

Ecosystem Workforce Program

WORKING PAPER NO. 113

Summer 2022

# Perceptions of Air Quality and Smoke in Oakridge, Oregon

Results from pilot interviews with key informants

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## Acknowledgments

This project was conducted in partnership with Oakridge Air, a community-level program funded by the US Environmental Protection Agency and Lane Regional Air Protection Agency, that seeks to mitigate health threats from smoke-related air quality in Oakridge, Oregon.

Key partners on this pilot project included Benjamin Clark (University of Oregon Institute for Policy Research and Engagement), Justin Overdeest (Good Company), and Travis Knudsen (Lane Regional Air Protection Agency).

Funding for this project was provided by a University of Oregon Resilience Initiative seed funding grant.

## About the Ecosystem Workforce Program

The Ecosystem Workforce Program is a bi-institutional program of University of Oregon's Institute for a Resilient Organizations, Communities, and Environment and the College of Forestry at Oregon State University. We conduct applied social science research and extension services at the interface of people and natural resources. Our publications aim to inform policy makers and practitioners, and contribute to scholarly and practical discourse.



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## Introduction

This report summarizes the results of the Oakridge Air community key informant (or community leader) interviews on air quality and smoke. This research was conducted as a pilot project to discern community understanding, perceptions, and awareness of air quality and smoke issues in the Oregon communities of Oakridge and Westfir, and to inform a survey to be distributed to households in Oakridge-Westfir for further study. Oakridge has historically been ranked among the top 20 communities in the United States with the worst air quality due to high concentrations of particulate matter (PM<sub>2.5</sub>) from home wood heating (wood stove) and wildfire smoke. Due to the steep topography of the area and Oakridge's location in a basin-shaped valley bottom, the community is prone to atmospheric inversions that trap seasonal wildfire smoke and wintertime home heating woodsmoke in the community.

### Oakridge Air

The City of Oakridge and community stakeholders have worked together over the past two decades to improve air quality and meet the Environmental Protection Agency (EPA) PM<sub>2.5</sub> threshold. In 2019, the EPA awarded a \$4.9 million Targeted Airshed Grant to the Lane Regional Air Protection Agency (LRAPA) on behalf of the Oakridge and Westfir communities. This grant provided funding to formally launch Oakridge Air, a project to establish the infrastructure and programs to sustain smoke reductions into the future. Oakridge Air is managed by Good Company and South Willamette Solutions. In 2022, the EPA awarded an additional \$2.7 million for the program, thus extending it through 2027. The Oakridge Air program is designed with the expressed goal to permanently reduce and sustain the average 24-hour PM<sub>2.5</sub> concentration below 30 µg/m<sup>3</sup>. The program uses a combination of strategies to reduce air quality impacts to the community's health, including home heating interventions (weatherization, ductless heat pumps, certified wood stoves), seasonal firewood program, air monitoring, code enforcement, and school and community education.

### Research team

This project was led by a University of Oregon (UO) research team in collaboration with Oakridge Air. Following initiation of the Oakridge Air program in 2019, project partners recruited the UO research team's support to help inform on the effectiveness of the program elements, outreach, and communications aimed at increasing awareness, sharing resources, and shifting public perceptions about air quality and smoke in the community.

The UO research team and Oakridge Air designed the interview protocol through a collaborative process. Interviews and analyses were conducted by Grace Kaplowitz, with support from Alison Deak, Michael Coughlan, and Heidi Huber-Stearns. Results from this research will be used to inform a survey that will be distributed to households in Oakridge as part of additional communication practices and lived experiences research being conducted by UO on behalf of Oakridge Air.

## Methods

### Data collection

Data were collected through one-on-one interviews conducted between April and June of 2022. The interview protocol was established by the research team following Institutional Review Board (IRB) guidelines. The research team worked with a list of questions established in collaboration with Oakridge Air to gather information on community perceptions of air quality and smoke. The questions were additionally informed by previous smoke research conducted by UO\*.

To obtain a broad range of information from a relatively small number of interviews, the sampling strategy for this pilot project targeted community leaders and members of the community active in local organizations. A list of prospective interviewees was compiled by Oakridge Air and recruitment was conducted via email and phone to 33 prospective interviewees over the course of the interview period. Several interviewees were additionally recruited through referral from other interviewees. Prospective interviewees were contacted no more than three times to solicit participation. Per IRB protocol, all interviewees were given the Details of Research Participation (Appendix A) document and informed that participation was entirely voluntary. Interviewees were offered \$20 gift cards to local businesses as an incentive for participating in the research project.

Interviewees were given the option to meet in person, on Zoom, or over the phone. Given on-going risk posed by COVID-19, the majority of interviews were conducted on Zoom (n=11), or over the phone (n=8), with only a few conducted in person (n=3). The majority (n=20) of interviews were recorded using Zoom's recording feature or a digital recording device. Detailed notes were taken during each interview and the notes and recordings were re-examined and listened to for accuracy by another member of the research team. In addition to being interviewed, a structured demographics questionnaire was also administered to each participant.

The interview questions were semi-structured and focused on interviewees' overall awareness and understanding of air quality and smoke issues in the community. Questions asked about specific smoke and health-related topics, access to air quality information, resources and assistance, and communicating within the community. The interview protocol document is provided in Appendix B and the demographic questionnaire is available in Appendix C.

### Analysis

Interviews were coded in Microsoft Excel using an inductive coding structure to identify emergent themes within responses to each question. Inter-coder agreement was accomplished by meeting frequently to discuss identified themes and iteratively collapse codes into larger themes when appropriate. Themes identified within responses were summed to understand the proportion of responses reflecting each identified code.

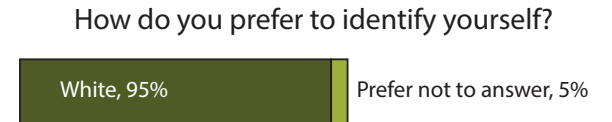
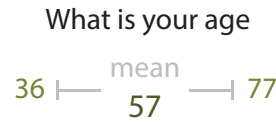
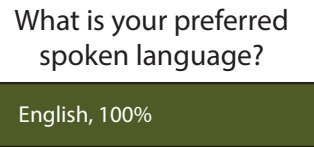
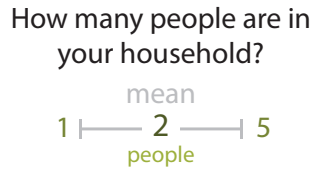
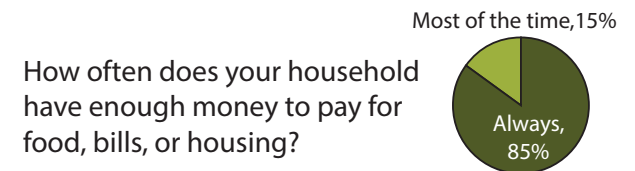
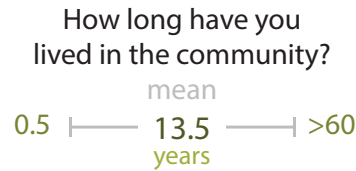
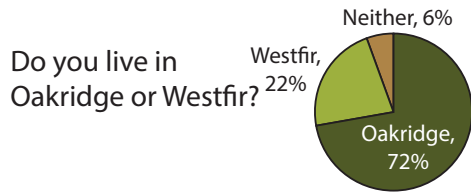
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\* Coughlan, M. R., Huber-Stearns, H., Clark, B., & Deak, A. (2020). Oregon Wildfire Smoke Communications and Impacts: An Evaluation of the 2020 Wildfire Season. Ecosystem Workforce Program Working Paper 111. Available at: <https://scholarsbank.uoregon.edu/xmlui/handle/1794/27179>

