# 2017 Oregon Public Health Hazard Vulnerability Assessment Summary

Oregon Health Authority

PUBLIC HEALTH DIVISION

# Contents

# Introduction

Natural and human-caused hazards affect individuals, communities, health care facilities and public health systems. In Oregon, potential hazards include winter storms, heat waves, earthquakes, tsunamis, emerging infections, pandemics and bioterrorism. Public health agencies and communities should be prepared to respond to and recover from these hazards. Hazard vulnerability assessments (HVAs) can inform public health emergency preparedness planning. HVAs help communities recognize relevant hazards and take steps to deal with them. This helps lessen the impact on the community when a public health emergency unfolds.

# Background: Public health HVAs in Oregon

Oregon conducted its first public health hazard vulnerability assessment (PH-HVA) in collaboration with state and local health departments in 2008. A technical review and hazard map were used to quantify the risk of key hazards to health systems and the public.

In 2012 the Oregon Public Health Division, Oregon Office of Emergency Management, Oregon Partnership for Disaster Resilience and local health preparedness partners collaborated to conduct another PH-HVA. Local public health departments used hazard and threat priorities identified by emergency managers to evaluate health indicators, hazard illness and injury data, and capabilities of individual health systems to respond to specific hazards.

The assessment used the Office of Emergency Management's standard reporting tool and a supplemental spreadsheet with relevant public health measures for data collection. The result was Oregon's first assessment of hazard probability that included likely consequences to the public health system and local planning priorities.

For the 2016–2017 PH-HVA, Oregon Public Health and local public health preparedness coordinators revisited the 2012 assessment to ensure that local health planning reflected local emergency management prioritization. Each local health department received a copy of its jurisdiction's 2012 responses. Public Health Emergency Preparedness (PHEP) coordinators connected with their local emergency managers and updated probability rankings of hazards, based on recent local assessments. Jurisdictions and PHEP coordinators were able to add any important public health hazards omitted in the original 2012 submission.

# Methods

## Data collection

Each PHEP coordinator received a checklist and PH-HVA tool in October 2016 (see Appendix). PHEP coordinators worked with state public health preparedness liaisons to complete the assessments, all of which were finished by the end of March 2017. Steps included:

- Review of 2012 results and the full list of potential hazards in the PH-HVA tool
- Conferring with the local emergency manager to review and discuss the most recent local emergency management HVA
- Review of the PH-HVA worksheet and documentation of any changes
  - Addition of any newly identified hazards
  - Subtraction of any previously listed hazard no longer felt to be relevant and
  - Revision of impact rankings for any hazards that gained or lost significance since the prior HVA.

PHEP liaisons were trained on tool purpose and use. They subsequently trained participating jurisdictions in the process and helped with data collection.

## Development

The development of the 2016–2017 PH-HVA was a collaborative process. At a May 2016 Oregon Epidemiologists Meeting breakout session, we reviewed the prior HVA results and discussed possible methodological modifications to refine the 2016–2017 process. A workgroup with state and local public health partners convened in July 2016 to determine appropriate methodology. PHEP liaisons provided feedback during a follow-up meeting in October 2016 to help finalize expectations and instructions.

## Definitions

**Probability of occurrence:** likelihood of future occurrence within a specified period, ranked on a scale of 1 to 10 —

- Low: 1 to 3, one incident likely within 75 to 100 years
- Medium: 4 to 7, one incident likely within 35 to 75 years
- High: 8 to 10, one incident likely within 10 to 35 years.

**Public health consequences:** Average impact on health and safety, response capacity and public health infrastructure, ranked from 1 to 5.

