From:	Carol McClelland Fields
To:	Benton Public Comment
Subject:	Public Comment to Oppose/Deny LU-24-027 - Coffin Butte Landfill Impacts on Health - Includes SUPPORTING RESOURCES
Date:	Tuesday, July 1, 2025 12:50:47 PM
Attachments:	Testimony - Oppose LU-24-027 - Carol McClelland Fields - Coffin Butte Impacts on Health WITH SUPPORTING RESOURCES - Landfill Impacts KunakAir in separate pdf.pdf

Carol McClelland Fields
37326 Soap Creek Rd
Corvallis, OR 97330

Thank you for accepting my public comment and for all the work you are doing to keep everything organized.

Main document has testimony and 5 Supporting Resources Appended and attached below

Final Supporting Resource in separate pdf in a separate email...too large to submit with testimony. You may be able to download from Google docs...not sure.

6 - Landfill impacts KunakAir.pdf

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Carol McClelland Fields, PhD, BCC
541 243 3675
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To: publiccomment@bentoncountyor.gov

Subject: Oppose/Deny LU-24-027 – Coffin Butte Landfill Impacts on Health

Dear Benton County Planning Commissioners

Submitted by:

Carol McClelland Fields – 37326 Soap Creek Road
Virginia Scott – 37016 Soap Creek Road

Linn, Benton, and Lincoln Counties Regional Health Assessment (Published 03/2023) **does mention** hazardous waste, air and water and solid waste.

But the Regional Health Assessment ***does NOT*** address health impacts of the hazardous outflow from the Coffin Butte Landfill:

- Air pollution in the form of landfill gases
- Water pollution in the form of leachate
- PFAS dispersed through both landfill gases and leachate
- (See also Joel Geier's testimony on arsenic levels in wells by the landfill)

(Regional Health Assessment is embedded in this document #1)

PFAS - per- and polyfluoroalkyl substances that *"are a large group of thousands of synthetic chemicals that share a common characteristic: a strong carbon-fluorine bond, which makes them* ***very resistant to breakdown,"*** **which is why they are called "forever chemicals**." *"This persistence in the environment is a major concern, as PFAS* ***can leach into soil and water sources, contaminating drinking water supplies and entering the food chain."*** (Google definition)

Please refer to the following testimonies for a detailed description of the environmental impacts of PFAS.

- Pam Castle's testimony - Background about why the PFAS in both landfill gas and leachate are such vexing problems. One point to highlight here: **landfills and wastewater treatment plants (WWTPs) both generate airborne PFAS** (an inhalation hazard) that **can move long distances** in addition to **settling locally where they can enter the water cycle and contaminate soil.** The particles are quite small and can be **carried on the wind for longer distances than an odor**

particle is likely to travel.

- Richard Llewellyn's testimony – **Long term impacts of PFAS contamination** through leachate and air emissions from fugitive gases or flares as well as the **liability** associated with expanding the landfill before these impacts are understood and mitigated.

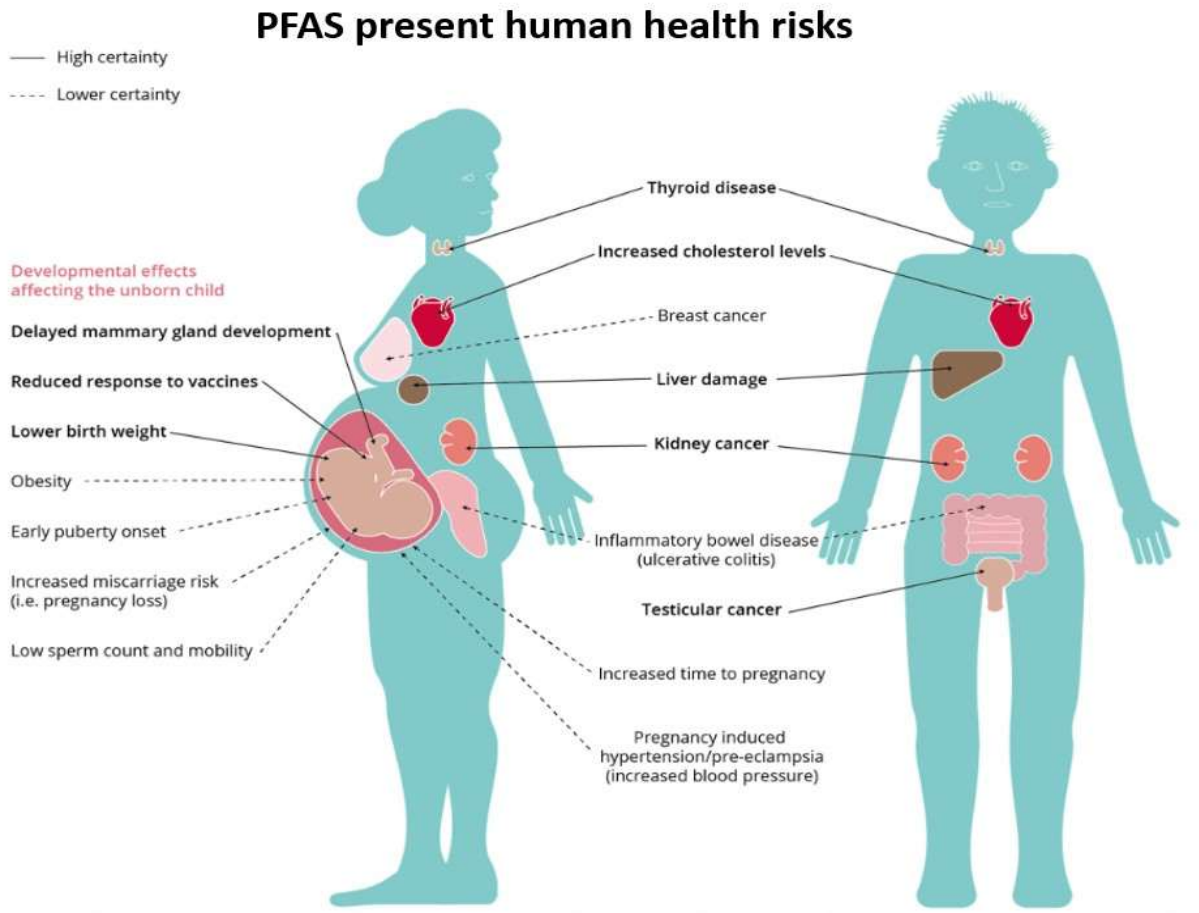

FIGURE 1: Effects of per- and polyfluoroalkyl substances on human health. Used with permission from European Environment Agency (2019). Original sources for this figure: National Toxicology Program (2016), C8 Science Panel (2012), IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2017), Barry et al. (2013), Fenton et al. (2009), and White et al. (2011b).

(slide from Pam Castle's presentation)

Health Impacts in Soap Creek Valley and Other Neighborhoods Surrounding Coffin Butte Landfill

You have likely seen the map of a section of Soap Creek Valley near the Soap Creek Schoolhouse that was created in 2022 by Vicki Idema and re-submitted as written

testimony in 2025. This map shows a 2.5 miles x.75 mile stretch of Soap Creek Road and several other roads in the neighborhood. The section highlighted in this map is 3-5.5 miles from the landfill.

Through a few recent conversations with people who live in close proximity to Coffin Butte Landfill, we discovered:

- **Cancer diagnoses, deaths, and pre-cancers:** bladder, brain, breast, lung, prostate, stomach, throat.
- **Other significant health diagnoses**: asthma, high cholesterol, liver damage, stroke, and thyroid issues.
- **A broader geographic pattern that completely circles the Coffin Butte Landfill**: Trillium area to the west, Military Rd just north of the landfill in Polk County, Adair Village to the east, and to the south the Tampico neighborhood and areas in Soap Creek Valley that extend beyond the 2.5 miles illustrated on the map.

Are these health impacts due to environmental factors associated with Coffin Butte Landfill? **That is the key question!**

High levels of greenhouse gases from Coffin Butte Landfill, primarily carbon dioxide (CO_2) and methane (CH_4) are also exacerbating the health impacts by setting off a cascade of impacts:

> Increased temperatures *(…which increases heat-related deaths)*
> → increases wildfires
> → increases wildfire smoke events
> → increases cardiovascular health impacts, strokes, and respiratory issues **particularly among vulnerable populations like the elderly and those with pre-existing cardiovascular conditions.** Fine particulate matter and other harmful substances in smoke can irritate the lungs, enter the bloodstream, and potentially trigger inflammation and other processes that contribute to stroke development.

Regional Health Assessment reports:

> **Under Environmental Health:** *"The full impact of climate change on the region is complex and interconnected. The effects of climate change in Western Oregon are expected to include heat waves, more precipitation in the winter and less in the summer, decreased snowpacks and increased drought, and* ***increased frequency and intensity of both wildfires and floods****." (Page 17 of report, Page 26 of PDF)*

Under Heat Heading: *"Extreme heat makes many populations, such as those with chronic disease, young children, older adults, and outdoor workers, vulnerable to heat-related illnesses such as* ***heat stroke, fainting, heat exhaustion, and heat cramps.*** *Wildfire smoke, air pollution, and pollen can* ***make respiratory conditions such as asthma worse****." (Page 20 of report, Page 29 of PDF)*

Under Wildfire Heading*: Wildfires affect health in many ways other than air quality. People living near wildlands can be* ***displaced by wildfires, lose their homes or other property,*** *and experience* ***mental and emotional distress****. In the summer, winds often blow north to south along the Oregon Coast"* so Willamette Valley receives smoke from Washington and Oregon wildfires. (Page 18 of report, Page 27 of PDF)

American Heart Association, NIH, and US EPA all concur that **wildfire smoke increases cardiovascular health events**. (I have appended the following articles in this pdf – 2, 3, 4.)

https://newsroom.heart.org/news/where-theres-smoke-theres-fire-and-heart-health-risks

https://pmc.ncbi.nlm.nih.gov/articles/PMC10537918/

https://www.epa.gov/wildfire-smoke-course/health-effects-attributed-wildfire-smoke

A summary of some of the details in these articles:

- **Mechanism:** Wildfire smoke contains various pollutants, including **particulate matter (PM2.5)** ***(see more below)***, carbon monoxide, and ozone, which can damage blood vessels and increase the risk of blood clots. These pollutants can also trigger inflammation in the body, which is a known risk factor for stroke.
- **Vulnerable Populations:**
    - **Elderly:** Individuals over 65 are at higher risk for stroke from smoke exposure, according to a study published by the American Heart Association Journals. (https://www.ahajournals.org/doi/10.1161/jaha.117.007492 - article appended in this pdf below #5.)
    - **People with pre-existing conditions:** Those with heart disease, lung disease, or other cardiovascular conditions are more susceptible to the harmful effects of smoke, including stroke.
    - **Children:** Young children are also more vulnerable due to their developing respiratory and cardiovascular systems.

- **Increased Risk:** Studies have shown that **wildfire smoke events are associated with a higher rate of stroke-related emergency department visits**. A study during the Mendocino Complex fires found a **23.1% increased rate of heart attacks, heart failure, stroke, and cardiovascular deaths compared to days with good air quality.**
- **Long-term Effects:** While some studies have shown short-term increases in stroke risk during smoke events, research is also investigating the long-term effects of wildfire smoke exposure on brain health and stroke risk.

PM2.5 sources aren't just related to wildfires...

Landfill gas (LFG) also contains particulate matter, including PM2.5.

> *PM2.5 refers to particulate matter that is 2.5 micrometers or less in diameter. These tiny particles, often called fine **inhalable particles**, are a significant component of air pollution and **pose serious health risks when inhaled**. (Google definition)*

While landfill gas primarily consists of methane and carbon dioxide, it also contains trace amounts of other gases and particulate matter, including **PM2.5, which can be released into the atmosphere and pose health risks.**

Unlike seasonal fire smoke days, the landfill is pumping out PM2.5 24/7, 365 days a year. Any **landfill fires exacerbate the release of PM2.5 and other pollutants.**

Sources of PM2.5 in Landfill Gas:

- **Landfill Fires:** These fires can generate significant amounts of PM2.5, along with other harmful pollutants like carbon monoxide, nitrogen oxides, and volatile organic compounds.
- **Waste Decomposition:** The natural decomposition of organic waste in landfills can release PM2.5, although this is typically a smaller source compared to landfill fires or combustion processes.
- **Fugitive Dust:** Activities like waste handling, vehicle movement, and even wind can stir up dust and particulate matter, including PM2.5, from the landfill surface. *(See other testimony regarding dust on open faces of Coffin Butte Landfill.)*
- **Combustion of Landfill Gas:** When landfill gas is flared (burned off) or used as a fuel source (e.g., in engines or turbines), it can also produce PM2.5 emissions,

although these are generally lower than those from landfill fires. *(However, we know that the Republic Service flares are not operating at a good efficiency level. See Ken Ekland's testimony about Republic Services flare (in)efficiencies.)*

- **Health Impacts**: **PM2.5 is a known health hazard**, capable of penetrating deep into the lungs and causing respiratory and cardiovascular problems. **Communities near landfills may experience increased exposure to PM2.5**, leading to:

    - **Respiratory Issues:** Asthma, bronchitis, and other respiratory illnesses can be exacerbated by PM2.5 exposure.

    - **Cardiovascular Problems:** PM2.5 can contribute to heart attacks, strokes, and other cardiovascular diseases.

    - **Reduced Lung Growth:** Studies have linked PM2.5 exposure in children to slower lung growth and smaller lung capacity.

https://kunakair.com/landfill-air-pollution/ (see appended text of this article below - 6)

Be aware that the proposed ODEQ permit [Title V] currently under review by ODEQ increases the landfill's limits **for fine particulate matter from not regulated to 11 tons per year.**

County Residents who live in the area surrounding the Landfill have been talking about the health impacts of the Coffin Butte Landfill for years.

We have enough evidence to have serious questions!

- Why didn't **Republic Services** or **Benton County** request a comment on the landfill expansion (LU-24-027) from the Benton County Health Department? If the Benton County Health Department was invited to comment, why didn't they submit comments?

- WHERE is **Oregon Health Authority**? Why haven't they reached out to start investigating the health impacts of Coffin Butte Landfill? This is the research they do! Has Benton County highlighted this issue with OHA?

- Why aren't **Republic Services** or **Benton County** offering to test well water for PFAS in the neighborhoods that surround Coffin Butte Landfill?

- Why aren't **Republic Services** or **Benton County** offering to pay for blood tests to test for PFAS in area residents?

- **What entity** is testing the water from the EE Wilson stocked pond for PFAS? Are families catching fish from a polluted, PFAS-laced pond to take home to cook up for dinner?

To get a full understanding of the health and services impacts within Benton County, the county must:

- **Acknowledge that a landfill exists** within the county in all planning documents *(For more information about why this is an essential, often-missed step: Read the other written testimony I submitted on 7.1.25 – **Cloak of Invisibility**)*

- **Research and understand the full scientific impacts of landfill gas, leachate, PFAS, and PM2.5** on health or find qualified experts to do so.

- **Connect the impact of the landfill** to the health of Benton County residents.

- **Don't make the landfill even bigger!**

  More landfill
  → More fugitive landfill gas
  → More leachate (from previously created cells and current cells)
  → More health problems for county residents
  → Creates even more of an undue burden on health professionals, healthcare services, health care expenses through OHP and Marketplace, Medicare, and the residents dealing with health issues
  → Decreases the livability of the region around Coffin Butte Landfill.

- **Close Coffin Butte Landfill** before it creates too many more coffins!

In conclusion, I want to **highlight Pam Castle's assessment** of the ways in which PFAS originating from Coffin Butte Landfill and migrating to Corvallis (and other) Waste Water Treatment Plants cause great harm and expense and run counter to Benton County's own land use guidelines:

If Benton County approves the application for expansion of Coffin Butte Landfill, it will continue to fail to meet its own goals, guidelines and policies.

- As described previously, PFAS originating at Coffin Butte Landfill are spread to the air, soil, and water in several ways.
- Continuing to allow this spread means the county is not meeting the **Benton County Comprehensive Plan policy 6.1.2** that dictates that the **county must manage air, water, and land resources to insure their protection, conservation, restoration or enhancement**. The same is true for policies **6.1.4** and **6.3.1** which call for the county to consider these types of impacts when making land use decisions and to **take steps to minimize degradation of our air, water, and land**.
- With regard to landfills and solid waste, comprehensive plan policies **6.5.4** and **6.5.8** direct the county to **make sure that our solid waste handling, disposal and storage is safe and environmentally sound** – allowing the unmitigated spread of PFAS does not meet the requirements in these two policies.

The expansion does not meet the CUP criteria BCC 53.215(2)

- The processing of PFAS-laden leachate currently constitutes an ill-defined, but serious, burden on the WWTP (Waste Water Treatment Plant). As part of City of Corvallis and Benton County roles in protecting residents, it would be appropriate to test the following or require the landfill operators to test the following for PFAS:
    - Landfill leachate destined to be WWTP influent for PFAS.
    - WWTP effluent.
    - WWTP biosolids.
        - This will likely be a costly endeavor in terms of planning, implementing proper protocols and testing, placing financial and burden on this public utility and therefore the application does not meet **BCC 53.215(2).**
- Carrying out the PFAS mitigation required to meet EPA standards when they are enforced will be a further economic burden on all of us.

    - We know that the landfill operators have a finite window of responsibility for maintaining the landfill once closed.
    - That leaves area residents faced with a potentially enormous financial bill associated with the contamination and continued production of leachate. Thus, an expansion does not meet **BCC 53.215(2)** since further economic burden will be placed on the public WWTP utility.
- The possibility of widespread PFAS contamination seriously affects the use of landfill-adjacent properties (and WWTP-adjacent and biosolid application-adjacent properties).
    - The application does not meet **BCC 53.215(1)** since an expansion would mean a worsening of all the PFAS-related issues – more air, soil, and surface and groundwaters will be affected further interfering with the ability of residents to use their property.

I firmly oppose LU-24-027.

- Expanding Coffin Butte Landfill **seriously threatens the livability on and uses of adjacent properties** [Benton County Code 53.215 (1)]**, seriously impacts the character of the area** [Benton County Code 53.215 (1)], **and imposes an undue burden on the county's and region's fire services, emergency management services, first responders, and health professionals and services, and the health of the county's residents and neighboring residents.** [Benton County Code 53.215 (2)]

Sincerely,
Carol McClelland Fields
Corvallis, OR 97330

Linn, Benton, and Lincoln Counties Regional Health Assessment 2022 - 2026

Benton County OREGON

Lincoln County Health and Human Services

Linn County Oregon

Samaritan Health Services

Building healthier communities together

United Way

United Way of Linn, Benton & Lincoln Counties

Confederated Tribes of Siletz Indians

InterCommunity Health Network CCO

Published 03/2023

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Boys & Girls Club of Corvallis
Casa Latinos Unidos
CASA of Linn County
Center Against Rape and Domestic Violence
City of Corvallis Parks & Recreation
Coastal Range Food Bank
Community Harm Reduction Mentors & Allies
Community Services Consortium
Corvallis Climbers of Color
Corvallis Environmental Center
Corvallis Multi-Cultural Literacy Center
Corvallis School District 509J Family Advocates
Faith Hope and Charity, Inc.
Family Tree Relief Nursery
FISH of Lebanon
Good Samaritan Regional Medical Center
Grace Wins Haven
Grupito Billingue
International Moms Group
Jackson Street Youth Services
Kepi Nak-Nak Resource Center
Lincoln County Behavioral Health
Lincoln County Developmental Disabilities
Lincoln County Library District
Lincoln County Sheriff's Office
Lincoln County Solid Waste District
Linn Benton Health Equity Alliance
Linn Benton NAACP
Mid Willamette Trans Support Network
Neighbors for Kids
Newport 60+ Activity Center
Newport Recreation Center
Olalla Center – Project Bravery
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Oregon Coast Community College Nursing
Oregon Department of Environmental Quality
Oregon State University
Oregon State University Basic Needs Center
Oregon State University Education Opportunities Program
Oregon State University Extension
Panther Creek Community Center
Parenting Success Network
Pathfinder Clubhouse
Philomath Pride
Reconnections Counseling
Samaritan Albany General Hospital
Samaritan Lebanon Community Hospital
Samaritan North Lincoln Hospital
Samaritan Pacific Communities Hospital
Senior Corps of Linn, Benton, and Lincoln Counties
South Benton Food Pantry
Strengthening Rural Families
Vina Moses Center
Volunteer Caregivers

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Executive Summary

The Partnership for Community Health conducted this Regional Health Assessment (RHA) to better understand the health-related issues affecting the Linn, Benton, and Lincoln (LBL) region. This report includes data from a variety of local, state, and national data sources including both secondary data (surveys and data collection systems reported publicly) and primary data (new data collected from our community specifically for this assessment).

In the 2022 County Health Rankings, Benton County ranked 1st among Oregon counties for health outcomes (including measures of length of life and quality of life) and 2nd for health factors (including health behaviors, clinical care, social and economic factors, and physical environment).[1] Linn County was ranked in the middle of the 35 Oregon counties that received a ranking (16th for health outcomes and 17th for health factors) while Lincoln County ranked 27th for health outcomes and 33rd for health factors. These summary rankings highlight the variability within the LBL region as well as the potential opportunities to improve community health.

After a thorough review of available secondary data sources and gathering input from community members via a variety of primary data collection activities, the following key themes emerged:

Key Health Themes from the 2022 - 2026 Regional Health Assessment (in alphabetical order)

Access to Affordable Housing & Homelessness: high prevalence of homelessness and financial burden due to housing costs.

Access to Quality Care: inadequate access to primary care physicians, behavioral health providers, and dentists.

Equity, Diversity & Inclusion: minoritized racial and ethnic groups and people living with disabilities (and likely other vulnerable populations not adequately identified in available data) experience more challenges than able-bodied White individuals.

Food Insecurity & Access: high rates of food insecurity and limited access to grocery stores.

Healthy Youth & Families: teen pregnancy, prenatal tobacco use, child abuse, and high number of children in foster care.

Mental Health: high rates of depression and suicide; high rates of feeling sad or hopeless among high school students.

Substance Use and Misuse: drug overdoses; teen use of e-cigarettes, alcohol, and prescription drugs.

1 Introduction

The 2022 - 2026 Linn, Benton, and Lincoln County Regional Health Assessment (RHA) is the result of many dedicated hours of research and collaboration between the Partnership for Community Health and agencies, leaders, and local residents across all three counties. A community health assessment provides comprehensive information about a community's health status, needs, and issues. The Partnership for Community Health recognizes that health is influenced by a wide range of conditions and factors. As such, the RHA presents information on numerous indicators, ranging from those commonly understood to impact health status, such as access to health care, to those whose link is less widely understood, such as education levels. This is an effort to recognize that health starts long before illness occurs and is impacted by where and how we live, learn, work, play, and pray.

This report is focused on describing the health trends, environmental conditions, and disparities affecting residents in recent years. Assessing health status and risk factors is a key foundation for informing plans for community health improvement, aligning priorities among regional stakeholders, and indicating health status trends.

Goals

Linn, Benton, and Lincoln counties are distinct areas with attractions that set them apart from one another and the state of Oregon as a whole. Despite these differences, the three counties also have many identifiers that make a regional approach to conducting a community health assessment valuable and reasonable. A regional approach allows for the identification of wider health trends that may promote or inhibit the health of those living in each of the three counties. Additionally, this regional approach allows all three counties to pool resources and to strengthen relationships, which can be leveraged for future activities. Due to the three counties' proximity, there are numerous organizations whose work extends beyond the confines of county lines to serve the LBL region in sectors including health care, social services, and more. It is also not uncommon for residents of one of the three counties making up the LBL region to frequent another for work, resources, or recreation.

This report is intended to:

- Describe the current health status and disparities affecting residents in LBL region;
- Identify areas of strength and weakness in terms of health status and access to resources; and
- Summarize available data to support collaborative alignment and decision-making among health stakeholders.

Development Process

The process of drafting the regional health assessment was guided by the Partnership for Community Health, a steering committee composed of stakeholder organizations. These organizations include the health departments of Linn, Benton, and Lincoln counties, Confederated Tribes of Siletz Indians, InterCommunity Health Network Coordinated Care Organization (IHN-CCO), Samaritan Health Services, and United Way of Linn, Benton & Lincoln Counties. See the Acknowledgments section of this report for a detailed list of participants. The Partnership for Community Health met monthly starting in September

2021 to plan and implement the regional health assessment. Additionally, two workgroups were established to coordinate specific efforts: the data workgroup and the engagement workgroup. The data group met biweekly from November 2021 through June 2022, with additional ad hoc meetings as needed after June. The data workgroup focused on identifying secondary data sources and creating relevant tables/figures to include in the chapters below. The engagement workgroup met biweekly from November 2021 through December 2022. The engagement workgroup focused on soliciting community input about community health through the community health survey, key informant interviews, and focus groups (see Chapter 10: Community Voices).

Methodology

Population-Level Data Sources

Most of the data presented in this report comes from publicly available secondary sources. An annotated list of the major data sources used throughout this report is available in Appendix 2. Data are reported separately by county where available.

We started by generating a list of health-related topics based on prior community health assessments, with additional topics identified as relevant (e.g., COVID-19). We looked for data sources available at the county level and excluded data collected prior to 2019.

In all tables and figures, nominal response categories are presented in alphabetical order. All tables and figures include a caption identifying the data source, the time period captured in the data, and a link to a relevant website.

We present age-adjusted numbers where possible to minimize the differences between counties due to different age distributions of the population. As shown in

Figure 2-3 and Figure 2-4, Benton County's population skews younger due to the large number of college students at Oregon State University while Lincoln County tends to be older due to retirees settling on the coast. Not all data sources had age-adjusted numbers available; for example, Chapter 6: Morbidity and Mortality includes the rates of leading causes of death using crude mortality rates (Table 6-2). As expected, the differences between counties are much larger using crude mortality rates than using age-adjusted mortality rates (for example, in Figure 6-6).

Community Voices

We gathered primary data from community members through a community health survey, focus groups, and key informant interviews.

Community Health Survey

The Community Survey was drafted to solicit input from anyone who lives, works, goes to school or spends time in Linn, Benton or Lincoln counties. The survey asked respondents to review a list of 30 different health-related topics, and assign each topic a rating corresponding to the degree of attention that issue should receive: 'least attention,' 'some attention', 'most attention,' or 'don't know.' The

survey also included a few questions about the respondent's demographic information and overall assessment of health of the community and health of the respondent.

The Community Survey was distributed in both paper and electronic methods. Paper copies were distributed to community partners, including versions translated into Arabic, Chinese, Korean, Russian, Spanish, and Vietnamese. Paper copies were also made available at popular community gathering spaces and some public events. The survey was also available via SurveyMonkey link for electronic distribution, which was advertised on partner social media sites and sent out via email.

Responses from the Community Survey were analyzed descriptively, as the use of convenience sampling means that the results are not representative of the general population.

Qualitative Data Collection

A variety of focus groups and key informant interviews were held across the region to solicit input from a broad range of community representatives, including under-represented populations. Conversation followed a semi-structured protocol, guided by 1-2 facilitators. Focus groups occurred via both in person and virtual formats. Participants gave permission for focus groups to be recorded and later transcribed. The following organizations and/or specific population groups participated in focus groups:

- African-American / Black focused
- Arabic Speakers
- Community Harm Reduction Mentors & Allies
- Esperanza para las Madres (Spanish-speaking moms living with depression)
- Grace Wins
- Grupito Billingüe (Spanish-English bilingual parent group)
- Guatemalan Immigrants and Mam-speakers
- Iglesia Bautista
- International Moms Group
- Oregon State University (OSU) Extension Nutrition Group
- OSU Basic Needs Center
- Panther Creek Echo Mountain wildfire survivors
- Parenting Success Network: Haga de la familia un placer
- Spanish-speaking farm workers
- Spanish Speakers
- Strengthening Rural Families

Additionally, 31 key informant interviews were conducted throughout the region with a diverse set of partners representing community-based organizations, cultural organizations, and decision-makers. Interviewees are not named to protect anonymity.

Analysis of the qualitative data included transcription of focus group recordings; identification of themes based on review of notes/transcripts by multiple reviewers; discussion to reach consensus on a final list of recurring themes; and then counting the total number of times each theme came up in focus groups and in key informant interviews. Results of the qualitative data collection are presented in Chapter 10: Community Voices.

Limitations

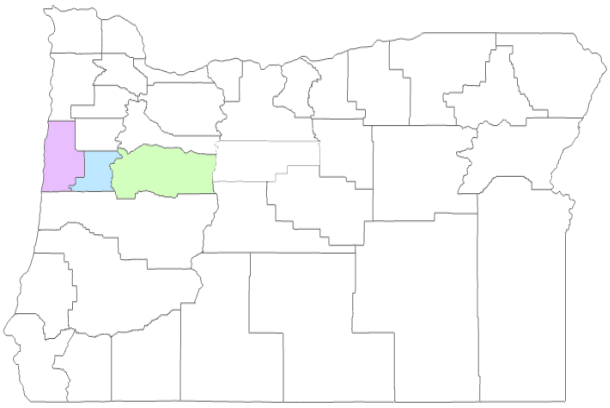
While the Regional Health Assessment identifies many critical issues pertaining to health in the region, it will never be fully comprehensive. This report should not be considered a formal study or research document investigating the causes of each issue raised or providing a detailed analysis of the data. In many cases, data are not available at the regional or county level, nor are all data stratified by race/ethnicity, income, education level, zip code, etc. Data that describe the many factors that contribute to health are not always readily available. In addition, conclusions, hypotheses, and interpretations of the interactions between the many factors that contribute to health may not be included, in part because the underlying structures of these interactions are still not fully understood.

Recognizing and highlighting the need for more detailed local data was a key objective of this assessment. As mentioned above (and throughout the document) data for Linn, Benton, and Lincoln counties were often not available for specific demographics, such as age, income, education-level, race/ethnicity, preferred language, or zip code. This greatly limited the ability to explore differences or disparities within specific sub-populations or geographies. When race/ethnicity data are gathered, analysis may be further limited due to a lack of data stratification by more specific racial categories, such as United States-born versus foreign-born for the Latino population, or the many ethnicities and cultures represented in the category of Asian Pacific Islander. There are limited data on populations that experience inequities and disparities in the region however, as highlighted in later chapters, and their needs and barriers to health and health care are likely to be greater than those of the population at large.

Throughout the document, national or Oregon state-wide data are provided to illustrate trends, especially among vulnerable populations, when county level or regional data are not available. It is important to note, however, that national or state-wide rates, trends, and patterns may not necessarily reflect the reality of specific communities, counties, or regional rates and trends. As regional partners continue to gather information to inform their practices and services, it is important to collect demographic data (i.e., zip codes, level of education, etc.) so that more accurate information can be used to inform future health improvement planning and other public health initiatives.

2 Who We Are

Benton, Lincoln, and Linn counties span approximately 3,946 square miles and are currently home to approximately 268,700 residents.[2]



For thousands of years, the land comprising the three counties was home to a variety of Native American tribes.[3] In the 1840s, European settlers began to move west and displace the tribes. In 1855, the United States established a 1.3-million-acre reservation in what is now Lincoln County. Lincoln County remains the home of the Confederated Tribes of Siletz Indians.[4]

Today, the Linn, Benton, and Lincoln (LBL) region is a mixture of urban and rural areas and encompass diverse populations that vary widely in health and social needs.

Benton County is home to Oregon State University (OSU). OSU is the largest public university in Oregon and currently enrolls approximately 24,000 undergraduate and 5,000 graduate students.[5] Benton County has a variety of recreational assets and outdoor spaces, including several trail systems to improve the health and recreation benefits for community members. In addition, Benton County is considered a regional health care hub and is home to agriculture and growing technology industries.

Lincoln County is located along the Central Oregon Coast and, in many ways, it benefits from its proximity to the Pacific Ocean. As a coastal community, Lincoln County's economy and attractions are vastly different than that of both Linn and Benton counties. Lincoln County contains the cities of Newport and Lincoln City, which are major tourism destinations, especially during the summer months when tourists flock to the county's miles of public beaches. Newport is one of two major fishing ports in Oregon and the county has a rich fishing history. Industries including accommodation and food services, retail, and health care and social assistance are drivers of the local economy.[6]

Linn County is the largest and most populous of the three counties and is located in the heart of the Willamette Valley. Linn County is a significant agricultural producer and is one of the main distributers of grass seed in the world. Linn County has additional industries in manufacturing and forestry and a growing health sector. Linn County has a plethora of outdoor recreation opportunities for community members to enjoy.

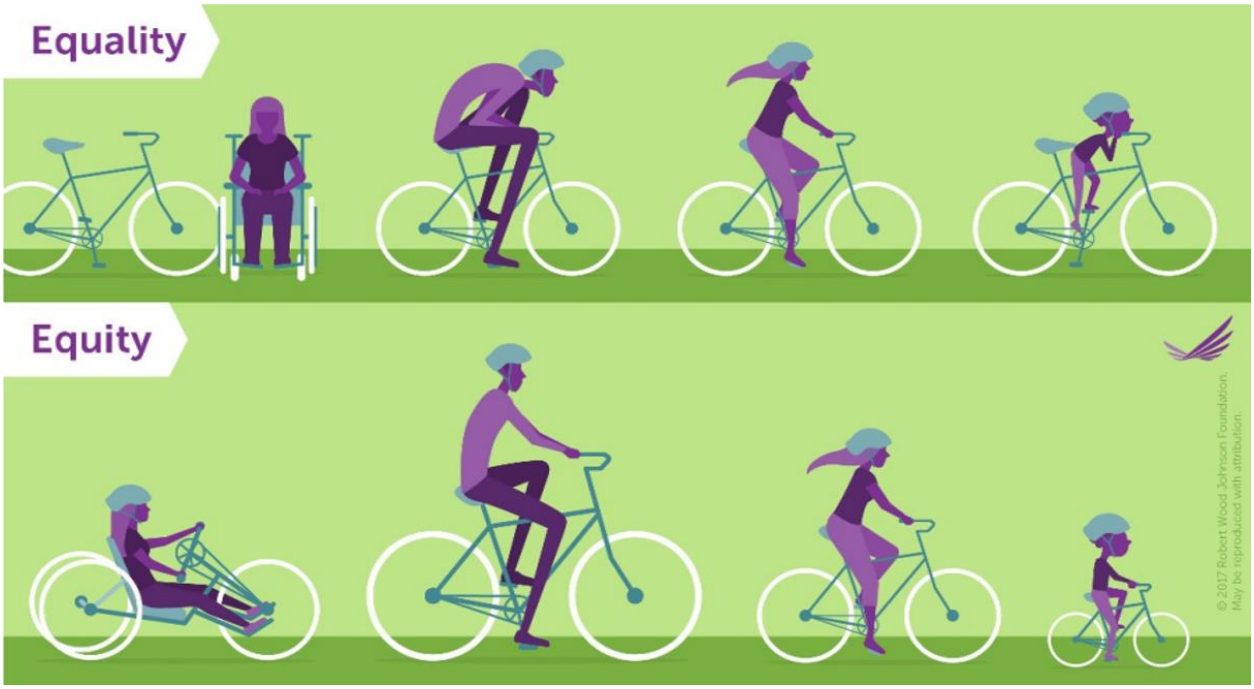
Health Equity

In discussing the health of our region, it is important to recognize that specific subpopulations may experience worse health outcomes than the general population. This chapter describes many of the sub-populations that will appear later in a health equity context. To understand the impact of these inequities, it is helpful to understand the variety of demographic characteristics represented in the LBL

region. This chapter includes information about geographic distribution, age, disability status, race and ethnicity, veteran status, and other categories.

Figure 2-1 defines equity by comparing it to equality. The top image shows equality, which is when everyone is given the same resources regardless of need. In this image, everyone has the same bike, but only the third person can ride the bike comfortably. The bottom image shows equity, in which we recognize that each person has different circumstances and needs. In this image, everyone is given the bike they need to ride comfortably. The goal of Partnership for Community Health is to promote equity across the region, recognizing that not everyone has the same opportunity to achieve health.

Figure 2-1: Visualizing health equity

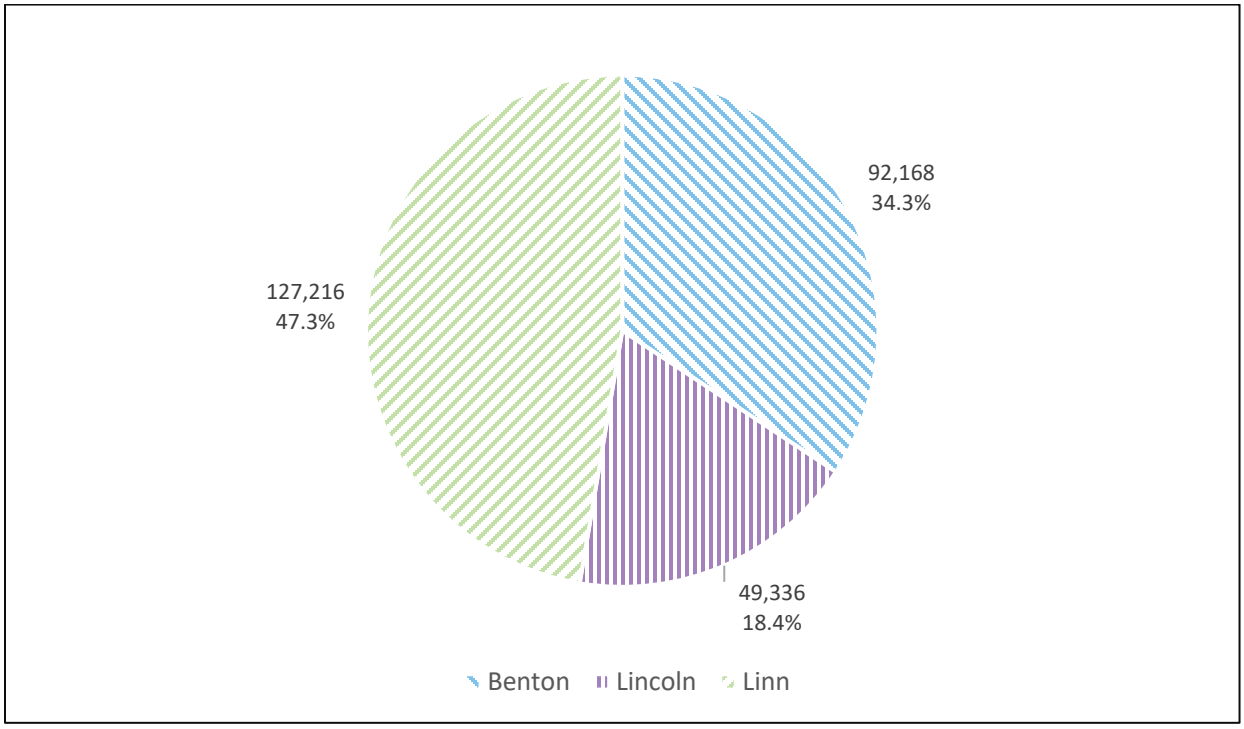


Source: Robert Wood Johnson Foundation
For more information: https://www.rwjf.org/en/insights/our-research/infographics/visualizing-health-equity.html

Population Size

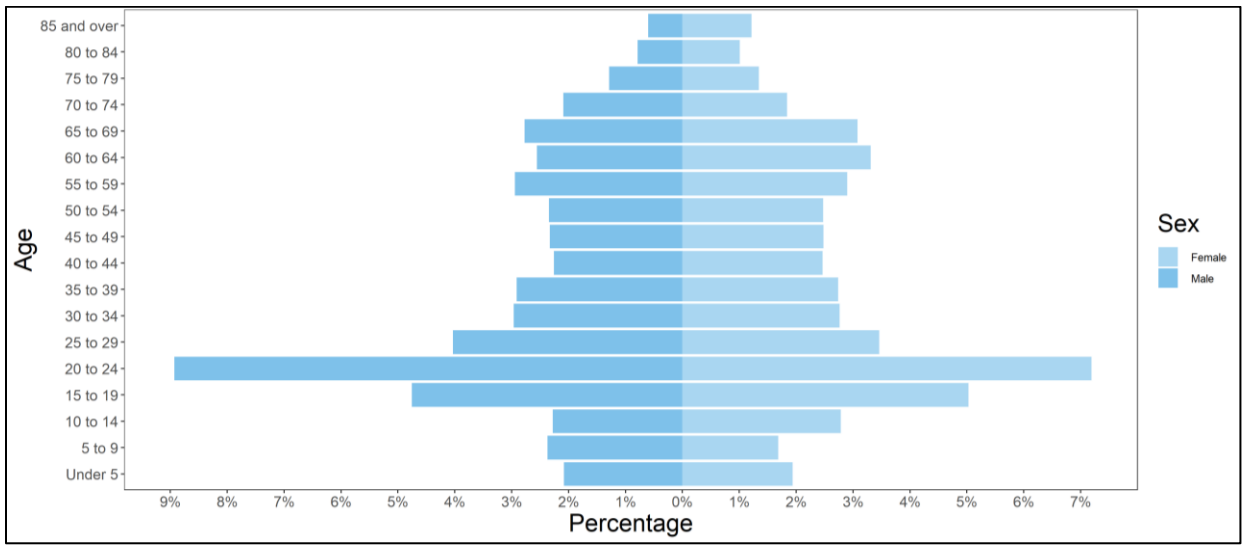
The LBL region is home to approximately 268,700 individuals. Linn County has the largest population with 127,216 individuals, followed by Benton County at 92,168 and Lincoln County at 49,336 individuals.[7] Within Benton County, the largest percentage of population is age 20 to 24, presumably from the large student population who attend Oregon State University. Lincoln County's largest percentage of population falls within the older age group of 60 to 69. Within Linn County, the percentage of population is spread out rather evenly between all age groups. The LBL region on average is racially/ethnically less diverse than the state of Oregon.

Figure 2-2: Population by county and percent of regional population



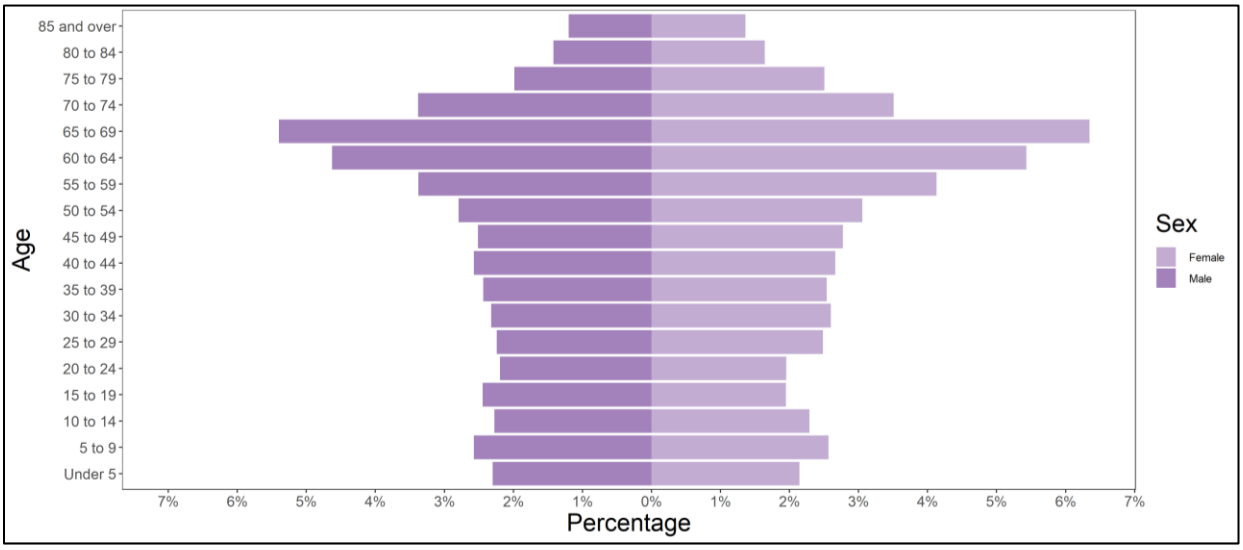
Data source: United States Census Bureau, America Community Survey, Table B01001
Time period: 2016-2020
For more information: https://data.census.gov/

Figure 2-3: Population pyramid for Benton County



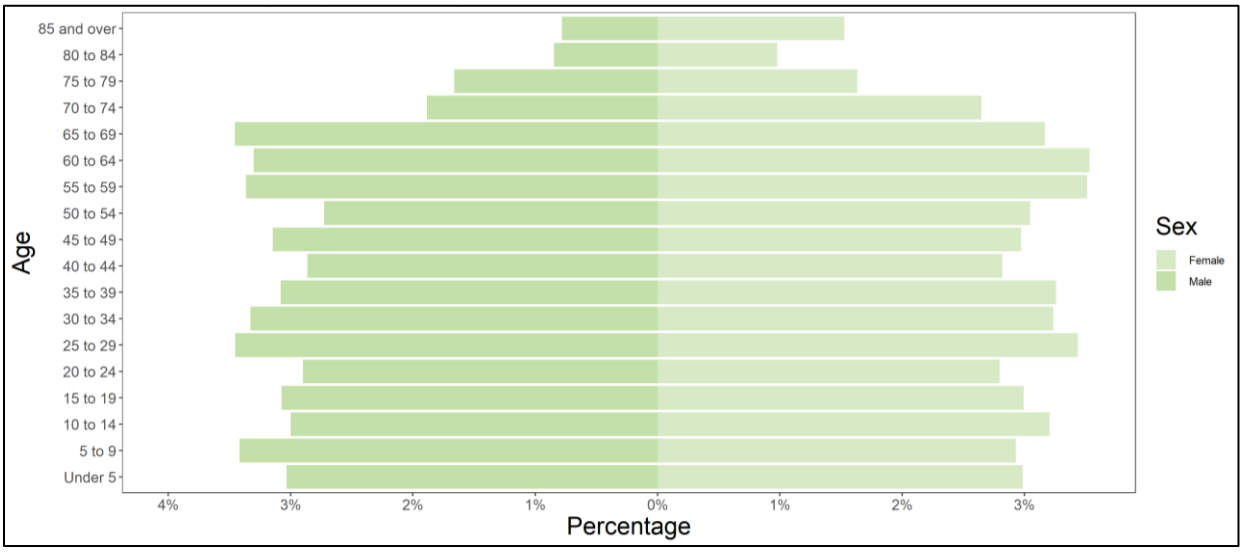
Data source: United States Census Bureau, America Community Survey, Table B01001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 2-4: Population pyramid for Lincoln County



Data source: United States Census Bureau, America Community Survey, Table B01001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 2-5: Population pyramid for Linn County



Data source: United States Census Bureau, America Community Survey, Table B01001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-1: Population size by age group

Age Category	Benton	Lincoln	Linn	Oregon
Under 5	4.0%	4.4%	6.0%	5.5%
5-9	4.1%	5.1%	6.3%	5.8%
10-14	5.1%	4.6%	6.1%	6.0%
15-19	9.8%	4.4%	6.1%	5.9%
20-24	16.1%	4.1%	5.7%	6.4%
25-29	7.5%	4.7%	6.9%	7.1%
30-34	5.7%	4.9%	6.6%	7.1%
35-39	5.6%	5.0%	6.3%	6.9%
40-44	4.7%	5.2%	5.7%	6.5%
45-49	4.8%	5.3%	6.1%	6.3%
50-54	4.8%	5.8%	5.8%	6.0%
55-59	5.8%	7.5%	6.9%	6.3%
60-64	5.9%	10.1%	6.8%	6.7%
65-69	5.9%	11.7%	6.6%	6.2%
70-74	3.9%	6.9%	4.5%	4.5%
75-79	2.6%	4.5%	3.3%	2.9%
80-84	1.8%	3.1%	1.8%	1.9%
85+	1.8%	2.6%	2.3%	2.1%

Data source: United States Census Bureau, America Community Survey, Table S0101
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-2: Percent of population by race

Race	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	0.7%	2.5%	0.9%	1.1%
Asian	7.4%	1.1%	1.1%	4.5%
Black or African American	1.1%	0.3%	0.5%	1.9%
Native Hawaiian or Pacific Islander	0.2%	0.2%	0.1%	0.4%
Some Other Race	2.2%	3.0%	3.1%	3.4%
Two or More Races	4.9%	5.8%	5.4%	6.2%
White	83.4%	87.1%	88.8%	82.6%

Data source: United States Census Bureau, America Community Survey, Table B02001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-3: Percent of population by ethnicity

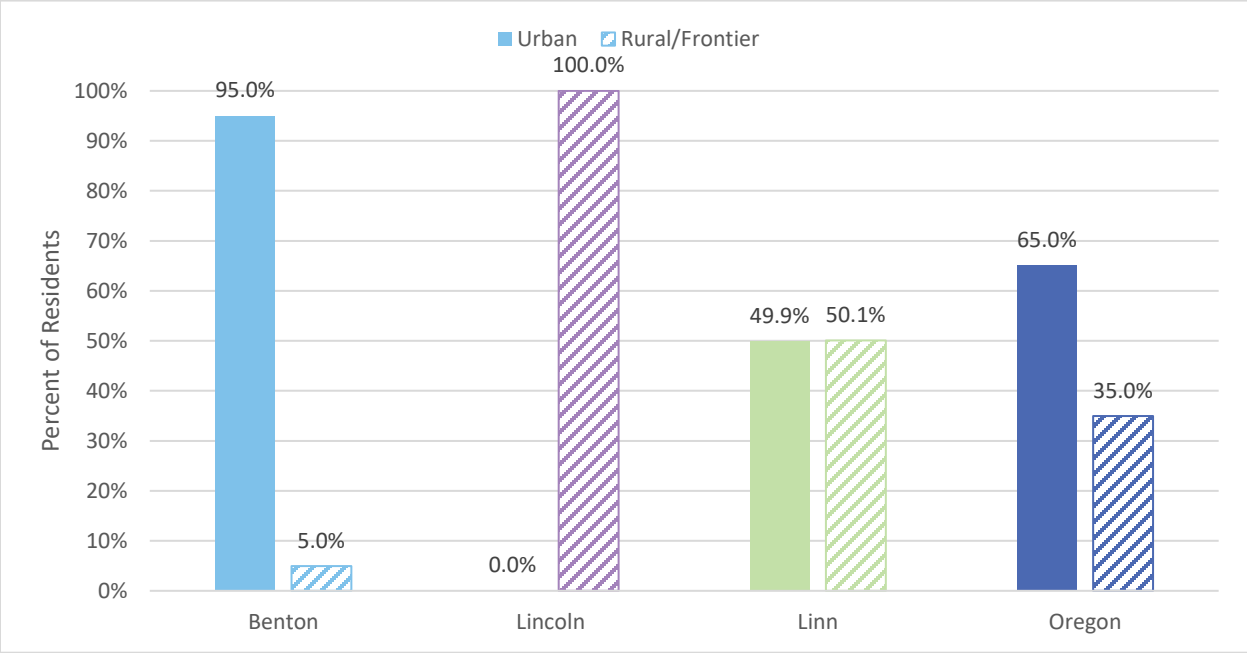
Ethnicity	Benton	Lincoln	Linn	Oregon
Hispanic or Latino	7.6%	9.4%	9.4%	13.2%
Not Hispanic or Latino	92.4%	90.6%	90.6%	86.8%

Data source: United States Census Bureau, America Community Survey, Table B03001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Rural & Urban Areas

The Oregon Office of Rural Health sets designations for urban, rural, and frontier Oregon areas. Rural is defined as any geographic area in Oregon ten or more miles from the middle of a population center of 40,000 people of more. Frontier is defined as any county with six or fewer people per square mile.8 65% of Oregon's population live in urban areas, 33% live in rural areas, and 2% live in frontier areas. Figure 2-5 shows the distribution of urban and rural areas by county. All cities/towns in Lincoln County are defined as rural whereas both Benton and Linn counties have urban and rural designations (no areas in Benton, Lincoln, or Linn counties are classified as frontier areas).

Figure 2-6: Percent of population residing in urban and rural/frontier areas



Data source: Oregon Office of Rural Health and Annual Population Report Tables, Portland State University Population Research Center
Time period: 2020
For more information: https://www.ohsu.edu/oregon-office-of-rural-health/about-rural-and-frontier-data

Table 2-4: Population size for cities with more than 5,000 residents in the region

Name	County	Population
Corvallis	Benton	57,601
Albany (excluding North Albany)	Linn	47,877
Lebanon	Linn	19,122
Newport	Lincoln	10,591
Lincoln City	Lincoln	10,067
Sweet Home	Linn	9,893
Albany (North Albany only)	Benton	9,322
Philomath	Benton	5,682

Data source: Annual Population Report Tables, Portland State University Population Research Center
Time period: 2021
For more information: https://www.pdx.edu/population-research/population-estimate-reports

Language, Disability, and Demographic Characteristics

Understanding the region's language, disability, and demographic characteristics offers the potential for advancements in health equity and improvements in health outcomes for diverse populations. Linn and Lincoln counties have a higher percentage of veterans when compared to Benton County and Oregon. Benton County has a larger foreign-born population than do both Linn and Lincoln counties, possibly due to Oregon State University (OSU), which attracts many international students. Both Linn and Lincoln counties have a greater percentage of residents ages five and older with a disability when compared to Benton County and Oregon. Additionally, the type of disability most seen varies significantly from one county to another.

Table 2-5: Percentage of specific demographic characteristics by location

	Benton	Lincoln	Linn	Oregon
Foreign born	9.9%	4.8%	4.2%	9.8%
Veterans	6.3%	12.9%	10.2%	8.3%

Data source: United States Census Bureau, America Community Survey (foreign born: Table DP02; veteran status: Table S2101)
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-6: Percentage of languages spoken at home by location

	Benton	Lincoln	Linn	Oregon
English only	86.3%	92.7%	91.8%	84.7%
Spanish	5.0%	5.6%	6.4%	8.9%
Other Indo-European languages	2.3%	0.9%	1.0%	2.6%
Asian and Pacific Islander languages	5.6%	0.6%	0.7%	3.2%
Other languages	0.9%	0.1%	0.1%	0.7%

Data source: United States Census Bureau, America Community Survey, Table S1601
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-7: Percent of population per age group with disability by location

Age	Benton	Lincoln	Linn	Oregon
Under 5 years	0.4%	0.0%	0.0%	0.7%
5 to 17 years	4.8%	7.9%	7.0%	6.2%
18 to 34 years	7.6%	12.9%	11.3%	8.4%
35 to 64 years	10.5%	22.2%	17.1%	13.6%
65 to 74 years	18.4%	30.1%	31.1%	26.0%
75 years and over	42.9%	51.4%	51.7%	49.6%

Data source: United States Census Bureau, America Community Survey, Table S1810
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-8: Percent of population with disability by disability type and location

Disability Type	Benton	Lincoln	Linn	Oregon
Hearing difficulty	3.9%	6.4%	6.0%	4.6%
Vision difficulty	1.7%	4.4%	2.8%	2.4%
Cognitive difficulty	5.1%	8.2%	7.5%	6.2%
Ambulatory difficulty	4.4%	12.4%	9.2%	7.0%
Self-care difficulty	1.9%	3.9%	23.8%	2.7%
Independent living difficulty	4.5%	8.5%	7.0%	6.1%

Data source: United States Census Bureau, America Community Survey, Table S1810
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Students

There are four institutions of higher learning in the LBL region: Oregon State University (OSU), Linn-Benton Community College (LBCC), Western University of Health Sciences Oregon (WesternU Oregon), and Oregon Coast Community College (OCCC).

Oregon State University (OSU) is located in Corvallis and draws people from all 50 states and more than 100 countries.[9] In fall 2022, OSU had a record-high enrollment of 35,239 students.[10] Linn-Benton Community College (LBCC) is based out of Albany, with additional campuses in Corvallis, Lebanon, and Sweet Home. LBCC had 6,451 students enrolled in fall 2022. Most of these students were enrolled in

classes held in Linn County, where LBCC's main campus is located. Considering dual enrollment with OSU and LBCC student populations, these figures may be subject to a small portion of double counting. Western University of Health Sciences Oregon (WesternU Oregon) has a campus in the Linn County city of Lebanon. WesternU Oregon offers a Doctor of Osteopathic Medicine program (through the College of Osteopathic Medicine of the Pacific – Northwest [COMP-NW]), Doctor of Physical Therapy program, and in 2023, the college will welcome its first occupational therapy students. WesternU enrollment for 2023 is projected to be 108 Doctor of Osteopathic Medicine students, 60 Doctor of Physical Therapy students, and 45 occupational therapy students. Oregon Coast Community College (OCCC) has locations in Lincoln City, Newport, and Waldport, all of which are in Lincoln County. During the fall 2022 term, OCCC had an enrollment of 933 students, the majority of which were enrolled in non-credit training and personal enrichment courses.

Education level is a strong predictor of health and will be explored further in Chapter 4: Social Determinants of Health. Benton County has a disproportionate number of students enrolled in college/graduate school when compared with Lincoln and Linn counties (Table 2-9).

Table 2-9: Number of enrolled students by education level and location

Education Level	Benton	Lincoln	Linn	Oregon
Students enrolled in early education	1,027	414	1,111	55,409
Students enrolled in K-12	11,162	6,111	19,954	627,934
Students enrolled in college/graduate school	21,248	1,737	5,574	264,831

Data source: United States Census Bureau, America Community Survey, Table S1401
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-10: Percent of students enrolled in K-12 by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	0.7%	4.5%	1.1%	1.2%
Asian	3.6%	0.7%	0.9%	4.0%
Black or African American	1.1%	0.5%	0.9%	2.3%
Hispanic or Latino	16.2%	23.9%	16.0%	25.0%
Multi-racial	8.2%	9.1%	7.2%	7.1%
Native Hawaiian or Pacific Islander	0.4%	0.2%	0.3%	0.8%
White	69.7%	61.0%	73.5%	59.7%

Data source: Oregon Department of Education, Fall Membership Report
Time period: 2021-2022
For more information: https://www.oregon.gov/ode/reports-and-data/students/Pages/Student-Enrollment-Reports.aspx

Table 2-11: Number of students enrolled in college (undergraduate) by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	101	6	35	2,107
Asian	2,052	15	134	17,401
Black or African American	332	0	28	6,154
Hispanic or Latino	1,455	154	592	33,014
Multi-racial	1,159	72	378	17,948
Native Hawaiian or Pacific Islander	101	0	18	1,178
White	13,449	1,006	3,654	160,427

Note: includes community college students
Data source: United States Census Bureau, America Community Survey, Table B14007A-B14007E, B14007G, B14007I
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

3 Environmental Health

The environments in which we live, work, learn, play and pray impact our health and well-being. The air we breathe, the water we drink, and the neighborhoods we live in can all promote or diminish health. Climate change impacts all of these and can also have direct impacts on health through impacts on mental health.

