

Health Effects of Wildfire Smoke

HEAC Meeting

June 5, 2018



Outline

- Health Effects of Particulate Air Pollution
- Ambient Air Quality Standards
- Wildfire Smoke Guidance
- Wildfire-related Research in California



Health Effects of PM2.5 Exposure

- Premature death
 - Causal for cardiopulmonary disease (US EPA)
- Hospital admissions for worsening of respiratory and cardiac disease
- Emergency room visits for asthma
- Reduced lung function in children
 - Increased risk of bronchitis and chronic cough
- Exposure during pregnancy – low birth weight, premature birth, and birth defects

Populations Most at Risk: PM2.5

- Older adults
 - People with chronic heart or lung disease
 - Children
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- Estimated annual health impacts in California
 - 7,200 premature deaths
 - 1,900 hospitalizations
 - 5,200 ER visits for asthma



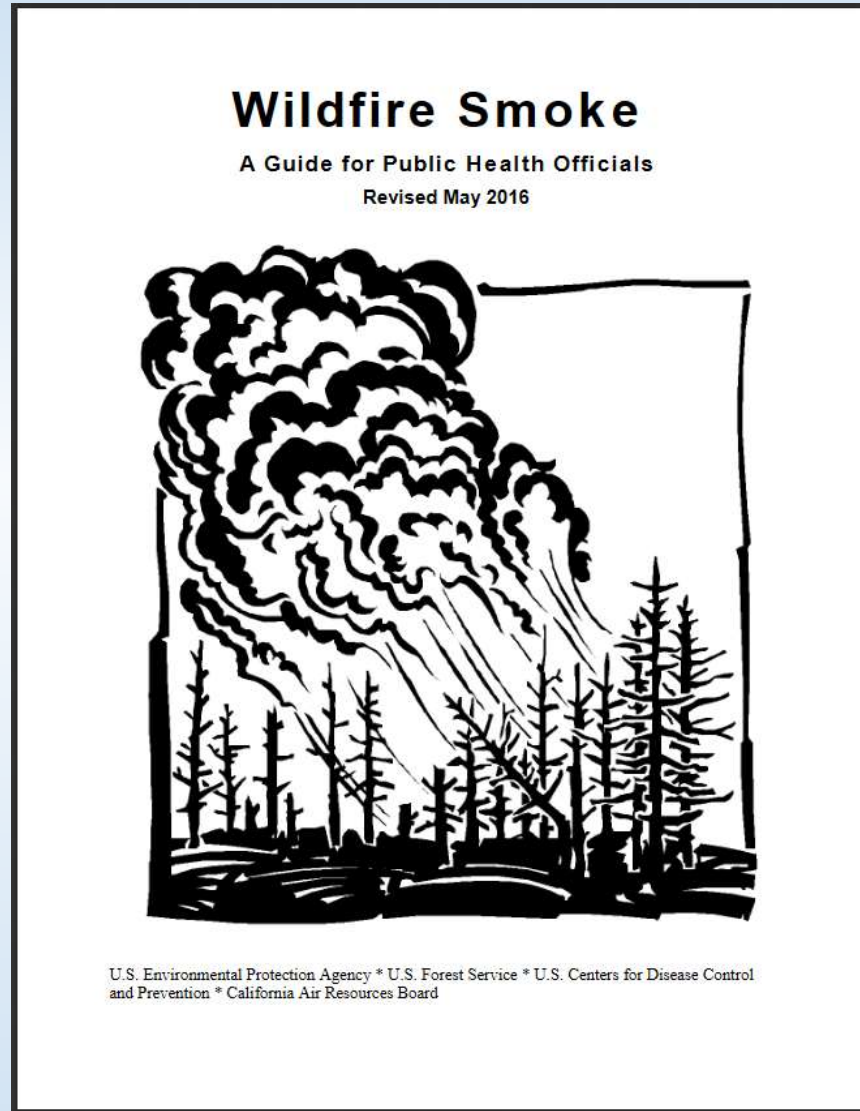
Ambient Air Quality Standards (AAQS)

