Public Health Responses to Reduce Community Exposure to Indoor Fine Particulate Matter

Sarah Coefield, Missoula City-County Health Department

Indoor Exposure to Fine Particulate Matter and Practical Mitigation Approaches

The National Academies of Sciences, Engineering and Medicine

April 28, 2021

Missoula Public Health
City-County Health Department

Wood Stove Changeout and Removal Programs

Seeley Lake Woodstove Changeout Program: A Model for Effective Community and Government Action.

Missoula City-County Health Department
Air Quality Division

SEELEY LAKE
WOODSTOVE
CHANGEOUT

Asthma Control Programs

- Montana Asthma control program
  - Home visits to identify triggers
  - Portable air cleaner (PAC) distribution for clients with asthma triggers in the home

2017 drove home the inadequacy of standard wildfire smoke public health messaging.

Photo credit: Kurt Wilson, Missoulian

Public health's role before and during a smoke event

Communication

- Advice for creating clean air spaces
- Health advisories and guidance documents
- Smoke outlooks
- Advice for reducing exposure
- Response to public inquiries

Intervention

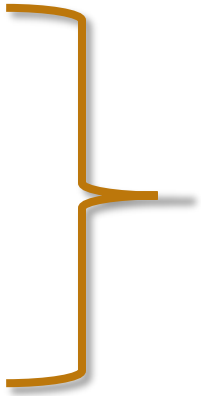
- Cleaner air shelters
- Provide portable air cleaners or N95s

Policy

- Advocate for cleaner indoor air requirements/adoption of updated ASHRAE guidance
- Cancel/postpone events
- Close schools
- Set up safeguards for outdoor workers

Missoula County smoke messaging: A multi-pronged approach.

- Listservs/email distribution lists
- News releases
- Websites and blogs
- Social media
- Guidance documents
- Public meetings
- Targeted messaging to vulnerable groups



- Smoke-ready messaging pre-smoke season
- Daily wildfire smoke updates during smoke season

HOME ABOUT TODAY'S AIR HEALTH RISKS COVID CLEAN INDOOR AIR OUTDOOR SAFETY THE SCIENCE

http://www.montanawildfiresmoke.org

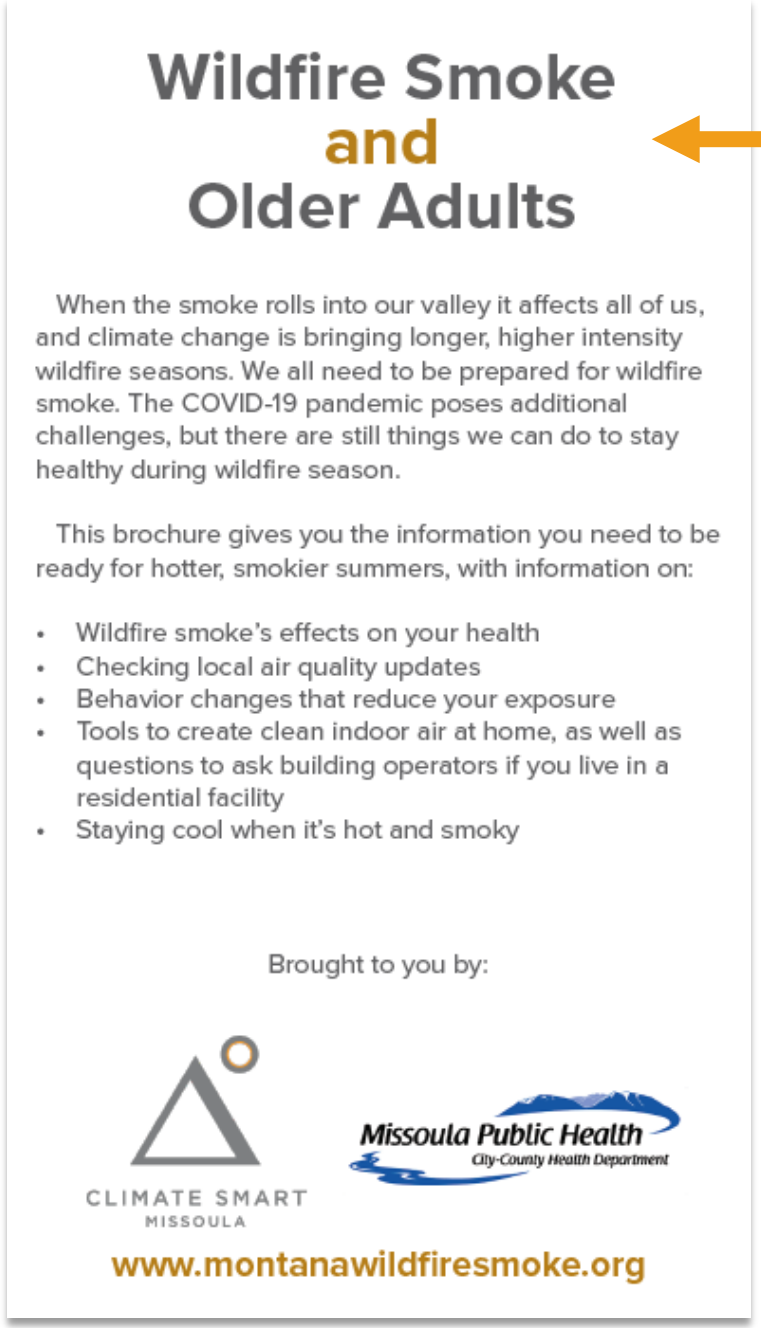
Late August 2020 - Smoke season is now here and conditions change daily or hourly.
Visit **Today's Air** page for link to real time conditions and smoke forecasts to stay healthy.

