Appendices for the 2024 Marion-Polk Regional Environmental Scan Assessment

Contents

Appendix A: Community Survey (Instrument)

Environmental Hazards and Threats Survey

WILLAMETTE UNIVERSITY

Marion County OREGON Health & Human Services

POLK COUNTY HEALTH SERVICES

Willamette University, Marion County Health & Human Services (MCHHS) and Polk County Health Services have partnered to understand Environmental Health Hazards and Threats (EHHTs) affect peoples' health.

EHHTs include events and situations such as:

- wildfire and wildfire smoke
- air quality
- infectious disease from mosquitoes and other vectors
- extreme storms
- extreme heat and heat waves
- storm and heat impacts on water quality and quantity extreme heat
- weather-related power outages

This survey will ask you about some of your experiences with these issues while living or working in Marion and Polk Counties.

If you choose to participate, this survey will take approximately 15 to 20 minutes. Your participation can help us to better understand the capacities, needs, and challenges of our climate and natural environment. It will ultimately help improve communication channels between organizations and vulnerable individuals and households.

You MUST live or work in Marion or Polk county AND be over 18 to be eligible to participate in this survey.

Details of Informed Consent

All answers will be anonymous with no email attached to the answers. There may be some discomfort in remembering challenging events. There are no additional anticipated risks to your participation.

In recognition of the time taken to complete the survey, you can enter into a raffle for one of two $50 Amazon gift cards. Any contact information you enter for the raffle will be kept separate from your answers and removed after submission. This will keep your answers anonymous.

This survey has been approved by the Willamette University Institutional Review Board. If you have any questions, please direct them to:

Dr. Nicole Iroz-Elardo, Assistant Professor of Public Health

nirozelardo@willamette.edu | 503-370-6306

Dr. Melinda Butterworth, Associate Professor of Environmental Science

mkbutterworth@willamette.edu | 503-370-5752

Dr. Michael Lockard, Chair of Willamette University's Institutional Review Board

irbchair@willamette.edu | 503-370-6658

Your participation in this project is completely voluntary, and there is no penalty should you refuse to participate.

You may further withdraw from this project at any time without penalty.

Yes, I consent and want to begin this survey.

No, I do not consent (Please do not continue this survey)

1. How long have you lived in Marion and/or Polk county?

< 1 year	5-10 years
1-2 years	10+ years
3-4 years	I do not live in Marion and/or Polk county

2. If you do not live in Marion or Polk county, do you work and/or go to school in either Marion or Polk county?

Yes

No* (Remember, you must live or work in Marion or Polk County to be eligible for this survey)

3. How old are you?

<18 (you are not eligible)	45-54
18-24	55-64
25-34	65-74
35-44	75+

4. Which of the following characteristics apply to you or someone in your household? (Select all that apply).

Experiences an underlying medical condition (diabetes, cardiovascular disease, asthma/COPD, etc.)

Experiences a physical disability / is physically disabled

Experiences an intellectual disability / is intellectually disabled

Experienced homelessness in the past year

Works in a job that is outside or not in air conditioning at least 50% of the time

Works as a frontline worker (firefighter, police, EMS, etc.)

Lives in a flood zone

Lives in a fire zone

5. What city do you live in?

(If you do not live in Marion or Polk County, answer this question about your work or school.)

Aurora	Grand Ronde	Saint Benedict
Aumsville	Hubbard	Saint Louis
Brooks	Idanha	Saint Paul
Butteville	Independence	Salem
Detroit	Jefferson	Scotts Mills
Donald	Keizer	Stayton/West Stayton
Dallas	Marin	Silverton
Falls City	Mehama	Sublimity
Gates	Monitor	Turner
Gervais	Monmouth	West Salem
Grand Ronde	Mount Angel	Woodburn

Hubbard	Rickreall	

Environmental Health Hazards and Threats Impact

For the next couple of sections of the survey, **we will be asking you about environmental health hazards and threats (EHHTs)**. Again, these are often weather events that disrupt daily life such as major storms and heatwaves. Other weather-related events such as longer, hot summers are also considered EHHTs. Some EHHTs are a bit more removed from weather such as harmful water algal blooms, droughts, wildfire, and the smoke that comes from the fires. All of these types of conditions are considered EHHTs.

6. On a scale of 1 to 5, with 1 being not at all and 5 being a great deal, indicate how you and your household were impacted by each of the following past events. If you did not experience these events, please leave it blank.

	1 (Not at all)	2	3	4	5 (Very)
Salem water crisis from harmful algal bloom (June 2018)					
Wildfire (Sept 2020)					
Wildfire smoke (Sept 2020)					
Ice Storm (Feb 2021)					
Heatwave (June 2021)					
Drought conditions (any time over the past 5 years)					

7. On a scale of 1 to 5, how concerned are you about the following environmental conditions and events impacting you or a member of your household in the next 5 years?

	1 (not at all)	2	3	4	5 (Very)
Heat Waves					
Air Quality					
Drought					
Flooding					
Long, hot summers					

High levels of pollen					

8. On a scale of 1 to 5, how <u>concerned</u> are you about the following environmental conditions and events impacting you or a member of your household in the next 5 years?

	1 (not at all)	2	3	4	5 (Very)
Poor Water Quality					
Weather-related Power Outage					
Severe Winter Storms					
Vector Borne (mosquitoes, ticks) diseases					
Wildfire					
Wildfire Smoke					

The next two questions **ask about communication and how you seek and receive information**. Information can include any media (TV, radio, internet), organizational (community, faith-based, or government), or personal (friend, neighbor) resources you might seek in order to understand the issue or problem, find resources, or get help.

9. Have you previously signed up for the <u>Marion and Polk County Emergency Alert System</u> for text notifications of emergencies?

Yes
No
I'm not sure

10. If an environmental event such as any we've been discussing occurred in the future, where or who would you turn to for information? (Circle all that apply).

TV	Friend
211	Neighbor
Radio	Community Organization
Internet	Faith-Based Organization
Social Media	Local Government Source
Phone/Text Alerts	Other _____

Environmental Events

We would like to ask you 6-8 questions about one of these environmental events. **Please choose the one that impacted your household the most.**

11. Which one would you most like to discuss with us in additional detail?

(Choose one, and proceed to the related page number. If you would like to fill out information on multiple events, you are welcome to)

Salem Water harmful algal bloom (June 2018) **-proceed to pg. 7**

Wildfire (September 2020) -**proceed to pg. 9**

Wildfire Smoke (September 2020) **-proceed to pg. 12**

Heatwave (June 2021) **-proceed to pg. 14**

Ice Storm (February 2021) **-proceed to pg. 17**

Drought (any time in the past 5 years) **-proceed to pg. 19**

I want to tell you about another similar event not listed. **-proceed to pg. 21**

I did not experience any of these**-proceed to pg. 23**

Salem Water Harmful Algal Bloom

12a. In your view, how serious a problem was the 2018 harmful algal bloom for your household?

Not a serious problem
Slightly serious problem
Moderately serious problem
Very serious problem
Extremely serious problem

12b. Did your household include any of these categories during the 2018 harmful algal bloom? (circle all that apply)

Under 6 years old
65+ years old
Pregnant or nursing
Compromised immune system
Experiencing dialysis
Pets

12c. Did the harmful algal bloom directly or indirectly impact your health, or the health of anyone in your household?

No
Yes, Please explain how:

_____

_____

12d. How did you source water during this time? (circle all that apply)

Purchased bottled water
Relied on free water from community distribution stations
Transported water from outside the affected area
Other: _____

12e. What difficulties did this event present for you and your household? (Include logistics and costs associated with sourcing water)

_____

_____

Now we are going to **ask you about information sources during the 2018 Harmful Algal Bloom.** Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

12f. When the algal bloom occurred and tap water became unsafe for certain groups, where did you first turn to for information?

_____

_____

_____

12g. On a scale of 1 to 5, how easy was it to find the information?

1 (Difficult)	2	3	4	5 (Easy)

12h. On a scale of 1 to 5, how helpful was the information you found?

1 (Unhelpful)	2	3	4	5 (Helpful)

12i. If you didn't find the information you were looking for, where did you go for additional information?

_____

_____

_____

GO TO page 23, unless you'd like to share your experience with another EHHT event

Wildfire

13a. In your view, how serious a problem was the wildfire that started around Labor Day of 2020 for your household?

Not a serious problem
Slightly serious problem
Moderately serious problem
Very serious problem
Extremely serious problem

13b. Did you lose property, livestock, or pets in wildfires during 2020?

Yes
No
Other:_____

13c. Did the wildfire directly or indirectly impact your health, or the health of anyone in your household?

No
Yes, Please explain how:

13d. What difficulties did this event present for you and your household?

In addition to a general description, please comment on details such as number of days of power loss; number of days evacuated; extent of loss of property in this section as well.

13e. Did your home or business lose power due to wildfire or red flag conditions?

Yes
No
Other: _____

13f. Please indicate the highest level of evacuation warning your household experienced during the Labor Day 2020 Wildfire.

Level 1 "Be Ready"
Level 2 "Be Set"
Level 3 "Go NOW!"
None
I don't remember
Other:_____

13g. Did you evacuate from your home at any point?

Yes, once my home was in a Level 1 "Be Ready" evacuation zone
Yes, once my home was in a Level 2 "Be Set" evacuation zone
Yes, once my home was in a Level 3 "Go NOW!" evacuation zone
No
Other:_____

Now we are going to **ask you about information sources during the Labor Day 2020 Wildfire**.

Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

13h. When the wildfire occurred, where did you first turn to for information?

_____

_____

13i. On a scale of 1 to 5, how easy was it to find the information?

1 (Difficult)	2	3	4	5 (Easy)

13j. On a scale of 1 to 5, how helpful was the information you found?

1 (Unhelpful)	2	3	4	5 (Helpful)

13k. If you didn't find the information you were looking for, where did you go for additional information?

_____

_____

_____

GO TO page 23, unless you'd like to share your experience with another EHHT event

Wildfire Smoke

14a. In your view, how serious a problem was the smoke from the Labor Day 2020 Fires for your household?

Not a serious problem
Slightly serious problem
Moderately serious problem
Very serious problem
Extremely serious problem

14b. In September 2020, did anyone in your household work outside?

Yes, I worked outside
Yes, someone else in my household worked outside
Nobody in my household worked outside
Other:_____

14c. In September 2020, did anyone in your household experience one of the following conditions:

	You	Another person in your household
Asthma		
COPD		
Another respiratory condition		
High blood pressure		
Another cardiovascular condition		

14d. Did the wildfire smoke directly or indirectly impact your health, or the health of anyone in your household?

No
Yes, Please explain how:

_____

_____

_____

14e. What difficulties did this event present for you and your household?

_____

_____

_____

Now we are going to **ask you about information you needed to protect you and your household from smoke during the wildfire.** Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

14f. When the wildfire smoke started, where did you first turn to for information?

_____

_____

14g. On a scale of 1 to 5, **how easy was it to find the information?**

1 (Difficult)	2	3	4	5 (Easy)

14. On a scale of 1 to 5, how helpful was the information you found?

1 (Unhelpful)	2	3	4	5 (Helpful)

14i. If you didn't find the information you were looking for, where did you go for additional information? _____

_____

GO TO page 23, unless you'd like to share your experience with another EHHT event

Heatwave

15a. In your view, how serious a problem was the heatwave (also known as the Pacific Northwest Heat Dome) in June 2o21 for your household?

Not a serious problem
Slightly serious problem
Moderately serious problem
Very serious problem
Extremely serious problem

15b. Did the heat dome directly or indirectly impact your health, or the health of anyone in your household?

No
Yes, Please explain how:

_____

_____

15c. What difficulties did this event present for you and your household?

_____

_____

15d. Did your house have air conditioning in June 2021?

Yes, we had a window or portable unit
Yes, we had a central air or ductless system in some but not all rooms
Yes, we had a whole house system
No, we did not have air conditioning
Other:_____

15e. Did you and members of your household have daytime access to air conditioning in June 2021 (circle all that apply)

Yes, I worked or went to school somewhere with air conditioning
Yes, someone else in my household worked somewhere with air conditioning
Yes, the school or daycare my child(ren) attended had air conditioning
No, I was working outdoors without air conditioning
No, someone else in my household was working outdoors without air conditioning
No, I was working in a building without air conditioning
No, someone else in my household was working in a building without air conditioning
No, the school or daycare my child(ren) attend did not have air conditioning
Other:_____

15f. Does your current home have air conditioning?

Yes, we have a window or portable unit
Yes, we have central air or a ductless system in some but not all rooms
Yes, we have a whole house system
No, we do not have air conditioning
Other:_____

Now we are going to **ask you about information sources during the June 2022 Heatwave**. Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

15g. When the June 2021 Heatwave (Heat Dome) occurred, where did you FIRST turn to for information? _____

_____

15h. On a scale of 1 to 5, how <u>easy was it to find information</u>?

1 (Difficult)	2	3	4	5 (Easy)

15i. On a scale of 1 to 5, how <u>helpful was the information you found</u>?

1 (Unhelpful)	2	3	4	5 (Helpful)

15j. If you didn't find the information you were looking for, where did you go for additional information?

_____

_____

_____

GO TO page 23, unless you'd like to share your experience with another EHHT event

Ice Storm

16a. In your view, how serious a problem was the February 2021 Ice Storm for your household?

Not a serious problem
Slightly serious problem
Moderately serious problem
Very serious problem
Extremely serious problem

16b. Did your household lose power during the ice storm?

Yes
No
Other:_____

16c. Did the ice storm directly or indirectly impact your health, or the health of anyone in your household?

No
Yes, Please explain how:

_____

_____

16d. What difficulties did this event present for you and your household?

*If you lost power, please describe how long your household was without power and how this impacted other basic needs such as heat, cooking, and/or water.

_____
_____
_____
_____

Now we are going to ask you about **information sources during the Ice Storm in February 2021.** Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

16e. When the ice storm occurred, where did you <u>first</u> turn to for information?

_____

_____

16f. On a scale of 1 to 5, how <u>easy was it to find information?</u>

1 (Difficult)	2	3	4	5 (Easy)

16g. On a scale of 1 to 5, <u>how helpful was the information you found?</u>

1 (Unhelpful)	2	3	4	5 (Helpful)

16h. If you didn't find the information you were looking for, where did you go for additional information?

_____

_____

_____

Continue to page 23, unless you'd like to share your experience with another EHHT event

Drought

17a. In your view, how serious a problem have drought conditions any time over the past five years been for your household?

Not a serious problem
Slightly serious problem
Moderately serious problem
Very serious problem
Extremely serious problem

17b. Does your household rely on well water?

Yes
No
Other:_____

17c. Have drought conditions over the past 5 years either directly or indirectly impacted your health, or the health of anyone in your household?

No
Yes, Please explain how:

_____

_____

17d. What difficulties have drought conditions over the past five years presented for you or your household?

_____
_____
_____
_____

Now we are going to ask you about **information sources during drought events.** Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

17e. Think about the time in the past 5 years when you felt most impacted by drought conditions. **Where did you <u>first</u> turn to for information?**

_____

_____

17f. On a scale of 1 to 5, how <u>easy was it to find the information you are looking for?</u>

1 (Difficult)	2	3	4	5 (Easy)

17g. On a scale of 1 to 5, <u>how helpful was the information you found?</u>

1 (Unhelpful)	2	3	4	5 (Helpful)

17e. If you didn't find the information you were looking for, where did you go for additional information?

_____

_____

_____

Continue to page 23, unless you'd like to share your experience with another EHHT event

Generic EHHT

You have suggested that you want to tell us about an environmental health hazard, threat, or condition that was not on the previous list. We want to hear about it! We also need you to define the condition and time frame you are telling us about.

18a. I want to tell you about the following environmental health hazard or threat topic that impacted me or my household:

- Water quality
- Water quantity
- Wildfire
- Wildfire smoke
- Air pollution
- Winter storm
- Heat wave
- Hot summer
- Drought
- Other:

18b. The timeframe that this environmental condition was a problem for my household was:

18c. Describe the environmental event / conditions that were difficult for you or your household:

18d. In your view, how serious a problem was this event or condition for your household?

- Not a serious problem
- Slightly serious problem
- Moderately serious problem
- Very serious problem
- Extremely serious problem

18e.What difficulties did this event or condition present for you and your household? Include logistics, costs, health challenges, or inconveniences associated with this condition.

Now we are going to ask you about **information sources during this event.** Information sources help you understand the issue and solve any household problems before, during, or after the event. This could include media, TV, radio, internet, social media, friend, neighbor, community, church, and/or government.

18f. When this event happened, **Where did you <u>first</u> turn to for information?**

_____

_____

_____

18g. On a scale of 1 to 5, how <u>easy was it to find the information you are looking for?</u>

1 (Difficult)	2	3	4	5 (Easy)

18h. On a scale of 1 to 5, <u>how helpful was the information you found?</u>

1 (Unhelpful)	2	3	4	5 (Helpful)

18i. If you didn't find the information you were looking for, where did you go for additional information?

_____

_____

_____

Demographics

Some households and individuals may have characteristics that make it difficult to prepare for or survive an environmental health hazard and threat (EHHT). Again, sharing this information is voluntary but helps government agencies, social services, and community organizations better prepare for an environmental threat.

18. Are you…

Male
Female

_____
Prefer Not to Say

19. Which of the following describes you? (Circle all that apply)

White
Hispanic, Latino, or Spanish Origin
Black
Asian
Native Hawaiian or Pacific Islander
American Indian, Eskimo, or Alaska Native
Middle Eastern or North African
Prefer Not to Say
Other
_____

20. What is your expected total annual income for your household?

$0 - $15,000
$15,001 - $30,000
$30,001 - $45,000
$45,001 - $60,000
$60,001 - $75,000
- $75,001 - $90,000
- $90,001 - $120,000
- $120,000+
- Prefer not to say

21. How many children under the age of 18 live in your household?

0
1
2
3
4
5+

22. For the most part, do you have reliable and regular access to the internet?

Yes
No

We are asking you about place of immigration and language to help Marion and Polk County and county partners use inclusive languages in their communication strategies. These questions are optional and completely anonymous.

23. With respect to immigration from other nations, which generation do you most identify with?

Immigrant or foreign-born
First generation (you have at least one foreign-born parent)
Second generation (you have at least one foreign-born grandparent)
Third or higher generation
Not Sure
Prefer not to say
Other _____

24. What language(s) do you speak in your home? (circle all that apply)

English
Spanish
Russian
Other _____

25. In what language do you prefer to speak? _____

26. In what language do you prefer to read and write? _____

32. If you feel comfortable, please share your country of origin. We would love to know the region/pueblo/state, etc within your home country as well.

_____

27. What is the highest level of school you have completed or the highest degree you have received?

Less than high school diploma or GED
Graduated high school / GED
Some college without a degree
Graduated college
Graduated graduate school
Informal education (apprenticeship, etc.)

28. In general, would you describe your political view as…

Strongly conservative
Conservative
Slightly conservative
Moderate or middle of the road
Slightly liberal
Liberal
Strongly liberal
Not sure
Other

_____

Religious Community - Communications

*The following questions ask you to describe your interaction with your religious community in terms of information. These questions are **completely voluntary** and will not be shared with anyone outside of the research team. Answering them may help us understand which religious organizations are ready to help with environmental health communications.*

29. Are you involved in a religious community?

Yes
No
Prefer not to say

30. What type of regular communication do you receive from your religious community (newsletter, email, word of mouth, meetings, etc.)

_____
_____

31. Which church, synagogue, mosque, group etc. do you belong to in Marion/Polk County?

_____
_____

Zip Code and Geography

*Many of the environmental health hazards described previously have different impacts in different places. To better understand this, we are asking you to share some information about where you live. These questions are **completely voluntary** and will not be shared with anyone outside of the research team.*

33. What is the zip code for your house? (Feel free to pull up Google Maps to find your zip code) _____

34. What street do you live on? _____

35. What is the nearest major intersection to your house?

_____

Thank you!

You have reached the end of the Survey!

Please mail return to:
Nicole Iroz-Elardo, Willamette University, 900 State St, Salem, OR 97301

You can also physically drop off at:
Marion County HHS, 3160 Center St. NE, Salem, OR 97301 | 8a-5p, M-F
Marion County HHS, 976 N Pacific Hwy, Woodburn, OR 97071 | 8a-5p, M-F

As a reminder, this survey is designed to be anonymous. However, **if you wish to participate in a follow-up interview, you may opt-in by entering your email or phone number here:**
_____

To be entered into the drawing for one of two $50 gift certificates, please enter your contact information: _____
This sheet will be removed immediately upon submission so that your answers will not be connected to your contact information in any way

Again, thank you so much for your time and sharing your experience!
If you have any additional questions or concerns, please feel free to contact:

Dr. Nicole Iroz-Elardo, Assistant Professor of Public Health
nirozelardo@willamette.edu | 503-370-6306

Dr. Melinda Butterworth, Associate Professor of Environmental Science
mkbutterworth@willamette.edu | 503-370-5752

Dr. Michael Lockard, Chair of Willamette University's Institutional Review Board
irbchair@willamette.edu | 503-370-6658

WILLAMETTE UNIVERSITY

Marion County OREGON Health & Human Services

POLK COUNTY HEALTH SERVICES

Appendix B: Stakeholder Semi-Structured Interview Guide (Instrument)

Reminder of Purpose of Community Partner / Key Informant Interviews

1. Who: individuals that work in agencies / groups affiliated with EHHTs and/or specified vulnerable populations.
2. What: interview or focus groups that address:
    a. Their role (services, policies, programs) to address community needs re: EHHTs
    b. Communication channels: how do they get information re: EHHTs and vulnerable populations related to their work, and what information do they share?
    c. What are the SWOTs to their work that they see in addressing local EHHTs?
    d. How were they impacted / what did they learn from the 4 notable events (wildfire, heatwave, algal bloom, ice storm)

Beginning of Interview Script

Introduce yourself (Name, WU student, major)

Preferred Name/Pronouns: What names and pronouns would you like me to use during the interview?

Introduce the project: We are doing interviews with stakeholders across the region as part of a research project to better understand environmental health hazards and threats (EHHT) and how they are communicated to the public.

Time Check: I want to be respectful of your time. Can you confirm how much time you have to spend with me today? Would it be an issue if we ran over by 10 minutes?

Incentives: We really appreciate your time today and are providing $20 gift cards to those who complete the interview as a token of our appreciation. Does your company/agency policy allow you to accept this?

If yes, confirm the best email to send this in about a week.

Recording: I was hoping to be able to record our interview today to be able to create a transcription. Once we have the transcript, I will delete the original recordings. Do I have your permission to record the interview?

- If YES, start the recording and a backup recording, take light notes

- If NO, continue the interview without recording, but instead take detailed notes Community Key Informant Interview Notes | EHHT

Org Identification: We will be stripping the recording of all personal identifying information and want to respect your confidentiality. I want you to be able to speak freely. Please let me know if there are any aspects of your responses that you need me to be more careful when reporting out. For example, you are telling me about your work. If there are things you would like me to not report about your organization by the organizations' name, please let me know and we will respect that.

IRB Consent

As you prep for the interview, look to see if there is an IRB on file. If yes, do nothing.

- If no, Read IRB consent MarionPolk Informed Consent Interviews 20231004.pdf

Interview Questions and Domains

Interview Guide Question	Domain (Rapid Qualitative Analysis)
1. What is the **role of your organization** in addressing: • The needs of vulnerable populations (If VP partner)? ○ OR • environmental health threats to the community you serve?	Organization Role
2. What were the major ways the populations you serve were impacted by any or all of the following events: • 2018 algal bloom at Detroit Lake • 2020 Labor Day fires • 2021 Ice Storm • 2021 June Heat Dome • [Can follow up with other EHHTs]	Event Impact on population served
3. What did you or your organization learn from these events? Did you make any changes to your operations?	Institutional learning & change
4. hen there are major environmental health events that impact the populations you serve, such as those we just discussed, how does your organization learn about the events? How do you communicate about environmental health events with the populations that you serve?	Communication pathways
5. What internal strengths and resources does your organization have that allow you to effectively support the populations you serve during environmental health events? ○ Followup prompt if needed: How do you feel about the following around environmental health and hazards ▪ Workforce capacity and knowledge ▪ Internal values and strategic plans	Organization Strengths

▪ Internal leadership ▪ Organizational structure ▪ Internal resources and budgetary health	
6. What do you think your organization could do better in order to support the populations you serve during environmental health events? Followup prompt if needed: How do you feel about the following around environmental health and hazards Workforce capacity and knowledge Internal values and strategic plans Internal leadership Organizational structure Internal resources and budgetary health	Organization Weaknesses
7. What external opportunities do you see for your organization to support efforts to better prepare and engage the community around resilience to environmental hazards and threats? Followup prompt if needed: For example, how do you see the landscape of external partnerships, policies, community engagement with respect to environmental hazards and threats?	External Opportunities
8. What external factors limit your organization's ability to support the population served during environmental health events? Followup prompt if needed: For example, policies, resources, funding streams, etc?	External Threats
9. What do you think is relevant to this topic that we haven't covered that you think is important to share?	Respondent-initiated importance
10. Who else do you think we should be speaking to about this subject?	Snowball & networks

End of Interview Script

- Thank them for their time and thoughts
- (if applicable) Remind them that we will send out a digital gift card in about a week, but it may come from a different email WU address.
- We also want to communicate next steps:
    - We are working on this throughout this school year.
    - We would like to keep your email for potential future events and/or surveys. Is that ok?

- We anticipate a report coming out in Summer 2024, would you like to be informed of this?

Appendix C: Focus Group Guides (Instrument)

Focus Group Guide Example:

AGENDA:

1. Welcome & Introductions
2. Permission to record
3. Consent
4. Questions:
    1. Brainstorm: Everyone name 1 way the <population> community was impacted by _____(EHHT event). (Stop, think, share)
    2. What impacts to physical health, mental health, and finances/property were experienced across these events?
    3. How are <population> meeting their (physical, mental, financial, communication) needs during these events?
    4. What resource gaps are <population> experiencing prior to, during and after these events?
    5. What can the health department do to better support <population> during these events?
    6. What else does the health department need to know?
5. Closing remarks and announcements

Spanish Version of Focus Group Refugee Interview Schedule

Preguntas para la entrevista en grupo focal con familias de refugiados Organizada y facilitada en colaboración con los gestores de casos e intérpretes de Salem for Refugees

- Inicio del grupo focal con una introducción a los peligros y amenazas medioambientales globales y locales
- Administración del consentimiento informado
- Inicio con sesiones de lluvia de ideas sobre los peligros y amenazas medioambientales

Questions:

1. ¿Qué sabes de los peligros y amenazas medioambientales, ya sea por tu experiencia personal, las noticias u otras fuentes de información?

2. ¿Te has visto afectado personalmente por uno o varios peligros o amenazas medioambientales? (pon ejemplos locales) ¿Dónde estabas? ¿Qué ocurrió? ¿Qué hiciste?
3.
3. ¿Sabías algo del peligro o amenaza medioambiental antes de sufrirlo? ¿Cómo se enteró? ¿Le avisaron? ¿Quién se lo dijo?

4. En caso afirmativo, ¿fue útil la información? ¿Por qué?

5. ¿Buscas personalmente información sobre fenómenos meteorológicos extremos o cualquier otro tipo de acontecimiento medioambiental? ¿Cómo y dónde busca?

6. ¿Cómo preferirías enterarte de un peligro o amenaza medioambiental inminente? ¿En quién o qué confiarías más?

7. Últimos 20 minutos:
   <u>Presenta y explica las diferencias entre:</u>
   Departamentos de Salud Pública de los condados de Marion/Polk
   Servicios de bomberos y EMS de la ciudad de Salem
   Departamento de Gestión de Emergencias de Oregón
   FEMA.

8. Sabiendo lo que ahora sabe sobre el papel de la Salud Pública, ¿qué sugerencia le daría a su Departamento de Salud Pública para mantenerlo informado y seguro?

Appendix D: Community Member Semi-Structured Interview (Instrument)

Beginning of Interview Script

Introduce yourself (Name, WU student, major)

Preferred Name/Pronouns: What names and pronouns would you like me to use during the interview?

Introduce the project: We are doing interviews with stakeholders across the region as part of a research project to better understand environmental health hazards and threats (EHHT) and how they are communicated to the public.

Time Check: I want to be respectful of your time. Can you confirm how much time you have to spend with me today? Would it be an issue if we ran over by 10 minutes?

Incentives: We really appreciate your time today and are providing $20 gift cards to those who complete the interview as a token of our appreciation. Does your company/agency policy allow you to accept this?

If yes, confirm the best email to send this in about a week.

Recording: I was hoping to be able to record our interview today to be able to create a transcription. Once we have the transcript, I will delete the original recordings. Do I have your permission to record the interview?

- If YES, start the recording and a backup recording, take light notes
- If NO, continue the interview without recording, but instead take detailed notes Community Key Informant Interview Notes | EHHT

Org Identification: We will be stripping the recording of all personal identifying information and want to respect your confidentiality. I want you to be able to speak freely. Please let me know if there are any aspects of your responses that you need me to be more careful when reporting out. For example, you are telling me about your work. If there are things you would like me to not report about your organization by the organizations' name, please let me know and we will respect that.

IRB Consent

As you prep for the interview, look to see if there is an IRB on file. If yes, do nothing.

- If no, Read IRB consent MarionPolk Informed Consent Interviews 20231004.pdf

Interview Questions and Domains

Interview Guide Question	**Domain (Rapid Qualitative Analysis)**
What environmental health hazards and threats concern you the most here in Marion/Polk County? Why? <Can prompt with list of EHHTs if necessary >	EHHT concerns
You community survey responses indicate you had a lot to say about [list one of the EHHTs] can you tell us more? a. 2018 Algal Bloom b. 2020 Labor Day Fires c. 2021 and 2024 Ice storms d. Extended drought conditions e. Respondent provided example(s)	Event Impact - Broad
In what ways was your health or the health of members of your household impacted during this event? a. Can include physical health b. Can include mental health c. Need some specific probing questions here…	Event Impact - Health
Did the event have other non-health related impacts on you or your family? If so, how? Examples if needed could include: property, livelihoods, local economy, employment, etc	Event impact - Non-health
What resources and/or support networks were most useful to you during this event? a. If needed, clarify that these can be formal services (ie. community agencies / organizations), or informal (like neighbors) b. Prompt follow-up if needed: How / why?	Key resources / support networks
What resources and/or support networks were lacking or unavailable during the event? [blah blah - rephrase along the lines of what did you need that you didn't have access to?] a. If needed, clarify that these can be formal services (ie. community agencies / organizations), or informal (like neighbors) b. Prompt follow-up if needed: How / why?	Missing resources / support networks
If you experienced a similar event in the future, do you think it would be more, less, or similarly impactful to you/your family? Why?	Learning & Change
Would you like to share about the impact of another EHHT event?	

a. If yes, work through questions 2-8 until the respondent has finished sharing	
What do you think is relevant to this topic that we haven't covered that you think is important to share?	Respondent-initiated importance
What one suggestion would you give your Public Health Department for ways to keep you informed and safe?	Snowball & networks

End of Interview Script

- Thank them for their time and thoughts
- (if applicable) Remind them that we will send out a digital gift card in about a week, but it may come from a different email WU address.
- We also want to communicate next steps:
    - We are working on this throughout this school year.
    - We would like to keep your email for potential future events and/or surveys. Is that ok?
    - We anticipate a report coming out in Summer 2024, would you like to be informed of this?

Appendix E: Media Scan Results

Introduction

Marion and Polk County health departments have identified four environmental health hazards and threats that occurred in the Pacific Northwest between 2018-2021 that they would like to learn more about in order to find ways to improve responses to similar events in the future. These events include the 2018 Detroit Lake algal bloom, 2020 Santiam Wildfires, 2021 ice storm, and 2021 Pacific Northwest heat wave. This project requires an interdisciplinary approach and was undertaken by several professors, student researchers, and classes at Willamette University to answer a series of research questions for the counties. To understand how these environmental health hazards and threats were communicated to vulnerable populations and what means of communication were used, the ENVS 399 Environmental Communication class was tasked with conducting a media analysis of risk communication.

The goal of this report was to understand how each of the four identified environmental health hazards and threats was communicated via social media, newspapers/print, and television/videos/newscasts. In order to accomplish this goal, students conducted a content analysis. A content analysis was an appropriate strategy for this project because it can be used to identify the focus of or intentions behind communication, find patterns in content, and assess responses to communications (Mailman School of Public Health, n.d.). Through this process, researchers look for the presence of certain words or patterns that they can code for and draw conclusions from. This process allows researchers to determine whether certain concepts are present in a text and how frequently they occur, and they can explore potential relationships between the concepts present in a text (Mailman School of Public Health, n.d.). The work done by students was roughly based around a content analysis because its goal was to determine if certain information was being communicated, identify the modes of communication, examine patterns in communication, gauge how the public responded to the communication, and find gaps in communication and places for improvement. However, their work represented the first step in a two part process that constitutes a more complete content analysis; they were not responsible for coding collected data. The second step of coding the data was done in subsequent classes. This report outlines the process of gathering the data and provides results based on a broad review of the findings.

