Washington State Wildfire Smoke Risk Communication Stakeholder Synthesis Symposium

A synthesis of the World Café discussions
Author Team

This report was prepared by the symposium organizing committee:

Faculty: Nicole A. Errett, Heidi A. Roop and Tania Busch Isaksen
Students: Claire Pendergrast, Annie Doubleday, Brad Kramer and Kim Anh Tran

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Cover Image: Wildfire smoke draping the Enchantments in eastern Washington August 2018. Credit: H. Roop
Introduction

Wildfires are a growing concern for communities, decision-makers, employers and workers across the Western United States, including Washington state. Wildfires have public health consequences for populations directly in wildfire-prone areas, as well as for populations located many miles downwind due to poor air quality from wildfire smoke.

In recent years, exposure to wildfire smoke has become a more regular occurrence in Washington state. According to the Washington State Department of Ecology's air monitoring network, communities in eastern Washington have experienced weeks of unhealthy to hazardous air quality, several times in the past decade, while densely populated areas in western Washington experienced significant wildfire smoke-related quality impacts for the first time in recent history. This wildfire smoke exposure is in addition to existing seasonal air quality impacts, including those related to wood stove use and silviculture burning.

While many have called for action to reduce the public health threat of wildfire smoke for affected communities, uncertainties remain around the health impacts of wildfire smoke exposure and the effectiveness of risk reduction strategies. Little research has been done on wildfire smoke risks, specifically in Washington state.

On October 30th, 2018 a Wildfire Smoke Risk Communication Stakeholder Synthesis Symposium was held in Seattle, Washington to identify and prioritize needs, barriers, and solutions to promote effective wildfire smoke risk communication and risk reduction across Washington state. Coordinated by an interdisciplinary team of University of Washington researchers, this symposium brought together 76 regional stakeholders representing over 30 agencies, organizations, communities and Tribes to share lessons learned from recent wildfire seasons, to provide information on the current state of the science related to wildfire smoke exposure and health, and to facilitate collaborations between researchers and practitioners involved with wildfire smoke across the state. Here, we synthesize stakeholder concerns and needs as documented during this interactive workshop to support ongoing conversations and agenda-setting for increasing coordination, collaboration and research to help Washington state communities, agencies and
practitioners reduce community-wide risks from exposure to wildfire smoke. A forthcoming accompanying manuscript will describe the research needs identified during the symposium.

This report aims to provide practitioners, researchers and funders with an overview of ongoing activities and existing practice-based needs for better characterizing and communicating about wildfire smoke health risks across Washington state. Practitioners may find this report useful for its lessons learned from previous wildfire smoke seasons and its summary of the scientific and policy context of wildfire smoke. Researchers and funders are encouraged to familiarize themselves with this report's content on current activities underway and information needs identified by policy and practice stakeholders.

Methodology & Symposium Structure

The symposium was designed to provide participants with opportunities to hear about the state of the science, engage in discussion around the real-world challenges of addressing wildfire smoke risk in communities and to actively share their knowledge and expertise to help guide the development of a research agenda for future work. The symposium began with presentations on the health risks of wildfire smoke, the connection between wildfire smoke and climate change, and examples of ongoing research efforts to better characterize wildfire smoke impacts on health to inform disaster recovery and public health practice. Participants also heard from a panel of practitioners from across the state who discussed their experiences, challenges, and needs related to wildfire smoke events. Following these presentations and panel discussions, participants engaged in small group discussions using the ‘World Café Method’, a technique designed to foster large group dialogue that is deliberate in its appreciation of local knowledge. Tables were divided into four subpopulations: indoor and outdoor workers, at-risk/susceptible populations, rural communities, and urban/suburban communities. Participants engaged in four 20-minute interactive group discussions on the following overarching questions:

1. Who is uniquely susceptible to wildfire smoke in this community? Why?
2. How can we effectively communicate risk to this population?
3. How can we reduce risk to this population?
4. How can research improve preparedness and response to future wildfire smoke events?

