

# Wildfire and Human Health in a Changing Climate

## Front-end Evaluation Report

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## **Introduction**

### **Project background**

Wildfire and Human Health in a Changing Climate (WHH) is a five-year project (2023 - 2028) led by the Oregon Museum of Science and Industry (OMSI) with the support of a National Institutes of Health Science Education Partnership Award (NIH SEPA: Project ID:1R25GM150140-01) and project partners Oregon MESA (MESA), Oregon Health & Science University (OHSU), World Forestry Center (WFC), and AB Cultural Drivers. The project will develop a bilingual (Spanish/English) traveling exhibition to promote public understanding of the health impacts of large and severe wildfires.

The project has four specific aims that primarily target youth ages 11-17 who are underrepresented in STEM<sup>1</sup> and their families:

- Foster public understanding of the health impact of wildfire and smoke exposure, especially on vulnerable and sensitive populations.
- Promote health strategies to assess risks and minimize harms of wildfire and smoke exposure.
- Foster public understanding of how land use practices and climate change contribute to more catastrophic wildfires.
- Promote and explore strategies to mitigate and adapt to wildfire and climate change, especially in fire management and forest restoration.

Wildfire and Human Health will engage youth aged 11–17 as co-developers to plan, design, and develop the traveling exhibition. In addition, the project team will develop educational resources that complement the exhibition and can be used in a variety of settings, including museums and school classrooms. The exhibition will emphasize stories of specific communities impacted by wildfire and their responses to heal their communities, build resilience, and ensure wellbeing in the future. While many of these stories are set in Western states, the exhibition will emphasize the relevance of wildfire across North America.

### **Front-end study objectives**

The aim of this front-end evaluation was to gather information from the target audience about their experiences with wildfires, and to explore topics of interest to them.

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<sup>1</sup> MESA identifies communities historically underrepresented in STEM to include BIPoC, women and gender diverse groups, disabled folks, and low-income communities.

Questions for the front end evaluation include:

- What topics are target audiences most interested in learning about?
- What are their experiences with wildfire/wildfire smoke?
- What impact has wildfire/wildfire smoke had on their lives?
- How concerned are they about the impacts of wildfire/wildfire smoke?

This report presents the methods and results of evaluation activities carried out with members of the target audience including: 1) youth ages 11-17 recruited through the project partner organizations; 2) youth and parents of youth ages 11-17 recruited while visiting OMSI.

## Evaluation activities

The evaluation employed a culturally responsive evaluation approach<sup>2</sup> which included:

- 1) A diverse team, including a bilingual, Latine evaluator,
- 2) Translation of all data collection instruments into Spanish, and of select instruments into Cantonese, Russian, Korean and Somali languages,
- 3) Inclusion of members of diverse communities as participants,
- 4) Data collection in English and Spanish as appropriate (based on participants' preference), and other languages for certain data collection activities, and
- 5) Data collection instruments were developed by OMSI's WHH team in collaboration with MESA that hosted one data collection activity during their community event and helped recruit the participants.

The study gathered data through activities such as a table top survey, a graffiti wall, an illustrated card sort, and a focus group (see Appendices A-F for instrument examples). Front-end evaluation data collection took place from October 2023 to March 2024, following the order as shown in the table below:

Table 1. *Data collection methods and locations.*

<b>Method of study (in chronological order)</b>	<b>Participants</b>	<b>Location</b>	<b>Recruited by</b>
Table top survey and graffiti wall	Family groups with youth ages 14 - 18	Maseeh College of Engineering &	Oregon MESA

<sup>2</sup> Oregon Museum of Science and Industry. (2018). *Culturally Responsive Research Framework*. [https://omsi.edu/wp-content/uploads/2023/02/CRR\\_Framework\\_REVEAL.pdf](https://omsi.edu/wp-content/uploads/2023/02/CRR_Framework_REVEAL.pdf)

		Computer Science at PSU	
In-person card sort	Family groups with youth ages 11 - 17	OMSI	OMSI data collectors on the museum floor
Online card sort	Youth ages 14-18	online	Oregon MESA
Focus group	Pairs of adults and youth ages 14-18	OMSI	Oregon MESA, Adelante Mujeres, Metropolitan Family Service

The following sections provide a detailed account of each data collection activity.

**Post-it exercise with project partners**

Setting and subjects

Project partners, including representatives from OMSI, OHSU/PSU, MESA, WFC, and the external evaluator from AB Cultural Drivers met on October 3, 2023. In addition to sharing what each partner thought they could bring to and hoped to get out of the project, the partners brainstormed ideas about potential exhibit experiences by writing responses to questions on post it notes. Partners were asked to write one idea per post it note for the questions below which were printed on large chart paper posted on the wall. Responses were collected for one question at a time in the following order.

- What is something that you think visitors need to know about wildfires and health?
- What are some ideas and activities to communicate these to audiences?
- What do you want to find out from the audiences before starting the project?
- What are some fun and engaging ways to get this information?

Once all responses were collected, the group went over the responses, grouping similar ideas together, and elaborating on notes as needed.

Data collection and analysis

The partners’ responses were typed up and categorized into themes using the thematic analysis. Themes and suggestions for activities were used to inform future front end activities. (the full list of responses is in Appendix B).

Findings

The following ideas stood out in partners’ responses regarding something that visitors need to know about wildfires and health:

- Visitors need to understand that wildfires get intensified by climate change.
- Visitors need to understand that wildfires pose diverse health risks, including mental well-being, particularly for those most vulnerable.
- Visitors should be aware of both the historical and ecological roles of wildfires as well as the uneven consequences of displacement caused by wildfires
- Visitors need to understand the importance of community and individual actions in mitigating effects, and the necessity of resilience and adaptation strategies

Some of the suggested methods to communicate the aforementioned ideas to the audience included:

- hands-on activities geared towards youth
- technological tools such as advanced data visualizations
- personalized experiences to help visitors determine their risk levels and find out how to best protect themselves
- interactive experiences that include designing a fire-adaptive home and simulations of fire behavior and smoke impact, alongside educational content.

Partners expressed that before launching the project, it's crucial to find out:

- audiences' personal experiences with wildfires, their existing knowledge about wildfires, their interest in various wildfire related topics, and concerns about health risks, and
- audiences' visualizations of successful exhibit design and their preferred methods of receiving information.

To gather this information from visitors, partners suggested methods such as creative expression activities, interactive scavenger hunts, visual success stories of resilient houses, and emotional connection exercises during high smoke days.

## **MESA college exploration day**

### Setting and subjects

The project's evaluation team set up a table at the MESA College Exploration Day event held at Portland State University (PSU) on December 2, 2023. During this event, students and their families explored some of the different engineering disciplines and heard directly from current college students about their experience.

OMSI’s evaluation team used this event as an opportunity to reach out to the target audience with information about the WHH project and to explore their topics of interest as well as concerns about the impact of wildfires on different aspects of people’s lives.

#### Data collection and analysis

The table setup included two front-end activities. One of them was a table-top survey where respondents were asked to rate their level of concern about the impacts of wildfires by placing color-coded poker chips (blue for youth, and red for adults) on a grid (see Figure 1). Each person received three chips and placed one at the appropriate level of concern for impacts on their health, community, and the environment. Youth and adult responses were tallied separately on a separate sheet of paper. Nineteen individuals (10 youth and 9 adults) took part in this activity.

#### How concerned are you about the impact of wildfires on...

	Not at all concerned	Slightly concerned	Somewhat concerned	Moderately concerned	Extremely concerned
your health? 					
the environment? 					
your community? 					

Figure 1. *Table top survey.*

The second activity was a graffiti wall where participants were invited to write about what they would like to learn about wildfires/wildfire smoke on post-it notes and stick them on large chart paper. Overall, 8 comments were left on the graffiti wall (see Appendix A).

During each of these activities, a bilingual evaluator took hand-written notes to document information about people’s interests, attitudes, and experiences related to wildfires that came up in casual conversations with the participants.

### Findings

In the survey of the level of concern, youth showed slightly higher concern overall than adults. In both groups, concern for the environment was slightly higher than community and health.

## How concerned are you about the impact of wildfires on...

Mean ratings

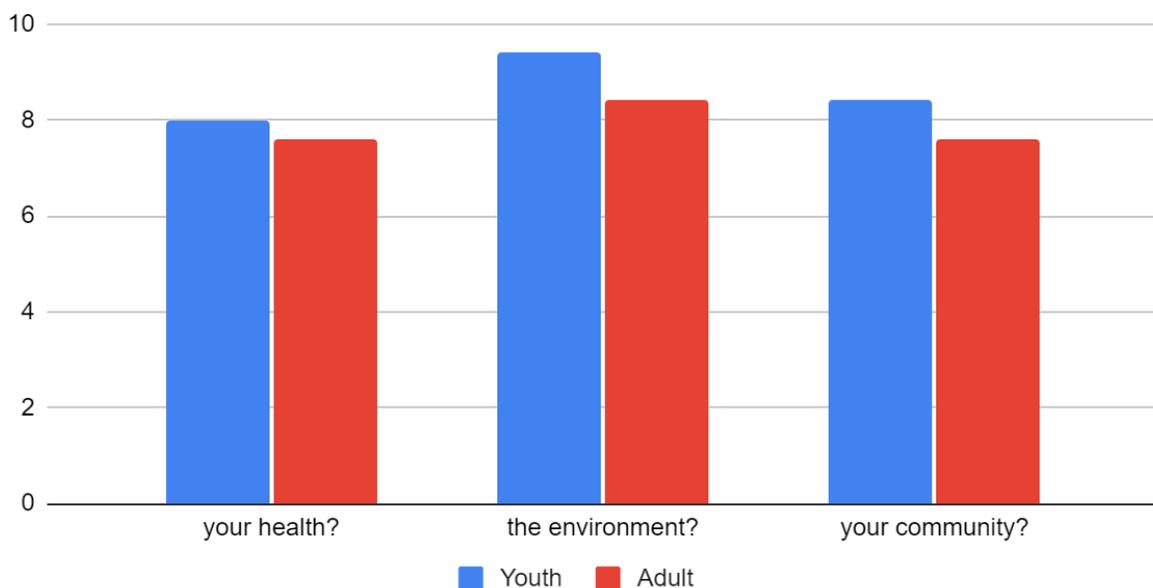


Figure 2. *Concern ratings.*

In the graffiti wall activity, youth comments on what they would like to learn about wildfires seem more forward-looking and showing interest in long-term effects, factors, and preventative measures. For instance, some of their responses included:

*“Is there a possibility to grow trees resistant to fire? If so, what would the consequences be?”*

*“What are the long term effects of wildfire on industries that handle lumber?”*

*“What are the top two major factors resulting in wildfires?”*

In contrast, adult comments seem to be focused on the present, such as actions in response to wildfires that can be taken immediately, for example:

*“Reforestation efforts need to be more publicized. More volunteer campaigns”*

*“Evacuation preparedness - concerns for the population”*

**Card sort (OMSI visitors, in-person)**

Setting and subjects

For this activity, the project’s exhibit developers created a set of 9 cards with four images on each of them grouped by a wildfire-related topic (see Appendix C). Each card also had a title referring to the topic illustrated by the images. The cards were printed on durable card stock.

