - Key component of smog
  - Best known for triggering respiratory complaints
  - Also associated with cardiovascular health effects

- **Nitrogen dioxide**
  - Largely from traffic
  - Important in the near-road environment
  - Associated with acceleration of atherosclerosis

- **Others (CO, lead, SO_2, volatile organics)**
  - Can be significant locally, less widespread impact

Cardiovascular Mortality - Leading Cause of Death in US

- Over **740,000** people die of cardiovascular disease & stroke each year
- Since 2011, improvements in mortality from CVD, heart disease & stroke have slowed
- Obesity and diabetes are on the rise



Research

Brief Report

Recent Trends in Cardiovascular Mortality in the United States and Public Health Goals

Stephen Sidney, MD, MPH; Charles P. Quesenberry Jr, PhD; Marc G. Jaffe, MD; Michael Sorel, MPH; Mai N. Nguyen-Huynh, MD; Lawrence H. Kushi, ScD; Alan S. Go, MD; Jamal S. Rana, MD, PhD

CONCLUSIONS AND RELEVANCE Deceleration in the decline of all CVD, HD, and stroke mortality rates has occurred since 2011. If this trend continues, strategic goals for lowering the burden of CVD set by the American Heart Association and the Million Hearts Initiative may not be reached.

JAMA Cardiol. doi:10.1001/jamacardio.2016.1326
Published online June 29, 2016.

Sidney S, et al. JAMA Cardiol 2016

Preview: Air Pollution Causes Impacts Both Short- and Long-term

- Long-term air pollution exposure accelerates atherosclerosis
- Short-term air particle pollution exposure triggers myocardial infarction, stroke, CHF, DVT
- Traditional risk factors fail to explain 25% of the incidence of coronary heart disease

The World is Changing:
New Opportunities to Improve Health

- **Healthcare systems changes – Value-based payment**
- **Affordable Care Act (ACA)**
  - Electronic medical records
  - Accountable care organizations
    - ➢ Focus on quality metrics & costs
  - Community benefits programs
  - Medicare/Medicaid (CMS)
    - ➢ Hospital readmissions reduction program

- **Predictive analytics and population health surveillance**
- **Environmental and physiological sensors**

One Example:
Hospital Readmissions Reduction Program

- **Under ACA, CMS must reduce payments to hospitals with excess readmissions**
- **Readmissions start from the patient's home**
  - Are the home or local community environments contributing?

Modern Healthcare

The leader in healthcare business news, research & data

Most hospitals face 30-day readmissions penalty in fiscal 2016

By Sabriya Rice | August 3, 2015

Most U.S. hospitals will get less money from Medicare in fiscal 2016 because too many patients return within 30 days of discharge.

Populations at Higher Risk
Air Pollution and Readmissions

CMS Readmission Reduction Program

Conditions evaluated for excess readmissions:

- Cardiovascular disease
  - **Myocardial infarction**
  - **Heart failure**
- Pulmonary disease
  - **COPD**
- Pneumonia
- Hip and/or Knee Arthroplasty

EPA – Sensitivity to PM Air Pollution

Populations showing increased sensitivity include those having:

- Cardiovascular disease
  - **Ischemic heart disease**
  - **Heart failure**
    - Ventricular arrhythmia
- Pulmonary disease
  - **COPD**
- Diabetes

Populations at Higher Risk
Air Pollution and Readmissions

EPA ISA - Air Pollution

Populations showing increased sensitivity to the adverse health effects of short-term air particle pollution include those having:

- Cardiovascular disease
  - **Ischemic heart disease**
  - **Heart failure**
  - **Ventricular arrhythmia**
- Pulmonary disease
  - COPD
- Diabetes

CMS Bundled Payments Program

Accelerating the shift to value-based payment

Mandatory in 98 markets across the U.S.

Conditions covered:

- Cardiovascular disease
  - **Myocardial infarction**
  - **Coronary artery by-pass**
- Hip and/or Knee Arthroplasty

2nd Example: Affordable Care Act
Community benefits requirement

New community benefit requirements in the Affordable Care Act (ACA)

- Non-profit hospitals must improve transparency and accountability
- Strategy to address ACA's priorities of preventive care and population health through community health improvement activities


HEALTH POLICY BRIEF WWW.HEALTHAFFAIRS.ORG 1

HealthAffairs | Robert Wood Johnson Foundation

Health Policy Brief

FEBRUARY 25, 2016

Nonprofit Hospitals' Community Benefit Requirements. Under the Affordable Care Act, many nonprofit hospitals must meet new requirements to retain their tax-exempt status.