Climate impacts on our mental health include increased anxiety and depression, post-traumatic stress disorder, substance abuse for coping, and strains on social relationships. Climate anxiety, also called eco-anxiety, is an overwhelming sense of fear, sadness and dread in the face of a warming planet. Elderly and children, those with preexisting mental illness, mobility impaired, indigenous, Black and Latinx people, migrants and refugees, and those with close ties to the land are at higher risk.[11]

The full impact of climate change on the region is complex and interconnected. The effects of climate change in Western Oregon are expected to include heat waves, more precipitation in the winter and less in the summer, decreased snowpacks and increased drought, and increased frequency and intensity of both wildfires and floods. Historical and contemporary inequities will place the greatest burden of these changes on racially diverse and low-income communities. For a full accounting of the scientific consensus on climate change in Oregon, see the Oregon Climate Assessment published January 5, 2021.

Air

Poor air quality can exacerbate chronic conditions like asthma and can increase the likelihood of acute cardiac events like heart attacks. Individuals who are unable to remain indoors where air can be filtered have greater exposure to air pollution. These populations include farmworkers, road workers, individuals experiencing homelessness, and people who live in housing with inadequate air conditioning and may need to keep windows open during the hottest months of the year.

Fortunately, air quality is usually good or moderate in the LBL region, except during wildfire season (Table 3-1). Air quality is most often measured by the concentration of microscopic particles called particulate matter (PM) in the air. The major source of particulate matter in Oregon is from wildfire smoke, with a smaller portion coming from transportation and wood fireplaces. Particles less than 2.5 microns (PM2.5) in diameter can penetrate lungs and cause or exacerbate health problems. Wildfire smoke from other counties and states impact our local air quality. With climate change, wildfire season is becoming longer, and the risk of larger wildfires is increasing.

Oregon's Air Quality Index reports how clean the air is and provides information on potential health risks. It is based on three pollutants regulated by the federal Clean Air Act: ground-level ozone, particle pollution and nitrogen dioxide. The highest of the AQI values for the individual pollutants becomes the AQI value for that day. These are usually particulate pollution in our area.

Other sources of air pollution are industrial facilities which release air toxics. Please see Hazardous Waste section below for more information.

Table 3-1: Air quality status by year and location

Location	Air Quality	2018	2019	2020	2021
Benton: Corvallis	Good	340	332	330	363
	Moderate	23	33	25	2
	Unhealthy for Sensitive Groups	2	0	0	0
	Unhealthy	0	0	3	0
	Very unhealthy	0	0	5	0
	Hazardous	0	0	3	0
Linn: Sweet Home	Good	299	297	320	360
	Moderate	65	68	36	5
	Unhealthy for Sensitive Groups	1	0	1	0
	Unhealthy	0	0	1	0
	Very unhealthy	0	0	2	0
	Hazardous	0	0	6	0

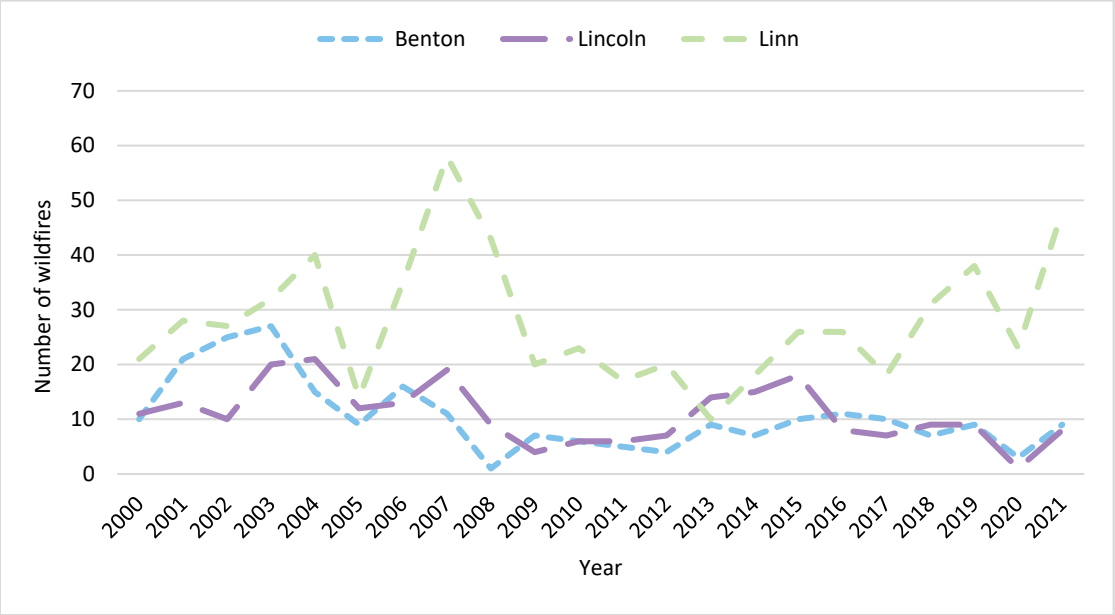
Note: Future updates will include new Lincoln County Toledo site data. 2020 was a leap year with 366 days.
Data source: Oregon Department of Environmental Quality air quality monitors
Time period: 2018-2021
For more information: https://www.oregon.gov/deq/aq/Pages/aqi.aspx, https://www.oregon.gov/deq/aq/Documents/2020AQMonitoringReport.pdf

Wildfires

Wildfires affect health in many ways other than air quality. People living near wildlands can be displaced by wildfires, lose their homes or other property, and experience mental and emotional distress. In the summer, winds often blow north to south along the Oregon Coast (Oregon Coastal Atlas), so we included Washington wildfire acres along with Oregon's below.

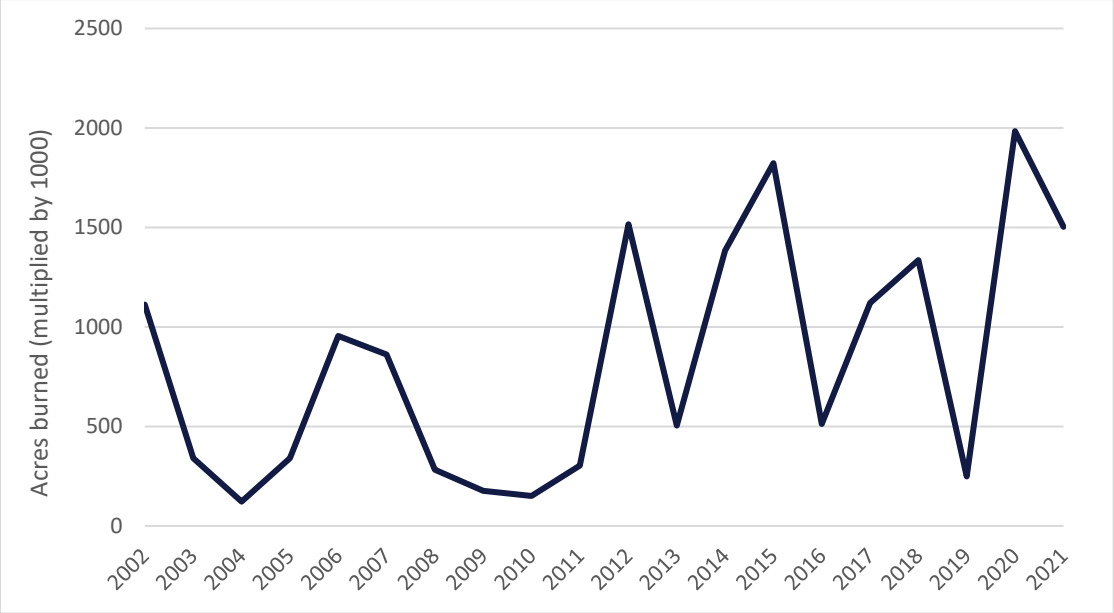
Fortunately, wildfires do not often kill many people in Oregon, but nine people died across the state of Oregon during the record-setting 2020 wildfire season. The 2020 Echo Mountain fire in Lincoln County displaced 532 families; 49 individuals were still being sheltered as of May 2022, and an additional 162 families continue to receive Disaster Case Management services.[12]

Figure 3-1: Number of wildfires by year and location



Data source: Oregon Department of Forestry
Time period: 2000-2021
For more information: https://oregon-department-of-forestry-geo.hub.arcgis.com/datasets/geo::odf-fire-2/about

Table 3-2: Total acres burned in thousands over time in Oregon and Washington



Data source: National Interagency Fire Center
Time period: 2002-2021
For more information: https://www.nifc.gov/fire-information/statistics

Heat

Extreme heat makes many populations, such as those with chronic disease, young children, older adults, and outdoor workers, vulnerable to heat-related illnesses such as heat stroke, fainting, heat exhaustion, and heat cramps. Wildfire smoke, air pollution, and pollen can make respiratory conditions such as asthma worse.[13]

Periods of extreme heat can exacerbate health conditions and cause deaths. The heat wave in June 2020 caused at least 96 deaths across the state of Oregon.[14] Climate change is increasing the likelihood and intensity of heat waves across the region, although the natural variability from year to year can obscure the trend over shorter time intervals.

Table 3-3: Number of high heat and extreme heat days by year and location of monitoring sites

Location	Heat Level	2017	2018	2019	2020	2021
Benton County (Hyslop Field Station)	High heat	57	47	29	43	58
	Extreme heat	12	10	3	8	11
Lincoln County (Otis)	High heat	11	2	5	4	4
	Extreme heat	4	0	0	0	0
Linn County (Marion Forks)	High heat	57	43	24	37	57
	Extreme heat	7	4	1	4	13

Note: high heat = daily maximum temperature above 84 degrees F; extreme heat = daily maximum temperature above 94 degrees F
Data source: National Oceanic and Atmospheric Administration
Time period: 2017-2021
For more information: https://www.climate.gov/maps-data/all

Marion Forks is located along Highway 22 in the eastern Linn County Cascade foothills. Hyslop Field Station is located along Highway 20 between Corvallis and Albany. Otis is located along Highway 18 in northwestern Lincoln County. Together, these three stations provide good coverage of the three different environments of the region (Cascades, Valley, and Coastal).

Water

Water quality and quantity are interdependent. Oregon is currently in the worst megadrought on record. Although there have been individual years of wet conditions over the past two decades, on average conditions have been drier than any other 22-year period in the past thousand years. Drought conditions impact water supplies, streamflow, agriculture productivity, wildfire danger, and ecosystem health.[15] For past, current and future drought conditions, please visit https://www.drought.gov/states/oregon.

Water quality is another factor that impacts health. Water quality varies greatly across geography, and even from source to source. The larger community drinking water systems in the three counties test regularly for many contaminants. Average water contaminant levels usually test below the EPA standards for the four listed contaminants in the three counties (Table 3-4). However, contaminant levels can vary widely, and there are no surveillance systems that monitor individual water sources such as private wells.

Arsenic is a known carcinogen, and there is no safe level of arsenic in drinking water. The EPA has set a standard of 10 µg/L in drinking water, but has a goal of 0 µg/L.

Nitrates can occur naturally in groundwater, but human sources such as fertilizer are the major source of high concentrations of nitrates. Nitrates can interfere with the blood's ability to carry oxygen, which can be a major risk for bottle-fed babies under six months old. The EPA standard for nitrates is 10 mg/L.

Haloacetic acids (HAA) and Trihalomethanes (TTHM) occur when chlorine used to disinfect water interacts with other naturally occurring chemicals in the water. There is some evidence that HAA5 (the 5 major compounds) and TTHMs can increase the risk of certain cancers or other diseases. The EPA regulatory standard is 60 µg/L in drinking water for HAA5 and 80 µg/L for TTHM.[16]

Table 3-4: Contaminants levels above federal standards in community public water systems, by contaminant and location

Contaminant & Regulatory Standard	Year	Benton	Lincoln	Linn
Arsenic (10 µg/L)	2020	0	0	0
	2019	0	0	0
	2018	0	0	0
Nitrate (10 mg/L)	2020	0	0	0
	2019	0	0	0
	2018	0	0	0
HAA5 (60 µg/L)	2020	0	0	0
	2019	0	0	0
	2018	0	0	0
TTHMs (80 µg/L)	2020	1	0	0
	2019	1	2	0
	2018	0	0	0

Note: Systems don't test every year.
Data source: Oregon Environmental Public Health Tracking
Time period: 2018-2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/CommunityWaterSystem_16680312416720/MapVisualization

Water fluoridation is a low cost and effective way of improving the oral health of populations. It protects every user of the water system against cavities, making it an important tool in improving health equity. Only 22% of Oregonians drink fluoridated water, compared to more than 50% of the total United States population. This is well below the Healthy People 2020 goal of 80%.

Table 3-5: Cities with fluoridated community public water systems by county

County	Cities
Benton	Adair Village, Corvallis, North Albany, and Philomath
Lincoln	No fluoridated public water systems in Lincoln County
Linn	Albany, Lebanon, and Sweet Home

Data source: Centers for Disease Control and Prevention (CDC)
Time period: website referenced January 2023
For more information: https://nccd.cdc.gov/DOH_MWF/Default/Default.aspx

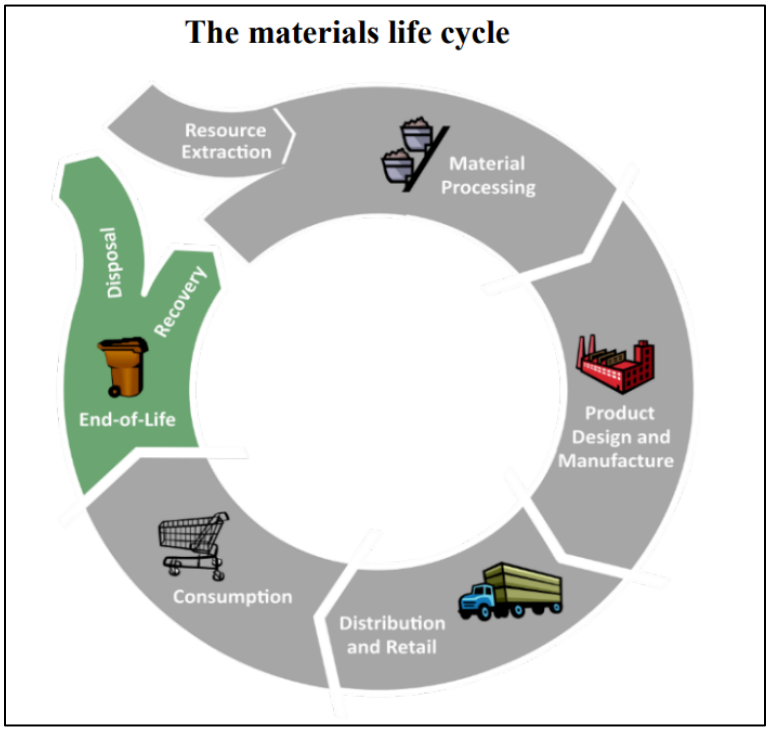
Solid Waste

Solid waste collection, recovery, disposal, and landfills are regulated to help protect our environment and public health. Reducing and recovering waste is important because each step in a product's life cycle takes raw materials, time, and energy (see the materials life cycle in Figure 3-2 below).

In Oregon we recover about 40% of the waste we generate, mostly through local recycling and composting efforts. Local manufacturers, governments and haulers are redesigning processes and systems. By 2024 we should see major headlines on improvements, thanks to Oregon's Recycling Modernization Act.[17]

Reducing food waste and plastic waste are two priorities due to their environmental impacts. Food production generates greenhouse gases, as does disposal in landfills. Plastic products break down in the environment into microplastics. These microplastics can end up in our food, water, air and lungs.[18] We can each do our part to reduce waste and pollution by buying less stuff, especially hazardous/toxic products. We can buy local products, look for packaging that is locally recyclable, and properly recycle and dispose of waste.

Figure 3-2: The materials life cycle



Source: Oregon Department of Environmental Quality
For more information: https://www.oregon.gov/deq/FilterDocs/2017mrwgrates.pdf

Hazardous Waste

Household and other hazardous wastes are collected and handled separately to protect environmental and public health. Household hazardous wastes include pesticides, herbicides, poisons, solvents, fuels, paints, motor oil, antifreeze, and mercury-containing wastes.

The Toxics Release Inventory (TRI)[19] includes certain toxic chemicals that may pose a threat to human health and the environment. Certain industrial facilities must report annually how much of each chemical is recycled, combusted for energy recovery, treated for destruction, and disposed of or otherwise released on- and off-site. In 2020, there were 287 of these facilities in Oregon including the following in the LBL region:

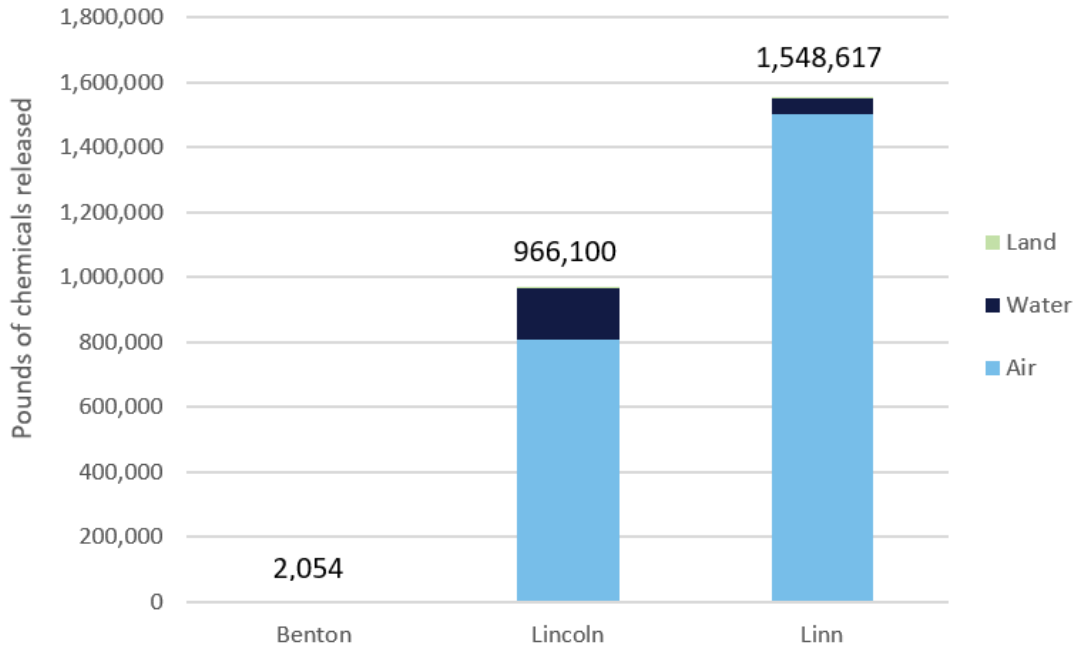
- One facility in Lincoln County that released on-site methanol, hydrogen sulfide, ammonia, nitrate compounds, acetaldehyde, and other chemicals.
- Four facilities in Benton County that released on-site barium compounds and zinc compounds.
- Seventeen facilities in Linn County that released on-site methanol, ammonia, nitrate compounds, manganese compounds, hydrochloric acid, acetaldehyde, and other chemicals.

Most of the facilities' on-site releases in Linn and Lincoln counties were to the air, consistent with Oregon. Benton County facilities released about 2,100 pounds on-site in 2020. This doesn't show up on the chart below because it's so much smaller than the approximately 966,000 pounds released on-site

by the facility in Lincoln County, and over 1.5 million pounds released on-site by facilities in Linn County, in 2020.

The Environmental Protection Agency and Oregon Department of Environmental Quality work with facilities on reducing waste and safer waste management by recycling, recovering energy from, and treating chemicals.[20, 21]

Figure 3-3: Pounds of chemicals released from industrial facilities in toxic release inventory



Data source: United States Environmental Protection Agency Toxic Release Inventory
Time period: 2020
For more information:
https://enviro.epa.gov/triexplorer/tri_factsheet.factsheet_forstate?pstate=OR&pyear=2020&pParent=TRI&pDataSet=TRIQ1

Neighborhood Environments

People need safe and healthy places to live, learn, work, play, and pray.[22] They need access to quality and affordable food, housing and transportation options, as well as the confidence that their local communities have not been contaminated with human-made pollutants.[23]

Populations including minoritized racial and ethnic groups, people experiencing poverty, people with disabilities, and people who experience language barriers are more likely to depend on public transit. However, they are more likely to live in areas with poor transit service, unsafe transportation conditions, fewer destinations, and poor connectivity. These burdens increase transportation costs and stress, and limit access to economic and educational opportunities, housing, healthy foods, and physical activity.

Transportation

Active transportation such as walking and biking increase physical activity, which has positive effects on overall health. Public transportation also involves active travel when walking or biking to and from stops or stations. 17.5% of Benton County's workforce used active transportation to and from work whereas 5.4% and 2.8% of Lincoln and Linn counties' workforce used active transportation respectively. There is a strong correlation between access to public transportation and using active transportation (which includes public transportation, cycling, and walking) to commute to work. Among Oregon counties with public transit systems, an increase of five percent of the population within one quarter mile of a bus station is associated with a one percent increase in the percent of the working population that commutes by active transportation.[24] This trend is reflected in regional statistics as well.

In comparison to Lincoln and Linn counties, Benton County community members have greater access to public transportation. This is due to the population concentration in Corvallis, which has the fareless Corvallis Transit System (CST). This provides a safe and reliable bus service to Corvallis community members. Benton County Dial-a-Bus provides transportation for seniors over 60 years of age and persons with disabilities who are unable to use public transit. Benton Area Transit provides the free 99 Express commuter bus services between Adair Village and Corvallis Monday through Friday.

Lincoln County's public transportation includes Lincoln City and Newport City Loops; north, south and east connecting routes; and Dial-a-Ride service.[25, 26] Linn County's public transportation includes Albany transit, which operates three fixed routes within the city of Albany; Linn-Benton Loop, which connects Albany and Corvallis; and Linn Shuttle, which provides public transportation service to East Linn County residents. There are additional transportation services available in Linn County by request or prior reservation.

The Coast to Valley Express is a regional bus service provided through a partnership between Benton Area Transit and Lincoln County Transit. This service provides four roundtrips everyday between Albany, Corvallis, and Newport.

Cascades West RideLine provides transportation services for eligible Oregon Health Plan (OHP) or Medicaid clients traveling to and from covered non-emergency medical services. Transportation is provided to those OHP eligible clients living in Linn, Benton, and Lincoln counties who have no other way to get to their medical Services.

Table 3-6: Percent of workforce 16 years and older by means of transportation to work and location

Transportation Type	Benton	Lincoln	Linn
Carpooled	7.4%	11.7%	10.2%
Drove alone	64.5%	73.0%	79.7%
Public transportation (excluding taxicab)	2.2%	0.6%	0.1%
Walked	7.9%	4.4%	1.9%
Biked	7.4%	0.4%	0.6%
Worked from home	9.4%	8.8%	6.2%

Data source: National Environmental Public Health Tracking Network
Time period: 2016-2020
For more information: https://ephtracking.cdc.gov/

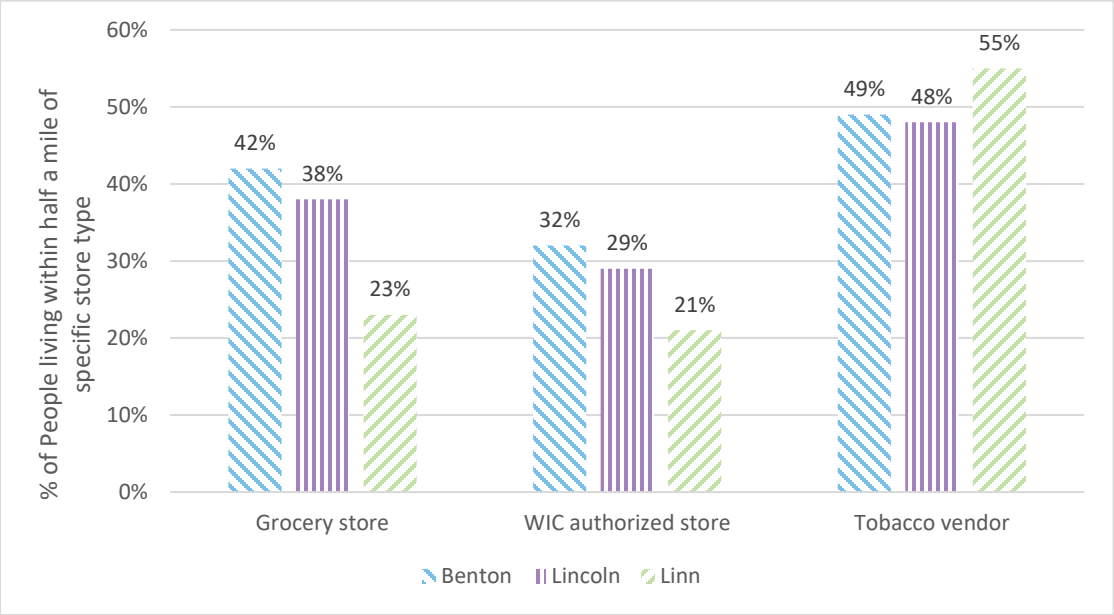
Food Access

Transportation options and limited public transportation for residents contributes to challenges in the region with regard to nutritious food access. For households without private vehicles, the ability to shop for food at grocery stores is highly dependent on proximity.

In all three counties, people are more likely to live within a half mile of a tobacco vendor than of a grocery store (Figure 3-4). Benton County community members have the greatest access to grocery stores as measured by proximity. This is due in part to the concentration of Benton County's population in one city (Corvallis), which has many grocery stores. In comparison, Linn and Lincoln counties' populations are more spread out among smaller communities, not all of which have full grocery stores with access to affordable and nutritious food.

All three counties belonging to the LBL region have farmers markets, which provide access to locally grown, nutritious foods. Benton County farmers markets include locations in Corvallis, Philomath, and North Albany. Lincoln County farmers markets include locations in Lincoln City, Newport, Toledo, Waldport, Yachats, and Siletz. Linn County has farmers markets in Albany, Lebanon, Brownsville, and Sweet Home. While these markets provide increased access to fresh and nutritious food, most only operate a single day a week during the spring and summer months. The outdoor Corvallis Market is open two days per week and operates an indoor market during the winter months.

Figure 3-4: Percent of people who live within half a mile of specific store types by location



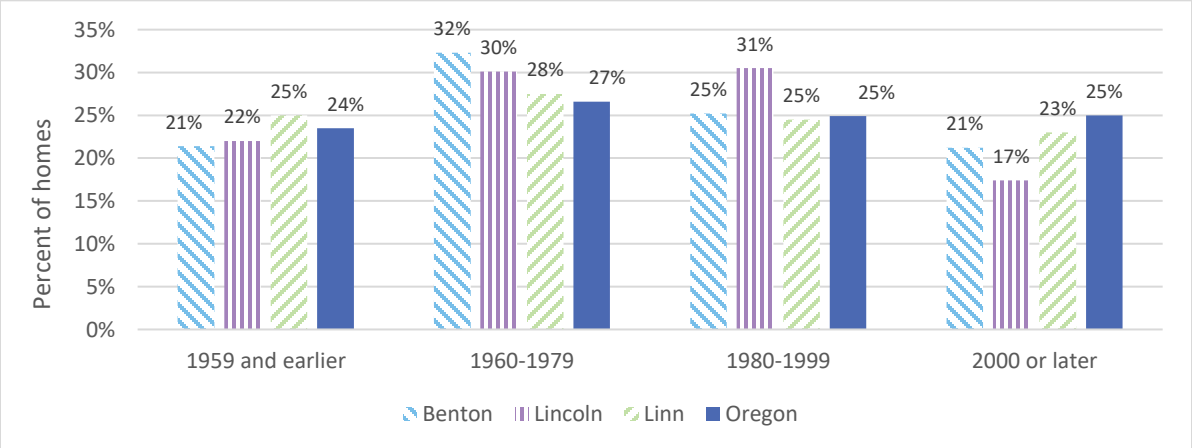
Data source: Oregon Public Health Assessment Tool
Time period: 2019
For more information: Contact Benton County Health Department

Housing

The age of a house can predict many other factors that affect the health of the occupants, including exposure to lead, asbestos, or other hazardous materials, mold or pest infestations, and weather resistance and temperature stability.

For additional housing data, see Chapter 4: Social Determinants of Health.

Figure 3-5: Percent of homes built by year and location



Data source: United States Census Bureau, America Community Survey, Table B25034
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Parks and Recreation

Research demonstrates a strong relationship between access to green outdoor spaces and physical activity and mental health and wellbeing among adults and children. Studies have shown that proximity to places with recreational opportunities is associated with higher physical activity and lower obesity levels.[27] Public recreation areas include parks, schools, public forests and trails, beaches, and waterfronts.

Publicly owned land is land managed by either federal, state, or local governments and is protected for natural resources, open spaces, and recreational areas. In 2019, 39.7% of Linn County's land was publicly held, 29.2% of Lincoln County's land was publicly held, and 26.4% of Benton County's land was publicly held.[28]

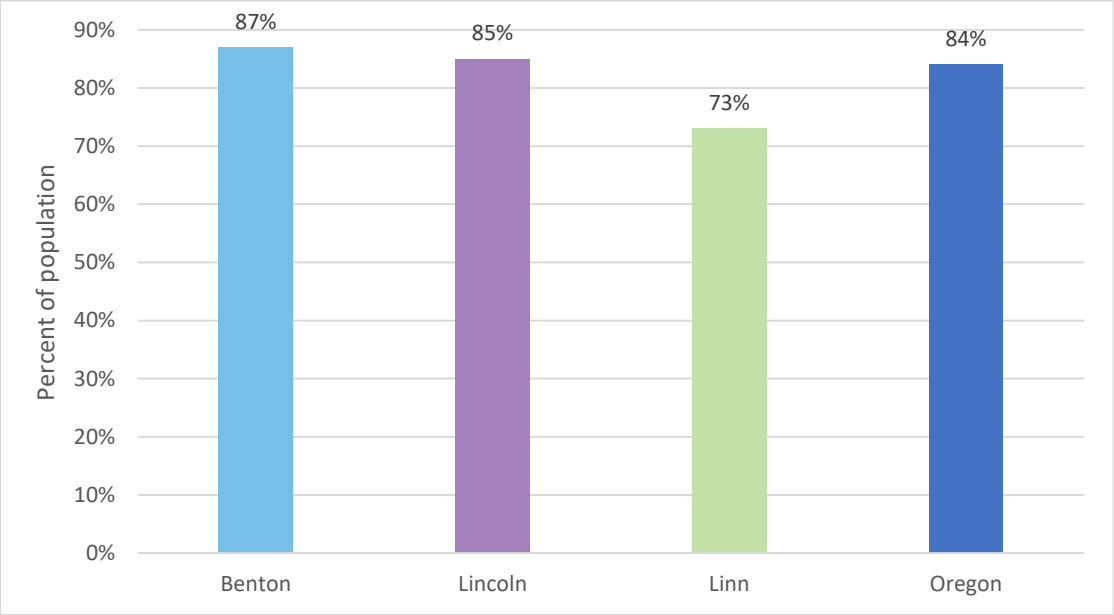
Both Benton and Lincoln counties have greater access to exercise opportunities than does the state of Oregon (Figure 3-6). Access to exercise opportunities is measured as census blocks where the border is a half mile or less from a park or 1 mile or less from a recreational facility in urban census blocks and 3 miles or less in rural census blocks.

Benton County has a plethora of outdoor recreational opportunities available county residents and visitors. The City of Corvallis Parks and Recreation Department manages 2,000 acres of parks, playgrounds, playing fields, trails, open spaces and beautification areas. Overall, there are 20 miles of trails in city natural areas and parks. The department has set a standard of 0.54 miles of trail per 100,000 people; it currently has 0.36 miles per 100,000 people, a deficit of 10 miles of trail. Benton County Natural Areas, Parks & Events (NAPE) works with private landowners, City of Corvallis Parks and Recreation, City of Philomath, Siuslaw National Forest, Oregon State University (OSU) Research Forests, Greenbelt Landtrust, Crestmont Landtrust, and others to offer a trail system that provides health and recreation benefits to the community. NAPE also manages over 1,400 acres of natural areas, open spaces, and parks, including forests, wetlands, boat landings, historic sites, and a campground.

Lincoln County has many public beaches and parks that provide free and low-cost places for the county's residents and many tourists to gather, hike, camp, fish, and more. The Lincoln County Parks department maintains 13 parks, which include campgrounds and waysides. Lincoln County's three recreation centers help advance community health and wellbeing through safe and accessible services, programs, and facilities for children, seniors, and families. Lincoln County benefits from the status of Oregon beaches, which are considered public parks and are open to all.

Linn County is home to 30 parks dotted throughout the heart of the Willamette Valley. Activities in these parks include camping, hiking, swimming, fishing and more. The non-profit organization Build Lebanon Trails is expanding trail access within the county, with the goal of building more than 50 miles of trail systems in the town of Lebanon.

Figure 3-6: Percent of population with access to exercise opportunities* by location



**Access to exercise opportunities is measured as census blocks where the border is a half mile or less from a park or 1 mile or less from a recreational facility in urban census blocks and 3 miles or less in rural census blocks.*
Data source: County Health Rankings
Time period: 2022
For more information: https://www.countyhealthrankings.org/explore-health-rankings/county-health-rankings-model/health-factors/health-behaviors/diet-and-exercise/access-to-exercise-opportunities

4 Social Determinants of Health

Social determinants of health (SDOH) are the non-medical factors found in an individual's environment that predict health outcomes and influence health inequities. The World Health Organization defines the social determinants of health as the "conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life."[29] When conducting and implementing public health work, it is essential that programs and policies prioritize improving the root causes of poor health. Without properly addressing these upstream factors, interventions will be unsuccessful at improving population health outcomes and reducing inequities. Chapter 2: Who We Are and Chapter 3: Environmental Health already introduced information on neighborhood and built environment as well as social and community context. In this chapter, additional data will be presented for three domains of social determinants of health: economic stability, education access and quality, and neighborhood and built environment in the context of Benton, Linn, and Lincoln counties. The other two domains, health care access and social and community context, will be addressed in other chapters.

Figure 4-1: Centers for Disease Control and Prevention (CDC) graphic on social determinants of health

For more information: https://www.cdc.gov/publichealthgateway/sdoh/index.html

Economic Stability

Financial stability impacts multiple facets of an individual's health and behaviors. Access to a high steady income allows people to purchase healthy foods and services, live in safe neighborhoods with better schools, and have greater access to healthcare resources. The overall median household income for Oregon between 2016-2020 was $65,667; the median household income for Benton, Lincoln, and Linn counties during the same time period was $65,142, $50,775, and $59,547 respectively.[30]

Despite Benton County having a high median household income, the income inequality ratio for the county was the largest in the state of Oregon in years 2016-2020. The larger the income inequality ratio, the more unevenly income is distributed within a population. This is associated with loss of social connectedness, and decreases in trust and sense of community, which can have broad health impacts including increased risk of mortality.[31] The ratio of income at the 80th percentile to income at the 20th percentile in Benton County was 5.5, compared to 4.5 for the state of Oregon overall. This means that households with higher incomes had incomes 5.5 times that of households with lower incomes. Benton County's high income inequality is partly driven by both high-salary positions among major employers (Oregon State University, Samaritan Health Services, Hewlett Packard) as well as the large number of students with relatively low incomes. From 2016-2020, over half of 18-24 year old's in Benton County were living in poverty (Table 4-2).

In Oregon, residents identifying as White were less likely to live in poverty. With a few exceptions, this trend is seen in the LBL region as well (Table 4-3). Disability status is also associated with poverty. Approximately 20% of those living with a disability in Linn, Benton, and Lincoln counties were living in poverty in 2016-2020 (Figure 4-2). This is consistent with the state of Oregon as a whole.

Table 4-1: Income inequality by location

Income Variable	Benton	Lincoln	Linn	Oregon
80th percentile of total income range	$132,226	$92,921	$104,041	$126,927
20th percentile of total income range	$23,937	$21,890	$26,925	$28,050
Income inequality ratio	5.5	4.2	3.9	4.5

Data source: County Health Rankings
Time period: 2016-2020
For more information: https://www.countyhealthrankings.org/explore-health-rankings

Table 4-2: Percent of age categories living in poverty by location

Age Category	Benton	Lincoln	Linn	Oregon
Under 5 years	14.5%	31.2%	15.5%	16.5%
5 to 11 years	13.6%	23.2%	15.5%	15.2%
12 to 17 years	16.3%	22.1%	11.4%	13.6%
18 to 24 years	51.6%	18.4%	20.1%	24.1%
25 to 34 years	20.3%	17.2%	14.0%	13.2%
35 to 44 years	11.2%	17.2%	11.4%	10.1%
45 to 54 years	7.3%	17.0%	10.6%	9.3%
55 to 64 years	7.4%	17.8%	11.6%	11.0%
65 to 74 years	4.7%	7.2%	7.3%	7.8%
75 years and over	5.9%	7.0%	7.7%	8.5%

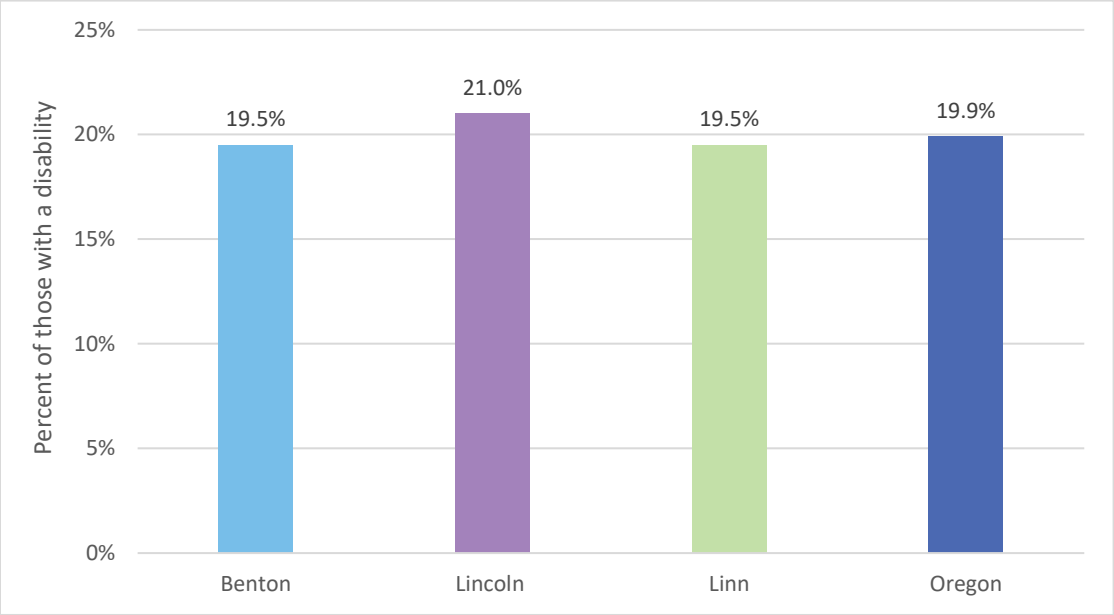
Data source: United States Census Bureau, America Community Survey, Table B17001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 4-3: Percent of racial/ethnic groups below poverty level by location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	19.9%	26.7%	12.6%	22.1%
Asian	41.2%	40.6%	13.1%	13.1%
Black or African American	44.9%	26.6%	2.2%	27.4%
Hispanic or Latino	22.6%	19.0%	15.4%	17.8%
Native Hawaiian or Pacific Islander	16.0%	5.6%	10.3%	17.1%
Some other race	30.8%	5.4%	18.0%	16.5%
Two or more races	19.1%	20.9%	14.6%	15.3%
White	15.9%	15.1%	11.9%	11.5%

Data source: United States Census Bureau, America Community Survey, Table S1701
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-2: Percent of those with a disability living in poverty by location



Data source: United States Census Bureau, America Community Survey, Table C18130
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 4-4: Median household income by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	$49,167	*	$42,236	$48,225
Asian	$41,667	$50,337	$90,787	$83,125
Black or African American	*	$23,125	$58,462	$44,138
Hispanic or Latino	$54,375	$58,695	$45,281	$54,797
Native Hawaiian or Pacific Islander	$155,714	*	*	$69,547
Some other race	$36,974	$61,640	$45,058	$55,422
Two or more races	$73,684	$40,540	$58,679	$57,283
White	$67,298	$50,213	$59,841	$66,480

**Unreliable due to small numbers*
Data source: United States Census Bureau, America Community Survey, Table B19013A – B19013I
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Education

The LBL region has a diverse distribution of academic resources that result in differences in the educational profiles of the three counties. Benton County, home to Oregon State University (OSU), has a unique social and population demographic as the city of Corvallis is centered about the university. OSU is one of three land, sea, space, and sun grant universities in the United States and offers nearly 200 degree programs. The residents of Benton County are highly educated, with a high proportion of the population having received at least a bachelor's degree (Table 4-5). Both Linn and Lincoln counties have community colleges, however the populations are much less centralized around an academic institution. Oregon Coast Community College, located in Lincoln County, offers associate degree and certificate programs in aquarium science, nursing and allied health, accounting, and welding. Lincoln County is also home to Oregon State University's Hatfield Marine Science Center, a world-class marine laboratory located in Newport. Linn County is home to Linn-Benton Community College's (LBCC) main campus and the campus for Western University of Health Sciences Oregon (WesternU Oregon). LBCC is one of the largest community colleges in Oregon and offers seven meta majors. WesternU Oregon offers three graduate programs in the medical field. The majority of Linn and Lincoln County residents have at attended at least some college or received an associate degree (Table 4-5).

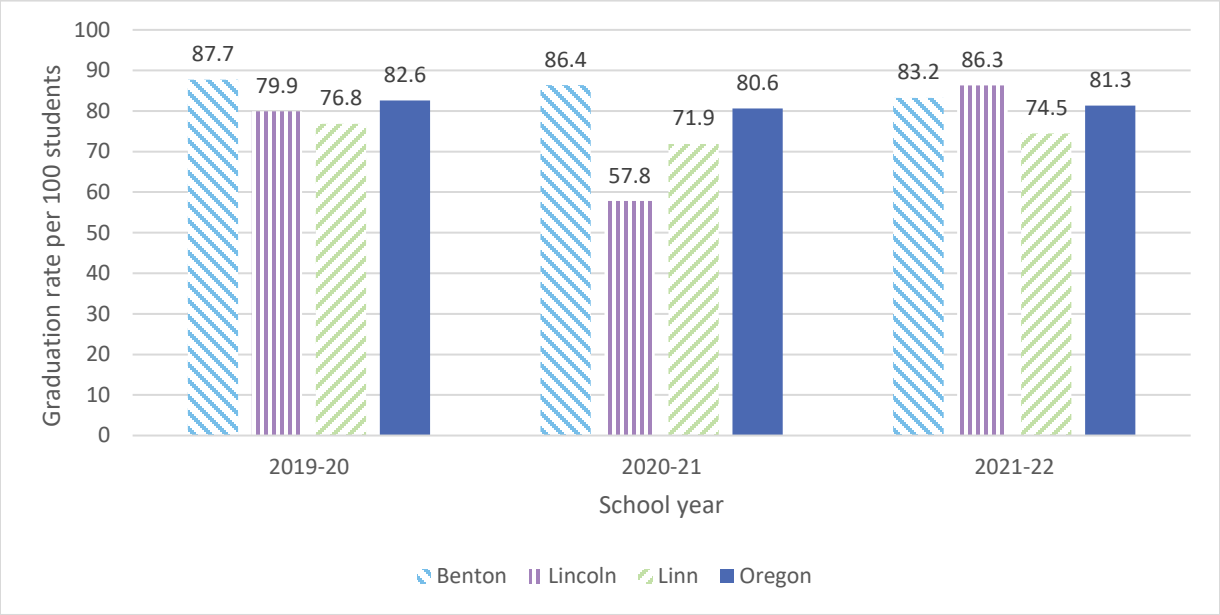
On average for years 2019-2022, Linn and Lincoln counties had similar high school graduation rates. Lincoln County's high school graduation rate during the 2020/2021 school year fell far below the Oregon state average, but by the following school year, its graduation rate exceeded that of Oregon. Benton County had a consistently high graduation rate, exceeding the state average for all three school years shown in Figure 4-3.

Table 4-5: Highest educational level achieved among adults age 25 years and over by location

Educational Level	Benton	Lincoln	Linn	Oregon
Less than high school	3.8%	7.7%	10.1%	8.9%
High school graduate	13.7%	24.9%	29.2%	22.7%
Some college or associate degree	29.2%	39.6%	41.1%	34.1%
Bachelor's degree	29.2%	17.2%	12.9%	21.3%
Graduate or professional degree	24.0%	10.5%	6.6%	13.1%

Data source: United States Census Bureau, America Community Survey, Table S1501
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-3: High School graduation rate per 100 students by school year and location



Data source: Oregon Department of Education, Cohort Graduation Rate
Time period: school year 2020-2021
For more information: https://www.oregon.gov/ode/reports-and-data/students/Pages/Cohort-Graduation-Rate.aspx

Table 4-6: Percent of high school students that graduate on time by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	*	80%	65.8%	68.9%
Asian	>95%	*	83.3%	92.1%
Black or African American	*	*	63.2%	73.7%
Hispanic or Latino	81.0%	82.6%	76.5%	78.7%
Native Hawaiian or Pacific Islander	*	*	*	74.6%
Multi-Racial	86.8%	92.7%	71.2%	79.7%
White	82.9%	87.9%	74.6%	82.5%

**Unreliable due to small numbers*
Data source: Oregon Department of Education, Cohort Graduation Rate
Time period: 2021-2022
For more information: https://www.oregon.gov/ode/reports-and-data/students/Pages/Cohort-Graduation-Rate.aspx

Food Insecurity

Access to healthy affordable food is an important predictor of health status. As the environmental effects of climate change become more severe in the future, public health practitioners are increasingly worried about production, higher prices, and obstacles in the global distribution of food. In the United States there are two primary federally funded health and nutrition programs. The Women, Infants, and Children Program (WIC) is a supplemental nutritional program that provides healthy foods to pregnant, breastfeeding gestational parents, infants, and children to promote optimal childhood development.[32] The Supplemental Nutrition Assistant Program (SNAP) provides access to healthy food for low-income families.[33] Linn and Lincoln counties had higher utilization of SNAP and WIC benefits compared to Benton County in 2020. Only about 10% of households in Benton County received SNAP benefits compared to 20.6% of households in Lincoln County and 18.6% of households in Linn County. Families with children under the age of 18 and/or with a disabled family member commonly utilize SNAP benefits across the LBL region (Table 4-9).

Food insecurity is a lack of consistent access to enough food for every person in a household to live an active, healthy life.[34] Estimates of food insecurity in the three counties making up the LBL region have remained fairly consistent from years 2018-2020. Based on these estimates, Lincoln County experienced the greatest food insecurity in the LBL region, followed by Linn County. All three counties have access to emergency food support thanks to community-based organizations operating in the LBL region.

Table 4-7: Use of WIC benefits by location

WIC Variables	Benton	Lincoln	Linn	Oregon
WIC participants	1,541	1,493	4,160	110,890
Families served by WIC	875	856	2,241	64,450
Percent of all pregnant women served by WIC	24%	41%	30%	27%

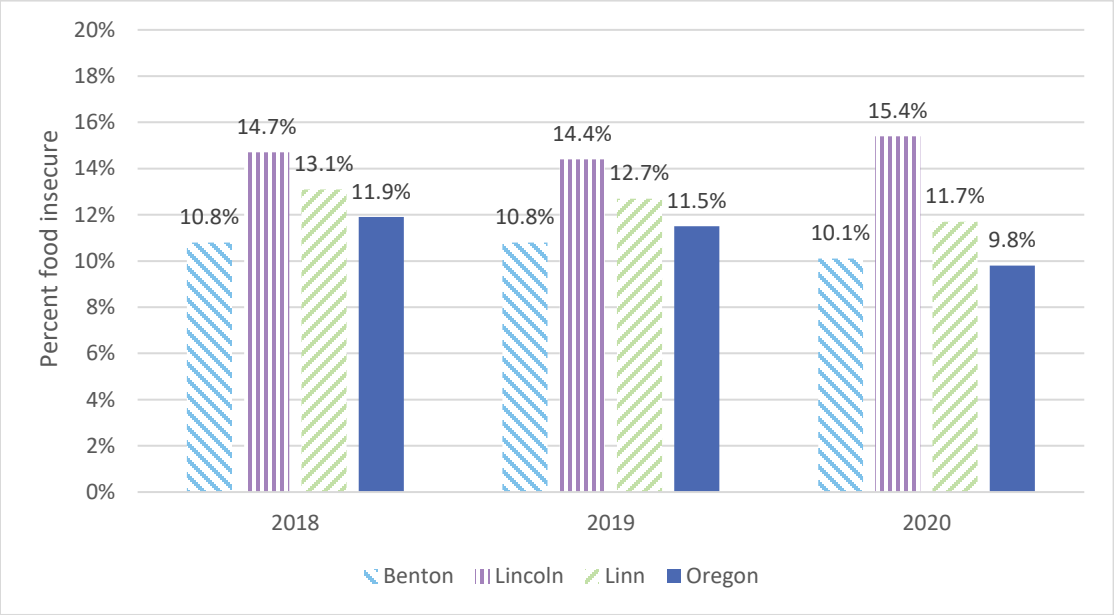
Data source: Oregon Health Authority, WIC Data Sheets
Time period: 2021
For more information: https://www.oregon.gov/oha/PH/HEALTHYPEOPLEFAMILIES/WIC/Pages/annual.aspx

Table 4-8: Use of SNAP benefits by location

SNAP Variables	Benton	Lincoln	Linn	Oregon
Percent of all households that use SNAP benefits	10.1%	20.6%	18.6%	15.0%
Percent of households with children under the age of 18 that use SNAP benefits	37.5%	29.5%	43.7%	40.8%
Percent of households with one or more people with a disability that use SNAP benefits	48.9%	58.5%	53.0%	49.9%

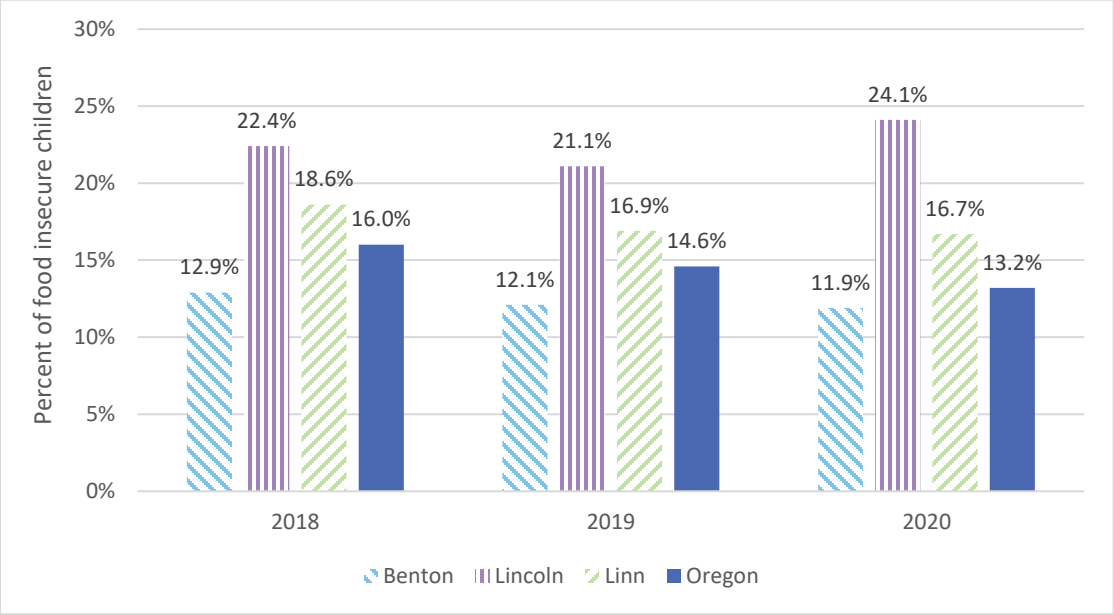
Data Source: United States Census Bureau, America Community Survey, Table S2201
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-4: Estimated percent of population experiencing food insecurity by year and location



Data source: Feeding America, Map the Meal Gap
Time period: 2018-2020
For more information: https://map.feedingamerica.org/

Figure 4-5: Estimated percent of children under age 18 experiencing food insecurity by year and location



Data source: Feeding America, Map the Meal Gap
Time period: 2018-2020
For more information: https://map.feedingamerica.org/

Emergency Food Support

The Linn Benton Food Share operates five meal sites in Linn County and three meal sites in Benton County. They also operate 11 food pantries in Linn County and nine food pantries in Benton County where emergency food boxes are provided to anyone at or below 300% of the federal poverty level. During the 2020-2021 fiscal year, the Linn Benton Food Share distributed 4.4 million pounds of food and provided 330,537 emergency meals to the Linn and Benton County communities.[35]

Food Share of Lincoln County provides similar resources to the Lincoln County community. Food Share of Lincoln County operates four hot meal sites and eight food pantries across Lincoln County. In 2021, Food Share's network of agencies distributed 894,697 pounds of food (equating 3,578,788 meals). This same year, 33,870 individuals representing approximately 14,143 families received emergency and/or supplemental food from Food Share of Lincoln County.[36]

Housing

Access to safe, quality, and affordable housing is a core necessity for healthy living. Lincoln County had the highest percentage of home ownership in the LBL region, closely followed by Linn County. Despite 66% of homes being occupied by the owner, Lincoln County homeowners spent a large percent of their income on housing costs, including mortgage, insurance, and utilities. Renters in Benton County spent the largest proportion of household income on rent, with 54.1% of households spending more than 30% and 32.7% of households spending more than 50% of their total income on rent. Comparatively, homeowners in Benton County were the least burdened by housing costs in the LBL region (Figure 4-6 and 4-7).

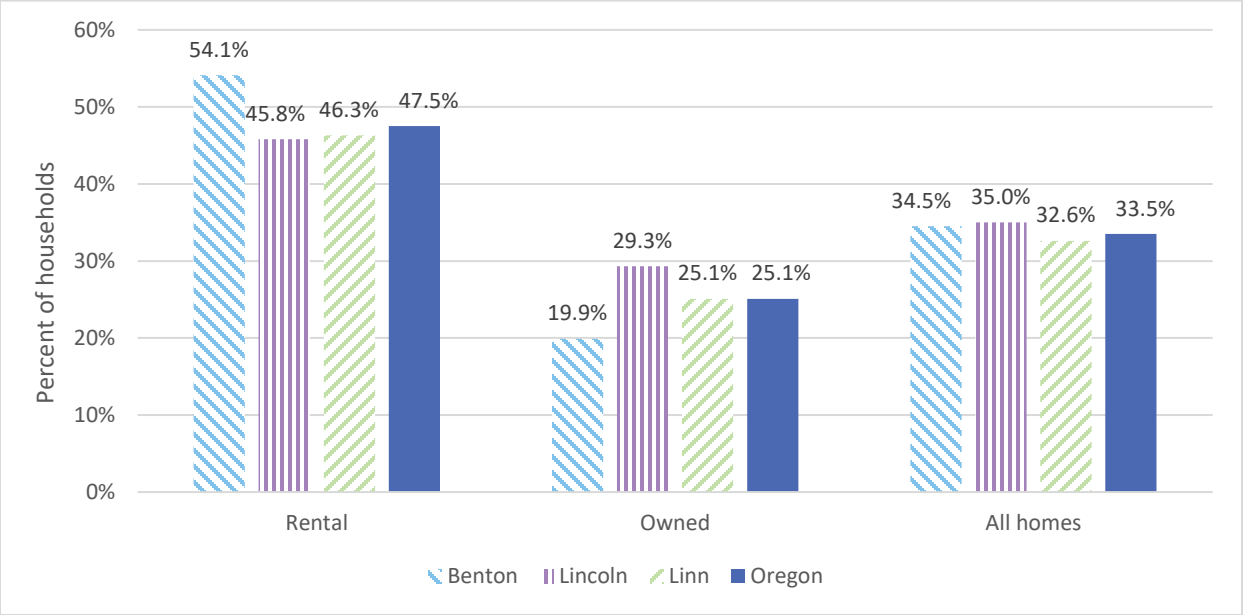
Across the LBL region, between 31% and 42% of unhoused persons had a disabling condition and experienced homelessness for a year or more, defined as chronic homelessness (Table 4-11). Chronic homelessness is especially high amongst veterans in the LBL region. In Oregon, coastal communities have large concentrations of children living on their own and experiencing homelessness.[37] This is consistent with regional findings, which show that Lincoln County had a disproportionately high percentage of K-12 students experiencing homelessness during the 2019-2020 school year (Figure 4-8).