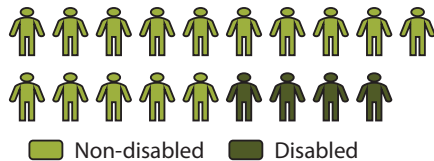
## Results

### Demographics

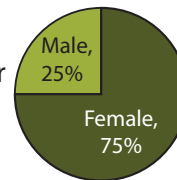
A total of 22 community leaders in the Oakridge-Westfir area were interviewed and 20 interviewees completed the demographics questionnaire. Results are shown below with descriptive statistics based on the number of respondents that answered each question. See Appendix D for a written summary of demographics data.



Please check any of the following [disabilities] that apply to you.



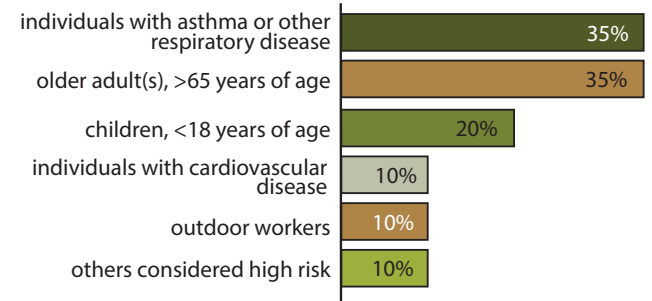
What is your gender identity?



Regarding your home, do you....?



Are any members of these [vulnerable] populations a part of your household?



## Interview results

The interview results are grouped into the following sections

- Community context
- Air quality literacy
- Effective communication sources
- Smoke related air quality concerns and behaviors
- Community preparedness for smoke events
- Awareness of the Oakridge Air Program
- Future interview questions

Responses were not mutually exclusive for open-ended questions. Therefore, some interviewee's responses are included in multiple response categories throughout the results.

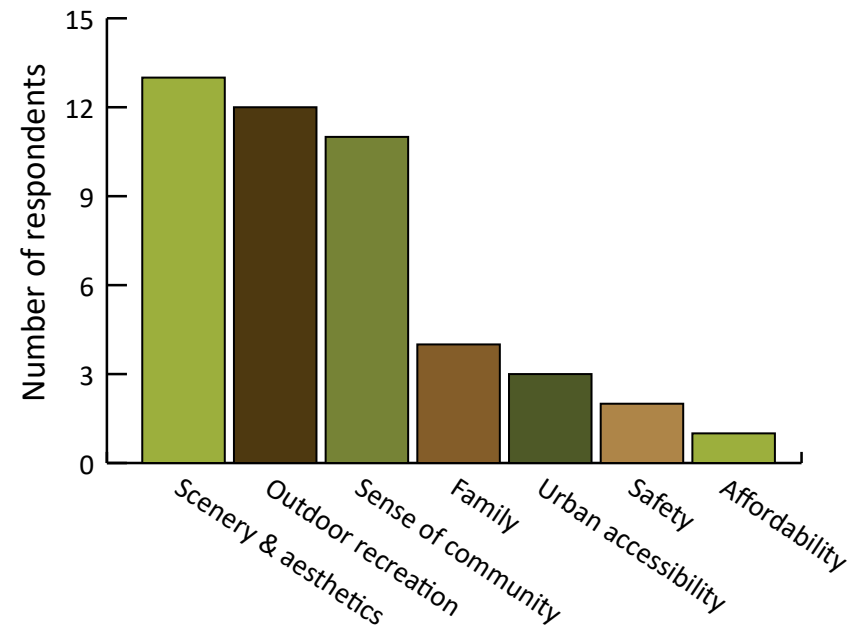
Throughout the report, we present results by highlighting the question asked followed by the question number (Q) and number (n) of interviewees that answered the question in parentheses.

### Community context

**Could you tell me briefly about your role(s) in the Oakridge-Westfir community? (Q 1; n=22)** The majority of interviewees identified themselves as volunteers or board members of local community-based organizations (73%; n=16). Twenty-seven percent of interviewees also identified themselves as business owners (n=6). **What makes Oakridge-Westfir unique or special to you? (Q 2; n=22)** Respon-

dents overwhelmingly described the scenery and aesthetics (59%; n=13), followed by outdoor recreation and accessibility (55%; n=12), a sense of community (50%; n=11), family (18%; n=4), and urban accessibility (13.5%; n=3). Safety (9%; n=2) and affordability (4.5%; n=1) were also mentioned by interviewees (Figure 1).

**Figure 1** What makes Oakridge-Westfir unique or special to you?



**What do you believe is most important to this community? (Q 2.1; n=22)**

Responses varied widely with community (36%; n=8), public safety (23%; n=5), and access to resources and social services (18%; n=4) as the most common answers (Figure 2). Other answers included: outdoor recreation (14%; n=3), scenery/aesthetics (14%; n=3), economic growth (14%; n=3), affordability (10%; n=2), livability (10%; n=2), air quality (5%; n=1), neighborliness (5%; n=1), resistance to change (5%; n=1), independence and self-sufficiency (5%; n=1), and homelessness (5%; n=1).

**What are your biggest concerns for the community in the next five years? (Q 2.2; n=21)**

The most common concerns were availability of general social services such as education and healthcare (52%; n=11), employment and the economy (52%; n=11), and housing (38%; n=8; Figure 3). Many interviewees also described emergency services and public safety (24%; n=5) and government accountability (19%; n=4). On the topic of smoke and environmental quality, 19% mentioned non-smoke related wildfire risks (n=4) and 14% mentioned air or water quality (n=3). Only one respondent specifically mentioned smoke.

Figure 2 What do you believe is most important to this community?



Figure 3 What are your biggest concerns for the community in the next five year?