Montana's summers are becoming hotter and drier, growing the risk of wildfires. As fires increase in size and severity, and as the wildfire season lengthens, the amount of wildfire smoke increases! In Montana, smoke can affect us from nearby fires, from surrounding states, and even as far as California or Canada. Visit these pages to find out more about the health risks of smoke, COVID concerns, what you can do to stay healthy, and more.

Sarah C's 2020 Clean Air Blogs - Click HERE!

SCROLL DOWN FOR NEW VIDEOS!

Short, distilled message for general consumption



Targeted, multi-page handout with multiple topics

Posters and pamphlets

Smoke-ready business workshops

- Launched a series of workshops for local businesses to promote cleaner indoor air spaces during wildfire smoke events.
- Goal: protect employee health and provide opportunities for customers to get out of the smoke and into local businesses.
- Modeled after SmokeWise Ashland workshop

Inaugural Missoula Smoke-Ready Businesses Workshop
July 15, 2019

Our Air

- Air Quality Monitoring
- Air Quality Publications
- Air Pollutants of Concern
- Climate Change
- Educational Resources
- Odors & Air Quality
- Air Quality Reports, Studies, Maps
- No-Idle Zone
- Wildfire Smoke

Smoke Ready Week 2020

On behalf of our Smoke Ready 2020 partners – Spokane Regional Clean Air Agency, Spokane Regional Health District and Spokane County Emergency Management – welcome to Smoke Ready 2020. The week encourages residents to prepare now for wildfire smoke with information, tips and resources.

Each day, from June 15-19, information and resources on preparing for wildfire smoke will be posted and shared on social media channels. Each day has a unique theme with related tips.

To help us spread the message, we need your help. During Smoke Ready Week, please post on your social media about the daily topics and use the hashtags **#SmokeReadySpokane** and **#SmokeReady2020**. We have provided graphics and messaging below.

We appreciate the important partnerships that have been critical to helping our community prepare for wildfire smoke.