Table 4-9: Percent of population by home ownership status and location

Ownership Status	Benton	Lincoln	Linn	Oregon
Owner occupied	56.8%	69.0%	66.4%	62.8%
Renter occupied	43.2%	31.0%	33.6%	37.2%

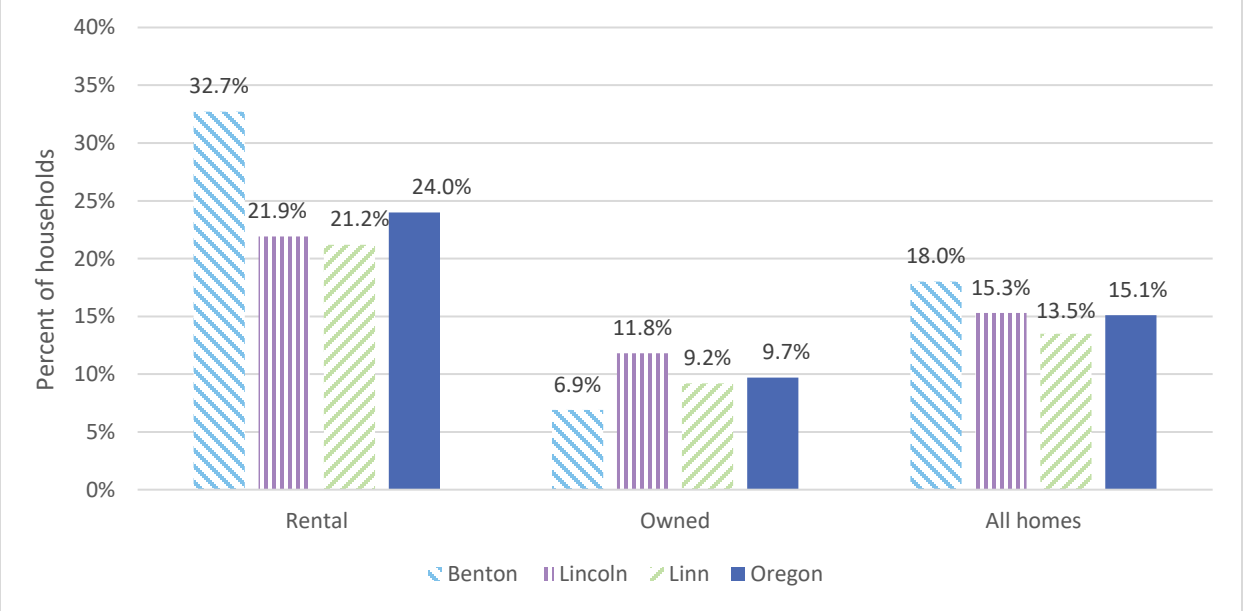
Data source: United States Census Bureau, America Community Survey, Table DP04
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-6: Percent of households experiencing housing burden by ownership status and location



Note: Housing burden is defined as paying more than 30% of household income on rent, mortgage, and utilities.
Data Source: United States Census Bureau, America Community Survey, Tables B2507s & B25091
Time period: 2020
For more information: https://data.census.gov/cedsci/

Figure 4-7: Percent of households experiencing extreme housing burden by ownership status and location



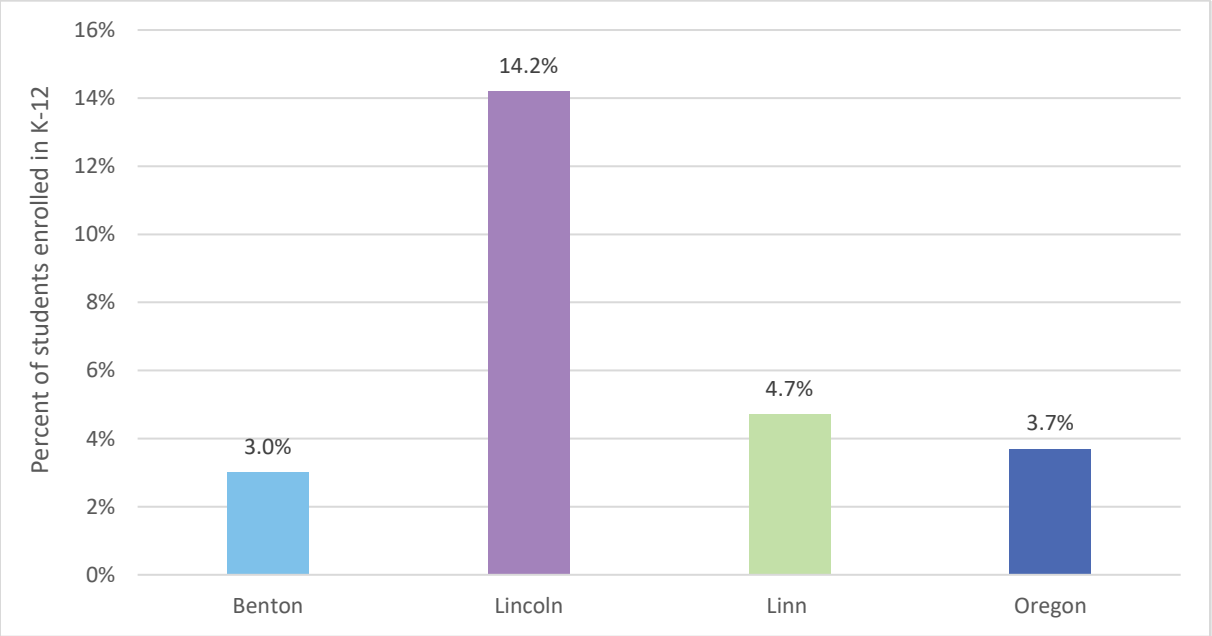
Note: Extreme housing burden is defined as paying more than 50% of household income on rent, mortgage, and utilities.
Data source: United States Census Bureau, America Community Survey, Table B25070, B25091
Time period: 2020
For more information: https://data.census.gov/cedsci/

Table 4-10: Demographics of the populations experiencing chronic homelessness by location

Demographic	Benton	Lincoln	Linn	Oregon
Percent of unhoused persons experiencing chronic homelessness	31%	35%	42%	31%
Percent of Veterans who experience chronic homelessness	65%	67%	52%	43%

Note: Chronic homelessness is used to describe people who have experienced homelessness for at least a year — or repeatedly — while struggling with a disabling condition such as a serious mental illness, substance use disorder, or physical disability.
Data source: Point-in-Time Homeless Count
Time period: 2019
For more information:
https://public.tableau.com/app/profile/oregon.housing.and.community.services/viz/2019Point-in-TimeDashboard/Story1

Figure 4-8: Percent of students enrolled in K-12 experiencing homelessness



Data source: Oregon Department of Education, K-12 District Totals and Percent of Enrollment
Time period: 2019-2020
For more information: https://www.oregon.gov/ode/schools-and-districts/grants/esea/mckinney-vento/pages/default.aspx

Table 4-11: Percent of the homeless population by race and location

Race	Benton	Lincoln	Linn	Oregon
Asian	1%	0%	0%	4%
Black / African American	3%	1%	3%	2%
Native American	4%	7%	2%	1%
Native Hawaiian / Pacific Islander	1%	0%	1%	0.4%
Two or more races	7%	7%	6%	5%
White	83%	85%	85%	85%

Data source: Point-in-Time Homeless Count
Time period: 2019
For more information:
https://public.tableau.com/app/profile/oregon.housing.and.community.services/viz/2019Point-in-TimeDashboard/Story1

5 Access to Health Services

Being able to access high-quality health care when needed is important for everyone. However, access to affordable quality healthcare remains a systemic issue across the country. Gaps in care access have been attributed to costs, rurality, provider shortages, and a lack of trust in the medical community.

In the LBL region, Samaritan Health Services is the largest provider of healthcare services. Samaritan operates five hospitals (two acute care hospitals, in Corvallis and Albany, and three critical access hospitals, in Lebanon, Lincoln City, and Newport) and 80 outpatient clinics spread throughout Benton, Lincoln and Linn counties. The Community Health Centers of Benton & Linn Counties operate four Federally Qualified Health Centers (Alsea, Corvallis, Lebanon, and Sweet Home) and two school-based health clinics (Corvallis and Monroe) throughout the region. The Lincoln Community Health Center operates three Federally Qualified Health Centers (Newport, Lincoln City, and Waldport) and four school-based health clinics (Newport, Taft, Toledo, and Waldport).

The healthcare industry in the United States is undergoing substantial changes. Emerging issues related to access to health services include the rise of telemedicine; policy changes related to abortion; and gender-affirming care for transgender individuals.

Telemedicine presents the opportunity to provide convenient cost-effective care to all populations, minimizing existing barriers to accessible healthcare. Since the start of the COVID-19 pandemic, the occurrence of telemedicine encounters has drastically increased. However, recent studies have documented inequalities in telemedicine utilization based on race and ethnicity, household income, and age.[38] Future usage of telemedicine will require direct attention towards this issue to prevent worsening disparities from occurring.

On June 24, 2022, the United States Supreme Court announced its decision to overturn Roe v. Wade severely limiting abortion access in the United States. Shortly after the announcement, Oregon leadership declared that they would be participating in a pact with Washington and California to protect abortion and contraceptive access. In 2020, Oregon providers performed approximately 7,000 elective abortions, of which 4% were performed for gestational parents residing in the LBL region.[39] As abortion access in other regions of the country becomes severely limited, it is expected that there will be an increased demand among out of state residents seeking abortion care in Oregon. Subsequently, availability of reproductive services will need to increase to continually provide timely access to care for all gestational people seeking treatment.

Identification as transgender or gender nonconformity has become increasingly prevalent in younger generations. In Oregon, 1.2% of adolescents between 13 and 17 years of age identify as transgender. In comparison, only 0.6% of adults identified as transgender. In the United States, an estimated 1.6 million people identify as transgender with over a quarter of the transgender population residing in the Western region of the country.[40] Literature has shown an extensive history of health disparities and barriers to care among transgender populations. As transgender youth grow and become more active healthcare consumers it is essential that adequate infrastructure is established to readily provide necessary care.

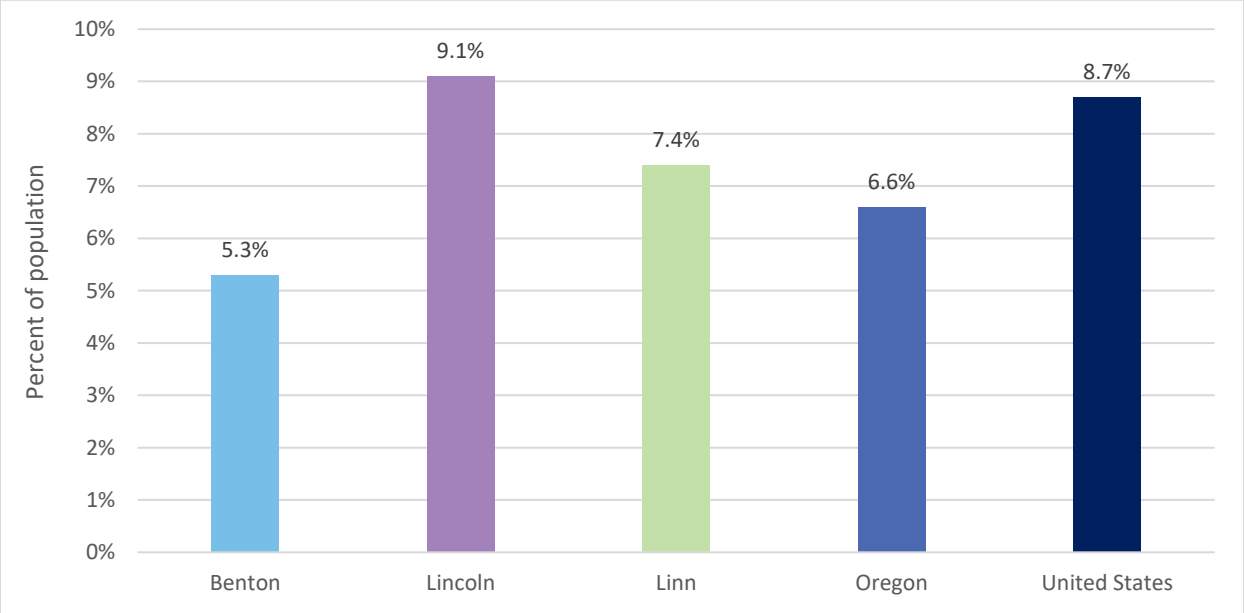
Locally, an issue related to access to care is increasing the primary care provider workforce. Samaritan Health Services created a new residency track for rural health (based in Newport) in 2022 as part of the

ACGME-accredited family medicine residency program based in Corvallis. This track offers two positions each year to enter the three-year program.

Insurance Coverage

Health insurance helps to guarantee a person can afford medical care in case of an emergency or when seeking preventative medicine. Between the three major types of health insurance (private insurance providers, Medicaid, and Medicare), 90% of the population residing in the LBL region has health insurance (Figure 5-1). LBL residents between the ages of 26 and 34 years of age had the lowest rates of insurance coverage (Table 5-1). This gap in coverage can be partially attributed to a stipulation in the Affordable Care Act (ACA), which only requires insurance providers to cover dependents until the age of 26. In the LBL region, Native Hawaiian/Pacific Islanders had the highest rates of insurance coverage (Table 5-2). Although insurance helps to reduce the financial burden of healthcare, the out-of-pocket cost of medical services is still a common issue reported by Americans.

Figure 5-1*:* Percent of the population without health insurance by location



Data source: United States Census Bureau, America Community Survey, Table S2701
Time period: 2016-2020
For more information: https://data.census.gov/all

Table 5-1: Percent of the population with health insurance coverage by age group and location

Age	Benton	Lincoln	Linn	Oregon
Under 6 years	98.4%	95.7%	91.5%	97.2%
6 to 18 years	95.9%	95.8%	93.3%	96.2%
19 to 25 years	93.2%	80.4%	87.6%	89.3%
26 to 34 years	88.7%	78.3%	87.8%	87.8%
35 to 44 years	93.0%	81.0%	88.9%	89.9%
45 to 54 years	93.1%	83.5%	93.3%	91.6%
55 to 64 years	96.0%	91.6%	93.1%	93.4%
65 to 74 years	99.3%	99.4%	99.1%	99.3%
75 years and older	100.0%	100.0%	99.5%	99.6%

Data source: United States Census Bureau, America Community Survey, Table S2701
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 5-2: Percent of the population with health insurance coverage by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native alone	64.1%	87.2%	93.9%	87.7%
Asian alone	92.8%	87.2%	96.8%	94.9%
Black or African American alone	83.9%	89.9%	100.0%	93.0%
Hispanic or Latino ethnicity (of any race)	84.9%	81.2%	86.3%	84.9%
Native Hawaiian or Pacific Islander alone	100.0%	100.0%	100.0%	88.9%
Some other race alone	78.6%	84.1%	85.5%	83.2%
Two or more races	94.4%	94.4%	92.2%	91.9%
White alone	95.6%	91.0%	92.8%	93.9%

Data source: United States Census Bureau, America Community Survey, Table S2701
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 5-3: Percent of the population with health insurance coverage by income level and location

Income	Benton	Lincoln	Linn	Oregon
Under $25,000	89.6%	90.4%	89.3%	91.0%
$25,000 to $49,999	93.5%	91.8%	89.3%	90.2%
$50,000 to $74,999	95.0%	87.6%	90.8%	91.5%
$75,000 to $99,999	92.7%	88.5%	95.6%	93.8%
$100,000 or more	97.2%	94.7%	96.5%	96.3%

Data source: United States Census Bureau, America Community Survey, Table B27015
Time period: 2016-2020
For more information: https://data.census.gov/table?q=B27015&g=0500000US41003,41041,41043

Provider Availability

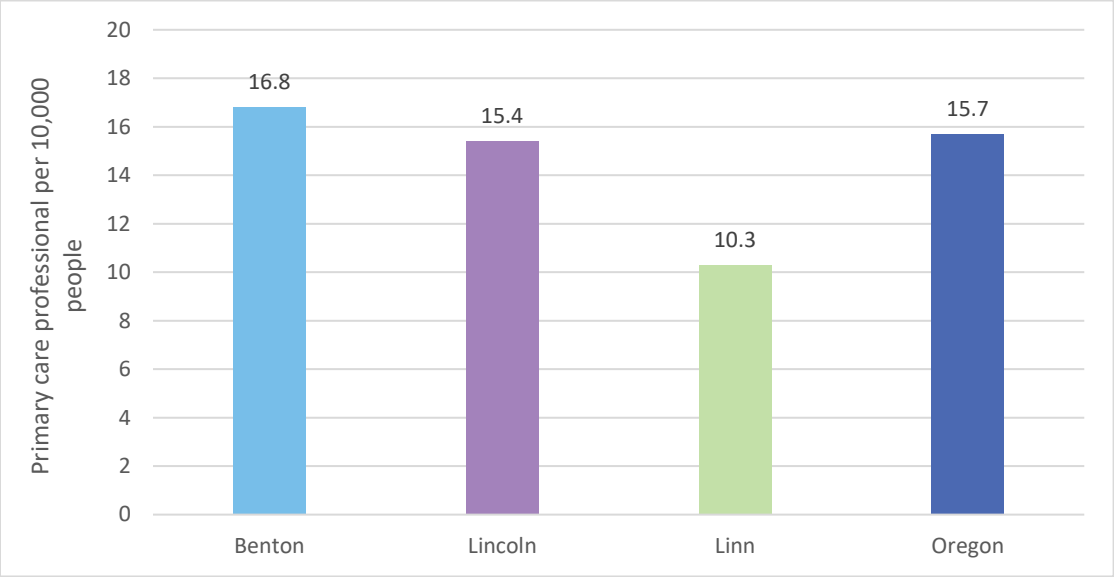
An adequate healthcare workforce is necessary for increasing access to care, improving patient experiences, and controlling service costs. The Association of American Medical Colleges has documented a growing concern in physician shortages due to an aging workforce, growing medical demands of served populations, and a limited number of new physicians being trained.[41] The COVID-19 pandemic has exacerbated the already dwindling number of physicians and has led to critical shortages in healthcare providers of all levels. It is anticipated that by 2034, an extra 37,800-124,000 physicians will be needed to adequately supply the American population with healthcare.[42]

Oregon's rural and frontier areas tend to have less access to healthcare providers and face greater barriers to accessing healthcare services.[43] Benton County has the greatest access to both primary care and behavioral health professionals. Despite making up only 35% of the LBL regional population, Benton County contains over 50% of all primary care physicians in the area. In contrast, Linn County residents make up 47% of the regional population but only 36% of the region's primary care physicians serve the area. Both Linn and Lincoln counties have fewer primary care professionals per 10,000 people than the state of Oregon (Figure 5-2). There is some overlap between the categorization of primary care and behavioral health professionals. Amongst the counties making up the LBL region, access to primary care and behavioral health providers follow similar trends, with Linn County having the least access per 10,000 people, followed by Lincoln County.

The terms 'mental health' and 'behavioral health' are at times used interchangeably, but while closely related, they do differ. Behavioral health describes the connection between a person's behaviors and the health and wellbeing of the body and mind,[44] while mental health refers only to one's emotional, psychological and social wellbeing.[45] There is some overlap between the categorization of mental health professionals and behavioral health professionals. In the LBL region, mental health providers were primarily located within city limits (Table 5-4). The city of Newport, located within Lincoln County, had the most mental health providers per 10,000 residents, although the county as a whole ranks below Benton County for access to mental health providers.

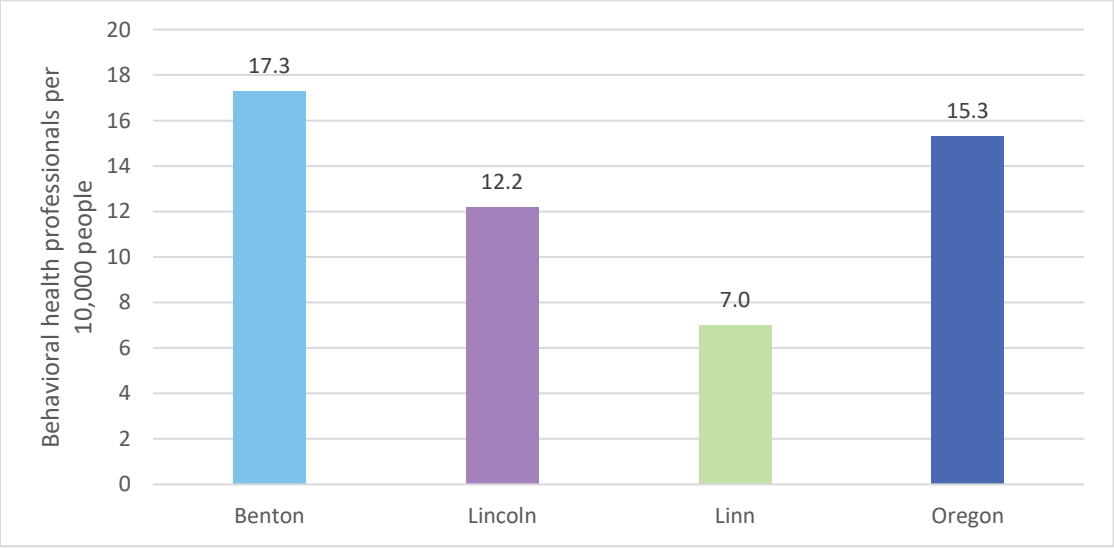
All three of the counties making up the LBL region had fewer dentists per 10,000 people than did the state of Oregon in 2020. Of the three counties, Lincoln has the greatest access to oral health providers, followed closely by Benton (Figure 5-4).

Figure 5-2. Primary care professionals per 10,000 people by location



Data source: Oregon's Health Care Workforce Reporting Program
Time period: 2020
For more information: https://www.oregon.gov/oha/HPA/ANALYTICS/HealthCareWorkforceReporting/2021-Workforce-Supply-for-web.pdf

Figure 5-3: Behavioral health professionals per 10,000 people by location



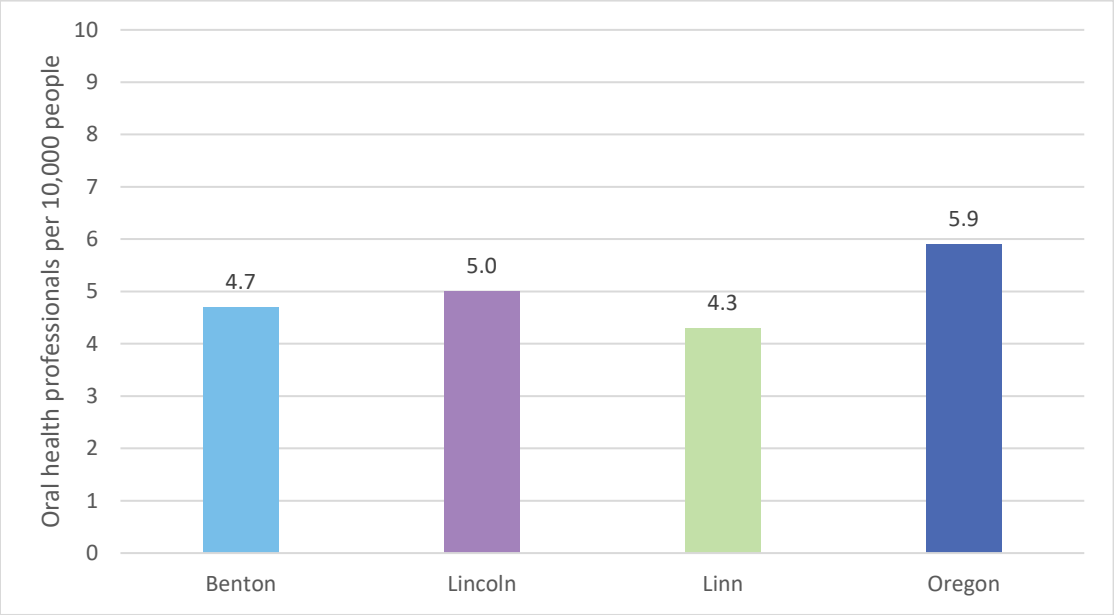
Data source: Oregon's Health Care Workforce Reporting Program
Time period: 2020
For more information: https://www.oregon.gov/oha/HPA/ANALYTICS/HealthCareWorkforceReporting/2021-Workforce-Supply-for-web.pdf

Table 5-4: Number of mental health professionals per 10,000 people by location

City	County	Mental Health Professionals per 10,000 people
Corvallis/Philomath	Benton	16.8
Monroe	Benton	0
Alsea	Benton	0
Newport	Lincoln	22.7
Lincoln City	Lincoln	9.7
Siletz	Lincoln	4.8
Waldport	Lincoln	3.5
Yachats	Lincoln	3.3
Toledo	Lincoln	2.8
Lebanon	Linn	3.0
Harrisburg	Linn	1.5
Sweet Home	Linn	1.0
Mill City/Gates	Linn	0.1
Brownsville	Linn	0
Scio	Linn	0
Albany	Linn/Benton	7.9
Oregon		12.5

Data source: Oregon Areas of Unmet Health Care Need Report
Time period: 2021
For more information: https://www.ohsu.edu/sites/default/files/2021-09/2021%20Areas%20of%20Unmet%20Health%20Care%20Needs%20Report%202.pdf

Figure 5-4: Number of oral health professionals per 10,000 people by location



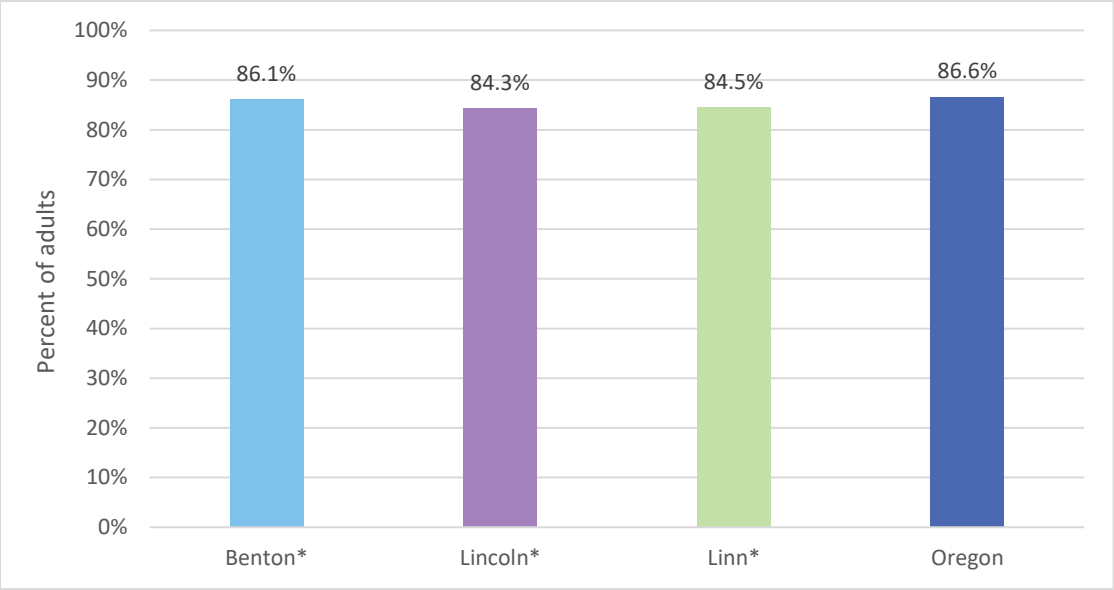
Data source: Oregon's Health Care Workforce Reporting Program
Time period: 2020
For more information: https://www.oregon.gov/oha/HPA/ANALYTICS/HealthCareWorkforceReporting/2021-Workforce-Supply-for-web.pdf

Preventive Services

The prevalence of chronic disease in the United States is an increasing concern among the medical community. Current statistics show that six out of every ten Americans will develop a chronic disease in their lifetime.[46] With the growing concern of chronic disease, medicine has shifted to focus on prevention. Screenings can identify the early warning signs of disease leading to improved prognosis and longer life expectancy. Current screening guidelines developed by American Heart Association recommend cholesterol screenings every 4-6 years beginning at age 20.[47] The United States Preventative Services Task Force recommends that women who are 50 to 74 years old and are at average risk for breast cancer get a mammogram every two years.[48] Although the percent of adults who follow screening guidelines varies by test, overall, Benton County residents were the most likely to follow screening guidelines in the region closely followed by Linn County. In addition to laboratory screenings, guidelines recommend routine annual exams with medical providers and annual prophylaxis dental cleanings to help prevent disease. Linn County had the highest percent of adults with a preventative doctor visit in the LBL region, and Benton County had the highest percent of adults who visited a dentist in the previous year.

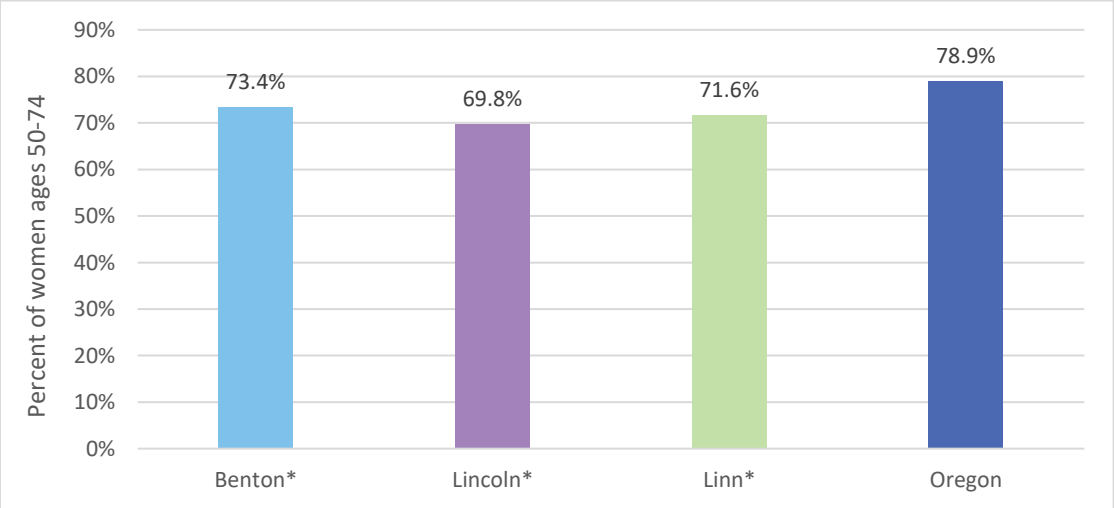
Much of the data in this section comes from the CDC's PLACES estimates based on the Behavioral Risk Factor Surveillance System (BRFSS). PLACES is a small area estimation approach that produces county-level results based on statistical modeling of all available survey responses. For more information on PLACES methodology, see https://www.cdc.gov/places/methodology/index.html.

Figure 5-5: Age-adjusted percent of adults who received cholesterol screening within the past five years by location



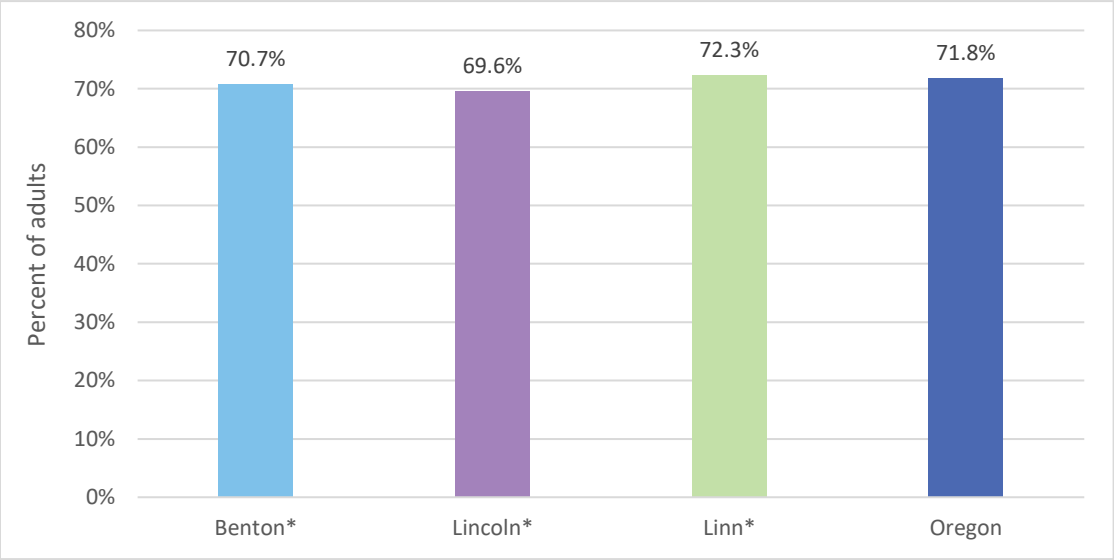
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 5-6: Age-adjusted percent of women ages 50-74 who received a mammogram within the past two years by location



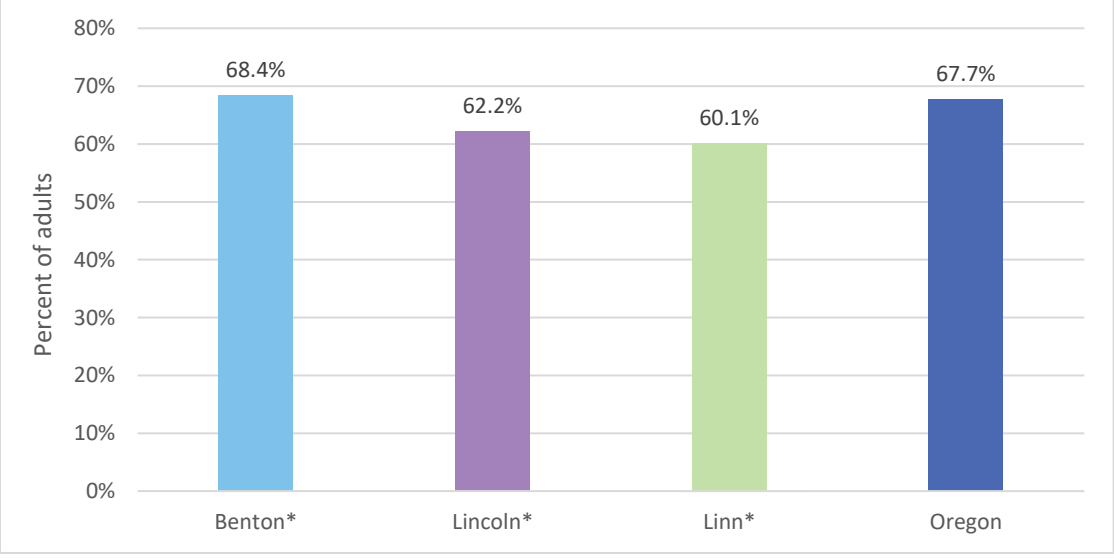
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 5-7: Age-adjusted percent of adults who visited a doctor for a routine check-up within the past year by location



**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 5-8: Age-adjusted percent of adults who visited the dentist within the past year by location



**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Oregon Health Plan (Medicaid): InterCommunity Health Network Coordinated Care Organization (IHN-CCO)

The Oregon Health Plan (OHP) is Oregon's Medicaid program. The Oregon Health Authority established a network of Coordinated Care Organizations (CCOs) as Medicaid managed care organizations to coordinate services for people covered by the Oregon Health Plan. InterCommunity Health Network Coordinated Care Organization (IHN-CCO), established in 2012, is responsible for managing care for OHP members in the LBL region. The Medicaid population in Oregon, like the rest of the country, is primarily low-income. Studies have found that Medicaid recipients face greater barriers to care and generally have worse health status than people with commercial insurance.[49, 50]

CCOs participate in an annual Consumer Assessment of Healthcare Providers Survey (CAHPS) to measure accessibility of healthcare services. Table 5-5 includes results for IHN-CCO members surveyed in 2021. Most surveyed IHN enrollees reported having adequate access to necessary health services in a timely manner, though perceived access to specialized therapy and medical equipment was lower.

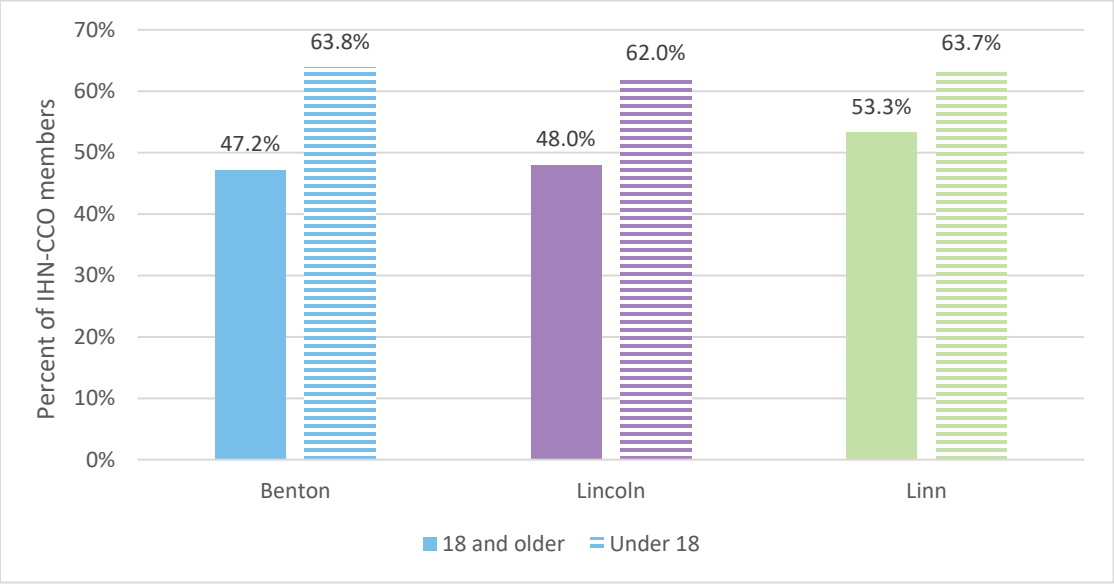
People covered by Medicaid have been shown to have greater emergency department utilization than persons insured through a private provider.[51] In 2021, approximately 23% of all IHN-CCO members visited an emergency department at least once (Figure 5-10).

Table 5-5: IHN-CCO Consumer Assessment of Healthcare Providers survey results

	Never	Sometimes	Usually	Always
How often did you get an appointment for a check-up or routine care as soon as you needed?	3.3%	16.8%	26.6%	53.2%
How often was it easy to get the care, tests, or treatment you needed?	2.2%	13.8%	32.8%	51.2%
How often did you get an appointment with a specialist as soon as you needed?	5.5%	15.6%	30.6%	48.2%
How often was it easy to get the special therapy you needed through your health plan?	13.7%	14.8%	26.2%	45.3%
How often was it easy to get the medical equipment you needed through your health plan?	18.5%	16.4%	20.8%	44.3%

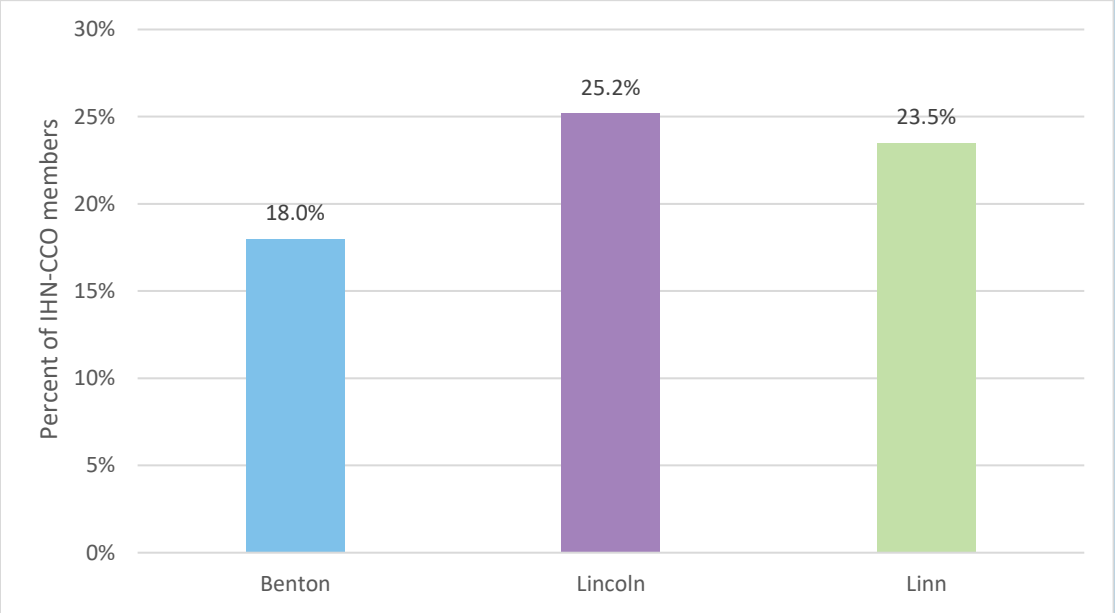
Data source: InterCommunity Health Network CCO 2021 Consumer Assessment of Healthcare Providers Survey
Time period: 2021
For more information:
https://www.oregon.gov/oha/HPA/ANALYTICS/CAHPS%20documents/InterCommunity%20Health%20Network%202020%20(Adult).pdf

Figure 5-9: Percent of IHN-CCO members with a dental claim in the past year by age category and location



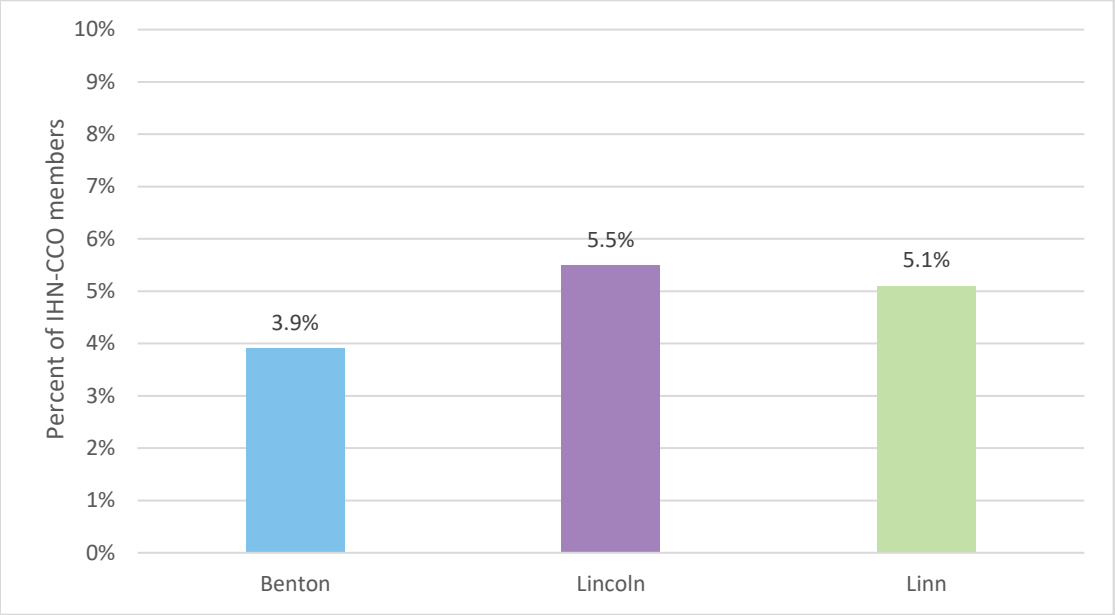
Data source: IHN-CCO claims data
Time period: 2021
For more information: email SHSresearch@samhealth.org

Figure 5-10: Percent of IHN-CCO members with at least one visit to an emergency department in the past year by location



Data source: IHN-CCO claims data
Time period: 2021
For more information: email SHSresearch@samhealth.org

Figure 5-11: Percent of IHN-CCO members with five or more visits to an emergency room in the past year by location



Data source: IHN-CCO claims data
Time period: 2021
For more information: email SHSresearch@samhealth.org

6 Morbidity and Mortality

Traditional measures used to evaluate the health of populations are morbidity (rate of disease) and mortality (deaths). Data on the leading causes of illness and death within a population can equip those seeking to improve the health of communities with information needed to prevent loss of life and improve quality of life. This chapter will present data on leading causes of death and occurrence of chronic and infectious disease with the exclusion of COVID-19 data, which can be found in Chapter 9: COVID-19.

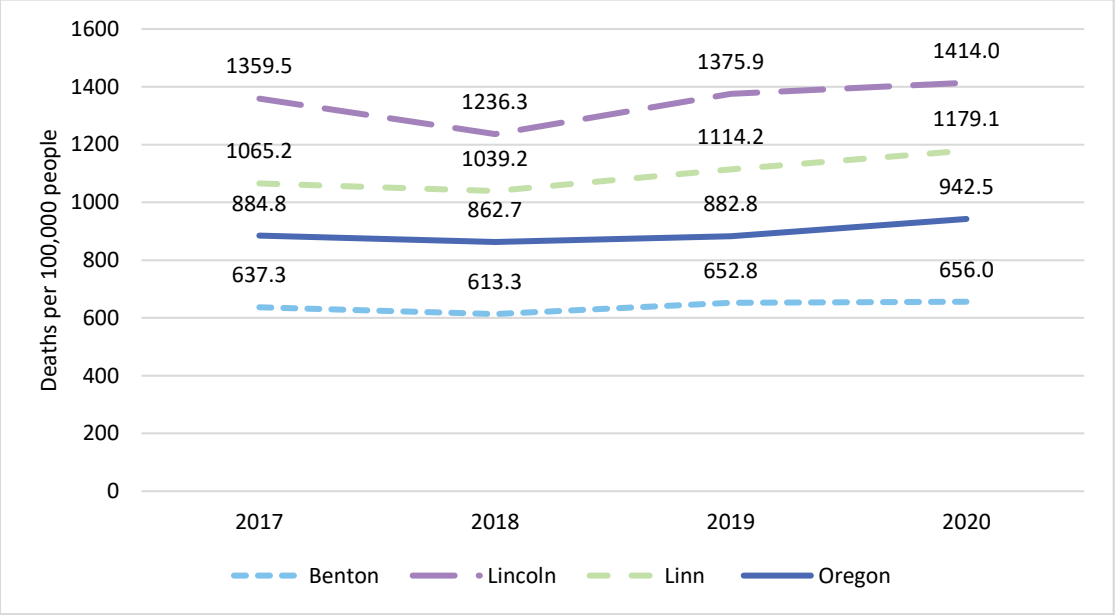
Mortality

Mortality is a measure of the number of deaths in a population. Crude death rate measures the number of deaths in a particular population per 100,000 people and is one way to capture mortality data. In 2020, all three counties making up the LBL region experienced their highest crude death rate since 2017. Lincoln County's crude death rate in 2020 was 1,414 deaths per 100,000 residents, the highest in the LBL region. Both Lincoln and Linn county's death rates exceeded that of the state average from years 2017-2020.

As would be expected, crude death rate increased substantially with age in all counties making up the LBL region. In 2020, men made up the greatest proportion of deaths in Linn County, Lincoln County, and the state of Oregon. Benton County's crude death rate was comparable between genders, with slightly fewer females having died in 2020.

Unfortunately, data on death rates by race/ethnicity were not available at the time of this report's release. The Oregon Health Authority (OHA) has a dashboard with county-specific mortality rates by race/ethnicity, but accurate data was not available when this report was drafted. Mortality data by race/ethnicity should be available at the following link once data has been updated and released by OHA:
https://visualdata.dhsoha.state.or.us/t/OHA/views/CountyDash/CountyDash_cause?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=

Figure 6-1: Number of deaths per 100,000 people by year and location (crude death rate)



Data source: OHA Center for Health Statistics
Time period: 2017-2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/CountyDash/CountyDash_cause?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Table 6-1: Number of deaths per 100,000 people by age group and location

Age (years)	Benton	Lincoln	Linn	Oregon
0-4	*	*	164.9	86.5
5-14	*	*	*	11.8
15-24	*	*	121.3	73.0
25-34	*	221.6	122.2	127.2
35-44	158.7	426.9	244.8	179.5
45-54	279.5	569.6	288.1	381.7
55-64	452.6	953.2	1,167.2	869.0
65-74	1,238.7	2,015.9	2,117.9	1,750.6
75-84	2,976.9	4,034.8	5,006.9	4,389.1
85+	11,326.1	13,572.0	17,032.4	14,121.4

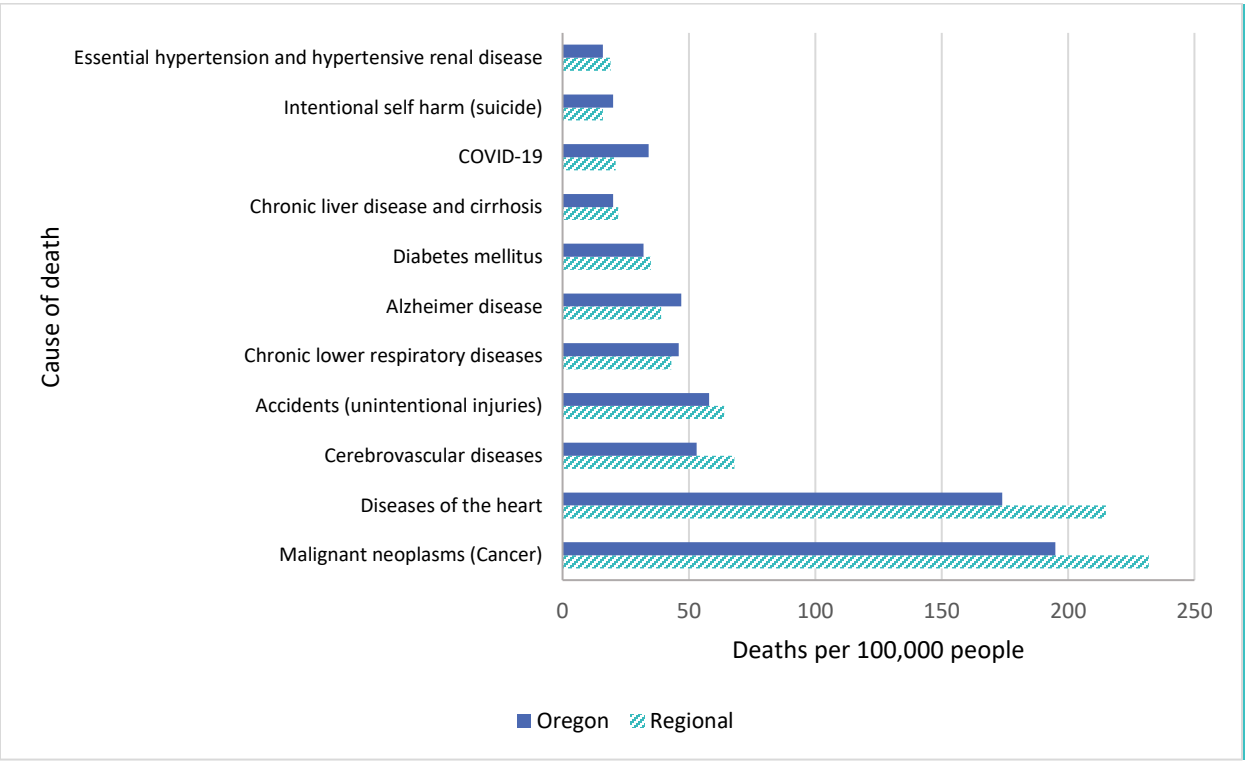
**Unreliable due to small numbers*
Data source: Oregon Public Health Assessment Tool
Time period: 2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/LeadingCausesDash/LeadingDash1?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Leading Causes of Death

The leading cause of death in the LBL region is cancer, followed by diseases of the heart and cerebrovascular diseases (Figure 6-3). Nationally, the most common disease of the heart is coronary heart disease, which occurs when arteries supplying blood to the heart narrow or harden from the formation of plaque. Cerebrovascular disease refers to a group of conditions that affect blood flow to the brain. Lack of sufficient blood flow affects brain tissue and may cause a stroke. Coronary heart disease, stroke, and many types of cancer are preventable with lifestyle changes.

The leading causes of death vary slightly across the three counties making up the LBL region. The leading cause of death in both Lincoln and Benton counties is cancer, followed by diseases of the heart. In Linn County, the leading cause of death is diseases of the heart, followed closely by cancer (Table 6-3).

Figure 6-2: Leading causes of death per 100,000 people comparison of Oregon and Linn-Benton-Lincoln Region



Data source: Oregon Public Health Assessment Tool
Time period: 2020
For more information: Contact the Benton County Health Department

Table 6-2: Number of deaths per 100,000 people by leading causes of death and location

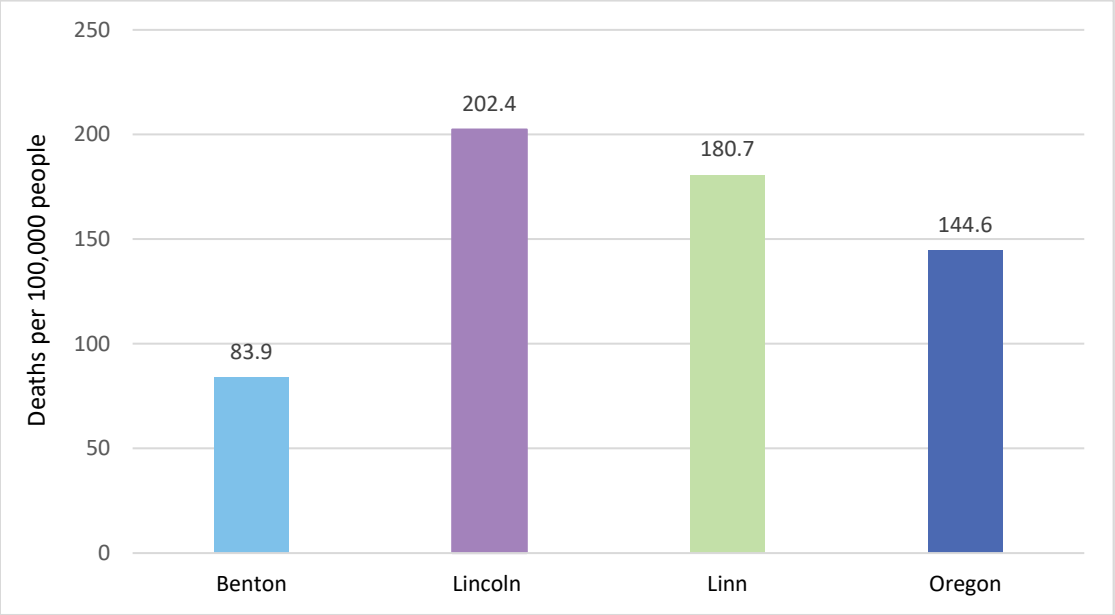
Cause of Death	Benton	Lincoln	Linn	Oregon
Malignant neoplasms (cancer)	152.1	356.1	253.7	194.2
Diseases of the heart	138.4	262.9	262.3	172.7
Cerebrovascular diseases	35.9	66.3	94.3	52.4
Accidents (unintentional injuries)	34.9	105.6	72.3	57.8
Alzheimer Disease	34.9	39.3	44.0	47.1
Diabetes mellitus	21.1	72.5	33.0	31.8
Chronic lower respiratory diseases	18.0	76.6	51.1	46.1
Chronic liver disease and cirrhosis	12.7	43.5	22.0	19.5
COVID-19	10.6	29.0	27.5	33.6
Essential hypertension and hypertensive renal disease	10.6	24.8	24.3	15.8
Intentional self-harm (suicide)	9.5	29.0	17.3	19.6

Data source: OHA Center for Health Statistics
Time period: 2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/CountyDash/CountyDash_cause

Tobacco-Related Mortality

Tobacco use is the number-one cause of preventable death and disease in Oregon.[52] Each year, tobacco use kills over 8,000 Oregonians and costs almost $5.7 billion in medical expenses and lost productivity. In Linn and Lincoln counties, tobacco was responsible for an average of 180.7 and 202.4 deaths per 100,000 people respectively from years 2017 to 2020. These rates exceeded that of Oregon and far exceeded that of Benton County, which experienced an average of 83.9 deaths related to tobacco use per 100,000 people from years 2017 to 2020 (Figure 6-4).

Figure 6-3: Age-adjusted number of deaths per 100,000 people related to tobacco use by location

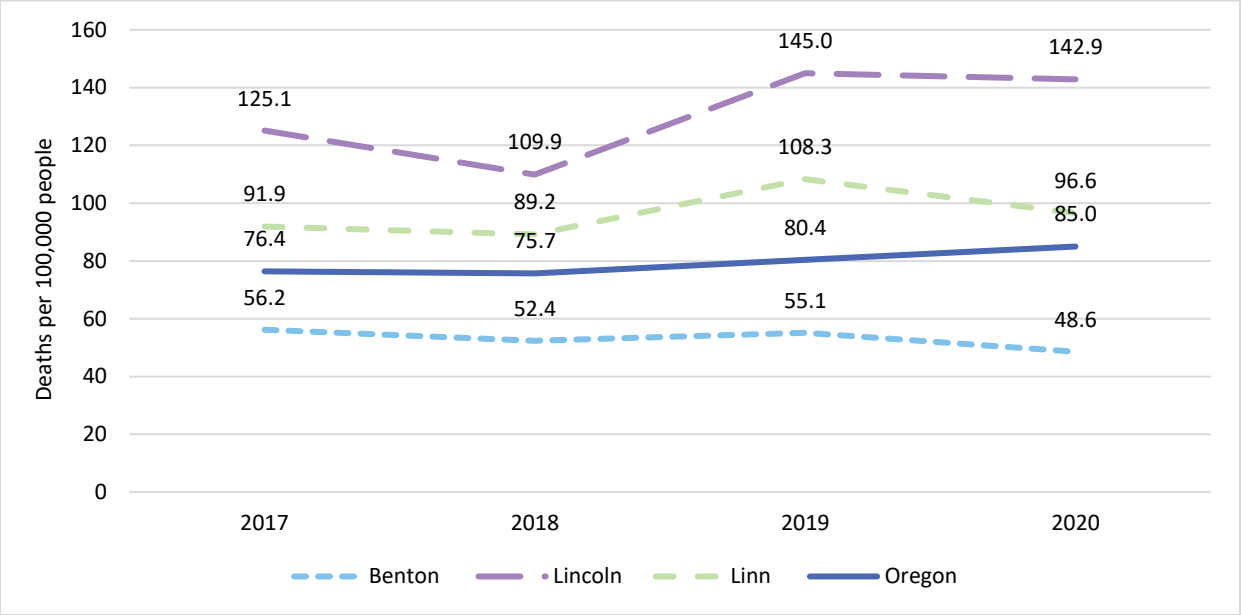


Data source: OHA Center for Health Statistics
Time period: 2017-2020
For more information: https://www.oregon.gov/oha/ph/preventionwellness/tobaccoprevention/pages/oregon-tobacco-facts.aspx

Injury

Injury is the leading cause of death for Oregonians between the ages 1 and 44. Unintentional injury is the fourth leading cause of death among those of all ages in the LBL region (Table 6-3). From years 2017-2020, Lincoln County experienced the highest rate of injury deaths in the LBL region, followed by Linn County. Falls accounted for the greatest number of injury deaths in the LBL region, but these rates vary drastically by county. In 2020, Lincoln County experienced 1.5 and 2.9 times the number of deaths from falls as Linn and Benton counties respectively. Overdose/poisoning is the second leading cause of injury death in the region and was the leading cause of injury death in Linn County in 2020. During that year, Linn County experienced 25.1 deaths from overdose/poisoning per 100,000 people (Table 6-4).

Figure 6-4: Number of injury deaths per 100,000 people by location



Date source: OHA Center for Health Statistics
Time period: 2017-2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/Oregondeathsfromexternalinjuries/CountyDash?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Table 6-3: Number of injury deaths per 100,000 people by leading causes of injury deaths and location

Cause of Injury Death	Benton	Lincoln	Linn	Oregon
Fall	23.2	55.9	19.6	19.5
Poisoning/Overdose	7.4	22.8	25.1	21.1
Transportation	7.4	22.8	19.6	13.6
Firearm	5.3	14.5	9.4	13.9
Suffocation	3.2	10.4	8.6	6.7
Drowning	0	8.3	4.7	2.0
Contact with Object	0	4.1	1.6	1.5
Medical Care Complications	2.1	0	0.8	1.9

Data source: OHA Center for Health Statistics
Time period: 2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/Oregondeathsfromexternalinjuries/CountyDash?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Homicide

Injuries can be split into two categories, intentional and unintentional. Intentional injuries are comprised of homicides, suicides, and some undetermined deaths. From years 2017 to 2020, the LBL region experienced 29 homicides total. During this time, Benton County experienced 4 homicides, Lincoln County experienced 5 homicides, and Linn County experienced 20 homicides. Suicides account for a greater number of deaths in the region than do homicides. The region's suicide deaths will be explored in Chapter 8: Mental and Behavioral Health.

Chronic disease

A chronic disease is a condition that lasts at least one year and requires ongoing medical attention. Chronic diseases including heart disease, cancer, and diabetes are the leading causes of death in the United States.[53] Many chronic diseases can be prevented through lifestyle changes that target risk behaviors like tobacco use, poor nutrition, lack of physical activity, and excessive alcohol use. These individual choices however can be greatly constrained by the characteristics of one's community and life circumstances. Chapter 4: Social Determinants of Health includes data on characteristics of the three counties that may influence community members' ability to make positive health choices.