Notetakers at each table recorded the key themes from the World Café discussions, which were later reviewed and summarized by the author team.
World Café Discussion Synthesis

Below is a synthesis of the results of the Wildfire Smoke Symposium’s World Café discussions. Discussions of high-risk groups, risk communication, risk reduction, and information needs are presented separately for workers (Table 1) and for the broader community (Table 2), and represent input from stakeholders across the state, including representatives of urban and rural communities.

Worker-Specific Considerations

**High-Risk Groups**
Participants identified many occupations at increased risk of wildfire smoke exposure or smoke-related health effects. Outdoor workers were noted as highly vulnerable, especially construction workers, wildland firefighters, and agricultural workers. Other occupations of concern included landscapers, law enforcement and public works workers, tourism and outdoor recreation workers, childcare professionals, field researchers, and indoor workers in workplace environments with poor or no air filtration systems. Self-employed workers and small-business employees were noted as less likely to receive information or support to limit smoke exposure. Participants noted that the occupational groups at greatest risk of smoke exposure likely faced other compounding threats to occupational health, such as lack of health insurance or power dynamics for migrant workers or non-unionized workers.

Construction and agricultural work were identified as at especially high-risk of smoke exposure as both occupations involve long hours of intense manual labor, resulting in increased inhalation rates, and continued smoke exposure outside of work shifts. Participants noted that wildland firefighters were especially vulnerable to mental and physical health impacts from very high wildfire smoke exposure. Specific concerns related to incarcerated firefighters were discussed. Sources of vulnerability for agricultural workers included the seasonal nature of the work which limits opportunities for cancelling or rescheduling work, the limited benefits and job security of many agricultural jobs which may prevent workers from expressing concern about smoke exposure or seeking medical treatment for smoke-related health issues, the inability of workers to forego a paycheck for workers receiving low wages, and the limited availability of culturally and linguistically appropriate smoke-related resources for migrant workers. Agricultural workers who own livestock were also recognized as facing unique challenges due to wildfire smoke concerns, including more limited ability to relocate, greater need to spend time outdoors to care for livestock, and concern for the risks of smoke exposure to the livestock themselves.
Table 1: Core worker-specific considerations

<table>
<thead>
<tr>
<th>Worker-Specific Considerations</th>
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<tbody>
<tr>
<td><strong>High-Risk Groups</strong></td>
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<tr>
<td>• Construction, agricultural workers identified as priority occupations</td>
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<tr>
<td>• Firefighting, tourism/outdoor recreation, landscaping also experience high exposure</td>
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<tr>
<td>• Indoor workers in buildings without air conditioning will be exposed</td>
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<td>• Compounding threat: highest smoke exposure is likely to be experienced by the most vulnerable workers (non-unionized, no health insurance, seasonal and low-wage work)</td>
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<tr>
<td><strong>Communication</strong></td>
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<tr>
<td>• Specific messages needed for workers</td>
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<td>• Employers must be supportive of the messages provided for workers (e.g. providing on-the-job training related to smoke risk reduction, emphasizing support for recommended risk)</td>
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<td>• reduction strategies, and assuring workers that they will not be penalized for implementing smoke risk reduction strategies</td>
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<tr>
<td>• Messages should highlight actionable risk reduction strategies</td>
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<tr>
<td>• Need to identify appropriate messengers &amp; format for outreach to workers discussed</td>
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<tr>
<td><strong>Interventions</strong></td>
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<tr>
<td>• Some Washington workplaces have already developed and implemented smoke safety workplace policy, including paid work cancellations on high-risk days and worksite discussions and trainings on smoke risk reduction strategies</td>
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<tr>
<td>• Additional evidence needed to inform exposure limits in regulations in recognition of realities of exposure</td>
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<tr>
<td>• Uncertainty around appropriate use of masks for workplace risk reduction discussed</td>
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<tr>
<td><strong>Information Needs</strong></td>
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<tr>
<td>• Information on holistic health risks associated with occupational smoke exposure</td>
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<tr>
<td>• Data on the effectiveness of potential workplace interventions (e.g. providing masks, shifting timing of outdoor work) on exposure and risk reduction</td>
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**Communication**