EHHT Event Backgrounds

2018 Detroit Lake Algal Bloom

On Friday, May 18, City of Salem officials became aware of an algal bloom in Detroit Lake that had contaminated the drinking water supply with dangerous levels of cyanotoxins (Bach, 2018). The public was not informed of the issue until May 23 in the form of a "do-not-drink" alert issued by the City of Salem (Currie, 2018). On June 8 tests indicated the toxin was down to safe levels and the alert was lifted. However, further testing on June 13 showed high levels of toxins so another "do-not-drink" alert was issued. One day later the alert was lifted following testing, but testing on June

15 once again showed high levels so another alert was issued. The alert was lifted on June 25 after three days of testing showed safe levels of cyanotoxin. A final alert was issued again on June 28 after testing showed levels had risen above safe levels (Currie, 2018). Environmental factors played a significant role in this event because while algal blooms are typical for Detroit Lake and other large bodies of water around this time of year, climate change was likely a contributing factor because the dry season and lack of rain meant that the bloom lasted longer and contaminated more water (Ross, 2020). City officials declared that the water was not safe for children under six to drink, as well as immuno-compromised adults and pets, though they could remain in bodily contact with it under supervision (Bach, 2018).

2020 Santiam Wildfires and Smoke

The Beachie Creek Fire officially ignited on August 16, 2020, due to a lightning storm and downed power lines in the Opal Creek Wilderness. On September 5, the fire grew to about 500 acres, roughly three times its original size, before a windstorm brought 50-75 mph dry winds into the area which caused it to spread rapidly (Braverman, 2021). By the morning of September 7, the Beachie Creek Fires had burned more than 130,000 acres. The storm downed power lines which ignited 13 spot fires and increased the burn size of the nearby Lionshead Fire (Braverman, 2021). The Santiam Wildfires impacted many different areas including the Willamette National Forest, Mt. Hood National Forest, Opal Creek Wilderness, Warm Springs Reservation, Mount Jefferson Wilderness, and Santiam Canyon (Bay Area News Group, 2020; Urness, 2021). The smoke from the fire also had widespread impacts on other parts of Oregon including Salem, Portland, and Eugene (Loew, 2020). Detroit and Mill City were most significantly impacted by the fire because thousands of people had to evacuate and many later lost their homes (Poehler & Lynn, 2020; Rosbach, 2022). The fire also contributed to hazardous air quality in other parts of Oregon (Loew, 2020). Exposure to smoke can cause symptoms such as coughing, headaches, and difficulty breathing. Residents of the areas impacted by smoke reported many of these symptoms, and there was a significant increase in emergency department visits for asthma-like symptoms. The populations most vulnerable to smoke exposure were children, older adults, pregnant women, and those with underlying health conditions (Loew, 2020). The effects of the fire were long-lasting, and over a year later, residents of Santiam Canyon were still struggling with the aftermath (Rosbach, 2022). Santiam Canyon communities struggled with extreme stress, loss of housing, lack of safe drinking water, and poor air quality (Rosbach, 2022). The Santiam Fires resulted in nine casualties, two missing person reports, and 2,998 destroyed and damaged structures (Bay Area News Group, 2020).

2021 Ice Storm

The 2021 ice storm was predicted during the first week of February using long-range weather models that showed sub-freezing temperatures spreading through the northern Rockies and cold air advection through the eastern side of Washington and Oregon (Bonner, 2021; Dames, 2022). On February 8, 2021 the models were able to provide more accurate readings and showed that multiple waves of moisture would move directly into the Willamette Valley at the same time as cold air which arrived from the east, and these would create conditions for a snow/icestorm (Bonner, 2021). From February 11 through 15 the region was hit with freezing rain, heavy snow, and strong gusts of cold wind. The impacts were widespread and ranged from the Columbia River Gorge to the

Willamette Valley (Torres, 2022; Oregon Office of Emergency Management, 2022). Counties affected include Multnomah County, Benton County, Clackamas County, Polk County, Marion County, and Yamhill County (Oregon Office of Emergency Management, 2022). The freezing rain left roads, power lines, and trees coated in thick layers of ice. Many of the ice-laden trees snapped under the weight, falling on power lines and causing transformers to blow out. By noon on February 13, more than 1,200 Portland General Electric power lines were down, leaving over 330,000 people in the Willamette Valley without power for various lengths of time (Associated Press, 2021; Bonner, 2021). The ice storm was particularly dangerous for houseless communities, so authorities in western Oregon opened warming shelters in an effort to protect houseless residents from the wet and cold (Associated Press, 2021).

2021 Pacific Northwest Heat Wave

The National Weather Service alerted the public to the upcoming heat wave on June 22, 2021 (Cappucci & Samenow, 2021). The peak of the heat wave lasted June 26 to July 2, but temperatures began rising several days prior (Cappucci & Samenow, 2021; Heat Wave 2021, n.d.). The duration of the heat wave varied by region, with regions west of the Cascade Mountains getting a reprieve from the heat the soonest when a surge of cool marine air forced out the heat, causing temperatures to drop almost 50 degrees Fahrenheit (Loikith, n.d.). The heat wave was originally forecasted to impact the majority of Washington and Oregon as well as parts of Northern California, but the actual event also impacted Idaho and Western Canada (Cappucci & Samenow, 2021; Popovich & Choi-Schagrin, 2021). Between June 26 and July 2, the region set record high temperatures with Salem, Oregon hitting 117 degrees Fahrenheit on June 28 (Loikith, n.d.). Additionally, temperatures did not drop significantly overnight, so individuals without air conditioning had little reprieve from the heat (Cappucci & Samenow, 2021; Loikith, n.d.). Older adults, houseless people, people who worked outside, and people who did not have access to air conditioning were especially vulnerable to the health impacts of the heat dome. These impacts included increased risk of hospitalizations related to heart disease, heat exhaustion and heat stroke. People were also at increased risk of critical illness, brain injury, worsened asthma, chronic obstructive pulmonary disease, extreme cases of dehydration, and even death (Assistant Secretary for Health, 2024). These circumstances led to record numbers of heat-related deaths with around 450 recorded in Washington, 160 in Oregon, and 400 in Canada (Bekiempis, 2021; Popovich & Choi-Schagrin, 2021). Aside from deaths, there was a spike in heat-related emergency department visits, with nearly 3,000 recorded in the Pacific Northwest from June 25-30 (Popovich & Choi-Schagrin, 2021). To help prevent major health risks, the Oregon Health Authority announced that it had lifted limits on the number of people who could gather in indoor spaces such as cooling shelters, movie theaters, and shopping malls (Vigdor, 2021).

Methods

Students enrolled in ENVS 399 Environmental Communication were tasked with conducting a media analysis of communication to answer RQ 4. What information has been communicated and is being communicated to vulnerable populations in Marion County and Polk County about environmental health hazards and threats and through what means of communication (such as television, newspaper, radio, social media, organizational communication)? A media scan was

essential for answering this question and understanding the EHHT events because it looked at how information was communicated across various media platforms, what the messaging surrounding these events were, and whether communication was being targeted towards vulnerable populations. The results from this media scan highlight (1) the information communicated to vulnerable populations, (2) the means through which this information was communicated, followed by (3) recommendations for improving communication during EHHT events in the future. The media scan consisted of five tasks (Figure 1), each of which are outlined below.

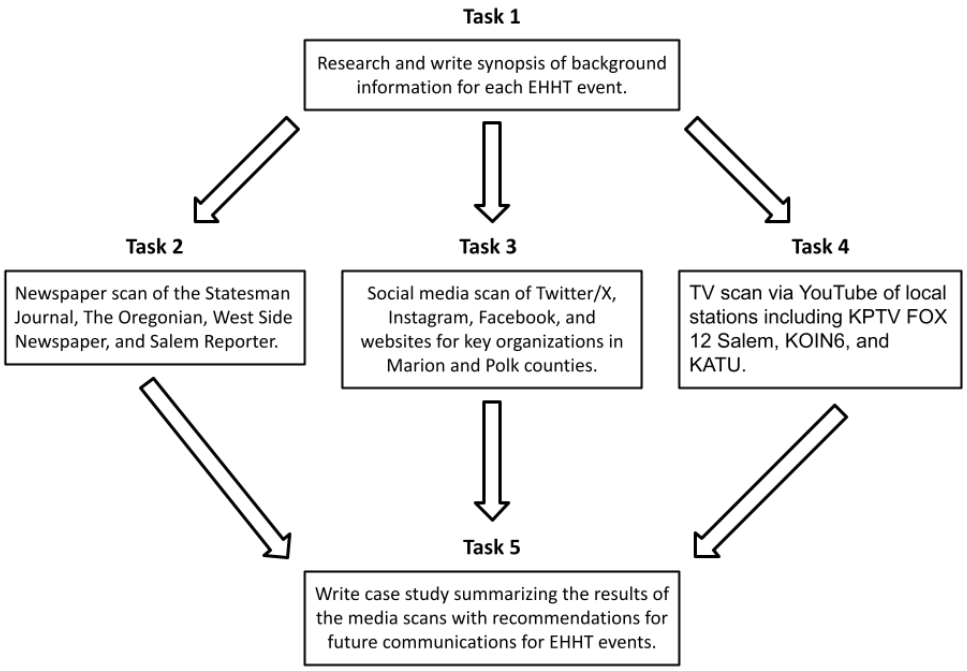

Figure 1 A visual representation of the media scan and analysis process.

Task 1 Background Research on EHHT Events

Students conducted research to write a brief synopsis about their assigned EHHT event that included information about the date and duration, extent, and effects. They performed a general Google search to find articles with this key background information. To confirm the date and duration of the event, they looked for information about when the event was predicted to occur, when and for how long it actually happened, and how long the effects were felt. To determine the extent, they searched for information about the locations affected and how widespread the impacts were felt. To understand the effects, they found information about the health risks or hazards associated with it and the challenges it created for communities. These synopses serve as the EHHT event backgrounds in the introductory section of this report.

Task 2 Social Media Scan

This task aimed to assess how key government and nonprofit organizations in Marion and Polk County used social media to communicate about each EHHT event. Originally, 21 organizations were identified for inclusion in the media scan, but the small class size of ENVS 399 limited its capacity to thoroughly assess all organizations, so the list was pared down to nine (see Appendix A). Among these organizations, four were local to Salem, four were statewide organizations, and one was a national organization. The platforms evaluated include Twitter, Instagram, Facebook, and organizations' websites (Appendix E.1).

Students were provided a spreadsheet with links to each organization's social media pages and websites, searching each platform for posts about their assigned EHHT event. For each platform, students logged information in a Google Form about the number of followers, number of posts about the EHHT event, date of the first post, date of the last post, how much attention the average post received (i.e. likes, comments, shares), if the posts shared information from other sources, posts directing users to additional resources, other languages used in the posts, underlying or overt mentions of vulnerable populations, and use of specific climate change keywords. Individual logs were aggregated into a master spreadsheet. Students also took qualitative notes as they assessed each platform to use later when writing their case studies. The organizations' websites generally did not have any available information about the EHHT events, so they were not included in the results. There were also significant challenges with finding information on Twitter. Students scrolled to the end of the Twitter feed for every organization, but it appeared that at some point, Twitter cut off the feed, and no more past tweets were available to view. This cut-off point often came before the date of an EHHT event, which meant that students could not find any tweets related to their event on some pages. The cut-off date of available posts varied, so it likely depended upon the number of posts made on that page. Organizations that were frequently tweeting, such as NOAA Portland, had cut-off dates in 2023, while others that did not tweet as often had cut-off dates in 2021. One possible explanation for this issue is that Twitter limits the number of posts users can view daily. Several different strategies were tested to get around rate limiting, but none were able to resolve the issue and access older posts.

Task 3 Newspaper Scan

Once finished with the social media scan, students conducted a scan of four local newspapers that may have reported on the EHHT events. These sources included the Statesman Journal, The Oregonian, West Side Newspaper, and Salem Reporter. Students were asked to find at least ten articles each from the Statesman Journal and The Oregonian and only five for the West Side Newspaper and Salem Reporter. There was not a specific methodology for how this sampling of articles was selected, but the ones chosen were intended to provide a general overview of what information was being shared about an EHHT event. The difference in ten articles for the Statesman Journal and The Oregonian compared to five for the West Side Newspaper and Salem Reporter was due to the size of the publications. The Statesman Journal and The Oregonian are much larger publications and were expected to have more articles available on the EHHT events. To locate articles from the Statesman Journal, The Oregonian, and the Salem Reporter, students were provided with the links to their archives to search for articles. Students were provided with a link to

the general website for the West Side Newspaper to search for articles. Ultimately, the West Side Newspaper did not have any articles related to the EHHT events, so it was not included in the results.

The class utilized Zotero, a reference management software, to save and organize articles students found. All articles were uploaded into a shared class Zotero folder. Once in Zotero, students ensured all information about the article's date, URL, and title were correct. They then read each article and tagged it using a set of predetermined keywords (Appendix B). As they read, students took notes on each article about where the article got its information, other organizations or resources the article directed readers to, and any other relevant qualitative information. In a separate document, they took notes about how many articles the source published about the EHHT event and the overall message being conveyed through the articles.

Task 4 Broadcasting Scan

Students concluded the media scan with TV broadcasts by searching through YouTube for video clips about the EHHT events. They reviewed videos from local TV stations including KPTV FOX 12 Salem, KOIN6, and KATU. Students were provided links to each TV station's YouTube page to search for videos. Students were to upload ten videos from each station to the shared folder in Zotero. There was no specific methodology for how the ten videos were selected, and students chose videos that generally represented the information and messaging of the communication about each EHHT event. Ultimately, no videos were found on KATU's YouTube page related to the EHHT events so this station was not included in the results. Once uploaded into Zotero, they ensured the information for the video's date, URL, and title was correct. Students then watched each video and tagged it using the same set of predetermined keywords as the newspaper scan (Appendix B). They also added notes about where the video got its information from, additional resources or organizations the video directed viewers to, and any other relevant qualitative information. In a separate document, students were also instructed to take notes on the total number of videos each station had about the EHHT event, the date range of the videos, and the overall message being conveyed.

Task 5 Case Study Summaries

After completing the media scans, students wrote case studies summarizing their findings. The introduction of each case study included the background information written up in Task 1, which was then followed with a discussion of the results of the media scan. The analysis considered which organizations communicated first about events, which were most effective at amplifying messages, which communicated the most, which media platforms were the most commonly used, and if there were any complaints about how the event was or was not being communicated. They also assessed whether communication targeted specific vulnerable populations, if people were provided strategies for responding to the event, and whether people were directed to additional resources or information. Using their findings, students then made recommendations about how to communicate more effectively about EHHT events in the future.

Results

Organized by EHHT, this section describes media strategies including how the first reporting happened, the most frequently used platform, the most active organizations, and how vulnerable populations were addressed. Each subsection also discusses communication issues and future recommendations. This is summarized in Table E-1.

Table E-1. Media Case Study Results Summary Table.

EHHT Event	Date and Method of First Reporting	Most Frequently Used Platform	Organizations With the Most Communication	Vulnerable Populations Addressed	Communication Issues and Complaints	Future Recommendations
2018 Algal Bloom	May 29, 2018 City of Salem, Salem Health, Fire Department Facebook pages	Social Media (Facebook)	City of Salem	Children, individuals with pre-existing health conditions, older adults, pregnant or nursing individuals	Delay in informing the public of the algal bloom, misleading information about water station hours, water safety for other purposes	Share key information with the public as soon as it is available, utilize a wider variety of platforms to communicate information
2020 Santiam Wildfires and Smoke	August 14, 2020 U.S. Forest Service Facebook page	Social Media (Facebook)	Beachie Creek Fire Facebook Page, U.S. Forest Service, City of Salem	Individuals with underlying health conditions, older adults, children, pregnant individuals	Lack of transparency over the cause of the fire, TV coverage was not focused on situational updates and safety information, not explicitly stating when areas were out of danger	Prioritize health and safety information in communications, communicate clearly when the threat has passed
2021 Ice Storm	February 11, 2021 KPTV FOX 12 Oregon	TV	KPTV FOX 12 Oregon, KOIN6	Older adults, unhoused individuals	Information was often only available in English, information shared in graphics was not made accessible for this with visual disabilities	Provide information in languages other than English, make communication accessible for those with visual disabilities, utilize more social media platforms
2021 Pacific Northwest Heat Wave	June 22, 2021 KOIN6	Social Media (Facebook), TV	U.S. National Weather Service, KOIN6, KPTV FOX 12 Oregon	Older adults, children, pregnant individuals, people with	Lack of sufficient communication with unhoused individuals meant this	Provide information in languages other than English, make communication accessible for

				disabilities, low-income individuals, outdoor workers, unhoused individuals, individuals with pre-existing health conditions	community was unaware of and unprepared for the upcoming heat wave	those with visual disabilities, more frequent social media posts on more platforms than Facebook

2018 Detroit Lake Algal Bloom

Salem Health, the City of Salem, and the county Fire Department Facebook page first posted about the algal bloom on May 29, 2018. The City of Salem's Facebook provided the most information about the algal bloom and made 168 posts throughout the course of the event. Facebook was the most heavily utilized social media platform, and there were no posts by any organizations about the algal bloom on Instagram or Twitter (Appendix E.4). TV stations, including KPTV FOX 12 Salem, KOIN 6, and KATU did not have any broadcasts about the event. However, KGW, which is a smaller broadcast located in Portland, did cover the event. For newspapers, the Statesman Journal published 56 articles and The Oregonian published seven. The Salem Reporter did not publish articles about the algal bloom (Appendix E.5). In general, there were very few TV broadcasts about the algal bloom when compared to the number of social media posts or articles from the Statesman Journal.

Social media posts' messaging focused on updates about the water contamination level, which populations were most vulnerable, where to access safe drinking water, and how to donate water. Social media posts frequently directed users to other resources available to them. The City's water advisories also directed Salem and Keizer residents to water stations where they could access safe water 24 hours a day. This resource may not have been easily accessible for some residents because no transportation resources were listed for those unable to drive. However, the City of Salem Public Works phone number and hours were listed for those with questions or concerns. Aside from the City of Salem, other organizations also directed users to additional resources. Some of the frequently linked organizations included the City of Keizer, Marion County Health and Safety, the EPA, and Oregon Health Authority. Across organizations, posts frequently advised users to visit official websites and social media channels to stay informed and up-to-date on the situation.

The City of Salem directly targeted vulnerable populations in their communication through the water advisories. Their water advisories clearly identified the groups that should not drink the water, which included children under six, immunocompromised individuals, those with pre-existing liver conditions, and dialysis patients. They also identified sensitive groups that should avoid drinking the water, which included older adults, pregnant or nursing individuals, and pets. There was consistency across posts directed at vulnerable populations because they all identified the same groups and contained the same messaging. Non-English speakers were also targeted for specific communication because the updates from the City of Salem were translated into Spanish,

and interviews with town hall representatives included an ASL translator. Information shared by the organizations included in the media scan was not made available in languages other than English, Spanish, and ASL.

The most significant complaint about communication was that information about the algal bloom was not shared with the public until six days after the City detected it. The City drew further criticism because they were not transparent about why they waited so long to make the information public. In addition, the City issued and lifted the "do-not-drink" alert four times between May 23 and June 28 which led to further confusion and instilled a lack of trust in the City and safety of drinking water. Other issues were that water filling station hours were not clearly communicated and it was not clear whether the water was safe for other purposes such as cooking. These complaints and concerns were all expressed via the comment sections and reposts on social media.

Communication regarding the algal bloom could have been improved by providing information earlier and waiting longer to lift the "do-not-drink" alert. Given that the City of Salem waited several days to issue a "do-not-drink" alert after learning of the issue, and lifted and reissued the alert several times, it led to confusion and instilled a lack of trust in the City. It also would have been beneficial to use more platforms to communicate the issue. While Facebook is a valuable communication tool, utilizing other social media platforms like Instagram would ensure more people receive information. Instagram was largely underutilized during this event, with the City of Salem and Salem Police Department being the only organizations included in the scan to post information on this platform. Communication could also be improved by sharing more information through newspapers and TV for those who do not rely on social media as a news source.

2020 Santiam Wildfires and Smoke

The U.S. Forest Service was the first organization to post about the 2020 Santiam Wildfires, and posted on Facebook when the fire ignited on August 14th. The Statesman Journal and The Oregonian produced the highest number of articles about the fire, and most were published in the first weeks of September (Appendix E). KOIN6 and KPTV 12 FOX 12 Oregon provided the most TV coverage of the fires, particularly within the first two weeks of September. Social media was the most frequently used and updated method for sharing information about the wildfires. Facebook was the most popular social media platform used by organizations and had the highest number of posts about the fires. In particular, the U.S. Forest Service, City of Salem, US National Weather Service, and Beachie Creek Fire Facebook pages were most heavily utilized for sharing critical information about the fires and were able to reach a wide audience due to their large followings (Appendix D). The Beachie Creek Fire Facebook page was likely one of the best sources of information because it had a large following and many other organizations directed users to this page.

Social media posts about the wildfire were mostly focused on safety and human health. The majority of posts provided information about fire status, current evacuation orders, air quality concerns, and resources available for those impacted by the fires. Posts also frequently directed users to other organizations such as the Red Cross, United Way of Mid Willamette Valley, and the CDC. The resources users were frequently directed to were fire maps and air quality trackers.

Newspaper outlets mainly communicated safety information about evacuation status and resources for evacuees. Donation information and property protection were also heavily communicated. The information being communicated and specific actions being advised were consistent across all media platforms.

Information targeted at vulnerable populations was typically about air quality concerns. Posts identified which groups would be most impacted by the smoke and outlined precautions they should take. The populations they specifically addressed were those with underlying health conditions such as asthma, chronic respiratory disease, and cardiovascular disease, as well as people over age 65, infants and children, and pregnant persons. Non-English speaking individuals also received specifically targeted communication because many social media pages had posts in both English and Spanish. The Ciudad de Salem OR Facebook page was one of the best sources of information for Spanish-speaking individuals because they only posted in Spanish and provided extensive information on the wildfire.

The lack of communication about the cause of the fire led to confusion and allowed misinformation to spread. Comment sections saw high numbers of complaints about updates on arson claims related to the riots in Portland and whether the fires started from downed power lines. However, people only expressed these concerns for the first few weeks after the fire started. One of the major complaints related to news coverage is that people wanted to see a heavier emphasis on situational updates and safety information instead of non-emergent stories. Viewers of KOIN6 and other TV stations were upset that broadcasts were not prioritizing immediately pertinent information. Another place communication fell short is that it was never made clear to communities when the threat had passed. Posts about the fire became less frequent and eventually stopped altogether, so it was difficult to define which areas were still threatened by the fire or if people were still aware of the fire status.

2021 Ice Storm

Communication regarding the 2021 ice storm started on February 11, 2021, with a KPTV FOX 12 Oregon broadcast. Newspapers and Social Media followed closely behind and quickly started sharing information about the storm. KPTV FOX 12 Oregon and KOIN6 were the main communicators during this event, and they combined produced about 200 video clips with ice storm coverage. Newspapers such as the Salem Reporter and the Statesman Journal were the top communicators and published 29 and 27 articles, respectively. The Oregonian was close behind with 21 articles (Appendix E). On social media, NOAA was the most active communicator and provided daily weather updates on Facebook. The City of Salem Facebook page was also a valuable social media resource (Appendix D).

Across platforms, communication about the ice storm was focused on health, safety, and power outages. TV broadcasts from KPTV FOX 12 Oregon and KOIN6 frequently encouraged viewers to stay home and avoid driving as conditions worsened. They also provided educational information about keeping their homes warm during an outage and preventing carbon monoxide poisoning from non-traditional heat sources. However, none of the TV broadcasts uploaded to YouTube highlighted vulnerable populations during the ice storm. Newspaper articles provided similar information, tips for staying warm and cleaning up after the storm, advisories on staying home and

avoiding driving, and updates about power outages. The Statesman Journal also provided information on how and where to report power outages, weather hazards, and road hazards.

Vulnerable populations were explicitly targeted for communication through newspaper articles and social media posts. Both The Oregonian and the Statesman Journal identified the unhoused and older adults as vulnerable populations within their articles. Articles stated that unhoused individuals would be disproportionately impacted by the ice storm, and encouraged readers to donate warm clothing in support. The City of Salem Facebook page also provided information about vulnerable populations and had a post with information regarding the unhoused population.

One of the main complaints voiced in the comments section on the City of Salem Facebook page is that the City did not share any information about warming centers until four days after the ice storm on February 16. In the days following the ice storm, commenters frequently asked about warming centers and expressed frustration that the City waited so long to make them available. There were also some critical communication gaps because most platforms only provided information in English. To increase the accessibility of messaging, future communication should be provided in multiple languages. Another concern is that infographics were frequently used to share important information, but students noticed that they were often not accompanied by a text description. When tested with a screen reader, some of the images did not have alt ID text available, and the image description was difficult to understand due to the design of the graphic. Including accurate alt ID text and written descriptions alongside infographics would ensure that individuals with visual disabilities can also benefit from online communications.

Future communication about EHHT events should also utilize social media more heavily because it is an effective way to reach people from a variety of populations. Using more social media platforms as a sort of database for communicating messaging related to current and future EHHTs will allow information to reach a broader audience as most people have some form of social media that they check regularly. Additionally, providing communication through flyers around town may help reach the unhoused community who might not have access to the internet, TV, or newspapers.

2021 Pacific Northwest Heat Wave

The 2021 heat wave was first communicated in a weather segment by KOIN6 on June 22, 2021. Newspapers and Social Media followed closely behind. Facebook was the most frequently used social media platform by organizations during the event. However, some organizations never posted about the heat wave on any of their social media platforms (Appendix D). Among newspapers, The Oregonian provided the most coverage of the heat wave, followed by the Salem Reporter and The Oregonian (Appendix E). TV platforms were one of the most popular forms of communication during this event, with KPTV FOX 12 Salem posting 35 videos and KOIN6 posting 57.

The information being communicated by organizations during the heatwave was similar across social media platforms, newspapers, and TV stations. Some of the most commonly shared information across platforms was related to health and safety. Many posts, articles, and TV segments provided information about the signs of heat-related illness, how to treat symptoms at

home, and when to seek medical attention. Individuals were also encouraged to check in on neighbors who may be more vulnerable to the effects of heat, ensure children and pets stay cool and hydrated, and open their homes to friends and family who did not have air conditioning.

Communications also frequently provided information about available resources or included helpful links. The City of Salem included links to resources that provided more detailed information about safety and heat-related illness. Media platforms also frequently posted about available cooling centers and provided information about their location, how to access transportation, and the resources available at each center.

Populations most vulnerable during the heatwave were identified on media platforms and encouraged to take specific precautions during the event. These populations included the unhoused, older adults, children, pregnant people, people with disability, low-income individuals and families, outdoor workers, and those with pre-existing health conditions. Non-English speaking individuals also received targeted communication and information on social media was often made available in both Spanish and English.

One of the most significant issues with communication during the heatwave was the lack of communication with unhoused individuals. A KOIN6 TV segment on June 28 discussed how communication efforts did not reach this group because many did not have access to traditional news sources. Many unhoused people were unaware that the heatwave was coming or only learned through word of mouth, which meant that they were largely unprepared for its effects and did not know about resources available to them. In the future, communication with this group will need to rely on methods other than social media, newspapers, and TV stations.

The most comprehensive recommendation for increasing the effectiveness of communication for future EHHTs would be to increase the accessibility of the messaging. This includes communicating the messaging in languages other than English to reach a broader audience. Additionally, providing varied infographics with text descriptions in the comments would allow people with visual disabilities to use a device/app that can read the text information to them. However, social media platforms have generally shown to be one of the most effective forms of communication during these kinds of events and should be more heavily utilized because they are able to reach a wide audience. If more organizations were to post on social media about EHHT events and use a wider variety of platforms, it would allow messages to reach more people than they have in the past.

Discussion/Conclusion

For each of the four EHHT events, social media, particularly Facebook, was the most heavily utilized method of communication. Other social media platforms, such as Instagram and Twitter, generally had fewer followers and fewer posts about an EHHT event when compared to an organization's Facebook page. However, any information that was shared on platforms such as Instagram was often the same as what was posted to Facebook, but not all posts were shared on other platforms. This may have been because posts can be shared simultaneously on Facebook and Instagram but not on Twitter/X. There was also very little information available about the EHHT

events on organizations' websites which suggests that this may not have been a primary source for information at the time of the event. In the future, organizations should prioritize posting information on all their social media pages to ensure communication reaches as many people as possible. Since many organizations are already sharing the same posts and information on each platform, this is a strategy that other organizations could implement to utilize various platforms and provide consistent messaging for all social media users.

In addition to social media, TV stations also seemed to be valuable resources during the EHHT events. While KPTV FOX 12 Oregon and KOIN6 heavily communicated about the EHHT events and uploaded many video clips of their coverage to YouTube, KATU did not appear to cover these events and did not have any videos about them uploaded to YouTube.

Newspapers also communicated about each EHHT event; however, certain events received more coverage than others (Appendix E.5). Significantly more articles were published by both The Oregonian and the Statesman Journal about the 2020 wildfires compared to the other three EHHT events. However, this may have been because the impacts of the wildfires lasted longer and were more widespread. In the future, newspapers should provide more regular and consistent coverage of all EHHT events to ensure that individuals who primarily rely on these sources are well-informed.

The information being shared across social media, newspapers, and TV stations was all related to human health and safety, and generally provided consistent messaging across platforms. However, not all platforms included outside links or directed people to additional resources. Newspaper articles and TV broadcasts would often inform readers and viewers of the resources available to them during an EHHT event, but they did not include helpful links like social media posts did. Social media posts for each of the EHHT events frequently included links directing users to further information or resources. This made social media an incredibly valuable resource because users were able to quickly find and access critical information and resources. In the future, newspaper articles and TV broadcasts should also include or reference other organizations or resources to ensure that people are aware of the resources available to them regardless of where they get their news.

While social media, newspapers, and television were all used to communicate about the EHHT events, it is important to consider which demographics use and prefer each news source. Different age groups have been shown to have various habits and preferences for news consumption, which must be considered to ensure communication reaches target audiences and certain groups are not excluded. A Pew Research Center (2023) survey showed that digital devices are the most popular means of accessing news among U.S. adults, with fewer people relying on television and print publications for news. When asked about which source they prefer to get their news from, 58% of U.S. adults said digital devices, 27% television, and 5% print publications. Preference for digital devices has risen 8% since 2021 while preference for television has dropped 9% and television has remained largely unchanged. Preferred news sources vary considerably by age group, and U.S. adults ages 50+ are more likely to use and prefer television and print publications than adults ages 18-49. However, a significant portion of adults ages 50+ still use digital devices, with 86% of adults ages 50-64 and 77% of adults ages 65+ reporting they at least sometimes get news from digital devices. When getting news on digital devices, news websites or apps are the most popular and 25% say they prefer this source while 15% prefer search engines

and 12% prefer social media. The digital news source people use and prefer also varies by age group, and adults ages 18-29 are more likely to prefer and use social media as a news source compared to other age groups (Liedke & Wang, 2023a).

Social media has become an increasingly important part of digital news consumption, with 50% of U.S. adults reporting that they at least sometimes get news from social media (Liedke & Wang, 2023b). Facebook is the most popular platform for news consumption with 68% of U.S. adults reporting that they use the site, and 30% of those users saying they regularly get news there. Instagram is also widely utilized with 46% of adults using the site, but a smaller percentage of users rely on it for news compared to Facebook. Twitter has a smaller general user base with only 26% of adults using the site, but many users frequently rely on it as a news source during emerging events. Facebook is the most popular news source among adults ages 30-49, and this group makes up 40% of the site's news consumers. Adults ages 18-29 and 50-64 each account for 22% of news consumers, while adults 65+ only account for 16%. Instagram and Twitter/X are frequent news sources for adults ages 18-29 and 30-49, and these groups account for the majority of news consumers on these sites. Instagram and Twitter/X are less popular among adults ages 50+ (Liedke & Wang, 2023b).

Communication methods during the EHHT events did generally align with what research has shown regarding news consumption habits and preferences. Digital devices and social media are more widely utilized than traditional news sources such as television and print publications, and this trend was reflected during the EHHT events as social media was the most frequently utilized for communication. The social media platforms used during the EHHT events also aligned with the research, and Facebook was used significantly more for communication compared to Instagram or Twitter/X. However, by relying primarily on social media, including Facebook, certain groups may have been left out of communication about the EHHT events. Older adults who prefer traditional news sources and do not use social media may not have received some of the critical information that was only being shared on those platforms. Similarly, young adults may have missed certain information because while they use social media more than other generations, Facebook is not their preferred news source. Young adults are more likely to use Instagram or Twitter/X and turn to those sites for news, but there were significantly fewer posts about the EHHT events on those platforms. While Facebook is a valuable communication resource and is an effective way to reach people, solely relying on Facebook will likely exclude certain age groups from communications. Ensuring that critical health and safety information is available on television, print publications, and other social media platforms such as Instagram and Twitter/X will enable communication with a wider audience.

Vulnerable populations were frequently mentioned in communications during each EHHT event and were informed of additional precautions they should take to ensure their health and safety. Communications also frequently encouraged individuals to support their friends, family, and neighbors who were a part of those groups and provided suggestions for how to do so. However, certain vulnerable populations were often left out of communications (Appendix C). Outdoor workers and those with disabilities were rarely mentioned in communications across EHHT events and media platforms. Future communication about EHHT events should more explicitly address each of the vulnerable populations during an event, and consider which forms of communication will be best to reach those populations.