- Focusing on air pollution concerns could be part of community health improvement activities

Casalino LP *et al. J Health Politics, Policy and Law* 40, 2015

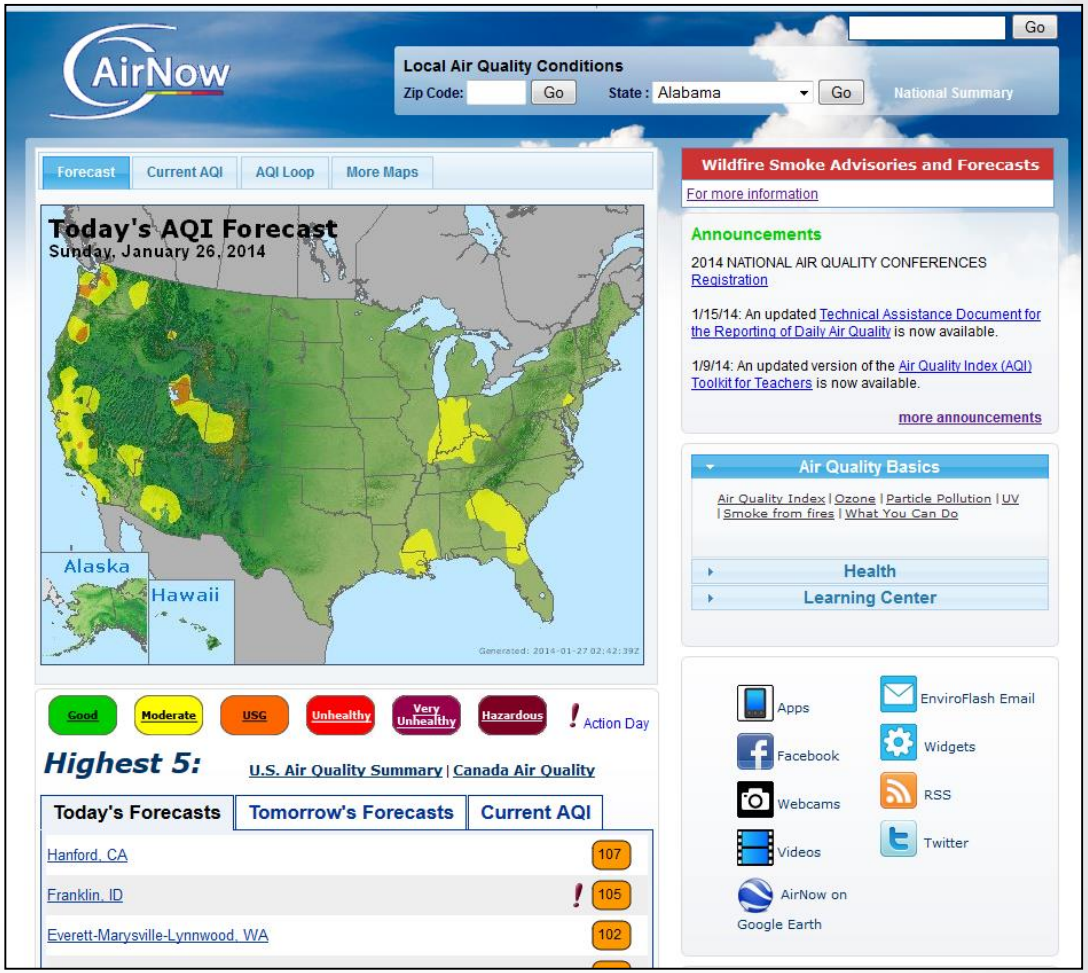
Informing the Public

Index reports daily air quality & related health effects

https://airnow.gov/index.cfm?action=aqibasics.aqi

https://www.epa.gov/air-research/healthy-heart-toolkit-and-research

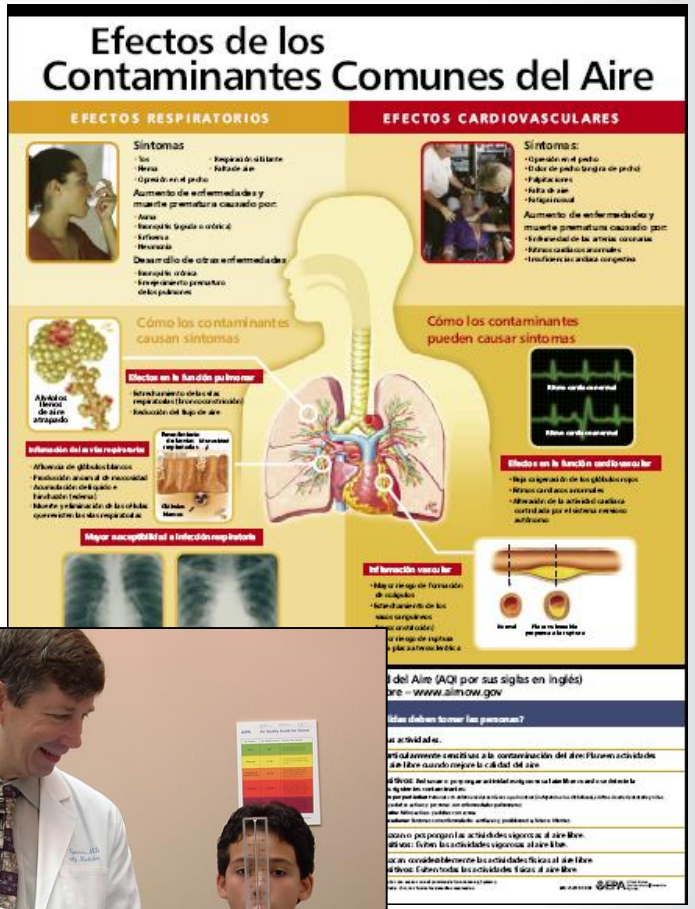
www.epa.gov/air-sensor-toolbox