A need for specific wildfire smoke messages for employers and employees was heavily emphasized by participants. Participants felt that occupationally-focused messages should highlight actionable controls for workers, explain the risk level for specific outdoor activities, and clearly communicate the effectiveness and appropriate use of personal protective equipment (i.e., N95 masks). Participants expressed that messages needed to capture the risk of exposure and put it in the perspective of anticipated health outcomes. Participants reported that current messaging scares people with vague language around ‘unhealthy’ levels of smoke exposure, and that message framing should be reconsidered and made more specific and actionable.

Communication strategies highlighted by participants included communicating through trusted sources (e.g., promotoras, unions, and local community-based organizations). Worksite communications such as health and safety meetings and ‘toolbox talks’ were discussed as a promising strategy, and participants emphasized that employer support for wildfire smoke risk
reduction was critical to ensuring that workers could act on recommended strategies. Specific communications tools for workers discussed included: Labor and Industries (L&I) information sheets on how to use masks effectively; a worker-specific version of the Washington smoke blog; flyers at local stores and businesses; radio, print, and social media messages; comics; and highway/transportation message boards. One participant recommended that interviews with the message's target population be used to inform the development of communication materials.

Challenges to smoke risk communication for workers included public health professionals' concern that it is not the role of their organization to communicate to workers. Participants noted there was insufficient data to inform messages. Also, there was a perception that employers are not currently well-advised on how to message to their workers around wildfire smoke, and efforts to recruit employers to communicate smoke risks and protective strategies were recommended. A lack of trust among workers in researchers and government agencies as traditional public health messengers was expressed. It was noted that certain government agencies may have limited access to certain communication methods, including social media.

Interventions

Individual companies' policies for addressing occupational smoke exposure were shared. One example was shared of a workplace being closed completely during an intense smoke period to protect workers, who received pay for the missed days. Another example described a workplace that discussed smoke issues at a health and safety meeting and expressed support for workers taking breaks if they felt the smoke was affecting their health. L&I policy for smoke-related workers comp was discussed; there are currently no policies that dictate that wildfire smoke claims will be accepted. Participants also noted that there are parameters in the Washington Administrative Code for voluntary use of masks, which a participant felt was easier for employers to understand and comply with.

Participants felt that exposure levels in occupational health and safety regulations need to be updated, but also emphasized that the economic impacts of regulations should be considered in decision-making, in addition to health effects. NIOSH, NIH and Washington L&I were mentioned as primarily involved with funding and supporting efforts to understand and reduce occupational smoke exposure. DOH expressed an interest in developing guidelines for reducing smoke exposure, potentially including shifting the timing of work. Recommendations for developing occupational policy included working collaboratively with all relevant stakeholders, shifting non-essential work timing to minimize exposures, identifying and modifying work responsibilities for workers with smoke sensitivity, employers providing masks to workers and training on appropriate use, directing field staff to spend time in an air conditioned vehicle, ensure that employers and employees have clear and consistent information on health risks, create a sick leave fund for missed work for hourly workers, and providing home air filters to employees. For indoor workers, policies addressing building maintenance, building design, ventilation maintenance, changing filters, and inspections during times of smoke events were suggested.
Policy challenges included the assumption of an eight-hour workday when determining the limit for occupational smoke exposure, which is not realistic given the continued smoke exposure workers experience outside of working hours. Participants felt that more clarity is needed on when occupational regulations apply versus when environmental regulations apply. Participants described public expectations of the Division of Occupational Safety and Health (DOSH) (as part of L&I) to shut down workplaces during severe smoke, without recognizing the limits to DOSH regulatory authority. Participants described difficulties using respirators and personal protective equipment (PPE) during smoke events. Workers who don't traditionally wear respiratory protection may not be trained to wear masks effectively. Participants discussed the use of masks for workers with facial hair and felt that clearer guidelines were needed for that group. Participants also recognized that smaller workplaces or businesses may not be able to afford expensive smoke risk reduction interventions such as installing air conditioning. Participants noted that nearly all workplaces will be resistant to closures due to smoke conditions.