While vulnerable populations did receive some communication during the EHHT events, much of the communication did not align with current recommendations for communicating with these groups. Vulnerable populations, such as older adults, unhoused individuals, non-English speakers, individuals with disabilities, and individuals with underlying health issues, are more susceptible to adverse health effects during EHHT events and have unique needs that must be factored in when creating communication plans for these events (Florida Vulnerable Populations Communications Work Group, 2009). General guidelines may be followed to ensure that communication will be accessible and easily understood by these populations. Effective communication with vulnerable populations should be culturally appropriate, utilize the group's preferred communication method, and involve collaboration with trusted community members and organizations. Additionally, communication should clearly describe actions for the population to take, provide resources specifically designed to meet the needs of the group, ensure that messages are translated into multiple languages, and verify that all digital communication can be interpreted by screen readers (Florida Vulnerable Populations Communications Work Group, 2009). Communication from key organizations during the EHHT events did not align with all of these recommendations. One issue is that communication with vulnerable populations was not always conducted using that group's preferred news source. Older adults generally prefer to get their news from television or print publications (Liedke & Wang, 2023a), but most communication was done through digital devices and social media. Another concern is that digital communication, specifically social media posts, could not always be clearly interpreted by a screen reader. This is a serious issue given that the majority of information about the EHHT events was shared digitally, which may have made it difficult for individuals with visual disabilities to access information. These guidelines should be incorporated into communication strategies for future EHHT events to ensure that messaging is appropriate for the target populations, which will allow vulnerable populations to respond better to EHHT events and reduce poor health outcomes.

Complaints about how EHHTs were being communicated varied by event, but one of the main issues was delay in communication. This was a significant issue during the 2018 algal bloom because people were upset that they were not immediately informed of the bloom and the threat it posed to health. If the information had been communicated as soon as the City was aware and able to draft a statement, people would have been able to take precautions sooner to protect their health. Similarly, during the 2020 wildfires, most major organizations did not share information about the wildfire until it became an immediate threat. Posting information earlier would give people more time to prepare for events and respond to the information.

Students also noticed that communication on social media was not always designed to be accessible for those with visual disabilities who may rely on screen readers. While a screen reader could interpret the information written on social media posts, key health and safety information was also frequently shared in graphics which can be difficult for screen readers to understand if they are not designed with accessibility in mind. Information presented in graphics was not always paired with a written description or alt ID text that could be interpreted by screen readers. Social media platforms can auto-generate alt ID text to accompany a graphic, but the auto-generated versions were not always accurate or were difficult to understand. When organizations use graphics to communicate in the future, they should either include a detailed image caption or

manually enter alt ID text to ensure that screen readers can interpret the information and clearly translate it for those with visual disabilities.

Another significant communication issue that cut across all EHHT events was that information was not readily available in languages other than English. While many social media posts were also available in Spanish, there is no evidence that information was available in other languages. Additionally, information shared on social media as a graphic could not be as easily translated into other languages or accessed by individuals with visual disabilities which would create challenges for these populations. The lack of resources for individuals speaking languages other than English or Spanish or those with visual disabilities may have led these communities to be underprepared for the events and prevented them from receiving critical health and safety information.

It is also important to note that there may have been information available in languages other than English and Spanish that was being shared by organizations not included in this media analysis. Information may have still been available for individuals that speak other languages, but it is unknown what information was being shared in and through what platforms. However, given that the organizations included in the media scan do play a significant role in communicating information about the EHHT events, it is important that the information they provide is accessible and is made available in multiple languages. In the future, when major organizations are preparing for EHHT events there should be a greater emphasis on creating a communication plan that will be accessible for non-English speaking individuals. Communication coming from these organizations about past EHHT events frequently prioritized Spanish speaking communities by writing social media posts in Spanish and English or creating Facebook pages specifically for Spanish speaking communities, and those same efforts should be directed towards communities that speak other languages as well. English and Spanish are not the only languages being spoken in Marion and Polk counties, and by prioritizing communication in other languages it will ensure that more people are prepared for EHHT events and receive the necessary health and safety information when they do occur.

Appendix E-1: Organizations and Platforms

Table of organizations and social media platforms included in the social media scan.

	Website	Facebook	Instagram	Twitter/X
City of Salem	X	X	X	X
U.S. Forest Service	X	X		X
NOAA Portland	X	X		X
Oregon Water Resource Department	X			
Oregon DEQ	X	X		X

Salem Fire Department	X	X	X	X
Salem Police Department	X	X	X	X
Salem Health	X	X	X	X
Oregon Health Authority	X	X		X

*Spaces left blank indicate that a social media account was not found for an organization on that platform.

Appendix E-2: Keywords

Keywords

1. **Climate change** - any reference to the specific term of 'climate change' or 'global warming'
2. **Human health** - anything that references the health of humans or a hazard to human health
3. **Protecting property** - any comment on damaged property or needing to protect property
4. **Education** - includes any tips, information, or facts educating the public
5. **Environmental impacts** - any consequences specific to the environment (not property)
6. **Philanthropy** - any reference to asking for charitable donations of volunteering, etc.
7. **Vulnerable populations** - direct or indirect mentions of a vulnerable populations
    a. Older adult

b. Unhoused
c. Medical/health
d. Non-English speaker
e. Children
f. Pregnant
g. Outdoor worker
h. Disability

Appendix E-3: Vulnerable Populations in Posts and Articles

Tables listing mentions of vulnerable populations in social media posts and newspaper articles.

2018 Algal Bloom: Facebook

	Older Adults	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
City of Salem	X		X		X	X		
U.S. Forest Service	X		X		X	X		

NOAA Portland								
Oregon Water Resource Department								
Oregon DEQ	X		X		X	X		
Salem Fire Department	X		X		X	X		
Salem Police Department	X		X		X	X		
Salem Health	X		X		X	X		
Oregon Health Authority	X		X		X	X		

*Instagram posts about the algal bloom did not mention any vulnerable populations.

2020 Santiam Wildfires: Facebook

	Older Adult	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
City of Salem	X	X	X		X	X		
U.S. Forest Service	X		X	X	X	X		
NOAA Portland								
Oregon Water Resource Department								
Oregon DEQ	X		X	X	X	X		
Salem Fire Department	X		X	X	X	X		
Salem Police Department				X				
Salem Health								

Oregon Health Authority			X	X			X	

2020 Santiam Wildfires: Instagram

	Older Adult	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
City of Salem	X	X	X		X	X		
U.S. Forest Service								
NOAA Portland								
Oregon Water Resource Department								
Oregon DEQ								
Salem Fire Department								
Salem Police Department								
Salem Health								
Oregon Health Authority								

2021 Ice Storm: Facebook

	Older Adult	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
City of Salem	X	X					X	
U.S. Forest Service								
NOAA Portland								

Oregon Water Resource Department								
Oregon DEQ								
Salem Fire Department								
Salem Police Department								
Salem Health								
Oregon Health Authority								

2021 Ice Storm: Instagram

	Older Adult	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
City of Salem	X	X					X	
U.S. Forest Service								
NOAA Portland								
Oregon Water Resource Department								
Oregon DEQ								
Salem Fire Department								
Salem Police Department								
Salem Health								
Oregon Health Authority								

2021 Heat Wave: Facebook

	Older Adult	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
City of Salem		X						
U.S. Forest Service								
NOAA Portland	X	X	X		X		X	
Oregon Water Resource Department								
Oregon DEQ								
Salem Fire Department								
Salem Police Department								
Salem Health								
Oregon Health Authority	X		X		X	X		X

*Instagram posts about the heat wave did not mention any vulnerable populations.

2018 Algal Bloom: Newspapers

	Older Adults	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
Salem Reporter 0 articles								
Statesman Journal 56 articles	3		35		40	3		
The Oregonian 7 articles	3		3		5	3		

2020 Santiam Wildfires: Newspapers

	Older Adults	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
Salem Reporter 14 articles		1	1		3			
Statesman Journal 56 articles	3	1	6		2	1	1	
The Oregonian 37 articles	2	1	2		2	1	1	

2021 Ice Storm: Newspapers

	Older Adults	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
Salem Reporter 29 articles		3	2					
Statesman Journal 27 articles	2	1	2		1			
The Oregonian 21 articles	2	3	3					

2021 Heat Wave: Newspapers

	Older Adults	Unhoused	Underlying Health Issues	Non-English Speaker	Children	Pregnant	Outdoor Worker	Disability
Salem Reporter 15 articles	1	2			1		4	
Statesman Journal 11 articles	2	4			2	1	6	

The Oregonian 17 articles	3	7	3		2	1	7	

Appendix E-4: Social Media Posts by Organization

Tables listing the total number of posts per social media platform per organization for each EHHT event.

2018 Algal Bloom

	Facebook	Instagram	Twitter/X	Total
City of Salem	7	10	0	17
U.S. Forest Service	0	N/A	0	
NOAA Portland	12	N/A	0	12
Oregon Water Resource Department	N/A	N/A	N/A	0
Oregon DEQ	3	N/A	0	3
Salem Fire Department	2	Need to check	0	2
Salem Police Department	3	3	0	6
Salem Health	0	0	0	0
Oregon Health Authority	0	N/A	0	0

2020 Wildfires

	Facebook	Instagram	Twitter/X	Total
City of Salem	57	5	0	62
U.S. Forest Service	83	N/A	0	83
NOAA Portland	25	N/A	0	25
Oregon Water Resource Department	N/A	N/A	N/A	0
Oregon DEQ	50	N/A	0	50
Salem Fire Department	12	0	1	13
Salem Police Department	10	7	0	17

Salem Health	3	0	0	3
Oregon Health Authority	21	N/A	0	21

2021 Ice Storm

	Facebook	Instagram	Twitter/X	Total
City of Salem	7	10	0	17
U.S. Forest Service	0	N/A	0	0
NOAA Portland	12	N/A	0	12
Oregon Water Resource Department	N/A	N/A	N/A	0
Oregon DEQ	3	N/A	0	3
Salem Fire Department	2	Need to check	0	2
Salem Police Department	3	3	0	6
Salem Health	0	0	0	0
Oregon Health Authority	0	N/A	0	0

2021 Heat Wave

	Facebook	Instagram	Twitter/X	Total
City of Salem	7	1	0	8
U.S. Forest Service	0	N/A	0	0
NOAA Portland	31	N/A	0	31
Oregon Water Resource Department	N/A	N/A	N/A	0
Oregon DEQ	1	N/A	0	1
Salem Fire Department	0	0	0	0
Salem Police Department	0	0	0	0
Salem Health	2	0	0	2
Oregon Health Authority	5	N/A	0	5

* Spaces filled with N/A indicate that an organization does not have an account on that social media platform
* If Twitter/X is listed as having 0 posts, that means that the feed stopped prior to those dates

Appendix E.5 Number of Articles per EHHT Event

Table listing the total number of articles per EHHT event per news publication.

	2018 Algal Bloom	2020 Wildfires	2021 Ice Storm	2021 Heat Wave
The Salem Reporter	0	14	29	15
The Statesman Journal	56	56	27	11
The Oregonian	7	37	21	17

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Appendix F.1: Community Survey Results

Key / notes

- Underlined questions are those that used a select-all format
  - Because respondents could choose multiple options, percentages for these questions will not add up to 100
- *Italicized* questions are those that were only asked in the final version of the survey
  - Otherwise, all data includes answers from the two initial pilot surveys
- Percentages are still weighted based on the county distribution of respondents
  - Due to this, the pie charts or graphs for some questions—which use raw proportions—will not directly correspond to information in tables

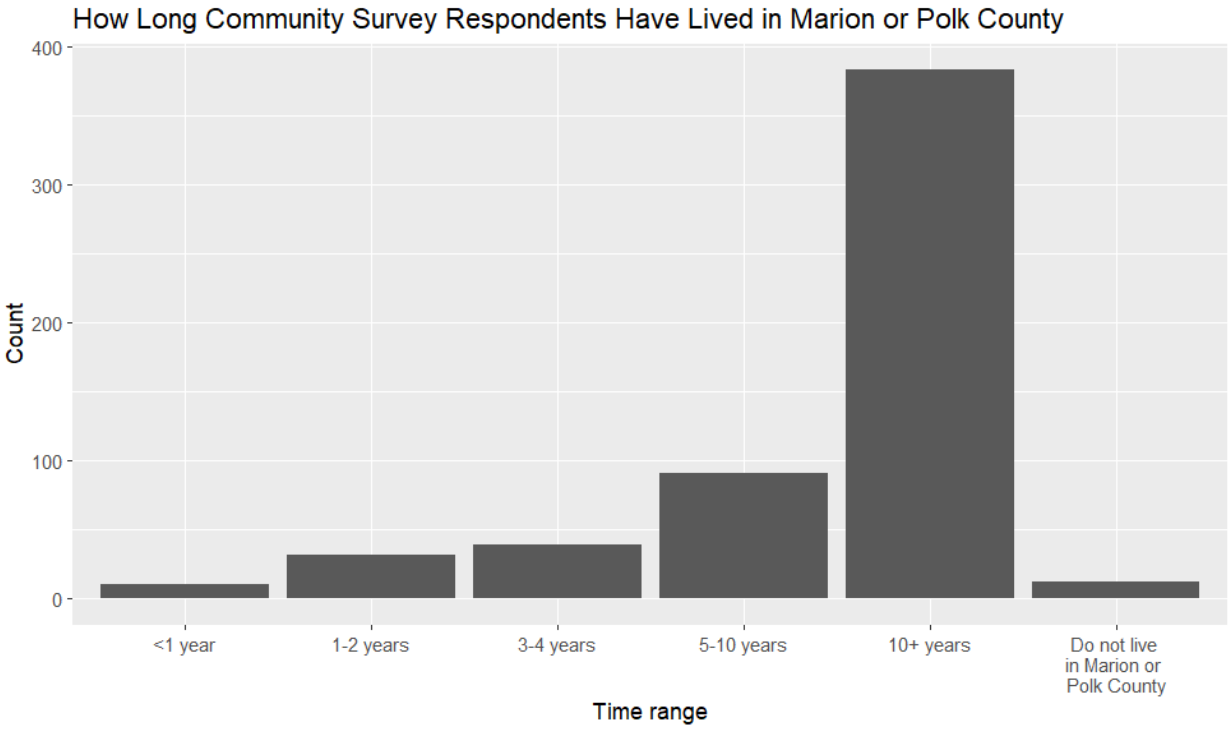
Location

Length of time lived in Marion or Polk

How long have you lived in Marion and/or Polk County?

Time range	n of respondents	% of respondents
<1 year	10	1.8
1-2 years	32	5.6
3-4 years	39	6.5
5-10 years	91	15.8
10+ years	383	68.3
I do not live in Marion or Polk County*	12	2.1

*All respondents who chose this option indicated in a follow-up question that they work or go to school in Marion or Polk County

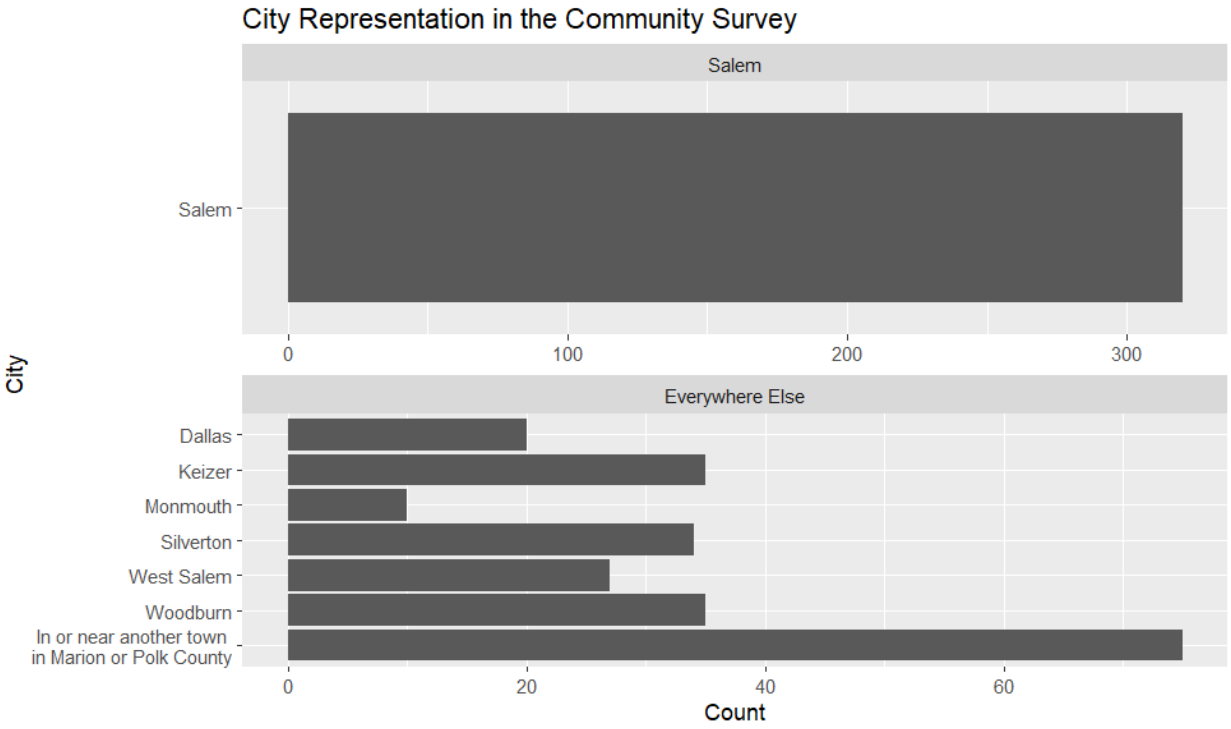


City

What city do you live in?

City	n of respondents	% of respondents
Dallas	20	6.5
Keizer	35	5.6
Monmouth	10	3.2
Salem	320	53.9
Silverton	34	5.4
West Salem	27	5.3
Woodburn	35	5.6
In or near another town in Marion/Polk Counties (see		

below)	75	14.5

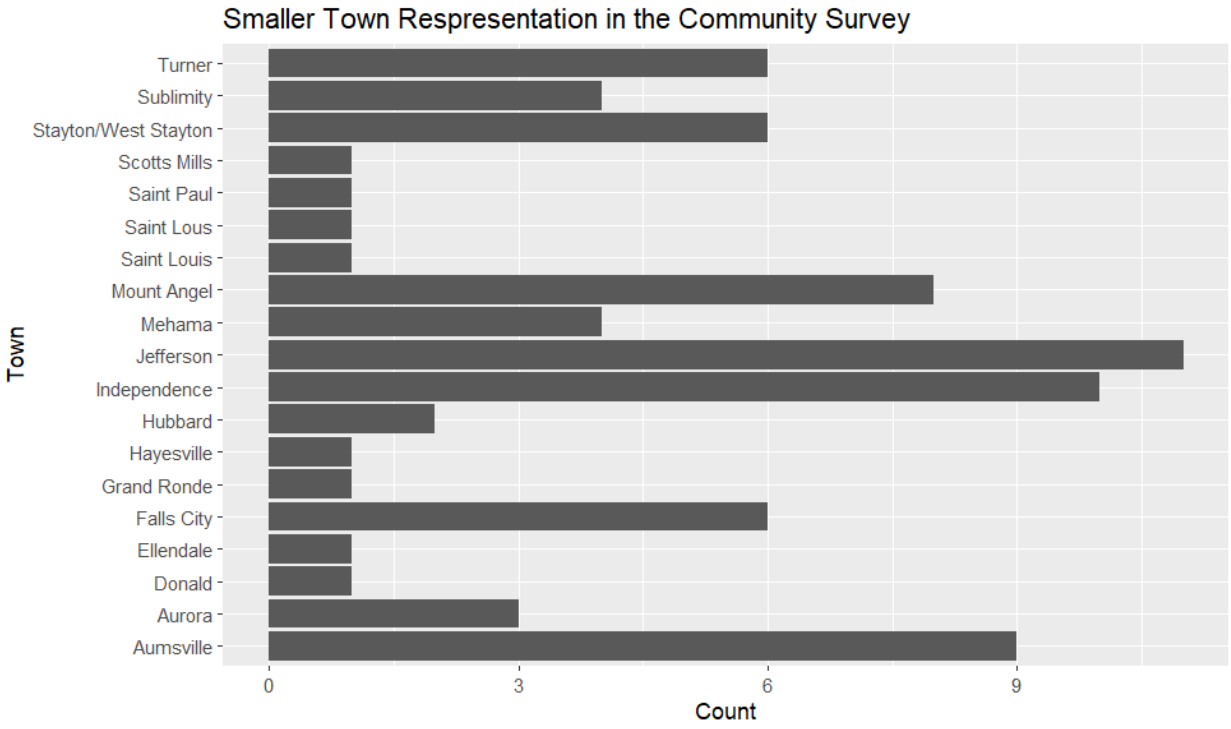


Town

Which town do you live in or closest to?

Town	n of respondents	% of respondents
Aumsville	9	1.6
Aurora	3	0.5
Donald	1	0.2
Ellendale	1	0.2
Falls City	6	1.1

Grand Ronde	1	0.2
Hayesville	1	0.2
Hubbard	2	0.4
Independence	10	1.8
Jefferson	11	1.9
Mehama	4	0.7
Mount Angel	8	1.4
Saint Louis	2	0.4
Saint Paul	1	0.2
Scotts Mills	1	0.2
Stayton/West Stayton	6	1.1
Sublimity	5	0.9
Turner	6	1.1



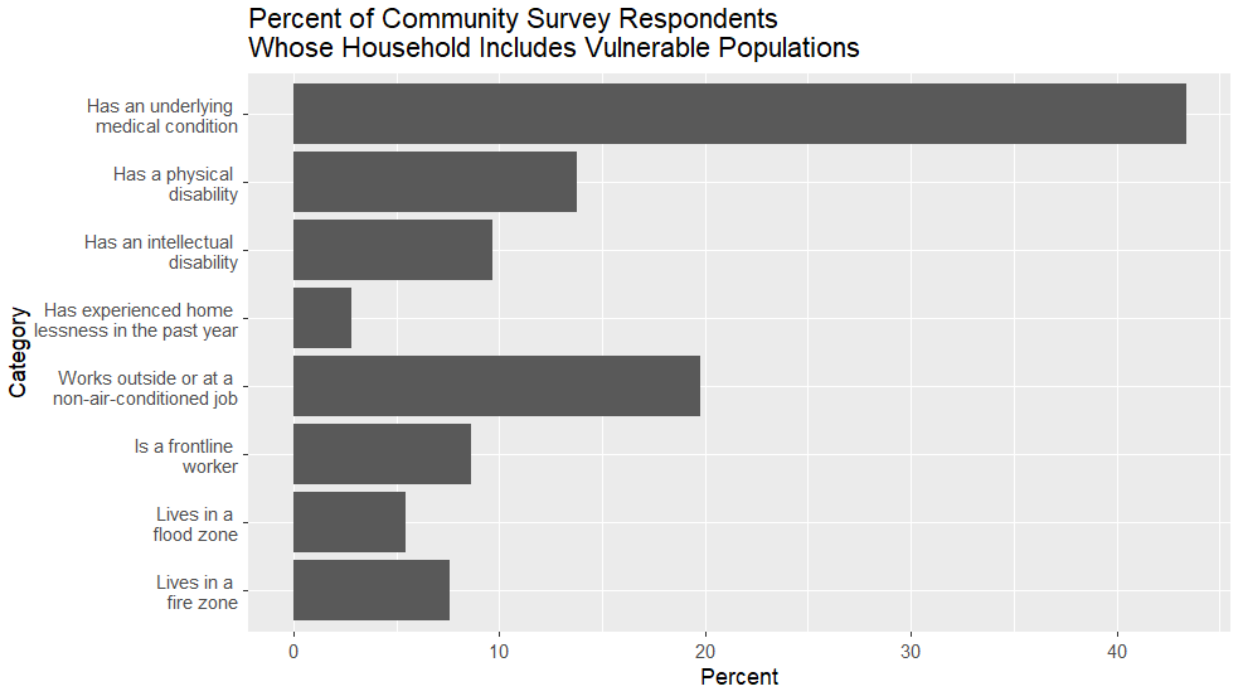
Demographics

Vulnerability

Which of the following characteristics apply to you or someone in your household?

Category	n of respondents	% of respondents
Experiences an underlying medical condition	246	44.1
Experiences a physical disability / is physically disabled	78	14.3
Experiences an intellectual disability / is intellectually disabled	55	9.3
Experienced homelessness in the past year	16	2.3

Works in a job that is outside or not in air conditioning at least 50% of the time	112	19.4
Works as a frontline worker	49	8.6
Lives in a flood zone	31	6.0
Lives in a fire zone	43	7.5
None of these apply	131	26.1

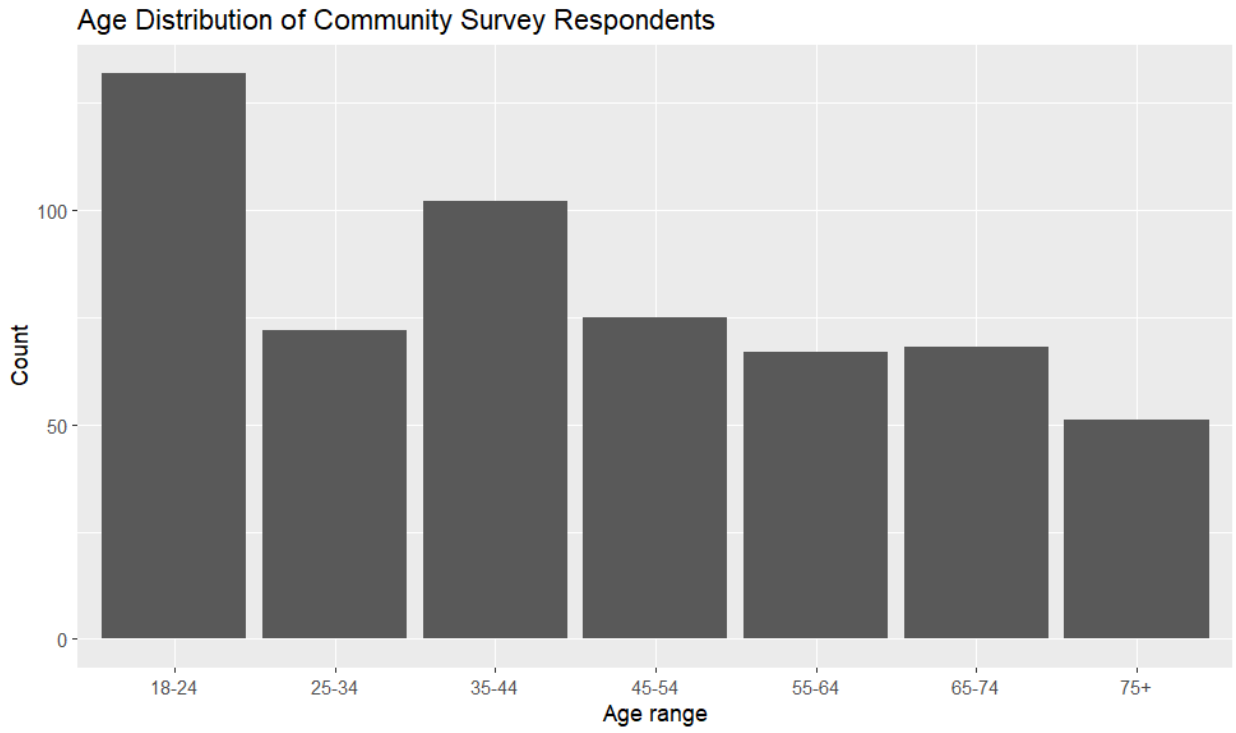


Age

How old are you?

Age range	n of respondents	% of respondents
18-24	132	22.8
25-34	72	12.4

35-44	102	17.7
45-54	75	13.8
55-64	67	12.4
65-74	68	12.4
75+	51	8.6

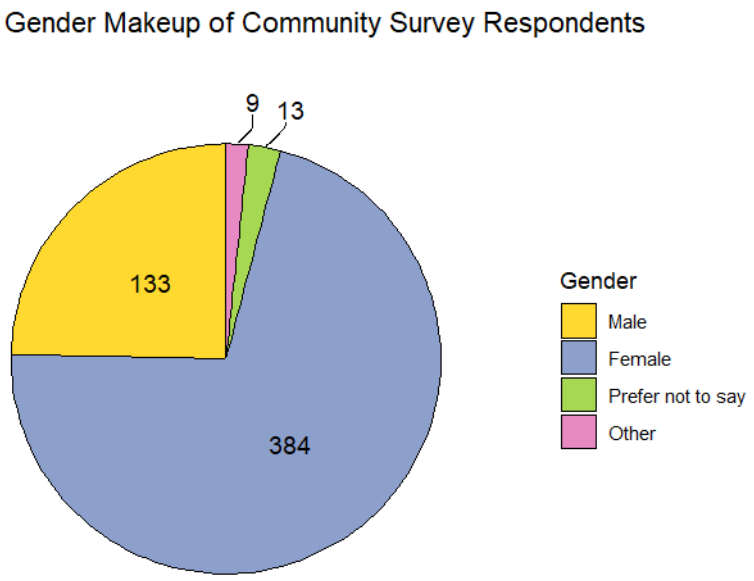


Gender

Are you...?

Gender	**n of respondents**	**% of respondents**
Female	384	72.2
Male	133	24.0

Other	9	1.5
Prefer not to say	13	2.3



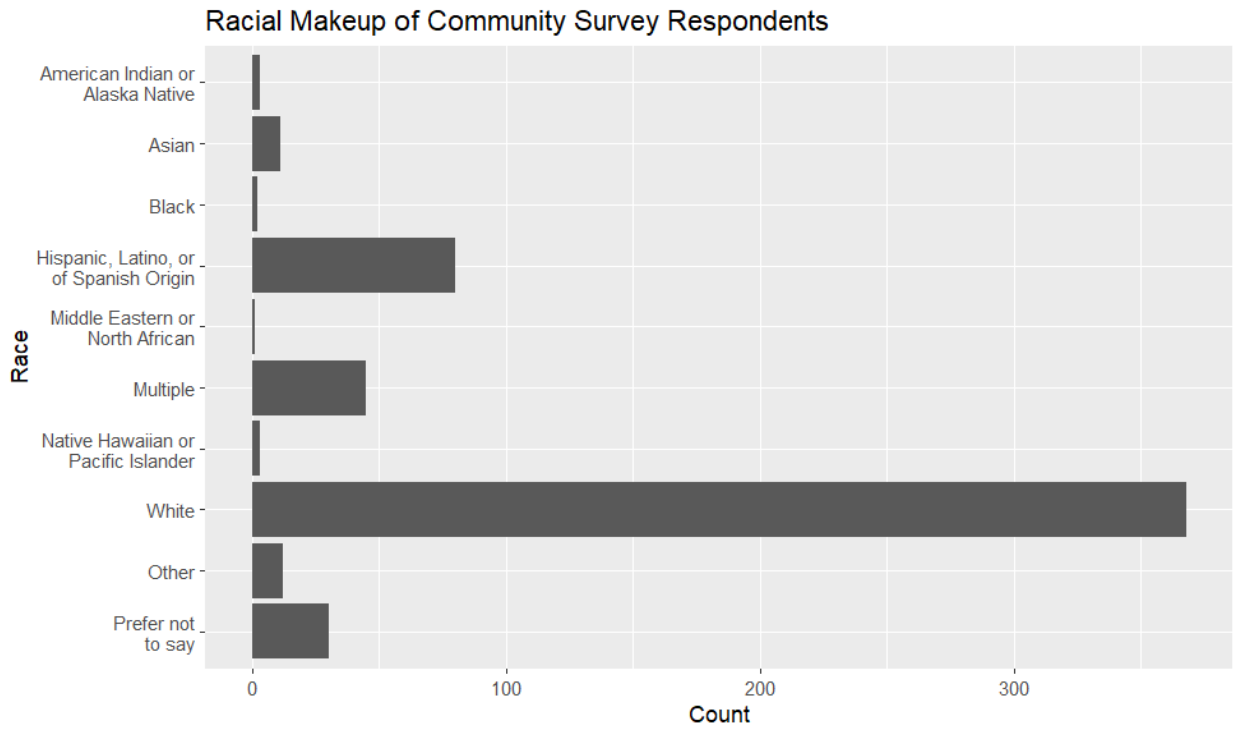
Race

Which of the following describes you?