**Public health risk:** Probability x consequences ranked from 1 to 50.

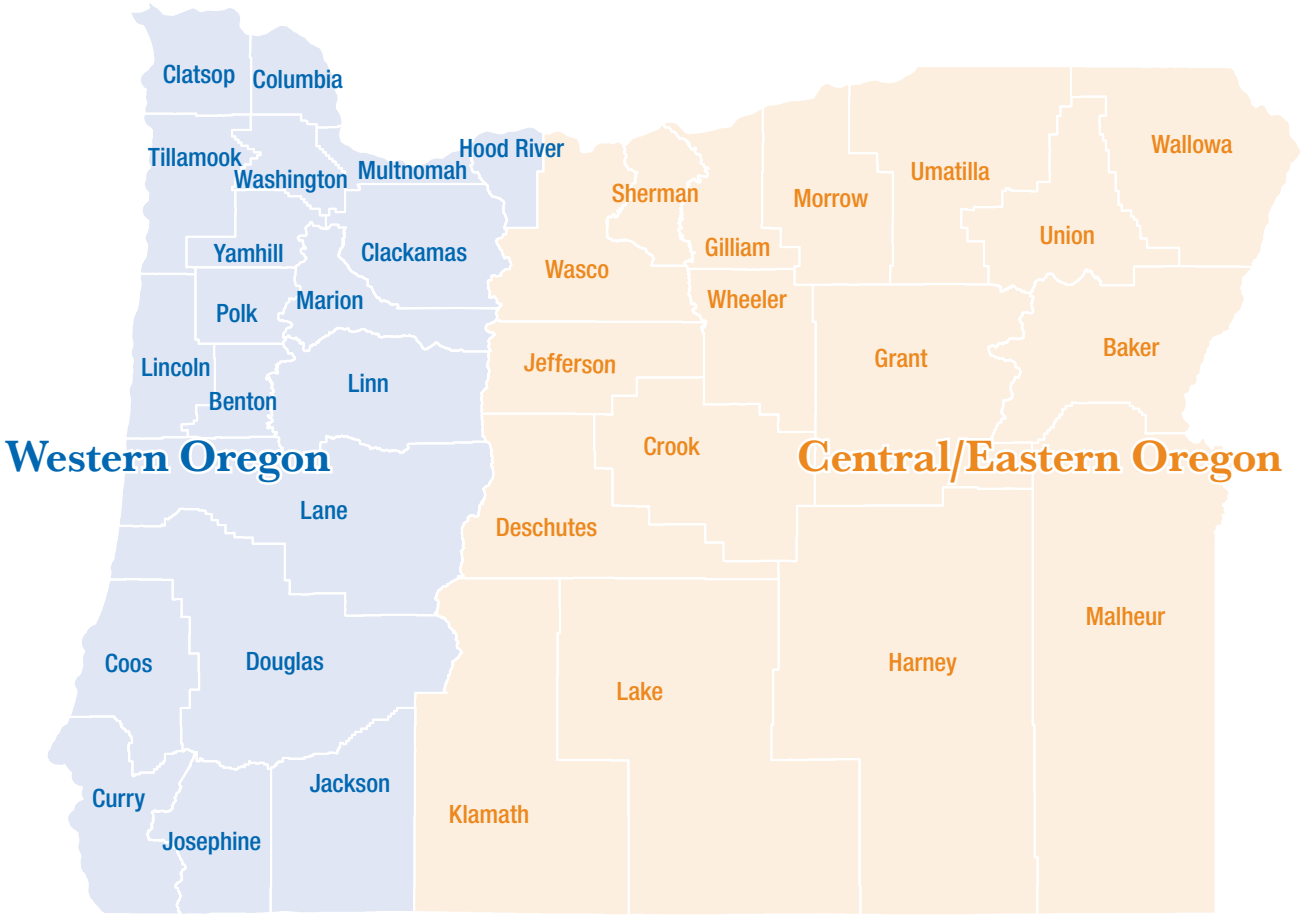
# Analysis and results

## *Data analysis*

For the purposes of the 2016–2017 PH-HVA, responses were analyzed in two regions, due to geographic variation in hazards throughout the state.

**Western Oregon** includes all counties west of the Cascades: Benton, Clackamas, Clatsop, Columbia, Coos, Curry, Douglas, Hood River, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington and Yamhill.

**Central/Eastern Oregon** includes all counties east of the Cascades: Baker, Crook, Deschutes, Gilliam, Grant, Harney, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco and Wheeler.




It is important to note that probability of occurrence was calculated at the county level, and there is variation among counties in the same region. Also of note, the numeric scales for calculating public health risk gives more weight to probability of occurrence (ranked 1 to 10) than public health consequences (ranked 1 to 5).

## *Results*

The probability of occurrence of each of the reported hazards was calculated for the Western Oregon and Central/Eastern Oregon regions. The 10 most probable hazards are shown in Table 1 (below).

Table 1. Top 10 ten probable hazards by region. (1 is the most probable.)

| | Western Oregon | Central/Eastern Oregon |
|---|---|---|
| 1 | Flood — riverine | Winter storm |
| 2 | Winter storm | Wildfire (with urban interface) |
| 3 | Landslide/debris flow | Drought |
| 4 | Wildfire (with urban interface) | Windstorm |
| 5 | Public health emergency | Flood — riverine |
| 6 | Windstorm | Public health emergency |
| 7 | Earthquake — Cascadia (3–5 minutes) | Hazmat release — transportation |
| 8 | Earthquake — crustal (1 minute) | Landslide/debris flow |
| 9 | Hazmat release — transportation | Power failure |
| 10 | Drought | Earthquake — crustal (1 minute) |

The risk to public health infrastructure was also calculated for the two regions. This measurement considers public health consequences in addition to the profitability of occurrence (Table 2).