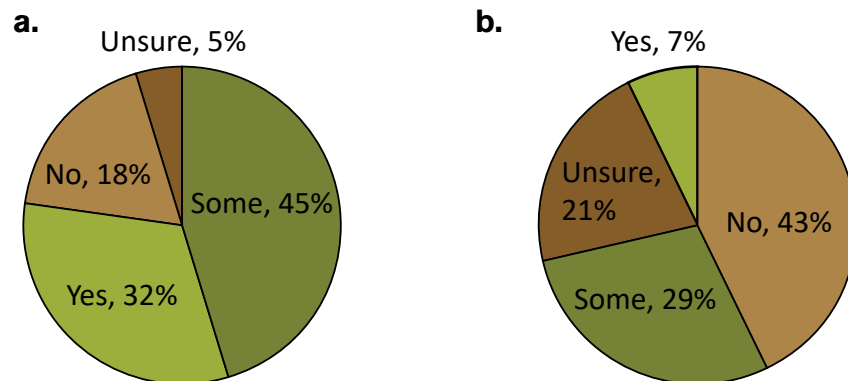
## Air quality literacy

**Do you think community members know where to find and how to understand air quality information (Q 5)?** For analysis we separated this question into two parts:

- 1. Do community members know where to find air quality information? (n=22)** 45% said that some but not all people know where to find air quality information (n=10), 32% said yes (n=7), 18% said no (n=4), and one person was unsure.
- 2. Do community members understand air quality information (n=14)?** 43% of interviewees said they did not understand air quality information (n=6), 29% said some people understand (n=4), 21% were unsure (n=3), and one person said yes (Figure 4).

One interviewee explained, “People know where to find [air quality information, but I’m] not sure about understanding the information. They know how to understand it in simple terms, like ‘healthy’ or ‘unhealthy.’”

**Figure 4 Do community members know (a) where to find and (b) how to understand air quality information?**



Another interviewee said, “People knew where to look to find the numbers [on air quality]. People in the community have been good about directing them to resources to understand concepts such as particulate count.” However, the interviewee went on to explain that they did not believe that people knew how to understand what the air quality index values meant, especially when they were high.

**Have you heard of anyone struggling to find or understand air quality information? (Q 5.1; n=20)** While the majority of respondents responded no (75%; n=15) and one interviewee was unsure, four people answered yes (20%) and gave the following examples:

- People looking for information on the Facebook chat forum.
- People struggling to find burn permit information and firewood information as well as information about dumping versus burning and debris dumping locations.
- Hearing conversations and misinformation from people, such as having to buy their own air filters, that “[air quality] is why the industrial park never had anything,” and “I don’t know what the big deal with smoke is.”
- Visitors and outdoor recreation business customers who didn’t understand AQI and the health implications.

In response to another question, an interviewee said “a lot of people don’t know what PM (particulate matter) 2.5 or PM10 is or what it means” and the community would be better served if communications were not as technical.

### Effective communication sources

**What have you found to be effective ways of communicating? (Q 5.2; n=21)**

Respondents' answers varied; however, the most common response was social media (76%; n=16), with many people specifically mentioning Facebook and Facebook groups. This was followed by word of mouth (48%; n=10), community events (38%; n=8), and flyers (29%; n=6). The remaining responses are included in Figure 5.

**Figure 5** What have you found to be effective ways of communicating?



**What sources of information does the community rely on? (Q 5.3; n=16)** The most common responses were the online newspaper (38%; n=6), of which several people mentioned by name (the Highway 58 Herald), and word of mouth (38%; n=6). Other responses are shown in Figure 6.

**Figure 6** What sources of information does the community rely on?



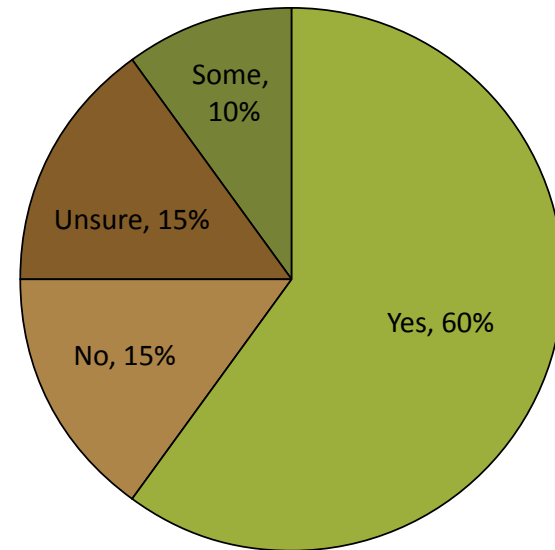
### Smoke related air quality concerns and behaviors

**Do you think smoke effects people's health? (Q 6; n=21)** All respondents said that they believed smoke does affect people's health.

**Do you think the broader community is aware of the negative health impacts caused by poor air quality and smoke? (Q 6.1; n=20)** Most interviewees thought that the community was aware (60%; n=12). The remaining 40% answered with a mix of "no" (n=3; 15%), "unsure" (n=3; 15%), and "some" (n=2; 10%).

One interviewee explained, "people are busy living their lives. Unless they see the smoke they are breathing, they don't stop to think about it."

**Figure 7** Do you think the broader community is aware of the negative health impacts caused by smoke?



**Do you worry about negative health impacts from the air you breathe in Oakridge? (Q 6.2; n=21) Do you do anything differently because of this? (Q 6.2.1; n=20)** The majority responded that they were worried about it (71%; n=15). The remaining 29% replied that they were not concerned (n=6). Nineteen respondents answered yes to the follow-up question (95%) and gave the following examples:

- Staying indoors and abstaining from outdoor activities
- Creating a clean air space by closing windows and using air filters or purifier
- Checking the Air Quality Index
- Wearing a face mask or respirator
- Using an inhaler
- Not burning on red days

**Do you have any concerns about air quality living in Oakridge-Westfir? (Q 3; n=21)** Of those who responded, the majority (86%; n=18) were concerned.

In response to this question, one interviewee said “I see chimneys with black smoke coming out of them, and it just makes me shudder because I know we don’t have to have that... Learning what you need to do to make that not be what happens, for me, that has been the answer. Because I know, I can heat my house with wood and burn clean.”

Another interviewee said, “It’s depressing... it’s definitely affecting people’s mental health. I think about covid– and through all this time, we’ve been able to manage ourselves by going outside. Whether it’s just riding from the house, going for a walk from the house... But when the air quality is over unhealthy... we’re waking up and checking the AQI with the daily temperature. I feel trapped. You can’t take care of yourself. You can’t open the windows because you can’t get that fresh air. It’s almost as if the air itself is trying to kill you.”

