



Clackamas County
Public Health Division

Climate and Health Adaptation Plan

Published June 2025

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Land Acknowledgements

What we now call Clackamas County is the traditional lands and waterways of the Clackamas, Chinook Bands, Kalapuya, Kathlamet, Molalla, Multnomah, Tualatin, Tumwater, Wasco and many other tribes of the Willamette Valley and Western Oregon.

We honor the Native American people of Clackamas County as a vibrant, foundational, and integral part of our community here today. We respectfully acknowledge Wy'east, also known as Mount Hood, and Hyas Tyee Tumwater, also known as Willamette Falls, as sacred sites for many Native Americans.

We thank those who have connection to this land and serve as stewards, working to ensure our ecosystem stays balanced and healthy.

Section 1. Introduction and Overview

Overview

Changes in our climate and extreme weather are growing public health concerns in the Pacific Northwest. In Clackamas County we can expect more days with extreme heat, poor air quality from wildfire smoke, severe winter storms, and other climate-related risks. These changes can lead to increases in heat-related illness, respiratory conditions, injuries and, in severe cases, death. Additionally, stressors from a single, or cumulative, climate event(s) also affect our mental health and can lead to depression or anxiety. *Figure 1* below shows how changes in climate interact with conditions of exposure that impact health outcomes. Community members at greatest risk are those who have one or more vulnerabilities to a climate hazard which can lead to negative health outcomes. Vulnerabilities can be social such as working outside, living alone, or being low-income; biological such as age or having an existing chronic condition, or behavioral such as substance use or participating in outdoor recreation in high heat.

Figure 1. Links between Changes in Climate and Health Outcomes



This Climate and Health Adaptation Plan (Plan) uses population health data for Clackamas County to understand climate vulnerabilities and who is most impacted and disproportionately impacted by increases in extreme weather. The plan leverages internal county partners to take actions as part of a comprehensive strategy to reduce exposures for vulnerable groups and increase their adaptive capacity in order to reduce negative health outcomes related to a changing climate. More about this plan is discussed in *Section 2 About This Plan*, the strategy is outlined in *Section 3*.

Climate and Health Adaptation Strategy and the methodology for developing this Plan is outlined in *Section 4. Process and Methodology*.

Role of Public Health in Climate and Health Adaptation

Clackamas County Health Division (CCPHD) is dedicated to protecting and promoting the community's health by advancing racial health equity, building partnerships, and establishing culturally responsive systems. The Public Health Modernization Manual and 10 Essential Public Health Services describe the public health activities that all communities should undertake to protect the population's health and wellbeing. The Public Health Modernization Manual provides descriptions for each foundational capability and program for governmental public health. Foundational capabilities are the knowledge, skills and abilities needed to successfully implement foundational programs. Foundational capabilities include the following and are foundational to the core of this plan:

- Leadership and organizational competencies
- Health equity and cultural responsiveness
- Community partnership development
- Assessment and epidemiology
- Policy and planning
- Communications
- Emergency preparedness and response

The 10 Essential Public Health Services serve as the framework for our climate and health program and this plan, with a focus on those in **bold**:

- 1. Monitor health status to identify and solve community health problems.**
2. Diagnose and investigate health problems and health hazards in the community.
- 3. Inform, educate, and empower people about health issues.**
- 4. Mobilize community partnerships and action to identify and solve health problems.**
- 5. Develop policies and plans that support individual and community health efforts.**
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. Assure competent public and personal health care workforce.
- 9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.**
- 10. Research for new insights and innovative solutions to health problems.**

Key Terms

Climate Adaptation. The process of changing policies, systems, and environments to respond to unavoidable impacts of climate change with the purpose of reducing health risks for communities.¹

Climate Mitigation. Acts to reduce the release of, or, total amount of greenhouse gases.²

Community Resiliency. Community resilience is the ability of a community to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.³

Emergency Preparedness. A continuous cycle of planning, organizing, training, equipping, exercising, evaluating and talking corrective action to ensure effective coordination during incident response.⁴

Vulnerability. Vulnerability is considered a function of sensitivity, exposure, and an individual or group's ability to adapt to one or consecutive extreme weather incidences. High vulnerability is considered a situation where the exposure to climate risks is high, the sensitivity is high, and the adaptive capacity is low.⁵ For example, a farmworker with a work visa working long hours outside in extreme heat with little power or resources to change jobs or improve their working conditions.

Exposure: Exposure is the condition of being unprotected from a risk or being subject to some effect or influence. For example, elevated daytime and nighttime temperatures, poor air quality, or contaminated water and debris from flooding are all exposures that, if come into contact with humans, risk negatively affecting them (in this case their health).⁶

Sensitivity: Sensitivity is the degree to which the (human) system is affected by the exposure to health risks.⁷ Sensitivity may consist of social vulnerabilities such as housing status or employment type, biological vulnerabilities such as age, or behavioral vulnerability such as substance use.

Adaptive Capacity: The ability of an individual or community to mitigate harm by taking action to reduce exposure or sensitivity.⁸

¹ Clackamas County Public Health Division. (2020). Blueprint for a Healthy Clackamas County.

² *ibid*

³ U.S. Department of Homeland Security. FEMA. National Risk Index. <https://hazards.fema.gov/nri/community-resilience>. Accessed April 2025

⁴ U.S. Department of Homeland Security. Plan and Prepare for Disasters. <https://www.dhs.gov/archive/plan-and-prepare-disasters>. Accessed April 2025

⁵ Eco-intelligent. Exposure, Sensitivity and Adaptive Capacity: Understand climate change vulnerability. <https://eco-intelligent.com/2019/10/22/exposure-sensitivity-and-adaptive-capacity/>. Accessed June 2025

⁶ *ibid*.

⁷ *ibid*.

⁸ *ibid*.

Social determinants of health (SDOH) are non-medical factors affecting health, like socioeconomic status and the neighborhood someone lives in.⁹

Green Infrastructure is infrastructure that mimics natural systems, such as urban green space and parks, trees, rain gardens, and bioswales, among others. It offers a wide array of social, environmental, and economic benefits.¹⁰

Systems change involves change made to the rules within an organization. Often systems change focuses on changing infrastructure within a school, park, worksite, or health setting or instituting processes or procedures at the system level that ensure a healthier workplace.¹¹

Policy change refers to policies at the legislative or organizational level. For example, institutionalizing new rules or procedures as well as passing laws, ordinances, resolutions, mandates, regulations, are all examples of policy change efforts. Government bodies (federal, state, local level), school districts and schools, park districts, healthcare organizations, worksites, and other community institutions have and make policies.¹²

Environmental change in this plan refers to changes made to the physical natural or man-made environment. Examples include adding sidewalks, expanding tree canopy, or parking lot pavement removal or painting.¹³

Climate Support Devices are devices designed to help keep people safe during extreme weather events such as air conditioners, heaters, portable power supplies, mini fridges, and air filters. Devices are used to mitigate and adapt to the effects of climate change.¹⁴

Greenhouse Gases (GHG) are gases that trap heat in the atmosphere and work to warm the planet. Each of these gases can remain in the atmosphere for different amounts of time, ranging from a few years to thousands of years. All these gases remain in the atmosphere long enough to become well mixed, meaning that the amount that is measured in the atmosphere is roughly the same all over the world, regardless of the source of the emissions.¹⁵

⁹ *ibid.*

¹⁰ Department of Land Conservation and Development. Community Green Infrastructure Grant Program. <https://www.oregon.gov/lcd/CGI/Pages/default.aspx>. Accessed June 2025

¹¹ The Food Trust. (2012). What Is Policy, Systems and Environmental (PSE) Change? https://healthtrust.org/wp-content/uploads/2013/11/2012-12-28-Policy_Systems_and_Environmental_Change.pdf. Accessed June 2025

¹² *ibid.*

¹³ *ibid.*

¹⁴ Oregon Health Authority. Helping Members Stay Healthy at Home During Extreme Weather. <https://www.oregon.gov/oha/HSD/OHP/Pages/Climate-Supports.aspx>. Accessed June 2025

¹⁵ Environmental Protection Agency. <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>. Accessed May 2025

Acknowledgements

The following departments, agencies, and organization were integral in identifying the adaptation actions contained within this plan. Additionally, these groups, and others, will be pivotal in the implementation of the plan over the next 3-5 years.

