

After the Smoke Clears: *How Wildfires Impact Our Health*



#ClimateChangesHealth

#APHAwebinar

June, 24 2020



MODERATOR

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What We Do



#ClimateChangesHealth



Raise awareness to encourage action, so that everyone in the U.S., beginning with the public health field, recognizes the urgency of practices, policies and individual choices that improve health outcomes and address climate change.



Enable an environment and culture in which “climate healthy” and equitable health choices are easy choices.



Promote policies focused on environmental justice and health equity designed to address climate change adaptation and mitigation.



Support science that clarifies the health impacts of climate change and policies in order to guide decision making.



Lead the charge to build awareness and action around the connection between climate change and health.

APHA's Center for Climate, Health and Equity

Wildfires and Health Equity



#ClimateChangesHealth



Get Involved



Follow the conversation on social media using the hashtags **#APHAWebinar** and **#ClimateChangesHealth**. For more information on how climate change impacts health, please visit **www.apha.org/climate**.



PRESENTER

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Presenting on cardiovascular health impacts of wildfire smoke with attention to at risk populations



Wildfire Smoke and Health

APHA Center for Climate, Health and Equity
Webinar
June 24, 2020

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Chiwaukum Creek Wildfire 2014
Okanogan-Wenatchee National Forest
Photo Credit: <https://ecology.wa.gov/>