The project’s evaluation team developed three types of card sort intended to explore 1) what interests people about wildfires (Interest), 2) what concerns them (Concern), and 3) what relevance the topic has in their own lives (Relevance). Within each of these sorts, the participants were offered to rate the cards according to their level of interest, concern, and perception of relevance (“very”, “somewhat”, and “less”), with a maximum of 3-4 cards going into each category (Appendix D).

Each group was asked to complete one type of sort. Once done with the sort, the participants were asked to take their cards from the top category (e.g. “very interesting”) and put them in the order from “most [interesting]” (top) to “least [interesting]” (down). Once finished, the participants were asked a few follow up questions, and the data collector took notes of their responses. After each group, the cards were shuffled.

Data collection took place at OMSI during the Winter break, on December 26-29, 2023. The data collectors were instructed to recruit family groups with youth of approximately middle-to-high-school age. A total of 34 family groups participated in the card sorting activity. Typical groups ranged between 2 - 4 people and would include at least one adult and one youth. However, data collectors also welcomed any adult visitors without a group that approached the table and inquired about the project.

Data collection and analysis

On the days of data collection, the evaluation team set up a table with a set of cards and titles of the rating categories printed on strips of paper.

Family groups with youth were encouraged to let the youth lead the sorting activity, but it was also communicated that they could work collaboratively and as they felt comfortable.

Prior to the data collection, the titles of the cards had been assigned a letter for the ease of tallying. For each family group, their ratings were tallied on a separate data collection sheet, and hand-written notes of their responses to the follow-up questions were taken in an assigned space on the same data collection sheet. The hard copies of the sheets were scanned into

digital format, and all of the data were transcribed into an Excel document by an evaluation team member. Quantitative data from the ratings were analyzed to determine frequencies using simple descriptive statistics.

Qualitative data in the form of responses to open-ended questions were recorded by question and then categorized into themes. Specific quotations were selected from open-ended responses in the data to illustrate representative ideas and themes in this report.

## Findings

### *Interest in Topics*

A total of 15 groups participated in the sort according to their level of interest in wildfire topics. Among the 9 topics represented on the cards, “Land recovery” and “Climate change impacts” were most frequently identified by groups as “very interesting”, closely followed by “Fighting wildfires” and “Record breaking wildfires”.

The top 2 choices in the “somewhat interesting” category were “Restoring and protecting wildlands” along with “Wildfire health impacts”.

“Protecting your health” and “Wildfire mental health impacts” were most frequently rated as “less interesting”, receiving 10 and 9 votes, respectively.

## Interest

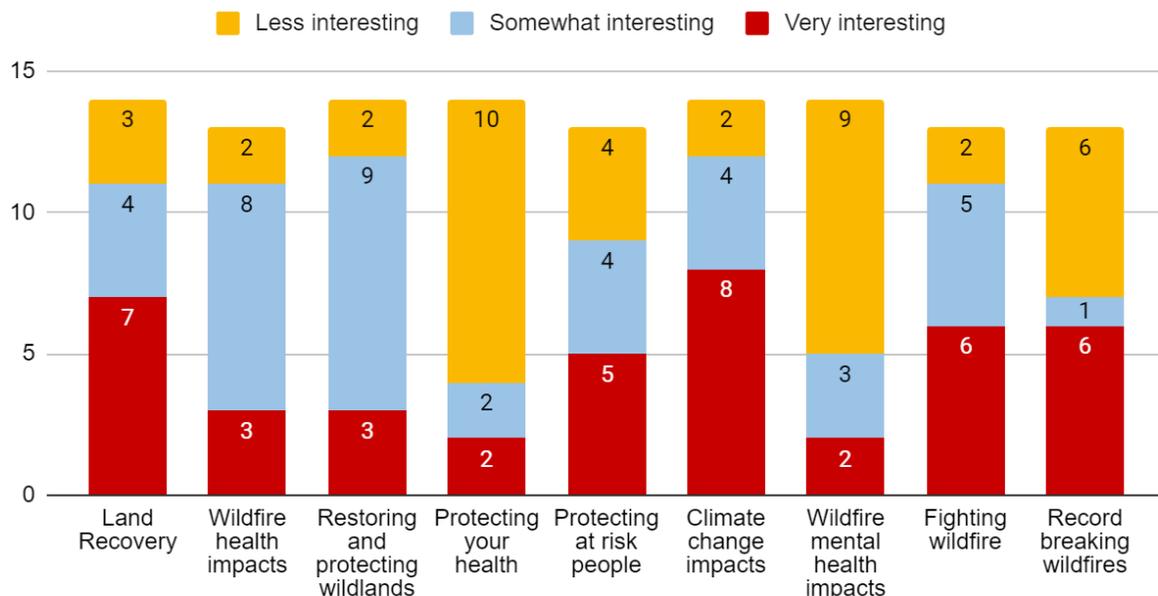


Figure 3. *Interest in topics.*

When asked follow-up questions about what kind of things they would like to learn about wildfires, the participants mentioned the following:

*“What can you do to protect your lungs and body?”*

*“What humans can do to take responsibility of our fires-what steps we can take to make sure they’re out.”*

*“Where are fires most common? Where do they start? Most common causes.”*

### Topics of Concern

A total of 10 family groups completed the sort according to their level of concern for the wildfire topics.

### Concern

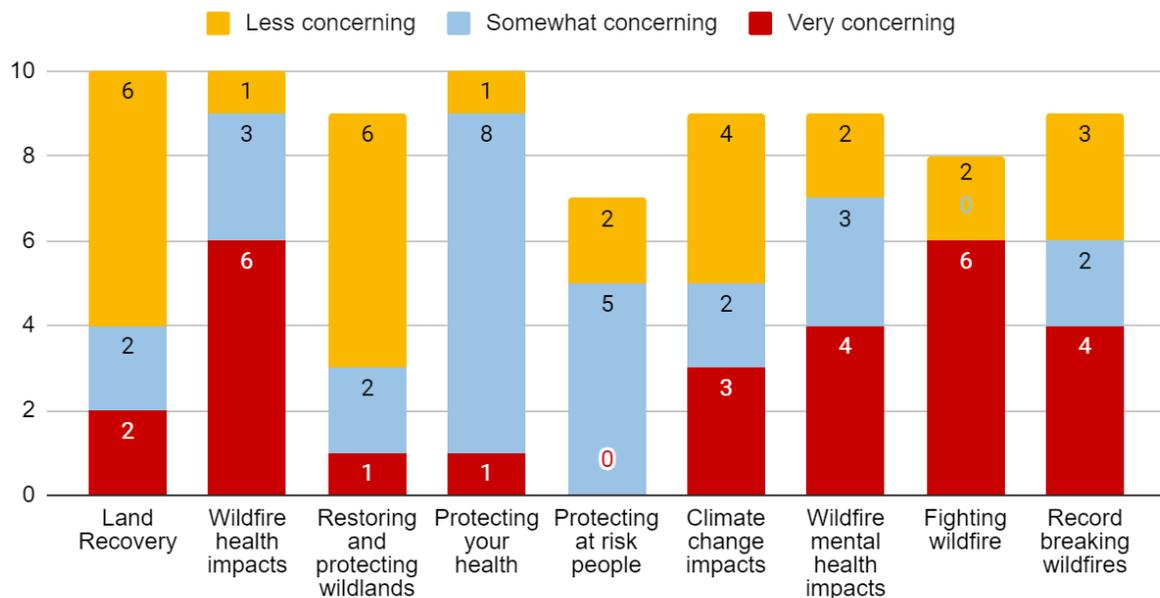


Figure 4. *Topics of concern.*

The topics of “Wildfire health impacts” and “Fighting wildfire” were most frequently identified as “very concerning”, with the latter also being one of the topics most often rated as “very interesting”.

Although named “less interesting”, “Protecting your health” was rated as “somewhat concerning” by 8 of 10 groups participating in this sort. Notably, none of the respondent groups found the topic of “Protecting at risk people” to be “very concerning”.

“Land recovery” and “Restoring and protecting wildlands” were most frequently rated as “less concerning”.

When asked to share why the topic is a concern for them, people talked about the following:

*“Most people’s health can go down. Ash is unhealthy bad substances go into the air and could be damaging for animals too.”*

*“Since we are going through severe climate change, I think health and mental health impacts could be bad. Cancers, asthma, anxiety, depression.”*

*“If there was a fire it could hurt animals we live around. We should know what to do.”*

### Relevance of Topics

Nine groups completed the sort according to what relevance the topic of wildfires has for their own lives.

### Relevance

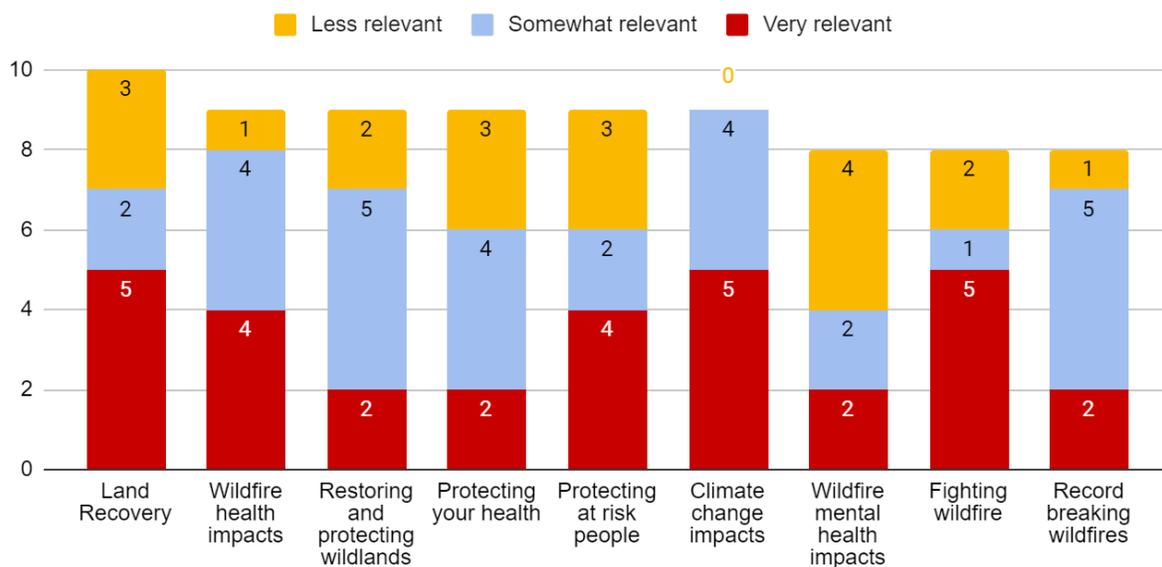


Figure 5. *Relevance of topics.*

Echoing the results of the sort according to participants’ level of interest, “Land recovery”, “Climate change impacts”, and “Fighting wildfire” turned out to be the three topics most frequently rated as “very relevant”.