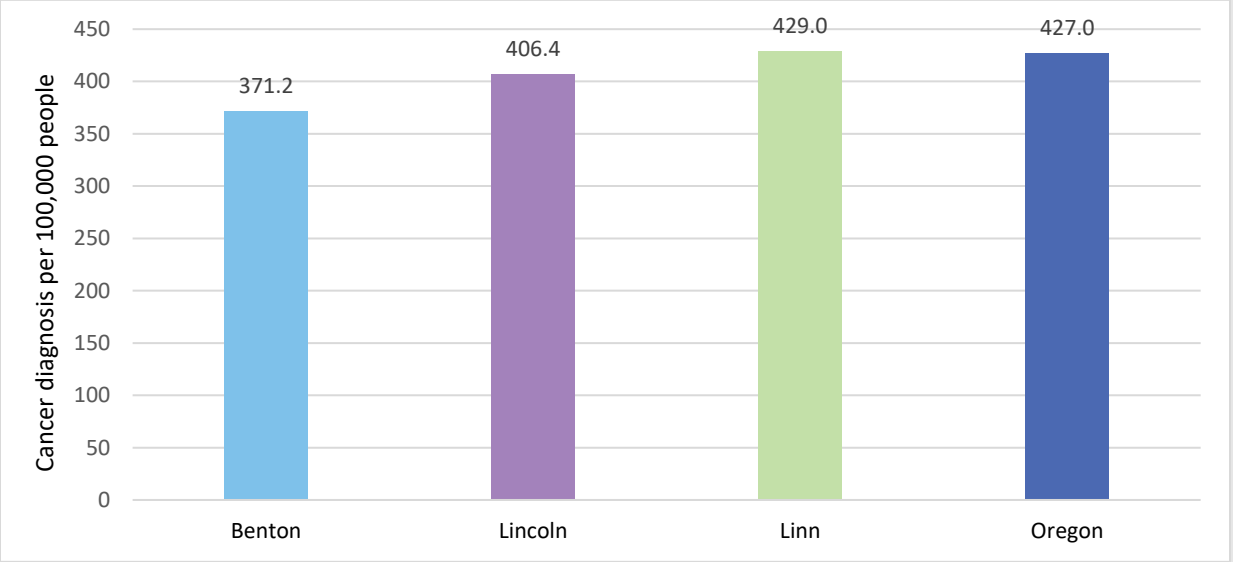
Cancer

Cancer is the leading cause of death in the LBL region and the state of Oregon. Each year, approximately 430 per 100,000 people in Oregon receive a cancer diagnosis and approximately 150 per 100,000 people die each year from cancer in the state. The LBL region's age-adjusted rate of newly diagnosed cancer cases range from 371.2 diagnoses per 100,000 people annually in Benton County to 429.0 diagnoses per 100,000 people annually in Linn County (Figure 6-5). On average, the LBL region experienced fewer cancer diagnoses than the state of Oregon. While Linn County's rate of cancer diagnosis is the highest in the region, its cancer mortality rate is comparable to that of Lincoln County. Annual cancer deaths ranged from 128.6 deaths per 100,000 people in Benton County to 172.5 cancer deaths per 100,000 people in Linn County over the years 2016-2020 (Figure 6-6). Note the difference between crude (unadjusted) mortality rates, as shown in Table 6-2, and age-adjusted mortality rates, as shown in Figure 6-6. The differences in mortality rates between Lincoln County and Benton County are much larger using crude mortality rates than with age-adjusted mortality rates, since the population in Lincoln County is substantially older than the population in Benton County. After adjusting for differences in the age of each county's population, the rates of cancer death experienced in each county of the LBL region are more similar.

Breast cancer makes up the largest proportion of cancer diagnoses in the LBL region, followed by prostate and lung and bronchus cancers (Table 6-4). From 2015 to 2019, Benton County experienced a high incidence (new occurrence) of breast cancer diagnosis, approximately 1.3 times higher than Linn and Lincoln counties. Despite its high incidence of breast cancer diagnosis, Benton County's breast cancer mortality rate was the same as the state of Oregon, and below that of Lincoln County during years 2016 to 2020. Lung cancer was the leading cause of cancer deaths in Oregon and in the LBL region from years 2016-2020. Both Linn and Lincoln counties experience higher rates of death from lung and bronchus cancers than the state and a far greater number than Benton County (Table 6-5). The leading

risk factor for lung cancer is smoking; it's estimated that about 80% of lung cancer deaths are the result of smoking.[54]

Figure 6-5: Age-adjusted number of cancer diagnoses per 100,000 people by location



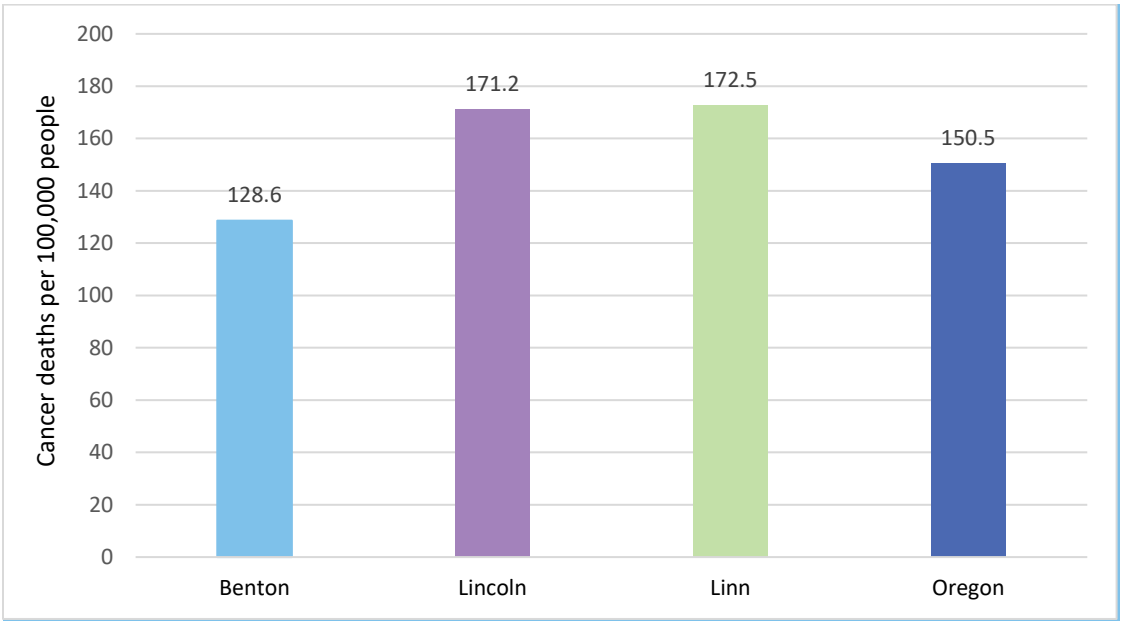
Data source: Oregon State Cancer Registry
Time period: 2015-2019
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

Table 6-4: Age adjusted number of cancer diagnoses per 100,000 people by cancer type and location

Cancer Type	Benton	Lincoln	Linn	Oregon (2019)
Breast	159.1	120.4	116.7	134.6
Prostate	91.0	97.7	109.6	96.4
Lung and Bronchus	31.7	53.8	57.0	46.5
Colon and Rectum	26.6	31.9	32.8	32.1
Corpus and Uterus (not otherwise specified)	29.4	25.6	33.9	30.2
Non-Hodgkin Lymphoma	15.8	19.1	19.2	16.9
Urinary Bladder	19.5	27.8	25.5	19.9

Data source: Oregon State Cancer Registry
Time period: Counties, annual average for 2015-2019; Oregon, 2019 only
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

Figure 6-6: Age adjusted number of cancer deaths per 100,000 people by location



Data source: OHA Center for Health Statistics
Time period: 2016-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

Table 6-5: Age-adjusted number of cancer deaths per 100,000 people by cancer type and location

Cancer Type	Benton	Lincoln	Linn	Oregon (2020)
Breast	18.5	22.4	17.3	18.5
Colon and Rectum	11.4	15.1	11.9	11.2
Lung and Bronchus	24.2	43.6	43.9	30.8
Liver and Intrahepatic Bile Duct	4.1	7.1	8.5	6.8
Ovary	7.8	8.3	8.8	6.1
Pancreas	11.2	13.3	11.9	10.9
Prostate	20.7	15.1	23.0	18.9

Data source: OHA Center for Health Statistics
Time period: Counties, annual average for 2016-2020; Oregon, 2020 only
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

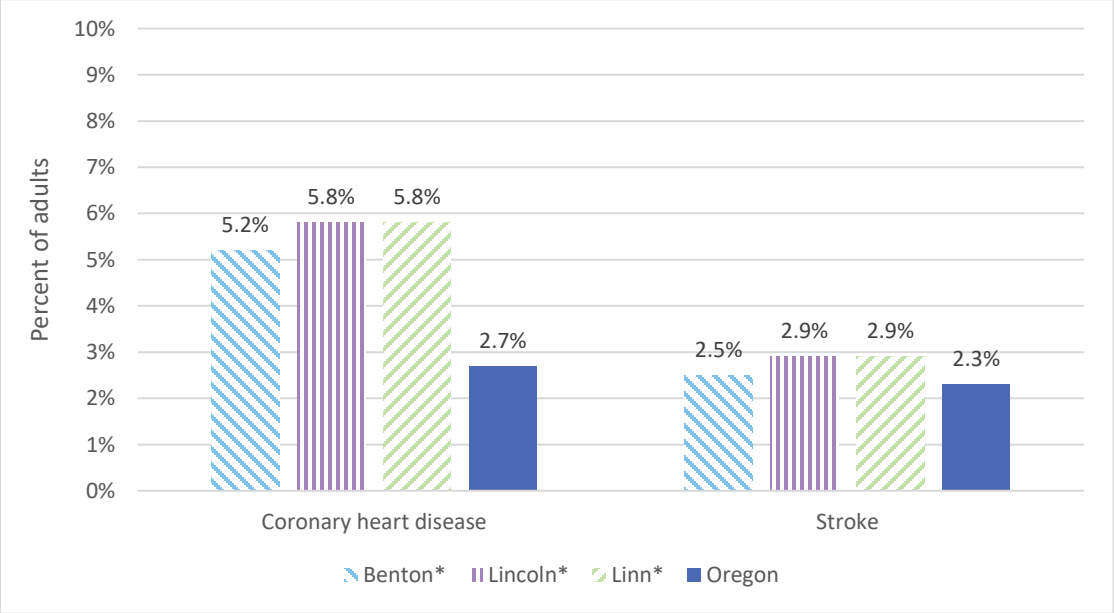
Heart Disease and Stroke

Heart disease is the leading cause of death in the United States and the second leading cause of death in Oregon and the LBL region (Figure 6-3). Heart disease refers to several types of heart conditions, including coronary heart disease, which is the most common type of heart disease. Coronary heart disease is more common in the LBL region than in the state of Oregon on average.

Stroke is the most common type of cerebrovascular disease, resulting from restriction of blood flow to the brain. Cerebrovascular diseases are a leading cause of death in the state of Oregon and in the LBL region (Figure 6-3). Based on PLACES county estimates from 2020, the three counties making up the LBL region experienced a comparable total number of strokes (Figure 6-8). Among those 35 and older, more people died from heart disease and stroke in 2018-2020 in Linn County than in Lincoln or Benton counties. Lincoln County's mortality rate for heart disease and stroke were similar to the state of Oregon, while Benton County's were lower (Figure 6-9).

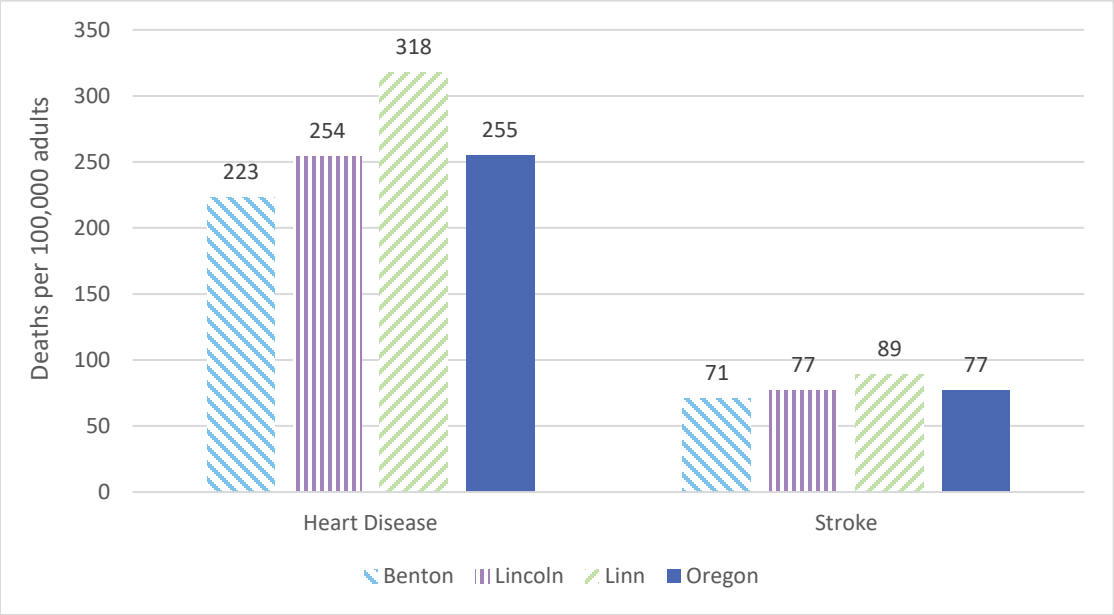
Oregon's Black population has the highest mortality rates from heart disease and stroke when compared to other race/ethnicity groups (Table 6-7 and 6-8). Due to insufficient data, trends in heart disease and stroke mortality by race/ethnicity in the LBL region can't be analyzed fully. Based on the data available, non-Hispanic Whites have the highest mortality rate from heart disease and stroke in the region. Rates of heart disease and stroke also vary by gender. In the region, men are much more likely to die from heart disease than are women, while women in the region (with the exception of Lincoln County) are more likely than men to die from stroke (Figure 6-10 and 6-11).

Figure 6-7: Age adjusted percent of adults who have ever experienced coronary heart disease or stroke by location



**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 6-8: Number of deaths per 100,000 adults 35 years and older from heart disease or stroke by location



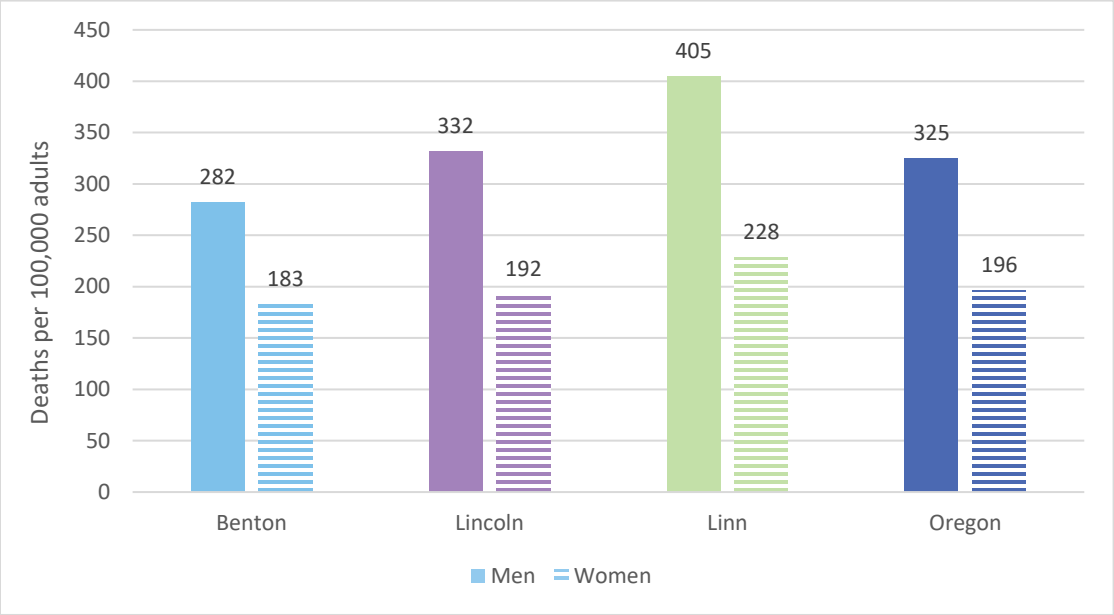
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Table 6-6: Number of deaths per 100,000 adults 35 and older from heart disease by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian / Alaska Native	195	173	247	208
Asian Pacific Islander	119	138	279	133
Black	219	*	241	287
Hispanic	115	164	97	133
White	234	260	325	264

**Unreliable due to small numbers*
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Figure 6-9: Number of deaths per 100,000 adults 35 and older from heart disease by gender and location



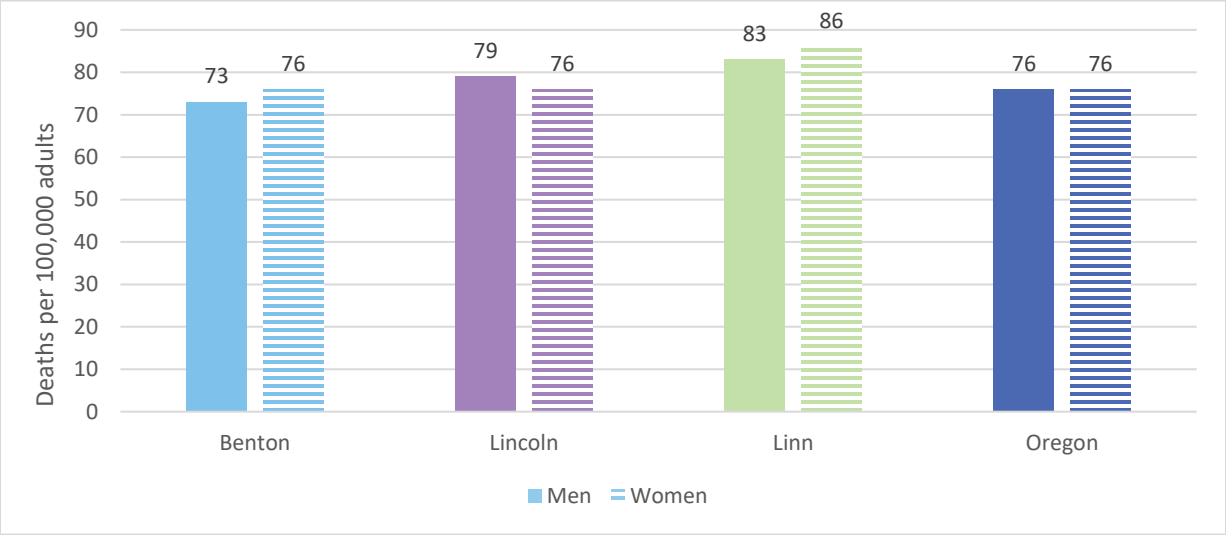
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Table 6-7: Number of deaths per 100,000 adults 35 years and older from stroke by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	*	*	*	63
Asian or Pacific Islander	50	90	73	85
Black	*	*	*	118
Hispanic	53	50	65	60
White	76	78	87	76

**Unreliable due to small numbers*
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Figure 6-10: Number of deaths per 100,000 adults 35 and older from stroke by gender and location



Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Both heart disease and stroke have risk factors that are largely modifiable with lifestyle change including high blood pressure, high cholesterol, diabetes, and obesity. PLACES estimates from years 2019 and 2020 find that the LBL region experienced rates of these risk factors similar to the state average. With the exception of high cholesterol, Benton County had the lowest estimated rates of these risk factors, falling below the state average in most conditions. Linn and Lincoln counties had similar estimated rates, in most cases with higher rates than the state average (Table 6-9). Smoking is another risk factor for heart disease and stroke, as well as numerous additional chronic diseases. Rates of smoking in the LBL region will be explored in Chapter 8: Mental & Behavioral Health.

Table 6-8: Age adjusted percent of adults with risk factors for heart disease and stroke by location

Risk Factor	Benton*	Lincoln*	Linn*	Oregon
High blood pressure	25.8%	28.8%	29.2%	27.5%
High cholesterol	25.8%	25.4%	24.2%	26.0%
Diabetes	8.2%	8.8%	8.8%	8.4%
Obesity	28.5%	32.4%	33.3%	28.1%

**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: Cholesterol and high blood pressure data 2019, diabetes and obesity data 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Infectious Illnesses (Non-COVID)

Prevention and control of infectious illnesses rank among the greatest health advances of the 20th century. The World Health Organization defines infectious diseases as those that are caused by bacteria, viruses, parasites, or fungi; and can be passed from person to person.[55] Some are transmitted via ingesting contaminated food or water, many are spread by microorganisms in coughs or sneezes, and others result from exposures in the environment or insect bites. Diseases that spread from animals are called zoonotic infections. Infectious illnesses are representative of the overall health and wellness of a community through prevention efforts and transition data represented below.

For reference, here are the diseases listed in the graphs below and their associations:

Campylobacteriosis. A bacteria carried by infected livestock which causes a food borne illness from underprepared, contaminated food. It is the most common bacterial cause of diarrheal illness in the United States. For more information visit https://www.cdc.gov/campylobacter/faq.html.

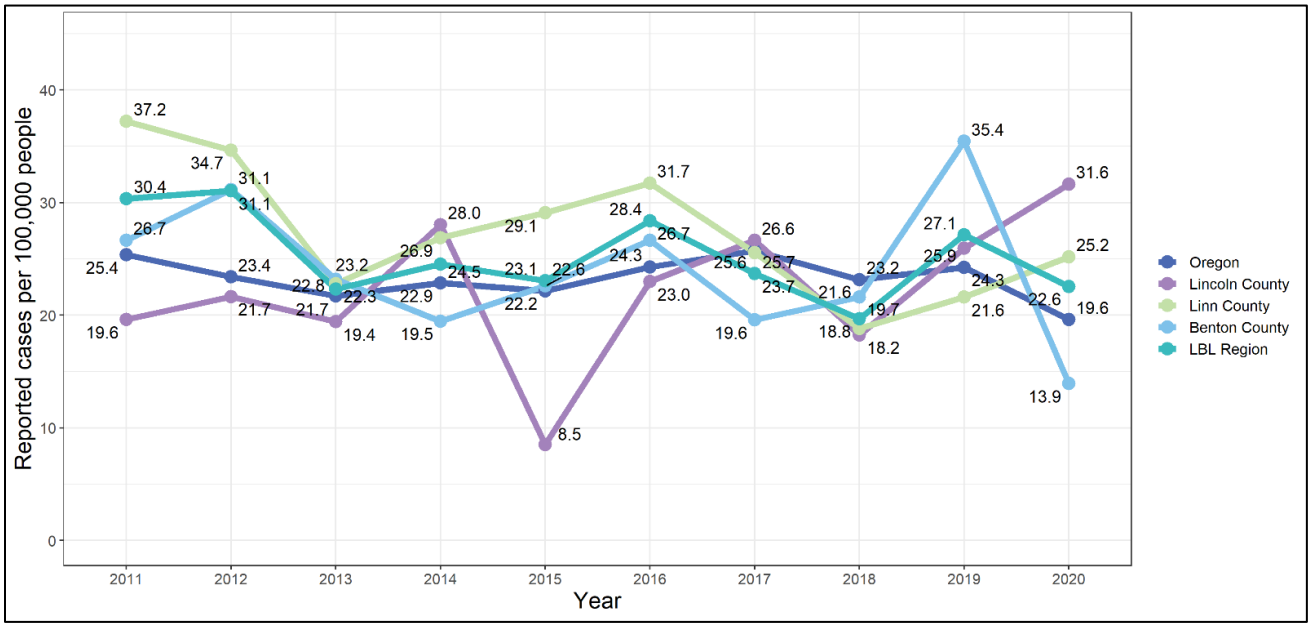
E.Coli. A group of large and diverse group of bacteria with many different strains, some of which can cause severe food borne illness, specifically Shinga Toxin-Producing E.Coli (STEC) from sources such as raw/undercooked meat and fecal contamination of vegetables. For more information visit https://www.who.int/news-room/fact-sheets/detail/e-coli.

Chlamydia. A common STD for both men and women that causes infection which can cause damage to the reproductive center of a woman if left untreated. For more information visit https://www.cdc.gov/std/chlamydia/stdfact-chlamydia.htm.

Gonorrhea. A common STD that causes infection in the genitals, rectum, and throat for both men and women. For more information visit https://www.cdc.gov/std/gonorrhea/Gonorrhea-FS.pdf.

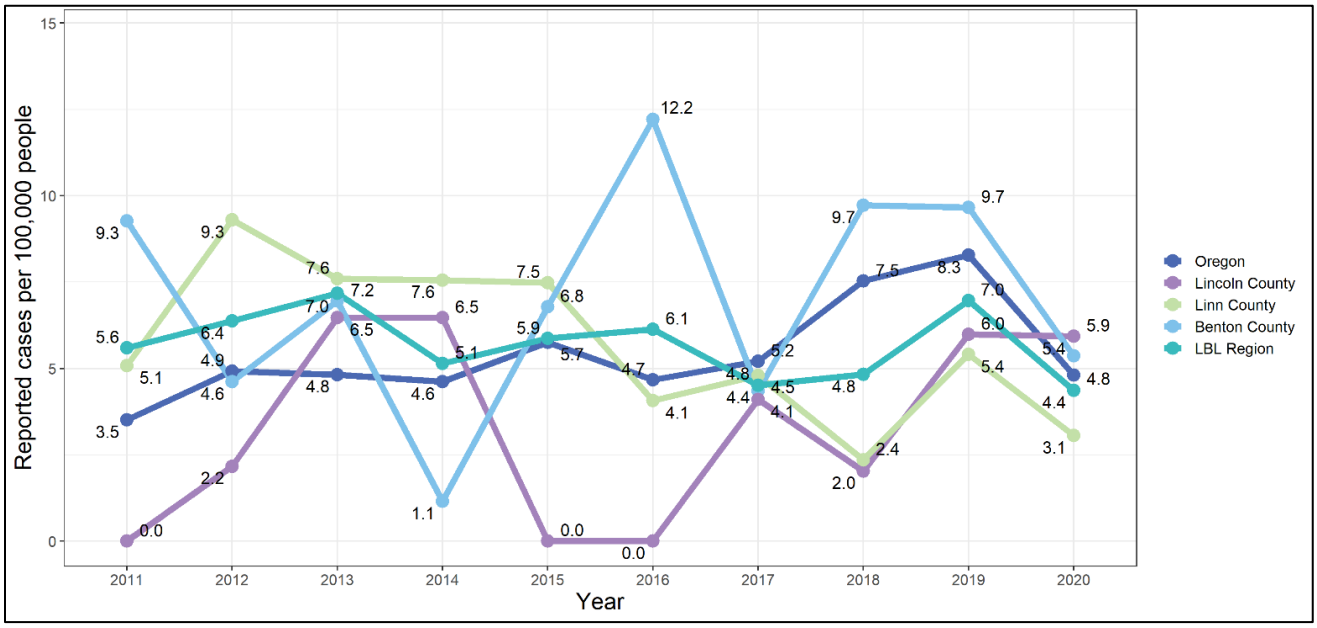
Syphilis. A STD that causes infection to develop in stages and can cause serious health problems without treatment. For more information visit https://www.cdc.gov/std/syphilis/stdfact-syphilis.htm

Figure 6-11: Reported cases of campylobacteriosis per 100,000 people by year and location



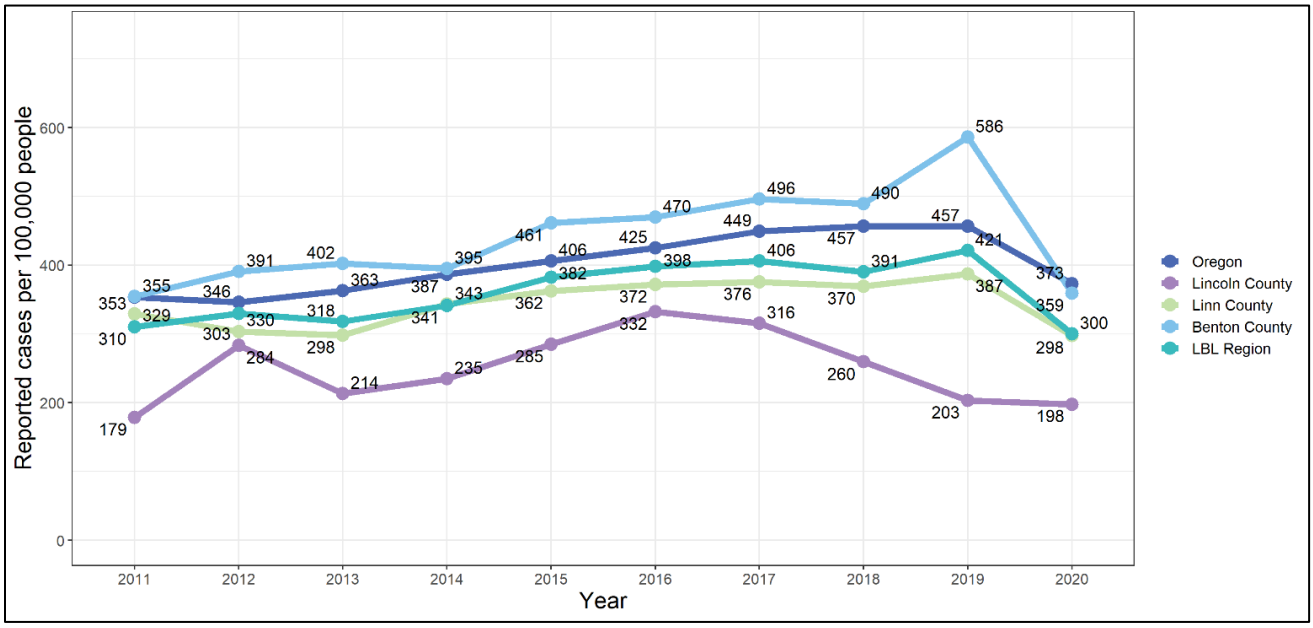
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-12: Reported cases of E. coli per 100,000 people by year and location



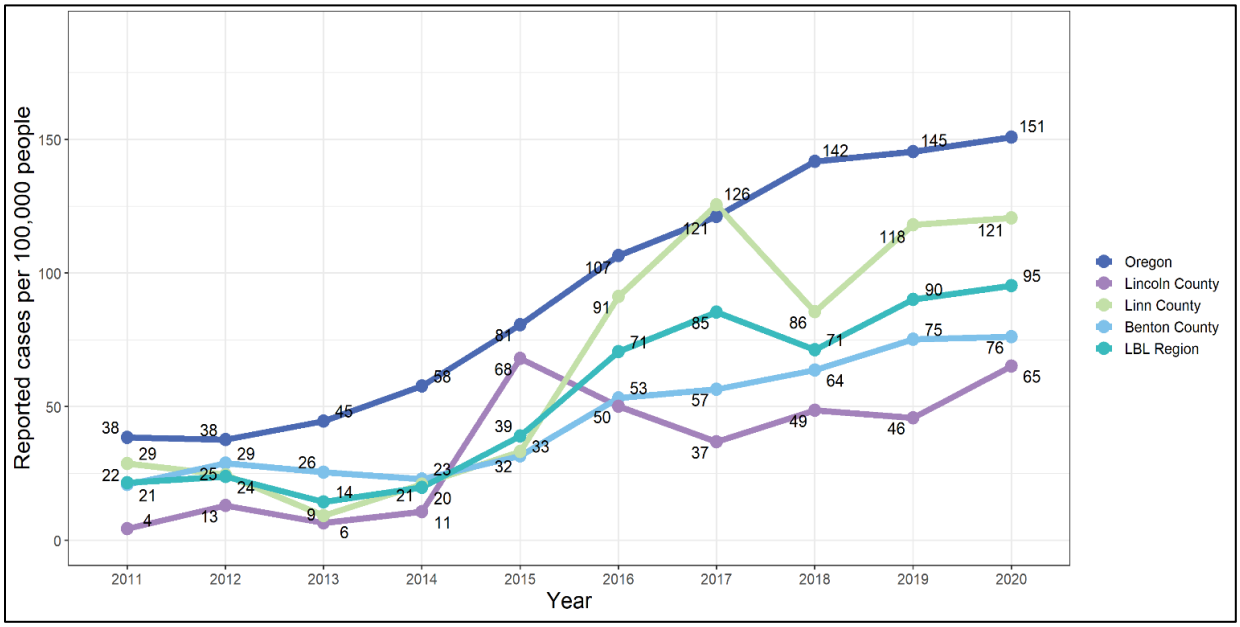
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-13: Reported cases of chlamydia per 100,000 people by year and location



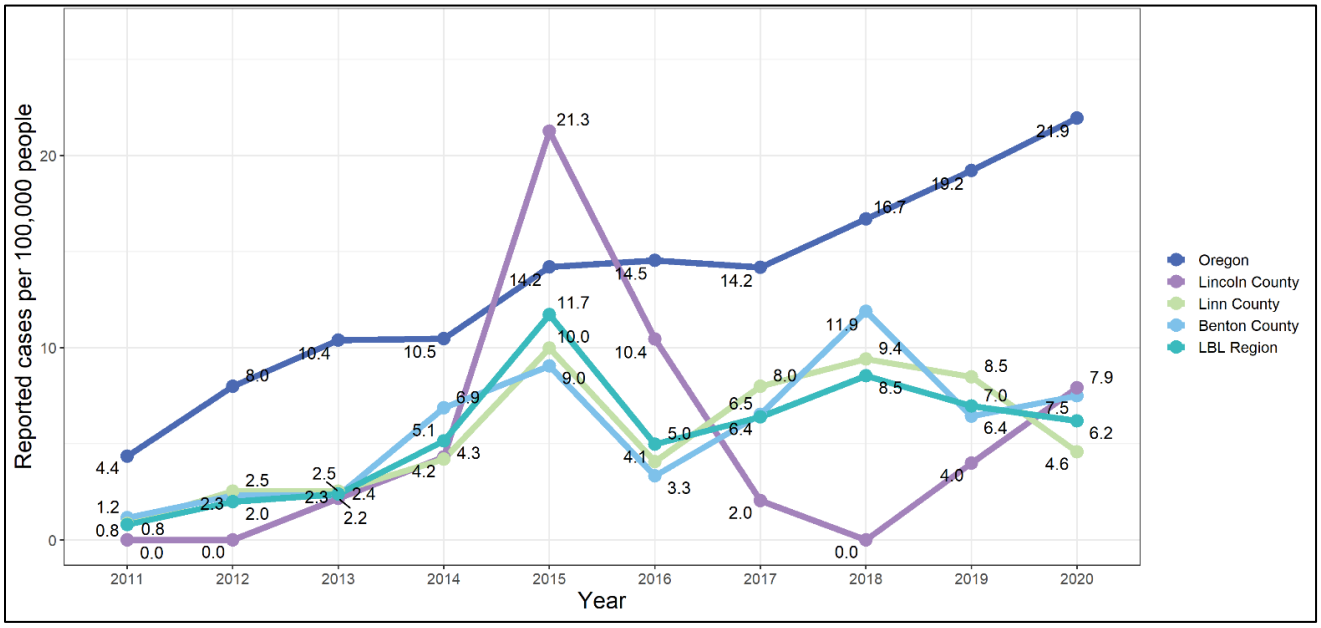
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-14: Reported cases of gonorrhea per 100,000 people by year and location



Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-15: Reported cases of syphilis per 100,000 people by year and location



Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

7 Healthy Youth & Families

The wellbeing of gestational parents, infants, and children determines the health of the next generation and therefore is an important area for public health intervention. This section evaluates gestational parents and child health outcomes and numerous factors that influence these outcomes.

Throughout this section, we use the terms 'maternal' and 'women' as well as 'gestational parent' and 'pregnant parent.' We recognize that not all pregnant people identify as women. Often the choice of wording used in this report reflects the wording used by the data source being cited. We hope that inclusive language will become the standard in the future.

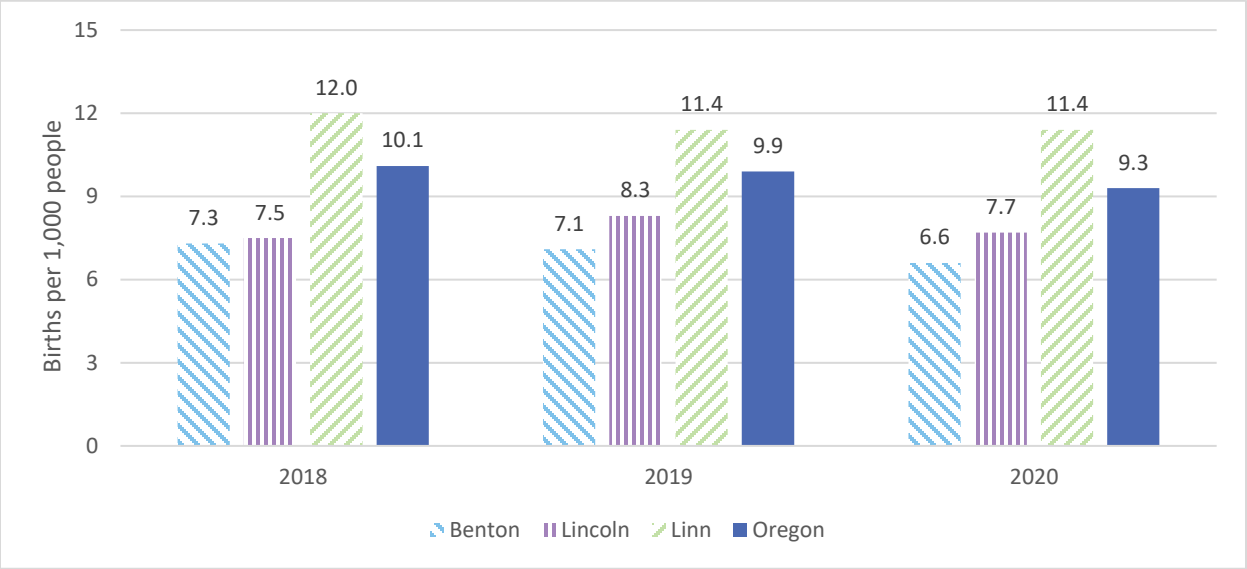
Pregnancy & Infant Health

Birth Rate

Birth rate is the total number of live births per 1,000 gestational parents each year. Overall, the birth rate in the LBL region decreased slightly from years 2018 to 2020. Linn County's birth rate is higher than that of Benton and Lincoln Counties and the state of Oregon (e.

Figure 7-1). Gestational parents in Benton County tend to give birth at a later age than gestational parents in Linn and Lincoln counties and the state of Oregon (Table 7-1). Gestational parents of Hispanic ethnicity had the highest birth rate.

Figure 7-1: Number of births per 1,000 people by year and location



Data source: Population data from Population Research Center, Portland State University; birth data from Vital Statistics, OHA Center for Health Statistics
Time period: 2018-2020
For more information: Population data: https://www.pdx.edu/population-research/population-estimate-reports, Birth data: https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/BIRTH/Pages/index.aspx

Table 7-1: Number of births per 1,000 population by maternal age group and location

Maternal Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0	< 1	< 1	< 1
15 to 17 years	1	7	6	5
18 to 19 years	4	46	42	26
20 to 24 years	12	97	99	58
25 to 29 years	60	100	115	83
30 to 34 years	93	76	87	87
35 to 39 years	54	41	39	48
40 to 44 years	11	12	8	11
45 to 49 years	1	0	0	1

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact local health department

Table 7-2: Number of births per 1,000 gestational parents by gestational parent's race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	28.1	37.8	35.2	35.6
Asian or Pacific Islander	24.7	36.2	35.6	36.9
Black	21.1	26.4	40.6	43.9
Hispanic	32.7	50.0	49.8	47.2
White	25.4	40.0	47.2	37.7

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Prenatal Care and Healthy Pregnancy

Prenatal care is the health care a gestational parent receives during pregnancy. Prenatal care can help parents have a healthy pregnancy for themselves and their baby and can help identify and treat complications. Pregnant people who don't receive prenatal care are three times more likely to have babies born at a low birth weight and five times more likely to have babies that die than pregnant people who do get prenatal care.[56]

Adequate prenatal care is defined as care that began before the third trimester and included at least five prenatal care visits. Pregnant people who identify as White, non-Hispanic are more likely to receive adequate prenatal care than are other racial/ethnic groups. This is consistent across Linn, Benton, and Lincoln counties as well as the state (Table 7-3).

Access to prenatal care also varies by age. Teen parents (pregnancies among people under the age of 20) are less likely to receive adequate prenatal care than are other age groups. When compared to Oregon, the LBL region tends to have more gestational parents with adequate access to prenatal care, with the exception of gestational parents ages 35-49 (Table 7-4).

Table 7-3: Percent of pregnancies with inadequate or no prenatal care services by gestational parent's race/ ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	20.0%	23.3%	14.5%	22.1%
Asian or Pacific Islander	11.2%	20.9%	18.6%	15.2%
Black	13.0%	23.3%	13.9%	19.6%
Hispanic	15.5%	17.5%	15.3%	16.3%
White	10.5%	14.1%	10.2%	11.3%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Table 7-4: Percent of pregnancies with inadequate or no prenatal care services by gestational parent's age group and location

Gestational Parent Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	0.0%	50.0%	48.0%
15 to 17 years	42.1%	17.2%	23.0%	26.4%
18 to 19 years	19.4%	24.5%	16.6%	21.3%
20 to 24 years	17.9%	18.2%	12.8%	17.6%
25 to 29 years	11.1%	14.3%	9.4%	12.8%
30 to 34 years	8.8%	12.2%	9.2%	10.0%
35 to 39 years	8.5%	13.9%	11.3%	9.8%
40 to 44 years	10.7%	17.8%	18.5%	12.5%
45 to 49 years	15.4%	20.0%	6.7%	11.1%

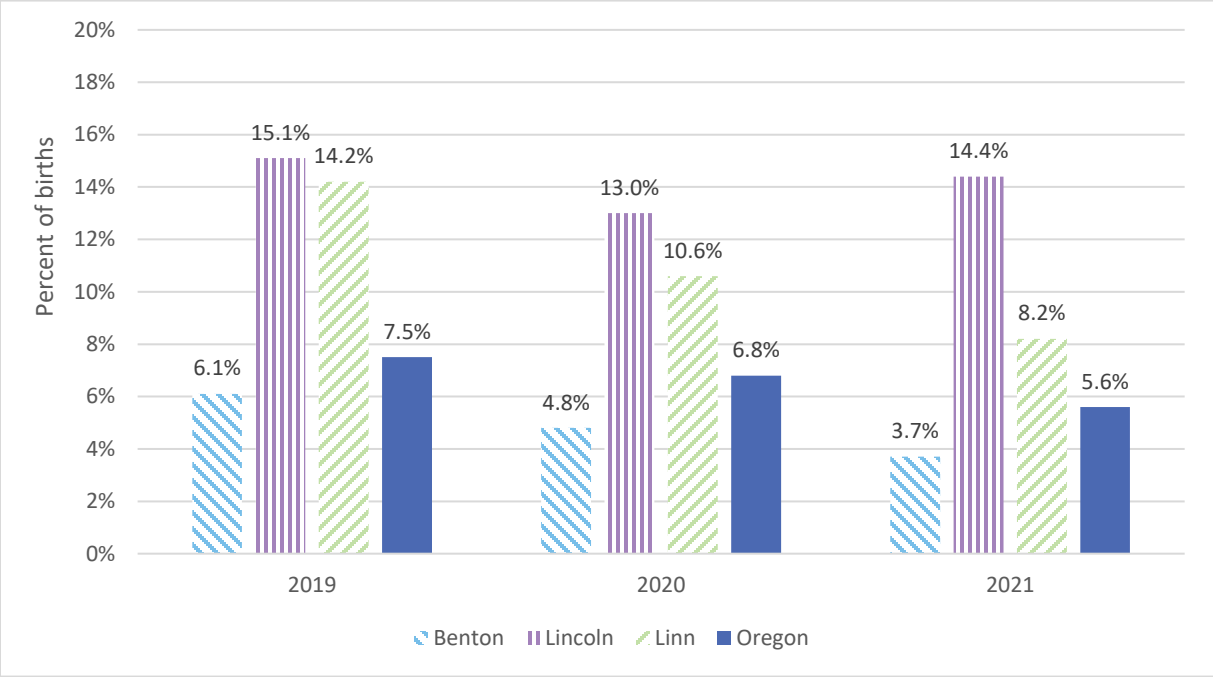
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Prenatal Tobacco Use

Prenatal care includes an educational component in which the gestational parent can learn about behaviors that increase risk for complication such as tobacco use. Gestational parents who smoke are more likely to deliver their babies early, deliver low birth weight babies, and deliver babies with weaker lungs, increasing their risk for numerous health problems.[57]

From years 2018 to 2020, Lincoln County had the greatest percentage of births in which tobacco was used during pregnancy. Both Lincoln and Linn counties had rates of prenatal tobacco use far exceeding the Oregon state average during all three years (Figure 7-2). In the LBL region, younger gestational parents had higher rates of prenatal tobacco use (Table 7-5).

Figure 7-2: Percent of births in which tobacco was used during pregnancy by year and location



Data source: OHA Center for Health Statistics
Time period: 2019-2021
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/Oregonbirthsandpregnanciesbycounty/CountyDashboard

Table 7-5: Percent of maternal prenatal tobacco use by maternal age

Maternal Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	0.0%	50.0%	7.3%
15 to 17 years	7.9%	25.0%	23.2%	12.2%
18 to 19 years	21.9%	26.5%	26.7%	16.5%
20 to 24 years	14%	24.2%	21.2%	15.4%
25 to 29 years	7.1%	17.6%	14.3%	10.1%
30 to 34 years	4.2%	15.7%	10.8%	6.3%
35 to 39 years	3.6%	12.3%	11.8%	5.0%
40 to 44 years	4.4%	10.2%	9.8%	4.7%
45 to 49 years	0.0%	20.0%	0.0%	2.3%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

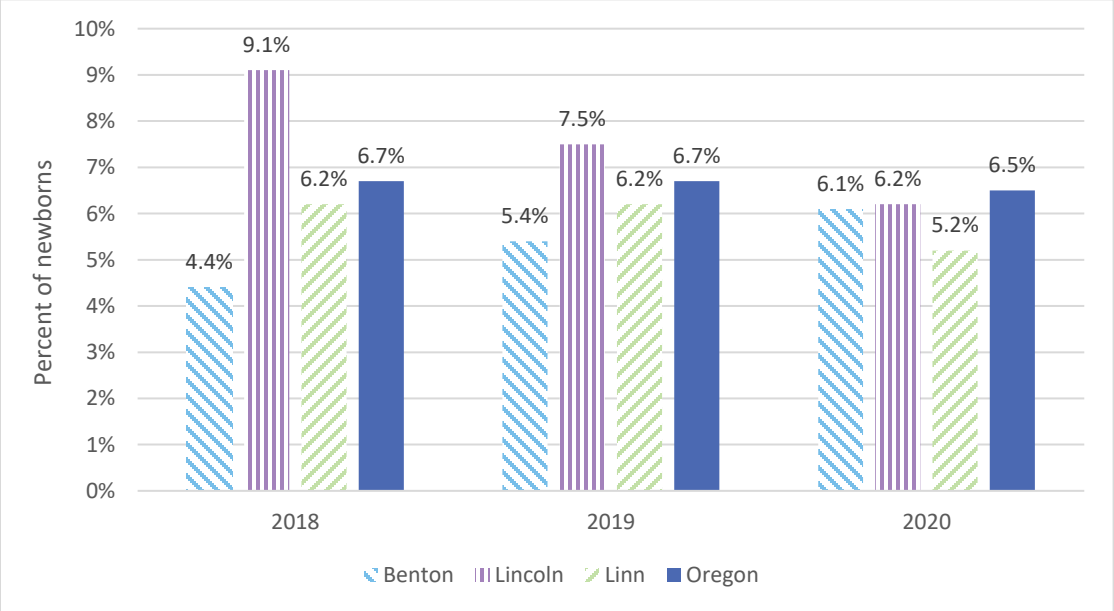
Premature Birth and Low Birthweight

Infant weight at birth is a strong predictor of health outcomes including chances of survival, risk of medical complications, and achievement of development milestones.[58] Low birthweight can be caused by numerous factors including premature birth, infection during pregnancy, smoking, and alcohol or drug use.

Low birthweight is defined as an infant whose weight at birth is 5.5 pounds or less. Lincoln County had the greatest percentage of low birthweight births from 2018 to 2020, although its rates have decreased drastically during this time period. Benton County's percentage of low birthweight births were below the Oregon state average for years 2018 to 2020 but its rates did increase during this time period (Figure 7-2).

Teen gestational parents (ages 10-19) and gestational parents of advanced gestational parent age (ages 35-49) have the highest percentage of newborns with low birthweight (Table 7-5). This may be in part driven by the region's rates of premature birth, which also exceed those of Oregon and follow a similar pattern when looking at gestational parent age. Premature birth is defined as birth that occurs before the 37th week of pregnancy. Black gestational parents are much more likely to both have a newborn with low birthweight and to experience premature birth (Table 7-6).

Figure 7-3: Percent of newborns with low birthweight by year and location



Data source: OHA Center for Health Statistics
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/VitalStatistics/birth/Pages/index.aspx

Table 7-6: Percent of newborns with low birthweight by maternal age group and location

Maternal Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	33.3%	0.0%	4.6%
15 to 17 years	7.9%	9.4%	10.2%	8.4%
18 to 19 years	9.0%	10.8%	7.5%	7.7%
20 to 24 years	6.4%	6.4%	6.4%	6.7%
25 to 29 years	5.1%	6.0%	5.4%	5.8%
30 to 34 years	4.3%	7.4%	5.4%	6.1%
35 to 39 years	6.0%	12.1%	8.1%	7.1%
40 to 44 years	10.2%	6.8%	10.9%	9.1%
45 to 49 years	15.4%	0.0%	20.0%	15.0%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Table 7-7: Percent of newborns with low birthweight by gestational parent's race/ethnicity and location

Gestational Parent Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	7.3%	8.3%	5.8%	7.5%
Asian or Pacific Islander	4.9%	7.0%	6.0%	7.8%
Black	11.7%	10.0%	10.2%	9.8%
Hispanic	6.6%	7.9%	6.3%	6.6%
White	5.1%	7.3%	6.1%	6.1%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact county health department

Table 7-8: Percent of premature births by gestational parent's age group and location

Gestational Parent Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	33.3%	0.0%	8.6%
15 to 17 years	5.3%	12.5%	9.7%	8.9%
18 to 19 years	11.6%	9.3%	8.8%	8.2%
20 to 24 years	5.9%	5.9%	7.7%	7.7%
25 to 29 years	5.9%	8.0%	6.9%	7.1%
30 to 34 years	5.4%	8.7%	7.4%	7.5%
35 to 39 years	7.2%	12.7%	10.8%	8.9%
40 to 44 years	10.3%	7.6%	13.4%	11.4%
45 to 49 years	38.5%	20.0%	46.7%	18.8%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Table 7-9: Percent of premature births by gestational parent's race/ethnicity and location

Gestational Parent Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	10.9%	5.2%	7.5%	10.0%
Asian or Pacific Islander	4.9%	8.1%	4.7%	7.9%
Black	14.3%	10.0%	11.1%	9.7%
Hispanic	7.4%	9.5%	8.2%	8.2%
White	6.0%	8.3%	7.8%	7.5%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

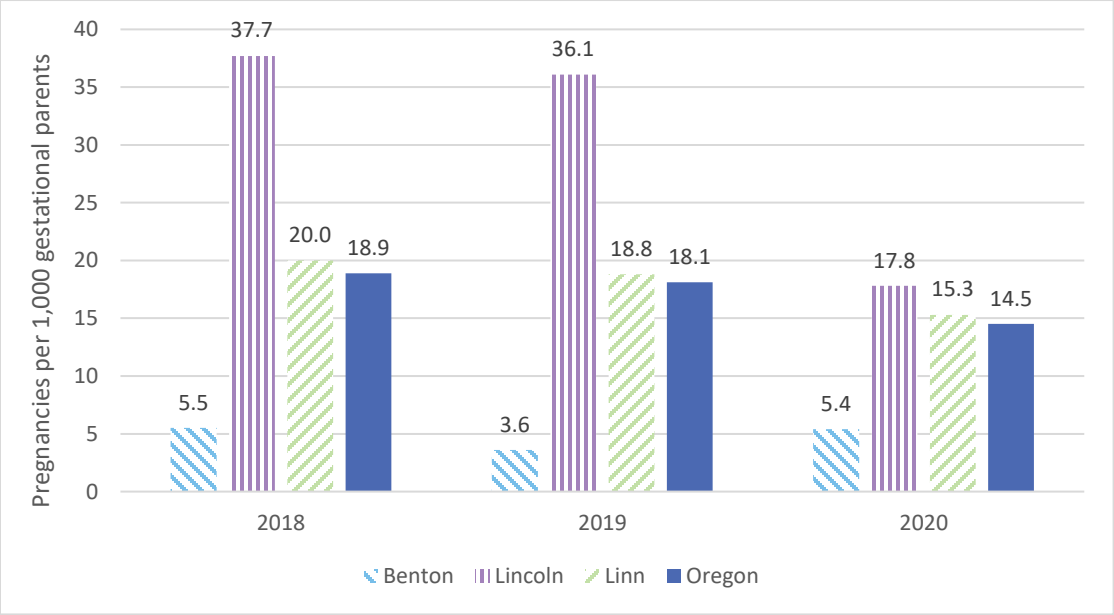
Teen Pregnancy

Teen pregnancy and childbearing have long-term social and economic costs on teen parents and their children. Only about 50% of teen gestational parents receive a high school diploma by age 22 compared to 90% of gestational parents who don't have children as a teen. The children of teenage gestational parents are more likely to drop out of high school themselves, have low academic achievement, have more health problems, be incarcerated as an adolescent, give birth during their teenage years, and face

unemployment as a young adult.[59] These long-term costs make teen pregnancy a pertinent public health issue.

In the United States, rates of teen pregnancy have been declining since 1991. On average, in the LBL region, teen pregnancy rates have been declining from years 2018 to 2020. Lincoln County experienced disproportionately high rates of teen pregnancy in years 2018 and 2019 but has seen a major reduction in rates of teen pregnancy in the year 2020. Linn County's rates of teen pregnancy are similar to those of the state of Oregon, while Benton County's teen pregnancy rates are lower (Figure 7-3).

Figure 7-4: Teen pregnancy rate by location, 2018-2020



Data source: Population Research Center, Portland State University
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/TEENPREGNANCY/Pages/Teen-Pregnancy-YTD-and-Final.aspx

Breastfeeding

Breastfeeding has health benefits for both babies and gestational parents. Breast milk is the best source of nutrition for most babies and thanks to antibodies shared from gestational parent to baby through breast milk, breastfeeding can protect babies from some short and long-term illnesses and diseases. Breastfed babies have lower risk of asthma, obesity, type 1 diabetes, sudden infant death syndrome, ear infections, and stomach bugs. Breastfeeding can reduce gestational parent's risk of breast and ovarian cancer, type 2 diabetes, and high blood pressure.[60]

Data on breastfeeding are limited at both the state and county level. However, state programs, such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), give some insight into the percentage of participating gestational parents who breastfeed. In 2021, Lincoln County had the greatest percentage of pregnant gestational parents on WIC and the greatest percentage of gestational

parents who started out breastfeeding. After 6 months however, Lincoln County WIC gestational parents are the least likely to have exclusively breastfed. Benton County had the greatest percentage of gestational parents who breastfed exclusively for 6 months in 2021 (Table 7-10).

Table 7-10: Percent of gestational parents who utilized WIC during the postpartum period by breastfeeding duration and location

	Benton	Lincoln	Linn
Percent of WIC gestational parents who started out breastfeeding (initiation)	97%	99%	93%
Percent of gestational parents who breastfed exclusively for 6 months	43%	33%	39%

Data source: 2021 WIC Annual Report, Oregon Health Authority
Time period: 2021
For more information: https://www.oregon.gov/oha/PH/HEALTHYPEOPLEFAMILIES/WIC/Pages/annual.aspx

Child and Adolescent Health

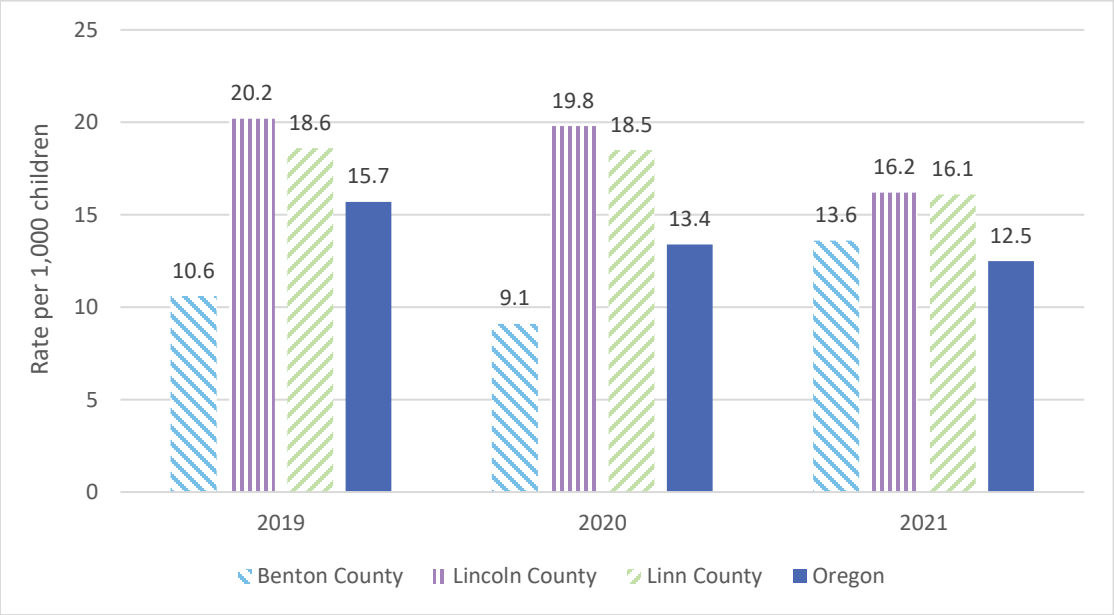
Childhood and adolescence are formative times in a person's life, and they set the stage for later health and wellbeing. The number and severity of adverse experiences during childhood affect an individuals' risk for alcoholism, depression, heart disease, liver disease, intimate partner violence, sexually transmitted infections, smoking, and suicide. Child and adolescent health include overall health and wellness involving child abuse, foster care, and youth immunization rates.