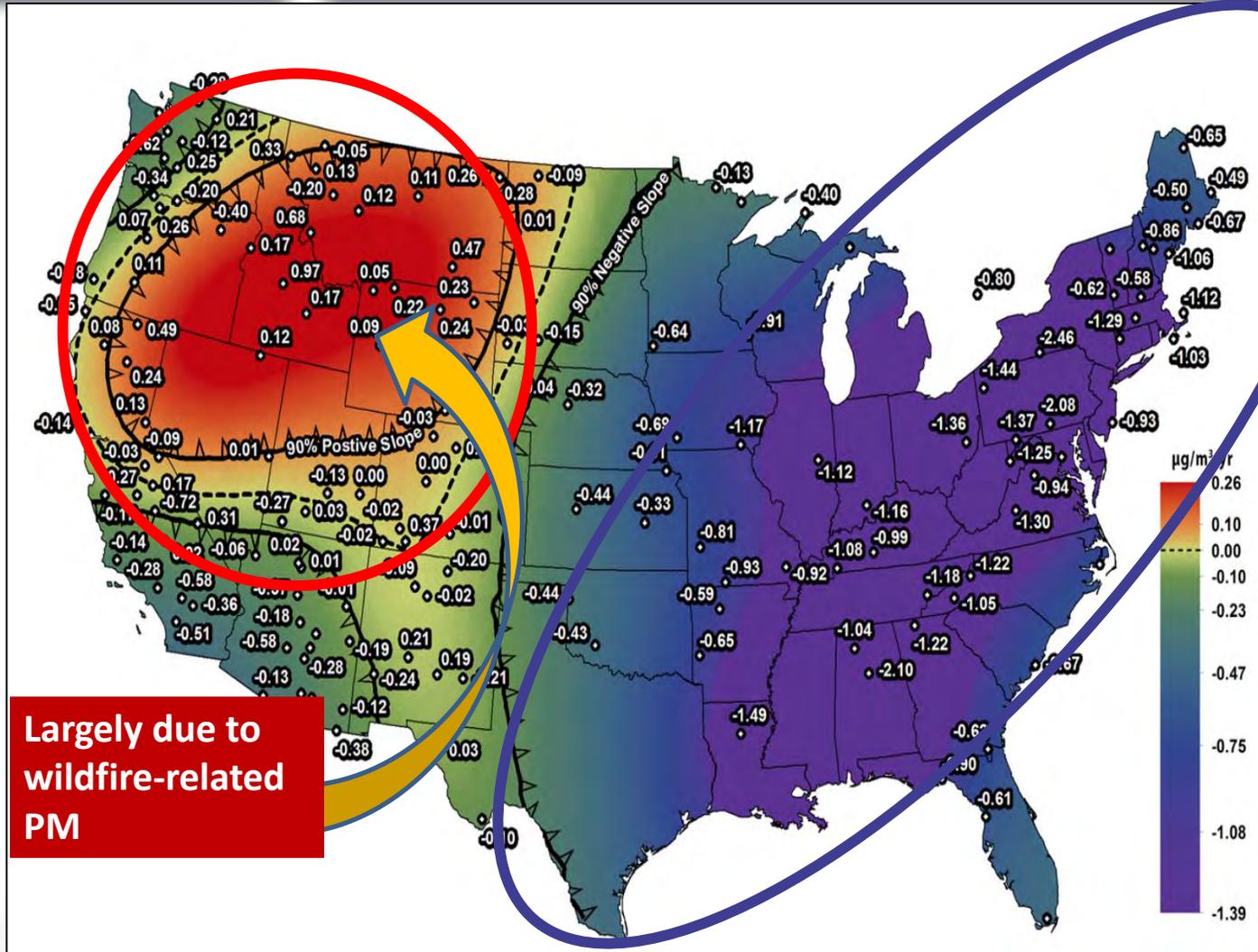


Air Quality Improves in US from 1988-2016

Except in Wildfire-Prone Areas

Worsening Air Quality

Increasing
annual ambient
air particle
pollution



Improving Air Quality

Decreasing
annual ambient
air particle
pollution



Wildland Fires & Their Emissions

Rural & Urban Community Public Health Concern



Brianna Paciorka, Knoxville News Sentinel



Stephanie Rodriquez, Courtesy of CAUSE





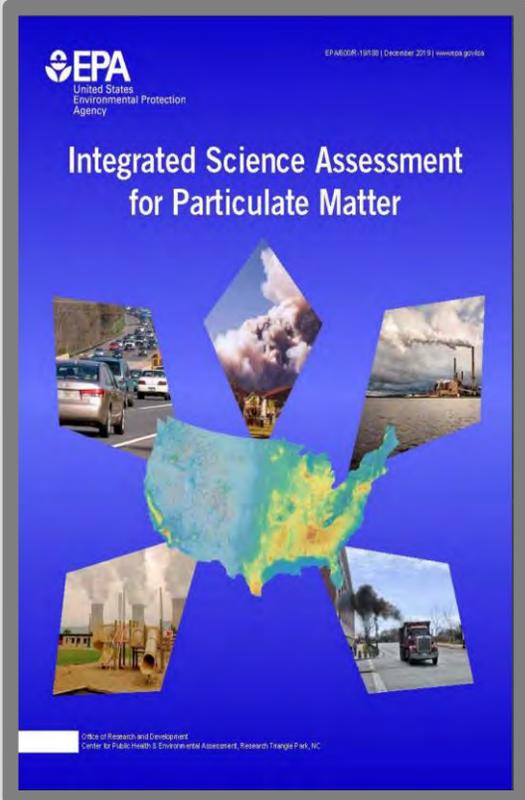
Wildfire Smoke and Wildfire-Related PM_{2.5} Comparison to Ambient Air Fine Particulate Matter (PM_{2.5})

Short-Term Exposure Effects

	US EPA PM ISA	Wildfire-PM/Smoke
• Respiratory	Likely Causal	+++
• Cardiovascular	Causal	++
• Metabolic	Suggestive	?
• Neurological	Suggestive	?
• Mortality	Causal	+++
• Reproductive & Developmental		
- Pregnancy/Birth Outcomes	Suggestive	+
- Reproduction/Fertility	Suggestive	?

Long-Term Exposure Effects

• Respiratory	Likely Causal	+
• Cardiovascular	Causal	?
• Metabolic	Suggestive	?
• Neurological	Likely Causal	?
• Mortality	Causal	?
• Cancer	Likely Causal	?