“Restoring and protecting wildlands”, “Record breaking wildfires”, and “Protecting your health” were identified as “somewhat relevant” by almost half of the participating groups each.

Finally, “Wildfire mental health impacts” was the topic most frequently placed into the “less relevant” category.

Reflecting upon the question about how the suggested topics are relevant to their lives, the participants shared the following ideas:

*“My dad lives in an area where they have to fight wildfires all the time.”*

*“It has impacted us directly, our health. I’ve even considered not having another child—because I think what kind of world would it be for them?”*

*“As a person with a disability—getting out of a fire would be next to impossible. I also think about my wheelchair, and accessibility.”*

#### *Awareness and Perceptions of Changes in Wildfires*

Ultimately, all groups, regardless of the type of sort they took part in, were asked two questions:

1) Have you seen any changes in your lifetime or have you heard people talking about how wildfires have changed? and 2) Why do you think the frequency/intensity of wildfires is changing?

Have you seen any changes in your lifetime or have you heard people talking about how wildfires have changed?

n=20

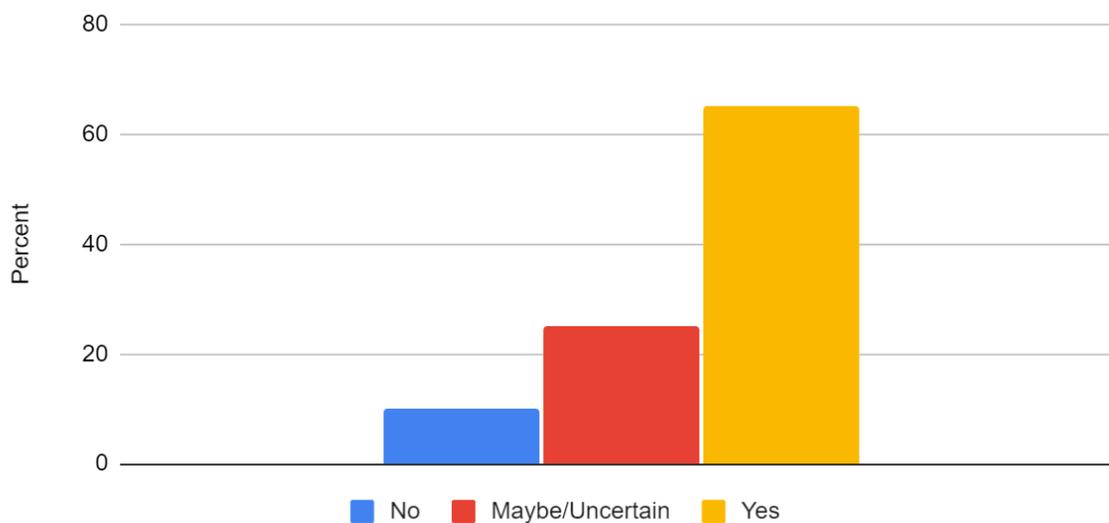


Figure 6. *Awareness of changes in wildfires.*

A total of 20 groups responded to the first question, with 65% of them agreeing that they have seen changes in wildfires themselves or heard other people talk about it.

Open-ended responses to the second question were parsed if they included more than one idea, which resulted in the greater number of responses (n=39) than respondents. The responses were coded and categorized into themes.

## Why is the frequency/intensity of wildfires changing?

n=39

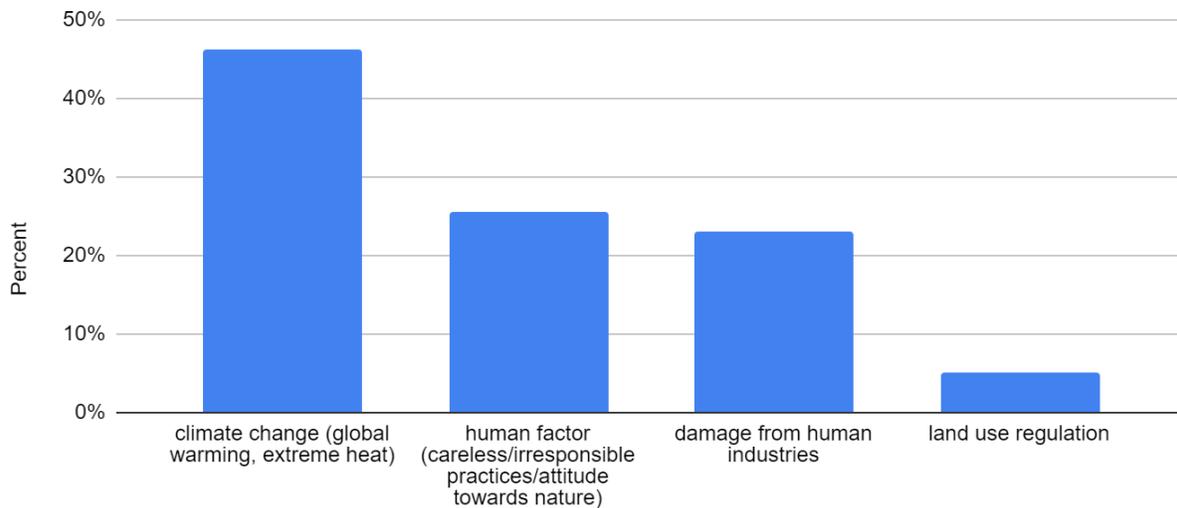


Figure 7. *Perceived causes of changes in wildfires.*

Nearly half (46%) of responses identified climate change, including global warming and extreme temperatures, as the main factor driving changes in wildfires:

*“Climate change. It’s impacted the balance of our ecosystem”*

*“It’s been so hot and dry even here. I think we see this weather too. It’s been so warm that it has to do with climate change.”*

*“Human-caused climate change.”*

*“Drier seasons, hotter temps”*

Other responses mentioned human-led factors, with 26% pointing at carelessness and irresponsible attitude towards the environment, and 23% of responses mentioning damage from industries (e.g. timber and chemical):

*“Again, us. Climate irresponsible fire practices.”*

*“People don’t care about the fires they start. No rain and fireworks”*

*“I think that things like our world is less sustainable, we use so many damaging materials.”*

## Online card sort

Setting and subjects

The project’s evaluation team created an online version of the card sort in Alchemer that asked

respondents to sort the nine wildfires-related topics by Interest, Relevance, and Concern. It also included open ended follow-up questions for each sort.

With support from the project's partner MESA, the cards and the survey were translated into the Spanish, Cantonese, Korean, Russian, and Somali languages and sent to MESA families on February 15, 2024. A follow up email was sent on February 23, 2024 and the survey was open through February 29, 2024.

Twenty-nine individuals completed the English survey, two the Russian, and two the Spanish.

#### Data collection and analysis

Quantitative data from the survey ratings were analyzed using simple descriptive statistics to determine frequencies. Qualitative data, gathered in response to open-ended questions, were systematically recorded, categorized into themes, and selected quotations were chosen to illustrate representative ideas for inclusion in this report.

#### Findings

##### *Geographical Distribution of Respondents*

A little over 40% of the respondents are from the Portland metro area, around 30% from Klamath Falls, with the remaining participants evenly distributed between Eugene/Springfield and South Metro/Salem.

##### *Interest in Topics*

The question, "Which topic are you most interested in learning about?" revealed that "Land recovery" was the most popular choice, closely followed by "Restoring and protecting wildlands" and "Climate change impacts".

## Which topic are you most interested in learning more about?

n=27

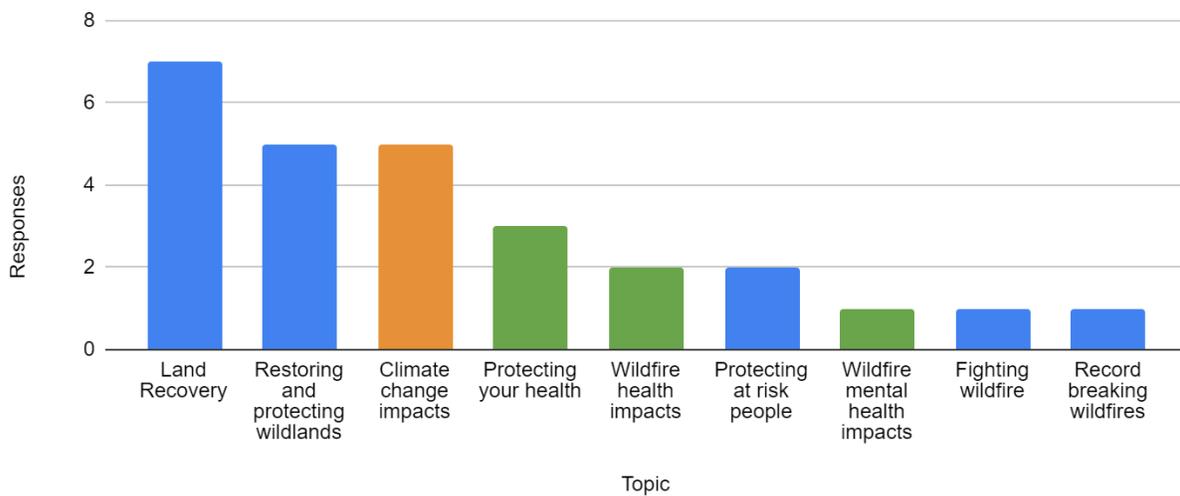


Figure 8. *Interest in topics.*

### Learning Interests

When asked what sort of things they would like to learn about the previously selected topic, respondents expressed a strong desire to learn about preventive measures and solutions, particularly what actions individuals can take. The most common interests were in learning what can be done about health overall, followed by actions to help nature and wildlands, and how to mitigate the health impacts of smoke and poor air quality.