Race	**n of respondents**	**% of respondents**
American Indian, Eskimo, or Alaskan Native	3	0.6
Asian	11	2.3
Black	2	0.4
Middle Eastern or North African	1	0.2

Native Hawaiian or Pacific Islander	3	0.6
White	368	77.5
Multiple	45	9.5
Other	12	2.5
Hispanic, Latino*	80	14.6
Prefer not to say	30	6.3

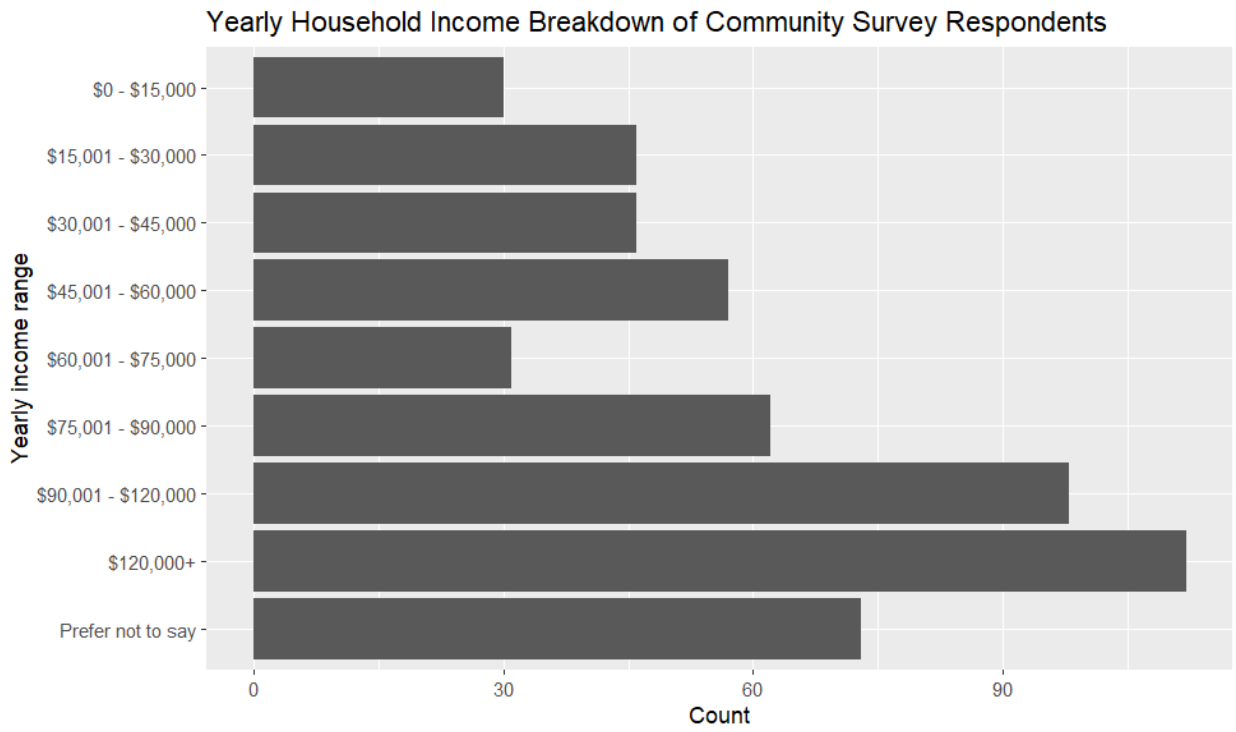
*Hispanic or Latino was treated as its own category separate from the other race options in analysis to mirror how the census collects data.



Annual household income

What is your expected total annual income for your household?

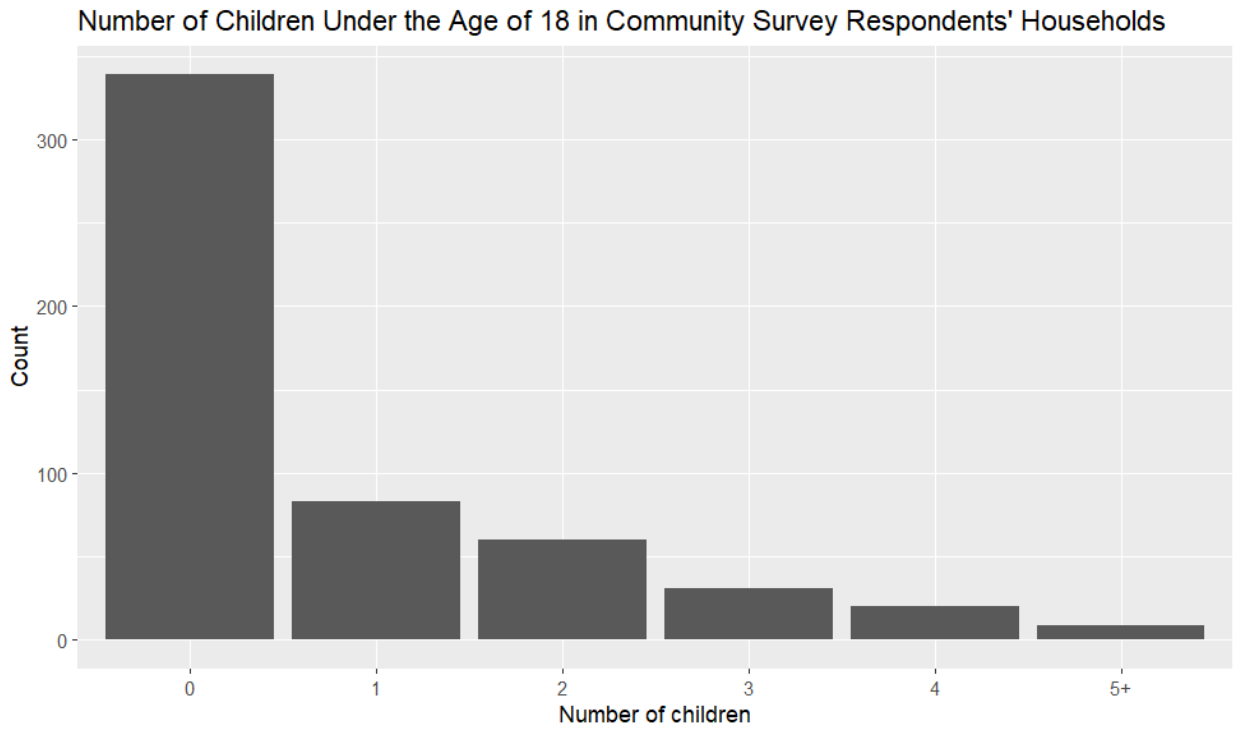
Income	n of respondents	% of respondents
$0-$15,000	30	5.4
$15,001-$30,000	46	8.3
$30,001-$45,000	46	8.3
$45,001-$60,000	57	10.3
$60,001-$75,000	31	5.6
$75,001-$90,000	62	11.2
$90,001-$120,000	98	17.7
$120,000+	112	20.2
Prefer not to say	73	13.2



Children under 18

How many children under the age of 18 live in your household?

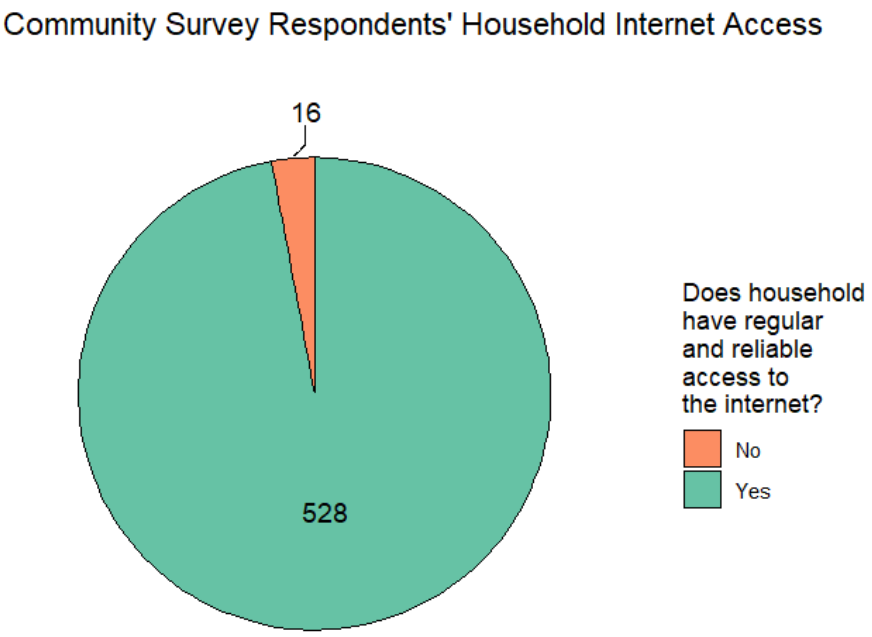
Number of children under 18	n of respondents	% of respondents
0	339	62.4
1	83	16.0
2	60	11.2
3	31	5.3
4	20	3.5
5+	9	1.7



Internet access

For the most part, do you have reliable and regular access to the internet?

Household...	n of respondents	% of respondents
Has regular and reliable internet access	528	96.8
Does not have regular and reliable internet access	16	3.2

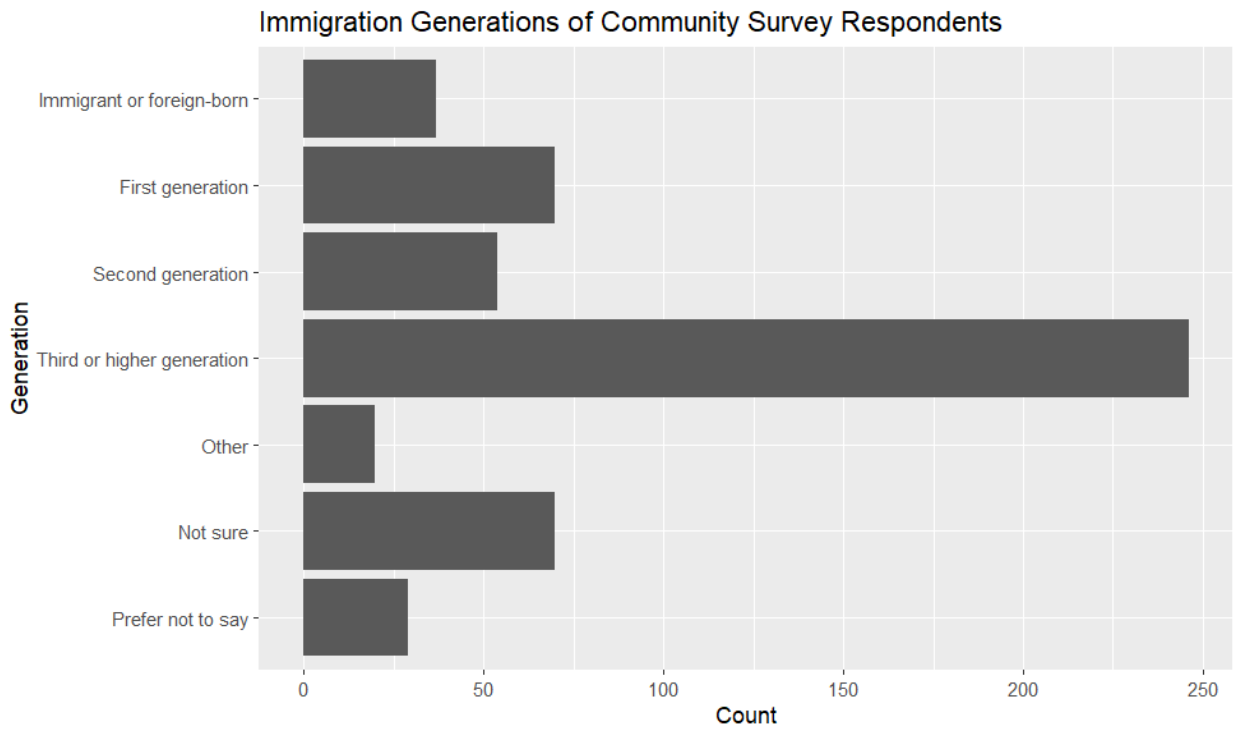


Immigration

With respect to immigration from other nations, which generation do you most identify with?

Immigration generation	n of respondents	% of respondents
Immigrant or foreign-born	37	7.3
First generation	70	12.8

Second generation	54	10.5
Third or higher generation	246	46.7
Other	20	3.8
Not sure/prefer not to say	99	18.9

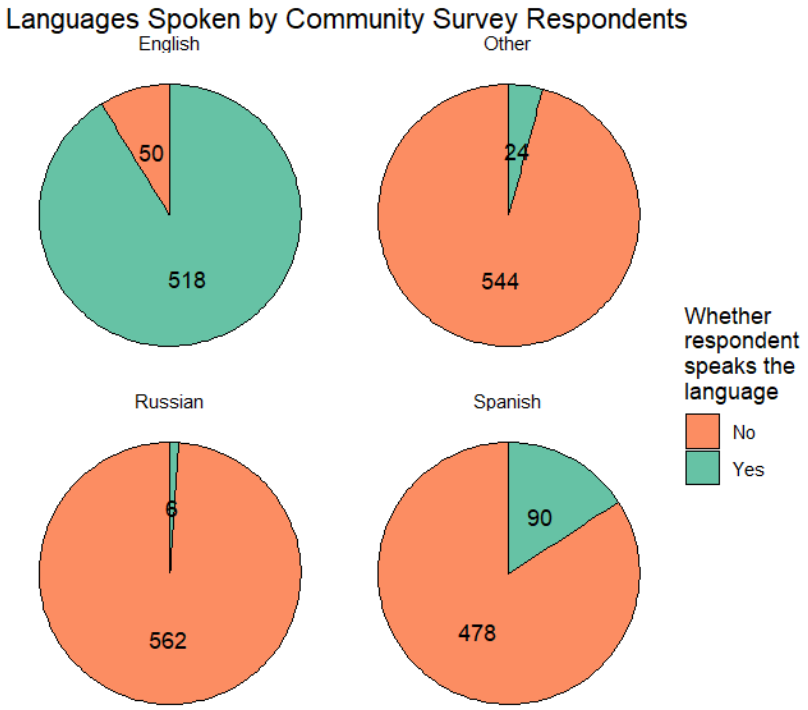


Language(s) spoken

What language(s) do you speak in your home?

Language	**n of respondents**	**% of respondents**
English	518	91.1
Spanish	90	15.2
Russian	6	1.1

Other	24	4.1

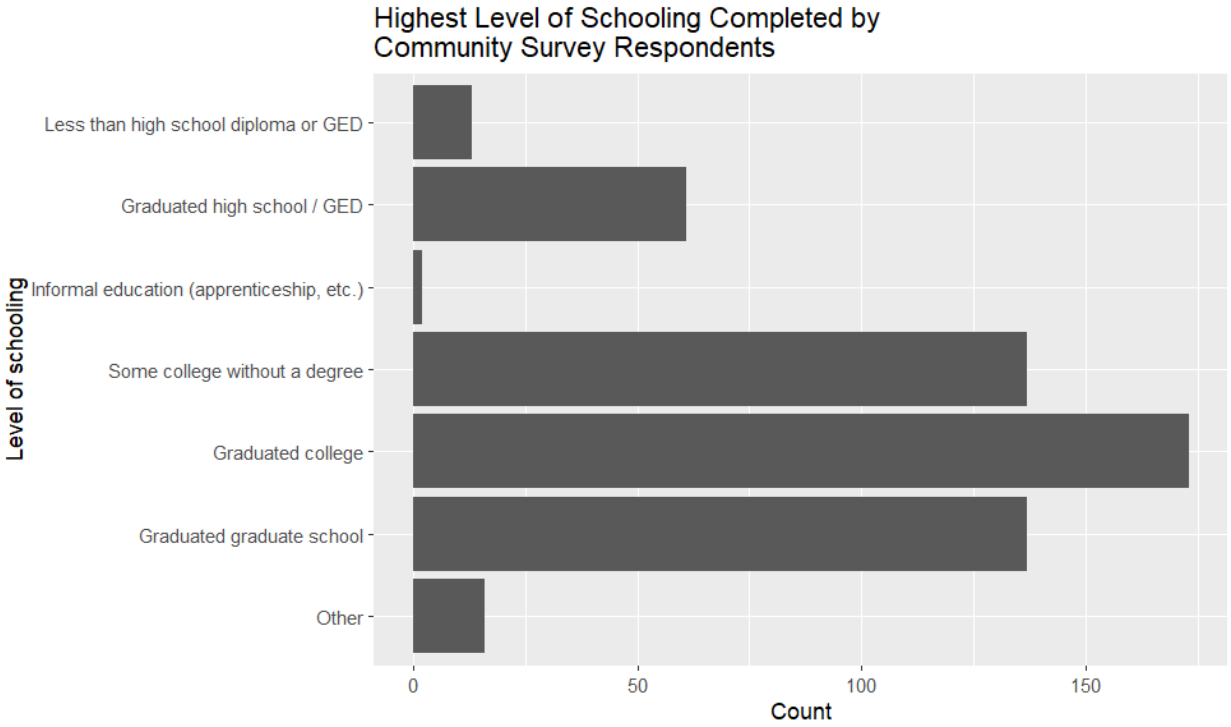


Highest level of schooling completed

What is the highest level of school you have completed or the highest degree you have received?

Level of schooling	**n of respondents**	**% of respondents**
Less than high school diploma or GED	13	2.3
Graduated high school / GED	61	11.0
Informal education (apprenticeship, etc.)	2	3.3
Some college without a degree	137	26.2
Graduated college	173	32.5

Graduated graduate school	137	24.8
Other	16	2.8

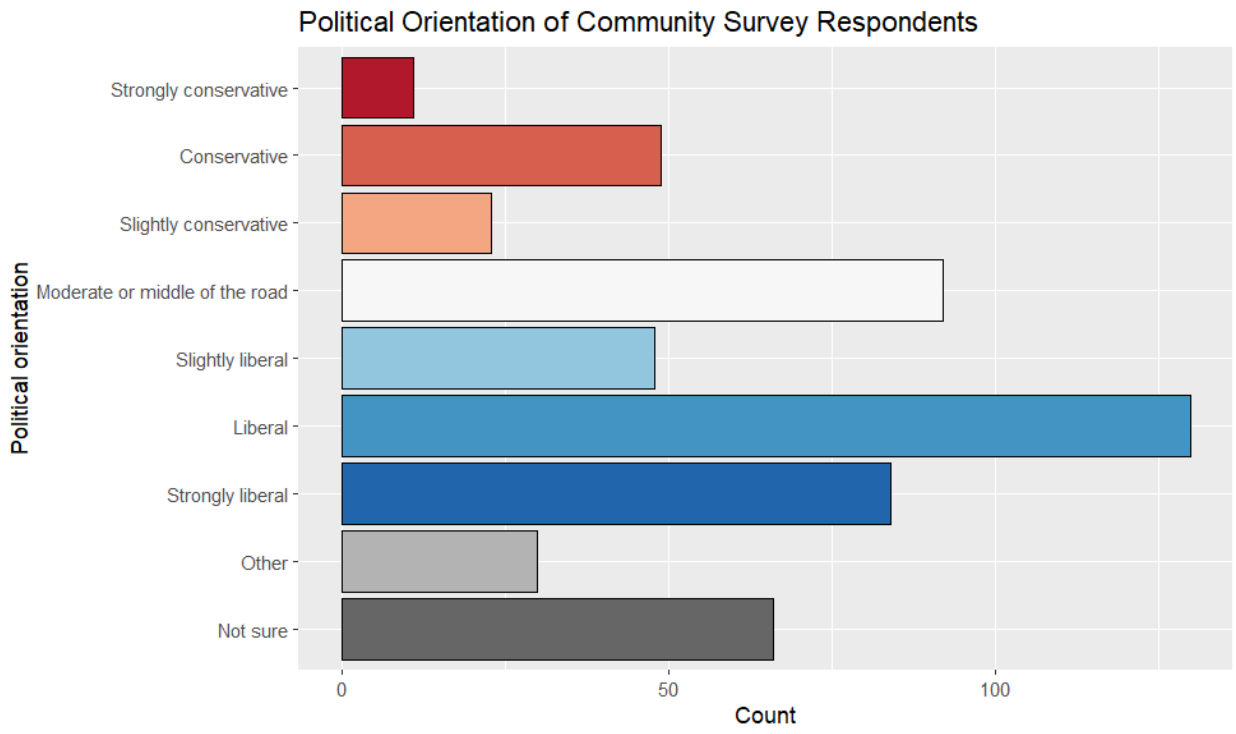


Political orientation

In general, would you describe your political view as…

Political orientation	**n of respondents**	**% of respondents**
Strongly conservative	11	2.4
Conservative	49	9.6
Slightly conservative	23	4.2
Moderate	92	17.6
Slightly liberal	48	9.2

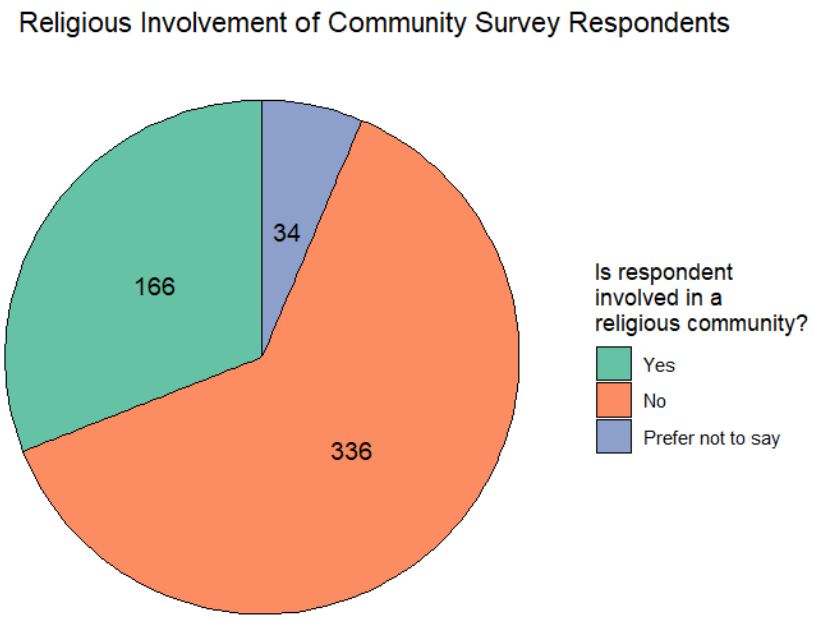
Liberal	130	24.1
Strongly liberal	84	15.4
Not sure	66	11.3
Other	30	5.6



Religious involvement

Are you involved in a religious community?

	n of respondents	**% of respondents**
No	336	62.2
Yes	166	31.2
Prefer not to say	34	6.6



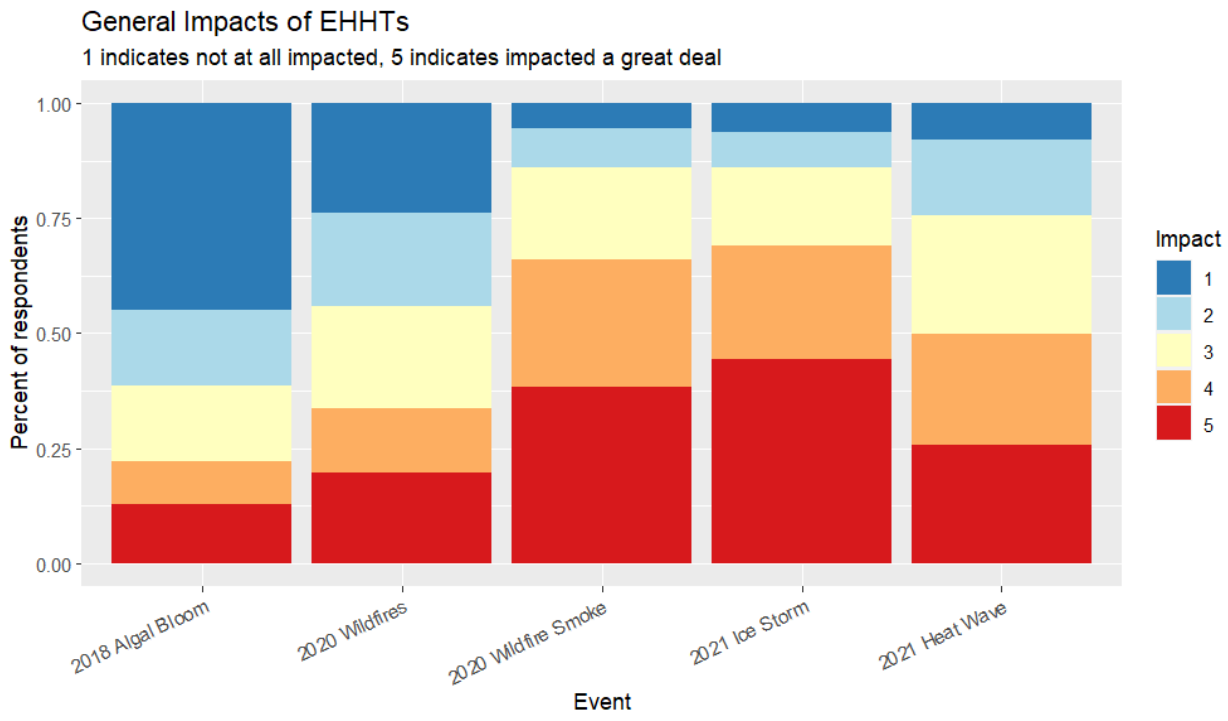
General EHHT Impact and Concern

General impact

On a scale of 1 to 5, how were you and your household generally impacted by each of the following past events?

Event	Mean score	n answered 1	n answered 2	n answered 3	n answered 4	n answered 5
Salem algal bloom	2.3	225	83	83	47	64
2020 wildfires	2.8	125	107	117	75	103
2020 wildfire smoke	3.9	30	46	107	150	207
2021 ice	3.9	35	42	92	135	243

storm						
2021 heat dome	3.4	44	90	143	133	141

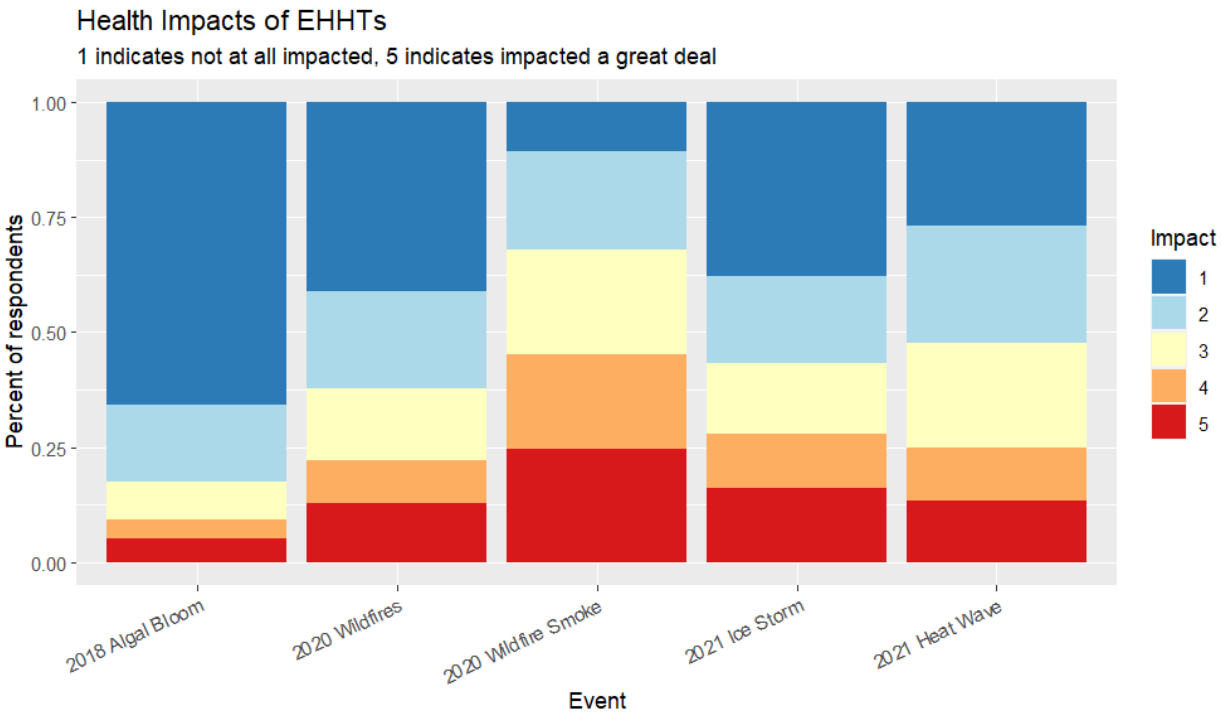


Health impact

On a scale of 1 to 5, how were you and your household's health impacted by each of the following past events?

Event	**Mean score**	**n answered 1**	**n answered 2**	**n answered 3**	**n answered 4**	**n answered 5**
Salem algal bloom	1.7	246	63	30	16	19
2020 wildfires	2.3	160	81	61	36	50
2020 wildfire	3.3	42	85	90	82	97

smoke						
2021 ice storm	2.5	152	75	62	47	65
2021 heat dome	2.6	108	103	93	46	54

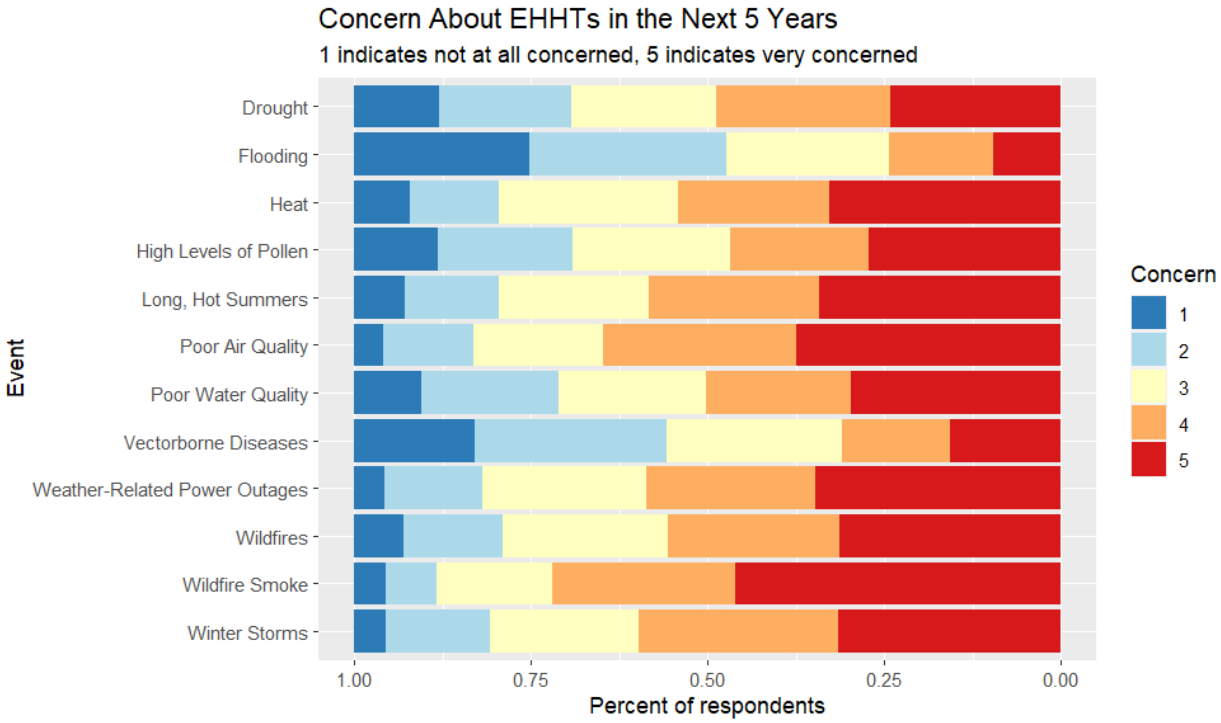


Concern

On a scale of 1 to 5, indicate how concerned you are about the following environmental conditions or events impacting you or a member of your household in the next 5 years.

Event	**Mean score**	**n answered 1**	**n answered 2**	**n answered 3**	**n answered 4**	**n answered 5**
Drought conditions	3.3	66	103	113	135	133

Flooding	2.6	136	152	126	81	52
Heat waves	3.6	44	71	143	120	184
High levels of pollen	3.4	66	105	124	108	151
Long, hot summers	3.7	40	74	117	134	190
Poor air quality	3.8	23	71	102	153	208
Poor water quality	3.4	53	108	116	114	165
Vectorborne diseases	2.8	94	150	137	85	86
Weather-related power outages	3.7	24	77	129	134	193
Wildfires	3.6	39	78	129	135	174
Wildfire smoke	4.0	25	40	91	144	257
Winter storms	3.7	25	82	117	157	175

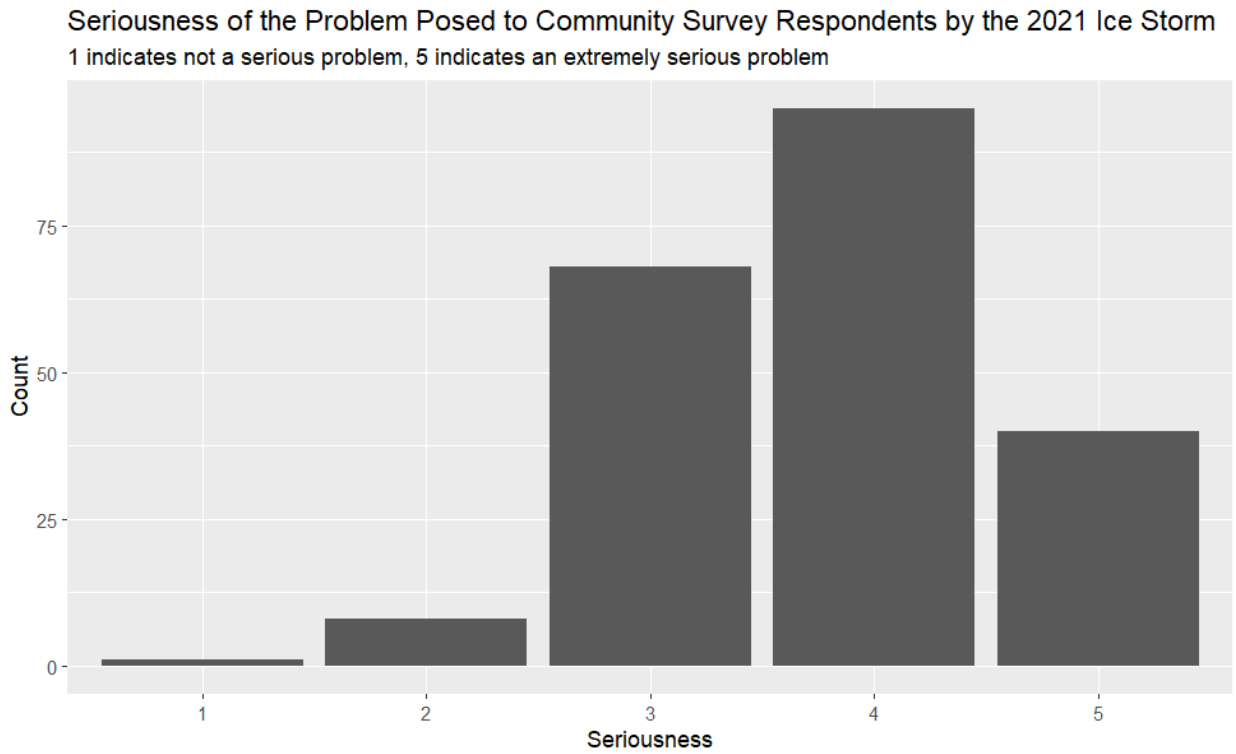


2021 ice storm

Problem

In your view, how serious a problem was the February 2021 Ice Storm for your household?