Child Abuse

Child abuse is one form of Adverse Childhood Experience (ACE). In 2021 there were a total of 5,576 reports of child abuse in the LBL region. Of those reports, 3,098 (53.6%) were referred to Child Protective Services. In 2021, neglect and threat of harm were the two most common forms of child abuse in the LBL region. In Oregon, leading family stress factors of abused children are substance use, domestic violence, and parental involvement with law enforcement.

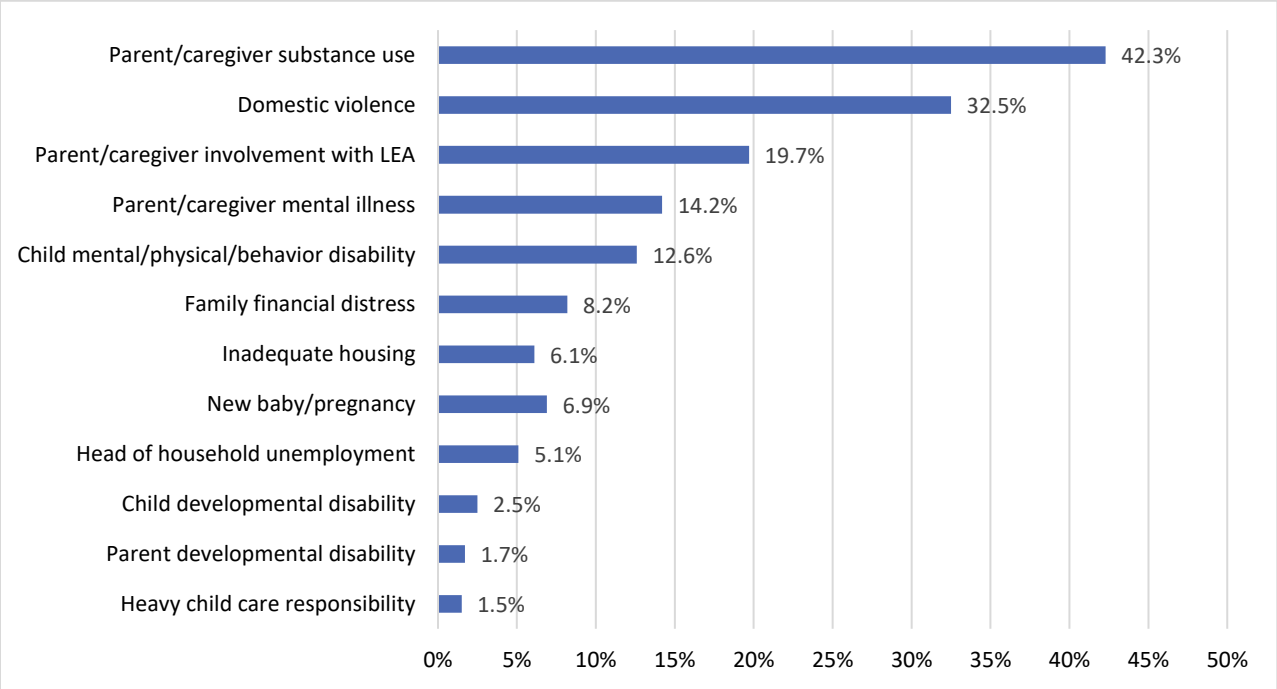
Lincoln and Linn counties had higher rates of child abuse compared to Benton County and the state of Oregon during years 2019 to 2021. Child abuse rates dropped in both Linn and Lincoln counties between 2019 and 2021, however did increase by 4.5% in Benton County from 2020 to 2021 (Figure 7-5). From 2019 to 2021, Lincoln County had many more children in foster care per 1,000 children than did Benton and Linn counties and the state of Oregon (Figure 7-7).

Figure 7-5: Number of child abuse victims per 1,000 children by location



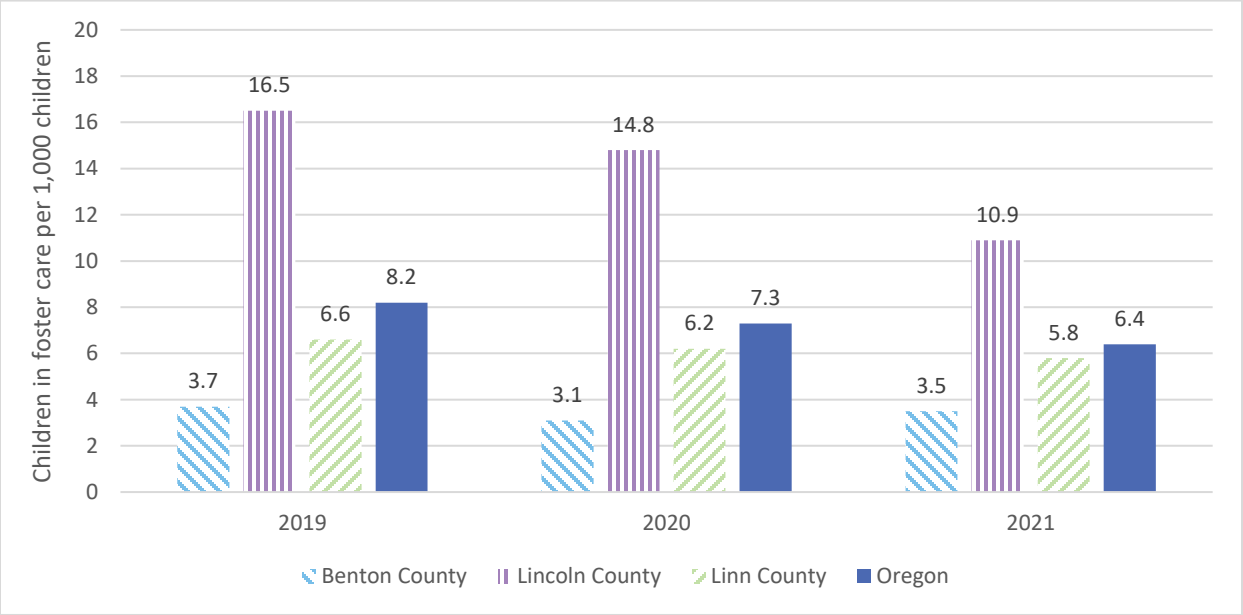
Data source: Child Welfare Data Book
Time period: 2019-2021
For more information: https://www.oregon.gov/dhs/CHILDREN/CHILD-ABUSE/Documents/2021-cw-data-book.pdf

Figure 7-6: Family stress factors among founded abuse cases, Oregon



Data source: Child Welfare Data Book
Time period: 2021
For more information: https://www.oregon.gov/dhs/CHILDREN/CHILD-ABUSE/Documents/2021-cw-data-book.pdf

Figure 7-7: Number of children in foster care per 1,000 children by location



Data source: Child Welfare Data Book
Time period: 2019-2021
For more information: https://www.oregon.gov/dhs/CHILDREN/CHILD-ABUSE/Documents/2021-cw-data-book.pdf

Youth Immunization Rates

Immunization against communicable diseases has been one of the greatest advancements in public health and has led to the elimination of numerous diseases in the United States including smallpox, polio, measles, and rubella. Each year, childhood vaccines save an estimated two to three million lives worldwide.[61]

The current Centers for Disease Control and Prevention (CDC) recommendations (as of 2022) are for children to be fully vaccinated by age two against:

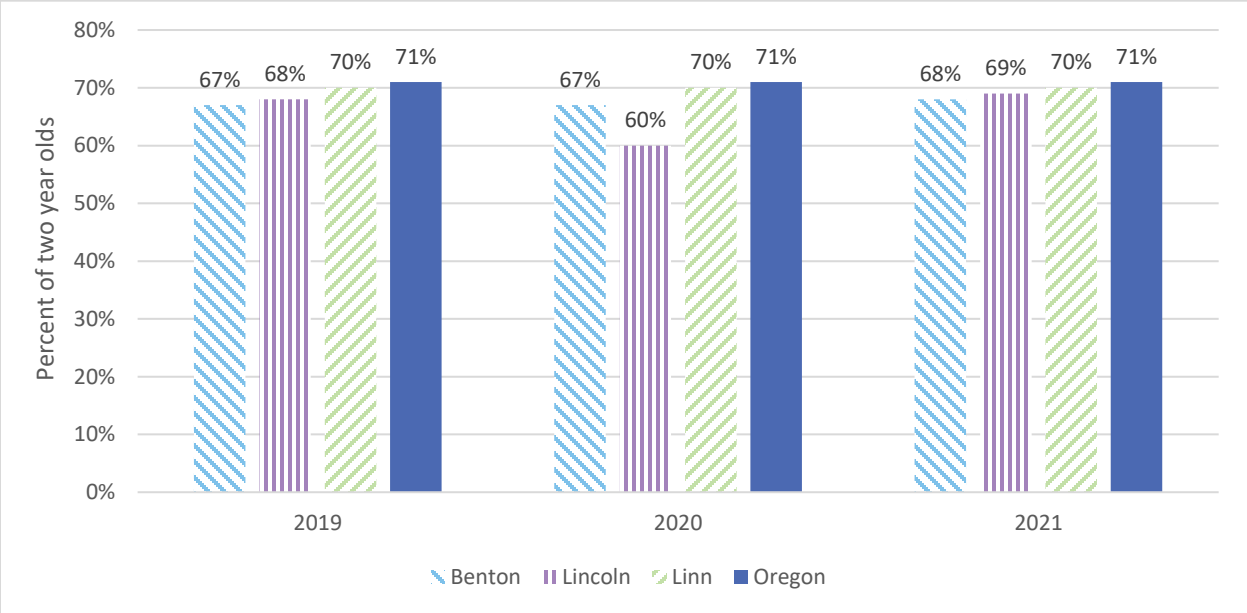
- Diphtheria, Tetanus, Pertussis
- Polio
- Measles, Mumps, Rubella
- Hib (a bacterial infection that can cause meningitis)
- Hepatitis B
- Varicella (Chickenpox)
- Pneumococcal conjugate

This is known as the 4:3:1:3:3:1:4 schedule. When compared to the state of Oregon, the LBL region had lower percentages of two year olds up to date with this vaccine schedule during years 2019 through 2021 (Figure 7-8). In years 2019 and 2021, the counties making up the LBL region had similar percentages of two year olds who completed the 4:3:1:3:3:1:4 vaccine schedule. In 2020, Lincoln County's percentage of two year olds who completed the 4:3:1:3:3:1:4 vaccine schedule declined, possibly due to COVID-19 healthcare interruptions.

Vaccination rates vary slightly among WIC clients. In 2019-2021, fewer two year olds enrolled in WIC services completed the 4:3:1:3:3:1:4 vaccine schedule in Benton and Linn counties when compared to the general population. In Lincoln County during these years, a greater or equal percentage of two year olds enrolled in WIC services completed the 4:3:1:3:3:1:4 vaccine schedule than the general population.

Starting at age 11 or 12, adolescents are recommended to receive Tdap, HPV, and Meningococcal vaccines. In 2021, adolescents in the LBL region received the Tdap vaccine at rates comparable to the state average. Adolescents in the LBL region received the Meningococcal and HPV vaccine at rates slightly lower than the state average in 2021 (Table 7-11).

Figure 7-8: Percent of two-year olds up to date with the 4:3:1:3:3:1:4 vaccine series by location



Data source: ALERT Immunization Information System (IIS)
Time period: 2019-2021
For more information:
https://www.oregon.gov/oha/ph/preventionwellness/vaccinesimmunization/pages/researchchild.aspx

Table 7-11: Percent of adolescents ages 13 to 17 immunized for specific diseases by location

	Benton	Lincoln	Linn	Oregon
Tdap (tetanus, diphtheria, acellular pertussis)	89%	87%	92%	90%
Meningococcal	75%	72%	76%	81%
HPV completion (2 or 3 doses depending on age at first dose)	50%	48%	44%	55%

Data source: Alert Immunization Information System (IIS)
Time period: 2021
For more information:
https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/VACCINESIMMUNIZATION/Pages/researchteen.aspx

8 Mental & Behavioral Health

The term "behavioral health" refers to a wide range of topics and is often used interchangeably with "mental health." Behavioral health describes the connection between a person's behaviors and the health and wellbeing of the body and mind,[62] while mental health refers only to one's emotional, psychological and social wellbeing.[63] This chapter explores topics that fall under the categorization of mental health and those that are categorized as behavioral health including substance use, nutrition and physical activity.

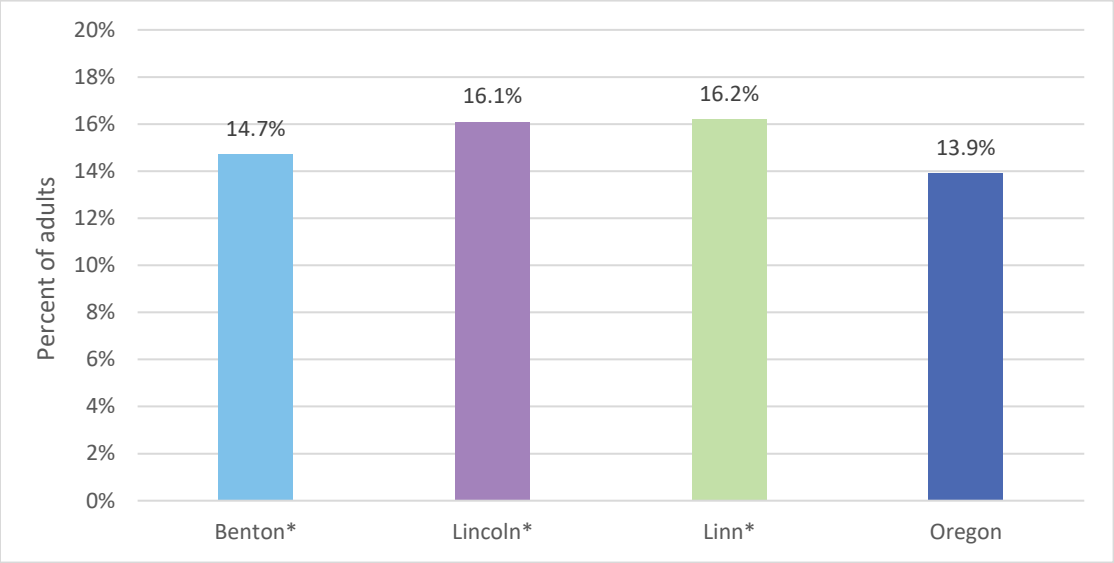
Mental Health

Mental health has a significant impact on overall health and is composed of emotional, psychological, and social factors. Poor mental health reduces one's ability to cope with stress, make healthy decisions, and recover from disease. The association between poor mental health and chronic disease has been well established in literature. Oregon has a considerably high prevalence of mental health illness and low access to mental health care. In 2020, Oregon ranked last in the United States for mental health.[64] Given the extreme burden of this public health issue, the 2020-2024 State Health Improvement Plan aims to improve behavioral health and reduce mental health stigma in Oregon communities.[65]

Based on PLACES estimates, a greater number of adults in the LBL region experienced 14 or more "not good" mental health days when compared to Oregon on average (Figure 8-1). Mental illness differs from poor mental health. A mental illness is a diagnosed condition that affects one's thoughts and behaviors. According to the CDC, more than 50% of Americans will be diagnosed with a mental illness in their lifetime. In 2020, 21.8% of Oregon's population had a diagnosis of depression.[66] PLACES estimates show the LBL region as having similar rates of depression as the state of Oregon, with Linn and Lincoln counties having slightly higher rates and Benton County having slightly lower rates (Figure 8-2). Benton County consistently outperformed the surrounding counties in regard to mental health indicators. From 2018-2020, Lincoln County had the highest rates of suicide deaths in the LBL region. The majority of suicide deaths in the LBL region were among those ages 25-44 (Figure 8-6).

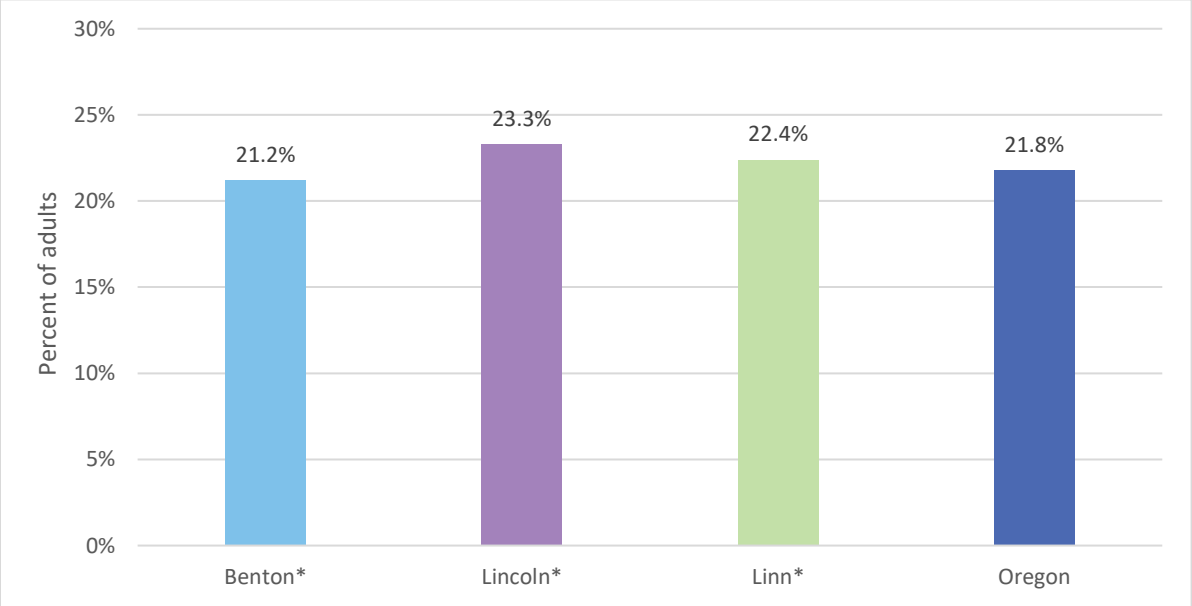
Mental health in adolescents and children is a growing problem that had been exacerbated by the COVID-19 pandemic. In the 2021 student health survey, 37% of surveyed high school students reported having poor mental health during the pandemic and 44% felt persistently sad or hopeless over the previous year.[67] To track health indicators in the adolescent population, the Oregon Health Authority administers the Oregon Healthy Teens Survey to eighth and eleventh graders across the state during in odd numbered years. In 2019, students residing in Lincoln County had a high prevalence of feeling sad and hopeless (Figure 8-3) and ranked consistently poor for other important mental health indicators. Close to a quarter of all eighth graders in Lincoln County reporting seriously considering suicide (Figure 8-7) and over 13% of the students reported attempting suicide (Figure 8-8). Lincoln County also had the highest percentage of eleventh graders who considered suicide, however eleventh grade students in Linn County more commonly reported attempting suicide. Benton County students had the lowest percentage of suicidal ideation and attempts in the region (Figures 8-7 and 8-8).

Figure 8-1: Age adjusted percent of adults who experienced 14 or more “not good” mental health days by location



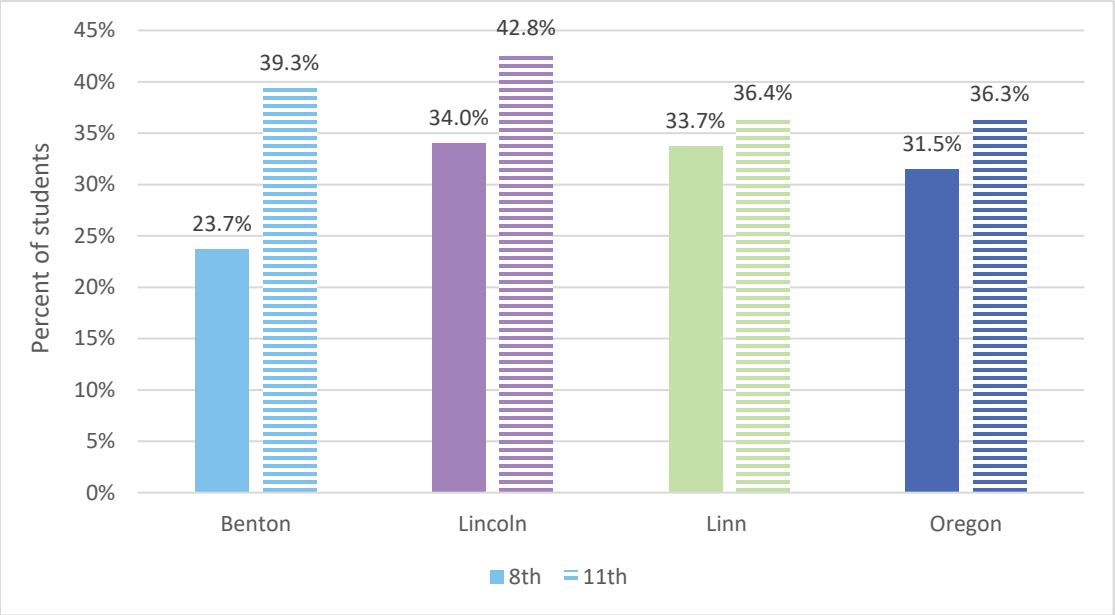
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 8-2: Age adjusted percent of adults that report being diagnosed with depression by location



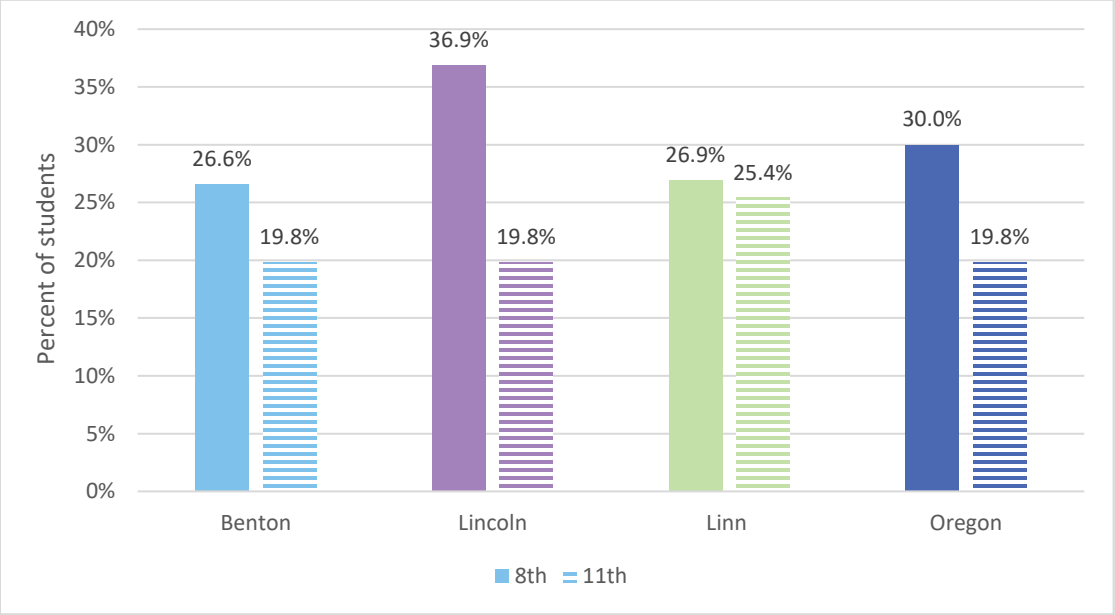
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 8-3: Percent of students who reported feeling sad or hopeless almost every day for 2+ weeks in a row by grade and location



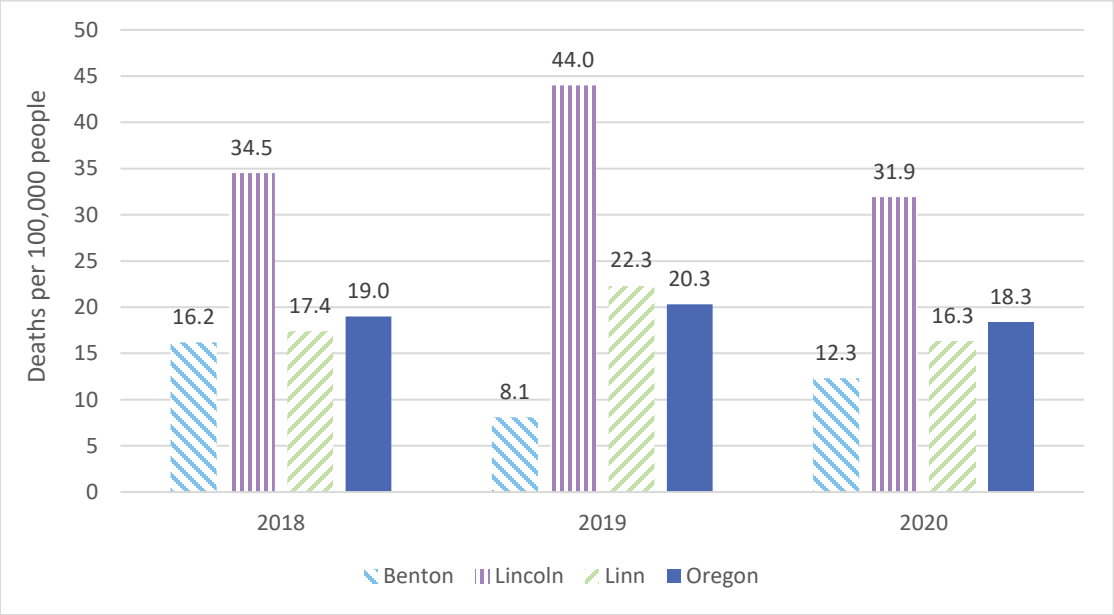
Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-4: Percent of students who reported being bullied at school in the last 30 days by grade and location



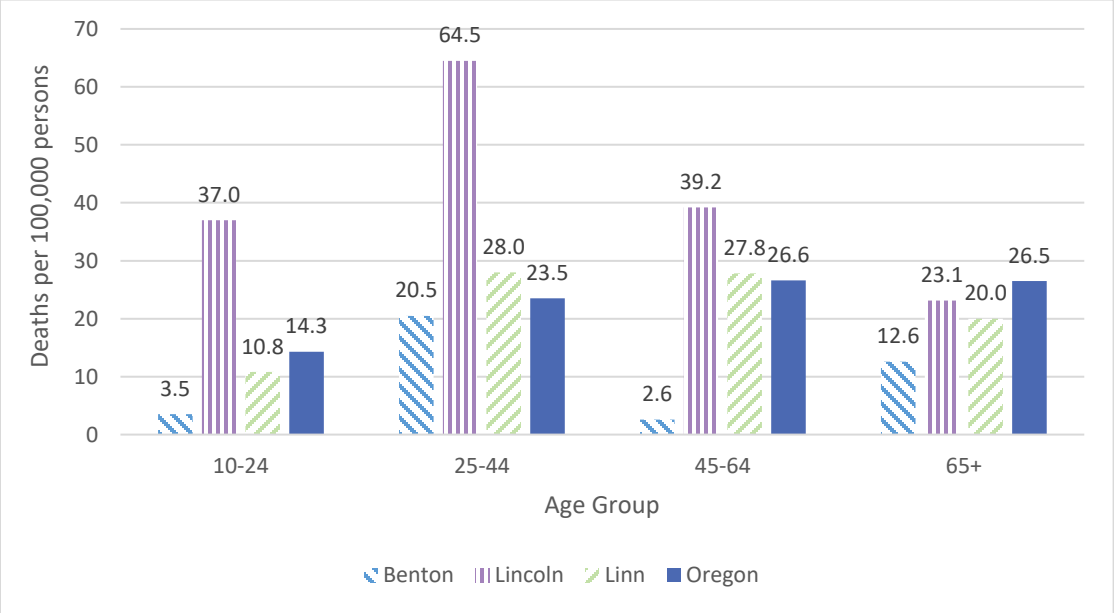
Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-5: Age adjusted number of deaths by suicide per 100,000 people by year and location



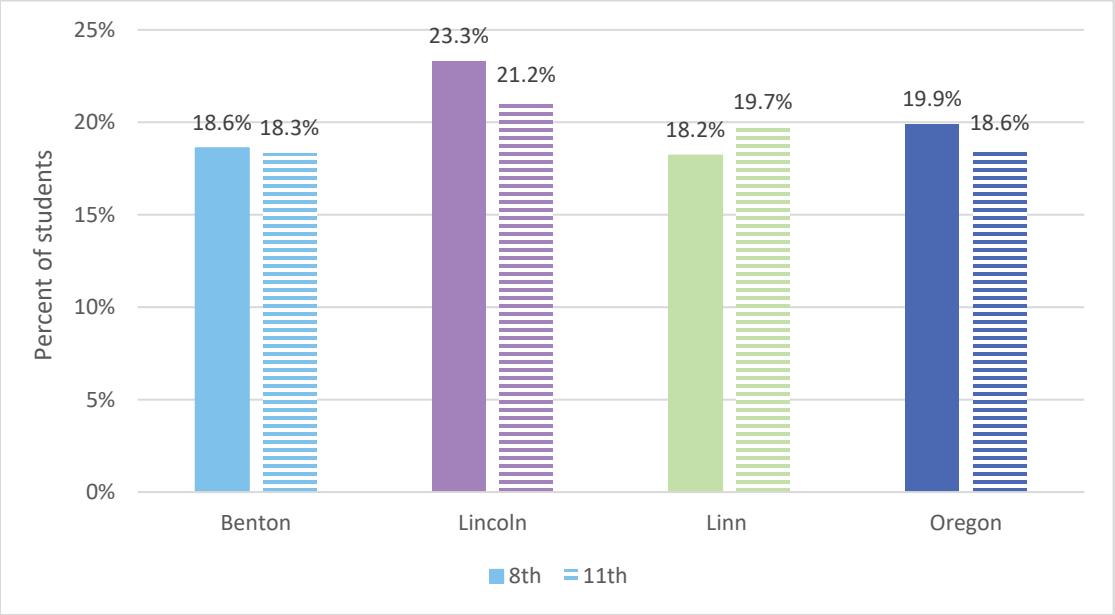
Data source: Oregon Violent Death Dashboard
Time period: 2018-2020
For more information: https://www.oregon.gov/oha/PH/DiseasesConditions/InjuryFatalityData/Pages/nvdrs.aspx

Figure 8-6: Number of deaths by suicide per 100,000 people by age group and location



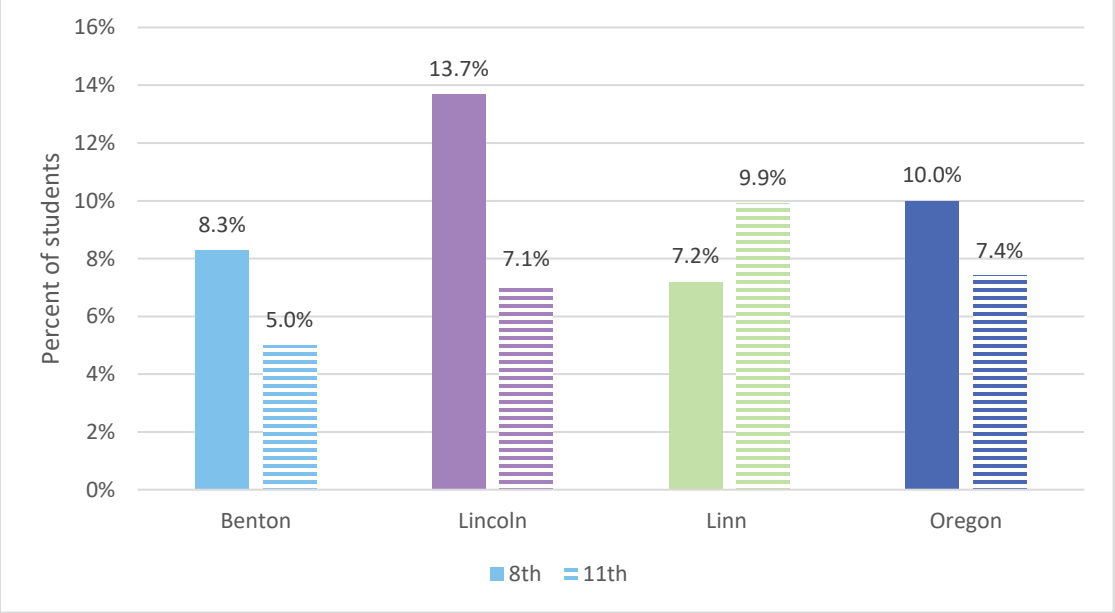
Data source: Oregon Violent Death Dashboard
Time period: 2019-2020
For more information: https://www.oregon.gov/oha/PH/DiseasesConditions/InjuryFatalityData/Pages/nvdrs.aspx

Figure 8-7: Percent of students who reported seriously considering attempting suicide by grade and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-8: Percent of students who reported attempting suicide by grade and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Substance Use

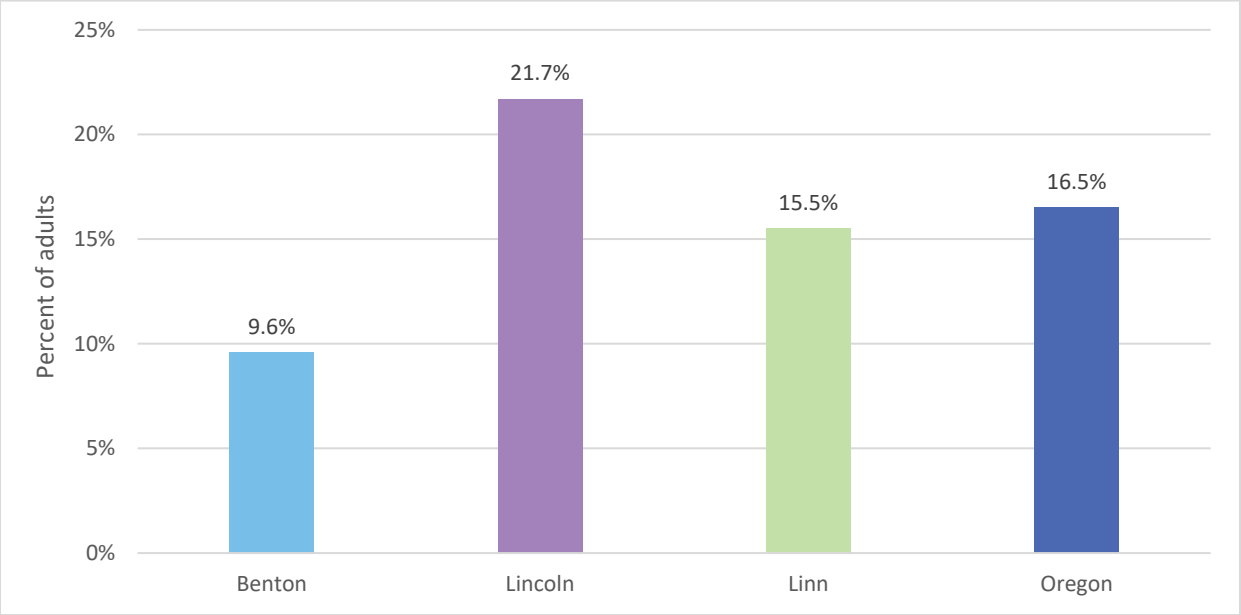
The dangers of tobacco use are well documented and include heightened risk for a myriad of diseases including cancer, heart disease, stroke, lung disease, diabetes, and chronic obstructive pulmonary disease.[68] For every person who dies because of smoking, at least 30 people live with a serious smoking-related illness. In 2020, 18.8% of Oregon residents living with one or more chronic diseases smoked cigarettes.[69] Lincoln County has the highest percent of adults who smoke cigarettes and a higher percentage than Oregon on average (Figure 8-9). Of those who smoke cigarettes in the LBL region, over half either want to quit smoking or have attempted to quit during the previous year (Table 8-1).

Alcohol and prescription medications are consumed appropriately and responsibly by most of the population. However, problems frequently occur when these substances are overconsumed, used inappropriately, combined with other substances, or consumed while engaging in risky activities such as driving or unsafe sexual activity. PLACES estimates show a greater percentage of Linn and Lincoln County adults engaging in binge drinking than the Oregon average (Figure 8-10). Binge drinking is defined as five or more drinks among men and four or more drinks among women per day.

Drug overdose deaths in the LBL region in years 2017 to 2019 were driven primarily by opioids and methamphetamine. The majority of Linn County's drug overdose deaths during these years were from methamphetamines while the majority of Benton and Lincoln County drug overdoses were from opioids.[70] In years 2017 and 2018, all counties belonging to the LBL region experienced fewer accidental/undetermined drug overdose deaths per 100,00 people than the state of Oregon. In 2019, drug overdose rates increased in all three counties and the state of Oregon (Figure 8-11). From 2018 to 2019, Lincoln County's drug overdose death rate increased 147%.

Misuse of substances at an early age (particularly before age 18) is shown to be an important predictor of substance use disorders later in life, making this period an important focus for prevention efforts. In 2019, Lincoln County had the greatest percentage of 8th grade students who had ever used cigarettes, alcohol, marijuana, and prescription drugs (Figure 8-12). Among 11th graders that same year, Linn County had the greatest percent of students who had ever used cigarettes, alcohol, marijuana, and e-cigarettes. In 2019, 37.4% of Linn County's 11th graders reported ever having used an e-cigarette (Figure 8-13). This is much higher than use in Lincoln and Benton counties and the state of Oregon.

Figure 8-9: Percent of adults 18 years and older who smoke cigarettes by location



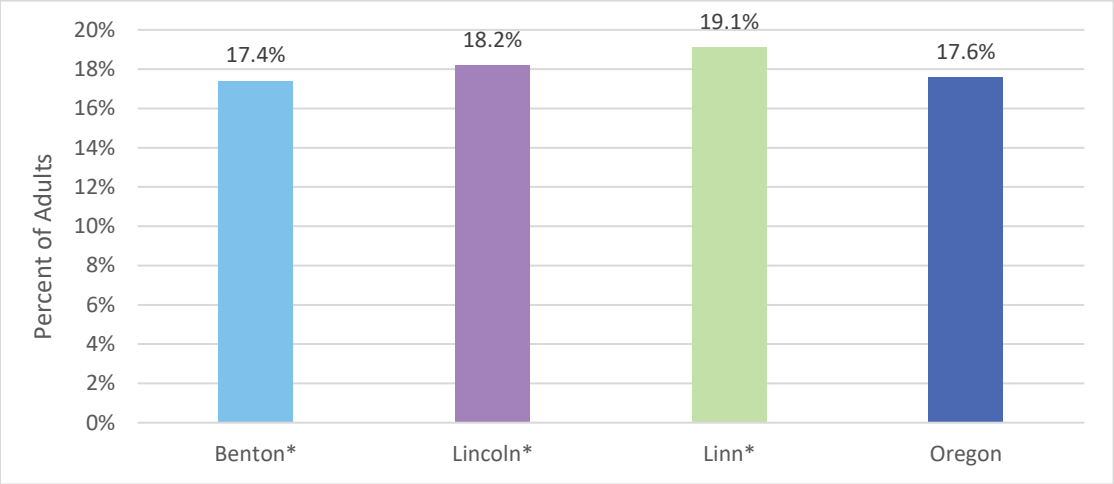
Data source: Oregon Behavioral Risk Factor Surveillance System County Combined dataset, 2016 –2019
Time period: 2016-2019
For more information: https://www.oregon.gov/oha/ph/preventionwellness/tobaccoprevention/pages/oregon-tobacco-facts.aspx

Table 8-1: Percent of adult smokers by quit status and location

	Benton	Lincoln	Linn	Oregon
Wants to quit cigarette smoking	55.9%	53.2%	59.5%	63.2%
Attempted to quit cigarette smoking during the previous year	51.9%	57.8%	51.0%	54.1%

Data source: Oregon Behavioral Risk Factor Surveillance System County Combined dataset, 2016 –2019
Time period: 2016-2019
For more information: https://www.oregon.gov/oha/ph/preventionwellness/tobaccoprevention/pages/oregon-tobacco-facts.aspx

Figure 8-10: Percent of adults 18 years and older who binge drink by location



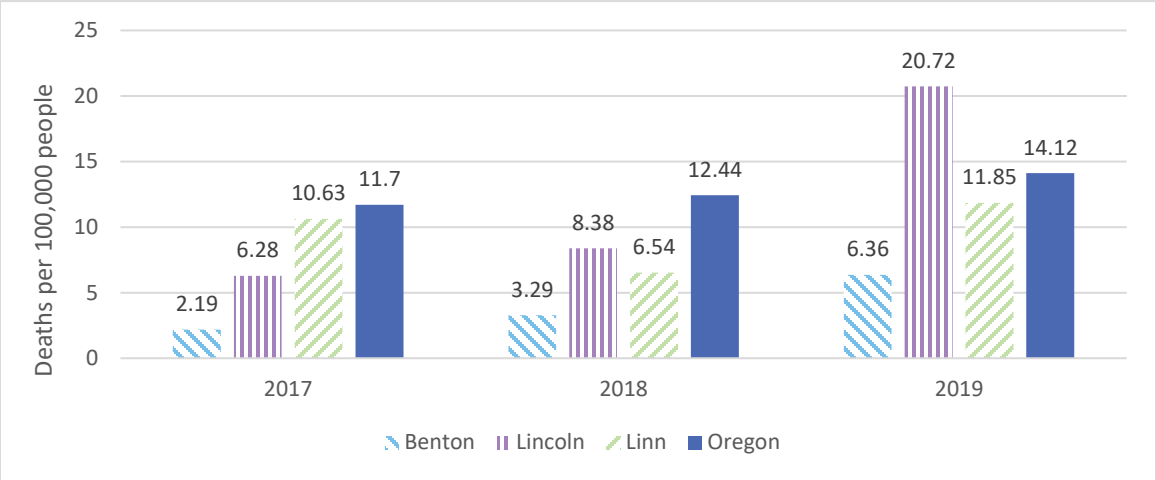
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*

Data source: Behavioral Risk Factor Surveillance System PLACES

Time period: 2020

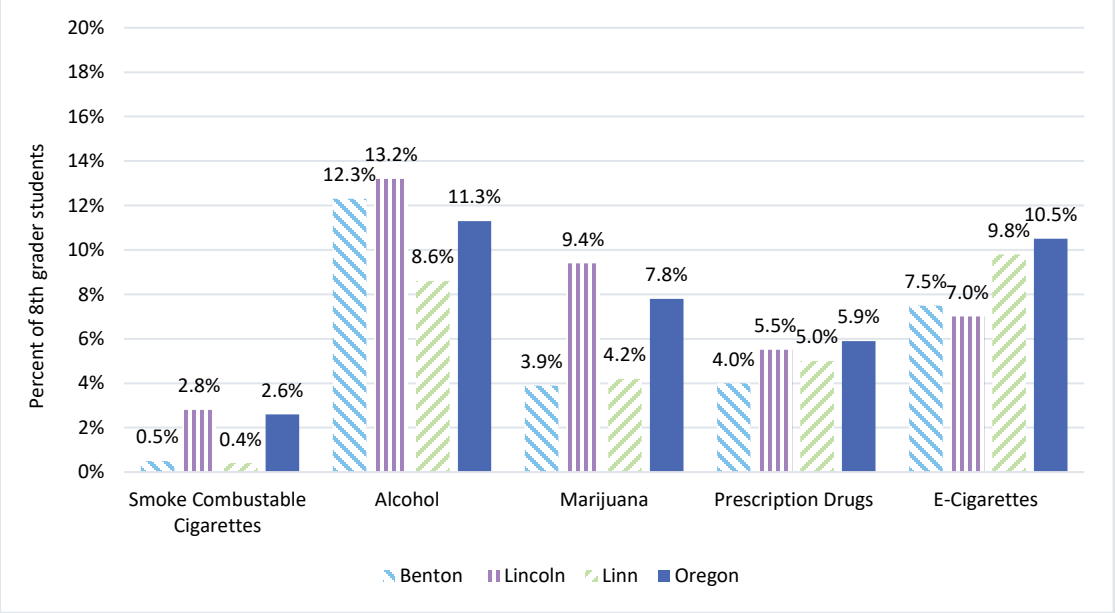
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 8-11: Number of accidental/undetermined deaths from drug overdose per 100,000 people by year and location



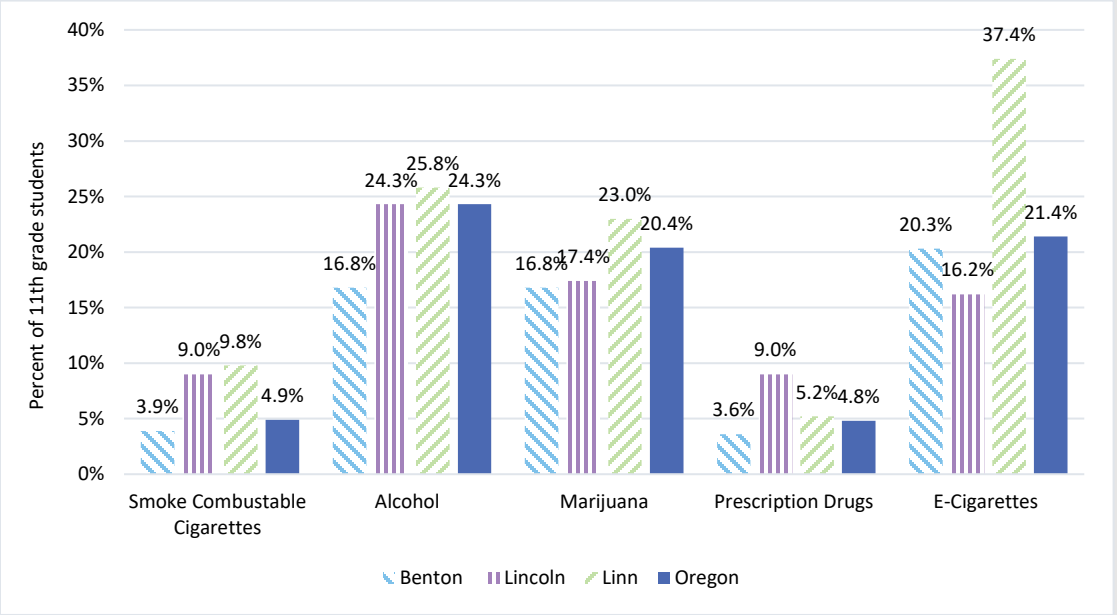
Data source: Oregon Prescribing Drug Overdose Data Dashboard
Time Period: 2017-2019
For more information:
https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/SUBSTANCEUSE/OPIOIDS/Pages/data.aspx

Figure 8-12: Percent of 8th grade students who reported ever using substances by substance and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-13: Percent of 11th grade students who reported ever using substances by substance and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Nutrition & Physical Activity

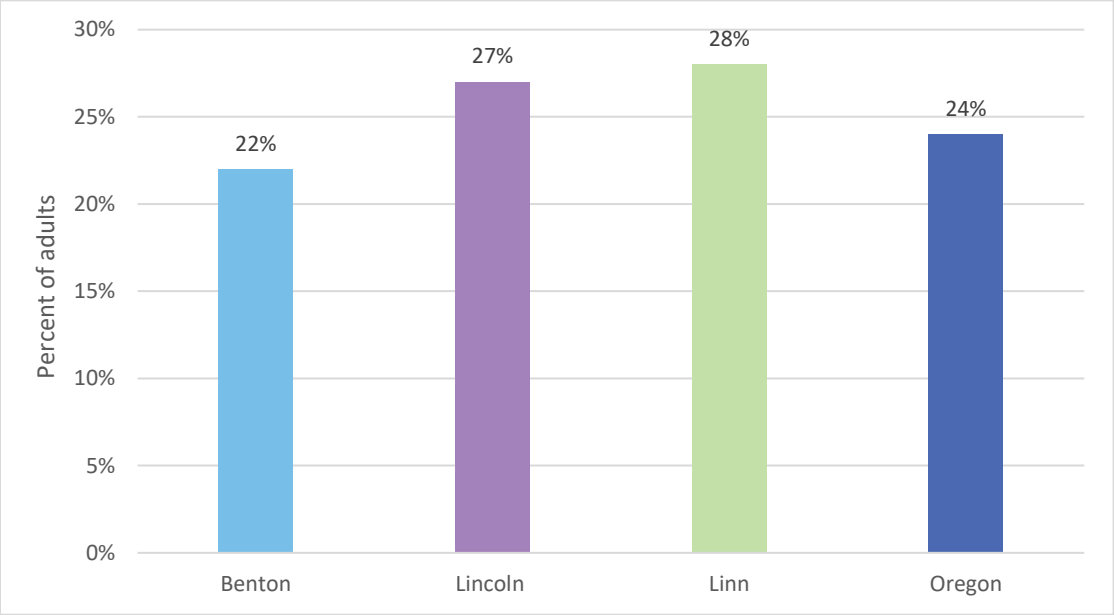
Healthy nutrition and physical activity promote lifelong health through improvement in body composition, musculoskeletal health, physical and cognitive health, and prevention of chronic disease.[71] However, the ability to make healthy choices related to nutrition and physical activity is greatly constrained by the characteristics of one's community and life circumstances (see Chapter 4: Social Determinants of Health.)

Physical inactivity is associated with several diseases and conditions, including type 2 diabetes, cancer, stroke, hypertension, cardiovascular disease, and premature mortality. The United States Department of Health and Human Services (DHHS) recommends that adults get at least 150 minutes of moderate-intensity physical activity per week, 75 minutes of vigorous-intensity physical activity per week, or a combination of both moderate-to-vigorous physical activity.[72] Leisure-time physical activity is physical activity that occurs outside of work hours and is often used as a population-level measure of physical activity. In 2019, a greater percentage of adults in Linn and Lincoln counties engaged in no leisure-time physical activity compared to the state of Oregon (Figure 8-14).

The DHHS recommends that adolescents get 60 minutes or more of physical activity every day.[73] In 2019, the percent of students meeting this recommendation was much lower among 11th graders than among 8th graders in both Linn and Benton counties. Lincoln County had the greatest percentage of 11th graders engaged in at least 60 minutes of physical activity a day in the LBL region, while Linn County had the greatest percentage of 8th graders meeting the guidelines in the LBL region.

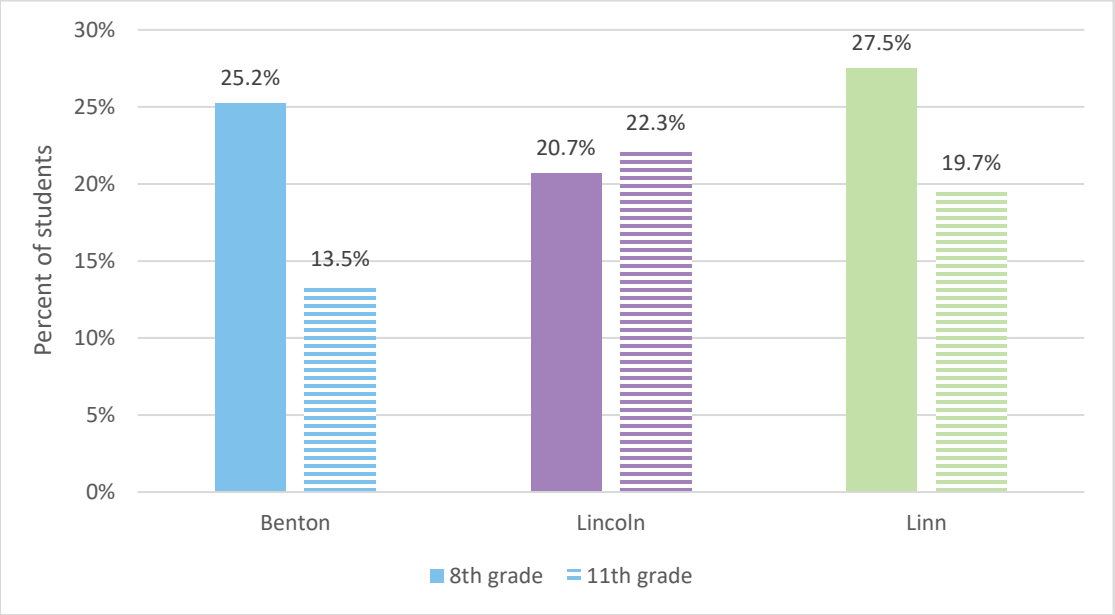
Eighth graders in the LBL region were more likely to consume five or more servings of fruits and vegetables per day than were 11th graders. Benton County had the greatest percentage of both 8th and 11th grade students who consumed five or more servings of fruits or vegetables per day in 2019. This is consistent with data that shows that Benton County residents have the greatest access to grocery stores (Figure 3-4).

Figure 8-14: Age-adjusted percent of adults 18 and over reporting no leisure-time physical activity in the past month by location



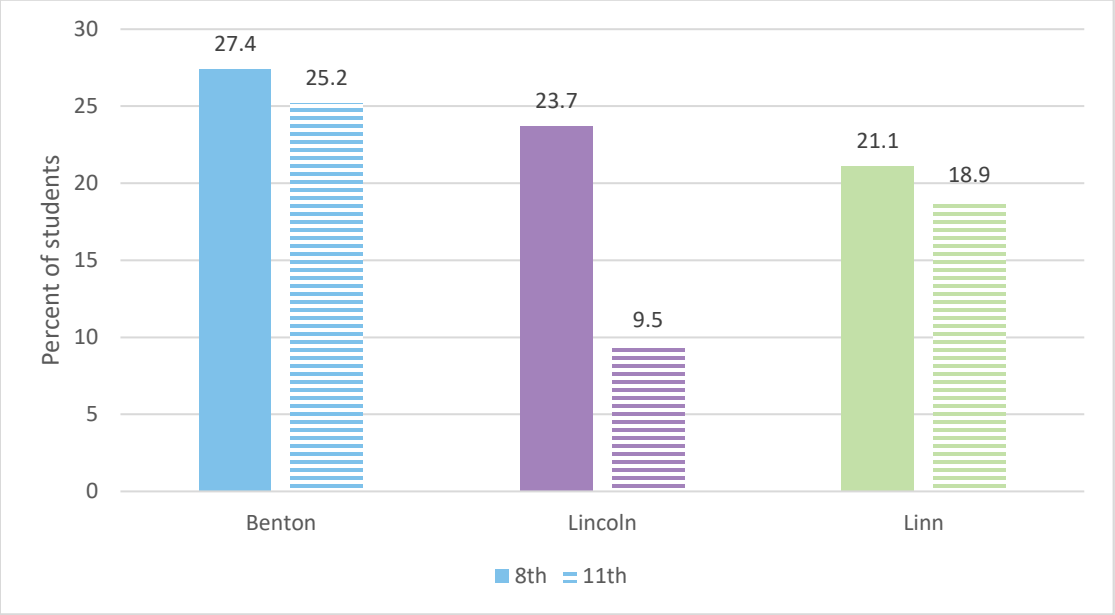
Data source: County Health Rankings
Time period: 2022
For more information: https://www.countyhealthrankings.org/explore-health-rankings/county-health-rankings-model/health-factors/health-behaviors/diet-and-exercise/physical-inactivity?state=41&year=2022#map-anchor

Figure 8-15: Percent of students who are physically active for at least 60 minutes per day by grade and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-16: Percent of students who consume 5 or more servings of fruits and vegetables per day by grade and location



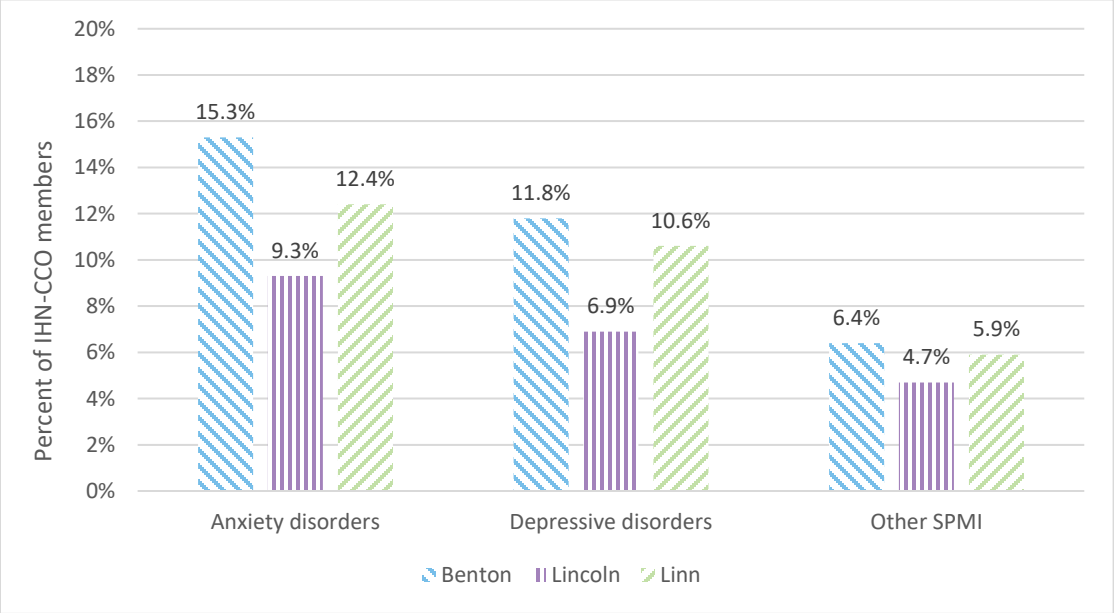
Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Oregon Health Plan (Medicaid): InterCommunity Health Network Coordinated Care Organization (IHN-CCO)

The Oregon Health Plan (OHP) is Oregon's Medicaid program. The Oregon Health Authority established a network of Coordinated Care Organizations (CCOs) as Medicaid managed care organizations to coordinate services for people covered by the Oregon Health Plan. The InterCommunity Health Network Coordinated Care Organization (IHN-CCO), established in 2012, is responsible for managing care for OHP members in the LBL region. Nationally, Medicaid recipients are disproportionately affected by mental health disorders and Medicaid is the largest payer for mental health services in the United States.[74] In 2021, 12.4% of all IHN-CCO members were diagnosed with an anxiety disorder and 10.6% had been diagnosed with depression (Figure 8-17). Over 70% of IHN-CCO members with a serious and persistent mental illness received at least one outpatient behavioral health visits in 2021, with persons residing in Lincoln County most likely to receive care (Figure 8-18).