*“I want to help the animals live and make the air healthier for them and us.”*

*“How can I keep the national forest's beauty.”*

*“How breathing poor air quality from wildfires affects your body.”*

### What sort of things would you like to learn about that topic?

n=26

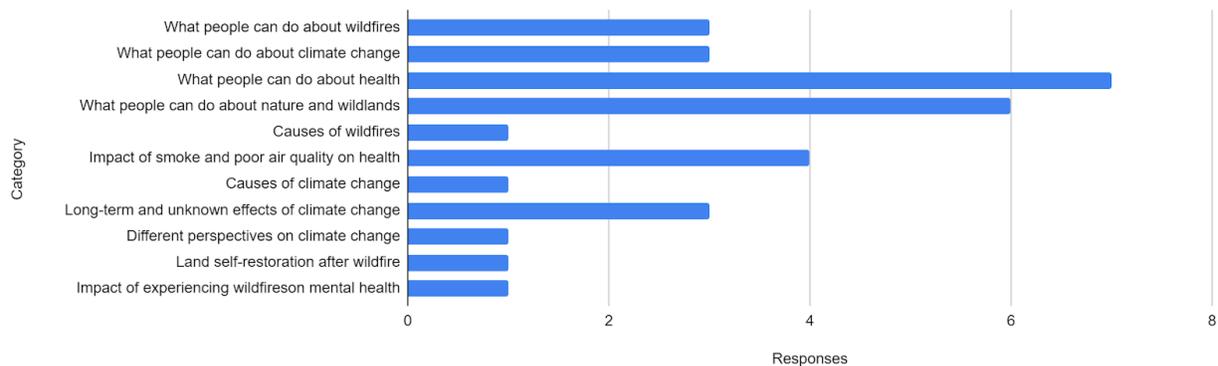


Figure 9. *Learning interests.*

*Relevance of Topics*

"Restoring and protecting wildlands" was identified as the most relevant topic, with "Wildfire health impacts" and "Protecting your health" also rated highly.

Which topic is most relevant to you?

n=27

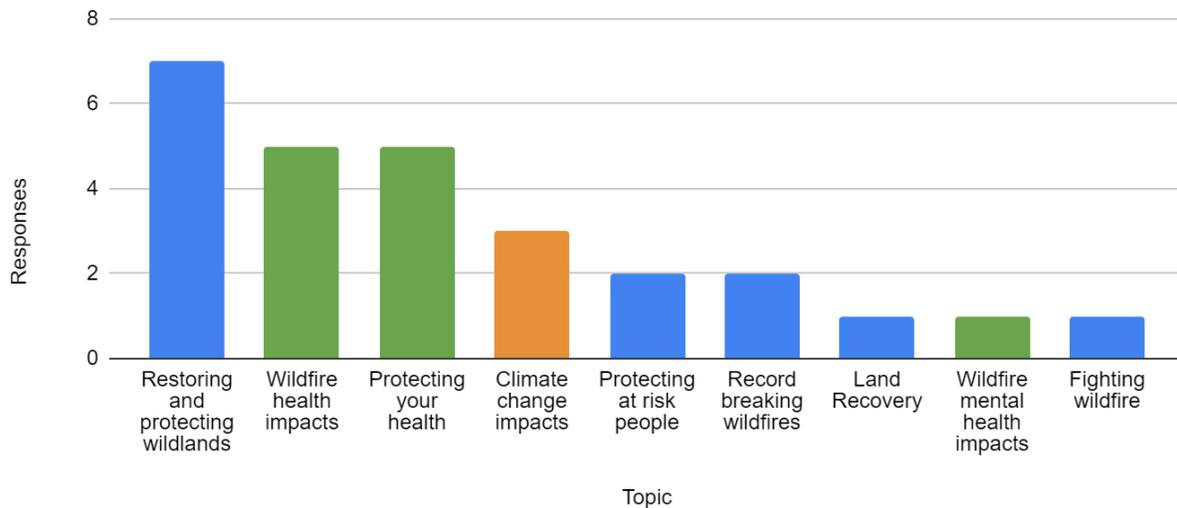


Figure 10. *Relevance of topics.*

*Personal Relevance*

When asked how these topics are relevant to their lives, most respondents mentioned personal health concerns. Others cited past personal or family experiences with wildfires. The impact of wildfires on air quality was another popular reason why people believed the topic of wildfires was relevant to their lives, with several individuals highlighting their health vulnerabilities and the need for protective measures during wildfire events.

*"I already have certain health things I need to keep a close eye on and I want to know what might be added to that list during/after a wildfire."*

*"I'm at risk & need to make sure I'm protected & can breathe."*

*"Oregon is really popular for wildfires. The last one that we had a couple years ago really affected my health physically, and mentally. not being able to go outside and enjoy things that I do like jogging was unbearable. And having to put on a safety mask when going out was scary."*

*"Every summer our air quality is affected by wildfire smoke."*

### How is the topic relevant?

n=22

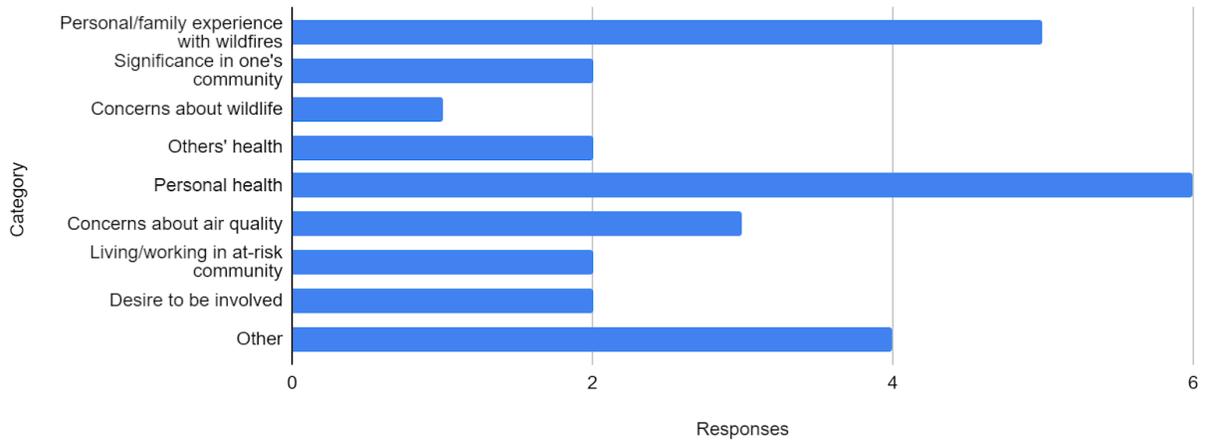


Figure 11. *Personal relevance.*

### Topics of Concern

In response to the question, "Which topic are you most worried about?" "Climate change impacts" emerged as the topic of greatest concern, alongside "Protecting your health".

### Which topic are you most worried about?

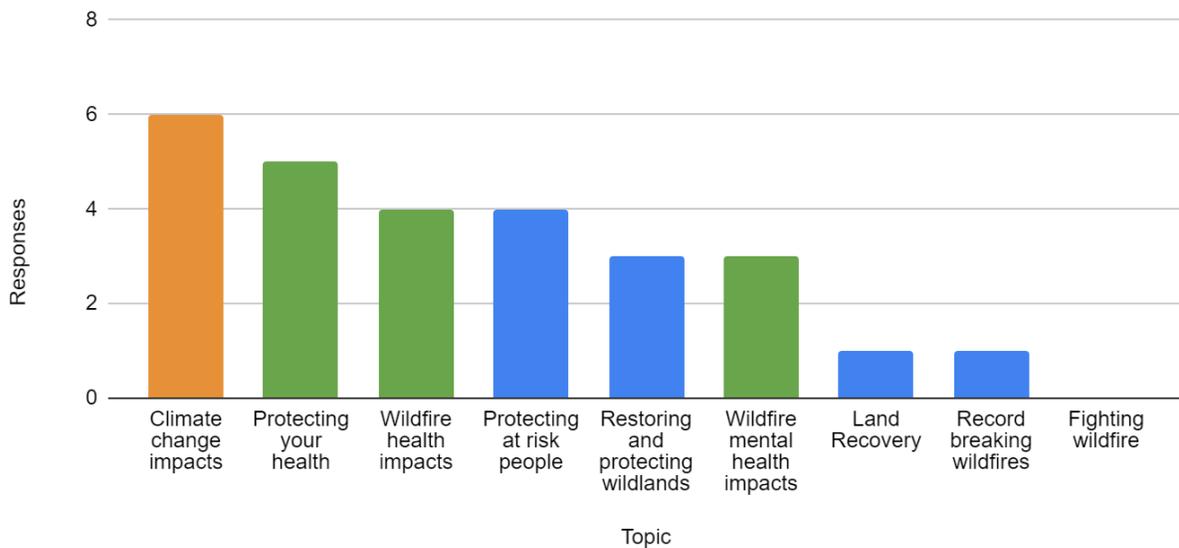


Figure 12. *Topics of concern.*

### Personal Concerns

When asked to share why the previously selected topic is a concern for them, respondents most frequently voiced worries and uncertainty about their own and planetary futures along with

concerns about air quality. “Worrying about growing climate change impacts” and “Concerns about personal or family health” were the next two most popular responses.