Current Air Quality

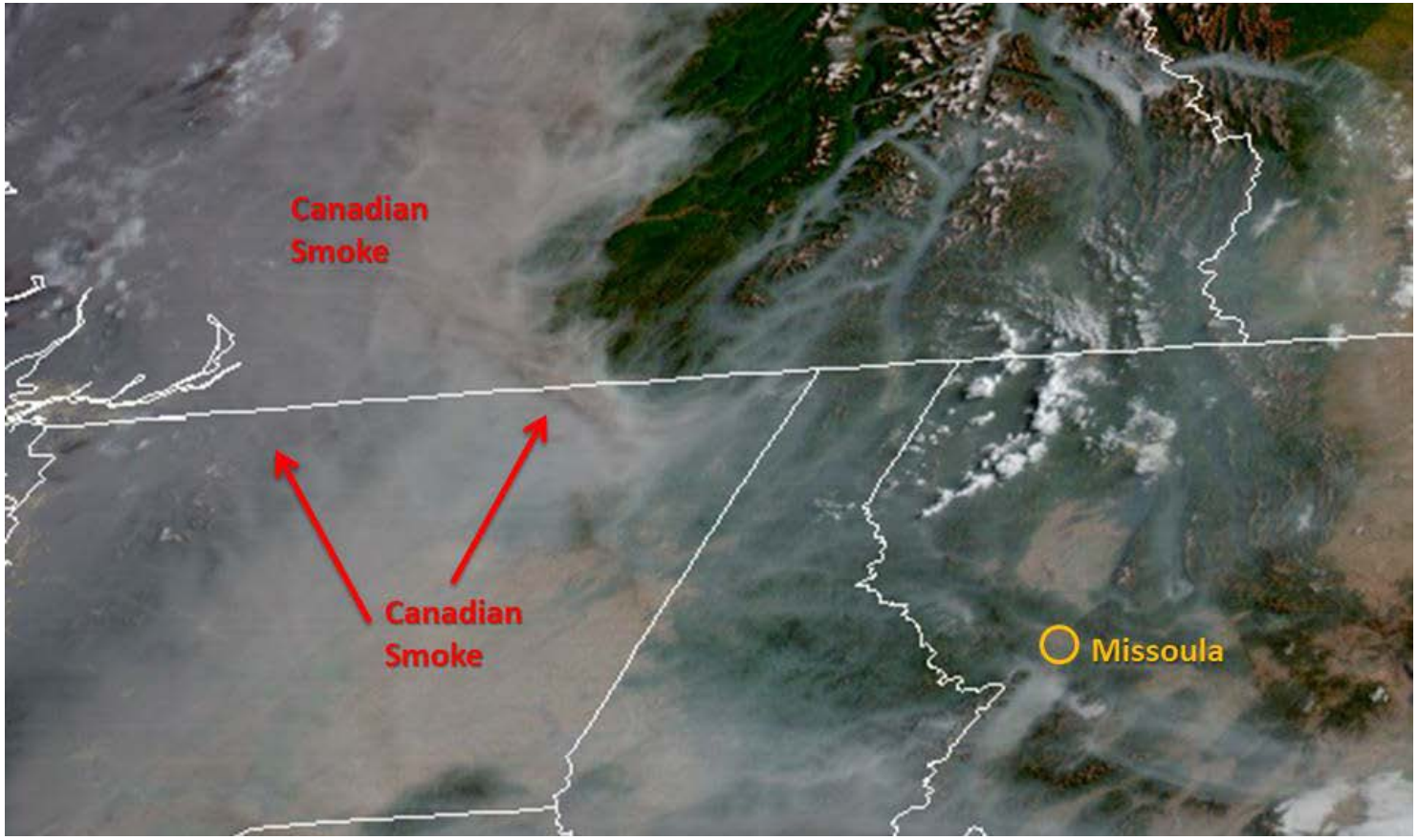
GOOD

details

Burn Restrictions

IN EFFECT

details



Daily updates

- Current air quality conditions
- Health concerns
- Where the smoke is coming from
- Fire activity
- Smoke behavior
- How conditions will (or won't) change during the day
- Where to find cleaner air
- How to stay protected from the smoke
- Maps and photos

Interventions

- Portable air cleaner (PAC) distribution
- DIY air cleaner distribution
- Cleaner indoor air centers/shelters
- N-95 distribution
- Evacuation

Photo and quote: “Summer of Smoke Exposes Need For Clean Indoor Air In Montana,” Nora Saks, Montana Public Radio, 1/3/18

Portable air cleaner (PAC) cache

- 125 PACs in MCCHD's cache, designated for use in facilities, not for individual use
- PACs disseminated by MCCHD and Climate Smart Missoula to local daycares and preschools 2018-2020; more than 500 young children had filtered air
- Some PACs kept on reserve for schools

PAC/DIY Distribution considerations

- How will you select/triage recipients?
- Cache to loan vs cache to give away
- How will you pay for it?
- Will you follow up with recipients to make sure they are using the PAC correctly and replacing filters as needed?

Cleaner indoor air centers

- **Least resources:** Pre-identify publicly accessible buildings in the community that have advanced filtration and a wildfire season plan
- **Moderate resources:** Designate respite sites accessible during business hours
  - Childcare
  - Snacks
  - Entertainment
  - Sanitation
  - Security
- **Most resources:** Set up 24-hour shelters
  - All of the above
  - More food
  - Sleeping facilities
  - Etc.

Cleaner indoor air center considerations

- HVAC may need retrofits to provide cleaner air.
- Monitor the indoor PM.
- Smoke event duration can vary.
- Who is the space for? Is there another, less expensive and resource-intensive intervention available?
- How will you pay for it?