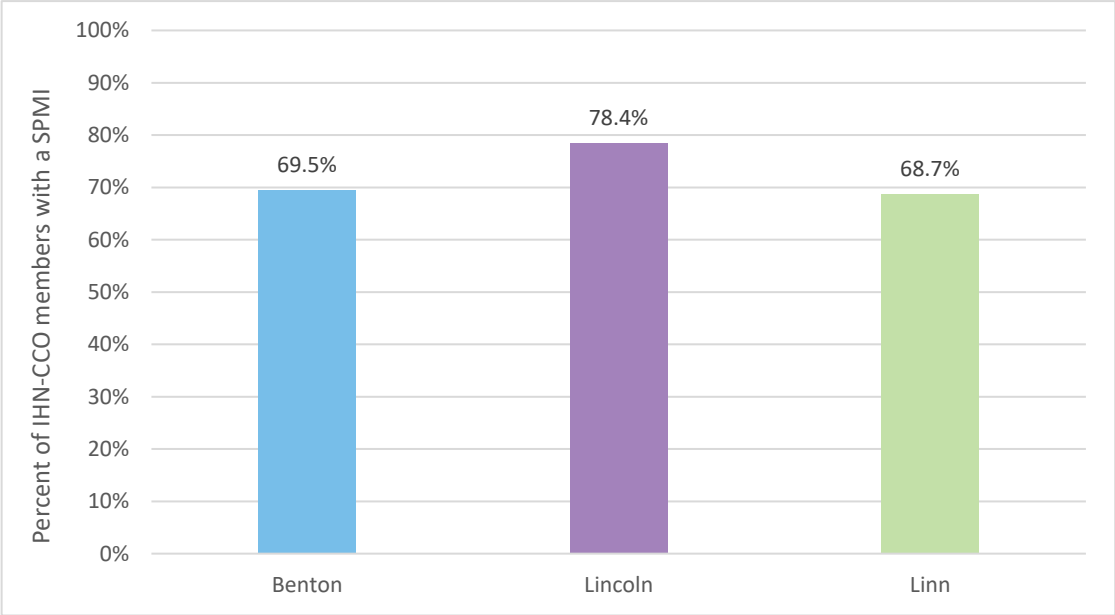
It is important to note that the data below come from insurance claims. Claims are only available for health care services that were provided – meaning that individuals both sought care and were able to access care. The data below should be interpreted as a reflection of the services provided, not a reflection of the total need or frequency of health conditions among IHN-CCO members.

Figure 8-17: Percent of IHN-CCO members with a serious and persistent mental illness (SPMI)* diagnosis, by type and location



**SPMI, as defined by OHA, includes Schizophrenia; Major depressive disorder; Bipolar disorder; Anxiety, limited to obsessive compulsive disorder (OCD) or post traumatic stress disorder (PTSD); Schizotypal personality disorder; Borderline personality disorder*[75]
Data source: IHN-CCO claims
Time period: 2021
For more information: email SHSresearch@samhealth.org

Figure 8-18: Percent of IHN-CCO members with a serious and persistent mental illness (SPMI)* who had an outpatient behavioral health visit by location



**SPMI, as defined by OHA, includes Schizophrenia; Major depressive disorder; Bipolar disorder; Anxiety, limited to obsessive compulsive disorder (OCD) or post traumatic stress disorder (PTSD); Schizotypal personality disorder; Borderline personality disorder*[76]

Data source: IHN-CCO claims

Time period: 2021

For more information: email SHSresearch@samhealth.org

9 COVID-19

The COVID-19 pandemic has taken over a million lives in the United States as of May 31, 2022.[77] Of those, 7,635 were Oregonians, and 402 lived in Linn, Benton, and Lincoln counties.[78] Almost 750,000 Oregonians have had a confirmed case of COVID-19, which represents about 18% of the population in 2022. The burden of the pandemic has landed heavily on diverse populations, low-income groups, and the elderly. This chapter focuses on the disease itself, but the broader community effects, including education, mental health, economic distress, food insecurity, racism, and the effect on the health care system cannot be ignored. These effects are still being investigated and may take years to be fully revealed and understood.

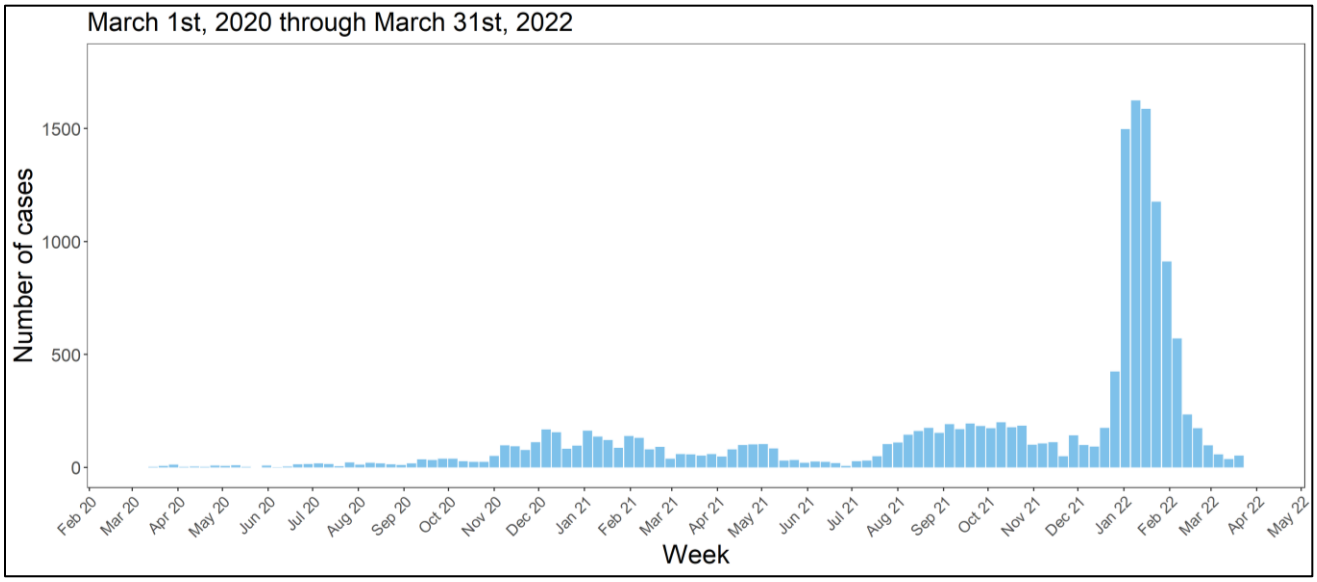
There are likely many cases of COVID-19 that have never been reported to public health authorities; therefore, all case rate data should be understood as reported cases only. However, in most cases hospitalizations and deaths that were caused by COVID-19 were accurately reported to public health, so those data are highly accurate.

Case Rates

The first recorded case of COVID-19 in Oregon was diagnosed on February 28, 2020 in Washington County.[79] Since that date, there have been over 50,000 diagnosed cases of COVID-19 in Linn, Benton, and Lincoln counties. The cases have come in waves as environmental conditions and emerging variants have sparked new surges. The following graphs show the number of reported cases each week from the beginning of the pandemic until March 2022. Linn County experienced the greatest number of COVID-19 cases in the LBL region, followed by Benton County (Figures 9-1, 9-2, and 9-3).

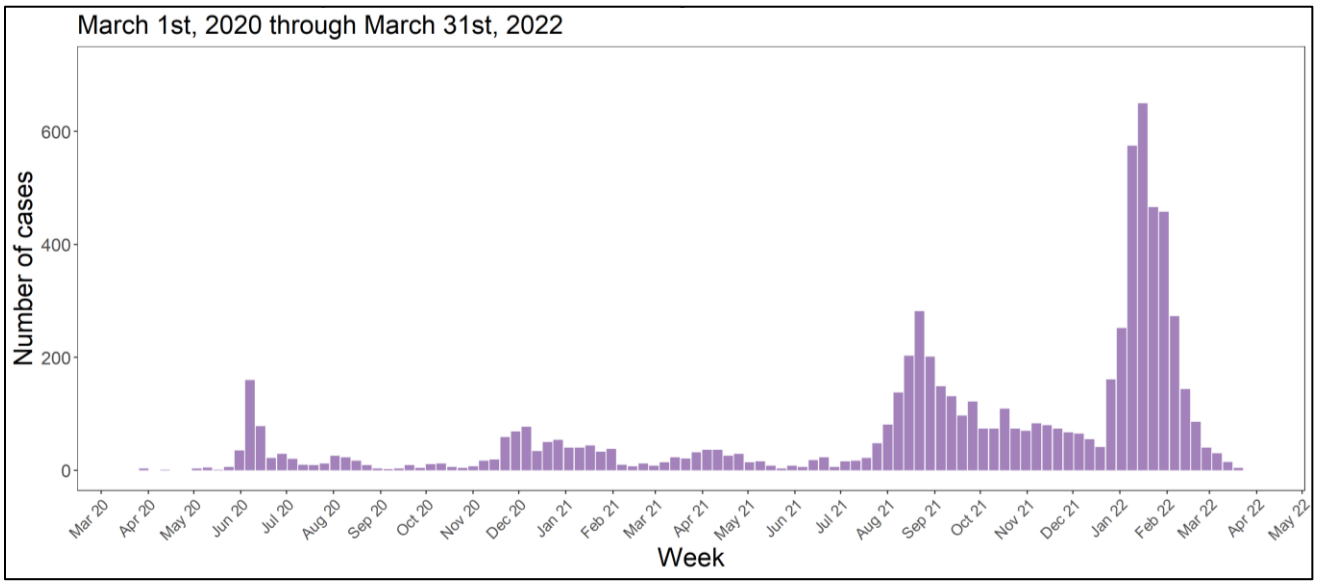
The disease dynamics are similar in all three counties. Lincoln County experienced a major outbreak at a seafood processing plant in June 2020, which explains the spike in cases during that month. The significant surges in August 2021 and January 2022 were caused by the Delta and Omicron variants, respectively.

Figure 9-1: Number of newly confirmed COVID-19 cases in Benton County by date



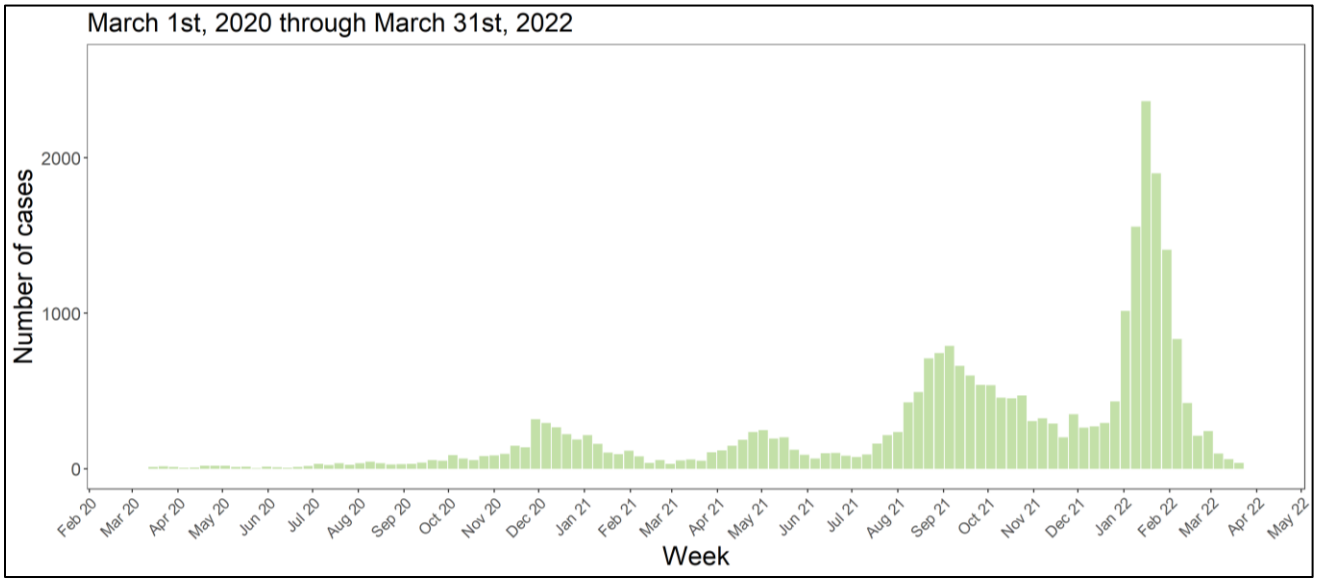
Data source: OPERA
Time period: 2020-2022
For more information: contact county health department

Figure 9-2: Number of newly confirmed COVID-19 cases in Lincoln County by date



Data source: OPERA
Time period: 2020-2022
For more information: contact county health department

Figure 9-3: Number of newly confirmed COVID-19 cases in Linn County by date



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

COVID-19 has affected demographic subgroups to different extents. The following two tables show the case breakdown by age group and by race/ethnicity. The tables show the number of cases in each subgroup and the percent of total cases that occurred in that subgroup. In order to compare subgroups, the percent of the total population in that subgroup is also listed. The column “Qualitative assessment of case count” indicates whether there were more or fewer cases in that subgroup than the population would lead one to expect. For example, if 10% of cases occurred in a subgroup, but 15% of the total population were in that subgroup, then the burden of COVID-19 would be lower than expected. If the percent of cases were equal to the percent of population, then the burden would be in line with what one would expect. The label of “close to the expected number of cases” is given when the percent of cases for a specified group is less than 2.5% above or below the percent of total population in the specified group.

When considering the population size of each age category, the 18 to 29 age group had much higher than expected case rates in all three counties, while the 65 and older age group had much lower than expected age rates in all three counties.

When considering the population size of each race/ethnicity category, the burden COVID-19 has been much higher in non-White populations compared to White populations in the three counties and beyond. All non-White subgroups had close to or higher than expected case rates, other than the Asian population in Benton County. In all three counties, the case rate among White populations has been below what would be expected given their share of the population.

Table 9-1: Newly confirmed COVID-19 cases by age group and location

County	Age group	Case count	Percent of cases in age group	Percent of population	Qualitative assessment of case count
Benton	Under 18	2,665	17.7%	16.4%	Close to expected # of cases
	18 to 29	6,269	41.5%	30.4%	Above expected # of cases
	30 to 49	3,310	21.9%	20.7%	Close to expected # of cases
	50 to 64	1,628	10.8%	17.0%	Below expected # of cases
	65 and older	1,189	7.9%	15.5%	Below expected # of cases
	Unknown	28	0.2%	N/A	N/A
Lincoln	Under 18	1,313	18.8%	16.9%	Close to expected # of cases
	18 to 29	1,277	18.3%	10.7%	Above expected # of cases
	30 to 49	2,239	32.0%	20.1%	Above expected # of cases
	50 to 64	1,199	17.1%	24.4%	Below expected # of cases
	65 and older	950	13.6%	27.9%	Below expected # of cases
	Unknown	19	0.3%	N/A	N/A
Linn	Under 18	4,846	18.4%	22.7%	Below expected # of cases
	18 to 29	5,555	21.1%	14.8%	Above expected # of cases
	30 to 49	8,283	31.4%	24.4%	Above expected # of cases
	50 to 64	4,538	17.2%	19.8%	Below expected # of cases
	65 and older	3,140	11.9%	18.3%	Below expected # of cases
	Unknown	12	0.0%	N/A	N/A

Data source: OPERA; United States Census Bureau, America Community Survey, Table B01001
Time period: 2020-2022; 2016-2020
For more information: contact the county health department

Table 9-2: Newly confirmed COVID-19 Cases by race/ ethnicity and location

County	Race/Ethnicity	Case count	Percent of all cases	Percent of population	Qualitative assessment of case count
Benton	American Indian or Alaska Native	169	1.1%	0.7%	Close to expected # of cases
	Asian	513	3.4%	7.4%	Below expected # of cases
	Black or African American	237	1.6%	1.1%	Close to expected # of cases
	Hispanic or Latinx	1,528	10.1%	7.6%	Above expected # of cases
	Native Hawaiian or Pacific Islander	42	0.3%	0.2%	Close to expected # of cases
	Multiple races	128	0.8%	4.9%	Below expected # of cases
	Other	2,311	15.3%	2.2%	Above expected # of cases
	White	9,539	63.2%	83.4%	Below expected # of cases
	Unknown/Refused	2,150	14.2%	N/A	N/A
Lincoln	American Indian or Alaska Native	337	4.8%	2.5%	Above expected # of cases
	Asian	66	0.9%	1.1%	Close to expected # of cases
	Black or African American	51	0.7%	0.3%	Close to expected # of cases
	Hispanic or Latinx	1,042	14.9%	9.4%	Above expected # of cases
	Native Hawaiian or Pacific Islander	28	0.4%	0.2%	Close to expected # of cases
	Multiple races	135	0.2%	5.8%	Below expected # of cases
	Other	629	9.0%	3.0%	Above expected # of cases
	White	4,519	64.6%	87.1%	Below expected # of cases
	Unknown/Refused	1,232	17.6%	N/A	N/A
Linn	American Indian or Alaska Native	357	1.4%	0.9%	Close to expected # of cases
	Asian	210	0.8%	1.1%	Close to expected # of cases
	Black or African American	163	0.6%	0.5%	Close to expected # of cases
	Hispanic or Latinx	2,330	8.8%	9.4%	Close to expected # of cases
	Native Hawaiian or Pacific Islander	53	6.6%	0.2%	Above expected # of cases
	Multiple races	191	0.7%	5.4%	Below expected # of cases
	Other	2,053	7.8%	3.1%	Above expected # of cases
	White	18,039	68.4%	88.8%	Below expected # of cases
	Unknown/Refused	5,308	20.1%	N/A	N/A

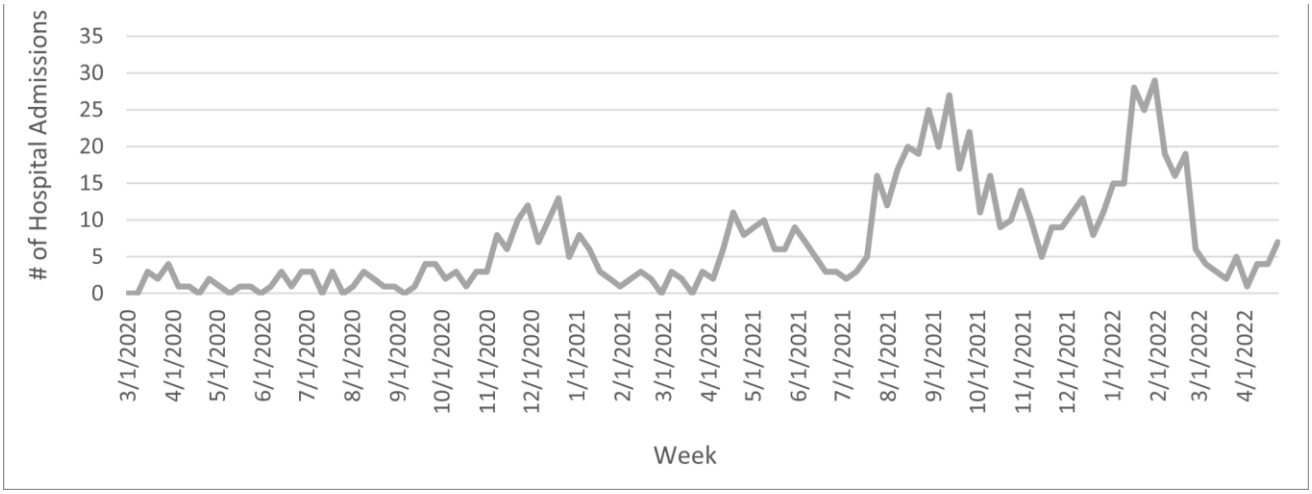
Data source: OPERA; United States Census Bureau, America Community Survey, Table B02001, B03003
Time period: 2020-2022; 2016-2020
For more information: contact the county health department

Hospitalizations

Severe COVID-19 disease can cause viral pneumonia and raise the risk of cardiac events. Across Oregon, about 4% of reported COVID-19 cases require hospitalization. However, that proportion has not remained constant throughout the pandemic. The graphs below show weekly COVID-19 hospital admissions in the three counties.

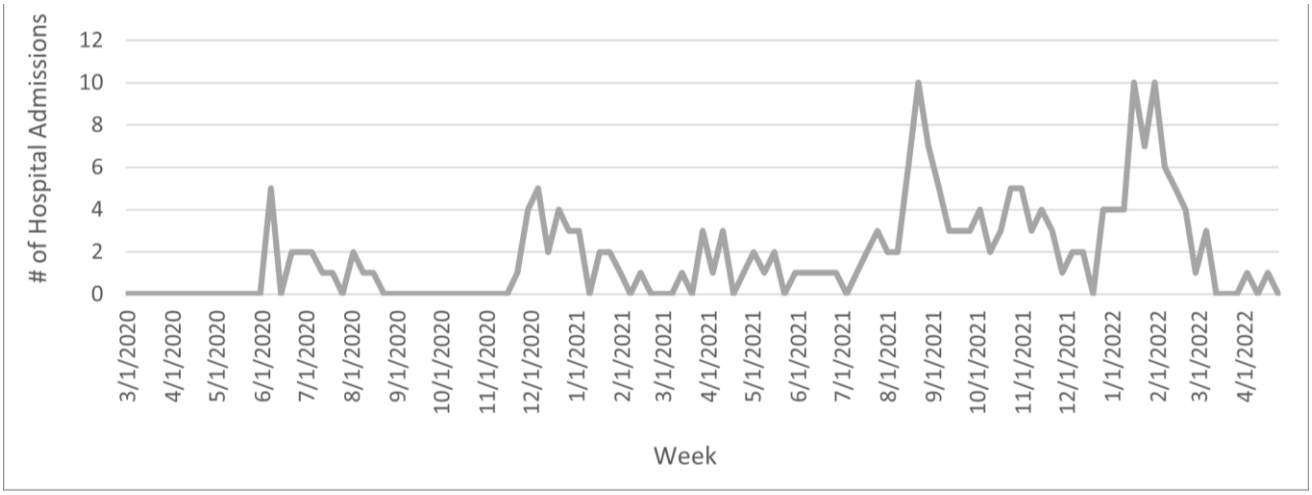
Hospitalization trends have largely mirrored case rates throughout most of the pandemic, with about 4% of reported cases resulting in a hospital admission. However, this trend broke during the Omicron-caused surge in January 2022. While the number of Omicron cases was between 3 and 6 times higher than the number of Delta cases during August 2021, the hospitalization rate was mostly the same during the two surges. This has been attributed to higher vaccination rates in January 2022, and to the likelihood that the Omicron variant caused less severe illness than the Delta variant for most people.

Figure 9-4: Number of COVID-19 hospital admissions in Benton County over time



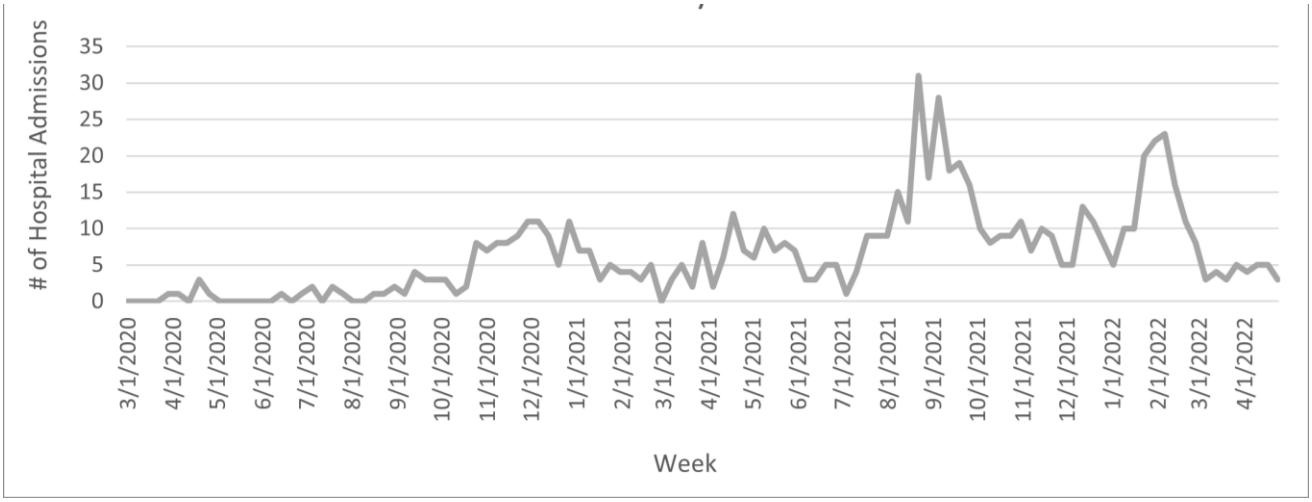
Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-5: Number of COVID-19 hospital admissions in Lincoln County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-6: Number of COVID-19 hospital admissions in Linn County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

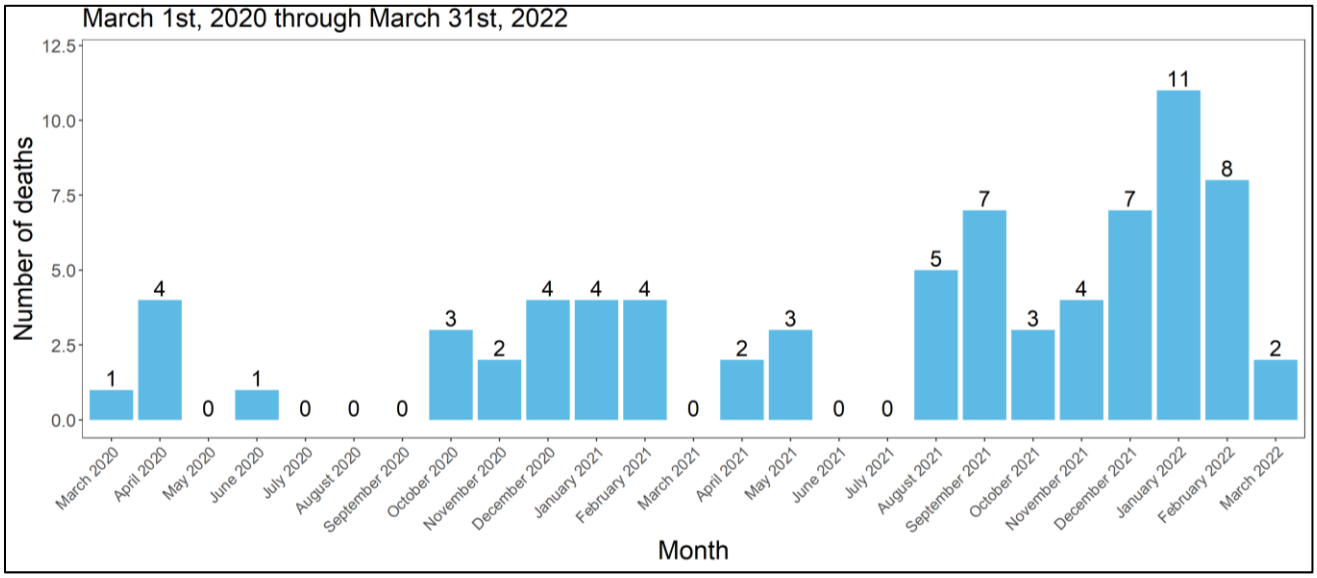
Mortality

During the period between the beginning of the pandemic until the end of March 2022, 437 people died of COVID-19 in the LBL region. Figures 9-7 to 9-9 below show the number of deaths each month, separated by county.

COVID-19 deaths follow the same trends as cases, with the exception of the much smaller than expected rise in the death rate during the January 2022 Omicron surge.

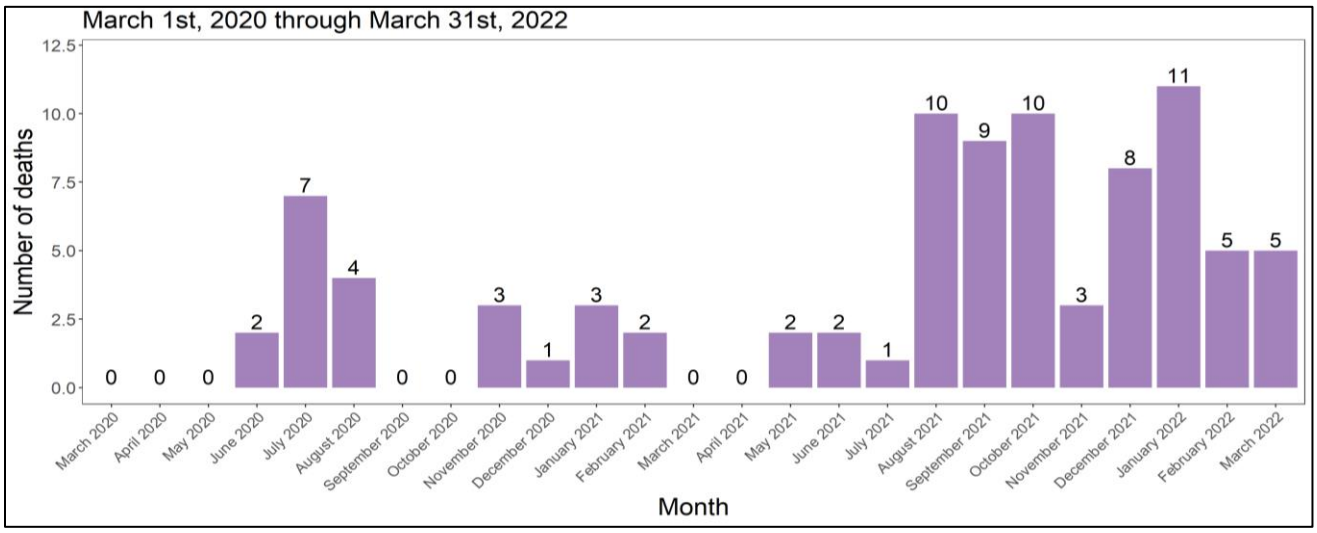
Benton County's number of COVID-19 deaths per 100,000 people is less than half of Lincoln County's number of deaths per 100,000 people, and 37% of Linn County's number of deaths per 100,00 people (Table 9-3). These numbers are not adjusted for age, and a large portion of Benton County's population is college age, which has a lower risk of death than older populations. However, this difference is still very stark.

Figure 9-7: Number of COVID-19 deaths in Benton County over time



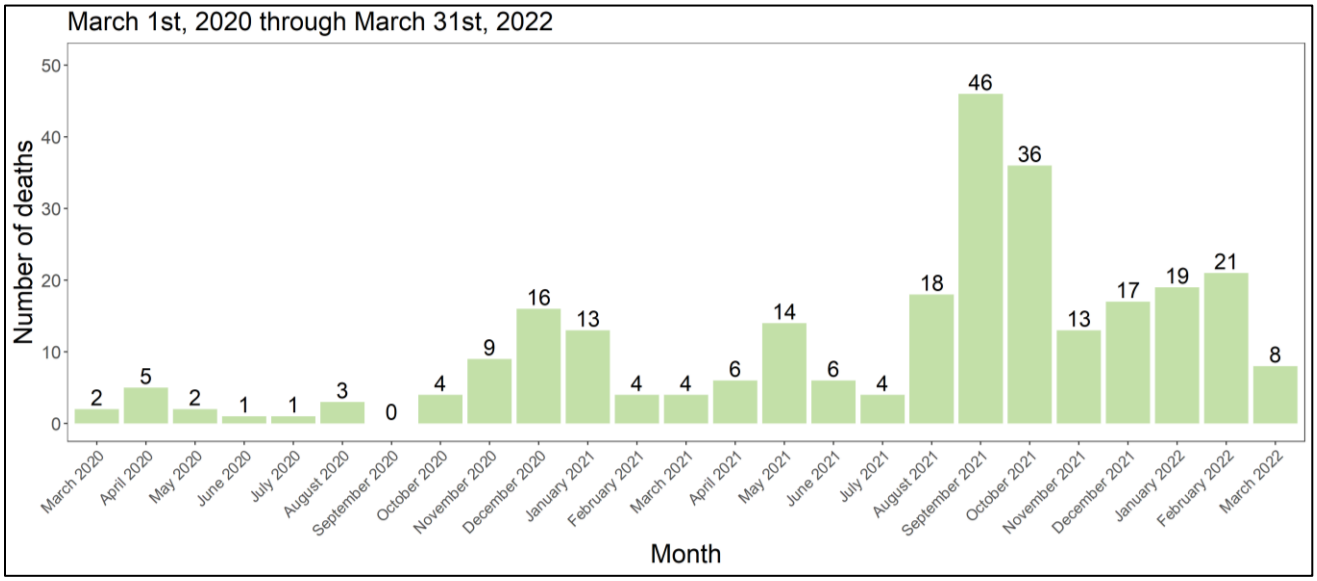
Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-8: Number of COVID-19 deaths in Lincoln County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-9: Number of COVID-19 deaths in Linn County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the local health department

Table 9-3: Number of COVID-19 deaths per 100,000 people by location

County	Number of deaths	Population	Deaths per 100,000 people
Benton	75	95,184	79
Lincoln	88	50,395	175
Linn	274	128,610	213

Data source: OPERA
Time period: March 2020-March 2022
For more information: contact the local health department

Vaccination

The first COVID-19 vaccines were developed in record time. Less than one year elapsed from the identification of the first United States case in January 2020 until emergency use authorization of the first vaccine in December 2020. Despite the rapid development, the vaccines were subject to rigorous and ongoing safety evaluations and have been authorized for wider segments of the population as additional safety and effectiveness studies have been submitted to the FDA. In May 2022, at least one COVID-19 vaccine was authorized for children as young as five years old. The CDC has recommended that most people complete a two-dose series of the COVID-19 vaccine, followed by a booster dose.

The rollout of the first COVID-19 vaccines in Oregon in January and February 2021 led to large vaccine uptake in the spring of 2021. There were both occupation and age-based eligibility requirements set by the Oregon Health Authority due to the limited supply of COVID-19 vaccines initially. Every couple of

weeks another population group became eligible for the vaccine, leading to consistently high demand for the first six months. After most individuals who wanted a vaccine received their first dose, vaccine uptake slowed, and has been growing slowly but steadily since around June 2021.

Benton County has the highest vaccination rate among the three counties in the LBL region. Linn County falls behind both Lincoln and Benton counties in the percent of community members with at least one dose of a COVID-19 vaccine. The COVID-19 vaccination data below utilizes Portland State University (PSU) population estimates, whereas the COVID-19 case and mortality data utilizes US Census population estimates. This accounts for the slight differences in population size.

COVID-19 vaccination rates vary by race/ethnicity and age. The LBL region's Native Hawaiian or Pacific Islander population had the highest rates of COVID-19 vaccination. Both Linn and Lincoln counties' Hispanic or Latinx populations had the lowest vaccination rates of any race/ethnicity group. In Benton County, the population with the lowest COVID-19 vaccination rate is the Black or African American population (Figure 9-5). Those ages 0-4 have the lowest rates of COVID-19 vaccination in the LBL region (Table 9-6). Those ages 6 months to 4 years became eligible for the COVID-19 vaccine in June 2022.

Table 9-4: Number of COVID-19 vaccinations by location

County	Number with 1+ dose	Population	Percent with 1+ dose
Benton	77,105	93,976	82.0%
Lincoln	40,065	50,903	78.7%
Linn	79,584	130,440	61.0%

Data source: Oregon Health Authority Workbook: Oregon Vaccine Metrics Summary Table (state.or.us)
Time period: January 2020 – February 2023
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/OregonVaccineMetricsSummaryTable/OregonCOVID-19VaccineProgressSummaryTable?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

Table 9-5: Number of people with at least one dose of a COVID-19 vaccination by rarest race/ethnicity and location

County	Race/Ethnicity	Number vaccinated	Estimated population size	Percent of population with at least one dose
Benton	American Indian or Alaska Native	1,997	2,422	82.5%
	Asian	5,604	6,871	81.6%
	Black or African American	1,274	1,812	70.3%
	Hispanic or Latinx	4,408	5,976	73.8%
	Native Hawaiian or Pacific Islander	639	609	104.9%*
	White	59,266	74,370	79.7%
	Other	*	*	*
Lincoln	American Indian or Alaska Native	2,391	3,313	72.2%
	Asian	749	904	82.9%
	Black or African American	539	761	70.8%
	Hispanic or Latinx	2,495	4,233	58.9%
	Native Hawaiian or Pacific Islander	303	303	100.0%
	White	31,923	39,787	80.2%
	Other	*	*	*
Linn	American Indian or Alaska Native	2,803	4,829	58.0%
	Asian	1,711	2,888	59.2%
	Black or African American	947	1,643	57.6%
	Hispanic or Latinx	5,267	11,292	46.6%
	Native Hawaiian or Pacific Islander	588	836	70.3%
	White	66,275	105,572	62.8%
	Other	*	*	*

** The Oregon Health Authority database uses the "Other" race category as a default when race is unknown. Because of this, the category includes many more individuals than those who would likely indicate "Other" race on the United States Census. Therefore, it is not possible to estimate the vaccination rate among "Other."*
**Vaccination rates over 100% is due to more individuals within race/ethnicity categories received a vaccine with a current address in Oregon than are estimated in the population.*
Data source: Oregon Health Authority Workbook: Oregon Vaccine Metrics Summary Table (state.or.us)
Time period: December 2020 - February 2023
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/OregonVaccineMetricsSummaryTable/OregonCOVID-19VaccineProgressSummaryTable?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

Table 9-6: Number of people with at least one dose of a COVID-19 vaccine by age group and location

County	Age group	Number vaccinated	Estimated population	Percent of population with at least one dose
Benton	0 to 4	988	3,642	27.1%
	5 to 11	3,392	5,746	59.04%
	12 to 17	4,323	5,372	80.47%
	18 to 49	38,447	51,002	75.38%
	50 to 64	12,995	15,491	83.89%
	65 and older	16,960	12,723	133.3%*
Lincoln	0 to 4	224	1,957	11.4%
	5 to 11	1,257	3,225	38.98%
	12 to 17	1,964	2,853	68.85%
	18 to 49	12,328	15,664	78.70%
	50 to 64	9,224	11,235	82.10%
	65 and older	15,068	15,970	94.35%
Linn	0 to 4	424	7,711	5.5%
	5 to 11	2,462	11,182	22.02%
	12 to 17	4,337	9,661	44.89%
	18 to 49	31,744	51,504	61.63%
	50 to 64	17,478	24,463	71.45%
	65 and older	23,139	25,920	89.27%

* *Vaccination rates over 100% are due to more individuals within an age category having received a vaccine with a current address in Oregon than are estimated in the population.*

Data source: Oregon Health Authority Workbook: Oregon Vaccine Metrics Summary Table (state.or.us)
Time period: December 2020 - February 2023
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/OregonVaccineMetricsSummaryTable/OregonCOVID-19VaccineProgressSummaryTable?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

10 Community Voices

In partnership with Samaritan Health Services, various forms of primary data were collected from community members and organizations to inform our assessment of regional health priorities. These different formats include the Regional Community Health Survey, Focus Groups, and Key Informant Interviews.

Regional Community Health Survey

Please see the Methodology section in Chapter 1: Introduction for more information about the Regional Community Health Survey (Community Survey). A total of 2,812 responses to the survey were collected through convenience sampling distributed by a broad range of channels. Table 10-1 shows a summary of demographic information about survey respondents. The highest proportion of respondents lived in Benton County (37%), followed by equal proportions from Lincoln (27%) and Linn County (27%). The survey invited participation from anyone who lived, worked, went to school, or spent time in Linn, Benton, or Lincoln County, and 9% of respondents lived outside the LBL region. Respondents were primarily middle-aged (age 25-64), identified as white or Caucasian, and were predominantly female (75%).

Table 10-1: Demographic information from the 2,812 Community Survey respondents

Respondent Characteristics	Percent of responses
County of residence	
Benton	37%
Lincoln	27%
Linn	27%
Other	9%
(Missing)	2%
Age	
Under 18 years old	1%
18 to 24 years old	6%
25 to 44 years old	35%
45 to 64 years old	36%
65 to 84 years old	17%
85 years or older	1%
(Missing)	4%
Race/ethnicity*	
African American or Black	3%
American Indian or Alaska Native	10%
Asian	3%
Pacific Islander	1%
White or Caucasian	80%
Hispanic or Latino	11%
Middle Eastern, North African, or Arab	1%
(Missing)	10%
Gender	
Female	75%
Male	22%
Non-binary or other gender	3%
(Missing)	1%
Languages spoken at home*	
English	88%
Spanish	4%
Arabic	1%
Other languages or multiple languages	5%
(Missing)	5%

**Respondents could check multiple categories, so percentages do not add up to 100%*

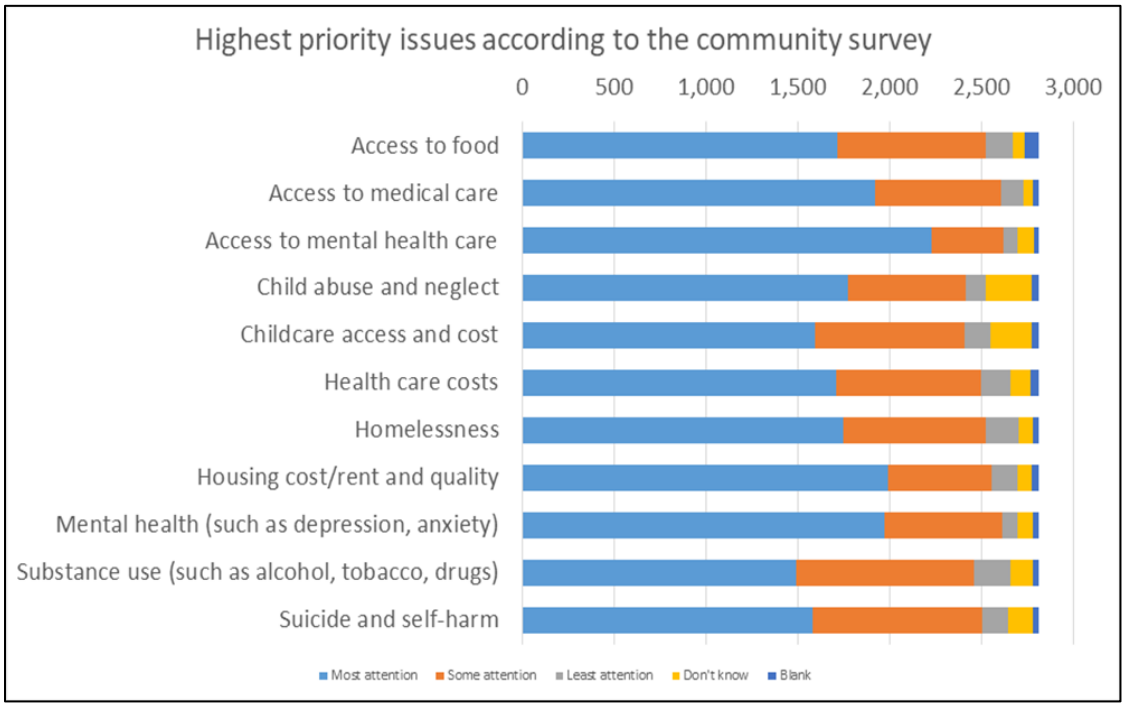
The Community Survey asked respondents to rate both the overall health of their community and their overall health as an individual. Most respondents felt that their community was 'healthy' (30%) or 'sort of healthy' (51%), while people felt that their individual health was overall slightly healthier (49% reported being 'healthy' while 30% reported being 'sort of healthy').

Table 10-2: Perceived health status among Community Survey respondents

Questions	Percent of responses
"How healthy is your community?"	
Very healthy	3%
Healthy	30%
Sort of healthy	51%
Unhealthy	13%
Very unhealthy	2%
"How healthy are you?"	
Very healthy	13%
Healthy	49%
Sort of healthy	30%
Unhealthy	7%
Very unhealthy	1%

Additionally, the Community Survey also asked respondents to consider 30 topic areas and rate each topic as deserving the 'least attention', 'some attention', or 'most attention' (or 'don't know') in their community. Figure 10-1 shows that the topics with the highest proportion of 'most attention' responses included access to mental health care (83%), housing cost/rent and quality (74%), mental health (such as depression, anxiety) (74%), child abuse and neglect (71%), and access to medical care (65%).

Figure 10-1: High priority issues from Community Survey respondents



Qualitative Engagement Sessions

Please see the Methodology section in Chapter 1: Introduction for more detailed information on how focus groups and key informant interviews were conducted.

Focus Groups

Sixteen focus groups were completed with community members of Linn, Benton, and Lincoln counties. The frequency in which a given topic was discussed was totaled across all focus group sessions. Access to quality care was brought up most frequently by participants, having nearly four times the occurrence of any other topic. Other topics that repeatedly came up across focus groups included 1) a lack of diversity, equity, inclusion, and cultural representation in the community, 2) pregnancy, child health, and child education, 3) access to affordable housing, 4) food insecurity, 5) mental health, 6) and substance use and misuse. Participants also discussed chronic disease, transportation, and access to information, although these topics were brought up less frequently than those listed above.

Key Informant Interviews

Thirty-one key informant interviews were completed with community representatives of Linn, Benton, and Lincoln counties. Significant words and phrases from each key informant interview were identified and placed into thematic groups. For example, the statement "the COVID-19 pandemic has been very challenging" would be placed under the thematic group, disease and disability. The thematic groups identified from the key informant interviews include (in no particular order) 1) community health & quality of life, 2) mental & behavioral health, 3) access to care & resources, 4) disease & disability. The topics included in each of these thematic groups can be found in Table 10-3. Mentions of the topics within each thematic group varied by county as seen in Figure 10-4.

Table 10-3: Thematic groups from key informant interviews and their associated topics

Thematic group	Topics included
Community health & quality of life	• Lack of safe/accessible housing • Poor nutrition/food insecurity • Overwork/time pressures • Lack of exercise/fitness • Lack of access to education
Mental & behavioral health	• Mental & behavioral health needs • Substance use disorder • Social isolation/lack of community • Suicidality in youth • Tobacco use • Teen births
Access to care & resources	• Lack of providers, appointments, and support • Lack of cultural and linguistic competence/trust • Cost of care/insurance • Lack of transportation

Disease & disability	• Diabetes • Disability/accessibility issues • COVID-19 impacts • Chronic health conditions • Senior health • Socioeconomic inequality

Table 10-4: Percent of key informant responses by thematic group and location

County	Thematic group	Percent of key informant interviews
Benton	Community health & quality of life	33%
	Mental & behavioral health	28%
	Access to care & resources	28%
	Disease & disability	12%
Lincoln	Community health & quality of life	11%
	Mental & behavioral health	43%
	Access to care & resources	24%
	Disease & disability	16%
Linn	Community health & quality of life	31%
	Mental & behavioral health	31%
	Access to care & resources	21%
	Disease & disability	14%

11 Summary

The 2022 - 2026 Regional Health Assessment (RHA) aimed to describe and compare the health status and conditions affecting residents in Linn, Benton, and Lincoln counties. Oregon is composed of 36 counties, 35 of which were ranked based on overall health outcomes and health factors in the 2022 County Health Rankings. Benton County ranked 1st among Oregon counties for health outcomes (including measures of length of life and quality of life) and 2nd for health factors (including health behaviors, clinical care, social and economic factors, and physical environment). [80] Linn County was ranked in the middle of the 35 Oregon counties that received a ranking (16th for health outcomes and 17th for health factors) while Lincoln County ranked 27th for health outcomes and 33rd for health factors. These summary rankings highlight the variability within the LBL region as well as the potential opportunities to improve community health.

The 2022 RHA also identified challenges that individual counties and the region face. Benton County has better health outcomes than Linn and Lincoln counties in regard to communicable disease, gestational parent and child health, mental health, and chronic disease indicators. Conversely, Benton County tends to have higher economic disparities compared to other counties in the region. The identification of areas of weakness helps to inform public health interventions, ensure high risk populations are being correctly targeted for community programs, and improve needed access to care and resources.

Key Themes

Based on review of the data presented in this report, the Partnership for Community Health identified seven key themes. The themes are presented below in alphabetical order, with a brief summary of key data points for each topic.

Access to affordable housing & homelessness

- The percent of the K-12 student population experiencing homelessness in Lincoln County was 3 times higher than the state percentage in 2019-2020.
- The LBL region had a total population of around 870 peoples experience homelessness in 2019.
- Half of rented regional households in the LBL region experienced a housing burden in 2020.

Access to quality care

- In Linn and Lincoln counties, the rates of Primary Care Physicians is lower than the Oregon in 2020.
- In the LBL region, the rate of dentists is the below Oregon in 2020.
- In Linn and Lincoln counties, the rates of Behavioral Health Providers is lower than the Oregon in 2020.
- 14 service areas in the LBL region had less than 5 mental health care providers per 10,000 individuals in 2021; 5 service areas in the LBL region had no mental health providers in 2021.

Equity, Diversity & Inclusion

- The percentage of individuals living in poverty with a disability within Linn and Lincoln County is higher than the state in 2021.
- 1 in 9 individuals within the region spoke another language at home in 2020.
- Minoritized racial and ethnic groups in the region are more likely to live in poverty than White individuals in 2020.

Food Insecurity/Access

- 1 in 10 households in Benton County utilized SNAP benefits. This is lower than the other two counties (1 in 5) and the state in 2020.
- In 2020, the LBL region experienced higher percentages of food insecurity (1 in 8 individuals) in comparison to the state.
- Only 3.5 out of 10 people in the LBL region lived within walking distance to a grocery store in 2019.

Healthy Youth & Families

- Prenatal tobacco use affects 1 of every 6 pregnancies in both Lincoln and Linn counties and 1 of every 10 pregnancies in Benton County.
- In Linn and Lincoln counties, the number of pregnancies per 1,000 ages 15 to 19 is higher than the state in 2020.
- The LBL region had higher numbers of child abuse victims per 1,000 compared to Oregon in 2021.
- Lincoln County had almost twice as many children in foster care per 1,000 in comparison to Oregon in 2021.

Mental Health

- Over 1 in 5 residents in the LBL region have a diagnosis of depression in 2020.
- The suicide rate in Lincoln County was double that of Linn and Benton counties in 2020.
- 1 in 3 eighth graders in Lincoln County report being bullied. This is higher than Oregon in 2019.
- 2 in 5 11^{th} graders felt sad or hopeless almost every day for two weeks in 2019.

Substance Use and Misuse

- Lincoln County drug overdose death rate per 100,000 persons is triple the rate of Benton County in 2019.
- In Linn and Lincoln counties, 1 in 6 individuals smoked cigarettes in 2020.
- 1 out of 3 eleventh graders report using E-Cigarettes in Linn County. This is higher than the other two counties and Oregon in 2019.
- 1 in 9 8th graders report using alcohol in the LBL region in 2019.
- In the LBL region, the percent of 11^{th} graders who report misusing prescription drugs is higher than the state in 2019.

Conclusion

Community partners in the LBL region have already implemented a variety of programs aimed at improving the health status of residents including tobacco prevention and education programs, crisis services, well water testing, among countless others. Future interventions will further improve environmental conditions and reduce the health disparities associated with adverse health outcomes through the Regional Health Improvement Plan.

This report was a collaborative project that would not have been possible without the help and dedication of Benton, Lincoln, and Linn County Public Health Departments, Samaritan Health Services, InterCommunity Health Network Coordinated Care Organization, the Confederated Tribes of Siletz Indians, and United Way of Linn, Benton & Lincoln Counties. The project not only provided a safe place for community partners to express their program needs and concerns but allowed for the growth of relationships and strengthening of communication bonds between agencies. With ongoing collaboration, we will continue to strive to eliminate disparities and improve the health of all LBL community members.

Appendix 1: Acronyms used

ACS	American Community Survey (data source)
CDC	Centers for Disease Control and Prevention
LBL	Linn, Benton, and Lincoln counties (the geographical area of focus for this assessment)
BRFSS	Behavioral Risk Factor Surveillance System (data source)
IHN-CCO	InterCommunity Health Network Coordinated Care Organization (a subsidiary of Samaritan Health Services that administers the Oregon Health Plan for beneficiaries living in Linn, Benton, and Lincoln counties)
OHA	Oregon Health Authority (Oregon's state health agency, which oversees statewide public health efforts as well as the Oregon Health Plan)
OHP	Oregon Health Plan (Oregon's Medicaid program, managed by the Oregon Health Authority)
OPHAT	Oregon Public Health Assessment Tool (data source)
RHA	Regional Health Assessment
SDOH	Social Determinants of Health
STD	Sexually Transmitted Disease

Appendix 2: Annotated list of select data sources

The following list provides more detail about some of the most common data sources used in the Regional Health Assessment report:

Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS, administered by the United States Centers for Disease Control and Prevention (CDC), continuously collects health data via telephone surveys. Adults residing in the United States are selected through random digit dialing conducted by public health departments and university partners. Approximately 400,000 adults residing in the United States are surveyed each year. Learn more at: https://www.cdc.gov/brfss/index.html

American Community Survey (ACS)

The American Community Survey is randomly administered to approximately 3.5 million United States households each year and collects information on socioeconomic, demographic, and housing characteristics. A two-phase systematic sampling scheme is utilized to select eligible housing units. If selected, participants are legally required to accurately complete the survey. In 2020, 74.2% of selected households in Oregon successfully responded to the survey. The data presented in this report was extracted from 5-year estimates between 2016 and 2020. Learn more: https://www.census.gov/acs/www/methodology/sample-size-and-data-quality/response-rates/index.php.

County Health Rankings

The County Health Rankings compiles and standardizes data from secondary sources to rank counties within states on important health indicators. The program was developed by the Wisconsin Population Health Institute with funding from the Robert Wood Johnson Foundation and uses data from reliable national and local data sources. The County Health Ranking's health indicator are regularly age-adjusted to allow comparability among counties and over time. Rankings are updated annually, though the data used to calculate rankings varies in recency. Learn more at: https://www.countyhealthrankings.org/explore-health-rankings/our-methods.

Oregon State Health Assessment

The Oregon State Health Assessment is conducted every five years with the aim of describing the health of Oregon residents. The assessment uses data extracted from a variety of primary data sources to collect information on health, demographic characteristics, and environmental factors. Learn more at: https://www.oregon.gov/oha/ph/about/pages/healthstatusindicators.aspx.

Oregon Healthy Teens Survey

The Oregon Healthy Teens survey is a comprehensive school-based survey that is administered to eighth and eleventh graders across the state during odd numbered years. Participation in the survey is confidential and voluntary. The survey covers a variety of topics, including but not limited to substance

use, healthy behaviors, and health conditions. The most recent available data is from 2019, including approximately 27,000 valid surveys were submitted by students. Learn more at: https://www.oregon.gov/oha/ph/birthdeathcertificates/surveys/oregonhealthyteens/pages/index.aspx

ALERT Immunization Information System

The ALERT Immunization Information System is a computerized registry that contains immunization records for children and adults across Oregon. Medical providers can directly input immunizations into the database to allow for efficient documentation across practices. One hundred percent of public clinics and ninety-two percent of private clinics utilize the database. All sites that administer COVID-19 vaccinations are required to report immunization administration to ALERT IIS. Learn more at: https://www.oregon.gov/oha/ph/preventionwellness/vaccinesimmunization/alert/pages/index.aspx.

Oregon Public Health Assessment Tool (OPHAT)

The Oregon Public Health Assessment Tool (OPHAT) is a web-based tool used by local and state public health agencies to access, analyze, and present data from multiple datasets.

Oregon Public Health Epidemiologist User System (Orpheus)

The Oregon Public Health Epidemiologist User System (Orpheus) is the electronic disease surveillance database used for all communicable diseases in the state of Oregon. Epidemiologists at the local and state level access the data when analyzing disease trends and conducting case investigations with sick persons.

Oregon Pandemic Emergency Response Application (Opera)

The Oregon Pandemic Emergency Response Application (Opera) is the Oregon electronic-disease surveillance system used to track all COVID-19 related health outcomes.

Oregon Environmental Public Health Tracking

Oregon Environmental Public Health Tracking complies data from the United States Environmental Protection Agency (EPA), hospital records, United States census data, and surveillance data from public health departments to improve the understanding of the role that environmental hazards and exposures have on health. The system is part of the larger CDC's National Tracking Network. Learn more at: https://www.oregon.gov/oha/PH/HealthyEnvironments/TrackingAssessment/EnvironmentalPublicHealthTracking/Pages/index.aspx

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Where there's smoke, there's fire – and heart health risks

The American Heart Association warns smoke exposure from the current wildfires out of Canada may cause heart problems or worsen existing ones

DALLAS, May 30, 2025 — Smoke from Canada wildfires is rapidly drifting into the U.S. and the American Heart Association, a global force changing the future of health for all, warns that this wildfire smoke exposure may pose an increased risk for heart disease.

"While breathing problems and respiratory health dangers are often considered the biggest health impact from wildfire smoke, it's important to recognize the impact on cardiovascular health, as well.," said Keith Churchwell, M.D., FAHA, American Heart Association volunteer president, an associate clinical Professor of Medicine at Yale School of Medicine in New Haven, Connecticut and adjunct Associate Professor of Medicine at the Vanderbilt School of Medicine, Nashville, Tennessee. "Wildfire smoke contains a lot of pollutants including fine, microscopic particles linked to cardiovascular risk. As these fires continue to burn that contaminated smoke is traveling many miles beyond the immediately affected area."

Several research studies have linked smoke exposure to an increased risk of sudden cardiac arrest and a higher volume of visits to local emergency rooms for other cardiovascular disease-related causes.

- In research presented at the American Heart Association's Scientific Sessions 2023, investigators found smoke from summertime wildfires that created short-term spikes in fine particulate matter air pollution was significantly associated with same-day hospitalization for unstable chest pain in Utah.
- A study published in the **Journal of the American Heart Association** in 2020 found that exposure to heavy smoke during wildfires raised the risk of out-of-hospital cardiac arrests up to 70%. The risk was elevated among men and women, among adults 35-64 years old and in communities with lower socioeconomic status.
- Previous findings from the same research group noted that wildfire smoke exposure was associated with increased rates of emergency room visits, not just for breathing trouble, but also ischemic heart disease, irregular heart rhythm, heart failure, pulmonary embolism and stroke. ER visits increased 42% for heart attacks and 22% for ischemic heart disease within a day of exposure to dense wildfire smoke. The increase was most notable for adults age 65 and older, according the study published in the **Journal of the American Heart Association** in 2018.

People with underlying cardiovascular disease risk factors may be at risk for an acute cardiovascular event when exposed to wildfire smoke.

According to the American Heart Association, recognizing the signs of a heart attack or stroke are important. Churchwell urges pay attention to your body and call 911 if you have:

- **Chest discomfort.** Most people having a heart attack feel discomfort in the center of the chest. It can last more than a few minutes, or it may go away and then return. It can feel like uncomfortable pressure, squeezing, fullness or pain.
- **Discomfort in other areas of the upper body.** Symptoms can include pain or discomfort in the:
  - Arms (one or both)
  - Back
  - Neck
  - Jaw
  - Stomach
- **Shortness of breath.** This can happen with or without chest discomfort.
- **Other signs.** Other possible signs include:
  - Breaking out in a cold sweat
  - Nausea
  - Rapid or irregular heartbeat
  - Feeling unusually tired
  - Feeling lightheaded

Additionally, knowing and performing CPR can more than double the chance of survival in the event of a cardiac arrest.

The U.S. Environmental Protection Agency, in collaboration with other government and private agencies, offers a zip code-level tracking map of current air quality at airnow.gov. Churchwell recommends checking that site regularly if you're seeing signs of wildfire smoke and haze developing where you live. It's also important to stay informed about any special alerts sent out by your local health department.