**Do you think the effects of smoke on air quality is a big concern for the community at large? (n=21)** Most interviewees agreed that the effects of smoke on air quality was a big concern (n=15; 71%), 19% didn’t think it was a big concern (n=4), and 10% though it was a concern for some.

**Does poor air quality or smoke impact the behaviors or actions of your friends, family, or neighbors? (Q 6.2.2; n=21)** Most interviewees responded that they thought it did (71%; n=15). An additional 24% said it did not (n=5), and one respondent said it impacted some community members’ behaviors or actions.

**Can you tell me about a time when the community took action or made changes to their behaviors in response to air quality or smoke concerns? (Q 7.3; n=18)** Many interviewees described actions people took during wildfire smoke events, especially the 2020 Labor Day Fires and 2021 Middle Fork Complex (n=15). Specific actions/behavior changes interviewees described in response to the wildfires included:

- Staying indoors
- Stocking up on inhalers
- Preparing for evacuation
- Canceling community events
- Local businesses shutting down or reducing their hours

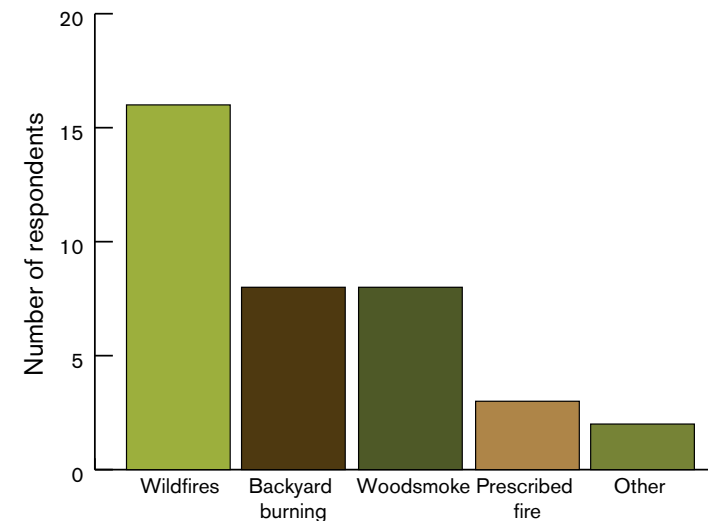
**How often do you think your community is exposed to unhealthy air quality? (Q 6.3; n=21) What time(s) of year do you think about or worry about air quality? (Q 6.4; n=21)** The objective of these questions was to understand what sources of smoke caused community members to be concerned about air quality without influencing their responses by listing specific smoke types (which we did in a follow-up question).

When asked how often interviewees thought the community was exposed to unhealthy air (n=21), responses ranged from very few days or several months to year-round. Of interviewees that specified a range of days or months, five said between 50 and 100 days per year (24%), three said less than 50 days per year (14%), and one said nine to 11 months per year. Additionally, four interviewees gave seasons during which they thought the community was exposed to smoke, two said “a lot,” and two interviewees said very few days or not often. Other responses included year round and during smoke events.

When asked what times of year they were concerned about smoke, most individuals mentioned “summer” (n=12), “winter” (n=10), or “fire season” (n=9), with many respondents mentioning both summer or fire season and winter (n=9). Other times of year respondents described that they thought or worried about air quality included fall (n=2), wood burning season (n=1), field burning season (n=1), and year-round (n=1).

**What types of smoke or poor air quality worry you the most? (Q 6.5; n=18)** Interviewees overwhelmingly reported wildfires (89%; n=16), followed by backyard burning 44% (n=8), woodsmoke (44%; n=8), and prescribed fire (16%; n=3). Other responses included non-smoke related air quality concerns such as pesticides and exhaust (11%; n=2; Figure 8).

**Figure 8** What types of smoke or poor air quality worry you most?



## Community preparedness for smoke events

**Do you feel prepared for smoke events? Why or how? (Q 7; n=20)** The majority responded that they did feel prepared (80%; n=16) while the remaining 20% reported that they did not (n=4). Reasons people felt prepared included having:

- An air filter or purifier in their home and/or place of business (n=13)
- Face masks and/or respirators (n=4)
- The ability to evacuate if needed (n=3)
- An evacuation plan (n=2)
- Well sealed homes (n=2)
- Heat pumps in their home (n=1)
- Access to information (n=1)
- Breathing medications (n=1)

**Do you think the community feels prepared for smoke events? Why or how? (Q 7.1; n=19)** Most respondents said they did not believe that the community felt prepared (47%; n=9) and 21% said that some but not all community members were (n=4). The remaining 32% were split answering that the community did feel prepared (16%; n=3) or they were unsure (16%; n=3). Responses to this question include the following:

- People felt like the things that made them feel safe or prepared (such as a well sealed home, air filtration, and the ability to evacuate if needed) weren't accessible to the community due to income barriers
- Many people mentioned air purifiers—both that more people had them which helps with preparedness and that there is still additional need for purifiers in the community
- An interviewee said, “Last year was a wakeup call” regarding how important wildfire and smoke preparedness is.

**Are there tools, resources, or information you wish you had to be more prepared? (Q 7.2; n=22)** Three people responded “no” (n= 14%). The remaining 66% of interviewees responses varied considerably and included:

### *Resources for individuals:*

- Continuation of the air purifier program (n=5)
- KN95 masks and/or respirators with information about how to use them (n=3)
- Options for junk/debris disposal other than burning
- Improving individual home insulation and heating systems
- Emergency preparedness resources and training (n=3)

### *Resources for organizations:*

- Funding for businesses that have to close during smoke events
- Cleaner air shelters specifically for senior populations
- Additional purifiers at local businesses and community gathering spaces

### *Community-level strategies and information sharing:*

- Community meetings on emergency preparedness topics (beyond just smoke)
- A wildfire resilience strategy
- A wider variety of information sources, such as a readerboard, printed newspaper, webpage, or text alerts
- Outreach and education about AQI sensors and PurpleAir

### *Individual preparedness information about:*

- The health implications of smoke
- DIY filters with locally available instructions
- How to maintain air purifiers

### Awareness of the Oakridge Air Program

**Are you aware of any efforts to improve air quality in your community? (Q 8; n=20)** Ninety-five percent (n=19) responded affirmatively.

**Have you heard of Oakridge Air and their different program activities? (Q 9; n=19)** All respondents said that they were familiar and most respondents said they were aware of the different program activities (68%; n=13). Program activities that respondents specifically mentioned included: outreach, the air purifier program, wildfire safety night, the community firewood program, and home heating upgrades.

**Do you know if your family, friends, and neighbors are familiar with the program? (Q 9.1; n=19)** 53% (n=10) thought that they were and the remainder said “some” (26%; n=5) or were unsure (21%; n=4). Notably, several people felt they didn’t know how to answer the question and felt like their friends and family were aware but were unsure about the broader community.