At-Risk Populations

Comparison between PM_{2.5} & Wildfire-Related PM_{2.5}/Smoke

	At-Risk Population	US EPA PM ISA PM _{2.5} *	Wildfire-PM/Smoke
• Sociodemographic Factors			
– Lifestage	Children	Adequate	++
	Older adults	Inadequate	++
– Race & Ethnicity	Non-white populations	Adequate	++ **
– SES	Low SES	Suggestive	++ **
– Sex	Female	Inadequate	+**
– Smoking	Current smoking	Suggestive	?
• Pre-existing Cardiovascular Disease		Suggestive	?
– Hypertension		Suggestive	?
• Diabetes and Metabolic Syndrome		Inadequate	+
• Pregnant women		Suggestive	+
• Obesity		Suggestive	?
• Pre-existing Respiratory Disease		Suggestive	+++
	Asthma	Suggestive	+++
	COPD	Suggestive	+++
• Genetic factors	GST variants	Suggestive	?

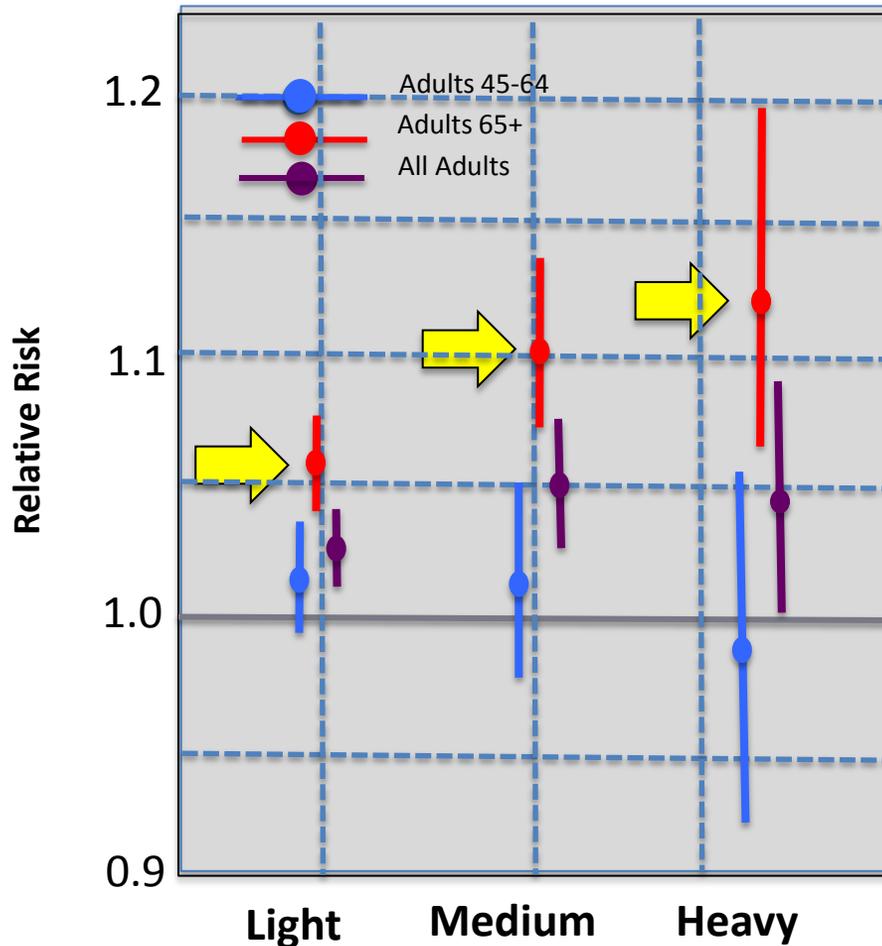
* EPA/600/R-19/188 | December 2019 | www.epa.gov/isa