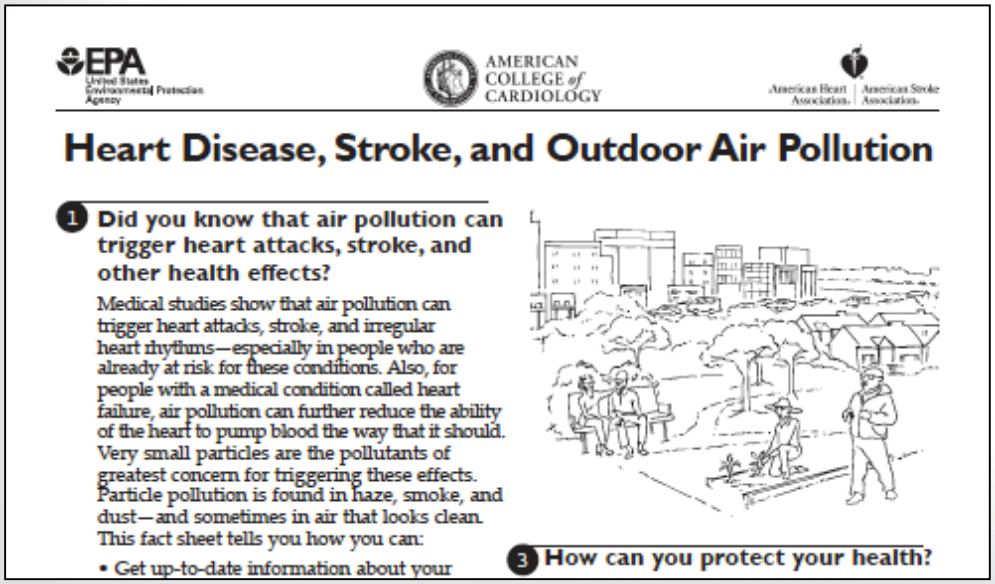


EPA provides the AQI nationwide on www.airnow.gov

Informing Health Care Providers

- **Medical poster for patient education**
- **Fact sheet for patient education**
- **Web CME courses for healthcare providers:**
  - ✧ **“Ozone and Your Patient’s Health”**
  - ✧ **PM course nearly completed**




EPA United States Environmental Protection Agency

AMERICAN COLLEGE of CARDIOLOGY

American Heart Association. | American Stroke Association.