Wildfire ASPIRE study
Advancing Science Partnerships for
Indoor Reductions of Smoke Exposures

Air monitoring study to understand drivers of indoor air quality during wildfire smoke events

Sarah Coefield, Ben Schmidt
Missoula City County Health Department

Amara Holder, Heidi Vreeland, Gayle Hagler
US EPA Office of Research and Development

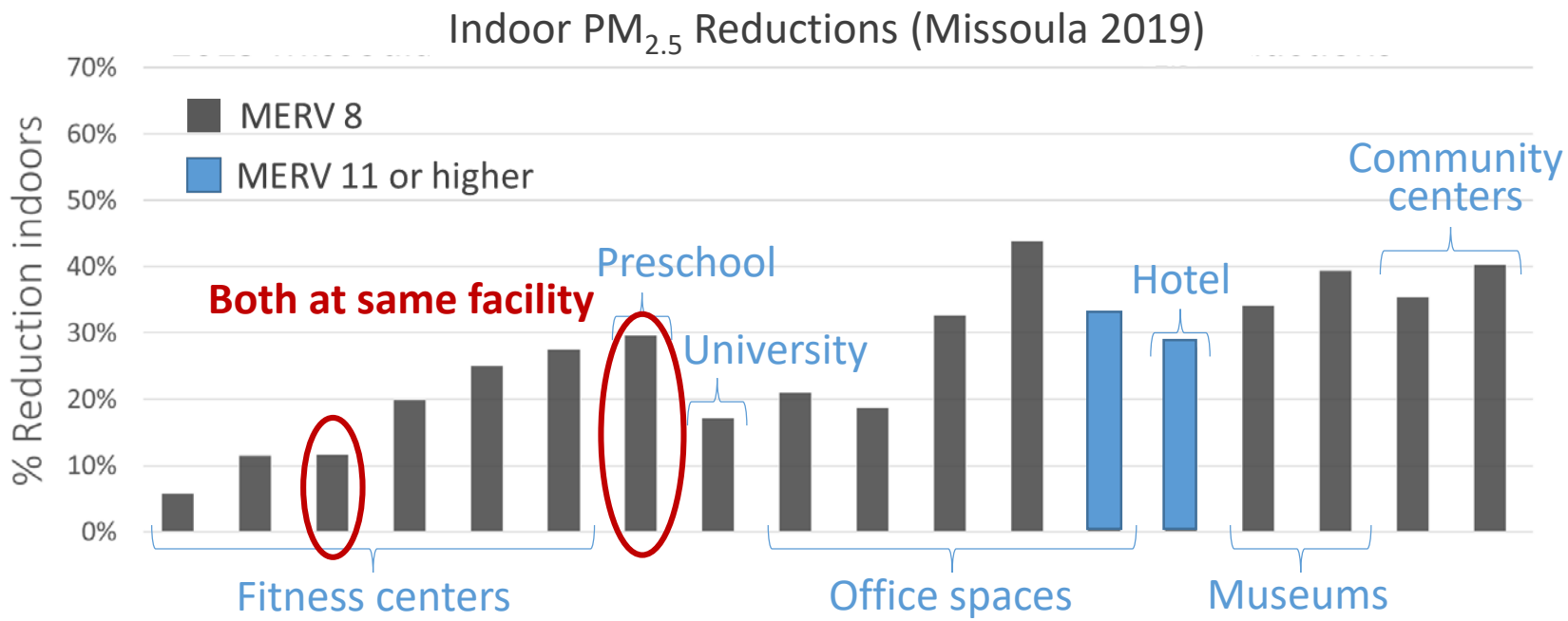
2019 Findings

- Missoula 2019:
  - MERV 8 filters in most buildings
  - Indoor $PM_{2.5}$ reductions varied widely

→ Filter rating alone is not a good indicator of indoor air quality

Additional causes of variability:

- Foot traffic (door openings)
- Ventilation (window/door openings)
- Sensor position indoors
- Air handling system settings and maintenance



Differences in Missoula Fitness Center Rooftop Units

- Outdoor air dampers not operable (both failed closed)
- Weight room: "poorly sealed" "warped panels"
- Preschool: "tightly closed" "good seal"