**Are there reasons you have or have not participated [in the Oakridge Air Program] in the past? (Q 9.6.1; n=20)** Only a few respondents mentioned specific reasons or barriers which included the following:

- They were busy or had other issues taking up their time, such as the COVID-19 pandemic.
- They didn’t know how to participate or didn’t think it applied to them because they:
  - already had air purifiers and/or wood stove or ductless heat pump upgrades
  - lacked information or awareness of how to participate (other than wood stove changeouts and purifiers program).
  - thought they didn’t qualify due to not being low-income.
  - did not know where the office was.
  - were not homeowners and had “less incentive” to do upgrades.

**How do you think Oakridge Air is perceived by the community? Are people aware of and receptive to their efforts? (Q 9.3; n=19)** Interviewees generally thought that the community was aware and receptive, but were hesitant to respond for the community at large.

**Do you believe Oakridge Air changed community members’ awareness and knowledge about air quality and smoke? (Q 9.4; n=20)** The majority responded affirmatively 85% (n=17). Two people said no (10%) and another was unsure. When asked how awareness and knowledge had been changed, interviewees specifically commented on the following:

- How the tone of Oakridge Air is a good fit for the community (e.g. messaging saying “be aware of woodstoves” rather than “stoves are bad” and giving people the option to upgrade their stoves).
- How the program has helped connect the dots from wildfire smoke to all other types of burning and helped people understand LRAPAs role in monitoring air quality.
- The difference between tangible visible wildfire smoke and everyday smoke from woodstoves.

One interviewee also commented that “the air purifier distribution let people know there are things they can do to help mitigate the impacts of smoke on themselves and their families” and the firewood program providing dry firewood has done the same.

**How did you first hear about Oakridge Air? (Q 9.2; n=20)** The most common response was word-of-mouth 45% (n=9). Other responses included mailings (n=3), community meetings (n=2), social media (n=2), websites (n=1), flyers (n=1), enforcement (n=1), and one respondent did not recall (Figure 9).

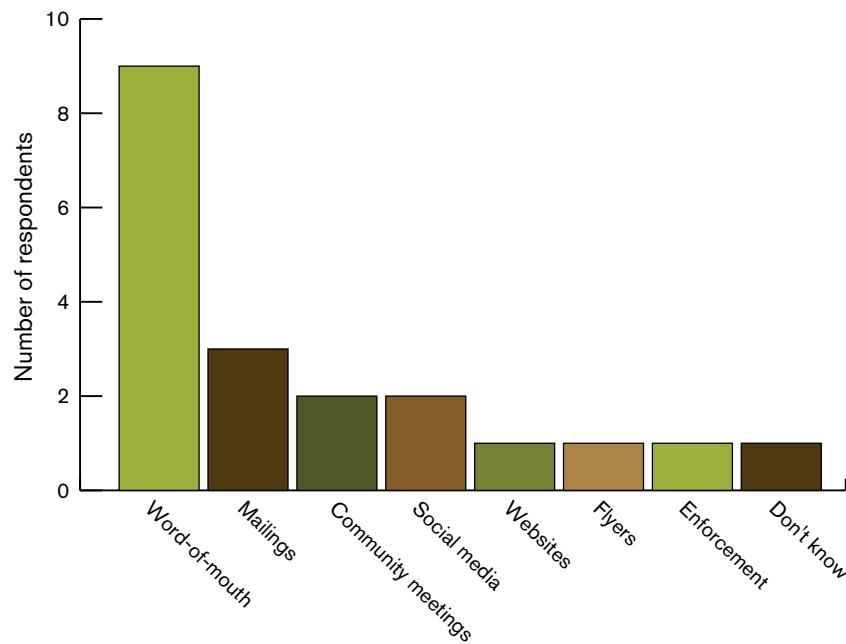
One interviewee added, “It gives me hope that people can work together to achieve goals [like the Oakridge Air program] for more than just a small entity. You know, it’s for the whole community, and that’s impressive.”

### Future interview questions

**Is there anything we should have asked but didn’t? (Q 10.1)** The following interview questions were suggested by participants:

- Have you participated in the program?
- What type of home heating sources do you have/use?
- Questions around prescribed fire (use questions as educational opportunity to share information about prescribed fire)
- Where do you get your information?
- What is the best way to communicate with you as an individual?
- Why do we have the air quality problem that we do?

**Figure 9** How did you first hear about Oakridge Air?



## Key findings

### Air quality literacy

The majority of interviewees thought that at least some community members knew where to find air quality information. They were less sure whether community members knew how to understand it and many reported that they thought they did not. Three out of four interviewees had not heard of anyone struggling to find or understand air quality information.

### Effective communication sources

Social media was reported as the most effective way of communicating within Oakridge-Westfir, followed by word-of-mouth and community events. Many interviewees specifically noted Facebook and Facebook groups as important sources of information in the community. When asked what sources of information the community relies upon, the most common responses were the online newspaper and word-of-mouth. Word-of-mouth was also commonly reported by interviewees as how they first heard about Oakridge Air.

### Smoke related air quality concerns and behaviors

Most respondents were concerned about air quality living in Oakridge-Westfir. Although some interviewees said that they weren't concerned about air quality, when asked whether they personally did anything differently due to concerns about the negative health impacts from smoke, nearly all answered yes. Most respondents also thought the effects of smoke on air quality was a big concern for the community at large. However, fewer interviewees thought that the broader community was aware of negative health impacts caused by smoke. Three-quarters of respondents said that concern about air quality impacted the behaviors of their friends, family members, or neighbors. Examples of actions the community took or changes they made to their behaviors in response to air quality or smoke concerns included staying indoors, stocking up on inhalers, preparing for evacuation, canceling community events, and temporarily closing or reducing hours for local businesses.

Responses were mixed to the questions (1) how often was the community exposed to unhealthy air quality and (2) what time of year interviewees thought about or

worried about air quality. Responses ranged from very few days per year to year-round. Of responses that could be quantified, the majority were between 50 and 100 days per year. Many respondents said they worried about air quality during fire season, summer, or winter. Smoke from wildfire, followed by backyard burning and woodsmoke, were reported by interviewees as the types of smoke they were most worried about.

### Community preparedness for smoke events

One out of five respondents said they personally felt prepared for smoke events, most commonly citing having an air filter or purifier in their home and/or place of business as the primary reason. However, only 16% thought that the community felt prepared for smoke events and an additional 21% thought some of the community was prepared.