** Liu JC, et al. Am J Epidemiology 2017



Wildfire-PM_{2.5} May Increase Heart Attack & Stroke

All Cardiovascular Causes Lag Day 1



- **Wildfire-PM_{2.5} associated with heart attacks and strokes for all adults, particularly for those over 65 yr old**
- **Increase in risk the day after exposure:**
 - All respiratory causes, 18%
 - All cardiovascular, 12%
 - Heart attack, 42%
 - Stroke, 22%
 - Heart rhythm abnormalities, 24% (on the same day as exposure)
 - Heart failure, 16%

At-risk populations include –

- Aged adults
- Pregnant women and fetuses
- Children
- People with respiratory disease
- People with cardiovascular disease



**~30% of the
U.S.
population is
at-risk**

Populations suspected to be at greater risk –

- Populations with chronic inflammatory diseases (e.g., diabetes, obesity)
- Women, Non-White and populations with lower socio-economic status*

* Liu C *et al.* *Am J Epidemiology* 2017

- Individuals of low SES may have greater mortality risk from short-term air pollution exposures
- In NC, lowest SES counties had greatest risk of health effects from a 2012 wildfire*
- Less access to air conditioning, or inability to evacuate, may increase smoke exposures in lower SES neighborhoods
- Higher rates of asthma in minorities could increase risk of health effects
- Interventions to reduce impacts - must be equitable in design and capacity to be implemented



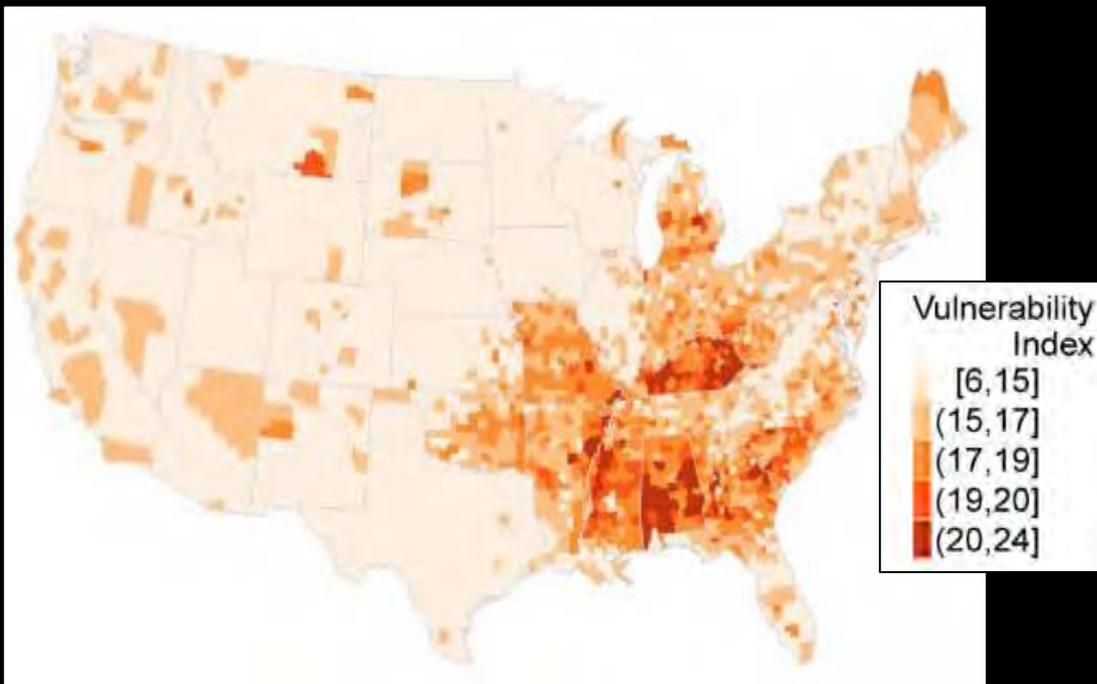
* Rappold et al. 2012



Community Health-Vulnerability Index

EPA tool for public health officials to identify populations at risk from wildland fire smoke exposure