Weight room

Preschool

→ Poor seal allows outdoor air to more easily infiltrate weight room

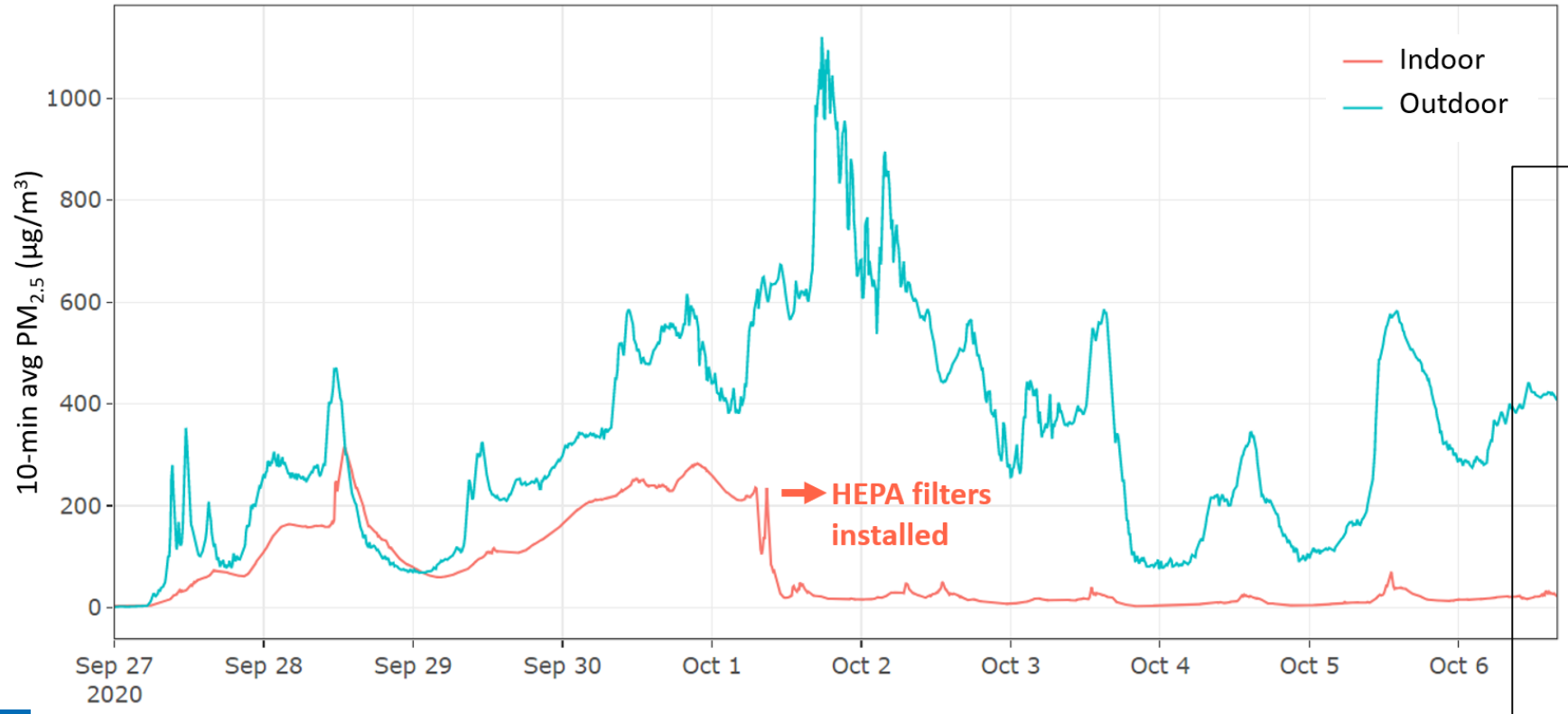
(Photos by: Tom Javins)

From Hoopa, CA site: extreme smoke intervention

Indoor PurpleAir sensor measurements demonstrated the effectiveness of HEPA filter use during extreme smoke event.

PurpleAir $PM_{2.5}$ at Daycare

(US-wide correction <223 µg/m³, quadratic correction >223 µg/m³)



- Building has central air conditioning system
- 1- 3 people occupy the building daily

During smoke episode, doors and windows were kept closed and an industrial rental air cleaner was used

Policy, guidance and programs

Montana School Health Rules: Schools must limit infiltration during air pollution events and inspect HVAC annually.