Public Health Contributors

- Oregon Health Authority (OHA)
- Clackamas County Public Health Division (CCPHD)
 - Clackamas County Office of Public Health Emergency Services (OPHES)
 - Clackamas County Equity and Partnership Unit
 - Clackamas County Public Health Advisory Council (PHAC)
- Health Share of Oregon

Internal County Partners

- Clackamas County Disaster Management (DM)
- Clackamas County Department of Transportation and Development (DTD)
- Clackamas County Water Environment Services (WES)
- North Clackamas Parks and Recreation District (NCPRD)
- Washington County Public Health (WCPH)
- Multnomah County Public Health Division (MCPHD)

Community Partners

- Northwest Family Services
- University of Oregon, Oregon Partnership for Disaster Resilience

Section 2. About This Plan

Purpose and Scope

This Climate and Health Adaptation Plan (plan) aligns with the 2021 Oregon Climate Adaptation Framework in purpose and scope. It also incorporates OHA principles: centering health and equity, prioritizing engagement, and incorporating locally relevant climate and health data in decision-making. The purpose of this plan is to take action to reduce climate-related health risks and promote community resilience, especially among people and communities who are disproportionately affected by climate change.

Purpose: The purpose of this plan is to take action to reduce climate-related health risks and promote community resilience, especially among people and communities who are disproportionately affected.

| What this plan is | What this plan is not |
|--|---|
| <ul style="list-style-type: none">• Climate Adaptation. The process of changing policies, systems, and environments to respond to impacts of climate change with the purpose of reducing harm and adverse health impacts to people.• Focus on actions or interventions within the authority of Clackamas County.• Actions that can be taken within current staff capacity in the next 3-5 years.• Actions that mitigate exposures of most impacted and disproportionately impacted populations in Clackamas County. | <ul style="list-style-type: none">• Environmental, economic, infrastructure and property aspects of climate change.• Communications Plan• Emergency Preparedness Plan or Emergency Operations Plan• Hazard and risk assessment• Climate action plan to reduce Green House Gasses• Will not and does not include all mitigation and adaptation efforts possible.• Reflective of all adaptation efforts happening throughout Clackamas County |

Climate Hazards of Concern

Climate and health is a relatively new area of focus for public health divisions. Our work at CCPHD began about a decade ago and is guided primarily by available data, direction and guidance from health agencies like the Centers of Disease Control and Prevention (i.e. the BRACE Framework¹⁶) and the Oregon Health Authority, and research and best practices coming out of research universities (i.e. University of Oregon Eugene, Oregon State University, and Portland State University). Using data and guidance, this plan prioritizes work in three primary hazard areas that pose the greatest risk to human health in Clackamas County based on the best available information at the time this plan was developed. Hazards focused on in *Section 3* include: extreme heat, poor air quality from wildfire smoke, and extreme winter weather.

Figure 2. Climate Hazards of Concern for Public Health



Additionally, staff continue to research, track, and monitor hazards and issues of concern in Clackamas County, particularly: water security/quality, communicable diseases including vector borne diseases, mental health, and allergen severity resulting from changes in the environment. For more information, review our most current Regional Climate and Health Monitoring Report found on our public health reports and publications page at www.clackamas.us/publichealth/reports. The climate and health team is also building our capacity in, and maintaining awareness of, hazards and impacts of high priority in other regions which may impact Clackamas County indirectly or more directly in the future.

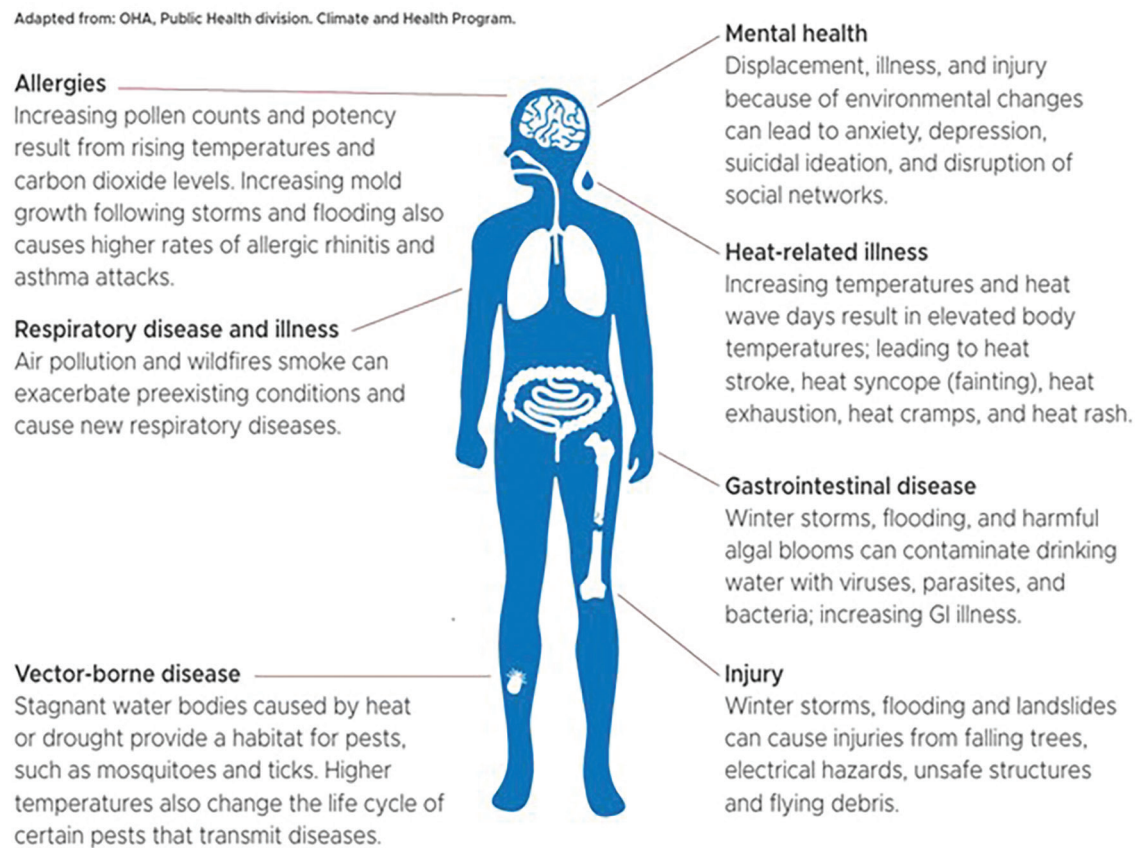
¹⁶ The Building Resilience Against Climate Effects (BRACE) framework is a five-step process that allows health officials to develop strategies and programs to help communities prepare for the health effects of climate change.

Climate Impacts on Health

Climate impacts create a number of different exposures that have the potential to harm human health in the short and long-term. In particular, vulnerable groups with one or more sensitivities like housing status (social vulnerability), age (biological vulnerability), or substance use (behavioral vulnerability). *Figure 3* illustrates some of impacts on health from changes in climate and increase in extreme weather.