Churchwell offers the following tips for reducing exposure to wildfire smoke:

- Stay indoors with doors and windows closed.
- Use high-efficiency air filters in air conditioning systems or portable air cleaners.
- Avoid exertion.
- Keep well hydrated.
- Consider seeking other shelter if your home does not have an air conditioner and it's too warm to stay inside.
- Be mindful that your pets may also be affected by the smoke and bring them indoors, as well.

"While these types of wildfires and the extent of their smoke reach can't always be predicted, protecting yourself and your family from poor air quality throughout the year is something to consider," Churchwell said. "In the American Heart Association's 2020 scientific statement on air pollution exposure, we note that one of the most effective measures is the use of portable air cleaners, which have been shown to reduce indoor particulate matter by as much as 50-60%. Given their modest upfront cost ($50-200) and potential benefits in reducing cardiopulmonary outcomes, this measure has a high benefit for the cost."

Churchwell said while most people in the U.S. are not directly impacted by the physical wildfires burning in Canada, the exposure to this lingering smoke can be extremely harmful and shouldn't be taken for granted. "Protect yourself, be alert and prepared," he said.

The American Heart Association has resources to help at www.heart.org.

Additional Resources:

- Multimedia is available on the right column of the release link.
- AHA health information: Wildfire resources
- AHA health information: Community Emergency Resources
- Follow AHA/ASA news on X @HeartNews

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Wildfire smoke exposure and cardiovascular disease—should statins be recommended to prevent cardiovascular events?

Alpo Vuorio [1,2,*], Bruce Budowle [2], Frederick Raal [3], Petri T Kovanen [4]

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Introduction

The risk of wildfires has been increasing which may well be associated with climate change (1, 2). The effects of wildfires can have serious consequences on human health. Currently, extremely destructive wildfires in Canada have generated substantial smoke within as well as beyond the borders of Canada (3). It has been estimated that toxic wildfire smoke from about 200 wildfires in Quebec alone, has affected over 100 million people in Canada and the USA (4). The severity of harm is such that residents in smoke-affected areas have been advised to use N95 masks when outdoors and, if possible, to remain indoors.

There are broad-based negative health effects caused by forest fires that will only worsen as their numbers and severity increase (5, 6). As an example, a study compared hospital visits during a wildfire in August 2015 and post-wildfire in September 2015 in the city of Calgary (7). In this study, physician visits increased by 19% among seniors, mainly related to ischemic heart disease (95% CI: 7%–33%). Wildfire smoke has also been associated with out-of-hospital cardiac arrest (8). Importantly, wildfire smoke has a significant negative impact on airway epithelial cell viability, as there is a disruption of the cellular survival processes governed by autophagy, i.e., of processes that are already dysregulated in chronic obstructive pulmonary obstructive disease (9). Moreover, even short-term exposures of pulmonary airways to $PM_{2.5}$ particles cause systemic inflammation, oxidative stress, and changes in the balance of the autonomic nervous system, all of which may then jointly result in vascular thrombosis and ventricular arrhythmias (8, 10). The primary initiating pathways causing systemic oxidative stress and systemic inflammation include the migration of $PM_{2.5}$ particles from the lungs to the circulation (11, 12), and as shown in a recent *in vivo* study, exposure to $PM_{2.5}$ particles associates with features of vulnerable atherosclerotic plaques in coronary arteries (13).

It can be reasonably concluded that significant forest fires and smoke exposure are associated with a notable additional burden on healthcare services. Moreover, studies have revealed that several sectors of the population are particularly vulnerable to the effects of smoke from forest fires. As an example of social vulnerability, a study using satellite-collected data on wildfire smoke exposure at locations of exposed populations during 2011–2021 indicated that in almost 90% of the US population, large increases of exposure were especially high in communities representing ethnic minorities (14). In this article, we focus on another vulnerable group, i.e., people with cardiovascular disease.

Our intent was to perform a cursory assessment of public guidance that has been recommended for individuals with cardiovascular disease, hopefully, to prevent additional health-threatening events during exposure to wildfire smoke. The purpose is not to determine the effectiveness of current wildfire smoke health exposure guidelines (15), but simply to explore whether such guidelines contain evidence-based guidance for high-risk cardiovascular disease patients who are exposed to toxic smoke.

Wildfire smoke exposure and cardiovascular events

In general, exposure to wildfire smoke has been shown to increase cardiovascular-related health issues such as acute myocardial infarction, cardiovascular mortality, cardiovascular emergency department visits and hospitalization, cardiac arrest, as well as heart failure (16–19). Especially vulnerable are those individuals who have pre-existing cardiovascular disease who, when exposed to external factors such as wildfire smoke-generated $PM_{2.5}$ particles, can severely worsen their pre-existing endothelial dysfunction (20–22). Even acute exposure to $PM_{2.5}$ particle pollution is associated with increased cardiovascular morbidity and mortality (18). This observation is due to inhaled particles entering the circulation and worsening systemic endothelial dysfunction which in turn causes adverse cardiovascular effects due to oxidative stress, inflammation, cytokine release, and hypercoagulability (23, 24). Additionally, diabetics are at increased risk from $PM_{2.5}$ particle exposure because of pre-existing endothelial dysfunction as well as autonomic dysfunction due to diabetic neuropathy (20). Similarly, we proposed that patients with familial hypercholesterolemia, who have pre-existing endothelial dysfunction from lifelong exposure to elevated LDL-cholesterol levels, are likely to be at increased risk if exposed to $PM_{2.5}$ particles (22). Lastly, the majority of patients presenting with an acute coronary syndrome have endothelial dysfunction, and in a 6-year follow-up study, endothelial dysfunction was an independent significant positive predictive value for major adverse cardiovascular events (hazard ratio 2.04, 95% confidence interval 1.43–2.89, $P < 0.001$) (25).

Pharmacological prevention of cardiovascular events during wildfire smoke exposure

When exposed to wildfire toxic smoke, a likely preventive measure to decrease cardiac events is to lower $PM_{2.5}$ particle exposure and thereby limit further endothelial dysfunction. The use of effective masks (e.g., N95 masks) during short and particularly long-lasting wildfires is one relatively inexpensive solution, but these can become uncomfortable, particularly if they need to be worn for a protracted period whilst exposed to polluting particles. Another alternative, but still an effective and practical approach, is to pharmacologically improve endothelial function to reduce the risk of cardiovascular events (26). In a recent review, Hadley and coworkers (18) stressed that an important target when preparing for the wildfire season is the prevention of cardiovascular disease. This goal can be met to some degree by the reduction of endothelial dysfunction, which can be rather rapidly achieved with pharmacological agents (27). The use of statins, which are relatively inexpensive and readily accessible, should be prioritized, as these agents acutely improve endothelial function and offer long-term stabilization of vulnerable plaques (28, 29). Several studies are showing that statin use beneficially modifies $PM_{2.5}$ effects on inflammation and, as a result, most likely also improves endothelial function (30–35).

Public health guidance for heart patients to prevent cardiovascular events

To assess whether pharmacological prevention is recommended to address the effects of wildfire smoke exposure, we analyzed several public guidance documents provided by the Centers for Disease Control and Prevention (CDC), USA (36), Government of Canada (37), BBC News (38), American Heart Association (AHA) press release (39), World Health Organization (WHO) Europe (40) and the Government of California (41) Table 1. The Government of Canada indicates that there is a rare risk of cardiovascular events, and that “wildfire smoke can worsen heart and lung disease”. The BBC news guidance does not address the challenges for heart patients during wildfires, while the AHA press release reminds cardiovascular patients of the risk—“People with underlying cardiovascular disease risk factors may be at risk for an acute cardiovascular event when exposed to wildfire smoke.” However, it does not mention the importance of effectively treating the underlying cardiovascular disease itself. The WHO only warns of the cardiovascular risk related to wildfire smoke exposure—“Particulate matter is capable of penetrating deep into lung passageways and entering the bloodstream, primarily resulting in cardiovascular and respiratory impacts”. Interestingly, only the CDC indirectly recommends pharmacological prevention before the wildfire season by stating, “Plan how you will protect yourself against wildfire smoke.” The CDC advises that “Before wildfire season: Talk to your healthcare provider about your heart disease”. This advice would seem to indicate that there is an unmet need to medically evaluate cardiovascular disease and to ensure that it is being effectively treated prior to wildfire smoke exposure.

Table 1.

Public health guidance for heart patients to prevent adverse cardiovascular outcomes.

Source and title of guidance	**Guidance for patients**
Centers for Disease Control and Prevention (36) *“Chronic Conditions and Wildfire Smoke”*	*Before wildfire season:* Talk to your healthcare provider about your heart disease. Plan how you will protect yourself against wildfire smoke. *During a wildfire smoke event:* Think about evacuating if you have trouble breathing or other symptoms that do not get better. *After a wildfire:* Look out for any symptoms.
Government of Canada (37) *“Wildfire smoke, air quality and your health”*	Less commonly, exposure to wildfire smoke can lead to stroke, heart attack and premature death.
BBC News Canada 30 June 2023 (38) *“Air quality: How to protect yourself from Canada wildfire smoke”*	No specific guidance regarding cardiovascular patients
The American Heart Association Press release 7 June 2023 (39) *“Wildfires may fuel heart health hazards: smoke exposure increases cardiovascular risks”*	People with underlying cardiovascular disease risk factors may be at risk for an acute cardiovascular event when exposed to wildfire smoke. According to the American Heart Association, recognizing the signs of a heart attack or stroke are important, and if you or someone you’re with is experiencing serious symptoms, call 9–1-1 immediately.
World Health Organization (40) *“Health advice: wildfires in the WHO European Region”*	Smoke from wildfires can also contribute to higher exposures to air pollution at longer distances with more long-term effects: particulate matter is capable of penetrating deep into lung passageways and entering the bloodstream, primarily resulting in cardiovascular and respiratory impacts.
Government of California (41) *“Protecting yourself from Wildfire smoke”*	Health problems related to wildfire smoke exposure can be as mild as eye and respiratory tract irritation and as serious as worsening of heart and lung disease, including asthma, and even premature death.

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Conclusion

Although not considered in current guidances, it can be concluded that pharmacological prevention using statins acutely improves endothelial function (28), and in the longer term may stabilize vulnerable plaques (29) and thereby reducing the risk of acute cardiovascular events. Only the CDC has included it in its guidance and arguably only indirectly. We encourage the various relevant authorities to place more emphasis on this neglected area to inform vulnerable cardiovascular patients exposed to wildfire smoke of their risk, to recommend that such patients seek appropriate medical care, and when medically relevant, that the use of lipid-lowering statins is considered.

Many physicians may not be necessarily aware of the harmful cardiovascular effects caused by wildfire smoke and this needs to be brought to their attention. For example, the 2021 European Society of Cardiology (ESC) Guidelines on cardiovascular disease prevention in clinical practice mentions that “Important sources of fine particles are road traffic, power plants, and industrial and residential heating using oil, coal, and wood” (42). However, wildfire smoke is not clearly mentioned in this guideline as an acute toxic exposure that can increase the risk of having a cardiovascular event. It would be beneficial in this and other respective guidance materials to inform healthcare providers and at-risk individuals, as well as the greater population, of the substantial risk that wildfire smoke poses, and that there are preventive measures that can, and should, be taken. Further prospective controlled studies with larger sample sizes are needed to confirm the association between wildfire smoke, major adverse cardiovascular events, and the role of statins in preventing them. This is particularly because there are data to show that wildfire smoke is even more toxic than many other forms of air pollution (24).

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Wildfire Smoke and Your Patients' Health

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Contact Us About Wildfire Smoke and Your Patients' Health

Health Effects Attributed to Wildfire Smoke

Although particle pollution is a principal public health threat from short-and longer-term exposure to wildfire smoke, it is important to keep in mind that wildfire smoke is a complex mixture that consists of other pollutants that have also been shown to lead to a variety of health effects. The health effects of particle pollution exposure can range from relatively minor (e.g., eye and respiratory tract irritation) to more serious health effects (e.g., exacerbation of asthma and heart failure, and premature death).

Fine particles are respiratory irritants, and exposures to high concentrations can cause persistent coughing, phlegm, wheezing, and difficulty breathing. Even in healthy people, exposures to fine particles can potentially lead to transient reductions in lung function, and pulmonary inflammation.

Particle pollution may also affect the body's ability to remove inhaled foreign materials, such as viruses and bacteria, from the lungs. Short-term exposures (i.e., days to weeks) to fine particles are associated with increased risk of exacerbation of pre-existing respiratory and cardiovascular disease, as well as premature mortality (U.S. EPA, 2009).

The examination of persistent short-term exposures to wildfire smoke (i.e., exposures over a series of days up to a few weeks) has been limited to a few epidemiologic studies examining the cumulative effect of wildfire smoke exposure on the health of wildland firefighters (Adetona et al. 2016). Initial evidence indicates that continuous (i.e., over multiple days) occupational wildland fire smoke exposure may have a cumulative effect on lung function, with some studies reporting a progressive decline during burn seasons (e.g., Adetona et al. 2016). However, it is unclear if this decline persists across off-seasons and it is difficult to compare a wildland firefighter's occupational exposure and resulting health effects to those experienced by the general population. But certainly, more caution is warranted during extended exposures.

Health Effects Attributed to Wildfire Smoke Exposure

Short-term exposures (i.e., over a few days)	Irritation of the eyes and respiratory tract Respiratory symptoms • Coughing • Phlegm • Wheezing • Difficulty breathing Respiratory effects • Bronchitis • Reduced lung function • Increased risk of asthma exacerbation and aggravation of other lung diseases • Increased risk of emergency room visits and hospital admissions Cardiovascular effects • Heart failure • Heart attack • Stroke • Increased risk of emergency room visits and hospital admissions Increased risk of premature death
Cumulative short-term exposures (i.e., over multiple days up to a few weeks)	Reduction in lung function*
Long-term exposures	----**

*Information only available from a study of wildland fire fighters.

**Studies have not evaluated the health effects attributed to wildfire smoke exposure over multiple seasons.

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Cardiovascular and Cerebrovascular Emergency Department Visits Associated With Wildfire Smoke Exposure in California in 2015

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Abstract

Background

Wildfire smoke is known to exacerbate respiratory conditions; however, evidence for cardiovascular and cerebrovascular events has been inconsistent, despite biological plausibility.

Methods and Results

A population-based epidemiologic analysis was conducted for daily cardiovascular and cerebrovascular emergency department (ED) visits and wildfire smoke exposure in 2015 among adults in 8 California air basins. A quasi-Poisson regression model was used for zip code-level counts of ED visits, adjusting for heat index, day of week, seasonality, and population. Satellite-imaged smoke plumes were classified as light, medium, or dense based on model-estimated concentrations of fine particulate matter. Relative risk was determined for smoky days for lag days 0 to 4. Rates of ED visits by age- and sex-stratified groups were also examined. Rates of all-cause cardiovascular ED visits were elevated across all lags, with the greatest increase on dense smoke days and among those aged ≥65 years at lag 0 (relative risk 1.15, 95% confidence interval [1.09, 1.22]). All-cause cerebrovascular visits were associated with smoke, especially among those 65 years and older, (1.22 [1.00, 1.49], dense smoke, lag 1). Respiratory conditions were also increased, as anticipated (1.18 [1.08, 1.28], adults >65 years, dense smoke, lag 1). No association was found for the control condition, acute appendicitis. Elevated risks for individual diagnoses included myocardial infarction, ischemic heart disease, heart failure, dysrhythmia, pulmonary embolism, ischemic stroke, and transient ischemic attack.

Conclusions

Analysis of an extensive wildfire season found smoke exposure to be associated with cardiovascular and cerebrovascular ED visits for all adults, particularly for those over aged 65 years.

Clinical Perspective

What Is New?

- Wildfire smoke exposure was associated with increased rates of emergency department visits for numerous cardiovascular disease outcomes, including ischemic heart disease, dysrhythmia, heart failure, pulmonary embolism, and stroke.
- The observed risk was greatest among adults aged>65 years.
- This analysis used data from nearly the entire wildfire season across a large area of California, which is one of the most extensive studies of wildfire health impacts in California to date.

What Are the Clinical Implications?

- Individuals with underlying cardiovascular disease risk factors may be at risk for an acute cardiovascular or cerebrovascular event during a period of wildfire smoke exposure.
- Further studies should explore individual-level behavioral interventions that may help reduce exposure to smoke during wildfires.
- Hospital administrators and public health planners may want to use these results to inform surge planning of emergency departments, particularly among stroke centers and hospitals with cardiac catheterization facilities.

Introduction

Wildfire season in North America has increased in intensity and duration, resulting in a greater population at high risk of wildfire smoke exposure.[1, 2, 3] Exposure to wildfire smoke is already contributing to substantial clinical, public health, and economic societal burdens, and yet, large-scale wildfire events are projected to increase through the end of the century in many regions, including in California.[2, 4, 5]

Wildfire smoke contains numerous air pollutants, including particulate matter, ozone, carbon monoxide, polycyclic aromatic compounds, and nitrogen dioxide, all of which have previously been associated with respiratory and cardiovascular outcomes in health studies of air pollution.[6, 7, 8, 9, 10] Fine particulate matter (<2.5 μm in diameter [$PM_{2.5}$]) is a known respiratory irritant and causally related to cardiovascular morbidity.[11, 12, 13] $PM_{2.5}$ passes deep into the lung and has been shown to increase systemic inflammation, oxidative stress, and coagulation through $PM_{2.5}$-mediated changes in the autonomic nervous system.[11, 14] This has been linked to cardiovascular health impacts such as ischemic heart disease and cerebrovascular events such as ischemic stroke in the ambient air pollutant $PM_{2.5}$ literature.[11, 15, 16, 17, 18] Other air pollutants in wildfire smoke have also been linked to cardiovascular and respiratory outcomes in urban and ambient air pollution studies, including nitrogen oxides, carbon monoxide, and ozone.[7, 8, 9, 10]

Among the pollutants during wildfire smoke episodes, fine particulate matter is the primary pollutant of concern to human health because of its abundance.[19] It is therefore surprising that the literature is less consistent about the cardiovascular and cerebrovascular effects associated with wildfire smoke exposure.[11, 12, 13] In contrast to respiratory impacts, fewer studies have examined cardiovascular and cerebrovascular outcomes and fewer yet reported positive associations with respect to exposure to wildfire smoke, potentially as a result of underpowered studies or limited population exposed, as these studies generally were conducted during solitary wildfire events.[11, 12, 20]

This study investigates a particularly widespread wildfire season in 2015 in California, during which a series of fire complexes encompassing over 800 000 acres burned in northern and central parts of the state. We examined the relative risk of combined and specific cardiovascular-, cerebrovascular-, and respiratory-related emergency department (ED) visits on light, medium, and dense plumes relative to days without wildfire smoke exposure. Data were used from the entirety of this intense fire season across a vast region of California to elucidate the cardiovascular and cerebrovascular health impacts previously inconclusive in the literature.

Methods

The data, analytic methods, and study materials will not be made available to other researchers for purposes of reproducing the results or replicating the procedure. The analytic methods and the statistical program code can be made available but access to the data requires institutional review board approval from the Committee for the Protection of Human Subjects (CPHS) under the California Health and Human Services Agency.

Study Setting

All ED visits between May 1 and September 30 were included within 8 of the 15 California air basins in the northern and central regions of the state that were most exposed to smoke during the 2015 wildfire season: Great Basin Valleys, Lake County, Lake Tahoe, Mountain Counties, North Coast, Northeast Plateau, Sacramento Valley, and San Joaquin Valley. The largest and longest fires during this study occurred in the North Coast, Lake County, Sacramento Valley, and San Joaquin Valley air basins but smoke plumes were present in all 8 air basins during the study period. During this period, precipitation was low and present mainly at higher elevations.

Exposure Data

Exposure data were from the publicly available National Oceanic and Atmospheric Administration (NOAA) Hazard Mapping System (HMS) Fire and Smoke product. The HMS provides geospatial boundaries of smoke plumes as seen by visible band satellite imagery. The HMS incorporates data from 7 NOAA and National Aeronautics and Space Administration environmental satellites, recording multiple plumes throughout each day. Each smoke plume in HMS is accompanied by estimated concentrations of $PM_{2.5}$ attributed to wildfire smoke, generated using atmospheric models, and grouped into light ($PM_{2.5}$ range 0–10 μg/m^3), medium (10.5–21.5 μg/m^3), and dense smoke categories (range 22+ μg/m^3).[21, 22] Daily maximum density of smoke at each zip code was used to characterize exposure. All HMS smoke plume densities are published daily as shapefiles on the NOAA website and are used to communicate smoke plume locations to researchers and the public.

Healthcare Utilization Data

Daily counts of ED visits for each zip code in the study area and period came from the California Office of Statewide Health Planning and Development (OSHPD). The OSHPD Emergency Department Dataset (EDD) and Patient Discharge Dataset (PDD) contain records of over 14 million annual ED visits from hospitals across California. Diagnoses were included for all adults aged ≥19 years. *International Classification of Disease, Ninth Edition* (*ICD-9*) codes were used for diagnoses of interest, using all 25 discharge diagnosis code positions in the OSHPD data set.[13, 23, 24, 25, 26] Cardiovascular end points were hypertension (*ICD-9* codes 401–405), myocardial infarction (410), ischemic heart disease (410–411, 413), pulmonary embolism (415), dysrhythmia and conduction disorder (426–427), heart failure (428), peripheral arterial disease (444), and all-cause cardiovascular (401–405, 410–411, 413, 415, 426–428, 444). Cerebrovascular end points included non-traumatic subarachnoid hemorrhage (430), intracerebral hemorrhage (431), non-traumatic intracranial hemorrhage (432), precerebral vascular occlusion (433), ischemic stroke (434), transient ischemic attack (TIA) (435), lateral medullary syndrome (436), and all-cause cerebrovascular events (430–436). Ischemic stroke and TIA were analyzed individually, while the other outcomes were included only in the all-cause cerebrovascular category given their rarity. Respiratory end points were included for external validity: asthma (493), COPD (491–492, 496), pneumonia (480–486), other non-cardiac chest pain or respiratory syndrome (786), and all-cause respiratory (480–486, 491–493, 496, 786). Control end points were acute appendicitis (540–542) and long-bone fracture (812–813, 820–821, 823) given their independent pathophysiology from $PM_{2.5}$-related inflammation and coagulation, as has been done elsewhere.[26] The category of all visits was used to approximate overall ED volume, which included discrete ED visits for any diagnosis code.

Covariate Data

US Census American Communities Survey 2015 population estimates were used for zip code population estimates. Daily mean temperature and relative humidity were obtained for 50 California airports from Weather Underground Data and History Archive. The daily heat index, a combined metric of temperature and relative humidity, was calculated for each zip code based on the mean temperature and relative humidity for the nearest airport to the zip code centroid.[27]

Statistical Analysis

A population-based epidemiological analysis was conducted to examine zip code-level associations between daily maximum smoke density (low, medium, and dense) and ED visits using a quasi-Poisson regression model. A quasi-Poisson regression analysis was used to allow for under- and over-dispersion of the data. Each health outcome was analyzed separately and associations were examined for exposure lagged between 0 and 4 days, with each lag analyzed independently. Estimated relative risk (RR) of each health outcome is reported for all adults, as well as for sex- and age-stratified adults. Relative risk is expressed as rate of outcome-specific ED visits on smoke days relative to the days with no smoke. The statistical model included indicator variables of smoke plume density (light, medium, dense), day of week, and smoothing splines for heat index (3 degrees of freedom) and for temporal trend (3 degrees of freedom), as done elsewhere[25, 26] Logged zip code-population size was used as an offset to adjust for differences in baseline rate of visits by location. The sensitivity of the results was examined for different degrees of freedom for the smoothing splines of the covariates, and Bayesian Information Criteria (BIC) was used to choose the best fitting model.[28] No adjustment was made for multiplicity of comparisons.

Statistical analyses were conducted using the R Project for Statistical Computing Version 3.3.2 (R Foundation for Statistical Computing, Vienna, Austria) and emergency department data cleaning and management was conducted with SAS® software, Version 9.4, of the SAS System for Windows (SAS Institute Inc, Cary, NC).

Ethics

The study was approved by the Committee for the Protection of Human Subjects (CPHS) under the California Health and Human Services Agency and the subject informed consent requirement was waived.

Results

Descriptive Statistics

This analysis included 1 196 233 emergency department outcomes that occurred in the study region and time-period: 361 087 cardiovascular, 15 505 cerebrovascular, and 230 029 respiratory diagnoses, in addition to 2520 acute appendicitis and 13 473 long-bone fracture diagnoses for the controls. Age- and sex-stratified counts of ED visits delineated by diagnosis categories are shown in Table 1.

Table 1. Counts of Cardiovascular, Cerebrovascular, Respiratory, and Control Emergency Department Visits; by Age and Sex; 8 California Air Basins, May 1 to September 30, 2015

	ICD-9 Code	19 to 44 y	45 to 64 y	≥65 y	Female	Male
All-cause cardiovascular	401 to 405, 410 to 411, 413, 415, 426 to 428, 444	48 330	136 644	176 113	193 559	167 528
Hypertension	401 to	41 368	122 267	153 270	172 865	144 040

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All visits includes all discrete ED visits for any diagnosis in the study region during the same period. COPD indicates chronic obstructive pulmonary disease; ED, emergency department; *ICD-9*, *International Classification of Disease, Ninth Edition*.

Medium- and dense-smoke days were most frequent in August, followed by September (Table 2). Three air basins shared the largest burden of smoke days, including the North Coast, Sacramento Valley, and San Joaquin Valley air basins (Figure 1). These were also the air basins with the largest population centers in the study region.

Table 2. Proportion of Days Corresponding to Wildfire Smoke Plume Density (Based on $PM_{2.5}$ Concentration Estimates) and Descriptive Summary of Heat Index, by Month; 8 California Air Basins, May 1 to September 30, 2015

Smoke Density Estimate	May	June	July	August	Sept.
None (%)	91.6	87.2	88.4	54.1	72.7
Light (%)	7.6	11.4	8.9	25.5	17.8
Medium (%)	0.8	1.3	2.4	13.3	7.5
Dense (%)	0.0	0.2	0.3	7.2	2.0
Heat index, mean (°F)	61.1	73.3	75.1	74.3	70.1
Heat index, maximum (°F)	83	95	93	91	89

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Figure 1. Total number of days with any smoke plumes by county from May 1 through September 30, 2015. California air basins in the study region are labeled and outlined in black, those excluded in gray.

Cardiovascular Outcomes

ED visits for all-cause cardiovascular diagnoses and for individual cardiovascular diagnoses were associated with wildfire smoke density for all adults (Table 3, Figure 2) and were more pronounced among adults aged ≥65 years (Tables 4 and 5). Risk increased for all-cause and individual cardiovascular diagnoses across multiple lags (Figure 3). The greatest change in risk was observed for myocardial infarction (RR [95% confidence interval (CI)]) (1.42 [1.09, 1.84]) and ischemic heart disease (1.22 [1.01, 1.47]) with dense smoke at lag 1, among adults aged ≥65 years. Risk of dysrhythmia was greatest among adults aged ≥65 years on days with dense smoke exposure but was elevated across most lags and smoke densities for all adults and those over aged >65 years. Heart failure was associated most strongly with dense smoke at lag 3 among adults aged ≥65 years (1.22 [1.10, 1.35]) and elevated across all lags. Risk of heart failure was not increased in other age groups (Tables 3 and 4). Associations with all levels of smoke density were observed with hypertension in adults aged ≥65 years, at lags 0 through 4. Increased risk of pulmonary embolism was observed only at lags 2 and 3 with medium and dense smoke, among adults aged ≥65 years (1.71 [1.12, 2.62]).

Table 3. Relative Risk of Selected Emergency Department Visits on Wildfire-Smoke Days Relative to Days Without Smoke Across Lags 0 Through 4 Days for Adults Aged 19 Years and Older, 8 California Air Basins (May 1–September 30, 2015)

	Lag d	0		1		2		3
Outcome	Smoke Density	RR	95% CI	RR	95% CI	RR	95% CI	RR
All-cause cardiovascular	Light	1.02	1.00, 1.03	1.04a	1.03, 1.05a	1.03a	1.02, 1.05a	1.02
	Medium	1.05a	1.03, 1.08a	1.05a	1.03, 1.08a	1.04a	1.01, 1.07a	1.06
	Dense	1.08a	1.03, 1.12a	1.04	1.00, 1.09	1.07a	1.03, 1.12a	1.04

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Models adjusted for heat index, day of week, time trend, and log-population offset. CI indicates confidence interval; RR, relative risk.

a Statistically significant relative risks.

Figure 2. Relative risk and 95% confidence intervals for select cardiovascular, cerebrovascular, and respiratory outcomes relative to smoke-free days, at lag 0 days, stratified by age; 8 California air basins (May 1–September 30, 2015). Models adjusted for heat index, day of week, time trend, and log-population offset. RR indicates relative risk.

Table 4. Relative Risk of Selected Emergency Department Visits on Wildfire-Smoke Days Relative to Days Without Smoke Across Lags 0 Through 4 Days for Adults Aged 45 to 64 Years, 8 California Air Basins (May 1–September 30, 2015)

	Lag (Days)	0		1		2		3
Outcome	Smoke Density	RR	95% CI	RR	95% CI	RR	95% CI	RR
All-cause cardiovascular	Light	0.99	0.97, 1.01	1.02	1.00, 1.04	1.01	0.99, 1.03	1.00
	Medium	1.03	0.99, 1.07	1.01	0.97, 1.05	1.00	0.96, 1.04	1.05a
	Dense	1.03	0.96, 1.10	0.98	0.92, 1.05	1.04	0.97, 1.11	1.01

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Models adjusted for heat index, day of week, time trend, and log-population offset. CI indicates confidence interval; RR, relative risk.

a Statistically significant relative risks.

Table 5. Relative Risk of Selected Emergency Department Visits on Wildfire-Smoke Days Relative to Days Without Smoke Across Lags 0 Through 4 Days for Adults Aged 65 Years and Older, 8 California Air Basins (May 1–September 30, 2015)

	Lag (Days)	0		1		2		3
Outcome	Smoke Density	RR	95% CI	RR	95% CI	RR	95% CI	RR
All-cause cardiovascular	Light	1.06a	1.04, 1.08a	1.07a	1.05, 1.09a	1.06a	1.04, 1.08a	1.03
	Medium	1.09a	1.05, 1.12a	1.10a	1.06, 1.13a	1.08a	1.05, 1.12a	1.08
	Dense	1.15a	1.09, 1.22a	1.12a	1.06, 1.18a	1.13a	1.07, 1.20a	1.10a

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Models adjusted for heat index, day of week, time trend, and log-population offset. CI indicates confidence interval; RR, relative risk ratio.

a Statistically significant relative risks.

Figure 3. Relative risk and 95% confidence intervals for select cardiovascular, cerebrovascular, respiratory, and control outcomes relative to smoke-free days, across lags 0 to 4 days, adults aged ≥65 years, 8 California air basins (May 1–September 30, 2015). Models adjusted for heat index, day of week, time trend, and log-population offset. RR indicates relative risk.

Cerebrovascular Outcomes

Risk of all-cause cerebrovascular ED visits on smoky days was most pronounced among adults aged ≥65 years and persisted at lag days 0 through 4 (Tables 3, 4 through 5, Figure 2). Increased risk was observed with all 3 levels of smoke density, although not consistently statistically significant, possibly because of the fewer number of cerebrovascular events. Among adults aged >65 years, the highest relative risk was observed at dense smoke levels on lag day 0 (1.22 [1.00, 1.48]) and lag day 1 (1.22 [1.00, 1.49]). However, elevated risks were also seen for all adults and light smoke (1.09 [1.03, 1.15]) and medium smoke at lag days 1 and 3 (1.17 [1.06, 1.28], 1.14 [1.04, 1.26)]) (Table 3). In contrast, ischemic stroke diagnoses were increased only at longer lags and driven by the ≥65 age group. Among adults aged ≥65, ischemic stroke was statistically significant at lag 3 for light (1.16 [1.04, 1.29]) and medium smoke (1.25 [1.04, 1.50]), and was also increased for all adults at lag 3 days (1.16 [1.00, 1.34]) and adults 19 to 44 years at lag 4 (1.90 [1.26, 2.85]) (Table S1). Associations with transient ischemic attack were significant only among adults 45 to 64 and medium smoke at lag day 3 (1.39 [1.01, 1.92]) and consistently increased but with wider CIs for older populations at multiple lags (Tables 4 and 5).

Respiratory and Control Outcomes

All-cause respiratory outcomes were increased with medium and dense smoke exposure (Table 3), but most pronounced in adults aged ≥65 years (Figure 2). The risk of asthma related ED visits among younger adults on medium and dense smoke plume days was the highest but was elevated in other age groups as well (Table S1). Risk for COPD and pneumonia were increased across multiple lags and highest on dense smoke days for adults aged ≥65 years (Table S1). Statistically significant differences were not found among sex-stratified results for these respiratory diagnoses (Table S2).

No association was found between wildfire smoke density and acute appendicitis diagnoses. Long-bone fractures, however, were observed to have a significant association with $PM_{2.5}$ among all adults at lags 0 through 2 and dense smoke (1.31 [1.09, 1.56]), primarily adults 65 years and older (1.47 [1.12, 1.92]). When stratified by sex, the association was significant among women (1.37 [1.09, 1.70]) but not among men (1.22 [0.90, 1.65]) (Table S2).

Sensitivity Analysis

Additional sensitivity analysis was conducted by assessing zip code-specific associations between wildfire smoke density and health outcomes and summarizing results using random-effects meta-analysis to account for possible geographic heterogeneity of outcomes (Table S3). Sparsely populated zip codes had too low a count of diagnoses to perform the analysis so a population cutoff of 13 250 per zip code was used. The results are generally consistent with those presented here, with smaller standard errors, since the data were subset to larger zip code populations. Additional sensitivity analysis was conducting using the zip code-specific proportion of the population below the poverty level and the results were also consistent with those of the original analysis.

Additional age- and sex-stratified results, and those of rarer outcomes, can be found in Tables S1 and S2.

Discussion

In this investigation, a positive association was found between wildfire smoke density and ED visits attributable to cardiovascular, cerebrovascular, and respiratory disease in northern and central California in the summer of 2015. The impacts were greatest on medium and dense smoke days and among adults aged ≥65 years, although also observed among younger age groups for some clinical conditions. In addition to the all-cause cardiovascular and cerebrovascular categories, relative risk was elevated for specific outcomes including myocardial infarction, ischemic heart disease, dysrhythmia, heart failure, pulmonary embolism, ischemic stroke, and transient ischemic attack. All-cause respiratory outcomes were statistically significant as well and surprisingly, so were long-bone fractures. No association was found with the control condition of acute appendicitis.

The evidence for particulate matter-mediated mechanisms for cardiovascular disease has been discussed elsewhere.[18] Recent reviews on the topic have identified 3 main pathophysiologic mechanisms: modulation of autonomic balance and neural input to the heart, release of pro-inflammatory mediators by lung tissue with attendant systemic effects, and penetration of particulate matter into the systemic circulation.[18, 29, 30, 31, 32, 33, 34] These 3 pathways can lead to an increase in systemic oxidative stress, endothelial dysfunction, and other inflammatory responses, in addition to platelet activation, hypercoagulability, and vasoconstriction.[18, 29, 30] Acute $PM_{2.5}$ exposure and the resulting autonomic stimulation, pro-coagulability, and inflammation all favor the underlying pathophysiology of the cardiovascular disease outcomes observed in this investigation, including cardiac dysrhythmia, ischemic heart disease, heart failure exacerbation, pulmonary embolism, and cerebrovascular events.

These pathophysiologic mechanisms are consistent with the apparent triggering of cardiovascular and cerebrovascular clinical events based on the temporal relationships observed between short-term exposures to wildfire smoke and the clinical outcomes.[35] Dysrhythmia, likely precipitated by immediate changes in the balance of the autonomic nervous system, first appeared at lag 0.[36] Myocardial infarction and ischemic heart disease appeared second at lag 1. Epidemiologic studies indicate that ambient particulate matter exposure is more strongly associated with ST-elevation myocardial infarction than non-ST-elevation myocardial infarction, suggesting that the mechanism is dependent upon erosion of a rupture-prone plaque and changes in the balance of pro-thrombotic and anti-thrombotic processes promoting more extensive thrombosis.[37] ED visits for heart failure appeared first at lag 0 and increased with time, with the highest RR at lag 3. In contrast to the mechanisms accounting for the triggering of myocardial infarction, hospitalizations for heart failure are most likely secondary to exacerbations of pre-existing heart failure worsened by PM-induced increases in systemic blood pressure, and systemic and pulmonary vasoconstriction.[38, 39, 40, 41] All these outcomes were most strongly associated with the aged. Cerebrovascular responses primarily manifested among older people and appeared within the first day and continued through lag 4, consistent with endothelial dysfunction and vasoconstriction, as well as thromboembolic phenomena.

Studies of wildfire-related cardiovascular outcomes have reported inconsistent findings. One recent review found that most studies with combined cardiovascular outcomes have found no significant associations, although some specific outcomes have been shown to be increased in the context of wildfire smoke, such as out-of-hospital cardiac arrest, heart failure, and ischemic heart disease.[11] Another review found that 6 of 14 studies revealed statistically significant associations of wildfires and cardiovascular outcomes.[12] Since the publication of that review, however, at least 4 subsequent investigations have identified elevated risk of cardiovascular events associated with wildfire smoke exposure, which may reflect recent use of more sophisticated methods or utilization of more specific outcomes.[15, 20, 26, 42]

With respect to specific cardiovascular diagnoses, previous research has shown mixed results on ischemic heart disease. No association was found with wildfire smoke and ischemic heart disease hospitalizations in California, while another study found an increase in clinic-based ischemic heart disease visits among Native Americans of the Hoopa tribe of northern California.[43, 44] An Australian study mentioned earlier found increased rates of hospital admissions and ED visits for ischemic heart disease among women and adults aged >65 years at lag day 2.[15]

Similarly, heart failure was found to be associated with wildfire smoke in this study. Elsewhere, heart failure-related ED visits were elevated in the context of peat bog fires in North Carolina in 2008, but the association was not significant when repeated for fires in 2011 and only suggestive among wildfires in 1 study from California.[15, 16, 26, 43, 45] Other cardiovascular outcomes, such as cardiac dysrhythmia, or pulmonary embolism, have not been found to have a clear association with wildfire-$PM_{2.5}$, although some suggestive effects have been found for dysrhythmia.[26, 43, 46] This investigation contributes to those significant findings of dysrhythmia and pulmonary embolism, but no association was found with peripheral arterial disease, potentially because of a small number of related ED visits.

Hypertension is another cardiovascular outcome that some have found to have a significant association with wildfire-$PM_{2.5}$ and may play an important role in the pathogenesis of more significant cardiovascular outcomes, such as ischemic heart disease and non-traumatic intracranial hemorrhage.[25, 26] In this study, significant associations were also found between wildfire smoke and hypertension diagnoses in the ED.

In contrast to the evidence from the ambient $PM_{2.5}$ literature, few studies discussed cerebrovascular impacts associated with wildfire-$PM_{2.5}$, and mostly in the context of all cardiovascular disease outcomes combined.[8, 18] This study is one of the few to explicitly investigate cerebrovascular outcomes and to find significant associations with smoke density defined by wildfire-$PM_{2.5}$. Of 3 studies that described this association, only 1 found elevated impacts.[43, 46, 47] Another study of 1 wildfire season in New Mexico found statistically significant elevated rates among adults aged 20 to 64 years (1.69 [1.03–2.77]) during the fire period.[20]

While the aim of this study was to explore cardiovascular and cerebrovascular health impacts attributable to wildfire smoke, respiratory outcomes were included for external validity, given the strong associations between wildfire-$PM_{2.5}$ and respiratory disease that have been documented elsewhere, including asthma, COPD, and some respiratory infections such as pneumonia.[11, 12] As with other studies, positive associations were found between wildfire smoke and asthma, COPD, pneumonia, and respiratory-related chest pain symptoms. In 1 study of long-term wildfire-$PM_{2.5}$ exposure and asthma, adult women were found to be at greatest risk of asthma-related ED visits. Differential impacts of wildfire- and urban-$PM_{2.5}$ are still being explored; 1 study found increased pulmonary toxicity of wildfire-$PM_{2.5}$ compared with background urban sources in an animal model.[48] In addition to differences in component particles in $PM_{2.5}$ between urban and wildfire sources, urban exposures can be an order of magnitude lower but more persistent over time, while wildfire particulate exposure can vary significantly, peaking at much higher levels.[49, 50]

We also used acute appendicitis and long-bone fractures as control conditions that were not expected to be associated with wildfire-$PM_{2.5}$ given their inflammation- and coagulation-independent pathophysiology. No association was found with acute appendicitis but acute appendicitis events were rare and the resulting CIs were wide. Interestingly, an association was found with long-bone fractures and wildfire smoke among older adults at lag 0. Another study has used bone fractures as a control condition and while their results were not statistically significant, risk of bone fractures among all adults exposed to wildfire smoke was increased (RR 1.06, 95% CI: 0.97–1.15).[26] This could be because of trauma or falls, particularly among older adults, in the context of the wildfire response or evacuation. Motor vehicle accidents, for example, may precipitate long-bone fractures and may be more common during wildfire smoke events and evacuations, during which "superfog"—a combination of smoke and precipitation—may form at the ground level and can drastically reduce visibility on roadways.[51] Additionally, cardiac and cerebrovascular events can also precipitate falls and, given the associations found with cardiac dysrhythmias and other cardiac outcomes in this study, may offer another explanation for the surprising association with long-bone fractures. Based on the number of appendicitis-related visits and the possible connection between cardiovascular outcomes and bone fractures among older adults, we interpret the results for these conditions with these considerations in mind.

A major strength of this study was using data from the entirety of the 2015 wildfire season across a large area of California, during which a substantial population was exposed to a particularly intense season. This may have increased the statistical power of detecting rare health events, such as the cardiovascular and cerebrovascular effects observed in this study. The HMS data set provided estimates of smoke density on a smaller spatial resolution compared with the ground-based monitoring data, particularly in rural areas of California, where wildfires were more prevalent and monitors less so. In some instances, an individual county may have only 1 ground-based air monitor for $PM_{2.5}$. In addition, the OSHPD healthcare utilization data provided comprehensive state-wide data of ED visits based on discharge diagnoses, whereas some other studies have relied upon syndromic surveillance.[16, 26, 52] One study evaluated syndromic surveillance for cardiovascular disease in New York City and found high specificity for many of the disease entities, but often a low sensitivity and positive-predictive value, which may underestimate the impact of wildfire smoke on cardiovascular disease.[53]

This analysis is not without limitations. In the current analysis, because we focused on age-stratified and specific cardiovascular outcomes, we were not able to further refine daily counts of ED visits by other factors. For example, we did not examine the effect of personal traits or characteristics such as socioeconomic status, past medical history, race, sex and other factors that may modify the association between daily variation in smoke exposure and ED visits. The modifying effect of these factors has previously been observed and discussed in the literature.[11, 25, 54] However, we did examine the sensitivity of these results to the confounding by socioeconomic status, such as poverty, and did not find evidence of confounding between poverty, smoke exposure, and health outcomes (Table S3).

The HMS data set provides smoke plume density based on estimated $PM_{2.5}$ concentrations and is characterized as light, medium, and dense smoke, where cutoff points are chosen with some degree of subjectivity.[21] These categorical exposure estimates made it difficult to complete a more nuanced assessment of incremental changes in $PM_{2.5}$ or other air pollutants on outcomes. Additionally, the number of smoky days was not evenly distributed between the different smoke levels, leading to wider CIs among dense smoke results and making the evaluation of a dose-dependent response more challenging.

The HMS data, however, are convenient, publicly available, and obtained via remote sensors providing more complete, timely data compared with other publicly available ground-based sources in California. Additionally, HMS data provide a classification of categorical smoke density which is a convenient representation for the purposes of making timely public health announcements. The results of the current analysis suggest that development of rapid ground-level air pollutant concentration validation methods based on satellite data could potentially be beneficial to public health risk messaging.

While $PM_{2.5}$ is a primary pollutant of concern from the perspective of population wide exposures, smoke plumes contain other pollutants that have known impacts on respiratory outcomes, such as ozone, nitrogen dioxide, carbon monoxide, coarse particulate matter ($PM_{10\text{-}2.5}$), and ultrafine particulate matter (0.1 μm or less). These pollutants may play an interactive role with $PM_{2.5}$ on health outcomes. However, other air pollutants are measured to a lesser extent with poor geographic and spatial coverage. Additionally, a recent study demonstrated that $PM_{2.5}$ estimates alone significantly underestimated the particulate matter emissions of wildfire smoke plumes in the western United States by a factor of 2 to 3.[19] Therefore, examining health effects based on plume density as visible by satellites may have its own advantages as the plume may represent multiple air pollutants emitted from the fire. Future research would benefit from an inclusion of co-pollutant exposure in the analysis when such data are available.

These results may be useful for public health practitioners in decision-making surrounding risk mitigation during wildfire smoke events. Hospital administrators may find this information helpful for hospital and emergency department surge planning for increased volume, including staffing, bed utilization, and discharge challenges during ongoing wildfires. Similarly, stroke centers and hospitals with cardiac catheterization capabilities may find these results applicable to surge preparation.

On the level of the individual patient, the Center for Medicaid and Medicare Services and the Centers for Disease Control and Prevention, as part of the *Million Hearts® 2022* framework (https://millionhearts.hhs.gov/files/MH-Framework.pdf), have identified counseling of patients and family on the risks of airborne particulate matter, along with nutrition, physical activity, tobacco use, and referral to community-based physical activity programs and cardiac rehabilitation, as healthcare strategies to optimize care. Healthcare professionals may benefit from utilizing these results for patient risk stratification and subsequent education on risk mitigation for optimizing health care in the context of wildfire smoke exposure. Interventions for higher-risk individuals range from the well-established, such as evacuation from the affected area or transport to a clean air shelter, and reduction of outdoor activity, to other methods under study, such as indoor air filtration of fine particulates or use of N-95 respirators.[55, 56] Further study is needed to define patient populations at increased risk for specific events, but these results suggest that patients with vascular and cardiac risk factors would be among the most susceptible, including patients with underlying coronary artery disease, heart failure, peripheral vascular disease, atrial fibrillation, cerebrovascular disease, hypertension, and diabetes mellitus.[18]

Conclusions

Time-series analysis was conducted of wildfire smoke and emergency department visits for the 2015 wildfire season in northern and central California. Despite the inconsistent findings discussed elsewhere, in this study wildfire smoke exposure was found to be positively associated with many cardiovascular and cerebrovascular health events, including ischemic heart disease, dysrhythmia, heart failure, and pulmonary embolism. Impacts were greatest among adults ≥65 years. This epidemiologic evidence helps strengthen the association between wildfire smoke exposure and cardiovascular disease outcomes and highlights the increased risk to the older population. These findings, along with others, support the need for clinical research to assess the clinical and public health value of interventions to decrease exposure to particulate matter, and particularly to wildfire smoke, among those at highest risk.[11, 12, 55, 57, 58, 59] As wildfire season intensity and duration is projected to increase in California, understanding adverse health impacts of wildfire smoke and identifying the most susceptible populations is relevant to a broad group of stakeholders, including state and local officials responsible for land and air quality management, environmental scientists, policy makers, public health officials, and frontline public health and healthcare practitioners.

Acknowledgments

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Supplemental Material

File (jah33054-sup-0001-tabless1-s3.pdf)

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Date:	Tuesday, July 1, 2025 12:52:28 PM
Attachments:	6 - Coffin Butte Landfill Impacts on Health - 6th Supporting Resource - KunakAir.pdf

Carol McClelland Fields
37326 Soap Creek Rd
Corvallis, OR 97330

Thank you for accepting my public comment and for all the work you are doing to keep everything organized.

Main document has testimony and 5 Supporting Resources Appended and attached below

Final Supporting Resource in separate pdf in a separate email...too large to submit with testimony. You may be able to download from Google docs...not sure.

6 - Landfill impacts KunakAir.pdf

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Carol McClelland Fields, PhD, BCC
541 243 3675
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Landfill air pollution: how it affects air quality

February 1, 2025 - Updated March 4, 2025

Written by the **Marketing & Communication Team**

Table of contents

It is impossible to remain indifferent to the significant impact that our **waste** is having on both **human health** and the **planet**. There are solutions, but the growth of the **population** and **urbanisation**, along with **inadequate waste management** in **landfills** worldwide, make it difficult to tackle one of the greatest **environmental challenges**.

Current global **consumption** and **production models** exacerbate an already worldwide problem: the more **waste** we generate, the higher the **emissions** from **landfills**, laden with **toxic gases** and **substances** that **pollute the atmosphere**. In fact, **landfills** are responsible for **20% of the methane** released globally, a **greenhouse gas (GHG)** up to **80 times more potent** than **CO_2** in the short term.

Living near a **landfill** is living on the edge. The **local population** faces serious **health risks** due to **environmental pollution** and the damage caused to **ecosystems**. However, this is not just a **local problem**; **landfills** represent a **global threat**. Their **emissions** are the **third leading cause of global warming**, following **fossil fuels** and **agriculture**.

Solid waste management has been a challenge for decades, accumulating problems due to **inaction** or **inefficient management**. Although many developed countries have implemented more **sustainable strategies**, **urban growth** and **excessive consumption** continue to generate an **unsustainable accumulation of waste**.

This issue affects everyone globally, making it imperative to take **urgent action** to mitigate it.

> *The world generates 2.01 billion tonnes of municipal solid waste annually, of which at least 33%—a very conservative estimate—is not managed safely for the environment. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*, World Bank Group.

This article examines the environmental damage and the direct impact on public health caused by landfill emissions, as well as potential solutions to curb their effects.

What is landfill air pollution?

Landfill air pollution occurs due to the **release of harmful gases and particulate matter** generated during the decomposition of solid waste. This process, involving **physical, chemical, and biological reactions**, results in **methane, carbon dioxide, and airborne particulates** that negatively affect **air quality** and intensify the **greenhouse effect**, the primary driver of **climate change**.

One of the **main contributors** is the **anaerobic process** (in the absence of oxygen) that occurs when organic waste decomposes in **landfills**.

This process is a **significant source** of methane gas, the second most harmful greenhouse gas derived from human activities, only surpassed by **CO_2**. What we consume daily becomes a **global problem** when waste ends up in landfills. **Inadequate waste management** directly affects our health by polluting water, degrading the soil that feeds our crops, and deteriorating the air we breathe.

Municipal solid waste landfill site and sealed areas of the facility.

Sources of air pollution from landfills

Landfills are a significant source of air pollution due to the **release of gases and particles** from waste decomposition and associated operations. These are the **main sources** of air pollution in landfills:

Waste and direct management

These sources are directly related to the materials deposited in the landfill and their decomposition:

- Decomposing organic waste.
- Hazardous and chemical waste (such as solvents, batteries, paints).
- Secondary biological processes (microbial activity generating gases such as ammonia and hydrogen sulphide).

Landfill infrastructure and operation

These sources are linked to the design, management, and maintenance of the landfill:

- Poorly sealed waste cells.
- Leaks in biogas capture systems.
- Improper leachate management.
- Inadequate or insufficient temporary covers.

Operational activities

Emissions generated by the necessary operations to manage the landfill:

- Waste movement and compaction (use of heavy machinery).
- Vehicles transporting waste to the landfill.

Combustion processes

Sources related to the burning of waste or fuels:

- Waste burning (intentional or accidental).
- Combustion of fossil fuels in machinery and vehicles (emissions of CO_2, NOx, and PM).

Release of particles and volatile compounds

Emissions from materials that volatilise or become suspended in the air:

- Leachates that volatilise and release pollutants.
- Release of dust and suspended particles (PM10 and PM2.5) due to machinery movement or unpaved roads.

Degradation processes in landfills and their impact on air

Biological

In landfills, microorganisms break down organic waste in two stages:

- **Aerobic:** Occurs in the presence of air and generates few atmospheric pollutants, but does produce odours and particles.
- **Anaerobic:** Microorganisms break down material in the absence of oxygen, releasing methane (CH_4) and carbon dioxide (CO_2), two greenhouse gases that contribute to global warming. This process also generates suspended particles such as volatile organic compounds (VOCs).

Additionally, if the waste contains sulphur (present in certain foods and plastics), specialised bacteria produce **hydrogen sulphide (H_2S)**, a toxic gas with an unpleasant smell.

Chemical

Chemical reactions in landfills occur due to the interaction of waste with water, air, and microorganisms:

- **Release of CO_2:** Carbon-containing waste, such as wood or paper, reacts with oxygen releasing carbon dioxide and thermal energy.
- **Formation of CH_4:** Waste rich in carbonates (from domestic, industrial, or food waste) produces methane through chemical reactions.
- **Hydrolysis and fermentation:** Fats, proteins, and carbohydrates release ammonia (NH_3) and alcohols, which become atmospheric pollutants.

Physical

Physical processes in landfills also contribute to air pollution:

- **Transport and compaction movements:** Release trapped gases such as CO_2 and CH_4, and generate suspended particles.
- **Heat from decomposition:** Biological and chemical reactions generate heat, driving the volatilisation of toxic compounds and even spontaneous fires.
- **Waste burning:** Especially plastics or materials with chlorine, which produce dioxins and furans, extremely toxic compounds for health.
- **Leachates:** Liquids circulating through the waste carry heavy metals and chemicals that may evaporate and contaminate the air.
- **Wind-blown particles:** Handling dry waste and its degradation generates dust and suspended particles that end

up in the atmosphere.

Pollutants released by landfills

Landfills generate a variety of **pollutant gases** and **suspended particles** that are slowly released into the atmosphere. If they lack **biogas capture systems**, these pollutants enter the air. **Biogas**, generated by the **anaerobic degradation** of organic waste, is a mixture of **methane (CH_4)** and **carbon dioxide (CO_2)**. The following are the main pollutants:

Methane (CH_4)

Methane is a **greenhouse gas** highly harmful for its ability to **trap heat** in the atmosphere. It is the **second most potent gas** in intensifying the **greenhouse effect**, after CO_2, and contributes significantly to **global warming**.

Carbon dioxide (CO_2)

Also known as **atmospheric carbon**, CO_2 is a critical indicator of the **planet's health**. While essential for biological processes, **human activities have disrupted its balance**, raising its levels, intensifying the **greenhouse effect**, and accelerating **climate change**.

Volatile organic compounds (VOCs)

These **hydrocarbons** are **chemical substances** containing carbon and are in gaseous form at ambient temperature. Their **high volatility** makes them dangerous **air pollutants**, as well as precursors of tropospheric ozone.

Suspended particles (PM)

PM comes from both natural sources, such as dust and pollen, and human activities, such as **burning fossil fuels**, **industry**, and **agricultural processes**. These microscopic particles remain in the air and are associated with **respiratory and cardiovascular diseases**.

Together, these **toxic gases** and particles pose a serious risk to **human health**, increasing the incidence of **respiratory**, **cardiovascular**, and **neurological diseases**. They also contribute to **climate change** and **ecosystem degradation**.

Effects of landfill air pollution

Landfill air pollution results from a complex mix of **gases and particles generated by waste decomposition**. This issue worsens when the waste includes hazardous materials, increasing the overall emission profile and complicating its management.

One of the major environmental challenges today is managing this pollution effectively. To address this, it is essential to implement innovative strategies, such as installing **advanced gas detection and control systems**, capable of:

- Detecting emissions in real-time.
- Capturing and treating gases such as methane before they reach the atmosphere.

These preventive systems can significantly reduce the amount of harmful gases released, contributing to protecting air quality.

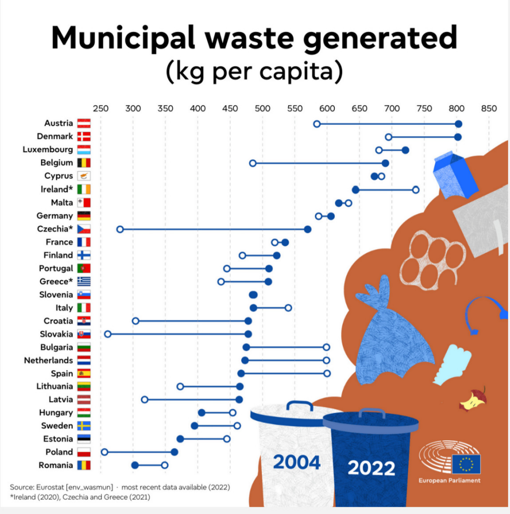
The implementation of **stricter regulations** and advanced control programmes encourages landfill operators to adopt better practices. This balanced approach allows minimisation of atmospheric emissions, ensuring effective waste management without compromising public health or air quality.

> *If no urgent action is taken, by 2050 global waste levels will exceed current levels by 70%. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. World Bank Group*

Reducing landfill dependence requires investing in sustainable and innovative approaches, such as:

- **Energy recovery technologies:** Extracting energy from gases generated in waste not only reduces emissions but also turns a problem into a **valuable resource**.
- **Source separation and recycling:** Improving **waste sorting** increases reuse and recycling, reducing the amount of materials that reach landfills.

In summary, adopting **sustainable measures** for landfill management will not only reduce their impact on **air pollution**, but also improve **air quality** and protect public health. These actions are crucial for ensuring a **safer and healthier environment** for future generations.



Source: Eurostat [env_wasmun] · most recent data available (2022)
*Ireland (2020), Czechia and Greece (2021)

Municipal Waste Generated – European Parliament.

How landfill emissions affect public health

The release of harmful gases and particles from landfills poses a **direct threat to human health**, especially for those living near these waste processing sites.

Research has shown that exposure to landfill air emissions can cause a range of **adverse effects on public health**, including chronic respiratory problems such as asthma and chronic obstructive pulmonary disease (COPD); as well as neurological issues and even cancer.

Municipal waste landfills typically house a harmful mix of waste, combining domestic, commercial, and industrial materials. This complex mixture can release a cocktail of atmospheric pollutants that are **difficult to monitor and control**.

The **social and economic repercussions** of landfill air pollution are significant, as they increase healthcare costs and reduce the quality of life for affected communities.

Municipal solid waste landfill.

What are the effects of landfills on local air quality?

Landfill air emissions, primarily composed of **methane**, **carbon dioxide**, and **volatile organic compounds (VOCs)**, pose a significant threat to the environment and the health of people living near these facilities.

The population residing near landfills is exposed to higher pollutant levels, which can worsen conditions such as:

- **Asthma**, **bronchitis**, and other respiratory diseases.
- More severe chronic conditions, such as **cancer** and **cardiovascular disorders**, in case of prolonged exposure.

The impact is even more severe on vulnerable groups, such as **children**, **elderly people**, and those with pre-existing conditions, as their health is more sensitive to **air quality** affected by these emissions.