Washington Department of Health School Closure Guidance

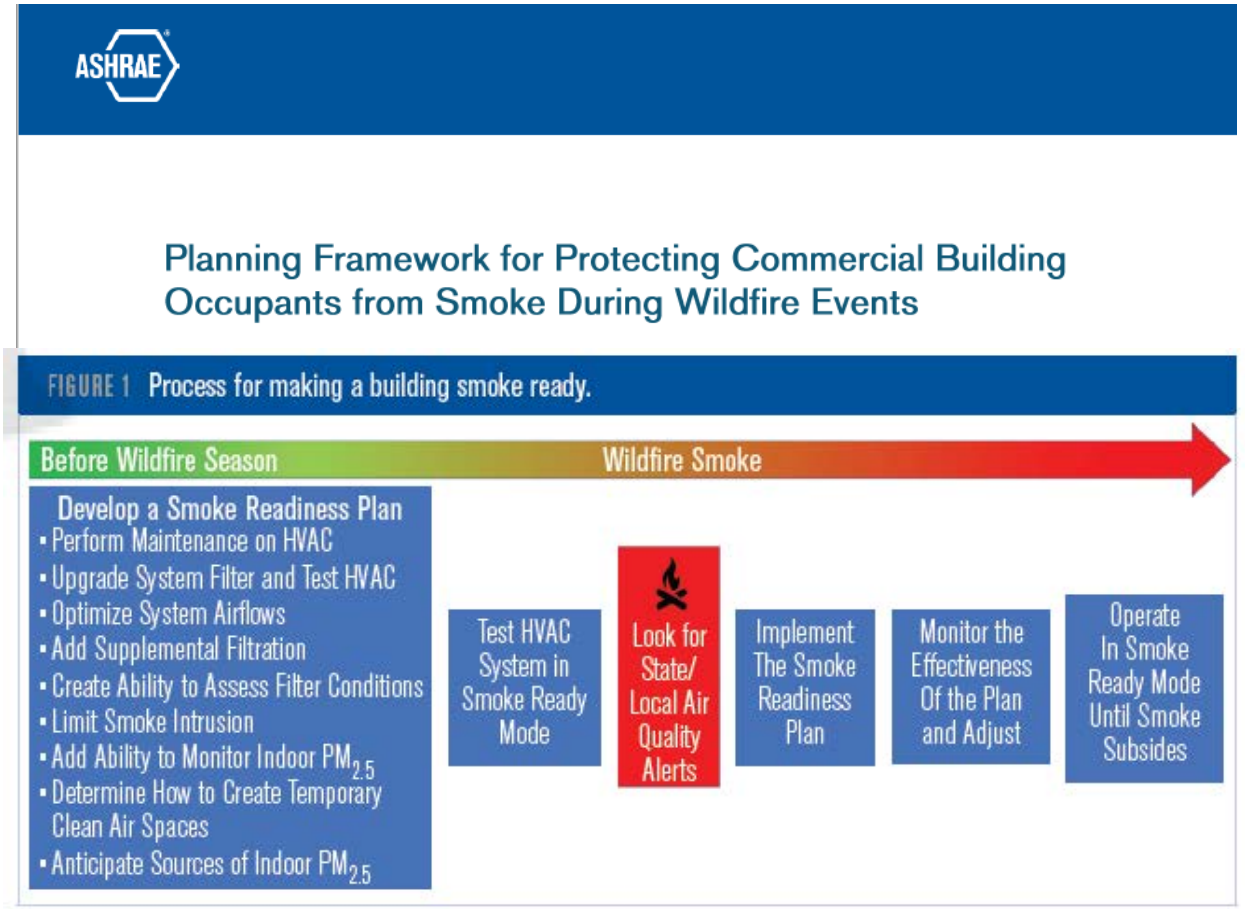
California AB 836 - Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program

Cal/OSHA regulation (section 5141.1) to protect employees exposed to wildfire smoke – includes indoor spaces.

Wildfire Smoke Response Protocols in WA and OR provide cohesive wildfire smoke messages for local health departments to share with their communities and call for cleaner air shelters – funding is unclear (OR legislature has bills in committee to address this).

ASHRAE* Guideline 44 – Protecting Commercial Building Occupants During Wildfire Events

- **How to make buildings with air handling units for heating ventilation and air conditioning (HVAC) smoke ready**
  - Upgrade to MERV^{+} 13 filters and have extra filters on hand for frequent replacement
  - Maintain HVAC system, identify and repair broken dampers and controls
  - Test and optimize HVAC flows to ensure positive building pressure and sufficient ventilation
  - Limit smoke intrusion by weatherizing building, closing windows, limiting door openings
  - Monitor $PM_{2.5}$ levels indoors
  - Identify indoor sources of $PM_{2.5}$ and limit activities during smoke episodes
  - Use portable air cleaners if necessary



https://www.ashrae.org/file%20library/technical%20resources/covid-19/guidance-for-commercial-building-occupants-from-smoke-during-wildfire-events.pdf

***ASHRAE = American Society of Heating, Refrigeration, and Air-conditioning Engineers**

$^{+}$MERV = Minimum Efficiency Reporting Value

We need effective communication

- How do you make sure everyone in the community knows where to find the information they need about wildfire smoke?
- What does effective communication look like?
- How can communication lead to behavior changes?
- How can you battle misinformation?