Figure 3. Climate Impacts on Human Health

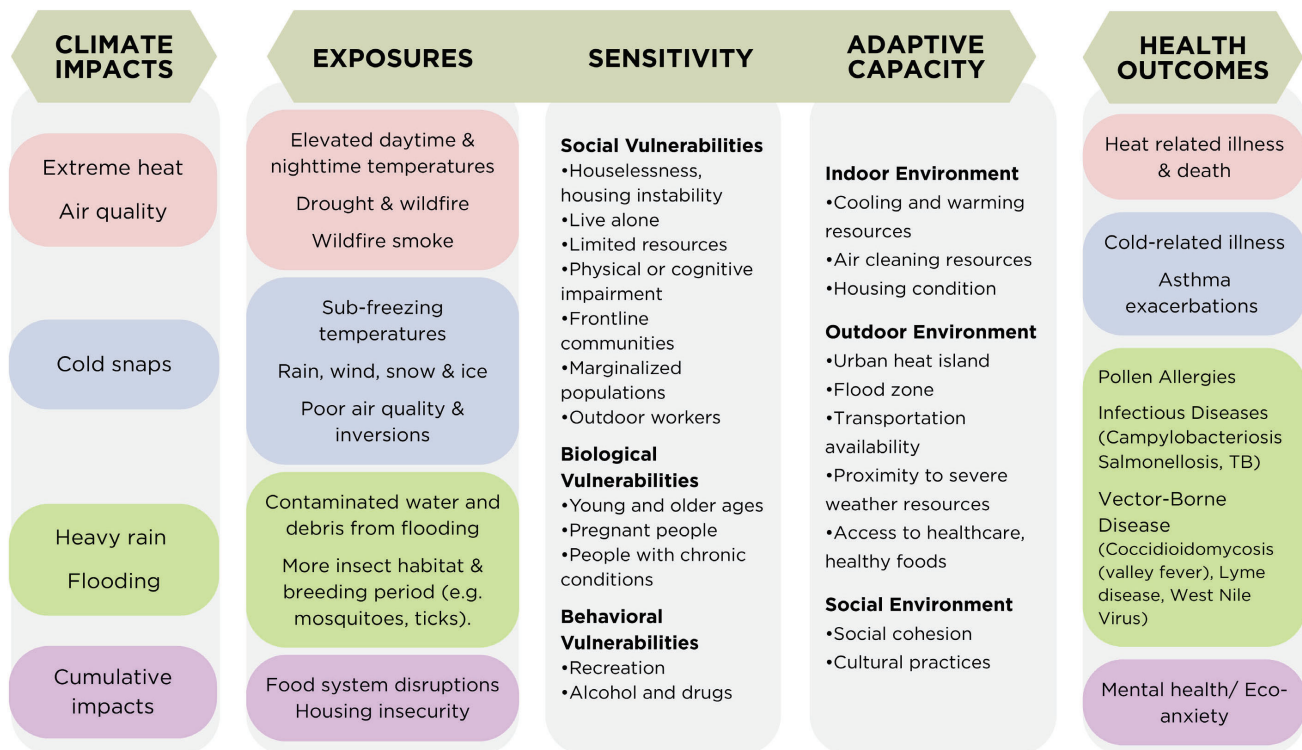
Source: Graphic courtesy of Lincoln County Health and Human Services and Benton County Health Department Climate and Health Adaptation Plan. (2023). Page 20. Created by Rede Group.



Communities of Focus – Leading with Health Equity

This plan focuses on actions that support groups vulnerable to extreme weather from a changing climate. Vulnerability is considered a function of sensitivity, exposure, and an individual or group's ability to adapt (adaptive capacity) to one or consecutive extreme weather incidents. See *Figure 4* below to better understand exposures, sensitivities and adaptive capacity as it relates to health outcomes.

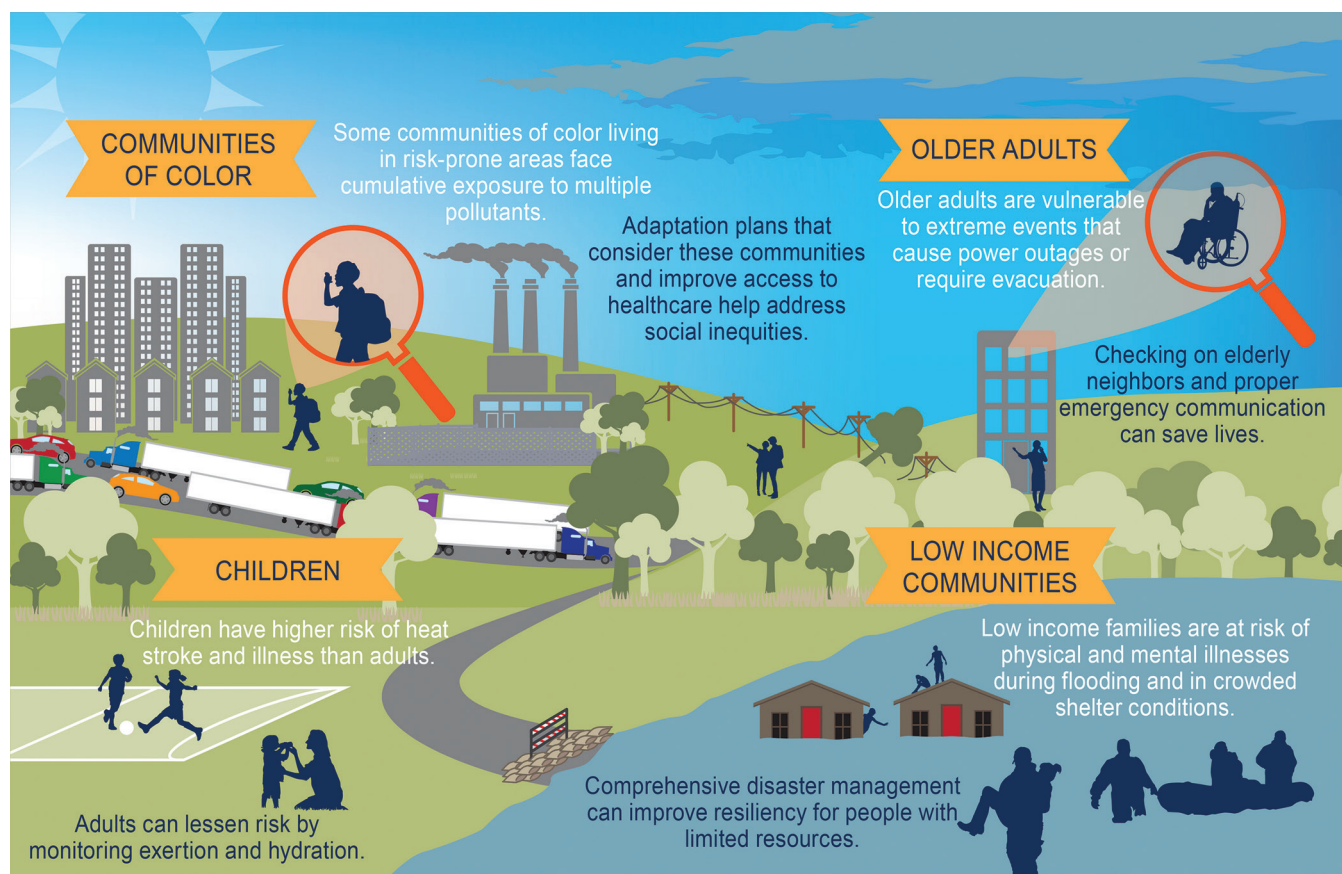
Figure 4. Interaction of Exposures, Sensitivities, and Adaptive Capacity related to Climate and Health Outcomes



Additionally, research shows that social determinants of health shape our baseline health risk (i.e. sensitivity), the conditions of our exposure, and an individual or groups' ability to recover from extreme weather events and a changing climate. For example, a person living in a neighborhood that has been historically disinvested by government is likely to have fewer trees, less transportation options, lower quality of housing which in turn decreases an individual's ability to walk on a shaded street, have travel options when road conditions are poor, live in a home with proper insulation, and have adequate indoor heating and cooling. *Figure 5* from Fourth National Climate Assessment, illustrates how social determinants interact with extreme weather and result in increased risk and worse health outcomes for groups with social, biological, and behavioral vulnerabilities.