*“We don’t really know what the long term effects are of breathing wildfire smoke every summer.”*

*“Because climate change is affecting us at an exponential rate and I don’t know what the future holds.”*

*“I’ve heard a lot about the impacts of climate change and how most of it is human centered. Knowing that our species is a major cause, it concerns me to see what’s in store for future generations.”*

*“I am always concerned about my health.”*

*“There’s a lot of diseases going around and that worries me a lot for my health and how much of a risk it is at. This also concerns me as I live with older people that are more immune to getting sick quickly.”*

Why is it a concern?

n=21

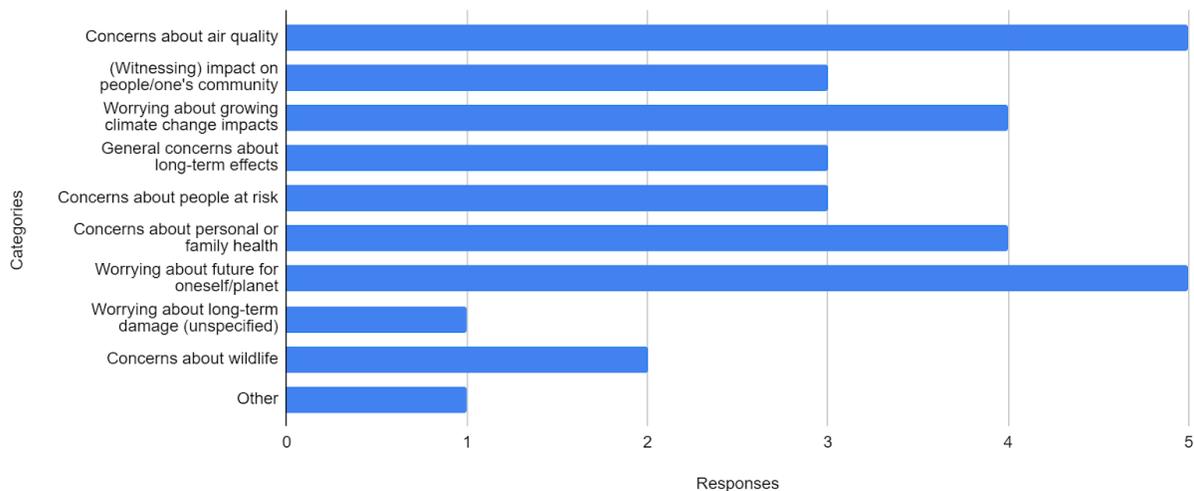


Figure 13. *Personal concerns.*

### *Awareness and Perceptions of Changes in Wildfires*

Regarding changes in wildfires over their lifetimes, about 77% of respondents acknowledged noticeable changes, mainly in the frequency and intensity of wildfires. Only 15% reported not seeing or hearing about any significant changes.

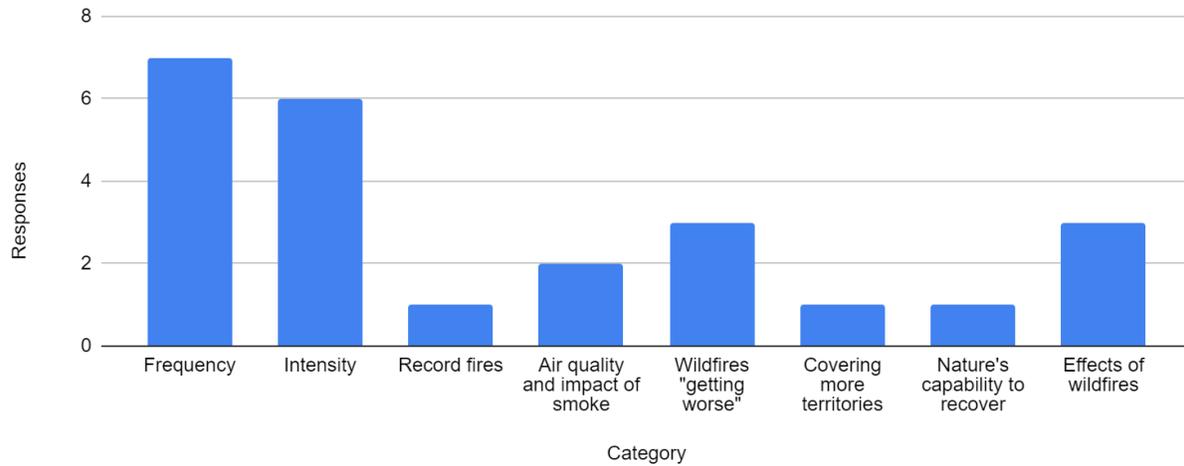
*“The frequency and size of wildfires seems to be increasing with time.”*

*“Fires getting bigger and more frequent.”*

*“The frequency and size of wildfires seems to be increasing with time.”*

What changes have you seen or heard about?

n=21



*Figure 14. Perceptions of changes in wildfires.*

The majority of respondents attributed the changing impact of wildfires on communities to human-led factors, such as poor management and development in woodland areas. Some mentioned carelessness with fire in wilderness areas as a contributing factor.

*“Human management and development in woodlands and other wildlands. Human activity that drives climate change.”*

*“Perhaps people are not careful with fire and may be careless when they are in the wilderness.”*

*“Human actions.”*

*“Probably because of climate change and the decisions people make that concerns the nature that surrounds that.”*

## Why do you think the impact of wildfires on our communities is changing?

n=24

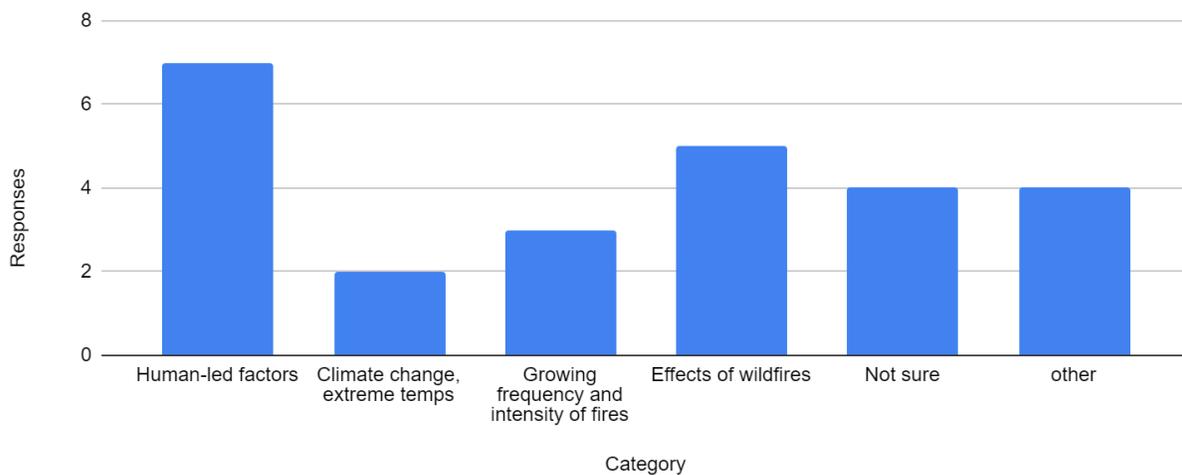


Figure 15. *Perceived causes of changing impact of wildfires on communities.*

### Focus group

#### Setting and subjects

For this activity, the WHH evaluation team recruited adult-youth pairs (youth ages 14-18) through MESA, Metropolitan Family Service, and Adelante Mujeres to participate in an in-person focus group at OMSI on March 23, 2024.

The team had prepared 10 open-ended questions to find out about participants' personal experience with the topic of wildfires, learn about their perspectives on changes in wildfires over time, and discover what concerns they have and what action they would like to see.

Table 2. *Focus group discussion questions.*

<b>Ice breaker</b>	A memorable experience with wildfire/smoke
<b>Looking back</b>	How have wildfires changed over the years? Why do you think these changes are happening?
<b>Looking forward</b>	How do you think wildfires will change moving forward in the next 10 years?

	What concerns do you have? Who is most at risk?
<b>Taking action</b>	What actions would you like to see to address these concerns? Who is responsible for taking those actions?

On the day of the focus group, the evaluation team met the participants in the museum lobby and led them to the classroom that had been set up for the focus group.

A total of 14 people (8 youth and 6 adults) attended the focus group.

#### Data collection and analysis

One of the evaluation team served as facilitator, posing questions and guiding the conversation. Two members of the evaluation team were taking written notes of the discussion. The participants' responses were analyzed for topics and themes.

Hand-written notes were transcribed into a Word document by an evaluation team member. Qualitative data in the form of responses to open-ended questions were recorded by question and then categorized into themes. Specific quotations were selected from open-ended responses in the data to illustrate representative ideas and themes in this report.

#### Findings

##### *Ice breaker*

As an ice-breaker, the participants were invited to share their memorable experiences with wildfires and smoke. Except for a few youth who had no personal experiences to share, the majority recounted events, particularly the wildfires of 2018 and 2020. Some adults described severe smoke conditions that kept them from going outside and having to place damp towels on air vents. Others shared the feeling of being scared and worried about the future wondering "what more could come of fires like this."

##### *Looking back*

Reflecting on how wildfires have changed over time, long-term residents of Oregon noted that summers were not as hot and intense as they are now. One woman recalled growing up in the 60s and not experiencing such extreme heat or frequent wildfires.

Most of the youth had little to share about the past, though one girl mentioned the current intensity of the heat in summer and expressed concerns about future restrictions on activities like fireworks due to extreme temperatures.

A girl with family in Malaysia compared their experience, noting the more humid, rainier conditions in summer there. “But here, summers are so dry, and I think we never feel the relief,” she said.

When asked why they think the changes in wildfires are happening, the participants discussed various factors contributing to this. One adult referred to the example of the town of Paradise in California, that suffered from a devastating wildfire, questioning urban planning and construction policies and their potential contributions to the increased risk of wildfires. Others pointed out the increased human expansion into what previously used to be wild areas, reducing natural fire breaks. The maintenance of electrical equipment and forest management policies were also mentioned as significant factors impacting the changes in wildfires.

### *Looking forward*

When discussing future outlooks, most participants agreed that the situation “will get worse” given lack of awareness about the problem and hence actions to address it both on the individual level and executive level. Along with the lack of awareness, mere human carelessness, such as irresponsible camping practices, was mentioned as one of the factors affecting the spread of wildfires.

All adults in the group also recalled the Smokey Bear educational campaign, expressing regrets that now there is no education like that, “at least whatever education there is, it’s not as public.” In this regard, one of the adults mentioned the power that social media currently has on shaping people’s day-to-day agenda and how that could play a vital role in spreading awareness and influencing behaviors.

One of the youth expressed a concern that if things keep changing at this rate, it’s going to become a new normal.

Participants were asked what concerns they have about wildfires and who is most at risk. As participants were articulating their concerns, the facilitator wrote down their ideas summarized into categories on large sheets of chart paper that were then put up on the walls around the classroom.

Participants identified several groups at high risk in wildfire scenarios, including young kids, individuals with health issues, wildlife, agricultural workers, Indigenous populations, the resort industry, and the homeless.