### Awareness of the Oakridge Air Program

Nearly all interviewees were aware of efforts to improve air quality in their community and had heard of the Oakridge Air program, but less were aware of the different program areas. Half of respondents thought their friends, family, and neighbors were aware of the program and one-quarter thought some of them were. When asked if they thought the broader community was aware of the Oakridge Air program, respondents generally thought they were. The majority also believed that the program had changed community members' awareness and knowledge about air quality and smoke.



## Limitations

**Many interviewees felt uncomfortable speaking for the community at large** and answered questions by saying they were “unsure” or “some but not all” of the community felt or behaved in a particular way. We reported those “unsure” in the results and have taken this feedback into consideration in the revisions to our interview protocol that will be used to inform future research

**Interview questions did not all produce comparable answers and some were two-part questions.** Questions asking interviewees how often they thought they were exposed to unhealthy air quality from smoke in Oakridge-Westfir and what times of year they worried about smoke resulted in a wide range of responses that were not directly comparable. Likewise, a two-part question was asked regarding whether the community knew where to find and how to understand air quality information. Participants were also asked if they knew about Oakridge Air and the different program areas, which did not illustrate which program areas interviewees were specifically aware of. These questions were similarly difficult to interpret and led to the loss of data in the final dataset.

Recommended changes to the interview protocol to be considered for follow-up survey development are available in Appendices E and F.

**The overall sample size was small and not demographically representative of the community at large.** The total sample size (n=22) of interviews is a small segment of the Oakridge population and is not demographically representative of the community at large. Because the pilot was designed to interview community leaders and residents who were actively involved in local organizations, interviewees were not intended to perfectly reflect the community as a whole. Several participants mentioned specifically feeling like they could not speak for the community or that they were more affluent and/or educated than the community at large.

## Next steps

### Further research

- We will incorporate questions into the community survey focused on understanding individual experiences based on the revised interview protocol in Appendix E.
- Our demographics questionnaire confirmed that our interviews targeted a fairly narrow sample of the community. Future research will include targeted outreach to a more demographically representative sample of the community.
- Once additional data is gathered from a larger sample size, it will be valuable to analyze data from responses between the following questions: (1) interviewees concerns for the next five years and their level of concern about air quality/smoke; and (2) the times of year interviewees worry about air quality and the types of smoke they are most concerned about.
- Wildfires were reported by most interviewees as the most concerning source of smoke and poor air quality. Moreover, fire season and/or summer were reported as the time of year when they were most concerned about smoke. However, less than half of interviewees viewed woodsmoke and wood burning season as a concern despite smoke from wood burning stoves being a major source of air quality issues in Oakridge-Westfir. Additional research will compare residents’ views on poor air quality frequency, seasonality, and sources with quantitative air quality data from Oakridge to explore how the community is understanding smoke-related air quality issues.
- Many respondents reported there was uncertainty in the community about how to understand the air quality index (AQI) and residents were not knowledgeable about the LRAPA AQI monitoring site located in Oakridge. Future research will explore whether people are familiar with AQI, how they interpret AQI, what information sources they use to get up-to-date AQI information, and whether they are aware of the AQI monitoring site in Oakridge.

## Oakridge Air

### Opportunities for outreach and education

- Several interviewees mentioned a lack of understanding in the community about AQI and “the numbers,” or how to interpret what the measuring site means. This is an opportunity for further outreach regarding interpretation of AQI values.
- Several interviewees offered to be ambassadors for the program and/or share flyers or information with patrons to their businesses, churches, and communities if they had the resources.
- There is an opportunity for outreach to outdoor recreation businesses that have had their operations impacted by smoke (such as river rafting and mountain biking guides and outfitters) to help them share AQI and health information with their customers, especially those coming from out of town who may be more unfamiliar with the negative health impacts from smoke.
- One interviewee recommended reaching out to anyone who is buying a new home in the community to tell them about the program.
- One interviewee felt like the community had yet to use Oakridge Air and the air quality improvement efforts as a way to lift up the community on a larger geographical level, wishing the community would capitalize on the positivity of it. This interviewee explained, “Being able to say, not only do we have the greatest place in the world to ride your bike and go camping and fish, but we are actively protecting our air. We are actively making it better.”
- Regarding smoke and health, one participant described how isolating it is when people have to stay indoors due to smoke and encouraged the program to follow up and provide more support on mental health.

### Suggestion for programmatic changes

- Several interviewees mentioned that they or someone they knew had tried to participate in the program and had not been followed up with or were uncertain of their status (specifically regarding home heating upgrades). There is an opportunity for follow up with these residents.
- An interviewee commented about the air purifiers program and was concerned about the purifiers that require replacement filters, both because it could create a barrier for people to continue using them and because of creating waste. They recommended only providing purifiers with reusable filters.
- Consider the list of tools, resources, or information that interviewees wished that they or the community had to be better prepared for smoke events (page 10).

## Appendices

### Appendix A. Details of research participation

**Title:** Oakridge Air Community Smoke Survey

**Researchers:**

Dr. Michael Coughlan, Institute for Resilient Organizations, Communities, and Environment

Dr. Heidi Huber-Stearns, Institute for Resilient Organizations, Communities, and Environment

Dr. Hollie Smith, School of Journalism and Communication

Dr. Autumn Shafer, School of Journalism and Communication

Grace Kaplowitz, Institute for Policy Research and Engagement

Alison Deak, Institute for Resilient Organizations, Communities, and Environment

**Contact:** Michael Coughlan, mcoughla@uoregon.edu, (541) 346-0675

You are being asked to participate in a research study. The box below highlights key information about this research for you to consider when deciding whether to participate. Carefully consider this information and the more detailed information provided below the box. Please ask questions about any information you do not understand before you decide whether to participate.

**Key Information for You to Consider**

**Voluntary Consent.** You are being asked to volunteer for a research study. It is up to you whether you choose to participate or not. There will be no penalty or loss of benefits to which you are otherwise entitled if you choose not to participate or discontinue participation.

**Purpose.** The purpose of this interview is to provide background about the Oakridge community and understand residents' understanding of smoke-related air quality issues and engagement with services available to them to address air quality issues.

**Duration.** You will be asked to provide information through a single one-hour

interview which can take place in person, over the phone, or virtually via Zoom.

**Procedures and Activities.** Meetings will be recorded. These recordings will not be transcribed and only used verify details.

**Risks.** There are no foreseeable risks from participating in this research

**Benefits.** There are no direct benefits for participating in this research.

**Alternatives.** Participation is voluntary and the only alternative is to not participate.

**Why is this research being done?** This research is being done to inform the development of a survey to be distributed to households in Oakridge. The survey will be aimed at understanding residents' awareness of smoke-related air quality issues and engagement with available services in the community to educate themselves about and protect themselves during poor air quality events. We also hope that through this project we will increase the availability and accessibility of resources that may be used by community members to inform and protect themselves during times of poor air quality.