Table 2. Top 10 hazards posing the largest risk to public health infrastructure, by region. (1 is largest.)

| | Western Oregon | Central/Eastern Oregon |
|---|---|---|
| 1 | Earthquake — Cascadia (3–5 minutes) | Winter storm |
| 2 | Public health emergency | Wildfire (with urban interface) |
| 3 | Flood — riverine | Flood — riverine |
| 4 | Winter storm | Public health emergency |
| 5 | Wildfire (with urban interface) | Drought |
| 6 | Earthquake — crustal (1 minute) | Windstorm |
| 7 | Landslide/debris flow | Hazmat release — transportation |
| 8 | Windstorm | Landslide/debris flow |
| 9 | Hazmat release — transportation | Earthquake — crustal (1 minute) |
| 10 | Hazmat release — fixed facility | Hazmat release — fixed facility |

## *Regionally specific priorities*

Many of the probable and high-consequence hazards were reported in both regions (see "Statewide priorities"). Some of the hazards were given a high rank in only one region. In Western Oregon, pubic health emergency and Cascadia earthquake ranked as the two highest-risk hazards. In Central/Eastern Oregon, drought ranked among the top hazards. These hazards, plus two others with regional distinctions, are described below.

### Public health emergency

Public health emergency (called an "emerging disease" in 2012) ranked high in probability and risk to public health infrastructure in Western Oregon. It was also in the top five risks to public health infrastructure in Central/Eastern Oregon. Although of lower probability in that region, large rural counties could suffer serious impact due to limited response capacity. Public health emergencies can be county-specific. For example, in some jurisdictions, a small outbreak of active tuberculosis would be an emergency, whereas others might classify foodborne or vaccine-preventable disease outbreaks as emergencies. Global public health events, such as a pandemic flu season or viral disease outbreaks, can have significant effects on public health preparedness.

### Cascadia earthquake

A Cascadia subduction zone earthquake was in the top five risks to public health infrastructure in Western Oregon. Although a Cascadia event is not highly likely, effects could be devastating to the public health infrastructure. According to the Oregon Office of Emergency Management, there is widespread complacency due to the rarity of severe earthquakes in Oregon's recent history.

### Drought

Drought is a regionally specific hazard that ranked high in Central and Eastern Oregon as both probable and posing a risk to public health infrastructure. The Cascade Mountains block precipitation from reaching the central and eastern parts of the state. The spatial and temporal distribution of precipitation, coupled with the increasing demand for water in the Western United States due to population increases, pose significant public health challenges.

### Windstorms

Windstorms are a regionally specific hazard ranked as highly probable in Central and Eastern Oregon. Windstorms, most common in the Coast Range, can be very destructive to infrastructure, with serious risks posed by debris and evident impacts extending hundreds of miles from storm epicenters.

### Landslides/debris flow

Landslides ranked as a highly probable, regionally specific hazard in Western Oregon. They are more common in areas with steeper slopes, such as the Coast Range.

## *Statewide priorities*

To determine which hazards might be priorities for state-level planning efforts, we assessed commonalities between hazard probability and risk in both regions. Counties in both Central/Eastern and Western Oregon ranked riverine floods, winter storms and wildfire on the urban interface as three of the five most probable hazards in their jurisdictions (see Table 1 and Table 2). These three hazards also ranked among the top five in the risk they pose to public health infrastructure statewide. These results are consistent with the 2012 PH HVA results.

### Riverine floods

In Western Oregon, flooding typically occurs in the winter with heavy rain or in the spring after quick snowmelt. The northern part of the Oregon Coast is particularly vulnerable; throughout the area, highways are often inaccessible due to high water during flooding events. In Central and Eastern Oregon, in addition to precipitation during warm winters and spring melt-related riverine floods, ice jams and summer thunderstorms can cause flooding.

### Winter storms

Cold temperatures, snow, ice and downed trees are common in Western Oregon. While heavy or prolonged winter storm events are unusual in the Portland metro area, the more mountainous parts of the I-5 corridor can expect annual impacts. In Central and Eastern Oregon, winter storms are more frequent and intense. Residents are usually well prepared for light-to-moderate events, but large storms disrupt travel and strain resources.