*“How will kids and teens cope?”*

*“Kids of future generations having to live like this is concerning.”*

*“Babies’ and younger kids’ health - their lungs are still developing.”*

*“How will exposure to smoke and the effects of not being able to be outside and socialize affect their development? They learn so much better in person.”*

*“I think about the homeless communities- How are they affected?”*

*“Heat Islands. How trees are being taken down to build developments.”*

*“The species’ habitats are being destroyed, they have no safe space to run to.”*

*“Tribal communities - their reservations are put on land that has been undesirable. What rights do they have, do they have access to resources and money from the Federal Government?”*

On a personal level, many shared concerns about their mental health. The conversation also highlighted the emotional stress and self-centered behaviors that intensify with the extreme conditions (including temperatures).

*“ I think about my mental health, I don’t know how much I and others are being affected.”*

*“I don’t just want to be sitting in my room alone, worried and not going out, wearing masks is hard.”*

*“There tends to be more road rage, and people are just looking out for themselves-keeping cool and hydrated.”*

*“People seem desperate when the heat kicks in.”*

The categories below summarize the participants’ responses regarding their personal concerns and potential at-risk groups:

Table 3. Summary of identified concerns and at-risk groups.

<b>Concerns</b>	<b>At-risk groups</b>
Being stuck inside, not being able to enjoy the outdoors	Farmers/agricultural workers/outside workers
Mental health	Tribal groups, Indigenous populations
Health of babies and young kids	Future generations
Asthma/heart problems	Homeless
Wildlife	
Emotional stress	

Loss of forests/land	
Increased heat (heat islands)	

Participants were then asked to consider what actions they would like to see to address the concerns identified and who is responsible for taking those actions. For this question, the focus group participants were asked to write down their ideas on post-it notes and place them under the corresponding category on the chart paper (see Appendix F for the full transcript of responses).

The responses suggested improvements in healthcare access, wildfire awareness, land use regulations, and inclusion of indigenous voices in policymaking. Federal, state, and local governments, media, and local organizations were identified as key entities responsible for implementing these changes. One of the participants expressed his concerns about the term “climate change” sounding politically charged and suggested that it should be removed from the conversations.

Once the participants were done with the post-it exercise, they got back together as a group for a short debrief. As most responses regarding the solutions to the problem called out some sort of official entities, the facilitator followed up on that by asking participants to reflect on their personal and family roles in addressing wildfire challenges. Suggestions included reducing waste, driving less, and engaging more with community members during critical times.

*“Stop food waste. Be aware who we buy from, what we buy; before ordering on Amazon wait until you have more items to order.”*

*“I personally could drive less, not turn on my AC.”*

*“I’m thinking about how I can connect better with my neighbors, be mindful of what they need, how I can help them in critical times.”*

*“We feel desensitized if it may be in another state or country. We need to think of it as a bigger picture.”*

In concluding the discussion, participants were invited to share what they personally would like to see in the future exhibit. The proposed ideas included showcasing indigenous practices in wildfire management, tools used by firefighters, and interactive features to illustrate the changing climate. These ideas aim to educate and engage the public in understanding and addressing the challenges posed by wildfires.

*“How can indigenous practices help mitigate how often fires are happening?”*

*“It would be interesting for the exhibit to show supplies, tools, etc. that firefighters use to help control wildfires.”*

*“It might be cool to have an interactive feature to feel how the climate has changed over the years-like how it felt before, since climate is changing so much now, to feel the difference.”*

## **Conclusions and recommendations**

Based on the analysis of the data gathered from the card sort activities, several trends can be identified among the survey respondents regarding their chosen topics of interest, concern, and relevance.

“Climate change impacts” appears across all three categories, indicating a consistent interest, concern, and perceived relevance. This suggests that participants are aware of climate change as a significant issue but may need more specific information about its effects and the human contributions to it. “Fighting wildfires” is also present in all three categories, indicating a high level of engagement with immediate, actionable topics. This reflects a desire for knowledge on how to directly address and manage wildfire situations. “Wildfire health impacts” and “Protecting your health” are both concerning and relevant, which highlights a trend where health-related issues directly impacted by wildfires are both a priority and personally significant to the participants.

Analysis of participants' comments about climate change through various evaluation activities revealed that while “Climate change impacts” is a topic of interest, concern, and relevance, there appears to be a gap in understanding the direct connection between increased wildfires and climate change. In turn, while frequently linking climate change to human activities, participants showed a lack of knowledge about the specific mechanisms through which human actions contribute to climate change. This suggests a need for targeted educational efforts that clarify these connections.

Additionally, comments from the focus group discussion indicated some confusion or conflation between the wildfires of 2020 and the COVID-19 pandemic, which was particularly severe at the same time. This overlap in timing may have influenced participants' perceptions and memories related to each separate event. While this conclusion does not necessarily apply to other study participants, exhibit developers should still be aware that the same misconception might have affected, for example, how the survey respondents rated and prioritized their concerns.

Based on the identified insights from the front-end study data, the WHH evaluation team recommends that exhibit developers:

- Clarify the link between human activity and climate change
- Focus on practical information on what individuals and communities can do to prevent and respond to wildfires
- Highlight health impacts (including both short- and long-term impacts), given the concern over "Wildfire health impacts" and "Protecting your health" topics.
- Address misconceptions and conflation of events. Finding a way to distinguish between different types of emergency situations could help clarify misconceptions and provide a clear understanding of the unique challenges caused by each.

## Appendix A. Comments on the graffiti wall

### Adult comments:

- Reforestation efforts need to be more publicized. More volunteer campaigns
- Evacuation preparedness - concerns for the population
- What steps are being taken to mitigate fire risk near populated areas
- Difference between the natural fire cycle and the new trend of fires - related to climate change?

### Youth comments:

- Is there a possibility to grow trees resistant to fire? If so, what would the consequences be?
- What are the top two major factors resulting in wildfires?
- What are the long term effects of wildfire on industries that handle lumber?
- Como prevenir los incendios, para que no poison, tener la herramienta educar para no respirar humo malo [How to prevent fires, so that they do not [poison], have the right tools to keep from breathing bad smoke]

## Appendix B. Post-it exercise with partners

### What is something that you think visitors need to know about wildfires & health?

- Health Impacts
  - You can experience health impacts from fires that are far away
  - Why is wildfire smoke bad for you
  - Health hazards
  - Impacts on health
  - Who is at greater risk? Why?
  - Impact on environment (source of food, home, relaxation)
  - these are significant mental health impacts that can have long-lasting consequences
  - There are numerous factors to weigh when protecting ourselves against wildfire smoke. Each person's risk is different
- Visitor Awareness
  - Why should visitors care (scale of problem/increasing frequency)
  - Visitors should learn how native and indigenous folks have approached/used wildfires on their land throughout millennia
  - Visitors need to know how they are impacted now
  - That wildfires are "closer to home" than you may think
- Protection and Mitigation
  - What can you do to protect your health?
  - Actions visitors can take to mitigate and reduce negative effects of wildfires?  
Community action?
  - This issue has proven solutions, if society chooses to act
- Resilience and Adaptation
  - Stories of resilience
  - How are wildfires good for forests or wildlands?
  - The health of our forests are directly connected to the health of our communities
- Causes and Consequences
  - Wildfire is not inherently bad
  - What can we do to keep wildfires from happening?
  - Smoke from wildfires is here to stay. It is now a choice of how and when we want it.
  - Why is suppressing all wildfires not a good idea?
  - Why are wildfires getting worse
- Climate Change
  - Climate change has made wildfires more severe and frequent
  - climate change
- Displacement and Inequality
  - Special implications from displacement

- Impacts are not equitably experienced
- Community level action is needed
- How to deal with displaced wildfire
- Helping Vulnerable Populations
  - How can you help vulnerable people?
  - Everyone is impacted, but there are massive disparities on who is most harmed
- Preparation and Resources
  - How to build resilience in our family, community, emergency procedures
  - What "everyday" items needed to be kept at home to keep ourselves safe from smoke?
  - Disaster preparedness
  - Resources
  - How to recognize when it's time to evacuate and how to effectively do so
  - For some where to get resources once Panic sets in -packing list, -local resources, -cataloging, -recommendations from those who went through it
  - Framework Context ( climate changes human cause ) The Plan ( kids, houseless, community) The fight ( fire suppression, firefight ) The recovery (waste removal, ecosystem ecosystem aftermath, water, food, soil)

## What are some ideas or activities to communicate these to audiences?

- Activities
  - Playing with opposites Fire suppress <-> ???
  - Hands-on activity each geared towards toddlers/children, middle schoolers, and high schoolers
  - Build a fire-adapted model home
  - Exhibit to feel heat and experience smoke
  - Pack your "go" bag activity
- Education and Awareness
  - Stories of adaptation and resilience
  - Real stories from people who have direct experience
  - Interactive showing how smoke can travel and impact various communities, adding historical data for reference
  - Interactive/engaging timeline that shows the events (natural and human-provoked) that got us to now and then alternate future realities based on our actions or lack thereof
- Technology and Data
  - Asynchronous ArcGIS Story Maps
  - Asynchronous visualization of fast data for comfort, CalTopo fire history/activity
  - Earth Null school net!!!! Global how?
- Takeaways and Call to Action
  - Have some sort of takeaway, such as a wristband with a QR code or hotline to learn more about wildfires

- Ideas to get involved air filters, air quality monitors, sensors
- Demos
  - Oxygen fire demo
  - Smoke filter before/after
- Educational Content
  - Compare size of 2.5 pm particles to other particles - why they are harmful
  - Show what materials filter 2.5 pm particles with models
- Personalized Experience
  - Add weights to the system that add smoke, health risks, age, resources, health conditions
  - Interactive on making your own choices to protect yourself from smoke, dependent on your risk level
  - Sharing of personal stories (video or in exhibit)

### **What do you want to find out from audiences before starting the project?**

- Personal Experience & Advice
  - What experience have you had?
  - For those who have gone through wildfires, what advice do they have for others? What do they undervalue?
  - What are cultural perspectives? Practices?
  - How have wildfires affected you?
- Information Delivery
  - How do people best connect with information? Stories? Statistics?
  - How best to deliver resources?
- Health Risks & Protection
  - What concerns do you have about wildfire?
  - How do you protect yourself from wildfire smoke?
  - How do you think you can protect yourself and community from wildfires and wildfire smoke?
  - What is your perceived risk from wildfires => people from various locations?
  - Who do you know that is vulnerable (their health or circumstances makes it more likely that smoke will harm)
- Exhibit Design & Content
  - What do you want to see, feel, touch?
  - What will make you feel welcome?
  - How important do folks consider their health to be, and do they consider wildfires an imminent threat?
  - What does a successful exhibit look like?
- Audience Knowledge & Interest
  - What do audiences already know about wildfires and their health? How to fill in the knowledge gaps?