Figure 5. Understanding Exposures for Vulnerable Communities

Source: Fourth National Climate Assessment. <https://nca2018.globalchange.gov/chapter/14/>. Accessed April 2025



In Clackamas County, vulnerable groups are delineated further and understood in our data sets as both most impacted and disproportionately impacted community members. Most impacted are those individual and groups that we see experience the highest proportion of poor health outcomes, including death, from a climate threat. Disproportionally impacted groups are those that see a greater burden of health impacts from extreme weather despite representing a smaller share of the population.

Disproportionally impacted communities are also often those who are already experiencing health disparities because of historic inequities in our institutions, systems, and environments such as energy systems, housing quality, economic opportunities, neighborhood development, economic stability, and transportation options. Multiple social or structural vulnerabilities can also overlap, leading to compounding health effects and underscoring the need to consider intersectionality when advancing health equity in climate resilience efforts. Examples relevant to Clackamas County include people with low-incomes, people in occupations where the majority of the workday is spent outside such as farm laborers or construction workers, people living in substandard housing or who are houseless, or people living in neighborhoods with little tree canopy or lots of paved surfaces. By supporting communities who are disproportionately impacted we can reduce health inequities while making progress toward our goal of health and well-being for all communities.

Priority Actions – Exposure and Adaptive Capacity

While there are many aspects that shape vulnerability to climate threats (sensitivity, exposure, and adaptive capacity), this plan uses population data for Clackamas County to understand which community members are most sensitive to climate threats and identifies actions to reduce vulnerabilities related to exposure and strengthen communities' adaptive capacity to respond and recover from climate events and impacts. Therefore, as outlined in *Section 3*, our county-wide climate adaptation strategy focuses on actions that advance, change, or create new policy, systems, and environments that reduce exposure and improve adaptive capacity for our most sensitive community members. See *Section 3*, Climate and Health Adaptation Strategy for more information.

Alignment with other County Departments, Plans, and Priorities

While our work is driven by the 10 Essential Public Health Services and Public Health Modernization, we cannot be successful in adapting to a changing climate without support from other County Departments also working in hazard preparedness, mitigation, recovery, and resiliency. There are a number of efforts happening in Clackamas County that directly and indirectly support climate adaptation that the climate and health team will continue to leverage and strengthen as part of our work.

County Plans that Support Climate and Health Adaptation in Clackamas County

The following County plans offer an opportunity to advance and reinforce climate and health adaptation efforts in Clackamas County.

- **Multi-Jurisdictional Hazard Mitigation Plan** (Disaster Management) - Hazard mitigation planning and plans reduce loss of life and property by minimizing the impact of disasters. It begins with state, tribal and local governments identifying natural disaster risks and vulnerabilities that are common in their area. After identifying these risks, staff develop long-term strategies for protecting people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction.¹⁷
- **Blueprint for a Healthy Clackamas County** (Public Health Division) - The Blueprint for a Healthy Clackamas County is Clackamas County's community health improvement plan. A community health improvement plan (or CHIP) is a long-term, systematic effort to address public health problems based on the results of community health assessment activities and the community health improvement process.
- **Climate Action Plan** (Planning and Sustainability) – The Climate Action Plan determines how the county – both county government and the county as a whole can reach carbon neutrality by 2050.

¹⁷ FEMA. Hazard Mitigation Planning. <https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning>. Accessed December 2024

- **Clackamas County Emergency Operations Plan** (Disaster Management) - The Emergency Operations Plan (EOP), updated every 4 years, is a framework that provides guidance for coordinated preparedness, response, and recovery in the county. It sets forth lines of authority and describes procedures for how the county will organize in an emergency, including how departments and agencies will carry out various responsibilities and coordinate activities and resources.
- **Public Health All-Hazards Base Plan** (Office of Public Health Emergency Services) – The All-Hazards Base Plan is the Support Annex 4 – Public Health of the County EOP and it specifies how Clackamas County Public Health will respond to a public health emergency.
- **Disaster Recovery Framework** (Disaster Management) – This Framework serves as a strategic guide for recovery/renewal efforts after various types of disasters. This can include activities like infrastructure repair, housing rehabilitation, economic revitalization, and the provision of psychological support.

See *Section 4, Process and Methodology*, for additional information on how the climate and health team is partnering with other county programs, departments, and divisions to achieve our adaptation strategy.

Section 3. Climate and Health Adaptation Strategy

This is a 3-5 year plan for Clackamas County Public Health Division's climate and health program team to implement with support from internal county and external community partners. While the plan was published in June 2025, work on the draft strategy began in June 2024 and will continue through June 2029 if not completed before that date.

The following components are key to achieving the actions outlined in this plan. Together they create a strategy for climate adaptation in Clackamas County with a focus on protecting and empowering our most vulnerable community members. This strategy focuses on actions that are achievable within the 1–5-year timeframe required by the Oregon Health Authority. Below is a summary of how data and surveillance, partnerships, communications, capacity building, community engagement, and policy, systems, and environmental change adaptation actions support each other and form an adaptation strategy for Clackamas County. Specific actions are outlined in *Table 1*. Climate and Health Adaptation Actions are organized by hazard type.

Data and Surveillance

Our CCPHD data staff monitor, track, and collect climate-related health indicators as well as exposure data in the environment, such as temperature and air quality. This data and information help us understand who is most affected by extreme weather and the exposures that contribute to those impacts. A major part of this work is collaborating with our Tri-County Local Public Health Authority (LPHA) partners¹⁸ to develop a bi-annual Regional Climate and Health Monitoring Report (RCHMR). The RCHMR has, and will continue to, inform our climate adaptation actions and overall strategy. Additionally, knowing where we have gaps or unknowns in our data informs future actions we can take to have more complete and robust data that supports this work.

Partnerships

Prioritizing relationships with internal and external partners is a core value of CCPHD and essential to the implementation of this plan. Key partner entities are identified in each action listed in *Table 1. Climate and Health Adaptation Actions*. Additionally, during plan implementation, the climate and health team will continue to support internal and external partnerships on the topic of climate adaptation in the following ways:

- Support CCPHD's efforts to build, strengthen, and maintain our **partnership and engagement capacity** as an agency.
- Support the **Clackamas County Resiliency Collaborative** which is a county-wide collaborative comprised of organizational partners, community leaders, and agency staff that convene to share information and resources that uplift and advance resiliency in Clackamas County.

¹⁸ Washington County Public Health and Multnomah County Public Health Department

- Continue to **partner and collaborate with our regional public health partners**, Multnomah and Washington County LPHAs to conduct surveillance and data projects, share information and resources, collaborate on strategies, and apply for funding opportunities.
- **Collaborate with other CCPHD programs, county departments, and regional agencies** that have the authority and ability to make changes in policy, our physical environment, and systems that also help communities adapt to a changing climate.