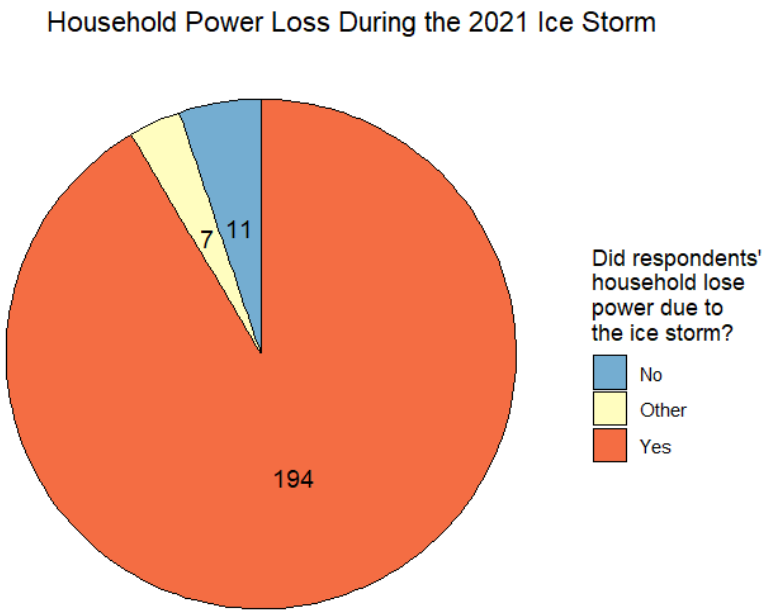
Seriousness of problem	n of respondents	% of respondents
Not a serious problem (1)	1	0.4
Slightly serious problem (2)	8	4.0
Moderately serious problem (3)	68	31.5
Very serious problem (4)	95	45.2
Extremely serious problem (5)	40	18.9



Power loss

Did your household lose power during the ice storm?

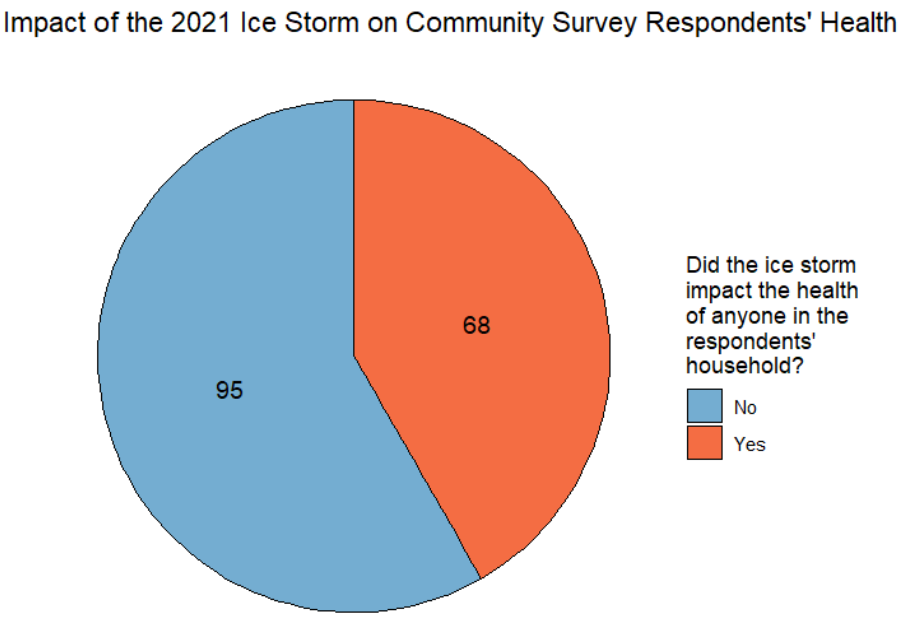
Did household lose power?	n of respondents	% of respondents
No	11	5.3
Yes	194	91.7
Other	7	3.0



Health impact

Did the ice storm directly or indirectly impact your health, or the health of anyone in your household?

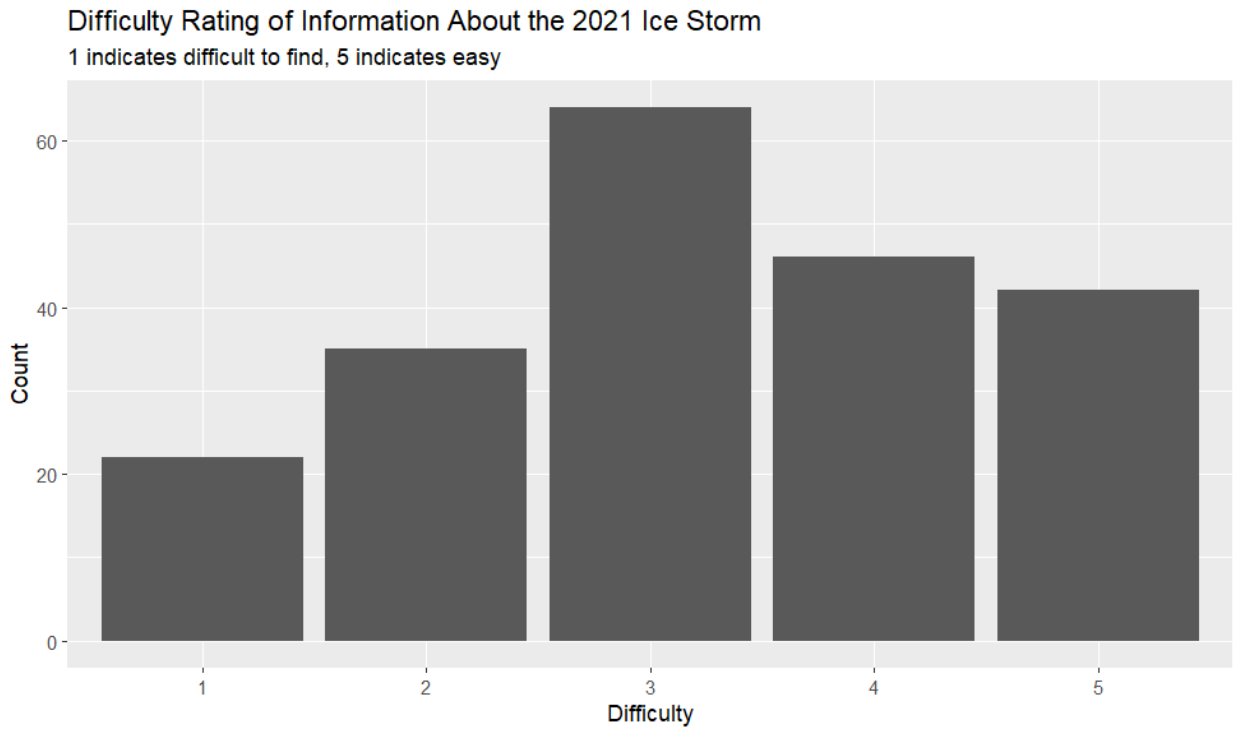
Impacted health?	n of respondents	% of respondents
No	95	57.8
Yes	68	42.2



Ease of finding information

On a scale of 1 to 5, how easy was it to find information about the ice storm?

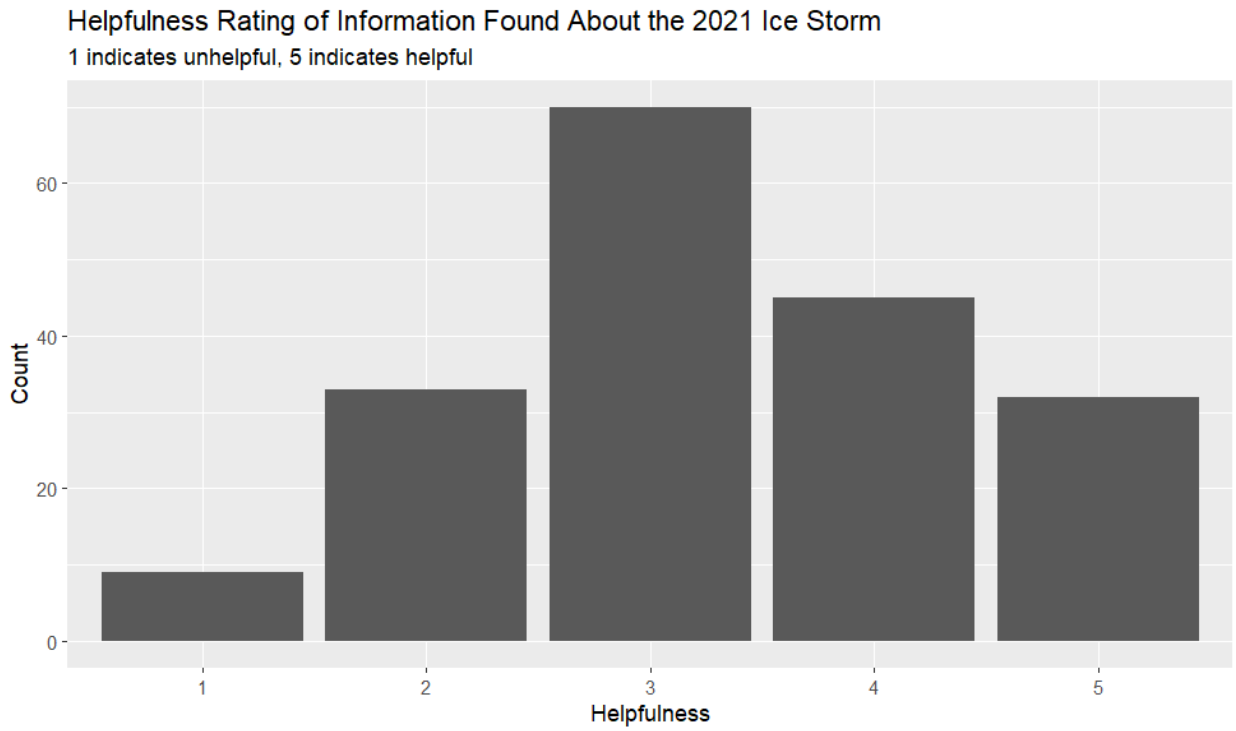
Ease	n of respondents	% of respondents
1 (difficult)	22	10.7
2	35	16.4
3	64	29.1
4	46	23.3
5 (easy)	42	20.5



Helpfulness of information

On a scale of 1 to 5, how helpful was the information you found about the ice storm?

Helpfulness	n of respondents	% of respondents
1 (unhelpful)	9	5.0
2	33	16.1
3	70	37.8
4	45	24.9
5 (helpful)	32	16.2

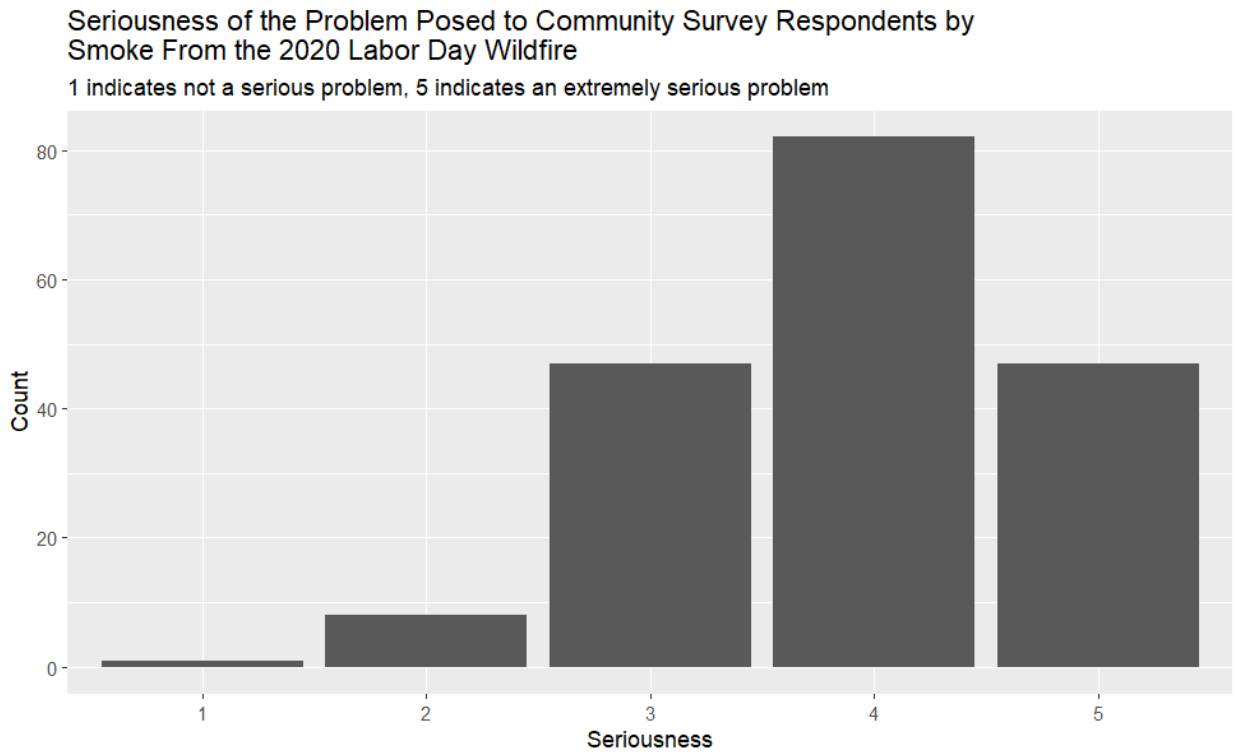


2020 wildfire smoke

Problem

In your view, how serious a problem was the smoke from the Labor Day 2020 fires for your household?

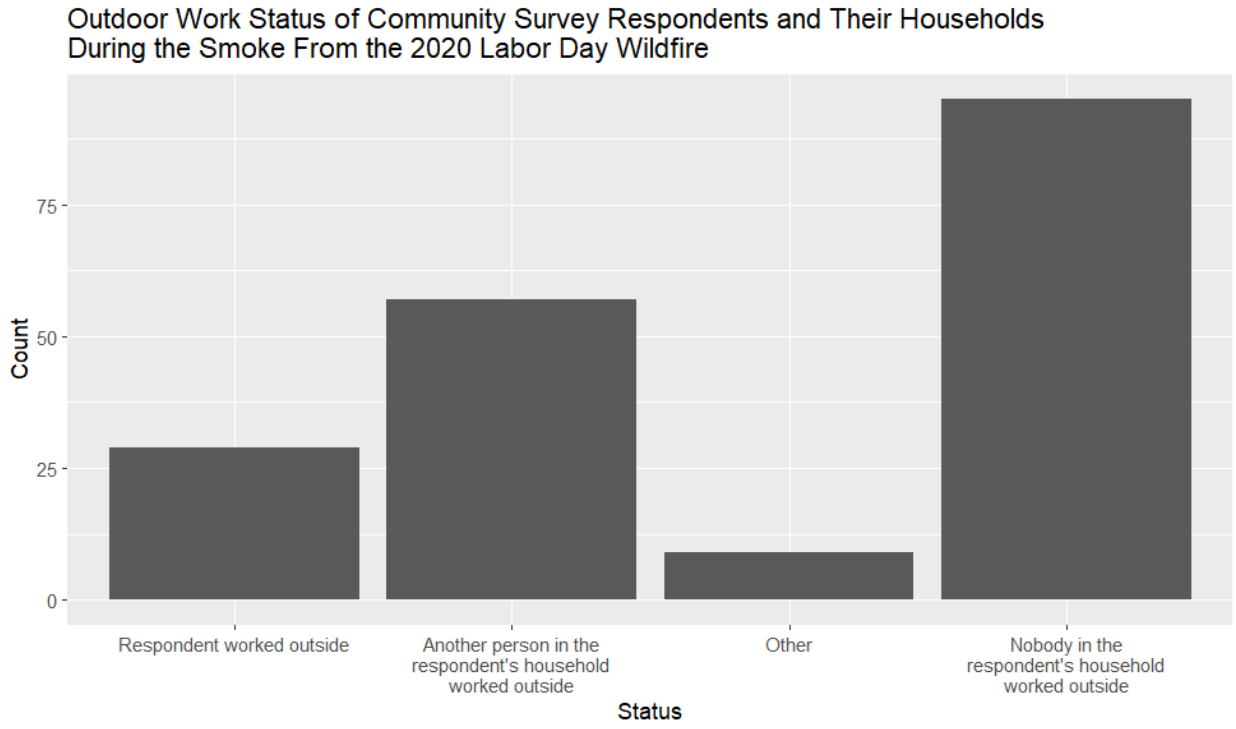
Seriousness of problem	n of respondents	% of respondents
Not a serious problem (1)	1	0.5
Slightly serious problem (2)	8	8.2
Moderately serious problem (3)	47	26.1
Very serious problem (4)	82	42.9
Extremely serious problem (5)	47	26.7



Outside worker status

In September 2020, did anyone in your household work outside?

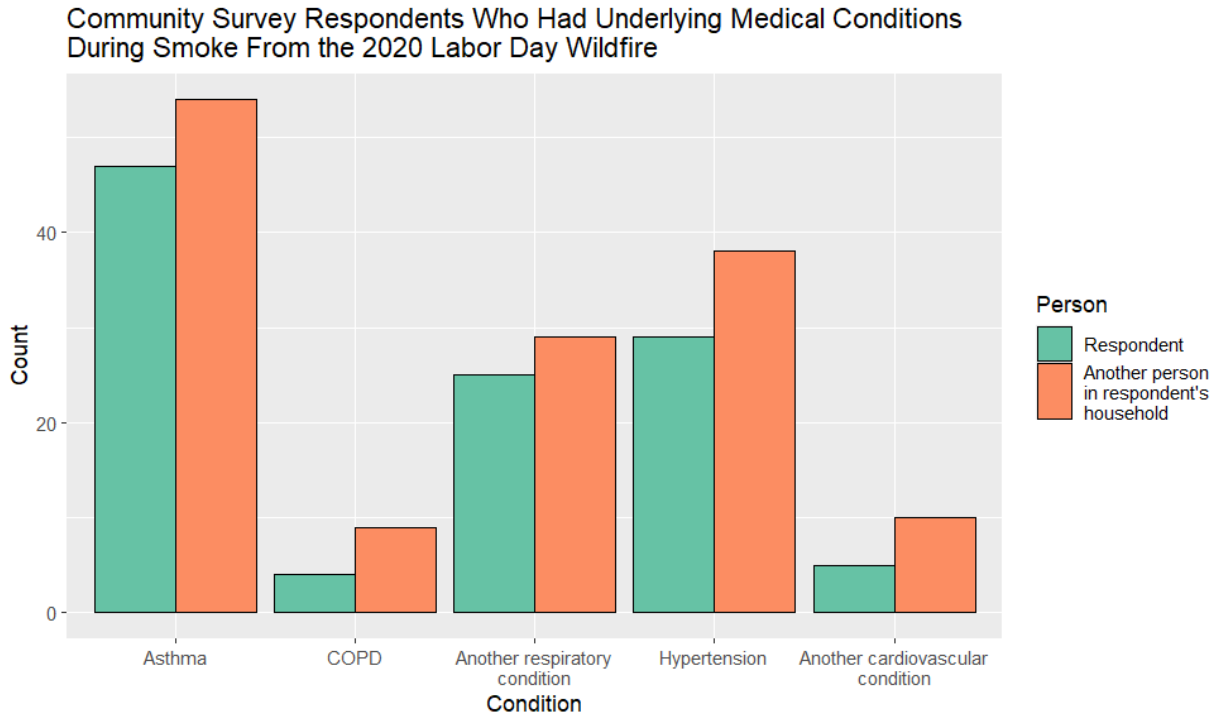
Option	n of respondents	% of respondents
Respondent worked outside	29	15.7
Somebody else in respondent's household worked outside	57	30.8
Nobody in the household worked outside	95	51.4
Other	9	4.9



Household conditions

In September 2020, did anyone in your household experience one of the following conditions?

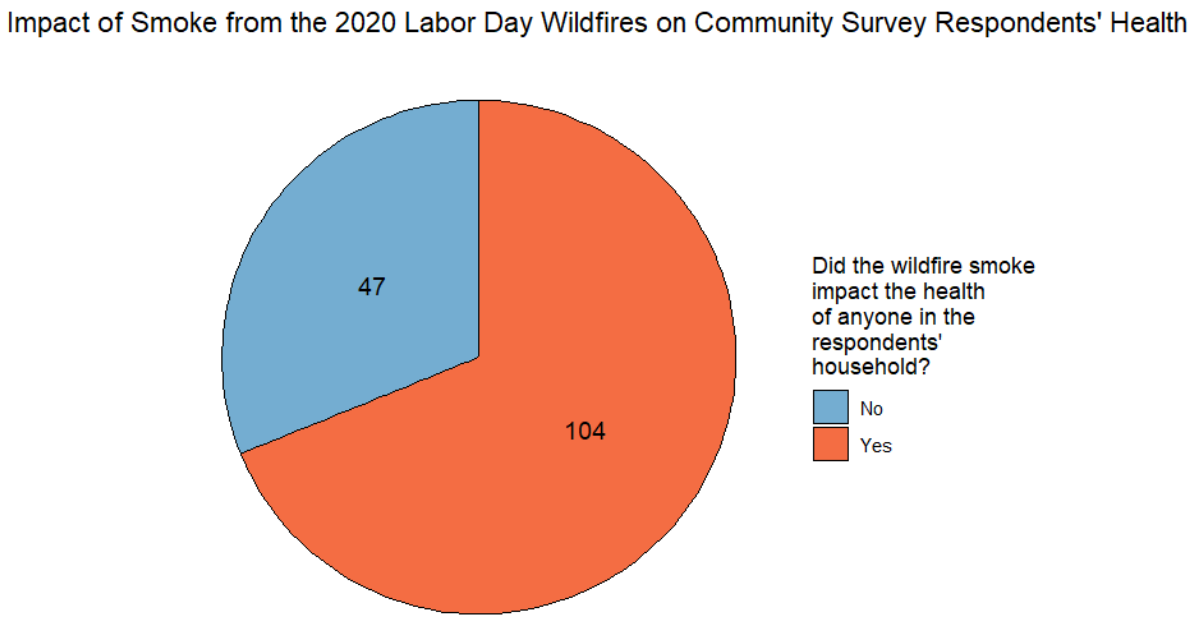
Condition	n respondents	% respondents	n somebody else in household	% somebody else in household
Asthma	47	25.4	54	29.2
COPD	4	2.2	9	4.9
Another respiratory	25	13.5	29	15.7
Hypertension	29	15.7	38	20.5
Another cardiovascular	5	2.7	10	5.4



Health impact

Did the wildfire smoke directly or indirectly impact your health, or the health of anyone in your household?

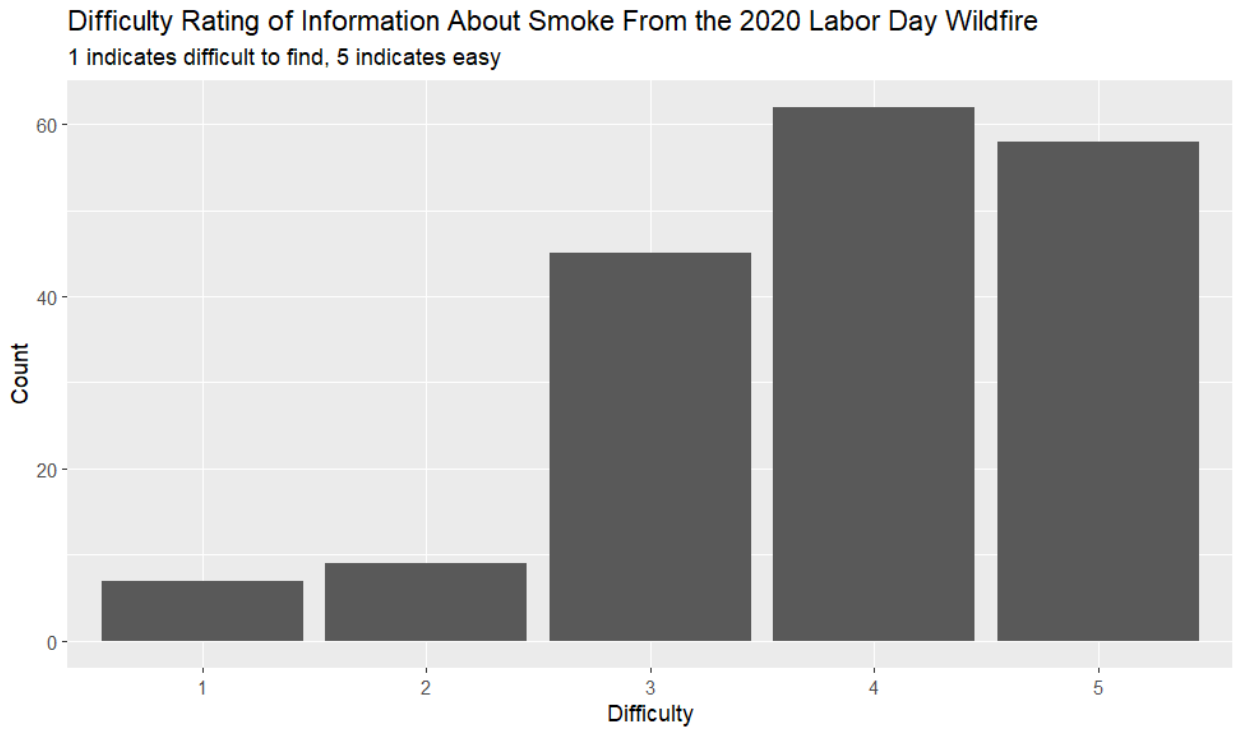
Impacted health?	n of respondents	% of respondents
No	47	31.2
Yes	104	68.8



Ease of finding information

On a scale of 1 to 5, how easy was it to find information about wildfire smoke?

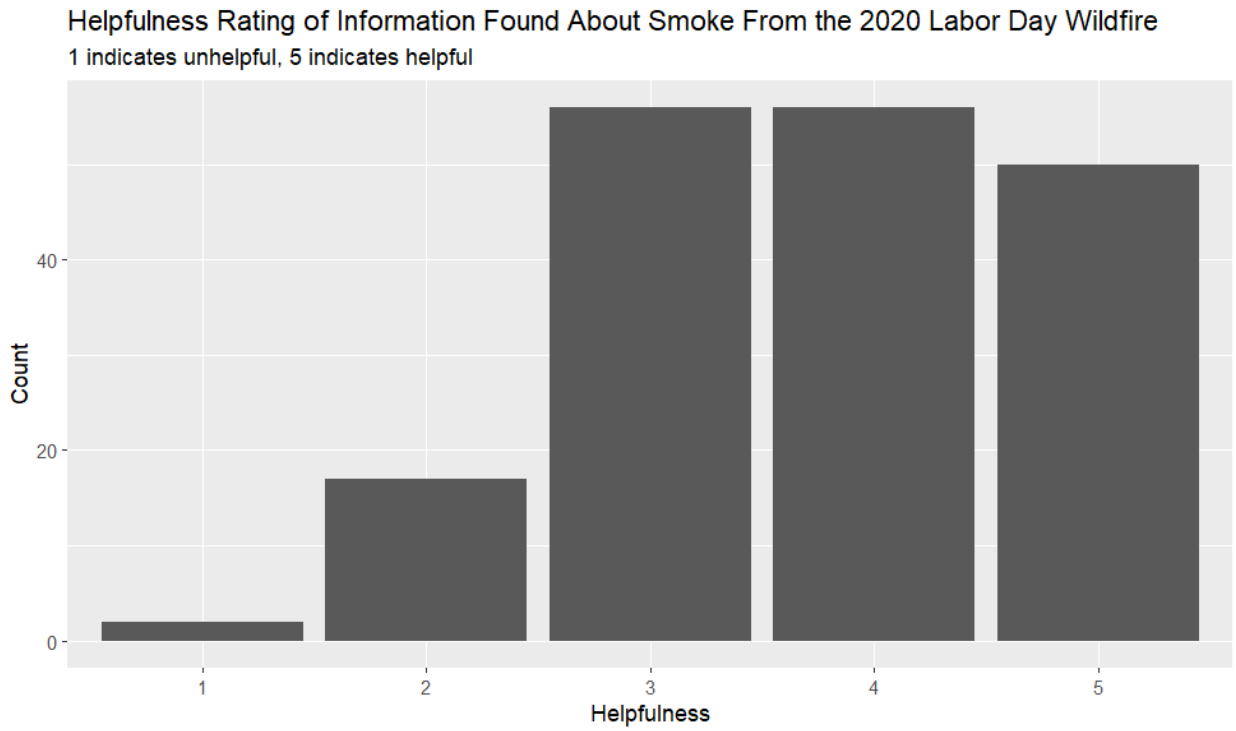
Ease	n of respondents	% of respondents
1 (difficult)	7	4.0
2	9	4.4
3	45	24.4
4	62	36.3
5 (easy)	58	30.8



Helpfulness of information

On a scale of 1 to 5, how helpful was the information you found?

Helpfulness	n of respondents	% of respondents
1 (unhelpful)	2	1.0
2	17	9.5
3	56	31.6
4	56	32.2
5 (helpful)	50	25.7

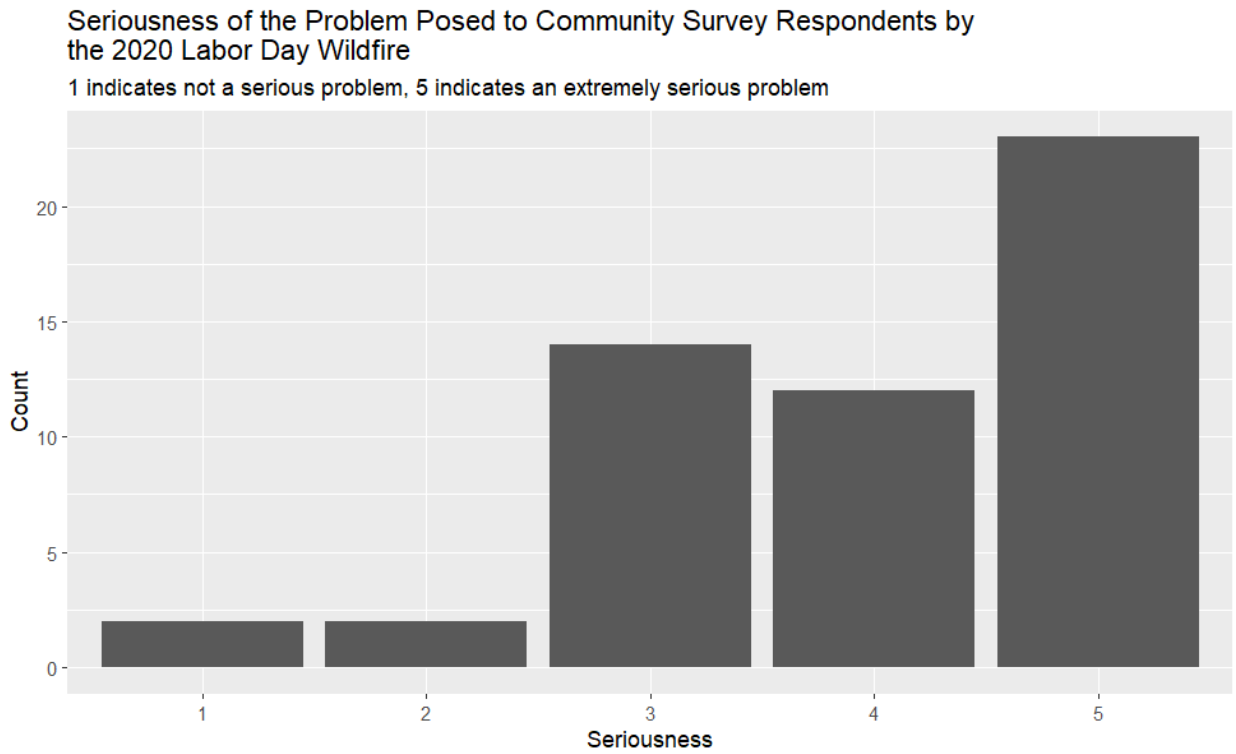


2020 wildfires

Problem

In your view, how serious a problem was the wildfire that started around Labor Day of 2020 for your household?