- More smoke in the West, but population is less vulnerable than those in the south
- This tool considers factors that define susceptibility to air pollutant-related health effects



Factors of Vulnerability

- Peds & Adult Asthma
- COPD
- Obesity
- Diabetes
- Hypertension
- % population age 65+
- Income, education, poverty, unemployment

[Rappold AG, et al Environ Sci Technol 2017](#)

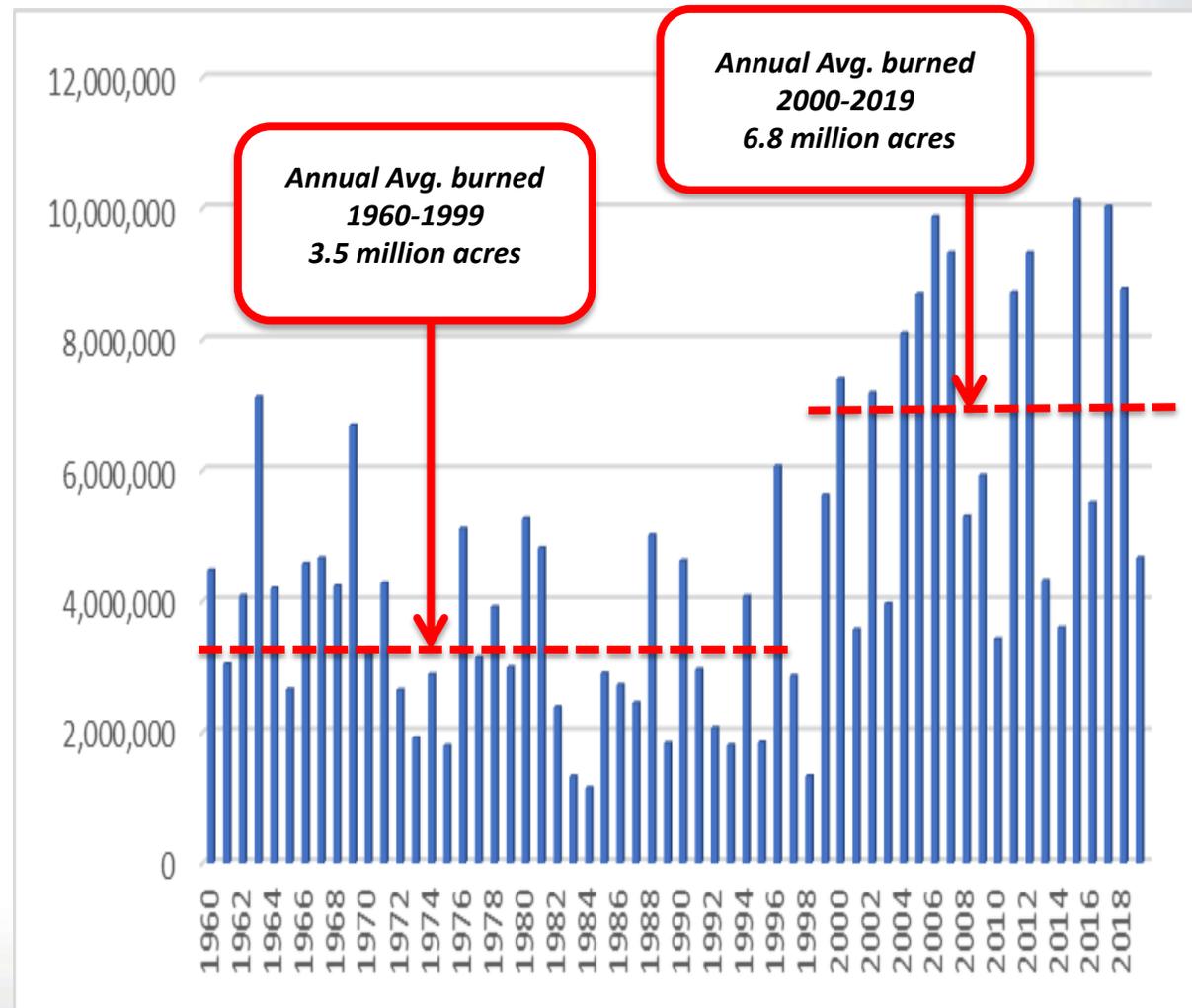


Future Public Health Concerns from Wildfire

Acreage Burned in the U.S. Annually

Future Conditions

- **Increasing acreage burned**
- **Increasing impact on urban areas through expanding WUI**
 - 10% of all land with housing are situated in the wildland-urban interface
 - 38.5% of U.S. housing units (Radeloff et al. 2005)
- **Increasing vulnerable and sensitive populations**
 - Aging US population



Adapted from <https://www.nifc.gov/fireInfo/nfn.htm>



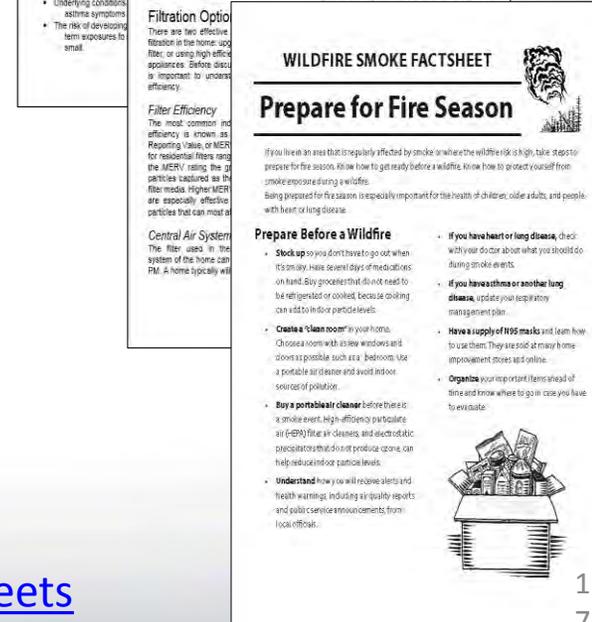
Wildfire Smoke Guide for Public Health Officials

WILDFIRE SMOKE A GUIDE FOR PUBLIC HEALTH OFFICIALS REVISED 2019

IV. COMMUNICATING AIR QUALITY CONDITIONS DURING SMOKE EVENTS