Communications

Communications is an important way to share accurate information with the community about how to protect themselves as well as build support for sustainable changes to policy, systems, and our environments. The climate and health team will partner with County programs, departments and staff already conducting communications related to extreme weather events and emergency preparedness to ensure communications is informed and supports vulnerable groups while also building support for actions listed in *Table 1* below. Climate and health staff will prioritize communications efforts that develop messages that are linguistically and culturally appropriate for the communities most vulnerable. Specifically, staff will collaborate with the following departments/programs and CCPHD's Public and Government Affairs (PGA) to develop and disseminate climate and health communications:

- CCPHD's Office of Public Health Emergency Services (OPHES)
- Clackamas County Disaster Management (DM)
- Human Services program in Health Housing and Human Services Department

Community Engagement

Community engagement is foundational to integrating health equity into our work and creating lasting change in our communities. In developing this plan, CCPHD's climate and health team utilized existing qualitative data collected from the community as part of other engagement efforts to inform the adaptation strategy and will continue to engage with community in the following ways over the course of implementing this plan in the following ways:

- **Use of existing qualitative data to inform the adaptation strategy** – See *Section 4. Process and Methodology*
- **Activity-specific engagement during plan implementation** – Many of the actions listed in *Table 1* include changes to policies, systems, and the built environment. These types of interventions typically include a community engagement process as a component of the project or involve individuals impacted by that change or project. The climate and health team is positioned for, and dedicated to, ensuring equitable engagement is appropriately incorporated the activities listed in *Table 1*. This may include influencing engagement efforts by other Departments, connecting with County staff working directly with impacted community members, and/or conducting project specific engagement for the listed activity. See *Table 1. Climate and Health Adaptation Actions* for additional information.

- **CCPHD 2025 Community Health Improvement Plan (CHIP)** - The climate and health team will integrate and support community outreach and engagement as part of the updated County CHIP and include climate and health into that engagement process.

Internal Capacity Building

Building the capacity of staff and internal county partners is foundational to our climate and health work and implementation of this plan. Climate and health staff participate in training, skill building, relationship building, and other educational opportunities on a monthly basis. Staff coordinate and collaborate with climate adaptation staff at other Local Public Health Departments and participate in Oregon Health Authority's Community of Practice. Additionally, opportunities to share information and build capacity across CCPHD, County departments, and with community partners is accomplished in the following ways:

- Co-hosting the Resiliency Collaborative, a forum for sharing information, data, and resources related to climate and health.
- Sharing data and resources through departmental and group presentations and one-on-one conversations.¹⁹
- Support incorporating data and best practices into plans, programs, or policies.
- Co-applying for grants or funding opportunities.

Policy, System, and Environmental Change

Policy, systems, and environmental (PSE) interventions are at the core of this strategy and work with other preparedness, mitigation, and sustainability efforts across Clackamas County to address impacts from climate change in a comprehensive way. PSE change approaches go beyond programming and into the policies and systems that shape and create the structures and places in which we work, live, and play. PSE interventions focus on entire groups or populations verses one or two individuals, changes are typically more sustainable, and these approaches often work hand-in-hand with each other. For example, an environmental intervention may be furthered by a policy or system change. For more information on PSE strategies, refer to Terms listed in *Section 1*.

The actions listed in *Table 1* were developed based on what research and best practices advised would support climate adaptation as well as a feasibility assessment to know what was possible within the constraints of the CCPHD. Therefore, many of the actions identified in *Table 1* leverage work and opportunities within other County departments or have been left open and flexible to seize opportunities that may arise with community organizations. It is through making these sustainable changes that we create more resilient communities able to withstand and recover from climate-related hazards.

¹⁹ Two examples of data sharing with partners include sharing results from the Jurisdictional Heat Map project (2023) and the Regional Public Health and the Regional Climate and Health Monitoring Report (2023).

Evaluation

CCPHD climate and health staff will conduct a process evaluation at year two of implementation (June 2026) and year four (June 2028) to understand if we are doing what we said we would do, and if not, make changes or redirect in order to accomplish actions necessary to support our most vulnerable communities. We will use primarily the Deliverables column in *Table 1* to track progress and other evaluation tools to track and assess challenges, factors of success, and organizational change.

Table 1. Climate and Health Adaptation Actions

Specific adaptation actions outlined below are organized by climate hazard. The table lists climate health impacts by health risk or indicator, identifies the vulnerable population(s) that have been prioritized, agency and community partners needed to be successful, as well as deliverables and areas of further community engagement. The first 11 actions and last two support all climate hazards, while air quality, extreme heat, winter weather, and water security each have hazard-specific interventions/actions. Also note that some actions may be repeated in other hazard categories because the intervention will reduce harm, or build community resiliency, in one or more hazard area.

| Climate Hazard | Health Risks (health indicators) | Communities of Focus ^A | Clackamas County Adaptation Actions (2024-2029) | Partners needed to accomplish strategy ^B | Deliverable(s) | Feasibility ^C |
|---------------------|----------------------------------|-----------------------------------|---|---|--|--------------------------|
| All Climate Hazards | N/A | N/A | (1) Data: Conduct ongoing surveillance of climate and health indicators. | CCPHD Data Team; WCPH, MCPHD | Regional Climate and Health Monitoring Report (bi-annual) | High |
| | N/A | N/A | (2) Data: Identify mental health indicators to better track and monitor changes to mental health from climate impacts. | OHA, PHAB, CCPHD Data Team; WCPH, MCPHD | New primary or secondary data source for mental health and climate | High |
| | N/A | N/A | (3) Partnerships: Establish and host on-going Resiliency Collaborative made up of government staff, community partners and advocates. | County Departments, Agency partners, community partners | Committee meetings Actions taken by Resiliency Collaborative to secure funding or advance policy/system change. | High |
| | N/A | N/A | (4) Communications: Collaborate with agency and community partners to deliver climate and health messages. | PGA, OPHEs, HHS, DM, and CBOs | Published County communications related to climate and health | High |
| | | | (5) Communications: Create seasonal hazard/ preparedness report and share publicly through communication channels and with community partners. | | Translation of messaging Seasonal reports published | |
| | | | (6) Communications: Distribute/share climate and health data and information with county departments and community partners. | | Presentations of climate and health information to entities outside CCPHD | |
| | N/A | N/A | (7) Policy: Integrate climate and health information into other plans, strategies and policy efforts. | County Departments, community partners | Number plans or policies that integrated climate and health information | High |
| | N/A | N/A | (8) Community Engagement: Integrate climate and health elements into 2025 CHIP process with community. | CCPHD staff | Updated CHIP | High |

| Climate Hazard | Health Risks (health indicators) | Communities of Focus ^A | Clackamas County Adaptation Actions (2024-2029) | Partners needed to accomplish strategy ^B | Deliverable(s) | Feasibility ^C |
|--|---|--|---|--|--|--------------------------|
| All Climate Hazards <i>Continued</i> | N/A | N/A | (9) Capacity Building: Internal capacity building through lunch and learns/webinars/presentations etc. | CCPHD Data Team | CCPHD learning opportunities offered | High |
| | | | (10) Capacity Building: Identify resources to support/fund community resiliency projects and programming. | DM, CCPHD Data Team, NCPRD, H3S WCPH, MCPHD | CCPHD learning opportunities offered | Medium |
| | | | (11) Capacity Building: Evaluate progress | CCPHD Data Team | Process evaluation OHA reporting | High |
| Poor Air Quality from Wildfire smoke | Respiratory diseases Cardiovascular diseases Cancer Injuries, displacement Toxic exposures Mental health effects | People with pre-existing conditions Children, pregnant women Older adults Rural communities | (12) Data: Develop plan to increase air quality monitoring sensors throughout Clackamas County. | DTD, DEQ, OPHEs | Clackamas County Air Quality Sensor Plan (new) | High |
| | | | (13) P/S/E -System: Identify and make needed system improvements to increase access to climate support devices (e.g. air purifiers). | CCOs, H3S, community partners, OHA, MCPHD, WCPH | Resources FAQ | Medium |
| | | | (14) P/S/E -System: Support the creation of resiliency hubs/support network. | DM, community partners | Trainings | Low |
| | | | (15) P/S/E – Environment: Encourage/ support strategies in the environment that reduce pollution/ GHG emissions with a focus on places where vulnerable communities live. | DTD, county, state and regional government partners, community partners, utilities | Any action that advances this effort (plan created, grant application, funding, etc.) | Medium |
| | | | (16) P/S/E – Policy: Promote clean forms of transportation (transit, walking, biking) and use of green energy to reduce GHG emissions through long-range planning processes and other efforts. | DTD, community partners, BCC | Green infrastructure or smart surface funding, project, or effort achieved long-range plans, policies that incorporate active transportation | Medium |
| | | | | | | |