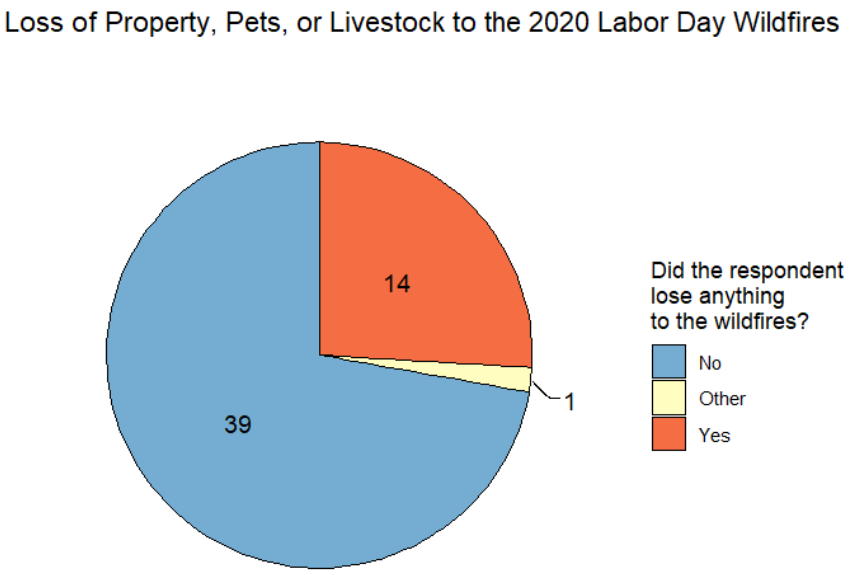
Seriousness of problem	n of respondents	% of respondents
Not a serious problem (1)	2	3.5
Slightly serious problem (2)	2	3.5
Moderately serious problem (3)	14	24.2
Very serious problem (4)	12	25.0
Extremely serious problem (5)	23	44.0



Loss

Did you lose property, livestock, or pets in wildfires during 2020?

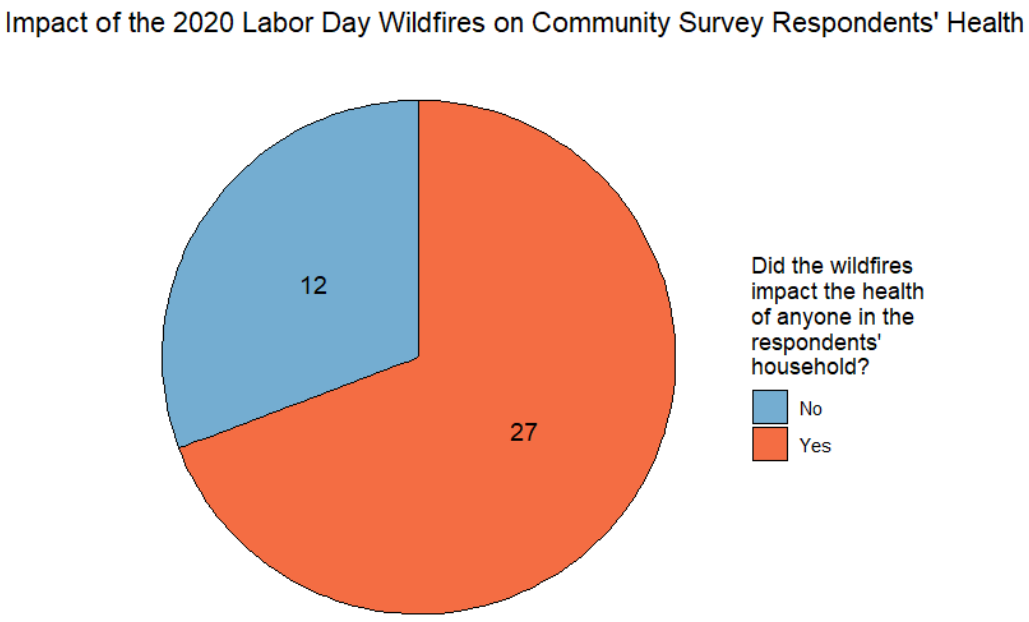
Loss	n of respondents	% of respondents
No	39	70.4
Yes	14	27.9
Other	1	1.7



Health impact

Did the wildfires directly or indirectly impact your health, or the health of anyone in your household?

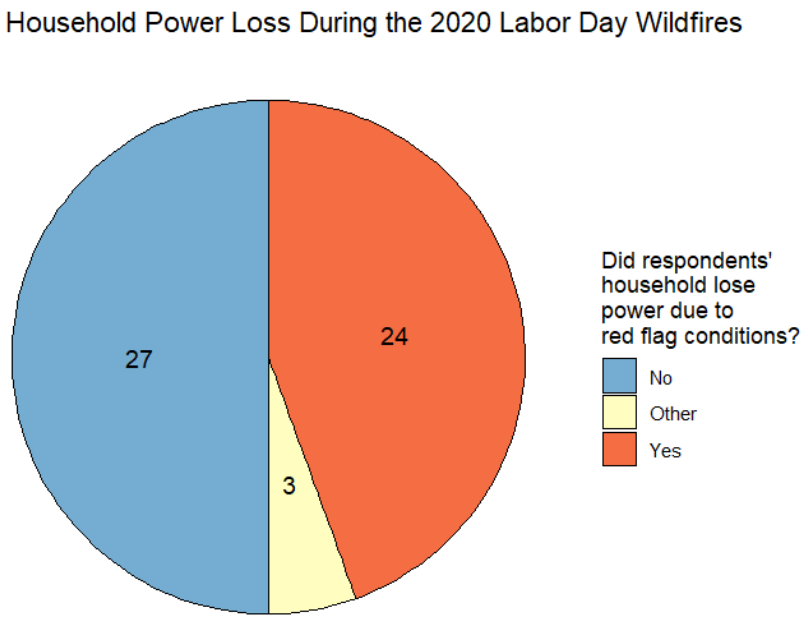
Impacted health?	n of respondents	% of respondents
No	12	31.0
Yes	27	69.0



Power loss

Did your home or business lose power due to wildfire or red flag conditions?

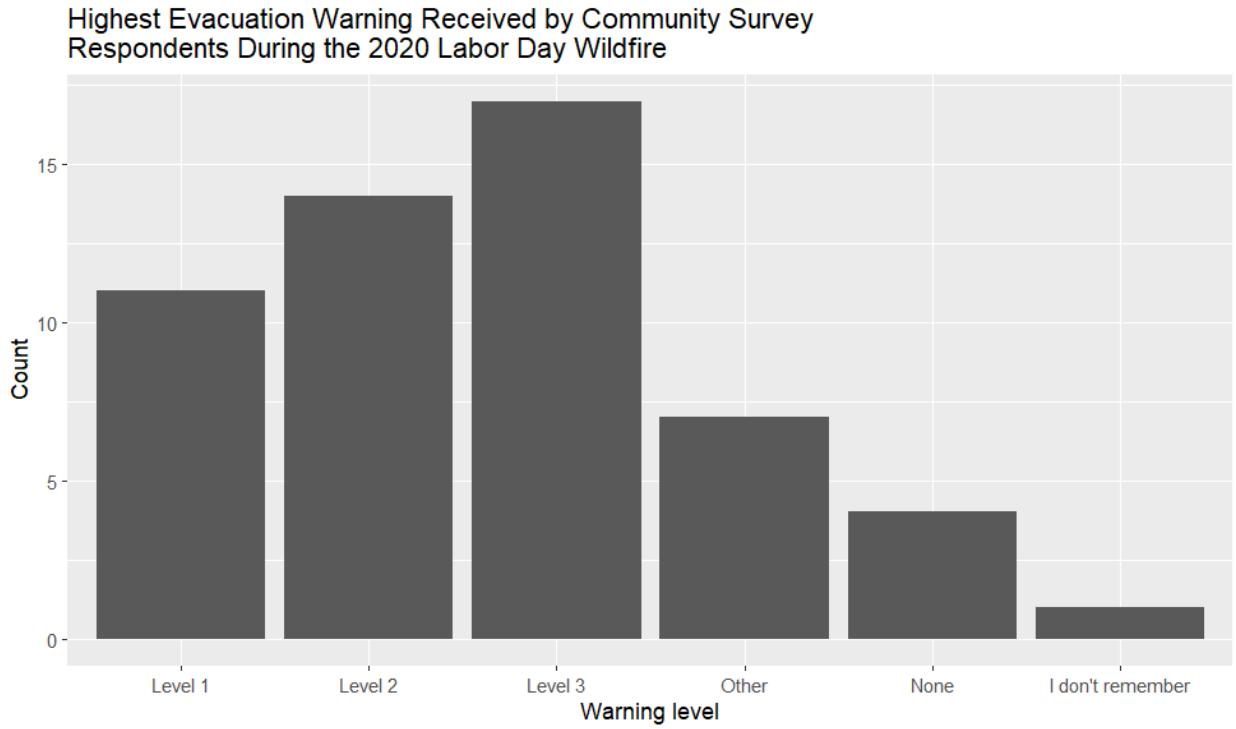
Lost power?	**n of respondents**	**% of respondents**
No	27	47.9
Yes	24	47.0
Other	3	5.1



Evacuation warning

Please indicate the highest level of evacuation warning your household experienced during the Labor Day 2020 wildfire.

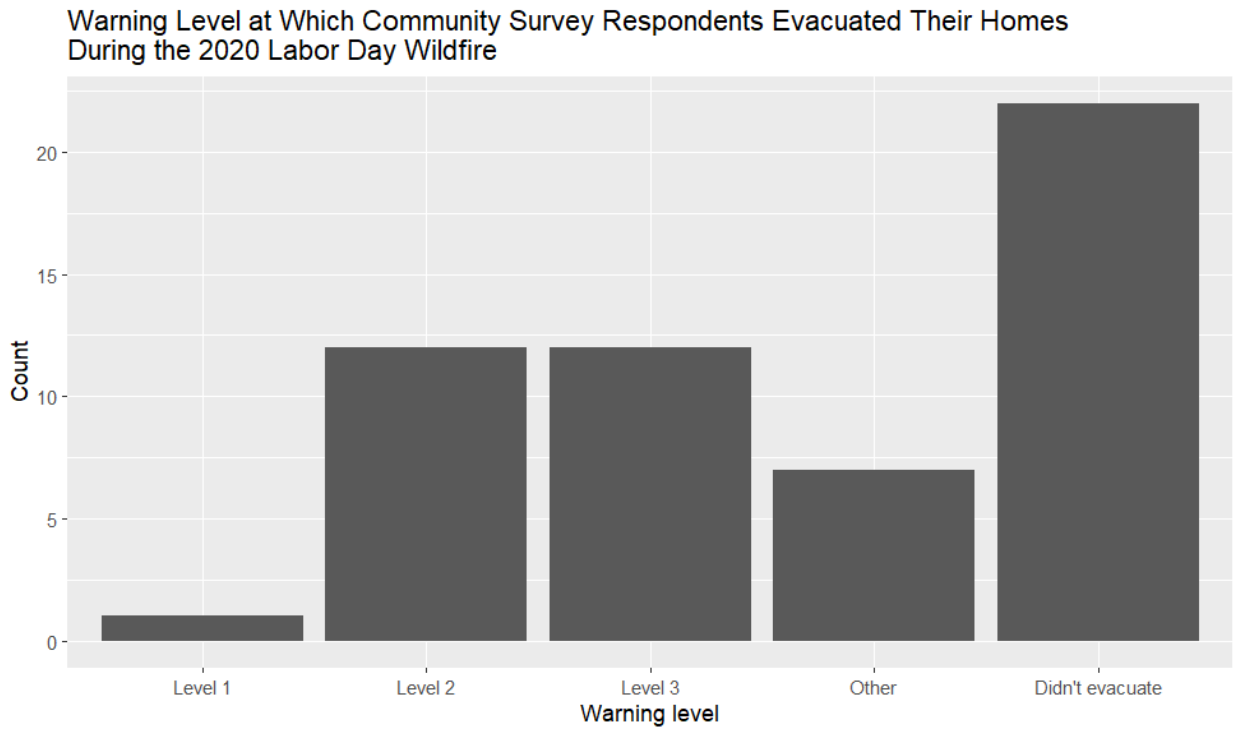
Highest warning level received	**n of respondents**	**% of respondents**
Level 1	11	20.8
Level 2	14	27.9
Level 3	17	30.9
Don't remember	1	1.7
Didn't receive a warning	4	6.8
Other	7	11.9



Evacuation

Did you evacuate from your home at any point?

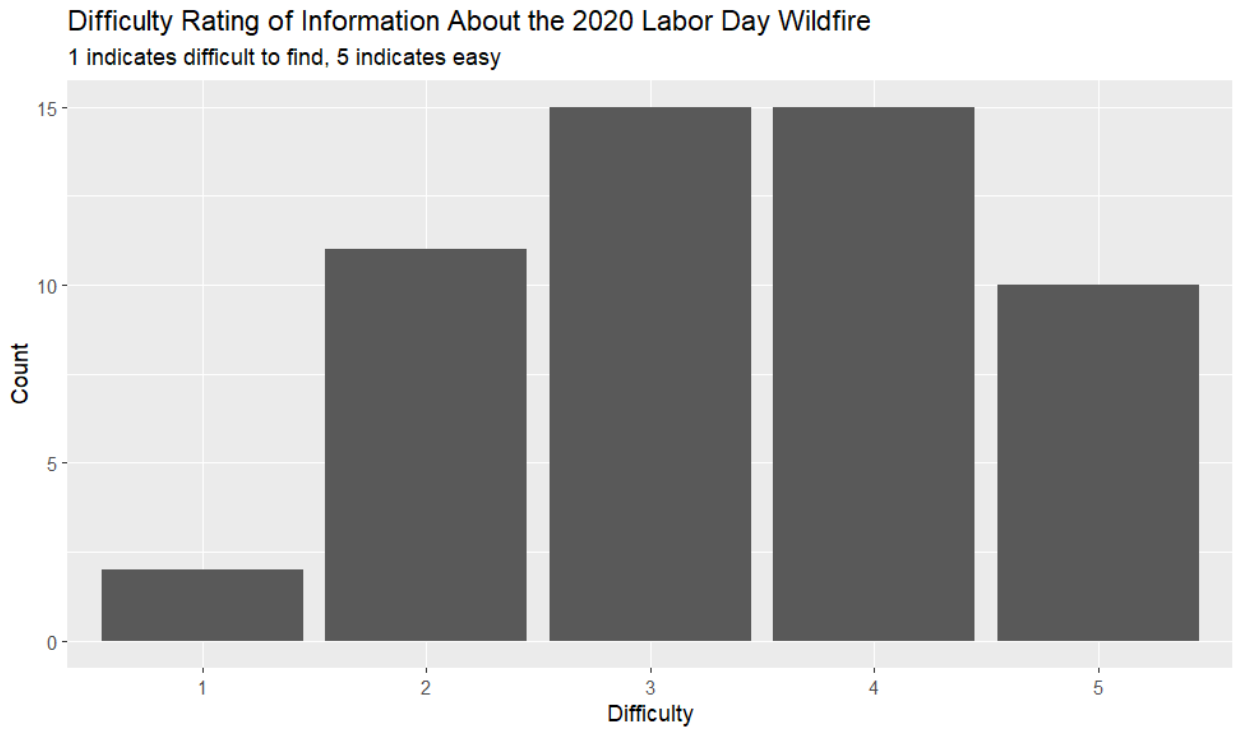
Evacuated at this level	n of respondents	% of respondents
Level 1	1	1.7
Level 2	12	22.5
Level 3	12	20.4
Didn't evacuate	22	39.4
Other	7	16.0



Ease of finding information

On a scale of 1 to 5, how easy was it to find information about the wildfire?

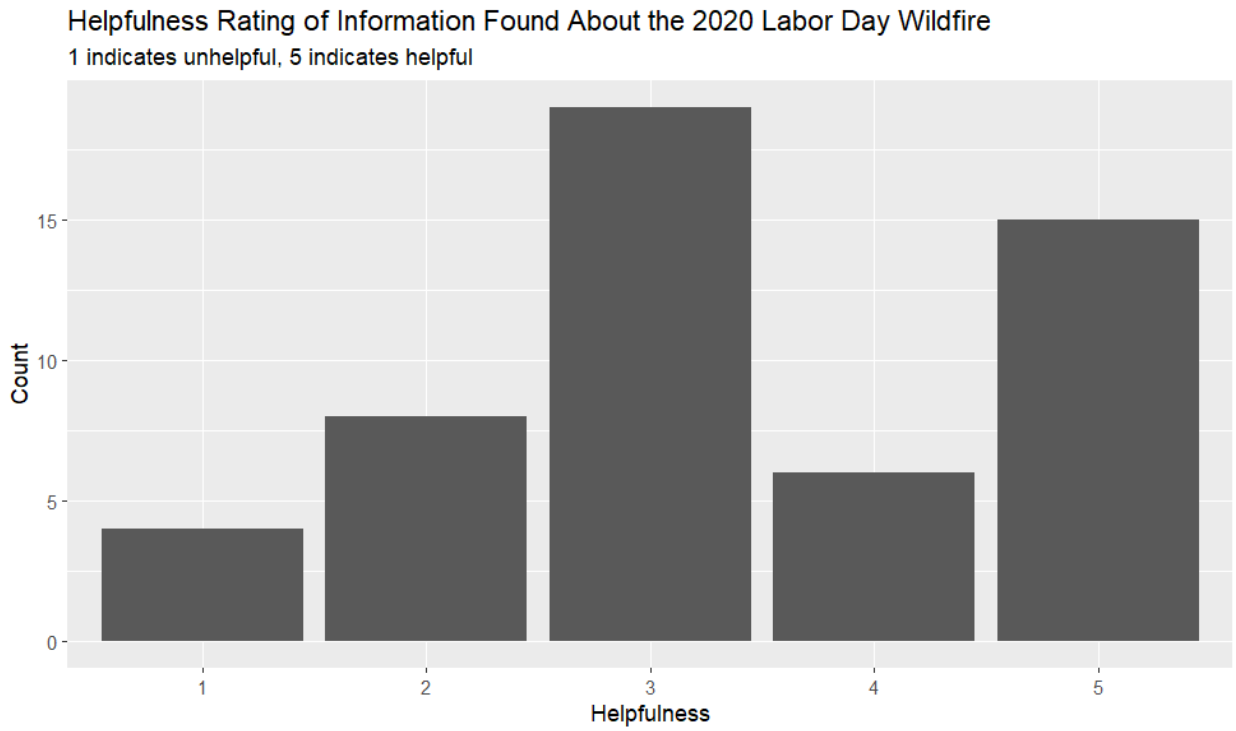
Ease	n of respondents	% of respondents
1 (difficult)	2	3.5
2	11	19.0
3	15	28.0
4	15	30.1
5 (easy)	10	19.4



Helpfulness of information

On a scale of 1 to 5, how helpful was the information you found about the wildfire?

Helpfulness	**n of respondents**	**% of respondents**
1 (unhelpful)	4	7.0
2	8	14.1
3	19	35.5
4	6	14.9
5 (helpful)	15	28.5

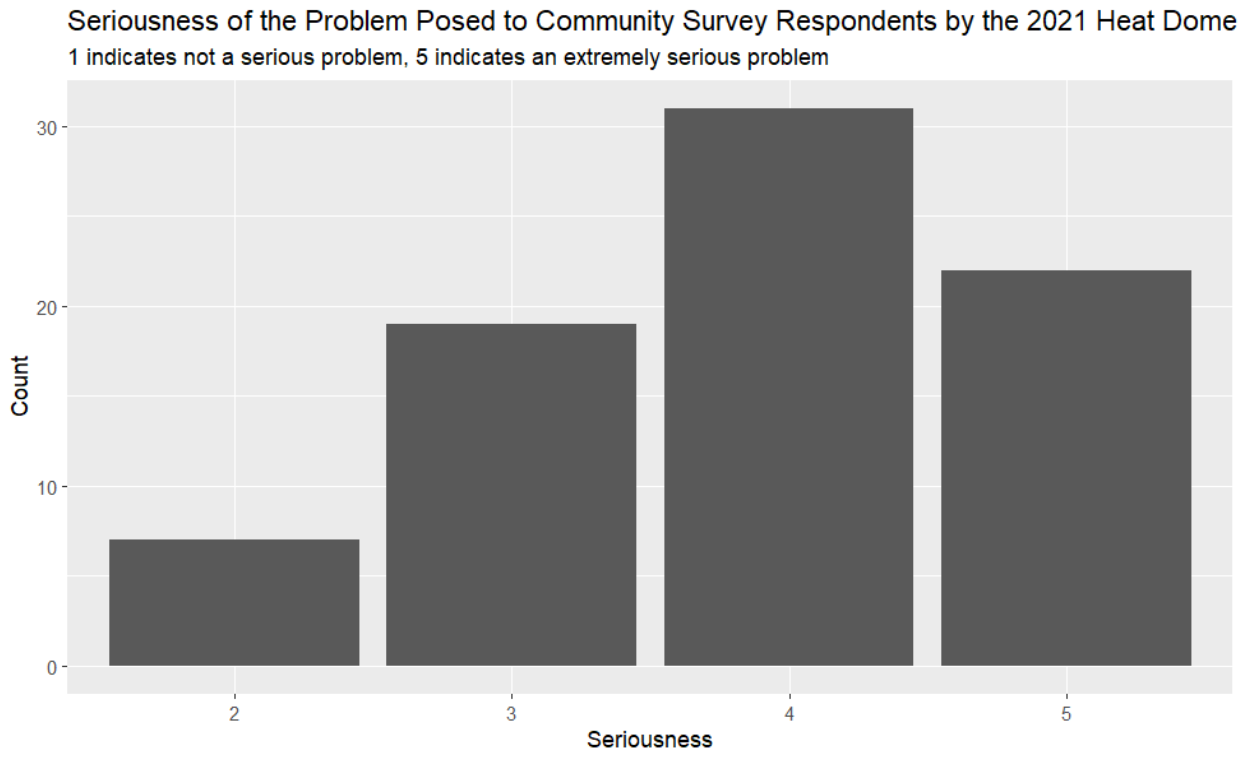


2021 heat wave

Problem

In your view, how serious a problem was the heatwave (also known as the Pacific Northwest Heat Dome) in June 2021 for your household?

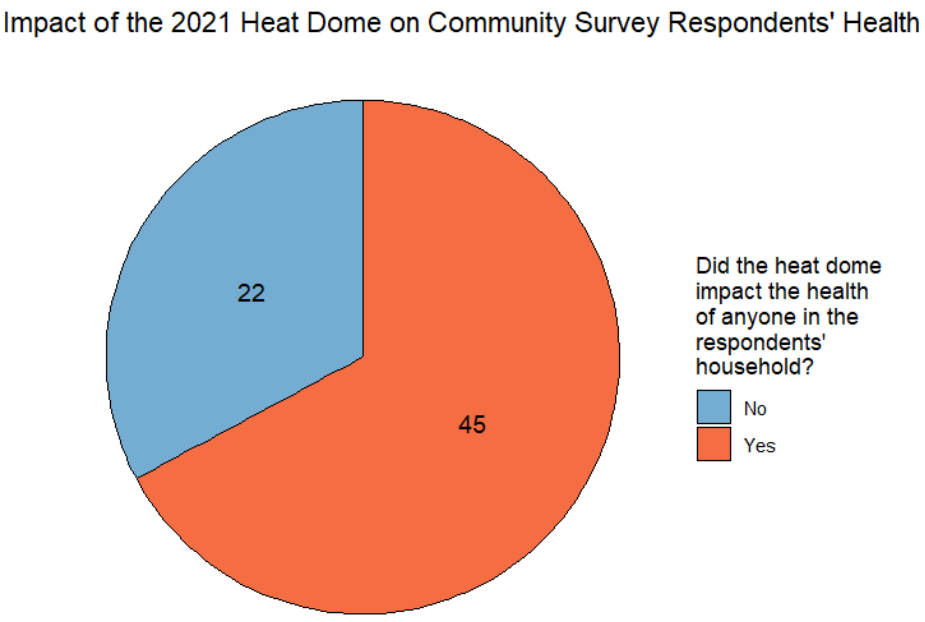
Seriousness of problem	n of respondents	% of respondents
Not a serious problem (1)	0	0
Slightly serious problem (2)	7	8.3
Moderately serious problem (3)	19	20.5
Very serious problem (4)	31	37.7
Extremely serious problem (5)	22	33.5



Health impact

Did the Heat Dome directly or indirectly impact your health, or the health of anyone in your household?

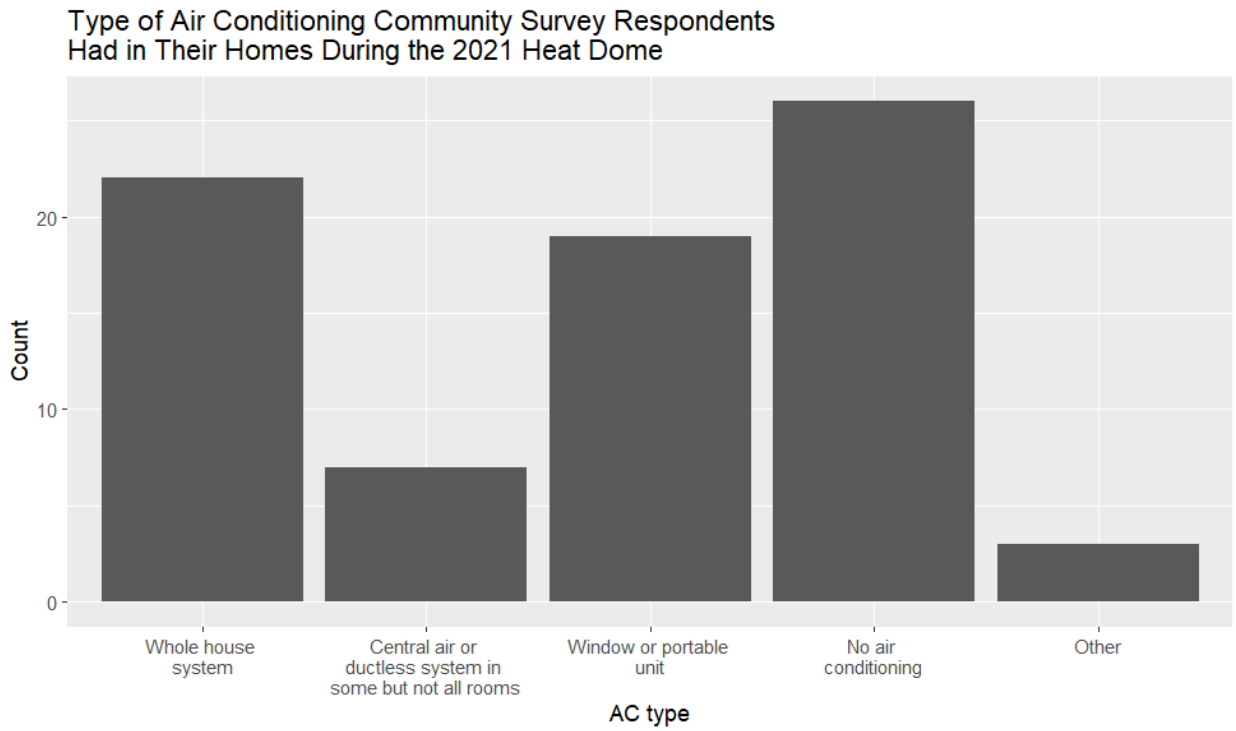
Impacted health?	n of respondents	% of respondents
No	22	31.5
Yes	45	68.5



Air conditioning - 2021

Did your house have air conditioning in 2021?

Air conditioning type	n of respondents	% of respondents
Whole home AC	22	31.7
Central or ductless system in some but not all rooms	7	7.2
Window or portable AC unit	19	24.7
No AC	26	32.0
Other	3	4.4

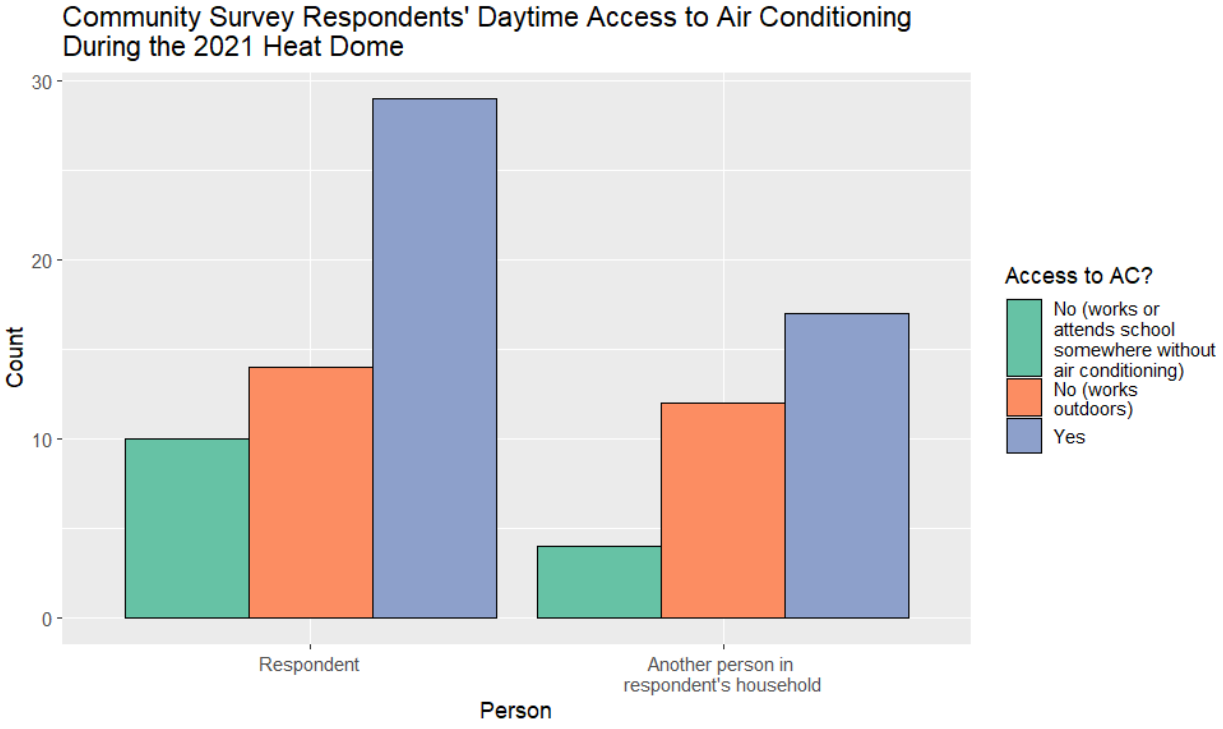


Daytime access to air conditioning

Did you and members of your household have daytime access to air conditioning in June 2021?

Daytime AC access	**n**	**% of respondents**
Respondent worked or went to school somewhere with AC	29	36.7
Someone else in the respondent's household worked somewhere with AC	17	21.5
The school or daycare the respondent's child(ren) attended had AC	4	5.1
The respondent was working outdoors without AC	14	17.7
Someone else in the respondent's household was working outdoors	11	13.9

The respondent was working in a building without AC	10	12.7
Someone else in the respondent's household was working in a building without AC	5	6.3
The respondent's child(ren) did not have AC at their school or daycare	1	1.3

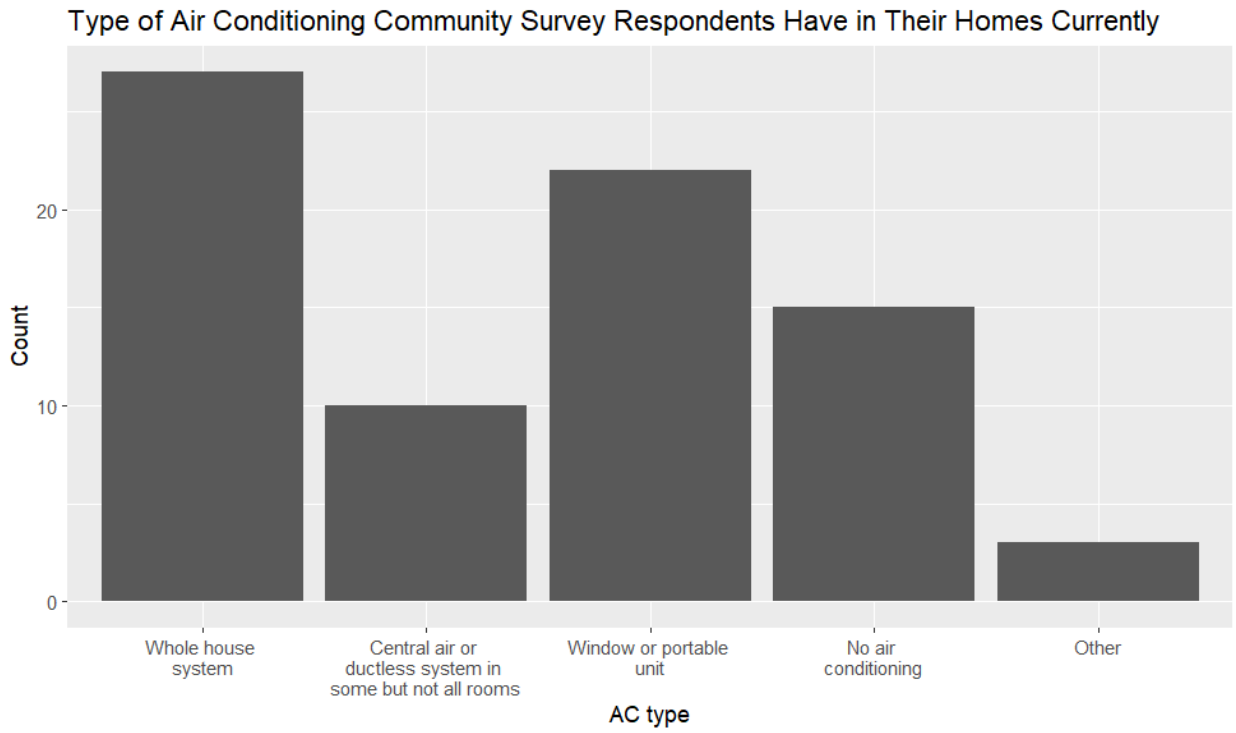


Air conditioning - current

Does your current home have air conditioning?