- What stories do you want to hear?
- What parts of the topic would drive attendance? Would visitors prefer an exhibit on wildfires, health, disaster, climate change, etc.?
- What do you think are the main causes of wildfires?
- Do they already care about this issue, or is our goal to get them to care?
- How do you think we should respond to wildfires?

### **What are some fun or engaging ways to get this information?**

- Creative Expression
  - Draw a fire self-portrait
  - Record a story
  - Extension activity photo voice of experience
- Interactive Activities
  - Scavenger hunt with props
  - Ongoing self-directed input stations
- Wildfires and the Community
  - Success stories visualizing houses that made it
  - Where did the smoke come from? maps of fires and where smoke went locate yourself on a map
- Emotional Connection
  - Do front end eval on days of high smoke => Elicit a lot of response

## Appendix C. Cards illustrating wildfire topics



## Appendix D. In-person card sort data collection script

Date / Time: \_\_\_\_\_ Data Collector: \_\_\_\_\_ Group #: \_\_\_\_\_

Group ages: 0-2\_\_\_\_ 3-5\_\_\_\_ 6-8\_\_\_\_ 9-11\_\_\_\_ 12-14\_\_\_\_ 15-18\_\_\_\_ 19-25\_\_\_\_  
26-49\_\_\_\_ 50+\_\_\_\_

(↑ Write M for each male, F for each female, X when no guess is made)

**Recruitment Script:** Hello, my name is \_\_\_\_\_. OMSI is developing a new exhibit about Wildfires and their impact on human health, and we would like to hear your thoughts about the topic - what interests you and what you would want to learn about. Hearing what you think can help us make a better exhibit. We're conducting a brief card sorting activity today, in which we're asking you to organize the following images into specific categories.

This should take about 5 minutes of your time, and we encourage you to think out loud as you do the sorting. Please remember there is no right or wrong order, we're just learning what people think about the topic, and your responses may help to inform our decisions about the future exhibit.

### **Sort I**

Step 1. Put the cards into three categories according to what interests you about wildfires. **Only 3 cards can go into each category.** Please share your thinking aloud as you do.

Very interesting	Somewhat interesting	Less interesting

Step 2. Within the "Very interesting" category, put the cards in the order from "most interesting" (top) to "least interesting" (down).

**Questions:** [indicate the topic they ordered first]

What sorts of things would you like to learn about this topic?

**Final questions:** Have you seen any changes in your lifetime or have you heard people talking about how wildfires have changed?

- Yes? How?
- Why do you think it's changing?

Thank you for your time and for helping us with this new exhibit. Do you have a minute to tell us about your group? [offer clipboard with demographics sheet]. Thank you again. Would you like a sticker or tattoo? Enjoy your day!

**Sort II**

Step 1. Put the cards into three categories according to what concerns **you** about wildfires. **Only 3 cards can go into each category.** Please share your thinking aloud as you do.

Very concerning	Somewhat concerning	Less concerning

Step 2. Within the “Very concerning ” category, put the cards in the order from “most concerning” (top) to “least concerning” (down).

**Questions:**

Why is this topic a concern for you?

Why do you think it is important for people to know about this topic?

**Final questions:** Have you seen any changes in your lifetime or have you heard people talking about how wildfires have changed?

- Yes? How?
- Why do you think it’s changing?

**Sort III**

Step 1. Put the cards into three categories according to the relevance of the topic of wildfires for your own life. **Only 3 cards can go into each category**. Please share your thinking aloud as you do.

Very relevant	Somewhat relevant	Less relevant

Step 2. Within the “Very relevant ” category, put the cards in the order from “most relevant” (top) to “least relevant” (down).

**Questions:**

How is this topic relevant to your life?

**Final questions:** Have you seen any changes in your lifetime or have you heard people talking about how wildfires have changed?

- Yes? How?
- Why do you think it’s changing?



## Appendix E. Online card sort questions

### Wildfires and Human Health Survey

1. Which MESA region are you in?

Portland Metro Area (Washington County, Multnomah County)

South Metro/Salem (Clackamas County, Marion County)

Eugene/Springfield (Lane County)

Klamath Falls

In this survey, you will be presented with the nine topics related to wildfires you see below. You will rate how INTERESTING, RELEVANT and CONCERNING each topic is for you.



## I. INTEREST

- 1) How INTERESTED are you in learning about each of these topics?

Click on the picture and drag it to the appropriate category by positioning your cursor in the box under the category label. No more than three images per category, please.

Categories: Very interested, Interested, Somewhat interested, Not interested.

- 2) Which topic are you most interested in learning more about?

Land Recovery

Wildfire health impacts

Restoring and protecting wildlands

Protecting your health

Protecting at risk people

Climate change impacts

Wildfire mental health impacts

Fighting wildfire

Record breaking wildfires

- 3) What sort of things would you like to learn about that topic?

## II. RELEVANT

- 1) How RELEVANT are each of the following topics to your life? Which have the most impact on your life? Click on the picture and drag it into the appropriate category. No more than three images per category. Categories: Very relevant, Relevant, Somewhat relevant, Not relevant.

- 2) Which topic is most relevant to you?

Land Recovery

Wildfire health impacts

Restoring and protecting wildlands

Protecting your health

Protecting at risk people

Climate change impacts

Wildfire mental health impacts

Fighting wildfire

Record breaking wildfires

3) How is this topic relevant to your life?

III. CONCERNING

1) How WORRIED are you about each of these topics? Click on the picture and drag it into the appropriate category. No more than three images per category. Categories: Very worried, Worried, Somewhat worried, Not worried.

2) Which topic are you most worried about?

- Land Recovery
- Wildfire health impacts
- Restoring and protecting wildlands
- Protecting your health
- Protecting at risk people
- Climate change impacts
- Wildfire mental health impacts
- Fighting wildfire
- Record breaking wildfires

3) Why is this topic a concern for you?

IV. Have you seen any changes or have you heard people talking about how wildfires have changed in your lifetime?

- Yes
- No
- I'm not sure

V. What changes have you seen or heard about?

VI. Why do you think the impact of wildfires on our communities is changing?

OMSI will be hosting 1-hour focus groups where we gather families and students in a group setting to answer questions and give us feedback that will help MESA and OMSI develop a new exhibit about Wildfires and Human Health. The focus group will be held at our museum in Portland. After the focus group, participants will be free to explore OMSI for the rest of the day.

Would you be interested in being part of a focus group?

- Yes
- No

If yes, please provide your contact information below:

Name

Age

Email address

Telephone number

Thank You!

Thank you for taking our survey. Your response is very important to us.

## Appendix F. Focus group participants' responses in the "taking action" activity

What concerns do you have?	What actions would you like to see?	Who is responsible for taking action?
Stuck inside, can't enjoy the outdoors		
Mental health	<ol style="list-style-type: none"> <li>1) Mental health counseling</li> <li>2) Free therapy for people in stressful situation</li> </ol>	
Lack of social interaction		The government. They should focus more on wildfires than other stuff.
Babies/young kids	<ol style="list-style-type: none"> <li>1) More money to research solutions to fire mitigation to cut down on fires</li> <li>2) Improved focus on care of infants and elderly groups</li> </ol>	
Farmers/agricultural workers	<ol style="list-style-type: none"> <li>1) Farm in a more sustainable way, as well as consume in a more mindful way. Reduce food waste, compost.</li> <li>2) Incentivise local community farms</li> <li>3) being proactive</li> </ol>	<ol style="list-style-type: none"> <li>1) local gov + residents</li> <li>2) local community, city council, local organizations, non-profits.</li> <li>3) agricultural systems</li> </ol>

	4) universal healthcare for all three of these (babies/kids, farmers, tribal groups)	
Tribal groups/Indigenous populations	<p>1) don't design for them, but with them; support for tribal community both financial and also access to resources: jobs, education, housing, medical, etc.</p> <p>2) build better relationship with tribes to help improve essential resource access</p> <p>3) include them in all decisions on how to safe/restore/support forests or other lands/water ways.</p>	<p>1) state and federal government</p> <p>2) federal/state county</p>
Asthma/heart problems	<p>1) access to medical care for all</p> <p>2) free medical help for people without documents or insurance</p> <p>3) help people with medical/health problems. More funding and awareness so we all know how to support.</p> <p>4) universal healthcare</p> <p>5) making prototypes with CO2 &amp; VOC valves, making it easier for people wanting to know the outside kpt/CO2</p>	1) state+federal government
Future generations	<p>1) more events that are interactive for people to learn more about wildfires etc.</p> <p>2) more state and national regulation for land use+climate change</p>	
Wildlife	1) help wild life/forest	1) people responsible for the action. We need to help now.

	<p>2) give people tickets for making fires in the forest</p> <p>3) people should take out their campfire properly</p>	
Emotional stress (e.g. road rage, hoarding)	<p>1) free emotional help for people</p> <p>2) remove the term “climate change” or “climate emergency” from topic to mitigate political tribalism</p> <p>3) make a group meeting for people (in the library, etc.)</p>	2) politicians and media
Homeless	<p>1) more shelters for the homeless</p> <p>2) give food/shelter/clean clothes</p> <p>3) water access in the streets. In the summer a lot of the outside taps and faucets don't work or are turned off by the city. If they were on, we'd ensure that more people drink water to stay hydrated. Donating more water/drinks to local shelters and non profits to ensure that the homeless population gets access to water.</p> <p>4) you can donate stuff that you don't want no more or just have no use for it</p> <p>5) the government should help homeless with a place to live</p> <p>6) help unhoused people. Support those that want to re-enter social life, work and become self-sufficient again</p>	

	7) the government being concerned about Tik Tok and not wildfire issues, mental health awareness and homelessness.	
Loss of forests/land	1) protecting forest land	1) legislators, community putting resXX [illegible] through.  2) people who start intentional fires for fun.
Increased heat (heat islands)	1) limit amount of urban development  2) invest in reforestations in urban regions	1) city/country/state  2) city/country
AG workers/outside workers	1) financial compensation when they can't work due to outside conditions	1) state+federal government

# Wildfire and Human Health Front-end Evaluation Supplement

Following the completion of the Front-end Evaluation report, a second focus group was conducted. This supplement summarizes the activities and findings from that work.

