After the Smoke Clears: How Wildfires Impact Our Health

#ClimateChangesHealth
#APHAwebinar
June, 24 2020
MODERATOR

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@SuriliSutaria

@ClimateHealthEquity
APHA’s Center for Climate, Health and Equity

What We Do

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.

www.apha.org/climate
APHA’s Center for Climate, Health and Equity

Wildfires and Health Equity

- Children
- Low-income Communities
- Communities of Color
- Older Adults

www.apha.org/climate
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.
Wayne Cascio

Director of the Center for Public Health and Environmental Assessment, U.S. Environmental Protection Agency

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

Wayne Cascio, MD, FACC
Director
Center for Public Health and Environmental Assessment
Office of Research and Development
US EPA

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

Increasing annual ambient air particle pollution

Largely due to wildfire-related PM

McClure CD and Jaffe DA. PNAS 115 (31): 7901-7906, 2018
Wildland Fires & Their Emissions
Rural & Urban Community Public Health Concern

Brianna Paciorka, Knoxville News Sentinel

Stephanie Rodriquez, Courtesy of CAUSE
### Short-Term Exposure Effects

<table>
<thead>
<tr>
<th>US EPA PM ISA</th>
<th>Wildfire-PM/Smoke</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory</strong></td>
<td>Likely Causal</td>
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<tr>
<td><strong>Mortality</strong></td>
<td>Causal</td>
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<tr>
<td><strong>Reproductive &amp; Developmental</strong></td>
<td>Suggestive</td>
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<tr>
<td>- Pregnancy/Birth Outcomes</td>
<td>+</td>
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<tr>
<td>- Reproduction/Fertility</td>
<td>?</td>
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<td><strong>Mortality</strong></td>
<td>Causal</td>
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<td><strong>Cancer</strong></td>
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### Long-Term Exposure Effects

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

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

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%

Wettstein Z, Hoshiko S, Cascio WE, et al. JAHA April 11, 2018
Who’s at Risk from Wildland Fire Smoke?

**At-risk populations include** –
- Aged adults
- Pregnant women and fetuses
- Children
- People with respiratory disease
- People with cardiovascular disease

**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*


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

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

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Adapted from [https://www.nifc.gov/fireInfo/nfn.htm](https://www.nifc.gov/fireInfo/nfn.htm)
Wildfire Smoke Guide for Public Health Officials

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

https://airnow.gov/index.cfm?action=topics.smoke_wildfires_guide_factsheets
**Smoke Ready Toolbox for Wildfires**

**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

<table>
<thead>
<tr>
<th>Toolbox Component</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>AirNow.gov: Current Fire Conditions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>How Smoke from Fires Can Affect Your Health</strong></td>
<td></td>
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<tr>
<td><strong>CME Course</strong></td>
<td>Wildfire Smoke and Your Patients’ Health</td>
</tr>
<tr>
<td><strong>Wildfire Smoke Exposure Infographics</strong></td>
<td></td>
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<tr>
<td><strong>Smoke Sense App</strong></td>
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[https://www.epa.gov/smoke-ready-toolbox-wildfires](https://www.epa.gov/smoke-ready-toolbox-wildfires)

Smoke-Ready Toolbox for Wildfires
https://www.epa.gov/smoke-ready-toolbox-wildfires

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Email: 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