Air conditioning type	**n of respondents**	**% of respondents**
Whole home AC	27	35.6
Central or ductless system in some but not all rooms	10	14.2

Window or portable AC unit	22	29.1
No AC	15	18.1
Other	3	3.1

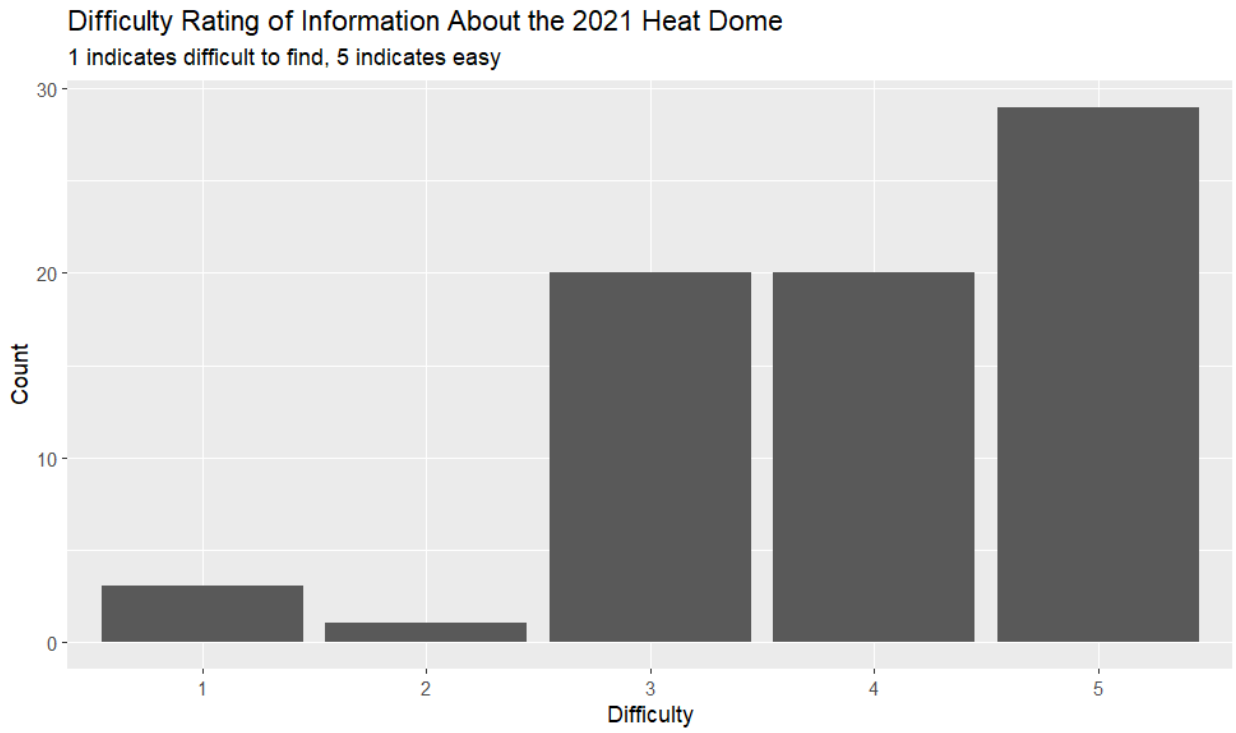


Ease of finding information

On a scale of 1 to 5, how easy was it to find information about the heat dome?

Ease	**n of respondents**	**% of respondents**
1 (difficult)	3	4.5
2	1	1.1
3	20	26.9
4	20	26.9

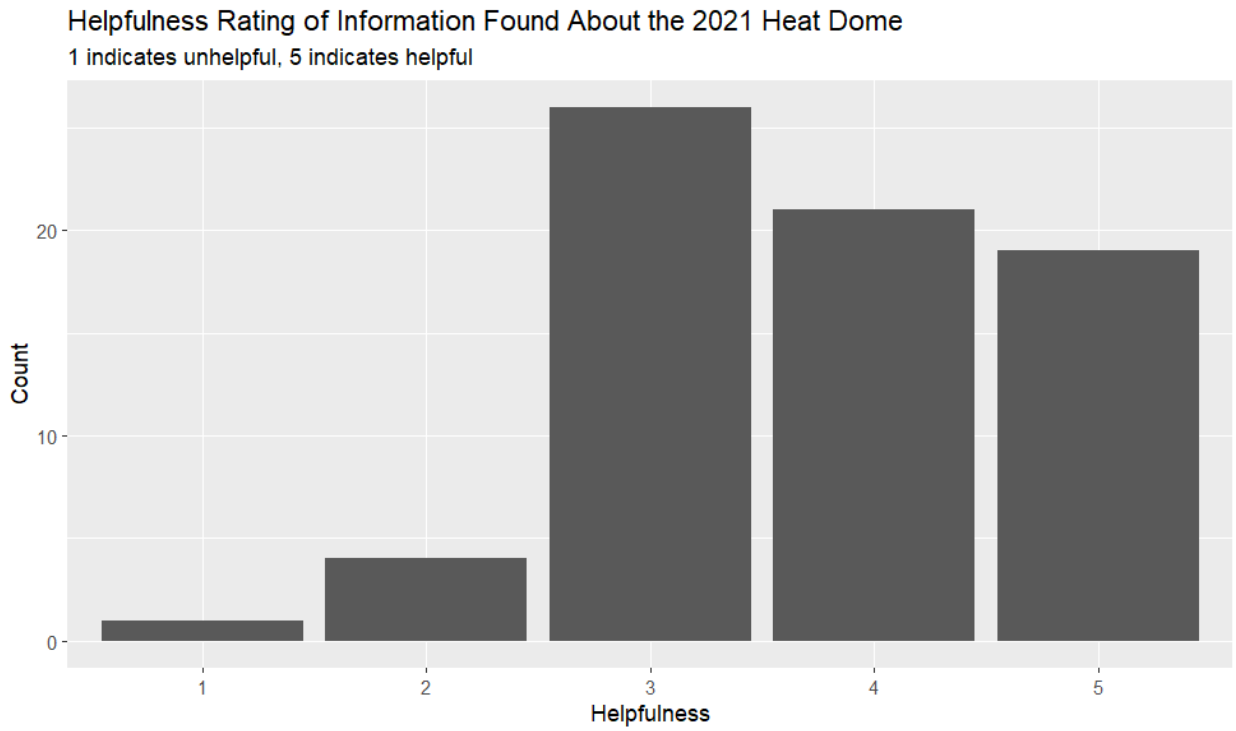
5 (easy)	29	40.6



Helpfulness of information

On a scale of 1 to 5, how helpful was the information you found about the heat dome?

Helpfulness	**n of respondents**	**% of respondents**
1 (unhelpful)	1	2.5
2	4	5.8
3	26	34.1
4	21	32.6
5 (helpful)	19	25.0

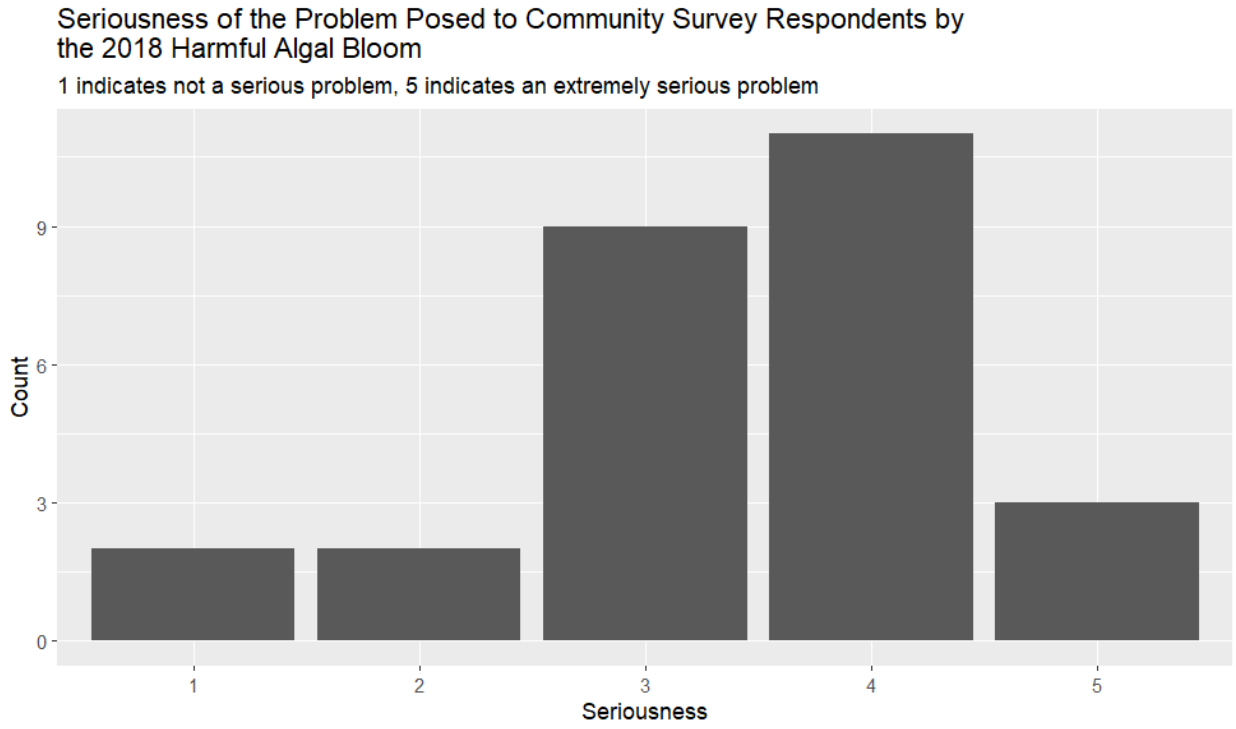


2018 algal bloom

Problem

In your view, how serious a problem was the 2018 Salem Water Harmful Algal Bloom for your household?

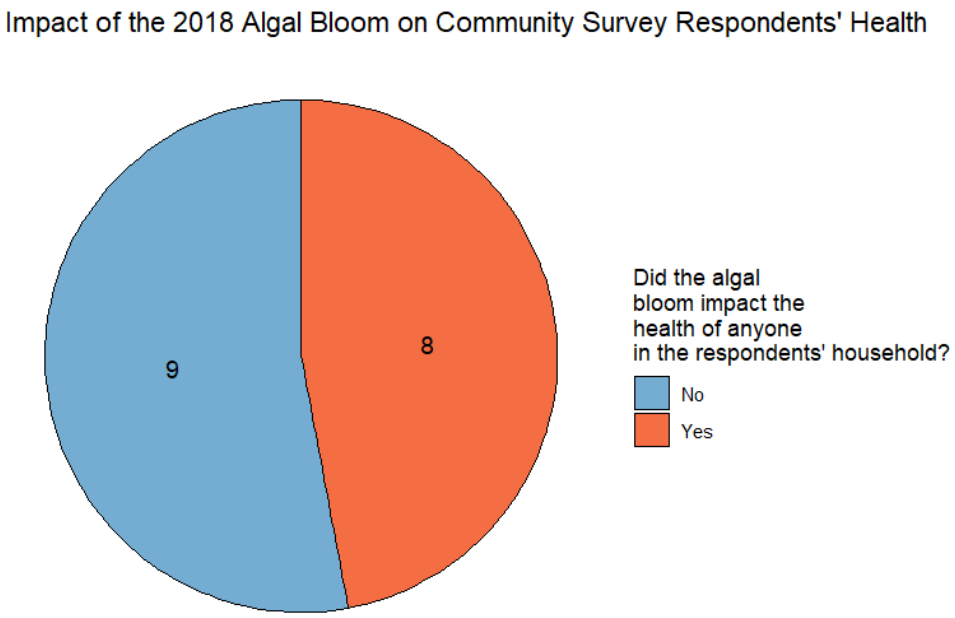
Seriousness of problem	n of respondents	% of respondents
Not a serious problem (1)	2	7.1
Slightly serious problem (2)	2	7.1
Moderately serious problem (3)	9	31.9
Very serious problem (4)	11	43.3
Extremely serious problem (5)	3	10.6



Health impact

Did the algal bloom directly or indirectly impact your health, or the health of anyone in your household?

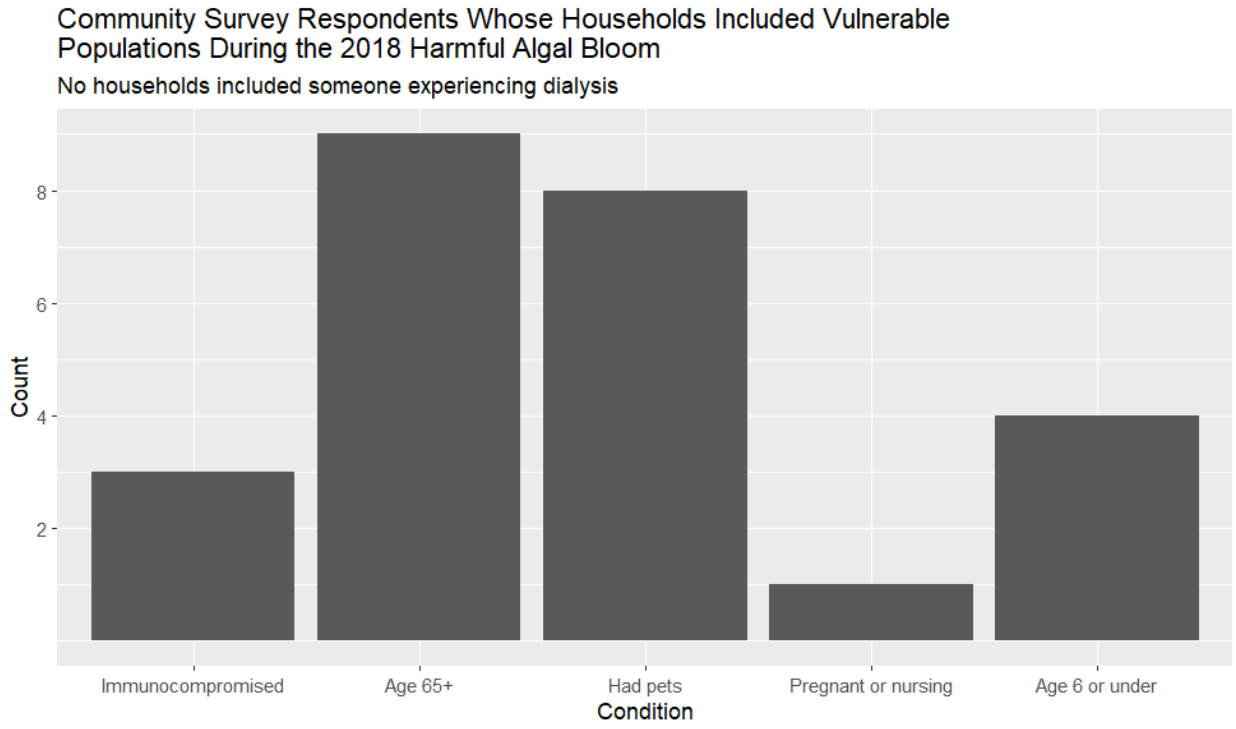
Impacted health?	**n of respondents**	**% of respondents**
No	9	56.1
Yes	8	43.9



Categories

Did your household include any of these categories during the algal bloom in 2018?

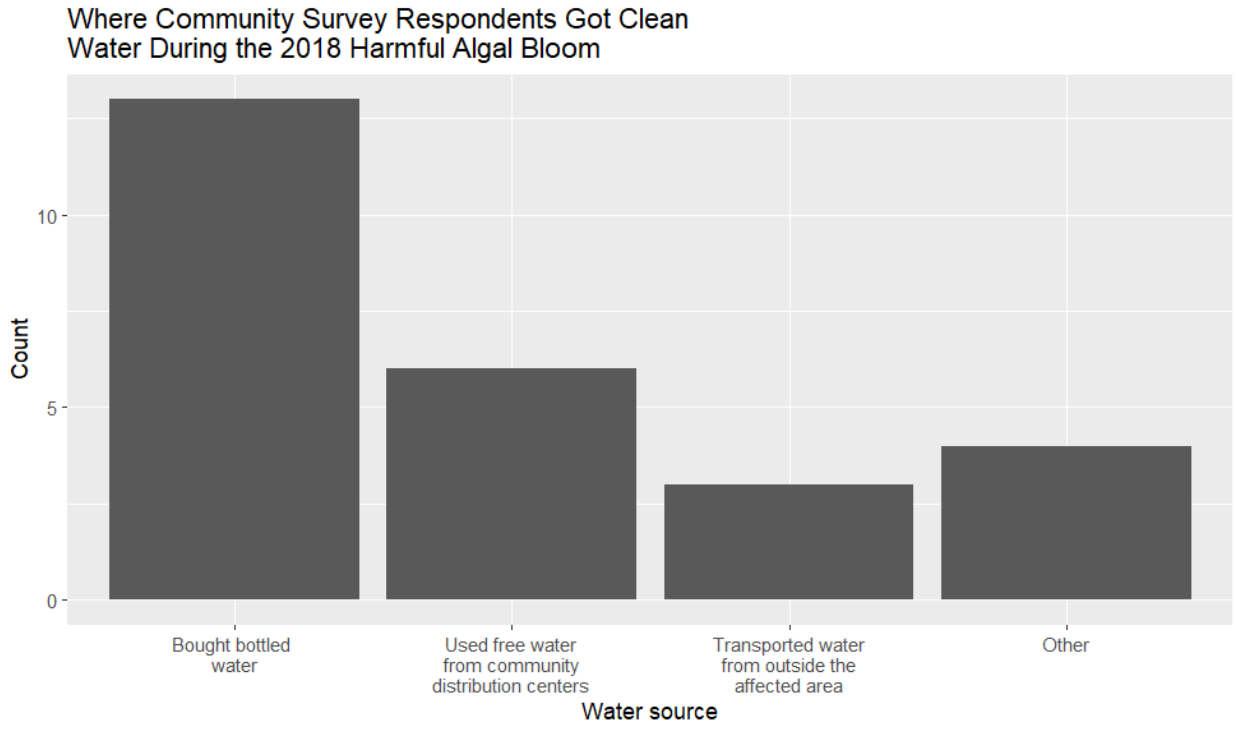
Household contains...	n of respondents	% of respondents
Child(ren) under 6	4	14.2
Adults aged 65+	9	31.9
Someone who is pregnant or breastfeeding	1	3.5
Someone who is immunocompromised	3	15.0
Someone experiencing dialysis	0	0.0
Pets	8	28.3



Water source

How did you source water during this time?

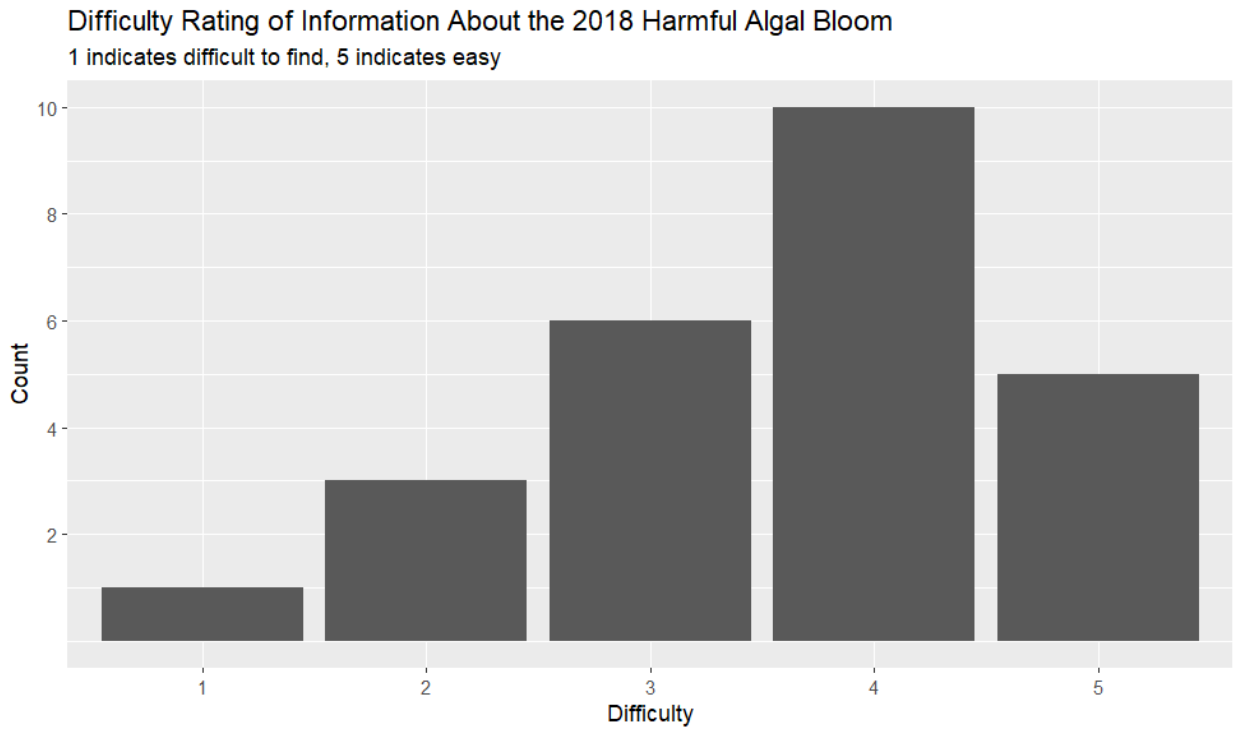
Source	n of respondents	% of respondents
Bought bottled water	13	50.3
Used free water from distribution centers	6	25.6
Transported outside water	3	10.6
Other	3	15



Ease of finding information

On a scale of 1 to 5, how easy was it to find information about the algal bloom?

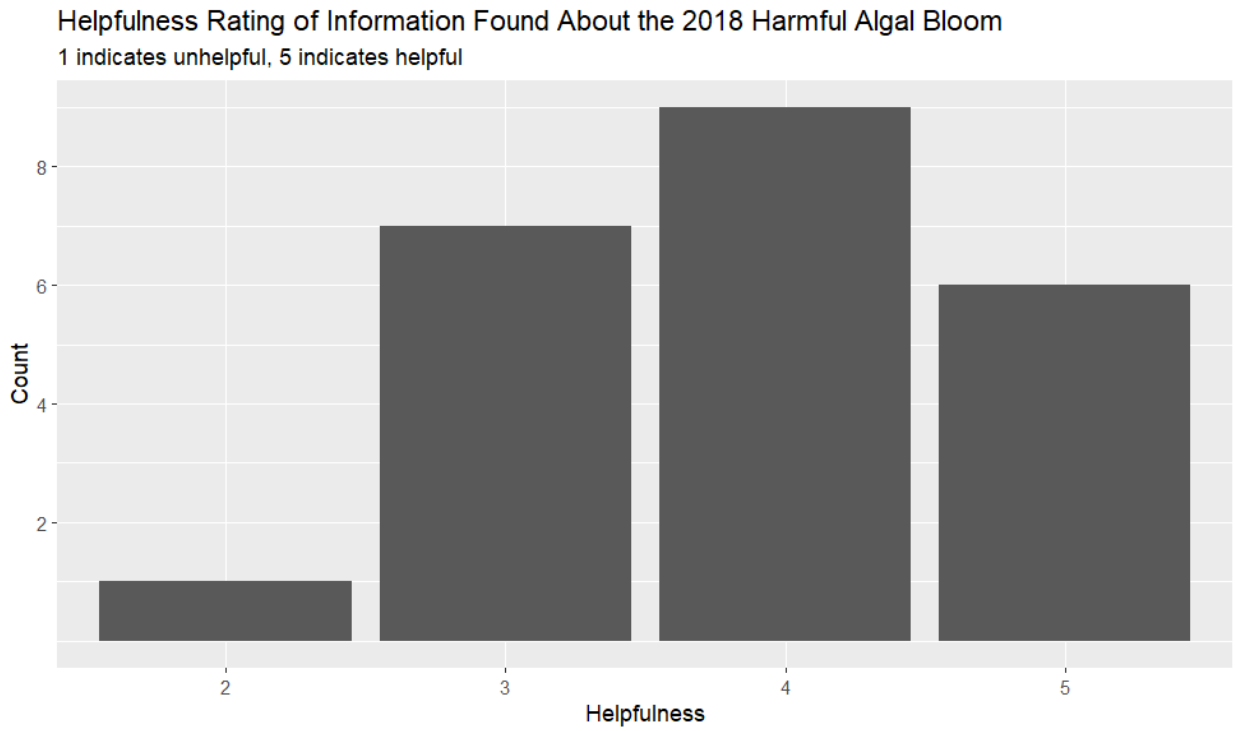
Ease	**n of respondents**	**% of respondents**
1 (difficult)	1	3.8
2	3	16.1
3	6	22.9
4	10	38.1
5 (easy)	5	19.1



Helpfulness of information

On a scale of 1 to 5, how helpful was the information you found?

Helpfulness	n of respondents	% of respondents
1 (unhelpful)	0	0.0
2	1	9.2
3	7	28.9
4	9	37.1
5 (helpful)	6	24.8

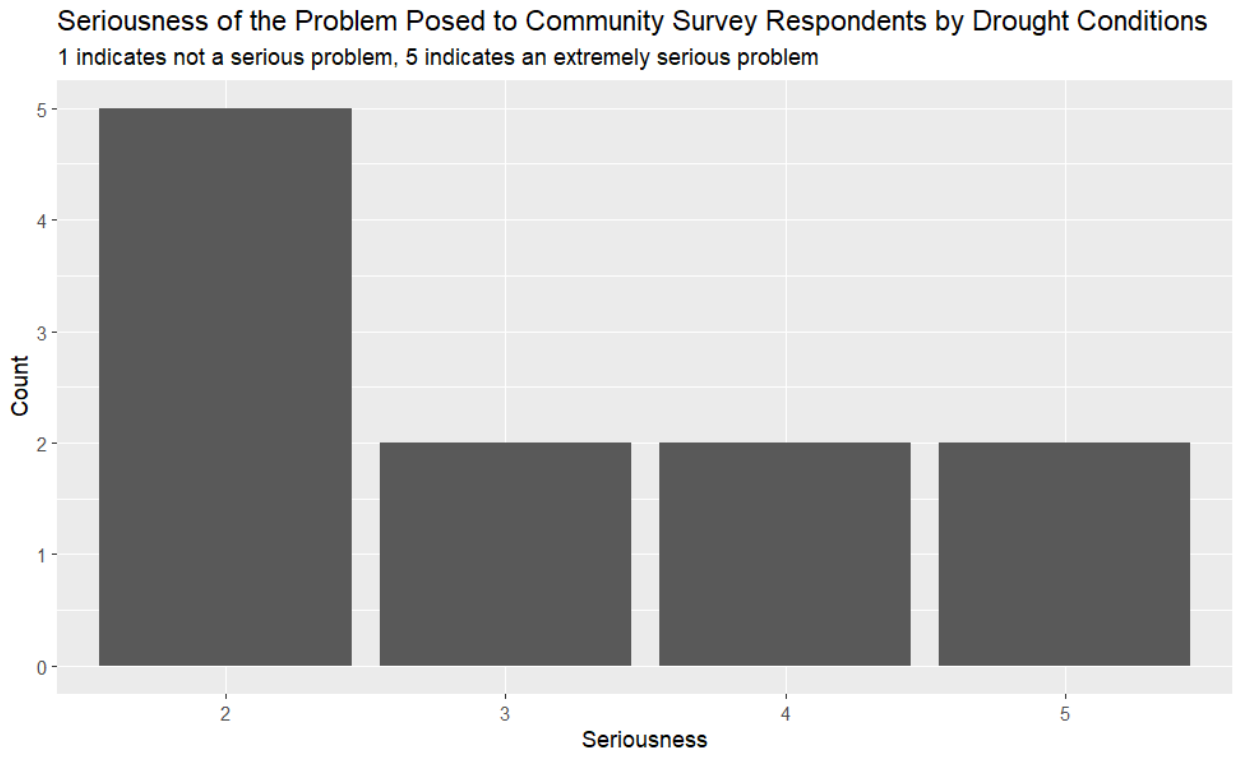


Drought conditions

Problem

In your view, how serious a problem have drought conditions any time over the past five years been for your household?

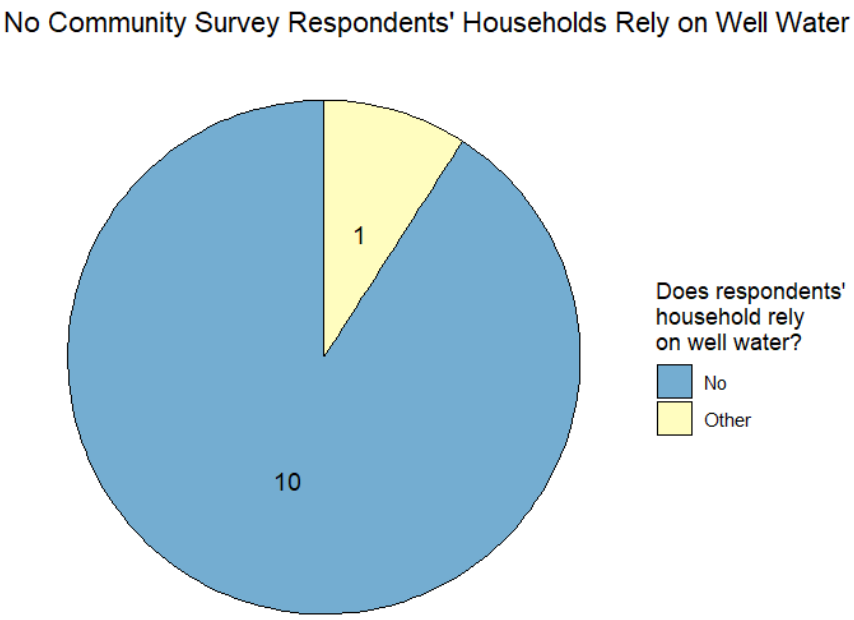
Seriousness of problem	n of respondents	% of respondents
Not a serious problem (1)	0	0.0
Slightly serious problem (2)	5	42.4
Moderately serious problem (3)	2	13.6
Very serious problem (4)	2	22.0
Extremely serious problem (5)	2	22.0



Well water

Does your household rely on well water?

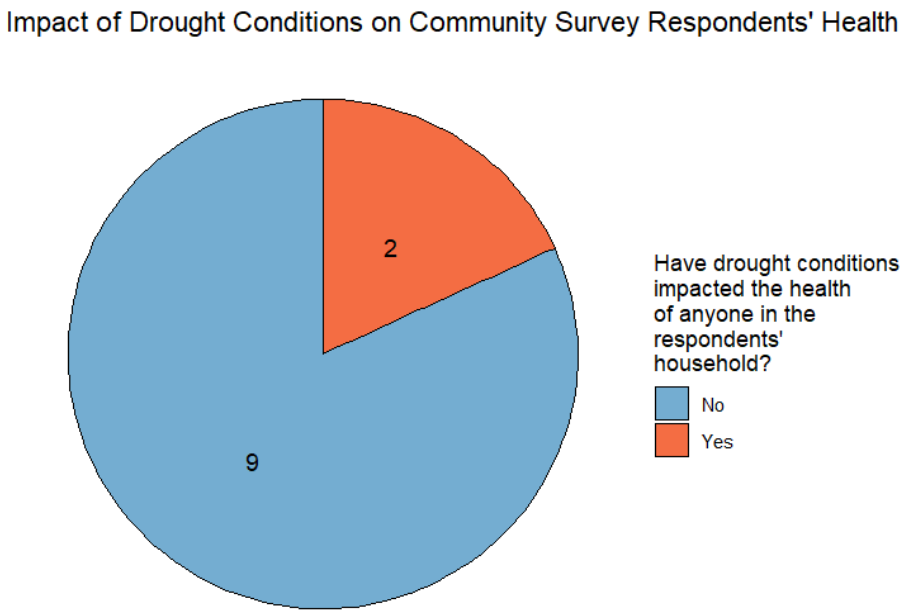
Household uses well water?	n of respondents	% of respondents
No	10	93.2
Yes	0	0
Other	1	6.8



Health impact

Have drought conditions over the past 5 years either directly or indirectly impacted your health, or the health of anyone in your household?