**Information Needs**
Better estimates of the health effects of smoke exposure for outdoor workers is needed, as well as a more holistic assessment of health impacts. Evaluation of the effectiveness of mask usage on reducing smoke exposure and minimizing health outcomes was suggested, as well as strategies to effectively reduce indoor smoke exposure. Concern over carbon dioxide build-up in vehicles used as on-site clean air shelters was raised. Participants expressed concern that identifying at-risk workers for smoke-related health effects would lead to workplace discrimination, and that this should be considered in associated research endeavors.

**Community-Level Considerations**

### High-Risk Groups
Participants recognized that socioeconomic status, age, housing, health status, geography, culture and language, and outdoor activities influence an individual's smoke exposure and health risks. Individuals without health insurance, or experiencing lower incomes or homelessness were seen as facing greater risks due to limited access to wildfire smoke risk information or limited capacity to act to reduce smoke-related health risks. Infants and children, older adults, pregnant women, individuals with cardiovascular and respiratory disease, visual and hearing impairments, and mental and physical disabilities were identified as sensitive, or potentially sensitive groups. Participants also noted that social isolation, co-exposures to air pollution due to neighborhood air quality or smoking status, outdoor recreation activities, active transportation, and cultural practices may increase vulnerability to smoke-related health effects.

Important differences were noted between rural and urban communities in terms of smoke-related health risks. Rural areas were noted as less likely to have air-conditioned indoor spaces, more limited information access, greater economic dependence on tourism and agriculture, and fewer and more spread-out services such as community buildings and healthcare providers. Rural communities also experience smoke-related air quality hazards in winter due to wood-burning
stove use, resulting in year-round exposure. In urban areas, low-income communities and communities of color are exposed to worse air quality than wealthier and whiter communities, so smoke exposure would add to existing air quality-related environmental injustices. Athletes and active commuters such as cyclists experience high smoke exposure due to increased time outside and higher respiratory rates. Children in summer camp or daycare may be more exposed as well, which was identified as a concern for both rural and urban communities. Individuals with limited English proficiency were also identified as at greater risk in rural and urban areas. While risks for tourists were discussed in both urban and rural areas, these concerns were heavily emphasized for rural areas. Individuals experiencing homelessness were identified as at greater risk in urban and rural communities, but strategies to reduce risk for homeless individuals were noted to differ between urban and rural communities.

Communication
Participants discussed messaging strategies to educate target populations about wildfire smoke health risks and risk reduction strategies. Potential messaging formats included infographics and images, videos, radio, social media, community message boards, town hall events, and ethnic media sources. Messaging strategies included providing year-round or advance risk messaging, clarifying the meaning of the different air quality measures (AQI and WAQA), ensuring communications use plain language and are available in multiple language targeting messages to specific groups, and communicating through caregivers. Distinct communications strategies were recommended for early on in smoke events and later in the smoke season. Participants heavily emphasized the importance of communicating through trusted community partners; some also called for incorporating community input on messages and approaching community partners with humility. Suggestions for communications partnerships included local government (fire, EMS, health department), community groups, health care providers, social networks, workplaces, schools, and caregivers.

Challenges for wildfire smoke risk communication for a public audience include state agencies' lack of access to vulnerable populations, limited technology and internet access for some communities, message fatigue during long events, and public skepticism of wildfire smoke-related health risks. High public risk tolerance for smoke, and risky behavior such as smoking during poor air quality were also pointed to as communications challenges. Participants described a lack of trust in rural communities in traditional source of risk communication messengers, further supporting the importance of engaging trusted local organizations in messaging and educational efforts.
### Table 2: Core community-level considerations