- Clean Air Act requires the US EPA to set NAAQS "with an adequate margin of safety...to protect human health"
 - Also mandated in California (CAAQS)
- NAAQS and CAAQS based **only** on health considerations
 - Zero risk not required
 - Penalties for failure to attain NAAQS by target date

Current Standards: CAAQS and NAAQS

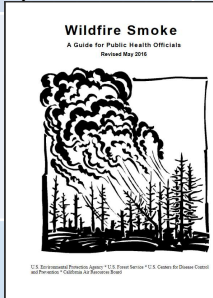
Pollutant	NAAQS	CAAQS	Averaging Time
PM _{2.5}	12 µg/m ³ 35 µg/m ³	12 µg/m ³ --	Annual 24-hour
PM ₁₀	150 µg/m ³ --	50 µg/m ³ 20 µg/m ³	24-hour Annual
Ozone	-- 0.07 ppm	0.09 ppm 0.07 ppm	1 hour 8-hour
NO ₂	0.053 ppm 100 ppb	0.030 ppm 0.18 ppm	Annual 1-hour
SO ₂	0.14 ppm 0.03 ppm	0.04 ppm --	24-hour Annual
Carbon Monoxide	35 ppm 9 ppm	20 ppm 9 ppm	1-hour 8-hour
Lead	0.15 µg/m ³ Rolling 3-mo avg	1.5 µg/m ³ 30-d avg	

Wildfire Smoke Guidance



Recommended Actions for Public Health Officials

AQI Category (AQI Values)	PM2.5 µg/m3 24-hr avg	Recommended Actions
Good (0 to 50)	0-12	<ul style="list-style-type: none"> •If smoke event forecast, implement communication plan
Moderate (51 to 100)	12.1-35.4	<ul style="list-style-type: none"> •Prepare for full implementation of School Activity Guidelines (http://www3.epa.gov/airnow/flag/school-chart-2014.pdf) •Issue public service announcements (PSAs) advising public about health effects, symptoms and ways to reduce exposure •Distribute information about exposure avoidance
Unhealthy for Sensitive Groups (101 to 150)	35.5-55.4	<ul style="list-style-type: none"> •Evaluate Implementation of School Activity Guidelines •If smoke event projected to be prolonged, evaluate and notify possible sites for cleaner air shelters •If smoke event projected to be prolonged, prepare evacuation plans
Unhealthy (151 to 200)	55.5-150.4	<ul style="list-style-type: none"> •Full implementation of School Activity Guidelines •Consider canceling outdoor events (e.g., concerts and competitive sports), based on public health and travel considerations.
Very Unhealthy (201 to 300)	150.5-250.4	<ul style="list-style-type: none"> •Schools move all activities indoors or reschedule them to another day. •Consider closing some or all schools •Cancel outdoor events involving activity (e.g., competitive sports) •Consider canceling outdoor events that do not involve activity (e.g. concerts)
Hazardous (>300)	>250.5-500	<ul style="list-style-type: none"> •Consider closing schools •Cancel outdoor events (e.g., concerts and competitive sports) •Consider closing workplaces not essential to public health •If PM level is projected to remain high for a prolonged time, consider evacuation of at-risk populations



Wildfire-related Research in California

Published Health Studies

- A number of epidemiological studies from southern California wildfires (2003, 2007)
- Increased respiratory hospital admissions, especially for asthma
 - For the very young and the elderly
- Slight reduced birthweight among infants exposure in utero
- Increased eye and respiratory symptoms in children
- CARB study on the effects of wood-burning ban in the San Joaquin Air Basin
 - PM2.5 concentrations decreased 12% after wood-burning ban
 - Hospitalizations for CVD decreased 7% after wood-burning ban
 - IHD hospitalizations decreased 16% after wood-burning ban

Wildfire-related Research in California

CARB-funded Health Studies (Lisa Miller, UC Davis)

- Cohort of 50 outdoor colony rhesus monkeys born ~ during Trinity and Humboldt County wildfires (2008)
- Impact of early life episodic ozone and PM exposure
- Blood and lung tests at age 3
 - Early life exposure to ozone and wildfire PM_{2.5} can result in immune and lung function decrements that ***persist with maturity***
- Follow-up study (in progress)
 - Are adverse health effects from air pollution exposure passed on from mother to child?



For More Information

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