- **Stand-alone fact sheets**
 - Children
 - Older adults
 - Pets/livestock
 - Preseason preparedness
 - Exposure reduction
 - Know when to evacuate
 - Respirator use
 - Ash clean-up





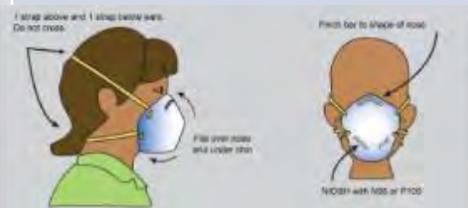
AirNow.gov: Current Fire Conditions



How Smoke from Fires Can Affect Your Health

CME Course

Wildfire Smoke and Your Patients' Health



Wildfire Smoke Exposure Infographics



Smoke Sense App

Toolbox

Resources health officials can use to educate the public about the risks of smoke exposure and actions people can take to protect their health

<https://www.epa.gov/smoke-ready-toolbox-wildfires>



Thank You and For More Information

2019 Wildfire Smoke: Guide for Public Health Officials is available at: <https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf>

Smoke-Ready Toolbox for Wildfires

<https://www.epa.gov/smoke-ready-toolbox-wildfires>

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- No conflicts of interest
- The presentation represents the opinions of the speaker and does not necessarily represent the policies of the US EPA