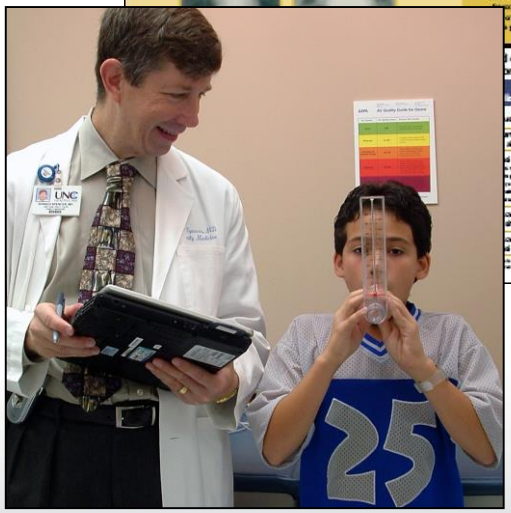
Heart Disease, Stroke, and Outdoor Air Pollution

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?



The Environmental "Buckets" of Prevention Framework

National Ambient Air Quality Standards specified by the Clean Air Act protect Public Health

Total Population Community-Wide Prevention	Innovative Clinical Prevention	Traditional Clinical Prevention
PM NAAQS **24-hour Standard: 35 µg/m³** **Annual Standard 12 µg/m³**	Healthy Heart A healthier environment for healthier hearts	**Currently no traditional "evidence-based" clinical prevention management strategies**

Public Health ⟶ **Health Care**

Modified from Auerbach J. *J Pub Health Manag Pract*, *22*: 215-218, 2016

Workshop Goals

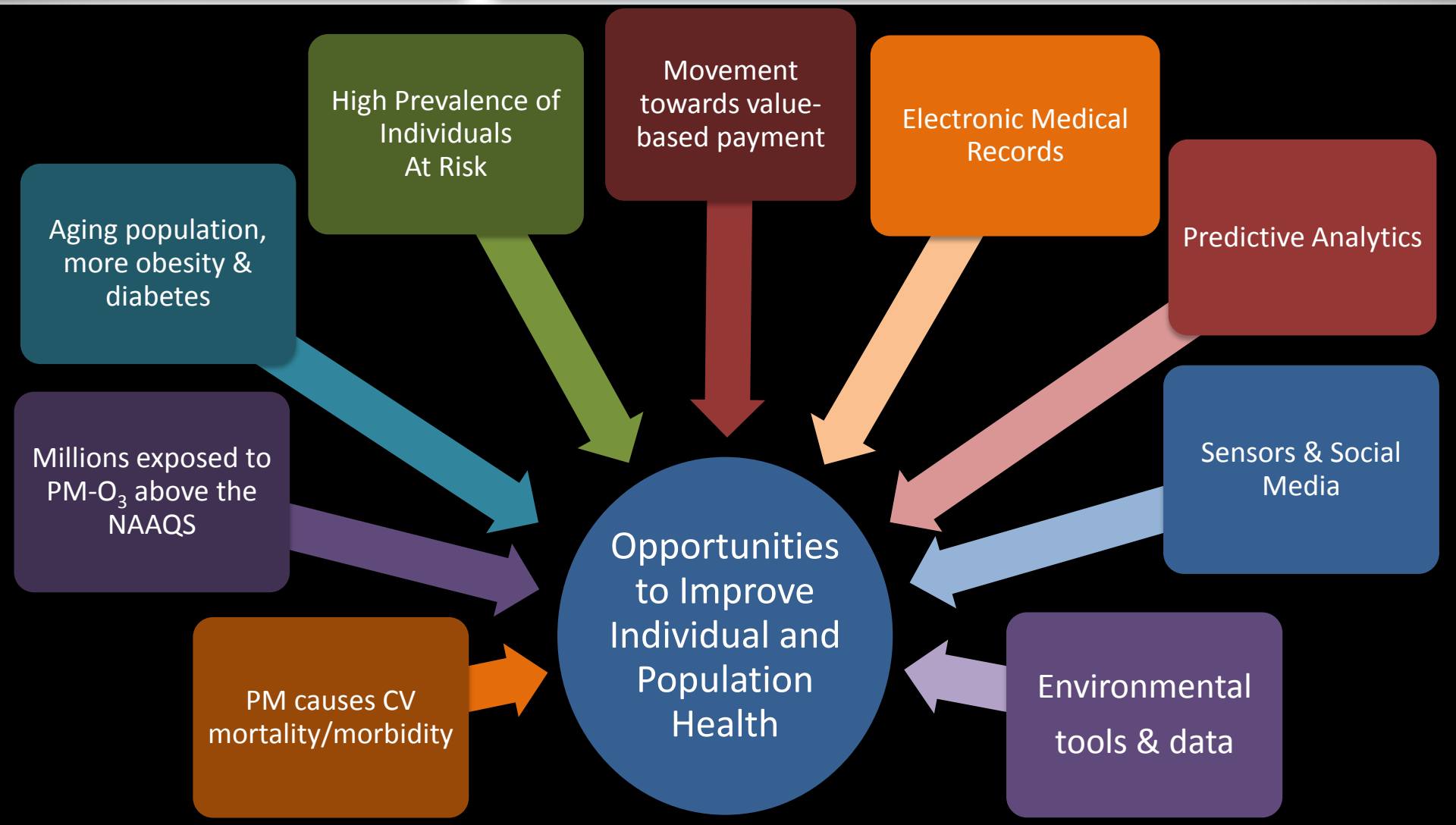
Reducing the Health Effects of Air Pollution