**What happens if I agree to participate in this research?** If you agree to participate in this research, your participation will include a single one-hour interview which can take place in person, over the phone, or virtually via Zoom depending on your preference. These meetings will be recorded in case the researcher needs to verify details. Questions will include asking about your knowledge and concerns about air quality. A topic of discussion may be whether air quality concerns you and what you do to protect yourself during times of poor air quality. Although no personal questions will be asked, participants can always skip any question that makes them feel uncomfortable and they can stop participating at any time.

**What happens to the information collected for this research?** Information collected for this research will be used to gain insight into the Oakridge

community and inform the development of a survey. Your name and other identifying information will not be used in any papers, reports, or otherwise related to this study.

How will my privacy and data confidentiality be protected? We will take measures to protect your privacy. Measures we will take include conducting meetings in a private setting and only recording your first name and affiliation. All information recorded will be stored on password protected servers. Despite taking steps to protect your privacy, we can never fully guarantee your privacy will be protected. The Institutional Review Board that reviewed this research may be permitted access to inspect the research records.

**What are the benefits of participating in this research?** As a thank you for participating in this research, we will provide you with \$20 worth of gift cards to local businesses. It is also hoped that participants may benefit indirectly as the purpose of this research is to inform efforts within the community to improve resources and education available to residents of the Oakridge area to protect themselves against poor air quality as a result of smoke.

**What other choices do I have besides participation in this research?** Participation is voluntary and the only alternative is to not participate.

**What if I want to stop participating in this research?** Taking part in this research study is your decision. Your participation in this study is voluntary. You do not have to take part in this study, but if you do, you can stop at any time. Your decision whether to participate will not affect your relationship with the researchers, the University of Oregon, or Oakridge Air.

**Will it cost me money to take part in this research?** There are no costs associated with participation in this research study.

**Will I be paid for participating in this research?** As a way to say thank you for participating, we are giving all participants \$20 gift cards to a local store.

**Who can answer my questions about this research?** If you have questions or concerns, contact Michael Coughlan by email at [mcoughla@uoregon.edu](mailto:mcoughla@uoregon.edu) or by phone at (541) 346-0675.

An Institutional Review Board (“IRB”) is overseeing this research. An IRB is a group of people who perform independent review of research studies to ensure the rights and welfare of participants are protected. UO Research Compliance Services is the office that supports the UO IRB. If you have questions about your rights or wish to speak with someone other than the research team, you may contact:

Research Compliance Services  
5237 University of Oregon, Eugene, OR 97403-523  
(541) 346-2510

## Appendix B. Interview protocol

1. Could you please tell me briefly (in 1-2 minutes) about your role(s) in the Oakridge-Westfir community?
2. What makes Oakridge-Westfir unique/special to you? (If needed: How would you describe the community in a few words to someone?)
  - 2.1 What do you believe is most important to this community?
  - 2.2 What are your biggest concerns for the community in the next five years?
3. Do you have any concerns about air quality living in Oakridge/Westfir? (Y/N)
4. Do you think the effect of smoke on air quality is a big concern for the community at large??
5. Do you think community members know where to find and how to understand air quality information?
  - 5.1 Have you heard of anyone struggling to find or understand air quality information?
  - 5.2 What have you found to be effective ways of communicating in the community?
  - 5.3 What sources of information does the community rely on?
6. Do you think smoke affects people's health? *If yes:*
  - 6.1 Do you think the broader community is aware of the negative health impacts caused by smoke?
  - 6.2 Do you worry about negative health impacts from the air you breathe in Oakridge?
    - 6.2.1 Do you do anything differently because of this?
    - 6.2.2 Does poor air quality or smoke impact the behaviors or actions of your friends, families, or neighbors?
  - 6.3 How often do you think your community is exposed to unhealthy air?
  - 6.4 What time(s) of year do you think about or worry about air quality?
  - 6.5 What sources of smoke/poor air quality worries you most? (Woodsmoke, wildfire, prescribed fire, pile burning?)
7. Do you feel prepared for smoke events? Why/how?
  - 7.1 Do you think the community feels prepared for smoke events? Why/how?
  - 7.2 Are there tools, resources, or information that you wish you had or the community had to be more prepared for smoke events?
  - 7.3 Can you describe a time when the community took action or made changes to their behaviors in response to air quality or smoke concerns?
8. Are you aware of any efforts to improve air quality in your community?
9. Have you heard of Oakridge Air and their different program activities?
  - 9.1 If yes, do you know if your family, friends, and neighbors are familiar with the program?
  - 9.2 How did you hear about Oakridge Air?
  - 9.3 How do you think Oakridge Air is perceived by the community? Are people aware of and receptive to their efforts?
  - 9.4 Do you believe Oakridge Air changed community members' awareness and knowledge about air quality/smoke?
    - 9.4.1 If so, how?
  - 9.5 If not, do you think there is more information or air quality resources available now than there used to be?
  - 9.6 Would you be interested in learning more about or participating in the Oakridge Air program?
    - 9.6.1 Are there reasons you have or have not participated in the past?
    - 9.6.2 Do you know anyone else who would benefit from learning more about or participating in the program?
10. Is there anything else you'd like to add?
  - 10.1 Is there anything we should have asked but didn't?
  - 10.2 Do you have any questions for us?
  - 10.3 We're hoping to speak with people who are in touch with different parts of the community—do you have any recommendations for others we should interview?
  - 10.4 Do you want more information about Oakridge Air?

### Appendix C. Demographics questionnaire

1. Do you live in Oakridge or Westfir?
2. How long have you lived in the community?
3. Regarding your home, do you:  
(a) Rent; (b) Own; (c) Live with family or friends; (d) I am currently unhoused; (e) Other, please explain
4. How often does your household have enough money to pay for food, bills, or housing?  
(a) Rarely; (b) Sometimes; (c) Most of the time; (d) Always; (e) I don't know
5. What is your age?
6. What is your gender identity?  
(a) Man; (b) Woman; (c) Non-binary/non-conforming; (d) Prefer to self-identify (please write in); (e) Prefer not to answer
7. How do you identify yourself? (Select all that apply)  
(a) Asian or Asian American; (b) Black or African American; (c) Hispanic or Latino/a/x; (d) Native American/American Indian/Alaskan Native; (e) Native Hawaiian or Pacific Islander; (f) Middle Eastern or North African; (g) White; (h) Other (please write in); (i) Prefer not to answer
8. Please check any of the following that apply to you. (Select all that apply)  
(a) Non-disabled; (b) Independent living, self-care disability; (c) Physical disability; (d) Hearing disability; (e) Vision disability; (f) Cognitive disability; (d) Mental health disability; (e) Activity disability; (f) Communication disability; (g) Learning disability
9. What is your preferred spoken language?  
(a) English; (b) Spanish; (c) Russian; (d) Chinese simplified; (e) Mandarin; (f) Cantonese; (g) Vietnamese; (g) Other (please write in)
10. How many people are in your household (including yourself):
11. Are any of these populations members of your household? (Select all that apply)  
(a) Children (under 18 years old); (b) Older adults (over 65 years old); (c) Pregnant women; (d) Individuals with asthma and other respiratory diseases; (e) Individuals with cardiovascular diseases; (f) Outdoor workers; (g) Others that I would consider at higher risk from smoke. Please describe; (h)None of these populations are part of my household