## Setting and subjects

On May 17, 2024, the WHH evaluation team conducted a focus group with MESA students from Klamath Falls who were attending an Oregon-wide MESA Day held on the PSU campus. The participants had been recruited through MESA in advance and had completed their consent forms prior to the day of the focus group.

The evaluation team used the same set of questions as for the first focus group, excluding the “Looking back” section (see Table 2), with the same objective to find out about participants’ personal experience with the topic of wildfires, learn about their perspectives on changes in wildfires over time, and discover what concerns they have and what action they would like to see.

The focus group was scheduled for 8.30 am in one of the classrooms in the Viking pavilion, and the evaluation team had set up the room prior to the students’ arrival. A total of 14 middle school youth attended the focus group.

## Data collection and analysis

One of the evaluation team members served as facilitator, posing questions and guiding the conversation. Two members of the evaluation team were taking written notes of the discussion. The participants’ responses were analyzed for topics and themes.

Hand-written notes were transcribed into a Word document by an evaluation team member. Qualitative data in the form of responses to open-ended questions were recorded by question and then categorized into themes. Specific quotations were selected from open-ended responses in the data to illustrate representative ideas and themes in this report.

## Findings

### *Ice-breaker*

As an ice-breaker, the participants were invited to share their memorable experiences with wildfires and smoke. Many participants appeared to have had firsthand experiences with wildfires, ranging from smoke pollution affecting daily activities to near losses of homes. These personal stories illustrate the immediate impact of wildfires on individual lives:

- “Klamath fire: giant flames of smoke.”
- “I remember one time I was going to swim in the pool, and there was ash in the pool, and we couldn’t swim. It was about two years ago.”
- “I remember visiting grandma in Salem, and how much smoke there was, the sky was red. It was 2-3 years ago.”
- “No specific experience. It gets really smoky sometimes from the wildfire smoke.”
- “I remember how smoke kept me up at night, I couldn’t sleep with all the smoke pollution in the air.”
- “My friend’s house in Klamath Falls almost burnt down. It was at the beginning of this school year.”

### *Looking forward*

When discussing how wildfires will change in the next 10 years, there seemed to be a general consensus among the youth that wildfires could become more severe in the future. This perception appears to be based on observed recent changes like warmer summers and longer dry seasons. Participants expressed the idea that by taking preventive measures, such as clearing brush and managing forests more effectively, the frequency and intensity of wildfires could be diminished.

- “Most likely, we’ll have better tools for stopping them.”
- “ If people don’t start clearing the brush; it’s just gonna build up, leading up to a bigger wildfire. If people don’t take any preventative measures, it’ll get worse. They have to clear the debris around their houses.”
- “We can help diminish the bigger wildfires with controlled fires”.
- “It might get worse because of all the oils and stuff from cars.”
- “ It will get worse, because it gets really warm now.”
- “They’ll get bigger, because we’re not really managing the forest.”
- Scott: Do you think summers are warmer now than they were when you were younger?  
The students: Yes! The dry season is longer now.

When asked to reflect on their own concerns associated with the growing impacts of wildfires, the youth shared the following ideas:

- “I might have lung disease because of the smoke, like lung cancer.”
- “People’s properties are burning down.”
- “People who already have heart/lung problems.”
- “Athletic performance: it’s hard to run, it’s hard to breathe when there’s smoke everywhere.”
- “The smoke blocking out the sun; forest and ecosystems will burn.”
- “Animal population is going down, and their environment/habitat will burn down.”
- “Smoke in the air/air pollution - and it plays a role in global warming.”
- “People inhaling ash from the smoke.”

- “Ash will impact the soil.”

As participants were articulating their concerns, the facilitator wrote down their ideas summarized into categories on large sheets of chart paper that were then put up on the walls around the classroom. Next, the youth identified several groups that are at high risk in wildfire scenarios, demonstrating an awareness of the risks to specific vulnerable populations, such as the elderly, children, farmers, and those with pre-existing health conditions:

- “Farmers who are outside all day”
- “Older people/seniors”
- “People with breathing problems”
- “People who smoke”
- “Children and babies”
- “People who grow their own food in their garden (homesteaders)”

After that whole-group discussion, the students were asked to consider what actions they would like to see to address the concerns identified and who is responsible for taking those actions. For this question, the youth wrote down their ideas on post-it notes and placed them under the corresponding category on the chart paper. Overall, the group identified various actionable steps to address the risks of wildfires (see Table S1 for the full transcript of responses). The most common suggestions included improving property maintenance to reduce fire hazards, implementing community-wide preventive measures like sprinkler systems, and enhancing personal preparedness through activities like installing air filters at homes. Responsibility for these actions is seen as shared among individuals, local governments, and businesses.

<b>What concerns do you have?</b>	<b>What actions would you like to see?</b>	<b>Who is responsible for taking action?</b>
Smoke in air, pollution, global warming	1) air filters in houses, buildings, stores so air pollution gets better  2) people listening to the pollution signs would decrease the effect of pollution	1) Fred Meyer should do it because they're rich  2) people
Inhaling ash	n/a	n/a
Soil affected by ash	1) clear the yards  2) use green houses	1) us  2) people who sell farm supplies
Outdoor athletics	move outdoor activities inside if you can, do health checks before and after	schools and people in charge of sports

Smoke blocking the sun	n/a	n/a
Animal population down	<p>1) keep an eye on animal population and step in if an alarming amount are dying at once</p> <p>2) manage the forest controlled burns, some logging and plant removal, so fire burns slower and harder to catch on</p> <p>3) forest floor clean-up, prescribed burns to keep the forests from burning.</p> <p>4) more vet hospitals and/or recovery vet hospitals for wild animals. Donations people can sign up for.</p>	<p>1) wildlife rescuers, park rangers, national park services</p> <p>2) government and forest services' responsibility</p> <p>3) forest service, funded by US government</p> <p>4) volunteers and vets get hired to help animals.</p>
Lung disease	<p>1) get air filters for everyone</p> <p>2) most likely, we will need medicine of some kind to protect us from lung disease from wildfire smoke.</p> <p>3) wear masks, get a filter for your house</p>	<p>1) Home Depot</p> <p>2) I think that medicine companies would be responsible for this</p>
Property burning	<p>1) picking up dead grass and things alike for at least an hour or two every month, ordered by community laws</p> <p>2) preventative measures</p> <p>3) brush and debris clearing</p> <p>4) have sprinkler systems in all buildings</p> <p>5) water round house, sprinklers</p> <p>6) kill weeds, but purposefully</p>	<p>1) people, local governments</p> <p>2) by the people as a whole</p> <p>3) by the owners [homeowners]</p> <p>4) construction workers would have to install the sprinklers</p> <p>5) home companies/homeowners</p> <p>6) everyone gets</p>

	<p>burn ends of grass so if a fire comes it can't cross over.</p> <p>7) build a defensible space around property</p> <p>8) if there is a fire, take proper safety precautions, educate yourself on how close it is; get rid of dead plants like brush, turn on sprinklers, etc.</p>	<p>sprinklers/everyone can do this.</p> <p>7) the people</p>
At risk health	<p>1) go outside only when needed/wear masks</p> <p>2) make it a policy for hospitals to have air scrubbers and ventilation for patients.</p> <p>3) at-risk people should speak with their doctor or health provider to make sure they're safe from pollution or discuss options to keep themselves safe.</p>	<p>2) funded by state government</p>
Farmers (work outside)	<p>1) farmers who need help should be able to rely on people</p> <p>2) people could pick up ash that collects on top of soil and makes it hard to grow food</p> <p>3) farmers could use respirators to breathe when outside</p> <p>4) allow more water access to farmers so they have enough to put fires out and grow crops.</p>	<p>3) the CVS should get this</p> <p>4) Indians should share water</p>
Older people	<p>1) older people can just stay inside</p> <p>2) filters for people in places</p>	<p>2) state government. I think</p>

	where wildfires happen a lot	they should be the ones to provide the supplies to get the filters or the money to do so.
Breathing problems	1) having sprinklers at every home and park provided by places who claim they care	
Smokers	1) get rid of the vapes and cigarettes 2) make healthy vapes and stuff	1) smoke shops 2) vape producers should put it on
Children	children can wear masks outside while playing	Ridaid [Rite Aid-?]
Homesteaders	1) giving good care to all sources of land (grassy areas) 2) they could have green houses for all their crops and proper materials, and tools if needed	1) people

Table S1. Notes from the post-it exercise.

The focus group also highlighted the need for broader community and systemic actions to address the increased impact of wildfires caused by climate change. Youth shared the ideas that included reducing the use of harmful chemicals, increasing recycling, and expanding green spaces:

- Get rid of the harmful chemicals and the cars, “cut down on how many we use.”
- Recycle
- Don’t use much plastic
- Use nuclear energy instead of oils and gas
- Plant more green spaces, more trees that can provide shade
- Keep grounds clean and clear so fires won’t start/spread

The youth’s responses to the final question - “What would you like to see in the exhibit?” - revealed a clear interest in learning more about the prevention of wildfires, their ecological and health impacts, and the role of community actions in mitigating these effects. In addition, participants expressed interest in exhibits that show the effects of wildfires on animal habitats,

historical perspectives on wildfires, and interactive elements that illustrate the consequences of inaction:

- The effects on the bodies [health impacts]
- What happens to animals' habitats because of the wildfires, what they go through during and after wildfires
- Something for people to read more about how they can help prevent wildfires
- Show what will happen if people don't take actions [before/after]
- Historical wildfires
- Show what areas are most at risk
- The different kinds of fires (in severity)

The findings from the second focus group complement and deepen the insights from the first in several key aspects:

- Direct experience and immediate impact. The second focus group participants' shared considerably more examples of personal experiences with wildfires, such as smoke affecting their daily activities, which highlights the immediate impact of wildfires on individuals who have experienced them firsthand.
- Understanding of climate change. While the first group acknowledged climate change impacts but showed gaps in understanding the connections between human activities, climate change, and increased wildfires, the second group also demonstrated a similar pattern but with a slightly better grasp of preventive measures that could mitigate these effects, such as reducing harmful chemicals and expanding green spaces.
- Health concerns and actionable steps. Participants in both groups expressed concerns about health impacts of wildfires. However, the second group articulated the importance of taking action for one's personal preparedness against health risks, such as using air filters and wearing masks. They also identified broader community and systemic actions needed to address the increased impact of wildfires, with an emphasis on shared responsibility among individuals, local governments, and businesses to implement these measures.