We need to know the most effective and sustainable interventions

Interventions are a matter of equity. Current interventions include establishing cleaner air shelters, and/or distributing portable air cleaners, DIY fan/filter combos, and N95s.

- What is the most effective intervention?
- What is the most sustainable intervention?
- Is one preferable for short term vs long duration smoke events?
- How do you decide who gets help?
- **Where will funding come from?**

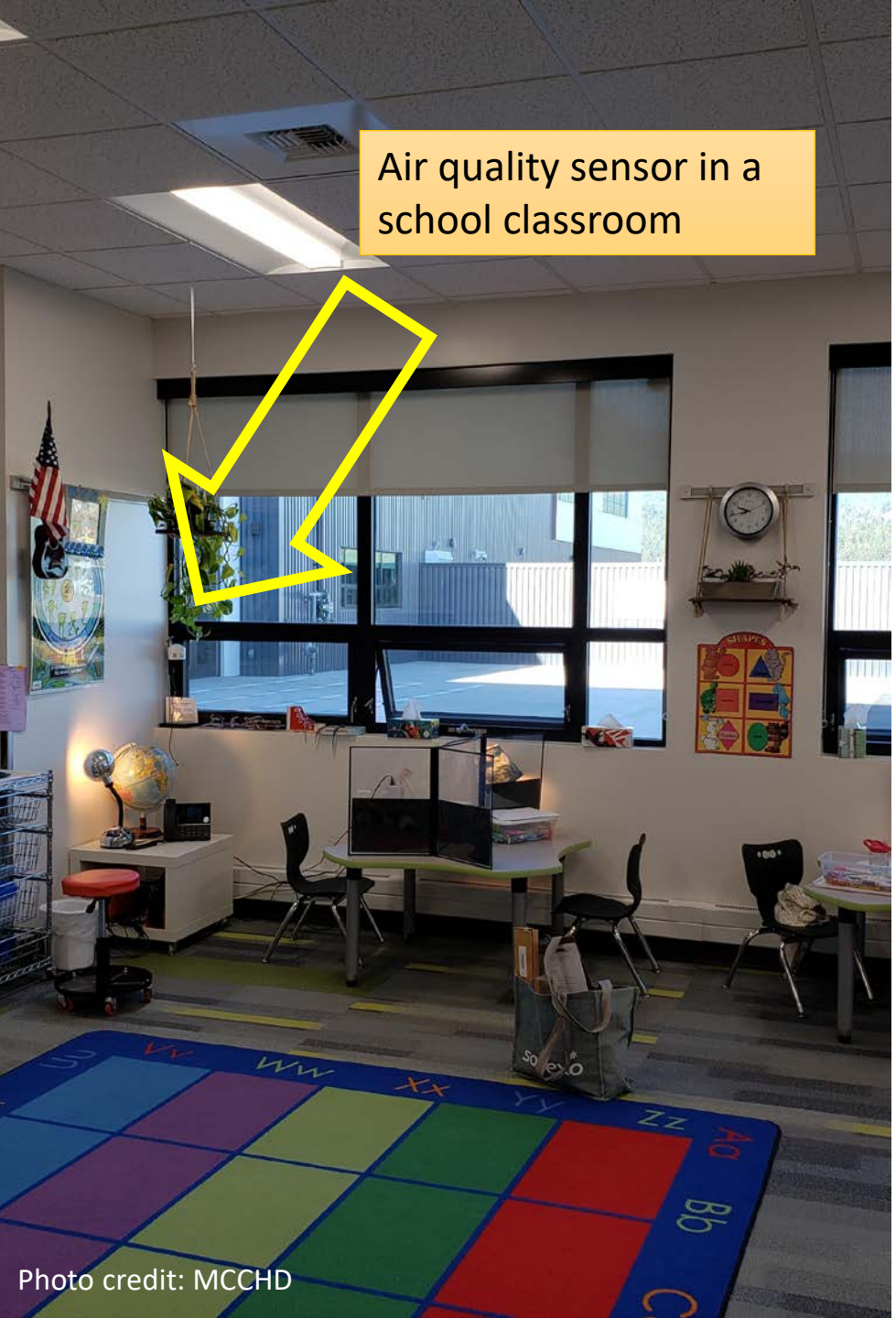


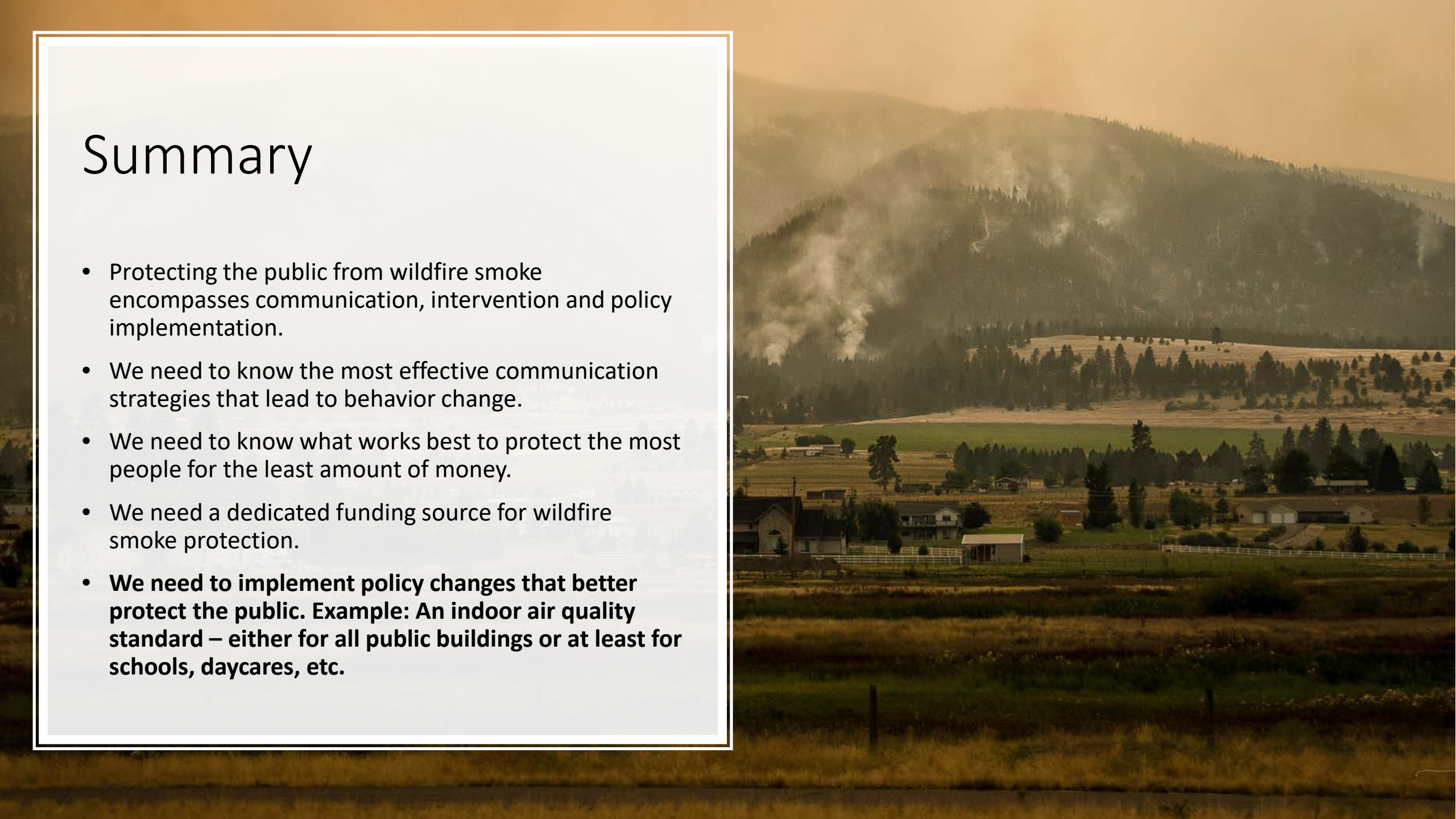
Photo credit: MCCHD

We need to know indoor air quality during smoke events

- Indoor air quality can quickly match outdoor air quality in commercial and public buildings.
- Need: Air quality sensors in indoor locations to help guide decision making
- Need: Data on the effectiveness of different air cleaning methods in homes, businesses and public facilities

Summary

- Protecting the public from wildfire smoke encompasses communication, intervention and policy implementation.
- We need to know the most effective communication strategies that lead to behavior change.
- We need to know what works best to protect the most people for the least amount of money.
- We need a dedicated funding source for wildfire smoke protection.
- **We need to implement policy changes that better protect the public. Example: An indoor air quality standard – either for all public buildings or at least for schools, daycares, etc.**



Questions?

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