| Climate Hazard | Health Risks (health indicators) | Communities of Focus ^A | Clackamas County Adaptation Actions (2024-2029) | Partners needed to accomplish strategy ^B | Deliverable(s) | Feasibility ^C |
|-------------------------------|---|--|--|---|---|--------------------------|
| Extreme Heat | Heat-related illness Heat-related death Violence | People with pre-existing conditions | (17) P/S/E - System: Increase access to portable or permanent cooling equipment (e.g. ductless heat pumps, portable AC units) to properly cool the living space of people disproportionately impacted by heat-related illness or death. | H3S, DTD, CCPHD | System improvement made/ additional funding awarded/ additional units installed | Medium |
| | | People without air conditioning or housing | (18) P/S/E - Policy: Promote code and standards updates that support passive cooling such as cool roofs, deciduous shade, and shade structures. | DTD | Policy, project, contract/MOU | Low |
| | | People living in urban heat islands | (19) P/S/E - System: Support the creation of resiliency hubs/support network. | DM, community partners | Resiliency hubs are available areas of need across Clackamas County | Low |
| | | Children, pregnant women Veterans Low-income communities Communities of color | (20) P/S/E - Built Environment: Increase tree canopy in heat island through policy, plan, or project. | DTD, NCPRD, State and Regional government partners, community partners, utilities | Green infrastructure or smart surface funding, project, or effort achieved | Medium |
| Extreme Winter Weather | Injuries Toxic exposures Displacement Disruptions in medical care Mental health effects | Socially isolated adults Older adults Rural communities | (21) Data: Identify and add additional health indicators to Climate Dashboard for severe weather (Specifically injuries/slips and falls + carbon monoxide poisoning) | CCPHD Data Team | New data source or indicator added to climate dashboard | High |
| | | | (22) P/S/E - System: Identify and make needed system improvements to increase access to climate support devices (e.g. portable power units and heat devices). | H3S, DTD, CCPHD | System improvement made/ additional funding awarded/ additional units installed | Medium |
| | | | (23) Policy/Capacity building: Implement 1-2 recommendations identified in the 2024 Regional Public Health and Climate Hazards Coordination Assessment with Tri-County Partners | WCPH, MCPHD, CCOs | Action taken on recommendation(s) | Medium |

| Climate Hazard | Health Risks (health indicators) | Communities of Focus ^A | Clackamas County Adaptation Actions (2024-2029) | Partners needed to accomplish strategy ^B | Deliverable(s) | Feasibility ^C |
|-------------------------|---|--|---|---|----------------|--------------------------|
| Water Security/ Quality | Illness from contaminants, vectors, and diseases of concern | Rural communities | (24) Data: Monitor health indicators. | OHA, CCPHD Data Team, CCPHD Environmental Health Team | N/A | High |
| | | Individuals with pre-existing conditions | (25) Capacity Building: Collaborate with Environmental Health staff and OHA to learn more about water security and safety priorities. | OHA, CCPHD Environmental Health Team | N/A | High |
| | | Older adults and children | (26) Communications: Work with other department to strengthen coordination and communications of do not use orders due to cyanotoxins. | OHA, CCPHD | Updated CHIP | High |
| N/A | N/A | N/A | (27) Evaluation: Design and complete a process evaluation of Climate and health Adaptation Plan by June 2029 | CCPHD | N/A | High |
| | | | (28) Share success and lessons learned through presentation opportunities and communication outlets to county staff, CBOs and other county partners. | CCPHD, WCHP, MCPHD, OHA | N/A | High |

^A The Communities of Focus column does not list all vulnerable or disproportionately impacted groups indicated in the data, only those groups CCPHD has focused on and created adaptation actions for due to feasibility and program capacity at this time.

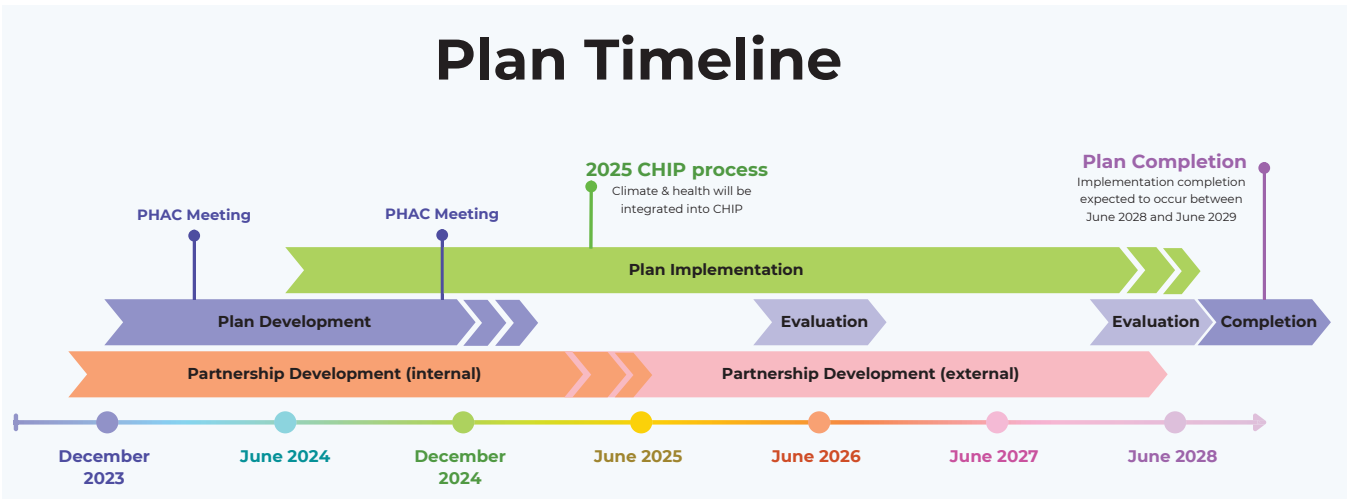
^B The Partners column uses agency acronyms for brevity, acronyms are spelled out here: Clackamas County Public Health Division (CCPHD), Clackamas County Department of Transportation and Development (DTD), Clackamas County Disaster Management (DM); Clackamas County Health and Human Services (HHS); Clackamas County Health, Housing and Human Services (H3S), Clackamas County Public and Government Affairs (PGA); Clackamas County Water Environment Services (WES); Clackamas County Office of Public Health Emergency Services (OPHES); Washington County Public Health (WCPH); Multnomah County Public Health Department (MCPHD) Department of Environmental Quality (DEQ), North Clackamas Parks and Recreation District (NCPRD), Coordinated Care Organizations (CCOs), Community Based Organizations (CBOs), Oregon Health Authority (OHA), Clackamas County Public Health Advisory Board (PHAB).