### Wildfires

In Western Oregon, wildfires are less common than in the central and eastern parts of the state. Urban areas are somewhat protected by development, but forests in this region are highly productive and susceptible to summer fires. Lightning-sparked fires are more common in Eastern Oregon. Past forestry management practices that suppress natural cycles have left many areas vulnerable to fire.

# Conclusions and recommendations

Tribal and local public health agencies in Oregon need to be prepared to respond to significant risks to public health infrastructure. Hazard priorities vary by county. However, appropriate response to more predictable, cyclical hazards such as wildfires or winter storms helps prepare for less common events, like a public health emergency or a Cascadia earthquake.

Through regular public health preparedness HVAs, public health can interface with local emergency management to prioritize efforts and optimize use of limited resources. It is critical to understand risks to communities, assess available capacity, and develop plans that promote effective use of local- and state-level resources in emergency and disaster response.

In the future, a quantitative approach might improve HVA-type assessments. The following could most accurately inform hazard vulnerability assessments: past event experience, quantitative ratings such as number of poor air quality days, inches of rain and number of days local emergency departments were on diversion, and associated health outcomes from ESSENCE or other quantitative sources. We should also work to fully capture the range of human-caused hazards and incorporate larger environmental and social factors such as climate change, which could dramatically increase threats to Oregon communities.

# Acknowledgments

Thank you to all local health department preparedness coordinators, local emergency managers, and other staff who assessed hazards and risks to your communities. We appreciate the Health Security Preparedness and Response liaisons for facilitating the PH-HVA process and the Office of Emergency Management for their collaborative planning.

The following people and organizations informed the 2012 assessment tool and process:

- The work of Kimberley Shoaf, Dr.P.H., at the University of California, Los Angeles Center for Public Health and Disasters
- The Oregon State Preparedness Report and
- The Building Resilience Against Climate Effects (BRACE) model developed for the Centers for Disease Control and Prevention-funded Climate Change Initiative.

# Appendix

## *2016–17 Oregon Public Health Hazard Vulnerability Assessment (HVA)*

### Purpose

- Assess the impacts natural and man-made hazards could have on the public health system.

### Timeline and Logistics

- Complete the activities below by **March 31, 2017**. Early completion is welcome!
- If you need assistance, please contact your PHEP Liaison.
- When finished, please send materials (updated HVA worksheet and this checklist) to your PHEP Liaison.

## *HVA Activity Check List*

| | |
|---|---|
| ☐ | Review 2012 results and full list of potential hazards in the PH-HVA tool. |
| ☐ | Connect with your local emergency manager* to review and discuss most recent local Emergency Management HVA. Document date of meeting below. |
| ☐ | Update PH-HVA worksheet and document changes below.<br>• Add or subtract any hazards with public health implications for the jurisdiction.<br>• Adjust impact ranking of any hazards that may have gained or lost significance in your jurisdiction. |
| ☐ | Return updated HVA worksheet and this checklist to your PHEP Liaison by March 31, 2017. |

*If you serve as both PHEP coordinator and local emergency manager, you're already done with this step.

### Documentation

Local Public Health Authority:_____

LPHA respondent's name:_____

Local Emergency Manager's Name:_____

Date of HVA Meeting with Local EM:_____

Briefly Describe Updates to HVA Worksheet:

- What hazards, if any, were added or subtracted during this review? Why?
- How were impact rankings adjusted? Why?

## *2016–2017 PH-HVA revision instructions (without attachments)*

The 2012 PH-HVA was based on a model from UCLA that assessed the public health consequences of natural and man-made hazards along with the capacity for public health response. The probability ranking of the hazards came from a Hazard Threat Analysis completed by emergency management around the same time. The spreadsheet being provided contains your jurisdiction's responses to the 2012 PH-HVA.

For the 2016–2017 PH-HVA, you'll connect with your local emergency manager and discuss the emergency management HVA that was recently completed. Also let your emergency manager know about the PH-HVA process we're using this year (briefly updating the PH-HVA tool).

You have an opportunity to review and revise the PH-HVA. If your 2012 submission was missing hazards that are important to your public health agency, you can add those; similarly, you can remove hazards or change the consequences or response capacity scores.

For your reference, the instructions from the 2012 PH-HVA are included. If you are adding a new hazard, or want to re-assess the consequences or response capacity, refer to the appropriate section in the instructions for guidance. The orange and yellow columns (S & T) calculate automatically, so be sure not to type anything in those.

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OHA 6988 (12/17)