- **Identify and discuss barriers to the inclusion of environmental health data and tools for the prevention and management of disease**

- **Imagine and discuss actionable approaches to improve health and clinical outcomes by integrating environmental health data and tools into public health and health care services for at-risk patients**

New Knowledge, Data and Tools

Social & Scientific Trends Present Opportunity



Healthy People Need Healthy Environments

Workshop Questions

- **Is evidence sufficient to incorporate environmental data/tools into health promotion & disease management strategies? For an individual? For a community? If not, what will it take?**
- What are the barriers to the development & implementation of interventions to decrease adverse health effects from air pollution exposures among people at-risk?
- **What novel approaches could improve health outcomes?**
- What collaborative efforts could address barriers and test new integrated environmental health-healthcare approaches to improve cardiopulmonary and decrease health disparities?

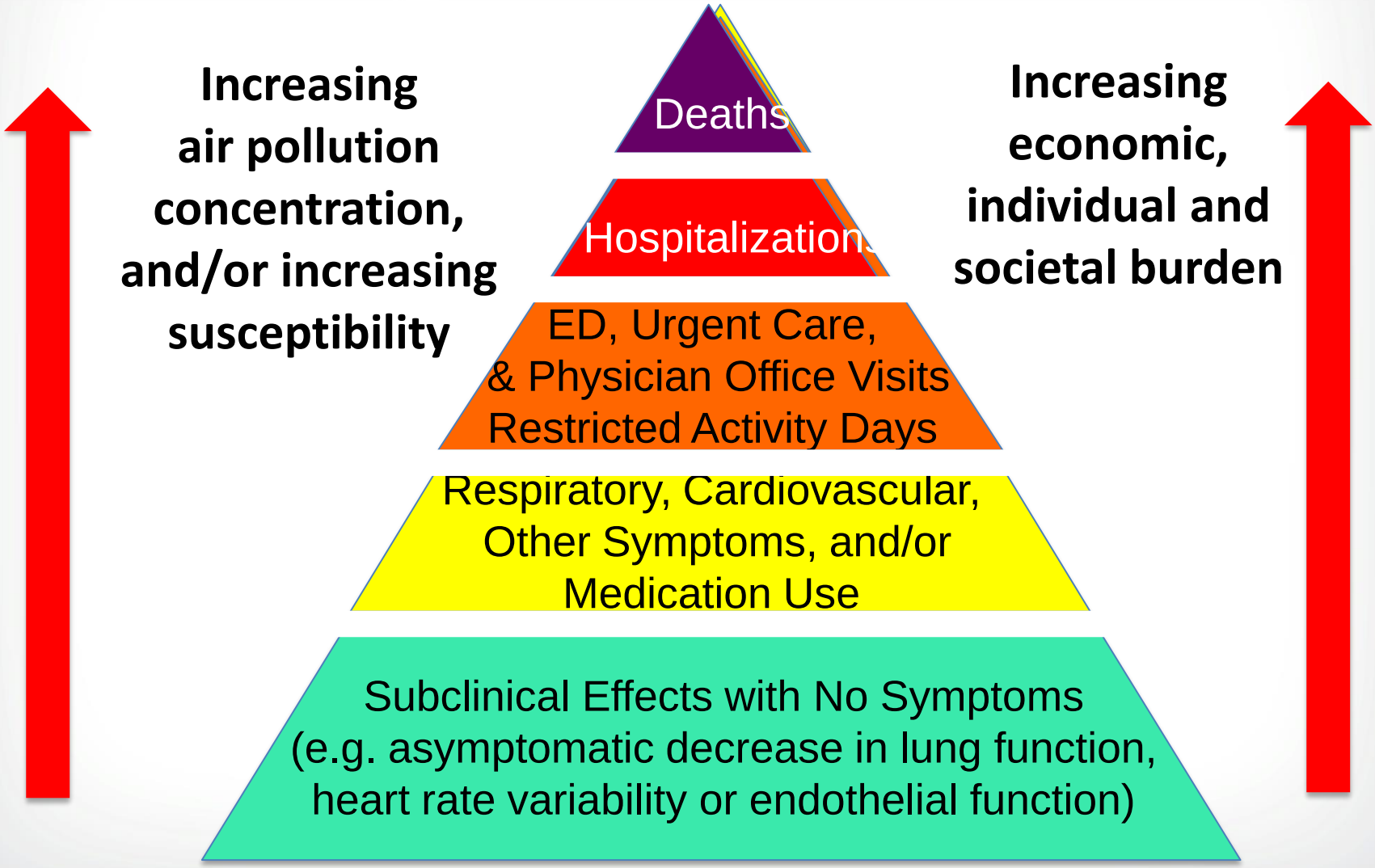
This is a Working Meeting

- **Hear from everyone**
- **Think boldly and creatively**
- **Intentionally small meeting designed to be very interactive**
- **Let's conclude with potential for real collaborations, pilot efforts, innovative approaches**
- **The time is Now**

Back-up Slides

Air Pollution and Health Effects

Estimating disease burden & benefits is challenging



Size of Population Affected by Exposure to Smoke

Air Quality Index

Transitioning from Public to Patient Education

Descriptors	Cautionary Statement
Good 0 – 50	No message
Moderate 51 – 100	Unusually sensitive individuals
Unhealthy for Sensitive Groups 101 - 150	Identifiable groups at risk - different groups for different pollutants
Unhealthy 151 - 200	General public at risk; sensitive groups at greater risk
Very Unhealthy 201 - 300	General public at greater risk; sensitive groups at greatest risk

- **Index for reporting daily air quality and related health effects**
- **Health-based descriptors reflect a range of effects**
- **Pollutant-specific health messages**
- **Uniform across the U.S. – red in Boston same as in Los Angeles**
- **Used by Federal, State, Tribal and local government agencies**
- **Air quality forecasts most important for reducing exposures and emissions**

Informing the Public

- **EPA provides the AQI nationwide on www.airnow.gov**
- **Local air quality conditions also often part of local weather reports**
- **Emergence of mobile phone apps that provide local AQI information**

Healthy Hearts

Promoting Environmental Health Literacy

www.epa.gov/healthyheart

Relevance:

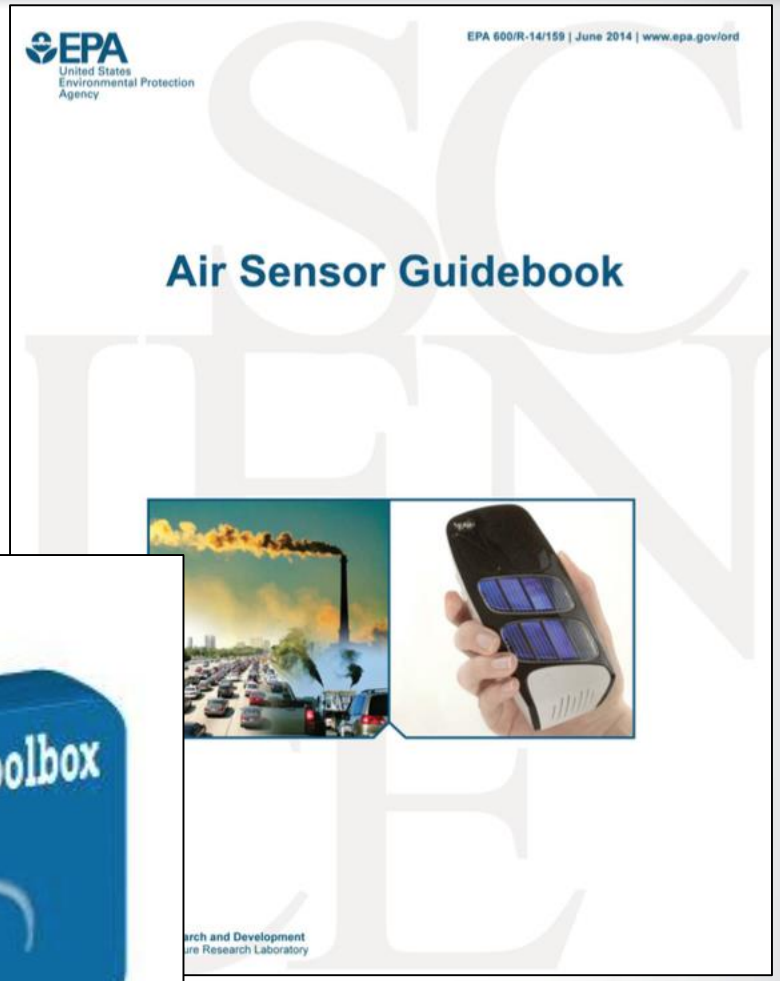
- Ambient PM triggers heart attacks, strokes, abnormal heart rhythms and sudden death
- More than 1 million heart attacks each year in US
- ~5% of heart attacks attributed to PM exposure
- 42 million Americans >60 years old with cardiovascular disease
- Heart disease costs ~$480 billion/yr
- Will approach ~$1 trillion/yr by 2030

Approach:

- Provide an environmental health message for individuals at high-risk for cardiac events

New Portable Technologies

- **EPA actively engaged in new sensor technologies for:**
  - **personal use**
  - **community engagement**
  - **research**



Environmental Quality Index

Air, Water, Land, Built, & Socioeconomic Domains

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lobdell.danelle@epa.gov

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USEPA Environmental Quality Index (EQI) - Air, Water, Land, Built, and Sociodemographic Domains Transformed Variables Dataset as Input for the USEPA EQI, by County for the United States

Metadata Updated: Mar 31, 2016

The US Environmental Protection Agency's (EPA) National Health and Environmental Effects Research Laboratory (NHEERL) in the Environmental Public Health Division (EPHD) is currently engaged in research aimed at developing a measure that estimates overall environmental quality at the county level for the United States. This work is being conducted as an effort to learn more about how various environmental factors simultaneously contribute to health disparities in low-income and minority populations, and to better estimate the total environmental and social context to which humans are exposed. This dataset contains the finalized transformed variables chosen to represent the Air, Water, Land, Built, and Sociodemographic Domains of the total environment. Six criteria air pollutants and 81 hazardous air pollutants are included in this dataset. Data sources are the EPA's Air Quality system (http://www.epa.gov/ttn/airs/airsaqs/) and the National-scale Air Toxics Assessment (http://www.epa.gov/nata/). Variables are average pollutant concentrations or emissions for 2000-2005 at the county level for all counties in the United States. Data on water impairment, waste permits, beach closures, domestic water source, deposition for 9 pollutants, drought status, and 60 chemical contaminants. Data sources are the EPA's WATERS (Watershed Assessment, Tracking and Environmental ResultS) Database (http://www.epa.gov/waters/), the U.S. Geological Survey Estimates of Water Use in the U.S. for 2000 and 2005

EJSCREEN

Environmental Justice Screening & Mapping Tool

- Nationally consistent dataset and approach for combining environmental and demographic indicators
- EJSCREEN users choose a geographic area; the tool then provides demographic and environmental information for that area
- EJSCREEN indicators are publicly-available data
- EJSCREEN provides a way to display this information and includes a method for combining environmental and demographic indicators into EJ indexes