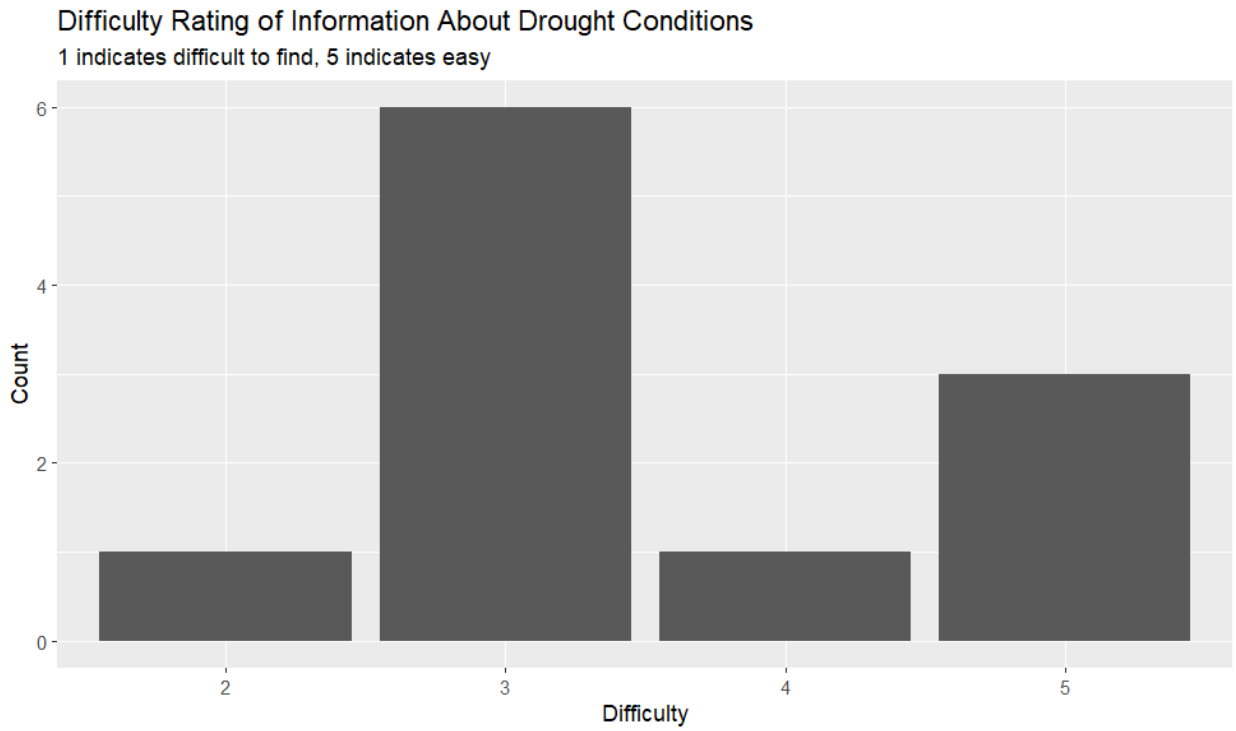
Impacted health?	**n of respondents**	**% of respondents**
No	9	78.0
Yes	2	22.0



Ease of finding information

On a scale of 1 to 5, how easy was it to find the information you were looking for about drought?

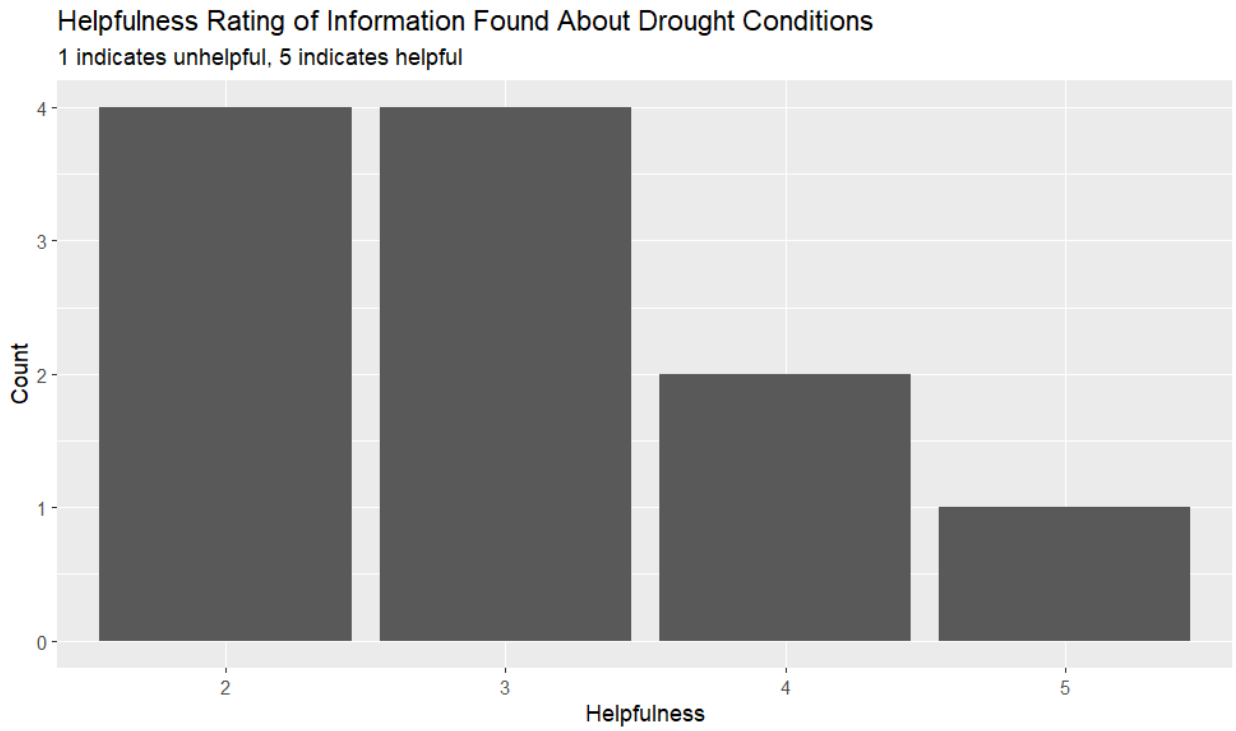
Ease	n of respondents	% of respondents
1 (difficult)	0	0.0
2	1	6.8
3	6	49.2
4	1	15.2
5 (easy)	3	18.8



Helpfulness of information

On a scale of 1 to 5, how helpful was the information you found about drought?

Helpfulness	**n of respondents**	**% of respondents**
1 (unhelpful)	0	0.0
2	4	44.0
3	4	35.6
4	2	13.6
5 (helpful)	1	6.8

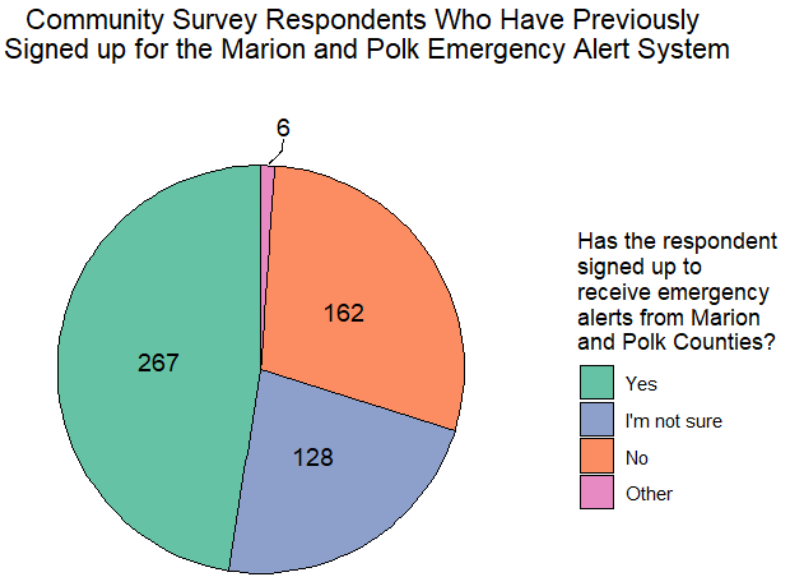


Information

Emergency alert signup

Have you previously signed up for the Marion and Polk County Emergency Alert system for text notifications of emergencies?

Is respondent signed up?	n of respondents	% of respondents
Yes	267	48.5
I'm not sure	128	22.3
No	162	28.3
Other	6	0.9

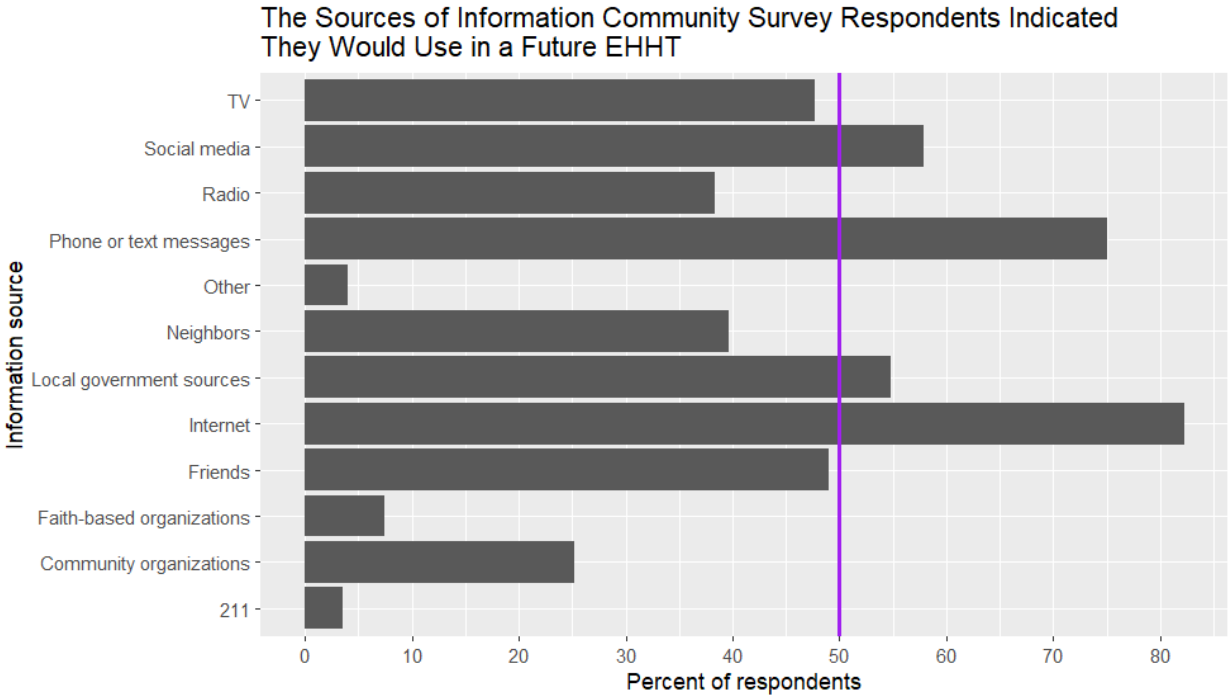


Information sources

If an environmental event such as any we've been discussing occurred in the future, where or who would you turn to for information?

Source	n of respondents	% of respondents
211	20	3.3
Community organizations	143	26.7
Faith-based organizations	42	7.3
Friend	278	48.3
Internet	467	81.6
Local government source	311	55.5
Neighbor	225	40.0
Other	q31	5.2

Phone or text messages	426	75.2
Radio	218	38.9
Social media	329	58.2
TV	271	47.4

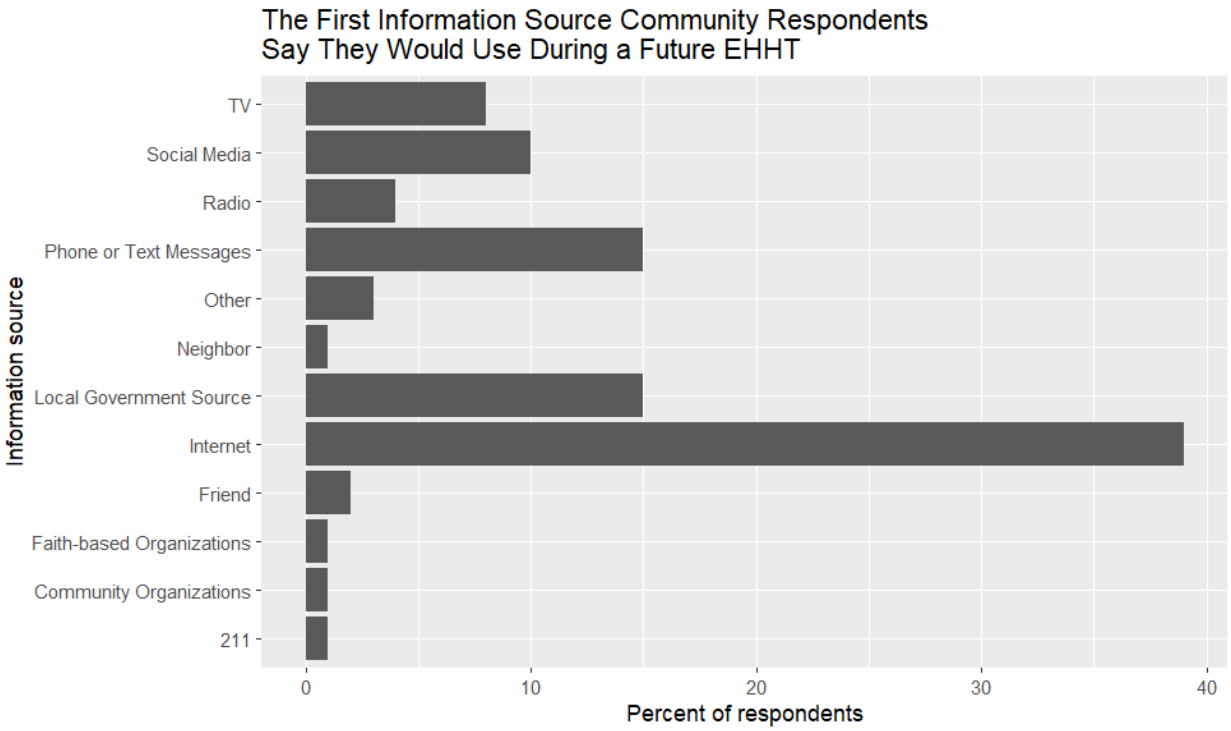


First information source

If an environmental event such as any we've been discussing occurred in the future, where or who would you turn to for information first?

Source	**n of respondents**	**% of respondents**
211	4	0.6
Community organizations	6	0.9
Faith-based organizations	3	0.4
Friend	12	2.1
Internet	217	38.4
Local government source	84	15.3

Neighbor	4	0.6
Other	15	2.6
Phone or text messages	65	14.9
Radio	83	4.2
Social media	57	11.1
TV	46	8.8



Appendix F.2 - Summary Table of Survey Free Response Coding

Algal Bloom			
Code		**Code Summary**	**Number of Uses**
Source of Information	Government	Some went to the local government and praised their communication while others expressed frustration with the government's communication and response.	15
	Personal Relationships	Respondents listed friends, family, neighbors, and their work.	6
	Internet & Social Media	Respondents listed the Internet and social media, but few specified beyond Facebook.	9
	News (TV, Online & Newspapers)	Several respondents went to local news outlets– whether online, through newspapers, or on the TV– but no one specified which.	9
Vulnerable Population	Children & Babies	Some said they were caring for children or were pregnant and discussed the fears that they had drunk contaminated water.	5
	Preexisting Conditions	One respondent was sick during the crisis, putting them at risk.	1
	Pets	Several discussed finding clean water for their pets. One said their dogs were already sick when information was released.	4
Health Impacts	Physical	A few respondents said they, a family member, and/or their pets became ill from the water.	3
	Mental	Many respondents discussed the stress this event caused.	8
Distrust Towards the Government		Several said they were frustrated by the government, between their handling of the contamination and the communication of the crisis.	5
Used Different Source of Water		Some discussed traveling for water while others discussed purchasing water at the store.	11

Change in Behavior After the Event		One respondent discussed purchasing a filter to reduce risk.	1
Difficulty in Accessing Water		Respondents discussed the difficulties of accessing water, due to the shortage of water, high prices caused by the general shortage, or because they were forced to travel to purchase it.	12

Droughts

Code		Code Summary	Number of Uses
Source of Information	Personal Relationships	Two respondents said they went to friends.	2
	Internet & Social Media	Respondents used social media and the Internet without specifying specific sites.	5
	News (TV, Online & Newspapers)	Some went to the TV for news or read articles online.	4
	Radio	One said they listened to the radio.	1
	Other Organizations	One said they learned information from a food bank while another said a school.	2
Difficulty in Finding Information		One respondent said they didn't have a TV, so they went to the Internet, and another said the information they found wasn't helpful since they didn't feel like anything could be done.	2
Vulnerable Population	Preexisting Conditions	One said they had asthma, and this caused difficulties with the drought.	1
	Low Income	One said it was difficult for low income families to protect themselves from droughts and any other weather event.	1
Higher Prices		One respondent said general prices were raised while another specifically said water prices were.	2
Searched for & Saving Water		One respondent said they had to search for water while another saved water due to the drought.	3
Wildfires, Wildfire Smoke, & Poor Air Quality		Several noted that droughts can cause or worsen wildfires, and one was concerned about fireworks.	5

Environmental Impacts		Two noted that droughts can impact plants and animals.	2
Health Impacts		One respondent said that the drought worsened/created asthma while another said that it can cause dehydration.	2

Heatwaves

Code		Code Summary	Number of Uses
Source of Information	Government	Sources included NOAA, the City of Salem website, the City of Independence Facebook page, the Polk County website, Marion County Emergency Management, alert systems, and other local government websites.	11
	Personal Relationships	Friends, family, neighbors, and the workplace were mentioned by respondents.	9
	Internet & Social Media	Respondents looked up weather and climate information on the Internet, including using Weather Underground. Others used social media, which included Facebook and Reddit.	44
	News (TV, Online & Newspapers)	Many went to online or TV news, and sources included KPTV, PBS, OPB, the weather channel, Fox 12, and Univision Portland.	32
	Radio	Several respondents mentioned using the radio, but only one specified the station, which was OPB.	6
	Weather & Health App	Respondents said the weather app on their phone.	7
	Other Organizations	One respondent went to a PGE power map while another went to a church in Corvallis, which wasn't helpful.	2
Difficulty in Finding Information		One person said the information they found was localized and not for general advice like how to manage heat. Another said the Polk County website wasn't helpful to those without AC.	2
Vulnerable Population	Outdoor Workers	Several respondents mentioned the increased risk to outdoor workers during high heat, particularly farmworkers.	4
	Children & Babies	Several respondents discussed concern about their unborn children during high heat, and one claimed their child was born early due to it.	4

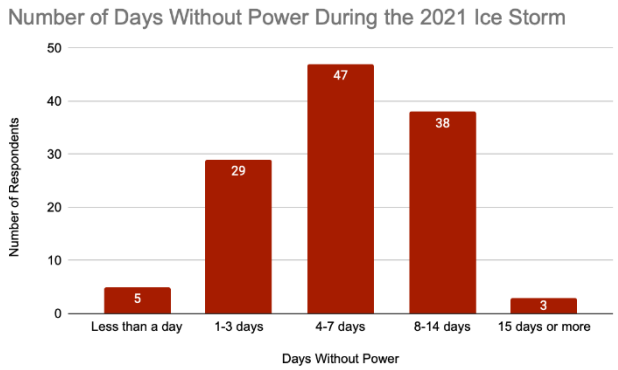
	Older Adults	There was concern for older adults during the heatwave, especially for those without heat.	2
	No AC	Many lacked AC at home or in their workplace, putting them at higher risk for heat illness. One noted the difficulty for renters to obtain AC if their landlord wouldn't pay for it.	26
	Pets	Several noted pets were at risk, and one said their pet died.	11
	Preexisting Conditions	The heat worsened many conditions, including autism/ADHD, inability to regulate body temperature, medication that didn't work well with the heat, diabetes, heat sensitivity, asthma, heart problems, and more unspecified ailments.	12
	Frontline Worker	Frontline workers were at risk due to high heat.	2
	Low Income	Some noted how difficult it was for them to purchase or fix AC and other cooling systems.	3
	Unhoused	The unhoused were at high risk due to a lack of AC or other means of cooling off.	2
AC & Other Cooling Systems		Many respondents discussed their inability to afford AC or other cooling systems. A few said AC was ineffective at cooling them. Some purchased AC after the heatwave.	34
Unbearable Heat		Many discussed feeling unbearable heat, whether it was at home, outside, or at work.	22
Health Impacts	Physical	Health impacts included asthma, trouble sleeping, lethargy, headaches, heat stroke, nausea, heat exhaustion, shortness of breath, passing out, throwing up, dehydration, and fever.	29
	Mental	Several discussed how the stress of the heat and/or an inability to find sleep worsened their mental health.	7
Failing Appliances, Infrastructure, etc.		Appliances which broke included water systems, cooling systems, and refrigerators. One discussed how the street outside of their house became cracked from the heat and also mentioned a water pipe breaking along the street.	10
Unable to do Activities		Several discussed being unable to go outside, visit family, or go to the grocery store during the heatwave.	8
Power Outages		Some discussed the fear of a power outage while others discussed how hard the power going out was.	5

Crop/Garden Loss		The heatwave harmed agricultural crops, forestry products, and personal gardens.	10
High Costs		Twelve respondents discussed how their spending rose due to the heatwave, mainly due to higher electricity bills. Others discussed food loss, spending for additional water, and fixing/paying for cooling systems.	12

Ice Storm

Code		Code Summary	Number of Uses
Source of Information	Government	Local government sources included City of Salem's website, Marion County's website, the local police department's website, Flashalert, 211, and Marion County Facebook page.	29
	Personal Relationships	Friends, family, and neighbors were mentioned.	85
	Internet & Social Media	Many listed the internet and social media, but very few gave specifics. Many lost access to them during the power outage.	108
	News (TV, Online & Newspapers)	Many respondents said various types of news, but many were unable to access them once the power went out. Sources mentioned were OPB, the Statesman Journal, the National Weather Service, and the Weather Channel.	54
	Radio	Many respondents said they used a radio during the ice storm, and many were forced to rely upon it if the power went out.	29
	PGE	Some respondents went to the PGE website, if possible, or called them. Several said that the call line was overwhelmed.	25
	Other Apps & Community Organizations	Two respondents said they used Trip Check. Another said they checked the weather app. One respondent mentioned community organizers, but they didn't say who they were.	6
Difficulty in Finding Information		Difficulties from power outage, loss of internet, loss of TV news, road closures, and more were mentioned. Several respondents said PGE was overwhelmed with callers.	45
Power Loss		Power loss impacted heating, cooking, refrigeration, and well water. People who had to refrigerate medicine often had it spoiled. It inhibited people from doing work, school, and accessing information.	212

Landscape or Property Damage		Physical damage the ice storm caused included falling trees and branches which damaged power lines, houses, cars, and blocked roads. Some reported injuries during cleanup. Two reported floods from loss of sump pumps.	40
Road Closures & Dangerous Road Conditions		Many reported traveling difficulties after the ice storm from ice or downed trees. This inhibited evacuation, getting groceries/supplies, and going to school/work.	20
Health Impacts	Physical	Some reported injuries from slipping on ice. The cold caused frostbite, illnesses, which included worsening preexisting conditions, loss of mobility, and lack of sleep.	35
	Mental	Stress and anxiety were prevalent. One respondent said it brought up preexisting trauma from previous natural disasters.	15
Freezing Temperatures		Freezing temperatures were felt in homes, especially those without power, and in some for over two weeks. In many cases, this led to health issues.	19
Financial: High Costs & Supply Issues		There were supply issues for water, food, and more. Power outages caused food and medicine spoilage. Repair costs were high even after insurance.	65
Evacuation		Many stayed with family, friends, or at hotels, often to get power, get heating, and/or go to places with stocked food. Some of this was hampered by dangerous roads.	31
Impacts on School or Work		Some were unable to work or go to school, due to dangerous roads and/or an inability to access the internet.	6
Vulnerable Population	Preexisting Conditions	Preexisting conditions worsened due to the cold, or they couldn't use technology for their condition. Several said that the power outage made important medicine go bad.	6
	Older Adults	Respondents mentioned being or caring for an older adult and how they were impacted by the storm.	8
	Children & Babies	Power loss impacted the needs of children and newborns.	8
	Pets & Livestock	Many held concern for their animals, especially as they tried to keep warm. Several reported deaths of pets.	8
Number of Days Without Power		Most of the respondents said that power was out for roughly a week. Very few respondents said their power was out for less than a day or for more than two weeks.	140



Wildfire Smoke

Code		Code Summary	Number of Uses
Source of Information	Government	Respondents listed the Marion County website, the City of Salem website, Marion County Emergency Management, Inciweb, NOAA, the Oregon Department of Emergency Management, and more.	30
	Personal Relationships	Respondents listed friends, family, neighbors, and their work.	41
	Internet & Social Media	Many listed the internet and social media, but very few gave specifics. Some mentioned various Facebook pages, including Silverton Connections.	110
	News (TV, Online & Newspapers)	Respondents mentioned the Statesman Journal, Univision Portland, the Weather Channel, and katunews.com. Most didn't specify their source, however.	78
	Radio	Several respondents said radio, but only one specified which station, which was OPB.	9
	Weather & Health Apps	Respondents mentioned the weather app, Accuweather, OregonAir, Nextdoor, and various wildfire mapping apps.	15
	Other Organizations	Respondents mentioned Chemeketa, local organizations and nonprofits, and Salem Hospital, where one had been staying at the time.	7
Difficulty in Finding Information		One respondent said that information was not timely. A few had difficulty finding information.	4

Vulnerable Population	Outdoor Workers	Respondents said they or a family member were outdoor workers during the wildfires, and some had to work during this.	12
	Children & Babies	Several respondents discussed being pregnant and how concerned they were for their babies health. One claimed they went into labor early while in their second trimester due to the smoke. Others discussed the health impacts on young children.	8
	Pets & Livestock	Respondents mentioned the difficulties of owning pets or livestock during this time and the health impacts they faced.	24
	Preexisting Conditions	Many respondents dealt with asthma, which severely worsened with the smoke. Some of the other conditions mentioned included COPD, sleep apnea, diabetes, chronic migraines, emphysema, cardiovascular issues, and unspecified respiratory diseases.	35
	Frontline Worker	One respondent said their husband was a firefighter and that this may affect his health in the future.	1
	Older Adults	Respondents discussed the high risk they or family members faced during the wildfires, and many said they had difficulty breathing. A caregiver to older adults also discussed difficulties.	7
Air Quality		The impacts from air quality included inhibiting people from going outside, health impacts, and obscuring visibility, making evacuation difficult.	21
Unable to Escape the Smoke Indoors		Respondents discussed the difficulty that was caused by smoke seeping into the house through cracks, despite their best efforts to close the house. This caused damage to things inside and presented a health risk to people indoors too.	27
Evacuation		Many respondents discussed how they evacuated and the difficulties of evacuating, including road closures, visibility issues, and having nowhere to go.	20
Health	Physical	Symptoms included difficulty breathing, coughing, burning eyes, coughing, irritated throats, lightheadedness, congestion, worsening of preexisting conditions like asthma, and sleep loss. Several mentioned these impacting pets and livestock.	142
	Mental	Several said they felt anxiety, stress, and fear because of the smoke and wildfires. One said they felt cabin fever and isolation because of having to stay inside with the smoke.	23
Unable to do Activities, Work, etc.		Many respondents were unable to do things because of the wildfire smoke, including leaving their homes, going to work, exercising, or taking care of pets.	65

High Costs & Supply Issues	Respondents listed the high costs of air purifiers, AC, traveling expenses, food, and other supplies during this time period. Some discussed having no income during this time period.	10
Damage to Appliances	Smoke and ash damaged items inside homes. AC systems were also damaged by the smoke.	3
High Temperatures	Several respondents said they didn't have AC during the time period, and being unable to open windows, it became unbearably hot. Several said they lost sleep because of this.	9

Wildfires

Code		Code Summary	Number of Uses
Source of Information	Government	Respondents listed emergency alerts, Inciweb, Metcom, Marion County Emergency management, wildfire trackers, evacuation websites, and other local government sources.	20
	Personal Relationships	Respondents listed friends, family, neighbors, and their work.	23
	Internet & Social Media	Many listed the internet and social media, but very few gave specifics. A few did say Facebook.	26
	News (TV, Online & Newspapers)	Several respondents mentioned local news on the TV and online. The only sources specified were Portland TV news and the Statesman Journal.	14
	Radio	One respondent said KYAC. Another didn't specify.	2
	Other Organizations	Sources mentioned included the Willamette Valley Communications Center, the respondent's power company, and a volunteer group.	3
Difficulty in Finding Information		Several respondents had issues with receiving alerts or receiving incorrect ones. Others had issues finding information online.	6
Alert Issues		Several respondents discussed issues with receiving the incorrect emergency alert or not receiving an alert.	7
Destruction of Homes, Buildings, Areas, etc.		Many respondents discussed the destruction of homes and loss of belongings caused by the fire. This had a devastating mental health impact. Several respondents discussed the destruction of trees and areas nearby due to the fire.	19

Evacuation		Many respondents discussed evacuating and the mental impact this had on them. Some issues mentioned included evacuating when they received the incorrect notification alert, transporting pets and livestock, and an unavailability of hotels.	34
Power & Electronic Issues		Several respondents discussed losing power, but few gave specific time periods for how long they had lost power.	10
Health	Physical	Health issues that arose were from poor air. causing breathing problems, coughing, or worsening preexisting health conditions. Several respondents also discussed people they know passing away.	15
	Mental	Mental health issues that arose included depression, anxiety, stress, and PTSD. These stemmed from losing homes, loved ones, or the stresses of evacuating.	22
Air Quality		Air quality issues worsened respondents' health and caused people to be unable to do work or other activities.	12
Inability to do Work, Activities, etc.		Respondents said they were unable to work or other activities due to evacuations or the wildfire smoke.	7
Vulnerable Population	Frontline Worker	A few respondents said they or a family member were firefighters during the wildfire. This event may have impacted their health.	3
	Children & Babies	One respondent said their newborn had a cough due to poor air quality.	1
	Preexisting Conditions	Two respondents discussed having preexisting conditions and how this worsened the health impacts of the fire on them.	2
	Older Adults	One respondent said they and their family were older, and this, along with other factors, put them at high risk of illness.	1
	Pets & Livestock	Several respondents discussed the difficulties in moving pets and livestock, and sometimes, they were even unable to move them during the fire.	7
Number of Days Evacuated		Most respondents said they evacuated from 3-7 days or over several weeks, with very few other responses.	15
Number of Days without Power		Only two respondents specified the days without power.	2

Additional Event

Code		Code Summary	Number of Uses
Source of Information	Government	Respondents mentioned DEQ, the National Weather Service, and other local city resources for information.	4
	Personal Relationships	One respondent said they went to their neighbors. One respondent said they went to others with Lyme Disease for information about the disease.	2
	Internet & Social Media	Respondents mention the Internet and social media but didn't specify any further.	5
	News (TV, Online & Newspapers)	Two respondents said they turned to the news for their problem, but didn't give much specifics.	2
	Weather & Health Apps	One respondent used the weather app on their phone.	1
	Other	Other sources of information included PGE, books, and doctors.	5
Difficulty in Finding Information		One person said it was difficult to find information as someone who didn't speak English well.	1
Events	Wildfire Smoke	A few respondents discussed wildfire smoke but gave little detail.	3
	Wildfires	A respondent discussed a fire event in South Salem and the confusion surrounding the emergency alert they received.	2
	Air Pollution–Non-Wildfire Smoke	Some of the instances of air pollution mentioned included trash burning, grass seed field burning, and sawdust from a factory.	9
	Vectors	One respondent discussed ticks and having Lyme Disease. They also think the Pacific Northwest medical community isn't adequate for dealing with ticks.	2
	Winter Storms	Respondents discussed an ice storm's impacts on infrastructure, health, and travel.	12
	Water Issues	Two respondents discussed concerns about water quality in specific areas. Another discussed a water quantity dispute.	10

	Heatwaves	A respondent said they purchased an AC unit when they moved, and they would've gotten ill without it.	3
Health	Physical	Respondents discussed the impacts of air pollution, ice storms, and Lyme Disease on their health.	6
	Mental	One respondent discussed the stress of being unable to get medication for their sick children during an ice storm.	2
Damage to Appliances, Infrastructure, etc.		The damage done by the ice storm mentioned by respondents included broken pipes, power loss, and warping of doors.	3
High Costs		The high costs mentioned by respondents include purchasing and using AC, for water, and for fixing damage caused by ice storms.	4
Vulnerable Population	Preexisting Conditions	Respondents discussed how they were more likely at risk to illness during events and had to be more cautious.	3

Communication

Code		Code Summary	Number of Uses
Alternate Information System	App/System	The alternative apps and alert systems included FlashAlert, Marion County alerts, Pulsepoint, Newsbreak, 911 alerts, WU Alerts, the Watch Duty App, Everbridge, and Red Cross Alerts.	19
	Family	A few respondents used family as a source of information.	5
	Work	A few respondents used work for information, but few specified what their jobs were and what information they received.	5
	Email	A few respondents received information via email.	3
	School	Englewood Elementary, Roberts Middle School, and Chemeketa Community College were listed as sources of information.	3
Inability to Receive Information	Personal	One respondent said they signed for phone alerts because they didn't have a cell phone while another said they used email alerts because they didn't have texting.	2
	Community-wide	One respondent said they were unable to receive information during the ice storm due to the power outage.	1