^C Feasibility is assessed as: high feasibility or very likely to happen within plan timeframe; medium feasibility, or low feasibility which means due to lack of authority, high uncertainty, prioritization or significant financial resources needed the certainty it will be accomplished in the timeframe is low. CCPHD attempted to only list actions that were achievable within the timeframe, however, this is a comparison between actions to help the reader understand which are more likely to occur over others.

Section 4. Process and Methodology

Clackamas County Public Health Division (CCPHD)'s climate and health team started the process of developing this plan in January 2024. The steps listed below, which are in alignment with the updated 2025 BRACE elements, were conducted over an 18-month period to allow time to orient new staff to the County, explore internal and external partnerships, review and analyze available and new data, and develop feasible actions outlined in *Section 3*. Additionally, the process was not linear, with staff often circling back when new information or opportunities arose and as well as taking advantage of current opportunities such as grant applications to fund adaptation work, project opportunities, and partnership development. Therefore, while the publication date is June 2025, the implementation period of this plan is approximately June 2024 - June 2029.

Figure 6. Climate and Health Adaptation Plan Timeline



Step 1. Listen and Assess

As a starting point, CCPHD's climate and health staff talked with internal and external partners with a connection to community and reviewed relevant community surveys, focus groups, and other community data related to climate and health to understand community priorities and needs. Additionally, staff reviewed existing quantitative data sources to understand health impacts and who was most vulnerable to extreme weather in Clackamas County. These information sources were a key driver of the selected adaptation actions.

Quantitative Data Review and Analysis

The data sources we reviewed include:

- OHA Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)
- OHA Oregon Public Health Epidemiologist User System (ORPHEUS)
- OHA Vital Statistics and Death Certificates

- OHA Public Health Division reportable disease data
- Oregon inpatient hospital discharge data

Qualitative Data Review and Analysis

CCPHD did not have the capacity and resources to conduct a separate robust community engagement process as part of the development of this plan. However, CCPHD programs, other departments, divisions, and community partners have, and continue to, conduct engagement with community on resiliency plans and programs that inform our adaptation work. We wanted to both honor the feedback we'd already received from the community and not over-burden our partners knowing we would soon return to engage with the community again for the Community Health Improvement Plan 2025 Update which will also include climate and health priorities. The following existing qualitative data informed our strategy.

(1) NW Family Services Survey of Latine Community (Northwest Family Services)

The NW Family Services survey identified key climate-related health and safety risks affecting county residents, particularly those with limited financial and housing stability. During the summer, most participants reported not having air conditioning and limited knowledge of low-cost cooling strategies, such as opening windows at night or using blackout curtains and shade structures. Barriers to using nighttime ventilation, such as safety concerns, were suggested. Many respondents did not recognize their risk for heat-related illness and had a low perceived vulnerability, highlighting the need for targeted education about conditions that increase risk, warning signs, and prevention strategies. In winter, most households relied on electric space heaters and reported difficulty paying energy bills. Many also lacked basic emergency supplies like ice scrapers, backup power options, or materials to prevent frozen pipes. Participants voiced that access to public warming and cooling shelters was limited due to awareness and location barriers.

Based on these findings, recommendations from the survey include: helping residents with energy costs, increasing access to weatherization services, providing public education on seasonal hazards, and offering direct material support to improve household preparedness.

(2) Community Health Needs Assessment (CHNA) Rural Focus Groups (CCPHD Center for Population Health)

Climate-related concerns raised in the CHNA focus groups point to gaps in emergency preparedness and health equity. Participants emphasized the need for more education on carbon monoxide (CO) poisoning, referencing a near-miss exposure event in the Hoodland area. Some residents reported accessing CO detectors, fire alarms, or air purifiers through Medicaid, but awareness of these benefits remains low. Additional concerns included the lack of air conditioning in schools, the widespread dependence on electricity for heating, and the inaccessibility of warming and cooling shelters due to limited information or challenging location options. Some residents also expressed concern about the reliability of local water systems during emergencies. These findings support the need for expanded outreach on seasonal

hazards and illness prevention, assistance accessing information and materials that can be obtained through Medicaid or other governmental programs, and improved access to shelters and resilient infrastructure in climate-sensitive communities.

(3) Hazard Mitigation Plan Update and the Wildfire Protection Plan -Community Survey Results (Disaster Management)

Disaster Management planning team released a survey for community members who live in Clackamas County. The survey remained open for five (5) weeks from May 22 through June 23, 2023. In total, 2,544 survey responses were received.²⁰ Respondents were asked about which hazards they were most concerned about (rated a 5 on the score), with respondents reporting that they were most concerned about Wildfire (35%) and Extreme Heat (29%). Approximately one-third of respondents indicated they were highly concerned (rated a 4 on the scale) about Winter Storms (32%), Windstorms (31%), and Earthquakes (29%).

Additionally, the survey sought to understand how and where community members remain engaged in their communities to assess community resilience and determine how much community connectivity exists within a community. Survey respondents indicated that they are quite engaged and active in their community. Almost two-fifths of respondents (41%) stated that they make donations that benefit their community, including donating to food drives, blood donations, and more. Respondents also are very sociable within their neighborhood, with 41% of respondents indicating they socialize with their neighbors. Almost one-third of respondents (31%) noted that they engage in local politics in some way, either through voting, supporting local campaigns, running for office, and more. Beyond the provided option, respondents also are involved in their community's CERT program, are members of their community/neighborhood organizations, follow community social media pages, and read local newspapers and newsletters.

Climate and health staff will continue to listen to community needs and priorities through project-specific adaptation actions throughout implementation.

Step 2. Utilize Partnerships

CCPHD's climate and health staff spent time during the first six months of the development of this plan connecting with internal county departments to understand and leverage work happening across the county that supported climate adaptation.

This plan includes sharing data, information, and best practices with planners, engineers, and policy makers, encouraging and advising on inclusive and equitable engagement and decision-making processes, influencing prioritization criteria and supporting projects that advance adaptation strategies. Specifically, given the nature of their work, the following county departments, programs, and plans are integral partners that will support adaptation and resiliency in Clackamas County.

²⁰ Survey respondents were largely from the Northwest region of the county (34%), including areas such as Lake Oswego, Stafford, and West Linn. The other survey respondents were more evenly balanced across the other regions, with the least responses coming from the West region of the county (5%), including areas such as Canby and Wilsonville. Furthermore, survey respondents were overwhelmingly white (90%), primarily female (50%), and were ages 30-49 (36%). The annual household income of respondents was more evenly balanced, with the greatest number of respondents earning between \$30,000-\$44,999 (19%).