<table>
<thead>
<tr>
<th>Community-Level Considerations</th>
<th>High-Risk Groups</th>
<th>Communication</th>
<th>Interventions</th>
<th>Information Needs</th>
</tr>
</thead>
</table>
| **High-Risk Groups**          | • Factors impacting smoke exposure or smoke-related health risks include socioeconomic status, housing condition, age, health status, geography, culture and language  
• Higher risk among children & older adults  
• Higher risk from homelessness, low income, and lack of health insurance  
• Many common high-risk groups for urban and rural populations  
• Rural areas: less likely to have air-conditioned spaces, more difficulty accessing community spaces, more responsibilities requiring time outdoors, economy more dependent on outdoor activities  
• Urban areas have more active commuters | **Communication** | • Need for better communication about differences in state and federal air quality indices (i.e. WAQA vs. AQI)  
• Communication through trusted messengers is crucial (e.g., local government partners, social networks, schools, caregivers)  
• Messaging is necessary both in advance of smoke exposure and during smoke events  
• Challenges gaining access to higher risk populations to deliver messages identified  
• Challenge of lack of trust in traditional risk communication sources (researchers and government) identified | • Provide clear air centers; barriers to accessing clean air shelters were also discussed  
• Reschedule events  
• Strategies for improving overall outdoor air quality  
• Subsidize or provide HEPA filters or air conditioners  
• Challenges identified to their implementation include high financial burden of  
• exposure reduction strategies and competing priorities for public health actions. | • Detailed assessment of exposure for specific activities  
• Clearer understanding of severity of risk for higher-risk groups  
• Better mapping and projections of smoke conditions  
• Assessment of holistic health and economic impacts of potential policies to reduce smoke exposures  
• Assessment of effectiveness of messaging strategies |

### Interventions

Participants suggested providing clean air centers, involving communities and healthcare workers in air quality monitoring, rescheduling events to months with lower smoke exposure, subsidizing or providing air conditioners or HEPA filters, providing guidelines for situation-specific decisions, moving facilities that serve sensitive groups (such as senior centers), developing a certification system for clean air spaces, and providing funding for air filtration in public spaces (such as schools). Strategies suggested to improve overall air quality included improving urban design and
access to greenspace, improving forest management practices, incentivizing retrofits to reduce air pollution, and banning and enforcing bans of outdoor and agricultural burning. Smoke insurance and business insurance were discussed as elements of smoke preparedness. Participants pointed to FEMA, the proposed Washington carbon tax, and local public health funds as potential sources of funding of wildfire smoke policies, but recognized that funds varied between counties and suggested sharing public health resources between urban and rural counties.

Challenges to risk reduction strategies for the general public included competing health threats that may take priority for attention and resources (especially for high risk populations such as homeless individuals), limited feasible options to reduce exposure, difficulty in reducing indoor air smoke exposure due to ‘leaky’ buildings, and the high financial burden of recommended interventions such as HEPA filters. Participants also felt that accessing clean air shelters was challenging in rural communities due to the long travel distances required, and responsibilities for home maintenance, livestock, and pets may limit rural communities’ capacity to avoid continued exposure to hazardous outdoor air.

**Information Needs**

More detailed information on exposures for specific activities, risks for specific populations, and effectiveness of specific interventions was suggested. Research on holistic health and economic impacts of wildfire smoke exposure and management strategies were recommended. Participants felt more information of effectiveness of messaging strategies and public understanding of wildfire smoke risk was needed. Participants also called for better mapping and projections of smoke conditions.

**Discussion & Next Steps**

This report summarizes high-risk groups, risk communication, and potential interventions for wildfire smoke exposure and offers an up-to-date summary of academic and practitioner concerns about this important public health threat for workers and the general public. Practitioners may find this report useful for its lessons learned from previous wildfire smoke seasons and its summary of the scientific and policy context of wildfire smoke. Researchers and funders are encouraged to familiarize themselves with this report’s content on current activities underway and information needs identified by policy and practice stakeholders. This will allow researchers and funders to develop an understanding of priority research questions for future studies, as well as facilitating future research-practice collaborations and policy-relevant research. Overall, the authors hope that the findings outlined in this report will galvanize stakeholders to develop an evidence-based approach for wildfire smoke risk communication and risk reduction interventions to protect communities and workers across Washington state from the growing threat of wildfire smoke.