## Appendix D. Written demographic data summary

Of those that completed the questionnaire:

65% lived in Oakridge (n=13), 20% lived in Westfir (n=4), 5% lived outside of the community (n=1), and 10% didn't answer the question (n=2). The mean length of residents varied from less than a year to more than 60 years, with a mean length of residence of 13.5 years (n= 18). Seventy-five percent of interviewees that completed the questionnaire owned their home (n=15) and 25% rented their home. The size of households varied from one to five people (n=19), with 53% of respondents having two people living in their household (n=10). The majority of respondents' households always had enough money to pay for food, bills, and housing (85%; n=17); the remaining 15% of respondents had enough money to pay for food, bills, and housing most of the time. The age of interviewees ranged from 36 to 77 years of age, with a mean age of 57 years (n=19). Of those interviewed, 95% identified as white (n=19) and one interviewee preferred not to answer the question. The majority of respondents were women (n=15, 75%), with 20% identifying as male (n=4) and one respondent preferring to not answer the question (5%). Seventy-nine percent of respondents reported being non-disabled (n=15), 11% reported a vision disability (n=2), and 5% reported having hearing (n=1), mental health (n=1), or physical disabilities (n=1). Most households had at least one vulnerable household member (n=17; 85%), with 35% of households having an individual with asthma or another respiratory disease (n=7) and/or an older adult (over 65 years old; n=7) living in their household; 20% of households had children (n=4); and 10% of households had individuals with a cardiovascular disease (n=2), outdoor workers (n=2); or another vulnerable household member that didn't fit within the given categories (n=2).

## Appendix E. Suggested changes to the interview protocol

Question five asked interviewees if they thought community members know where to find and how to understand air quality information. We recommend separating this into two separate questions in the survey.

Question 6.1 asked interviewees whether the broader community is aware of the negative impacts caused by smoke. Interviewees noted that there is a difference between having awareness and knowing what people should do about it.

Question 6.3 asked interviewees how often they thought the community was exposed to unhealthy air quality. Responses varied widely with interviewees giving a specified range of days, weeks or months, a season, or a qualitative descriptor, such as "a lot." We recommended making this a multiple choice question where respondents are given a specific range of time (such as days, weeks, or months).

Question 6.4 asked what time(s) of year interviewees worried about air quality. Similar to question 6.3, responses varied from specific smoke-related seasons (such as fire season) to annual seasons (winter, summer, fall). We recommend that this is also made into a multiple choice question during the survey and if the provided answers include "wildfire season," respondents are also asked when they believe fire season occurs.

Question nine asked respondents if they had heard of Oakridge Air and/or different Oakridge Air program activities. We recommend the survey list each program area and specifically ask if respondents have heard of each one.



## Appendix F. Interview protocol with suggested changes

1. Could you please tell me briefly (in 1-2 minutes) about your role(s) in the Oakridge-Westfir community?
2. What makes Oakridge-Westfir unique/special to you? (If needed: How would you describe the community in a few words to someone?)
  - 2.1 What do you believe is most important to this community?
  - 2.2 What are your biggest concerns for the community in the next five years?
3. Does Oakridge-Westfir have an air quality problem?
  - 3.1 If yes, why do you think we have an air quality problem?
4. Do you consider air quality/smoke to be a big concern for the community?
5. Do you think community members struggle to find air quality information?
  - 5.1 Do you think they struggle to understand air quality information?
6. How do you or your organization get information out to the community?
  - 6.1 What is a good way to share information with people?
  - 6.2 Where do you get information?
  - 6.3 What is the best way to communicate with you?
7. Are you aware of negative health impacts caused by smoke?
  - 7.1 Do you think the community is aware of the negative health impacts caused by smoke?
  - 7.2 How many days per year do you think the community is exposed to unhealthy air quality?
  - 7.3 Do you worry about negative health impacts from the air you breathe in Oakridge-Westfir?
    - 7.3.1 If yes, does this impact your behaviors/actions?
    - 7.3.2 Does poor air quality or smoke impact the behaviors or actions of your friends, families, or neighbors?
  - 7.3 What months of the year are you concerned about air quality?
  - 7.4 On a scale from not at all concerned to very concerned, how concerned are you about smoke from: (a) Wildfires; (b) Wood stoves; (c) Prescribed fires; (d) Backyard burning and/or pile burning?
8. Do you/your community feel prepared for poor air quality/smoke events?
  - 8.1 If yes, What contributes to your preparedness?
  - 8.2 Can you tell me about a time when the community took action or made changes in response to air quality/smoke concerns?
- 8.3 Are there barriers to the community being more prepared?
9. Are you aware of any efforts to improve air quality in your community?
10. Have you heard of Oakridge Air and their different program activities?
  - 10.1 What specific programs have you heard of? (a) Home heating upgrades; (b) Community firewood and woodshed program; (c) Community and school education; (d) Residential air purifiers; (e) Public building cleaner air spaces; (f) Code enforcement; (g) Yard waste program; (h) Air quality monitoring and text message alerts
  - 10.2 Have you participated in any of the programs?
  - 10.2 If yes, do you know if your family, friends, and neighbors are familiar with the program?
  - 10.2 How did you hear about Oakridge Air?
  - 10.3 How do you think Oakridge Air is perceived by the community? Are people aware of and receptive to their efforts?
  - 10.4 Do you believe Oakridge Air changed community members' awareness and knowledge about air quality/smoke?
    - 10.4.1 If so, how?
  - 10.5 If not, do you think there is more information or air quality resources available now than there used to be?
  - 10.6 Would you be interested in learning more about or participating in the Oakridge Air program?
    - 10.6.1 Are there reasons you have or have not participated in the past?
    - 10.6.2 Do you know anyone else who would benefit from learning more about or participating in the program?
11. Is there anything else you'd like to add?
  - 11.1 Is there anything we should have asked but didn't?
  - 11.2 Do you have any questions for us?
  - 11.3 Do you have any recommendations for others we should interview?
  - 11.4 Do you want more information about Oakridge Air?





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