Table 2. County Partners that Support Climate Adaptation in Clackamas County

| County Department/ Program | Area(s) of Work which Support CCPHD Climate and Health Priorities | Examples of Plans/Programs |
|--|--|--|
| CCPHD, Office of Public Health Emergency Services (OPHES) | Preparedness, Response, Recovery—education, communications, outreach | Emergency Response Plans All Climate Hazard Plan |
| H3S – Social Services | Preparedness and response, cooling shelters, energy assistance, developmental disabilities, transportation services, veterans services, housing support, aging and disability resource connection | Regional Food System Emergency Preparedness Plan Emergency Evacuation Plan Emergency cooling and warming shelters |
| H3S – Housing Services | Weatherization and community preservation programs that address indoor environment, supportive housing services, Housing Authority | Programs: Weatherization, Critical home repair, Housing rehabilitation loans, Home access grant, Utility support, and In-home energy services. |
| Disaster Management (DM) | Resiliency and recovery | Recovery Framework |
| | Mitigation all hazards planning, preparedness and response | Multi-Jurisdictional Hazard Mitigation Plan Response and Recovery Plans |
| Department of Transportation and Development (DTD) | Authority and ability to create safe walkable communities, travel options, transit, green infrastructure, zoning and housing policy | Walk Bike Plan Transportation System Plan Climate Friendly and Equitable Communities (state rules) |
| North Clackamas Parks and Rec (NCPRD) | Manage parks, trails and recreational facilities, green infrastructure, community resiliency as it relates to parks and recreation | Manage and expand green space and tree canopy Resiliency Hubs NCPRD System Plan |
| Water Environment Services (WES) | Stormwater management, watershed health | Low Impact Development (LID) and Green Infrastructure (GI) for stormwater facilities |
| Board of County Commissioners (BCC) and County Administration | BCC is charged with taking action in the best interest of the county and its constituents. They set county policies, establish departmental budgets, and therefore, are essential partners in this work. | County policies, budgets, approve county contracts |

Climate and health staff are also working with the CCPHD’s Equity and Partnership Team and leveraging other opportunities to identify and work with community partners serving communities disproportionately impacted by climate hazards. This work will be accomplished primarily through the 2025 CHIP update process and where opportunities arise on a project-by-project basis.

Step 3. Investigate Options

CCPHD climate and health staff spent time reviewing and investigating existing literature, plans, and promising practices to identify actions that are effective, feasible within the timeframe and our capacity, focus specifically on adaptation, and center vulnerable communities in Clackamas County we can reach. Additionally, staff consulted with colleagues internally and across other Oregon LPHAs for advice, insight, and promising practices related to climate and health

adaptation. The following federal, state, regional, and local organizational resources were key in informing our climate adaptation strategy:

Review of Federal, State, and Regional Resources and Plans

Federal Agencies, Organizations, and Resources

A number of federal agencies such as World Health Organization, Centers for Disease Control and Prevention, Environmental Protection Agency, and non-profit organizations like the American Public Health Association, Smart Surfaces Coalition, and American Planning Association are concerned about climate impacts on health and wellbeing. Key resources utilized to investigate adaptation actions include, but are not limited to the following:

- **NACCHO's Climate Change Page**, Resources to ensure local health departments are equipped to take on this role, while elevating best practices and success stories at the local level.
- **Oregon Cooling Needs Study (2021)**, Oregon Department of Energy
- **CDC's Building Resilience Against Climate Effects (BRACE) Framework**, Centers for Disease Control and Prevention
- **National Center for Environmental Health, Climate and health Intervention Assessment**, Centers for Disease Control and Prevention
- **Climate Change and Health Toolkit for Health Professionals**, World Health Organization
- **Climate Change, Health and Equity: A guide for local health departments**, American Public Health Association

State Agencies and Resources

State agencies such as Oregon Health Authority, Oregon Emergency Management, Department of Land Conservation and Development, Department of Environmental Quality, and the Oregon Department of Energy offer resources and plans that align with the purpose of this plan. Below are a key state resources reviewed in the process of developing our strategy for climate adaptation.

- **Public Health Modernization Manual (2017)**, Oregon Health Authority
- **Public Health Summary: Oregon Climate Change Adaptation Framework (2021)**, Oregon Health Authority
- **Oregon Climate Assessment Report (2023)**, The Oregon Climate Change Research Institute (OCCRI)
- **Oregon Wildfire Response Protocol for Severe Smoke Episodes (2024)**, Oregon Department of Environmental Quality, OHA, and other state agencies

Regional Organizations and Local Universities

Regional agencies like Metro and organizations like Oregon Environmental Council are working to mitigate, adapt, and reduce impacts from a changing climate and offer resources, best practices, and information that inform our work. Additionally, Oregon State University and University of Oregon both have programs dedicated to climate and hazard research and support.

Review of County Departments, Reports, and Plans

There are a number of County Departments doing work related to climate and health, preparedness, and resiliency. Knowing the local landscape and what we can leverage and build on allows CCPHD to develop actions and strategies that are realistic and achievable. Climate and health program staff met with staff from all departments to understand work related to climate and health and conducted a review of relevant county reports and plans related to climate, preparedness, and resiliency to understand areas of opportunity, collaboration, alignment, and need.

- **National Hazard Mitigation Plan** (Disaster Management)
- **Blueprint for a Healthy Clackamas County** (Public Health Division)
- **Climate Action Plan** (Planning and Sustainability)
- **Planning and Zoning rules** (Department of Transportation and Development)
- **Transportation System Plan** (Department of Transportation and Development)
- **Walk Bike Clackamas Plan** (Department of Transportation and Development)
- **Clackamas County Emergency Operations Plan** (Disaster Management)
- **Tri County Jurisdictional Scan and Heat Map** (Washington, Multnomah and Clackamas County Public Health Departments)
- **Regional Public Health and Climate Hazards Coordination Assessment** (Washington, Multnomah and Clackamas County Public Health Departments)

Step 4. Prioritize and Plan

Utilizing information from steps 1-3, as well as a gained understanding of county systems and opportunities for change, draft actions were identified for feasibility and analysis.

Equity and Feasibility Assessment

Selecting climate and health adaptation actions required a careful assessment of their overall feasibility, which encompasses multiple interconnected factors. First, as outlined in *Section 1*, health equity was at the core of this plan and our desired activities, therefore, we uplifted actions that would support populations disproportionately impacted by climate change. Because this plan focuses on policy, systems, and environmental change strategies, authority to act, or who has the legal or institutional mandate to implement actions, was a factor in our selection and assessment of feasibility as it can either streamline or complicate the process. Cost is a primary consideration, as limited financial resources can constrain the scope and scale of potential actions. Time is

critical, with some actions (e.g. policy) requiring long-term investment and planning, while others can deliver more rapid results to address urgent needs (e.g. tree planting in a heat island). Government commitment can also influence the success of adaptation initiatives, as clear direction and coordinated efforts are often needed to implement complex changes. Lastly, effective partnerships—across government levels, sectors, and communities—are essential for pooling resources, building consensus, and ensuring that adaptation measures are context-appropriate and equitably delivered. Together, these aspects shape whether proposed adaptation actions are realistically achievable in the 3-5 year implementation period and how they were ranked in *Table 1*.

Clackamas County Public Health Advisory Council

The plan was reviewed and supported by Clackamas County Public Health Advisory Council (PHAC) which provides community voice for public health programs, strategies and goals. The PHAC links to community input for the implementation of the Community Health Improvement Plan and assures alignment with standards addressing community partnerships. This plan was presented and reviewed with the PHAC in April 2024 and again when the actions were identified in December 2024.

Step 5. Take Action

The implementation period for this plan is June 2024-June 2029. It is likely this plan will be revisited at the 2-year and 4-year mark to assess for feasibility and addition of new opportunities. It is likely external and internal factors will arise that either limit the feasibility of actions outlined in this plan or additional actions not listed in the plan will become available and be added.

Step 6. Evaluate

To evaluate the progress and effectiveness of our climate and health adaptation strategy over a 3-5 year period, staff will conduct a process evaluation before June 2029, with a focus on understanding – *did we do what we said we'd do* as well as understanding *barriers and supportive factors* in implementing the plan's actions successfully. Staff will develop process measures based on the deliverables from *Table 1* above to understand progress made to improve community resiliency through climate adaptation actions.

Additionally, staff will reflect on the longer terms impacts these actions are having within the county to improve resiliency, reduce vulnerability, and improve health as it related to the health indicators in the RCHMR. We will conduct a summary on both the process measures and overall reflections to better understand outcomes and impact, comparing against baseline data. The evaluation findings will support continuous improvement and ensure that implementation remains aligned with our climate and health priorities.