The constant increase in waste volumes has led to the location of landfills closer to **urban areas**, where their emissions exacerbate atmospheric pollution in densely populated regions. Additionally, the expansion of these facilities to manage the **growing volume of waste** intensifies the need to control and mitigate pollutant emissions.

To protect public health and ensure **clean air**, it is crucial to adopt effective strategies:

1. **Control of pollutant gases:**
   - **Early detection and gas capture systems**.
   - **Controlled flaring** to reduce methane emissions.
   - Use of **biofilters** to filter harmful gases.
2. **Sustainable waste management:**
   - **Promotion of recycling** and waste reduction at source.
   - Implementation of **alternative treatment methods** to reduce landfill dependency.

A comprehensive approach that combines **constant monitoring of pollutant gases** with compliance to current regulations is essential to address the effects of landfill emissions on air quality. Furthermore, the commitment of the **community**, promoting sustainable waste management practices, will be key to protecting both **public health** and the **environment**.

What regional and global impact do landfills have?

Municipal solid waste landfills have significant impacts at both **regional** and **global** levels, affecting the **environment**, **human health**, and the local economy.

Regional impacts: health, economy, and air quality

Landfill air pollution, especially through emissions of **pollutant gases** and **volatile organic compounds**, has direct consequences:

- **Public health:** Pollutants affect the **local population**, increasing respiratory diseases and other chronic conditions.
- **Local economy:** Areas near landfills experience a **decline in property value** and increased **healthcare costs** due to environmental impacts.
- **Air quality:** Emissions accumulate and deteriorate the air at a **regional** level, worsening atmospheric pollution.

Global impacts: climate change and sustainability

Landfills are one of the largest sources of **methane** and **carbon dioxide**, two powerful greenhouse gases contributing to **global warming**. Additionally, the slow decomposition process of waste (which can extend for centuries) **prolongs the environmental impact** even after landfill closure.

What is the environmental impact of landfills?

Local ecosystems suffer multiple consequences:

- **Habitat destruction:** Landfill expansion leads to the loss of **biodiversity** by disrupting local flora and fauna.
- **Soil and water contamination: Leachate**, liquids from decomposing waste, can seep into the ground, polluting **groundwater** and endangering both ecosystems and human health.
- **Depositing pollutants:** These can accumulate in vegetation, soil, and water bodies, affecting the entire environmental balance.

Strategies to mitigate the impact of landfills

1. **Reducing atmospheric emissions:** Implement **gas detection, capture, and utilisation systems** like methane.
2. **Sustainable waste management:** Improve **recycling** and **composting** programmes to divert organic waste from landfills.
3. **Renewable energy sources:** Harness captured gases as energy, achieving a **dual environmental and social benefit**.

International cooperation: key to change

Fighting the impact of landfills requires coordinated action:

- Global initiatives such as the Paris Agreement promote landfill emission reductions as a key part of **global climate goals**.
- Collaboration between countries is essential to mitigate the effects of an environmental crisis that **knows no borders**.

The combination of **advanced technology**, **improved waste management**, and **effective international cooperation** can transform landfills into sustainability models. Reducing their emissions will not only help curb climate change but also improve **quality of life** and the **health of the planet** for future generations.

Methane emissions from landfills

Decomposition of solid waste in landfills generates **pollutant gases**, primarily **methane** and **carbon dioxide**, both considered **greenhouse gases** (GHGs) that contribute to **climate change**. **Methane**, in particular, is especially concerning due to its **potent ability** to trap heat in the atmosphere. Although it remains for only **10 to 12 years**, its **global warming potential** is **25 times higher** than carbon dioxide over a 100-year period, making it one of the primary causes of **global warming**.

Sources of methane in landfills

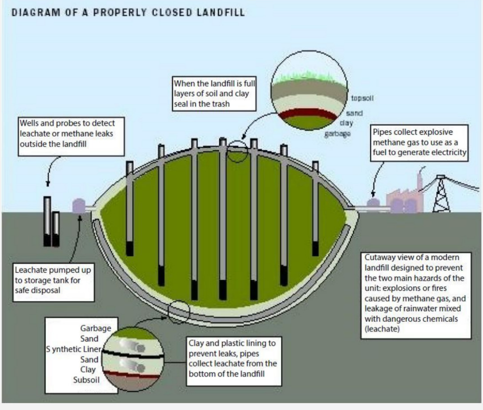
Landfills are a key source of **methane** due to the **anaerobic decomposition** of **organic waste**. The large amount of **garbage** that accumulates in these sites, along with the growing urban populations and increased consumption, makes waste management and associated emissions increasingly difficult. The expansion of landfills and the growing volume of waste complicate the **effective management** of atmospheric emissions.

Challenges in reducing methane emissions

Reducing methane emissions in landfills faces **technical**, **regulatory**, and **economic** challenges. The diversity of deposited waste, ranging from **municipal waste** to **hazardous waste**, contributes in various ways to methane emissions. This **complexity** makes it difficult to implement **universal solutions** that can be effectively applied in all landfills.

Moreover, the infrastructure required to **capture and utilise methane** is often costly and demands high technical standards. Many older landfills lack **methane capture systems**, and upgrading these facilities may be economically unfeasible. **Regulations** governing emissions vary significantly between regions, resulting in **inconsistent applications and compliance** globally.

> *According to the EPA, US landfills release methane equivalent to the carbon emissions of 23.1 million gasoline-powered cars driven for one year.* *Conservation Law Foundation*

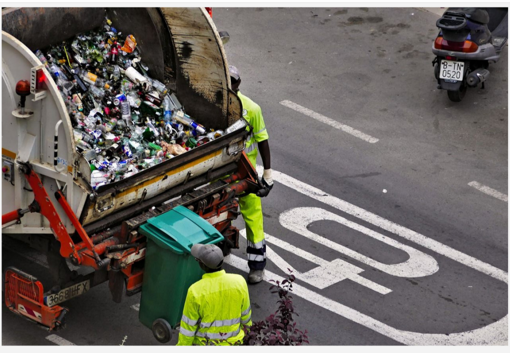


Landfill sealing diagram – credit US EPA

Methane regulation in landfills: key measures

Methane regulation in landfills focuses on controlling and reducing emissions of this potent **greenhouse gas**. These regulations usually include the following aspects:

- **Mandatory biogas collection**: Many countries require landfills to install **biogas capture systems**, using wells or pipes, to collect methane generated by the anaerobic decomposition of organic waste.
- **Use of captured biogas**: The **captured methane** can be controlled by flaring, converting methane into carbon dioxide. It can also be used to generate **energy**, such as electricity or thermal energy, or, once purified, used as **natural gas**. This reduces emissions and promotes **sustainable practices** in waste management.
- **Landfill planning standards**: Many regulations require **impermeable covers** to minimize methane generation and its release into the environment. **Geomembranes** and **compacted clay** are used to reduce emissions of pollutant gases and **odours**. In closed landfills, these covers are essential to seal the waste and prevent water infiltration, thereby avoiding the **production of leachate**.
- **Drainage systems**: These are employed to control leachate, preventing water accumulation that could increase **methane** and other GHGs. Leachate is treated through **reverse osmosis** and other physicochemical methods. In addition, toxic vapours generated by these leachates can be detected through **strategic monitoring** and treated before reaching the atmosphere.
- **Methane emission limits**: Some regulations require **continuous monitoring** of methane emissions, with regular reports on the data collected. In case of non-compliance, penalties are imposed.



Municipal solid waste collection.

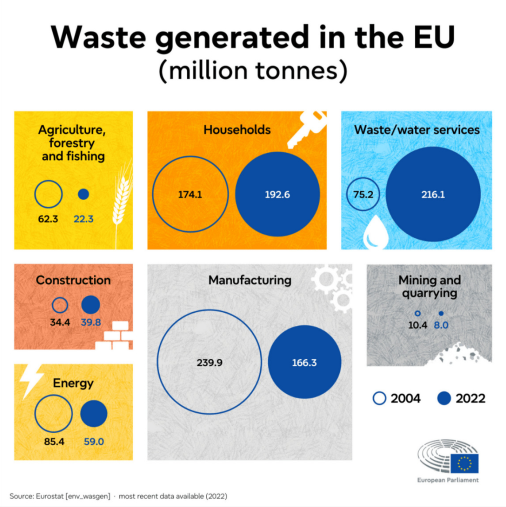
Incentives and funding for reducing methane emissions

To encourage methane capture, there are various **incentives** and **funding options** available:

- **Clean Development Mechanism (CDM)**: Established under the **Kyoto Protocol**, this mechanism offers **international funding** and carbon credits to projects that capture methane directly from landfills, helping mitigate climate change.
- **Grants and tax incentives**: Some countries offer **grants** and **tax exemptions** for projects promoting **methane emission reduction** in municipal solid waste landfills.
- **Waste disposal restrictions**: The **European Union** and other regions have established regulations limiting biodegradable waste in landfills, thus reducing the amount of **potentially generated methane**.

The **efficient management** of methane emissions from landfills is key to mitigating **climate change**. With a combination of **advanced technology**, **effective regulations**, and **international cooperation**, we can significantly reduce emissions and promote a more **sustainable** and **healthy** future.

> *By 2030, 60% of daily waste collected and treated by municipalities must be reused or recycled, according to EU goals.* *European Parliament*



Source: Eurostat [env_wasgen] · most recent data available (2022)

Waste generated in the EU – European Parliament.

Air pollution control in landfills

Air pollution control in landfills is crucial for reducing environmental impacts and protecting **public health**. The most commonly used measures and technologies to control these emissions focus on **reducing biodegradable waste** entering the facilities, which reduces the emission of **biogas**.

Among the most advanced and accessible technologies for managing emissions and mitigating risks in landfills is **continuous air monitoring**. **Air quality sensors**, strategically installed in the landfill, form networks that provide **real-time data** and detect emissions of **pollutant gases**, **volatile organic compounds**, and **particulate matter**.

Using these technologies ensures compliance with **air quality regulations** that govern the emissions of pollutant gases such as **methane**, **carbon dioxide**, and other pollutants from landfills.

In summary, **air pollution control** in landfills not only helps reduce **GHGs**, but also improves **local and regional air**

quality, minimizes **odours** and **health risks**, protects **ecosystems** and **biodiversity**, and makes it possible to harness **biogas** as a valuable source of **renewable energy**.

Gas control technologies in landfills

To mitigate the risks of landfill emissions, **advanced gas monitoring technologies** have been developed. These provide **real-time data** on the **composition**, **concentration**, and **emission rates** of gases, facilitating the management of emissions.

One of the most effective technologies is **gas chromatography**, which allows precise analysis of gas samples. This method helps identify specific components of each gas and apply management strategies to reduce emissions. Additionally, **infrared gas analyzers** are widely used for **continuous monitoring**, providing crucial data for the **early detection** of any anomalies or peaks in emissions.

The incorporation of **remote sensing** technologies and **Geographic Information Systems (GIS)** has transformed emissions control in landfills, offering a global view of emission patterns. The use of **satellite images** and **aerial analysis** helps track gas emissions over time and allows for more informed strategic decisions.

The Internet of Things (IoT) has led to the development of **smart monitoring systems**, where sensors distributed across landfills transmit data to centralized platforms for analysis. This improves the **accuracy** of monitoring and enables the creation of **predictive models** for future emission trends.

In summary, gas control technologies in landfills continue to evolve, playing a fundamental role in **reducing air pollution**, ensuring **regulatory compliance**, and protecting both public health and the environment.

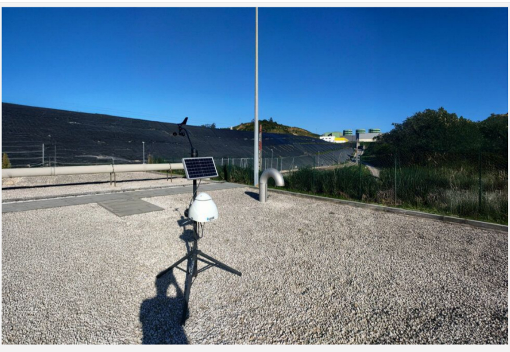
Odor emission control in landfills

Odor emissions in municipal solid waste landfills are a major concern for environmental health and the wellbeing of nearby communities. These odours come from the decomposition of organic matter, releasing harmful gases such as **hydrogen sulphide** and **methane**, which affect air quality.

Effectively controlling odour emissions through **constant monitoring** is essential to mitigate these impacts. This transforms landfills into more **sustainable** and **community-friendly** facilities, while also ensuring **compliance with environmental regulations**.

One of the most common methods for controlling odours is the use of **daily cover materials**, such as soil or synthetic alternatives, applied to waste to minimise the release of **malodorous gases**.

Additionally, some landfills have implemented advanced techniques, such as **biofiltration systems**, which use **microorganisms** to break down **volatile organic compounds** and other odour-causing substances. This technology significantly reduces odour emissions before they reach the atmosphere.



A Kunak AIR Pro air quality station installed at a landfill site in Portugal to monitor methane emissions and other pollutant gases.

How does Kunak help reduce atmospheric pollution in landfills?

Kunak Technologies plays a key role in combating the **pollution** generated by municipal solid waste landfills through advanced technological solutions for **air quality monitoring**. Below are the main **contributions** of Kunak:

Monitoring of pollutant gases

Kunak provides **real-time air quality monitoring systems** that allow measurement of **pollutant gases** such as **methane**, **hydrogen sulphide**, **carbon dioxide**, and **ammonia** near landfills. This monitoring is crucial to **assess** and **control emissions** that impact both the **environment** and **public health**.

Establishing perimeter sensor networks

The use of **air quality sensor networks** around landfills allows accurate data collection on the **presence of pollutants** in surrounding areas. These networks help **identify emission sources** and implement **corrective measures** that protect the **health** of **local communities**.

Solutions tailored to specific projects

Thanks to **Kunak AIR** systems, based on the patented design of **smart cartridges**, monitoring solutions can be precisely tailored to the needs of each project. This includes compliance with **current regulations** and consideration of **environmental conditions** at the installation site and the **specific pollutants** to measure.

Success story: Ada County landfill, Idaho

The largest landfill in Idaho, located in **Ada County**, in collaboration with Envirosuite, has implemented an advanced **real-time environmental monitoring strategy** to manage **emissions** more efficiently and address the challenges of urban growth. Using innovative systems, such as the state-of-the-art Kunak AIR Pro sensors and digital platforms, constant **air quality monitoring** is carried out, and **mitigation strategies** are established to protect both the environment and neighbouring communities.

In addition to ensuring **regulatory compliance**, this initiative has improved **stakeholder relations**, fostering **environmental resilience** and long-term sustainable management. This model not only ensures cleaner and more efficient operations but also aligns with the challenges of **urban expansion** and sustainable growth in the county.

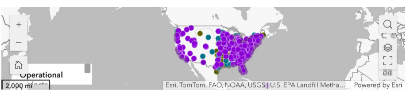
Success story: Cerro Patacón landfill, Panama

A notable example of Kunak's application is the project developed at the Cerro Patacón landfill in Panama. Located near Panama City, this landfill implemented a **real-time control system** for **odour emissions** and **suspended particulate matter**. This initiative has significantly improved **air quality** and protected the health of **nearby communities**.

Success story: Valdemingómez landfill, Spain

Another example is the Valdemingómez landfill, a large waste treatment facility located in the southeast of Madrid, Spain. Since landfills are one of the primary sources of methane emissions, among other gases, a **Kunak AIR Pro sensor network** has been deployed to measure hydrogen sulphide (H2S), methane (CH4), volatile organic compounds (VOCs), and ammonia (NH3) emissions, and **alert for potential leaks**, optimising the **environmental control** of the complex.

In summary, Kunak provides advanced technological solutions for **monitoring and controlling atmospheric pollution** in landfills, thus helping to mitigate their impact on both the **environment** and **public health**.



Landfill Methane Outreach Program (LMOP)

The **Landfill Methane Outreach Program (LMOP)** is a voluntary initiative by the **United States Environmental Protection Agency (US EPA)** aimed at **reducing methane emissions** from landfills by implementing **biogas recovery systems**.

After identifying landfills with potential for biogas capture, the program provides **tools**, **resources**, and **training** to stakeholders to design and develop **biogas recovery projects**. Through **awards** and **honourable mentions**, LMOP recognises organisations leading the most successful projects in **waste treatment** and methane emission reduction.

Program objectives

The main goal of LMOP is to **reduce methane emissions** from **municipal solid waste landfills** in the United States by encouraging the **capture and utilisation of biogas** produced during waste decomposition. The key objectives are:

1. **Reduce methane emissions**: Promote biogas capture technologies to decrease methane emissions from landfills.
2. **Encourage biogas utilisation**: Promote the use of biogas to generate **electricity**, produce **heat**, incorporate **renewable natural gas**, or use it as **fuel for vehicles**.
3. **Foster public-private collaboration**: Act as a facilitator for sustainable interaction between landfill owners, businesses, local governments, and project developers.
4. **Mitigate climate change**: Capture and use methane to reduce **greenhouse gas (GHG) emissions**, contributing to **national and international climate goals**.

LMOP benefits and achievements

The benefits of this program are multiple, both **economic**, **social**, and **environmental**:

- **Economic**: Generating income through the sale of **renewable energy** or **carbon credits**, as well as **reducing landfill operational costs** by promoting biogas utilisation.
- **Social**: Improving **public health** by reducing **odours** and **harmful gases** around landfills, benefiting **local communities**.
- **Environmental**: Contributing to **climate change mitigation** through **methane emission reduction**, improving local **air quality**, and promoting sustainability.

Methane emissions from a Madrid landfill detected on 20 August 2021 – European Space Agency.

Frequently Asked Questions

What causes air pollution at landfills?

Urban solid waste **landfills** generate **air pollution** through chemical and biological processes, releasing **greenhouse gases** such as **methane** and **carbon dioxide**, along with **volatile organic compounds** (VOCs) that affect air quality. They also emit harmful **gases** such as **hydrogen sulphide** and **ammonia**, which cause unpleasant odours, as well as **particulate matter**. Spontaneous fires release **carbon monoxide**, **dioxins**, and **furans**, substances harmful to health.

Can living near a landfill make you Ill?

Yes, living near a landfill increases the risk of health problems, such as **respiratory issues** from inhaling particles, gases, and VOCs. Prolonged exposure to substances like **benzene** and **toluene** can cause **neurotoxic effects**. Additionally, **PM2.5 particles** affect the **cardiovascular system** and increase the risk of **hypertension** and **heart disease**. There is also the risk of exposure to **carcinogenic substances** like **dioxins** and **heavy metals**. Although **bad odours** are not directly dangerous, they affect psychological well-being.

How far from a landfill is it safe to live?

People living within 5 km of a landfill without proper gas and leachate control are more exposed to emissions. Health risks depend on factors like **distance**, **waste type**, and **environmental control practices**.

What pollutants are commonly released by landfills?

Landfills release **greenhouse gases** (**methane** and **carbon dioxide**), **odorous gases** like **hydrogen sulphide** and **ammonia**, **volatile organic compounds**, and **particulate matter** (PM10, PM2.5). Leachates carry heavy metals like **lead** and **mercury**, and uncontrolled burning produces **dioxins** and **furans**, which cause **cancer**.

Overall, the pollutants released in landfills have **serious impacts on air quality, climate, and public health**. Therefore, it is crucial to **implement control measures**, such as gas capture systems, **continuous monitoring** with advanced technologies (like Kunak solutions), and **promote sustainable practices** in waste management.

How are landfill gases controlled and managed?

Biogas management is key to mitigating environmental impact. **Gases** like **methane** and **carbon dioxide** are captured through **wells** and **extraction pipes**. Impermeable covers are also used to prevent gas leaks. Biogas can be **burned** to generate **electricity** or produce **biomethane** for **fuel**. Additionally, emissions control includes **controlled flaring** of biogas. To optimise these processes, continuous **gas** and **particulate** monitoring using technologies like Kunak's sensors is essential, enabling real-time evaluation and control of emissions.

Kunak's CH_4, CO_2, H_2S, and VOC gas sensors enhance the continuous monitoring of control networks and assist in **making informed decisions** to **protect public health** and comply with **environmental regulations**.

Conclusion

The management of urban solid waste landfills represents **a major environmental challenge** due to the pollutant emissions from their processes. As emissions that **contribute to climate change** due to their high generation of GHGs, they also **affect air quality** and **public health** in nearby communities. These are reasons why it is **essential to measure and control** emissions and make informed and effective decisions based on the **timely detection** and **precision** of specific pollutants such as harmful gases, VOCs, and particulate matter.

This is the path to ensuring **more sustainable management** at treatment facilities and favouring their **compliance with current regulations** to mitigate their negative environmental and **public health** impacts. This practice should be generalised to **respond to the urgent need to drive a transition towards more responsible practices**, aligned with global sustainability goals and environmental protection.

References

- Salmerón-Gallardo, Y.A., et al. Emisiones de Gases de Efecto Invernadero en Vertederos de Residuos Sólidos Urbanos Huella de Carbono en Acapulco, México. Revista Iberoamericana de Ciencias 2017. http://ri.uagro.mx/handle/uagro/1063
- Andeobu, L., Wibowo, S. and Grandhi, S. Artificial intelligence applications for sustainable solid waste management practices in Australia: A systematic review, Science of The Total Environment, Volume 834, 2022,

To: publiccomment@bentoncountyor.gov

Subject: Oppose/Deny LU-24-027 – **Breaking the Spell of Invisibility**

Dear Benton County Planning Commissioners

Submitted by: Carol McClelland Fields, 37326 Soap Creek Rd.

Why is Coffin Butte Landfill missing from most Benton County planning and reporting documents?

Has a spell of invisibility been placed over the Coffin Butte Landfill?

While developing written testimony to **oppose/deny LU-24-027** over the last few months, several of us spotted an interesting pattern as we did a deep dive to review and study the following Benton County reports and planning documents.

1. Benton County Community Wildlife Protection Plan of 2023-2028
2. Linn, Benton, and Lincoln Counties Regional Health Assessment 2022 – 2026 *
3. Climate + Health Adaptation Plan 2023 *
4. Benton County Climate Action Plan
5. Benton County's 2040 Thriving Communities Initiative *
6. Benton County Comprehensive Plan Adopted 2007 *

* These reports are appended within this pdf.

We discovered two main themes:

1) Coffin Butte Landfill was **Not mentioned at all** in some key Benton County planning documents.

2) Benton County **Values & Guidelines do Not match** what's happening with the Coffin Butte Landfill Expansion Process.

Let me explain in more detail:

1) When we first read the **Benton County Community Wildlife Protection Plan of 2023-2028** that was approved in 2023, we were stunned to discover that **Coffin Butte Landfill was Not included as a source of fire risks or as a potential receiver of embers** from adjacent fires in neighboring forests, grasslands, or agricultural fields.

Please see **my previous testimony** *(A Garbage-Truck Sized Hole in the Community Wildlife Protection Plan (CWPP) WITH RESOURCES INCLUDED - originally sent 4.29.25 and re-sent 6.16.25 with all supporting resources embedded in PDF)* that includes the **actual CWPP report** and **an expanded version of the following email exchange**:

> Nancy Whitcomb says: *It seems that when you have* ***a vast reservoir of flammable methane as a known fire risk, and which has repeatedly caught on fire, that*** [it, Coffin Butte Landfill] ***should be taken into account in the formulation of a plan to reduce wildfires.***
>
> Inga Williams says: ***I don't see how I can include*** **this [impacts of Coffin Butte Landfill]** ***in CWPP*** [Community Wildfire Protection Plan] ***as I have no experience in the topic, and it would be a task too large to undertake for what is in the final draft stages.***
>
> > **And that was all it took for Coffin Butte Landfill fire risks and impacts to be hidden from view** ***in the document that is used by Benton County to plan its response to fires in our region.***

2) Then we read the **Linn, Benton, and Lincoln Counties Regional Health Assessment 2022 – 2026.** (Report 2. This report is appended in this PDF.)

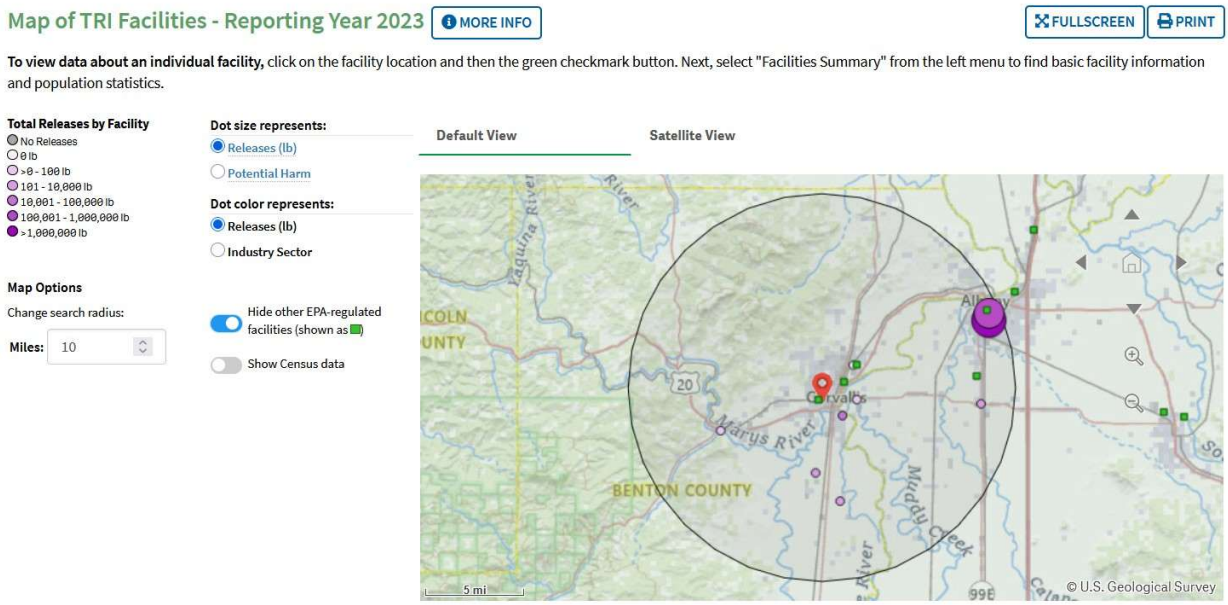
In the introduction to this report, we found this statement: *"This report is focused on describing the health trends,* ***environmental conditions [promising],*** *and disparities affecting residents in recent years.* ***Assessing health status and risk factors is a key foundation for informing plans for community health improvement****, aligning priorities among regional stakeholders, and indicating health status trends."*

Surely a report on health impacts will incorporate comments about Coffin Butte Landfill. Sadly, no.

Under the **Air** heading, on page 17 of the report (page 26 of the PDF), the authors noted that "***other sources of air pollution are industrial facilities which release air toxics.*** *Please see* ***Hazardous Waste*** *section below for more information."*

Under the heading of **Hazardous Waste** (page 23 of the report – page 32 of the PDF), the authors note: "***The Toxics Release Inventory (TRI)*** *includes certain toxic chemicals that may pose a threat to human health and the environment*." (Footnote 19: United States Environmental Protection Agency (2023). Toxics Release Inventory (TRI) Program. http://www.epa.gov/toxics-release-inventory-tri-program)

In that section, Regional Health Assessment notes that *"four facilities in Benton County…released on-site barium compounds and zinc compounds."* Locations noted as purple dots in the Toxics Release Inventory Map (at the bottom of the program web page.)



Note that the Coffin Butte Landfill is NOT included on the map of facilities included in the Toxics Release Inventory because *"The Environmental Protection Agency and Oregon Department of Environmental Quality work with facilities on reducing waste and safer waste management by recycling, recovering energy from, and treating chemicals."* (page 24 of the report – page 33 of the PDF)

Reports or graphs from EPA or ODEQ are NOT included in the Regional Health Assessment report to highlight Coffin Butte Landfill's impacts on air, water, etc.

Under **Solid Waste** (page 22 of report – Page 31 of the PDF), there's a brief discussion of what a landfill does, but:

a. **There is NO mention that Benton County is the home of a landfill (the Coffin Butte Landfill)** even though there are comments about relevant industry categories in Linn and Lincoln Counties.
b. There is **NO statement about the fact that toxins generated by the landfill are released into the air** through fugitive methane plumes and the flare.

c. There are **NO statistics about the amount of toxins** that are being emitted and **impacting the health of Benton County residents.**
d. **There was NO reference to statistics from Environmental Protection Agency (EPA) and Oregon Department of Environmental Quality (DEQ)** to provide any indication of the scope of the toxins released into the air.
e. **There is NO reference to leachate release** in Corvallis that is taken up as drinking water in Adair and downstream communities.
f. **There is NO reference to bio sludge** applied to local agricultural fields.

And once again Coffin Butte Landfill's impacts are hidden from view in a document that ***helps Benton County plan for health trends and risks to prepare for community health needs***.

3) Climate + Health Adaptation Plan 2023 (3. report is included in this pdf)

These two screenshot excerpts are from page 3 and page 6 of this report.

The evidence that a plan like this is necessary is undeniable. The Oregon Climate Change Research Institute has released its sixth assessment of what climate change means for Oregon, and the content is sobering. The intent of this document is to raise awareness about the array of health impacts of climate change we are facing, beyond those that our community has already experienced firsthand. Our hope is that this plan allows us to increase capacity and learning, through new conversations and actions.

Projected impacts for Lincoln and Benton counties are increasing heat waves, heavy rains, flooding, and wildfire; loss of wetland ecosystems; coastal hazards and changes in ocean temperature and chemistry; expansion of non-native invasive species and increased invasive species risk; and reduced air quality.

Many of these impacts will have ramifications at the landfill, which will ripple out to the residents of Benton County –

More heat waves
→ **increase the risk of wildfires**,
→ heavy rains **produce more leachate** that must be transported through the region and then eventually **released into the Willamette River to impact those downstream**.

And once again, there is **NO mention** of how the Coffin Butte Landfill will impact **Benton County's *response to climate change and health impacts*.**

In Summary: Coffin Butte Landfill in not referenced or incorporated:

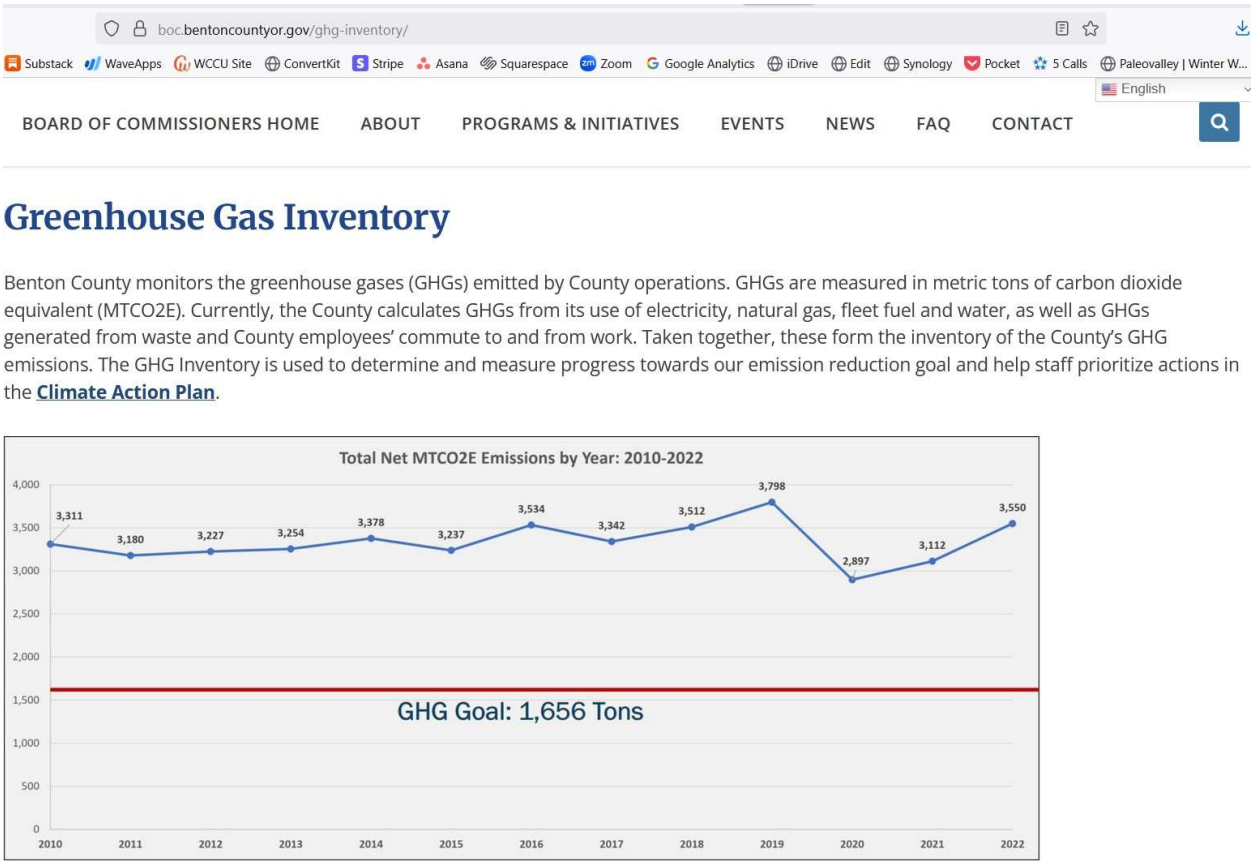
- **In the Community Wildfire Protection Plan** – the document that is used by Benton County to **plan its response to fires** in our region

- **In the Regional Health Assessment** – the document that **helps Benton County plan for health trends and risks to prepare for community health needs**.

- **In the Climate + Health Adaptation Plan 2023 – the document that spells out Benton County's response to climate change and health impacts.**

4) Benton County Climate Action Plan

*Benton County's goal is **to reduce emissions from County operations** to 50% of 2010 levels by the year 2030, and to be net-zero by 2050. Benton County's climate action goal is to reduce greenhouse gas emissions to 50% of 2010 levels by the year 2030, and to be net-zero by 2050. The County's Climate Action Plan (CAP) is the roadmap for achieving this goal. Work towards our goal is ongoing.* **https://boc.bentoncountyor.gov/cap/** *(see screenshot below. Note the table has not been updated since 2022.)*



Unfortunately, any advances made through changes to County operations will be quickly obliterated by the additional climate impact of any expansion to the Coffin Butte Landfill.

It's too bad that the county's decisions that impact greenhouse gas emissions are not included in the County emissions.

5) Benton County's 2040 Thriving Communities Initiative

Although listed as one of Benton County's Programs and Initiatives, I could only find the following paragraph about this initiative:

The 2040 Thriving Communities Initiative is a ***community-driven, visioning process that uses community-identified Core Values in order to address long-term, complex issues****. The Core Values were developed through a two-phased, multi-year process that guides strategies, actions, and progress measures to align community activities and government services surrounding the* ***dynamic challenges and opportunities facing the County now and into the future.***

No link to a document.
No information about why there wasn't a link to a document.
No timeline for update.
Nothing!

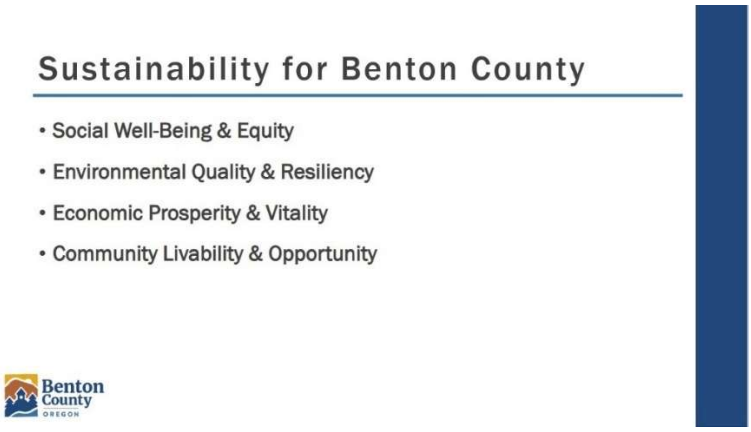
A Google Search on the current status of this Initiative gave me this answer:

> ***The Benton County 2040 Thriving Communities Initiative is a community-driven visioning process focused on building a resilient future for Benton County. It's currently in a phase of refining and implementing strategies based on core values identified from community input. This involves aligning community activities and government services to address long-term challenges and opportunities.***

Eventually I found a 22-page document that was labeled **[2040initiative-historyoverview-bctt-10-27-22] –** From what I'm gathering, this isn't the actual 2040 Initiative document, but an historical overview of the 2040 Initiative process that was presented during Benton County Trash Talks BCTT in October 2022. I've attached this document. **(5. report is appended in this pdf)**

Still no sign of a completed project document…

This historical overview of 2040 Initiative document did include several content slides.



The Core Values that came out of this process …finalized in February 2018.

Given our stated values as a County **– Liveable, a Sense of Place, High Environmental Quality, conservation of Natural Resources, Robust Economy, Prepared to Respond to Natural & Human Caused Disasters, Well-Being of Our People** — how do these values square with the expansion of the Coffin Butte Landfill requested by Republic Services?

6) Benton County Comprehensive Plan - Adopted 2007 **(6. report is appended to this pdf)**

This is the only Benton County document that I found that mentioned the Coffin Butte Landfill by name! That's the good news.

In reviewing this document, however, I found plenty of examples of ways in which **Benton County is NOT living up to its own Comprehensive Plan – Adopted 2007.** I

have attached the full document and copied in goals related to: **Air, Water & Land Resource Quality**

Page 6-1: Overview: The maintenance and improvement of air, water and land resource quality are important considerations in all phases of land use management and planning. The policies in this section of the Plan **provide the framework for evaluating land use actions for their potential impact on the county's natural environment** and guide the management of County operations, consistent with Benton County's commitment to protecting these valuable resources.

Cooperation among all levels of government and citizens is critical to protecting air, water and land resources. State and federal agencies, including the federal Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ), have a primary role in monitoring and enforcing quality standards. The policies in this chapter define the responsibility of the County **to work in partnership with others to achieve the highest level of air, water and land resource quality.**

Page 6-2: Statewide Planning Goal 6: To maintain and improve the quality of the air, water and land resources of the state.

All waste and process discharges from future development, when combined with such discharges from existing developments **shall not threaten to violate, or violate applicable state or federal environmental quality statutes, rules and standards.**

With respect to the air, water and land resources of the applicable air sheds and river basins described or included in state environmental quality statutes, rules, standards and implementation plans, such discharges **shall not** (1) **exceed the carrying capacity of such resources, considering long range needs**; (2) **degrade such resources**; or (3) **threaten the availability of such resources**.

Excerpt from OAR 660-015-0000(6)

Page 6-2: Benton County Goal

To maintain and improve the quality of air, land, and water resources in a manner that will meet current needs and **preserve resources for future generations**.

Policy Sections – Pages numbered by goals and subpoints (6-1 – 6-11)

6.1 **General Policies** – Full list of goals listed below
6.2 Water Resources – Worth reviewing
6.3 **Air Resources** – 1 Goal listed below
6.4 Subsurface Sewage Disposal Systems
6.5 **Landfills and Solid Waste** – Full list of goals listed below.
6.6 **Noise and Glare** – 1 Goal listed below

6.1 General Policies (page 6-3)

6.1.1 Benton County shall **provide by example and leadership a commitment to air, water, and land resource quality** by demonstrating sustainable, **"best management practices"** in all County operations and capital projects.

6.1.2 In cooperation with appropriate agencies, Benton County shall **manage its air, water and land resources to ensure their protection, conservation, restoration, or enhancement.**

6.1.3 Benton County, in cooperation with the Oregon Department of Environmental Quality (DEQ), Oregon Department of Human Services and other appropriate agencies, shall **conduct periodic environmental health assessments** and develop and update an environmental assessment priority list to **identify, monitor and evaluate potential health hazards** relating to sewage disposal, drinking water and solid waste. Benton County shall take appropriate steps to **minimize resource degradation**, and shall work with OSU Extension and others to increase public understanding and awareness around these issues.

6.1.4 In reviewing land use actions, Benton County shall **evaluate potential impacts on air, surface water, groundwater, noise and glare levels, and land quality**, where possible utilizing existing studies and prioritizations such as the County's Environmental Assessment Priority List. Appropriate steps shall be taken to minimize degradation.

6.1.5 **Benton County shall *work with local citizens*** and appropriate local, state and federal agencies to establish partnerships to achieve enforcement of air, land, and water quality standards.

6.1.a The **high value placed on clean air and water by Benton County residents** is reflected in local commitments to plans and programs directed toward reducing air and water pollution.

6.3 Air Resources (Page 6-5)

6.3.1 Benton County shall develop and implement programs necessary to **meet or exceed air quality standards**. This effort will include but not be limited to: considering air quality implications when reviewing capital improvement projects and **making land use decisions**, developing and implementing controls, reducing vehicle miles traveled (VMT), and monitoring and promoting proper burning practices.

> 6.3.g Because of high air pollution potential for much of Benton County, **land use decisions must consider effects on air quality.** Automobiles, industry, and agricultural burning cause most of the air pollution problems, and therefore **land use policies must be developed to minimize pollution problems.**
>
> Background Report 1979 Benton Co. Comp Plan

6.5 Landfills and Solid Waste (page 6-6)

6.5.1 Benton County shall pursue a variety of approaches to waste reduction and recovery and **strive to meet or exceed state-mandated goals for the recovery of waste materials.**

6.5.2 Benton County shall **assure compliance with county and state ordinances** pertaining to the unlawful storage, collection, and disposal of solid waste materials.

6.5.3 Benton County shall increase, to the **maximum degree possible, the salvage reclamation, recycling, and reuse of materials** from solid waste.

6.5.4 Benton County shall provide for the **safe, efficient, and sanitary storage, collection, transportation, and disposal of solid waste.**

6.5.5 Benton County shall strive for the **safe storage, collection, reduction, reuse, recovery, and appropriate disposal of hazardous waste materials.**

6.5.6 Benton County shall plan for the **safe and efficient transportation, storage, recovery, and disposal of disaster debris**.

6.5.7 **Benton County shall maintain a committee that advises the Board of Commissioners on solid waste and disposal site issues. Unfortunately, Benton County disbanded the Solid Waste Advisory Council** – last meeting was March 15, 2023. **Disposal Site Advisory Council** was paused by Benton County for six months in July 2024 and restarted January 2025. Why?

6.5.8 Benton County shall assure safe, accessible, and environmentally sound disposal of solid waste at the **Coffin Butte Regional Sanitary Landfill**.

6.5.9 Benton County shall explore incentives such as financial assistance to address cleanup of solid waste problem areas.

> 6.5.e Land use decisions at the **Coffin Butte Sanitary Landfill** have provided **another 43 years of capacity to the site**, continuing to serve as a **regional landfill serving Linn, Polk, Lincoln, and Benton Counties. My, how times have changed!**
>
> Benton Co. Environmental Health Dept.

> 6.5.f The **Coffin Butte Landfill is currently in compliance with permits and is heavily monitored by the County**. Leachate is collected and treated. A leak detection system is in place to monitor the bottom liner of the landfill for leaks. Monitoring wells surround the perimeter of the landfill. **My, how times have changed!**
>
> Benton Co. Environmental Health Dept.

6.6 Noise and Glare (page 6-7)

6.6.1 Benton County shall identify **excessive noise sources** and, with the cooperation of DEQ, develop and implement a noise ordinance to mitigate or eliminate those sources, when practicable.

> 6.6.a Exposure to excessive noise levels over prolonged periods can be a threat to health.
>
> Background Report 1979 Benton Co. Comp Plan

> 6.6.b **Excessive noise can reduce the livability of nearby dwellings**; examples are wind turbines and rifle ranges.

In summary, why is Coffin Butte Landfill missing from so many Benton County planning and reporting documents?

(Except the Benton County Comprehensive Plan - Adopted 2007)

1) Is it always **just an oversight**, plain and simple?

2) Is the county trying to hide the fact that Benton County is **the home of a large landfill**? Is it because the landfill is at the most northern point of the county and easy to dismiss? Is it a public relations strategy?

3) Is the county trying to minimize or **whitewash the actual impacts** of the landfill?

4) Is the county worried about making Coffin Butte Landfill and Republic Services **look bad**? Is the county worried about embarrassing Republic Services?

5) Does someone in Benton County **have their thumb on the scale** to purposefully advocate for minimizing the presence of the landfill in these documents? If so, for what purpose?

6) Is it because all topics surrounding the Coffin Butte Landfill are **so complex** that no one on staff in the various departments has the knowledge needed to adequately address the issues and so it is safest to eliminate any mention of the landfill?

7) If the complex topics were out of reach for the staff, why hasn't the County included **input from the many talented, educated, and knowledgeable county residents**?

8) Is it that one hand (one Benton County department/service) **doesn't know what the other hand is doing**?

Has a spell of invisibility been placed on the Coffin Butte landfill? (It sure seems so!)

Isn't it time to shatter that spell and take an honest look at the scientific

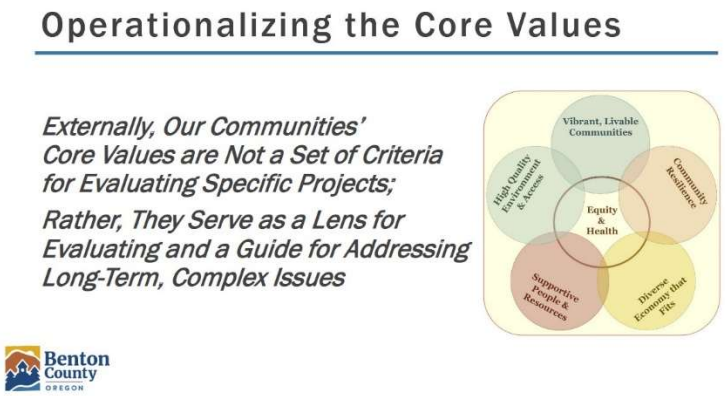
impacts of an expanded landfill on the issues that impact every resident of Benton County.

1) FIRE RISK
2) AIR QUALITY
3) WATER QUALITY
4) SOLID WASTE & HAZARDOUS WASTE
5) HEALTH IMPACTS
6) CLIMATE CHANGE HEALTH RISKS
7) GREENHOUSE GAS EMISSIONS
8) ETC
9) ETC

Isn't it time to live up to Benton County' Stated Guidelines & Values:

> The guidelines as articulated in the **Benton County Comprehensive Plan of 2007.**
>
> The Core Values that came out of the **Benton County's 2040 Thriving Communities Initiative –** a ***"community-driven, visioning process that uses community-identified Core Values*** ***in order to address long-term, complex issues***. *The Core Values were developed through a two-phased, multi-year process that guides strategies, actions, and progress measures* ***to align community activities and government services*** ***surrounding the*** ***dynamic challenges and opportunities*** ***facing the County*** ***now and into the future."***

The decision that is currently on the table regarding the expansion of the landfill is exactly the kind of project the Core Values were created for. The Core Values are meant to ***serve as a lens for evaluating and a guide for addressing long-term, complex issues with Benton County***, not swept under the rug, never to be referenced again!



I firmly oppose LU-24-027.

Expanding Coffin Butte Landfill **seriously threatens the livability on and uses of adjacent properties** [Benton County Code 53.215 (1)]**, seriously impacts the character of the area** [Benton County Code 53.215 (1)], **and imposes an undue burden on the county's and region's fire services, emergency management services, first responders, and health professionals and services, and the county's residents and neighboring residents.** [Benton County Code 53.215 (2)]

Sincerely,
Carol McClelland Fields
Corvallis, OR 97330

Linn, Benton, and Lincoln Counties Regional Health Assessment 2022 - 2026

Benton County OREGON

Lincoln County Health and Human Services

Linn County Oregon

Samaritan Health Services

Building healthier communities together

United Way

United Way of Linn, Benton & Lincoln Counties

Confederated Tribes of Siletz Indians

InterCommunity Health Network CCO

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Benton County Natural Areas, Parks & Events
Boys & Girls Club of Albany
Boys & Girls Club of Corvallis
Casa Latinos Unidos
CASA of Linn County
Center Against Rape and Domestic Violence
City of Corvallis Parks & Recreation
Coastal Range Food Bank
Community Harm Reduction Mentors & Allies
Community Services Consortium
Corvallis Climbers of Color
Corvallis Environmental Center
Corvallis Multi-Cultural Literacy Center
Corvallis School District 509J Family Advocates
Faith Hope and Charity, Inc.
Family Tree Relief Nursery
FISH of Lebanon
Good Samaritan Regional Medical Center
Grace Wins Haven
Grupito Billingue
International Moms Group
Jackson Street Youth Services
Kepi Nak-Nak Resource Center
Lincoln County Behavioral Health
Lincoln County Developmental Disabilities
Lincoln County Library District
Lincoln County Sheriff's Office
Lincoln County Solid Waste District
Linn Benton Health Equity Alliance
Linn Benton NAACP
Mid Willamette Trans Support Network
Neighbors for Kids
Newport 60+ Activity Center
Newport Recreation Center
Olalla Center – Project Bravery
Oregon Cascades West Council of Governments, Meals on Wheels
Oregon Coast Community College Nursing
Oregon Department of Environmental Quality
Oregon State University
Oregon State University Basic Needs Center
Oregon State University Education Opportunities Program
Oregon State University Extension
Panther Creek Community Center
Parenting Success Network
Pathfinder Clubhouse
Philomath Pride
Reconnections Counseling
Samaritan Albany General Hospital
Samaritan Lebanon Community Hospital
Samaritan North Lincoln Hospital
Samaritan Pacific Communities Hospital
Senior Corps of Linn, Benton, and Lincoln Counties
South Benton Food Pantry
Strengthening Rural Families
Vina Moses Center
Volunteer Caregivers

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Executive Summary

The Partnership for Community Health conducted this Regional Health Assessment (RHA) to better understand the health-related issues affecting the Linn, Benton, and Lincoln (LBL) region. This report includes data from a variety of local, state, and national data sources including both secondary data (surveys and data collection systems reported publicly) and primary data (new data collected from our community specifically for this assessment).

In the 2022 County Health Rankings, Benton County ranked 1st among Oregon counties for health outcomes (including measures of length of life and quality of life) and 2nd for health factors (including health behaviors, clinical care, social and economic factors, and physical environment).[1] Linn County was ranked in the middle of the 35 Oregon counties that received a ranking (16th for health outcomes and 17th for health factors) while Lincoln County ranked 27th for health outcomes and 33rd for health factors. These summary rankings highlight the variability within the LBL region as well as the potential opportunities to improve community health.

After a thorough review of available secondary data sources and gathering input from community members via a variety of primary data collection activities, the following key themes emerged:

Key Health Themes from the 2022 - 2026 Regional Health Assessment (in alphabetical order)

Access to Affordable Housing & Homelessness: high prevalence of homelessness and financial burden due to housing costs.

Access to Quality Care: inadequate access to primary care physicians, behavioral health providers, and dentists.

Equity, Diversity & Inclusion: minoritized racial and ethnic groups and people living with disabilities (and likely other vulnerable populations not adequately identified in available data) experience more challenges than able-bodied White individuals.

Food Insecurity & Access: high rates of food insecurity and limited access to grocery stores.

Healthy Youth & Families: teen pregnancy, prenatal tobacco use, child abuse, and high number of children in foster care.

Mental Health: high rates of depression and suicide; high rates of feeling sad or hopeless among high school students.

Substance Use and Misuse: drug overdoses; teen use of e-cigarettes, alcohol, and prescription drugs.

1 Introduction

The 2022 - 2026 Linn, Benton, and Lincoln County Regional Health Assessment (RHA) is the result of many dedicated hours of research and collaboration between the Partnership for Community Health and agencies, leaders, and local residents across all three counties. A community health assessment provides comprehensive information about a community's health status, needs, and issues. The Partnership for Community Health recognizes that health is influenced by a wide range of conditions and factors. As such, the RHA presents information on numerous indicators, ranging from those commonly understood to impact health status, such as access to health care, to those whose link is less widely understood, such as education levels. This is an effort to recognize that health starts long before illness occurs and is impacted by where and how we live, learn, work, play, and pray.

This report is focused on describing the health trends, environmental conditions, and disparities affecting residents in recent years. Assessing health status and risk factors is a key foundation for informing plans for community health improvement, aligning priorities among regional stakeholders, and indicating health status trends.

Goals

Linn, Benton, and Lincoln counties are distinct areas with attractions that set them apart from one another and the state of Oregon as a whole. Despite these differences, the three counties also have many identifiers that make a regional approach to conducting a community health assessment valuable and reasonable. A regional approach allows for the identification of wider health trends that may promote or inhibit the health of those living in each of the three counties. Additionally, this regional approach allows all three counties to pool resources and to strengthen relationships, which can be leveraged for future activities. Due to the three counties' proximity, there are numerous organizations whose work extends beyond the confines of county lines to serve the LBL region in sectors including health care, social services, and more. It is also not uncommon for residents of one of the three counties making up the LBL region to frequent another for work, resources, or recreation.

This report is intended to:

- Describe the current health status and disparities affecting residents in LBL region;
- Identify areas of strength and weakness in terms of health status and access to resources; and
- Summarize available data to support collaborative alignment and decision-making among health stakeholders.

Development Process

The process of drafting the regional health assessment was guided by the Partnership for Community Health, a steering committee composed of stakeholder organizations. These organizations include the health departments of Linn, Benton, and Lincoln counties, Confederated Tribes of Siletz Indians, InterCommunity Health Network Coordinated Care Organization (IHN-CCO), Samaritan Health Services, and United Way of Linn, Benton & Lincoln Counties. See the Acknowledgments section of this report for a detailed list of participants. The Partnership for Community Health met monthly starting in September

2021 to plan and implement the regional health assessment. Additionally, two workgroups were established to coordinate specific efforts: the data workgroup and the engagement workgroup. The data group met biweekly from November 2021 through June 2022, with additional ad hoc meetings as needed after June. The data workgroup focused on identifying secondary data sources and creating relevant tables/figures to include in the chapters below. The engagement workgroup met biweekly from November 2021 through December 2022. The engagement workgroup focused on soliciting community input about community health through the community health survey, key informant interviews, and focus groups (see Chapter 10: Community Voices).

Methodology

Population-Level Data Sources

Most of the data presented in this report comes from publicly available secondary sources. An annotated list of the major data sources used throughout this report is available in Appendix 2. Data are reported separately by county where available.

We started by generating a list of health-related topics based on prior community health assessments, with additional topics identified as relevant (e.g., COVID-19). We looked for data sources available at the county level and excluded data collected prior to 2019.

In all tables and figures, nominal response categories are presented in alphabetical order. All tables and figures include a caption identifying the data source, the time period captured in the data, and a link to a relevant website.

We present age-adjusted numbers where possible to minimize the differences between counties due to different age distributions of the population. As shown in

Figure 2-3 and Figure 2-4, Benton County's population skews younger due to the large number of college students at Oregon State University while Lincoln County tends to be older due to retirees settling on the coast. Not all data sources had age-adjusted numbers available; for example, Chapter 6: Morbidity and Mortality includes the rates of leading causes of death using crude mortality rates (Table 6-2). As expected, the differences between counties are much larger using crude mortality rates than using age-adjusted mortality rates (for example, in Figure 6-6).

Community Voices

We gathered primary data from community members through a community health survey, focus groups, and key informant interviews.

Community Health Survey

The Community Survey was drafted to solicit input from anyone who lives, works, goes to school or spends time in Linn, Benton or Lincoln counties. The survey asked respondents to review a list of 30 different health-related topics, and assign each topic a rating corresponding to the degree of attention that issue should receive: 'least attention,' 'some attention', 'most attention,' or 'don't know.' The

Limitations

While the Regional Health Assessment identifies many critical issues pertaining to health in the region, it will never be fully comprehensive. This report should not be considered a formal study or research document investigating the causes of each issue raised or providing a detailed analysis of the data. In many cases, data are not available at the regional or county level, nor are all data stratified by race/ethnicity, income, education level, zip code, etc. Data that describe the many factors that contribute to health are not always readily available. In addition, conclusions, hypotheses, and interpretations of the interactions between the many factors that contribute to health may not be included, in part because the underlying structures of these interactions are still not fully understood.

Recognizing and highlighting the need for more detailed local data was a key objective of this assessment. As mentioned above (and throughout the document) data for Linn, Benton, and Lincoln counties were often not available for specific demographics, such as age, income, education-level, race/ethnicity, preferred language, or zip code. This greatly limited the ability to explore differences or disparities within specific sub-populations or geographies. When race/ethnicity data are gathered, analysis may be further limited due to a lack of data stratification by more specific racial categories, such as United States-born versus foreign-born for the Latino population, or the many ethnicities and cultures represented in the category of Asian Pacific Islander. There are limited data on populations that experience inequities and disparities in the region however, as highlighted in later chapters, and their needs and barriers to health and health care are likely to be greater than those of the population at large.

Throughout the document, national or Oregon state-wide data are provided to illustrate trends, especially among vulnerable populations, when county level or regional data are not available. It is important to note, however, that national or state-wide rates, trends, and patterns may not necessarily reflect the reality of specific communities, counties, or regional rates and trends. As regional partners continue to gather information to inform their practices and services, it is important to collect demographic data (i.e., zip codes, level of education, etc.) so that more accurate information can be used to inform future health improvement planning and other public health initiatives.

2 Who We Are

Benton, Lincoln, and Linn counties span approximately 3,946 square miles and are currently home to approximately 268,700 residents.[2]

For thousands of years, the land comprising the three counties was home to a variety of Native American tribes.[3] In the 1840s, European settlers began to move west and displace the tribes. In 1855, the United States established a 1.3-million-acre reservation in what is now Lincoln County. Lincoln County remains the home of the Confederated Tribes of Siletz Indians.[4]

Today, the Linn, Benton, and Lincoln (LBL) region is a mixture of urban and rural areas and encompass diverse populations that vary widely in health and social needs.

No mention of landfill

Benton County is home to Oregon State University (OSU). OSU is the largest public university in Oregon and currently enrolls approximately 24,000 undergraduate and 5,000 graduate students.[5] Benton County has a variety of recreational assets and outdoor spaces, including several trail systems to improve the health and recreation benefits for community members. In addition, Benton County is considered a regional health care hub and is home to agriculture and growing technology industries.

Lincoln County is located along the Central Oregon Coast and, in many ways, it benefits from its proximity to the Pacific Ocean. As a coastal community, Lincoln County's economy and attractions are vastly different than that of both Linn and Benton counties. Lincoln County contains the cities of Newport and Lincoln City, which are major tourism destinations, especially during the summer months when tourists flock to the county's miles of public beaches. Newport is one of two major fishing ports in Oregon and the county has a rich fishing history. Industries including accommodation and food services, retail, and health care and social assistance are drivers of the local economy.[6]

Linn County is the largest and most populous of the three counties and is located in the heart of the Willamette Valley. Linn County is a significant agricultural producer and is one of the main distributers of grass seed in the world. Linn County has additional industries in manufacturing and forestry and a growing health sector. Linn County has a plethora of outdoor recreation opportunities for community members to enjoy.

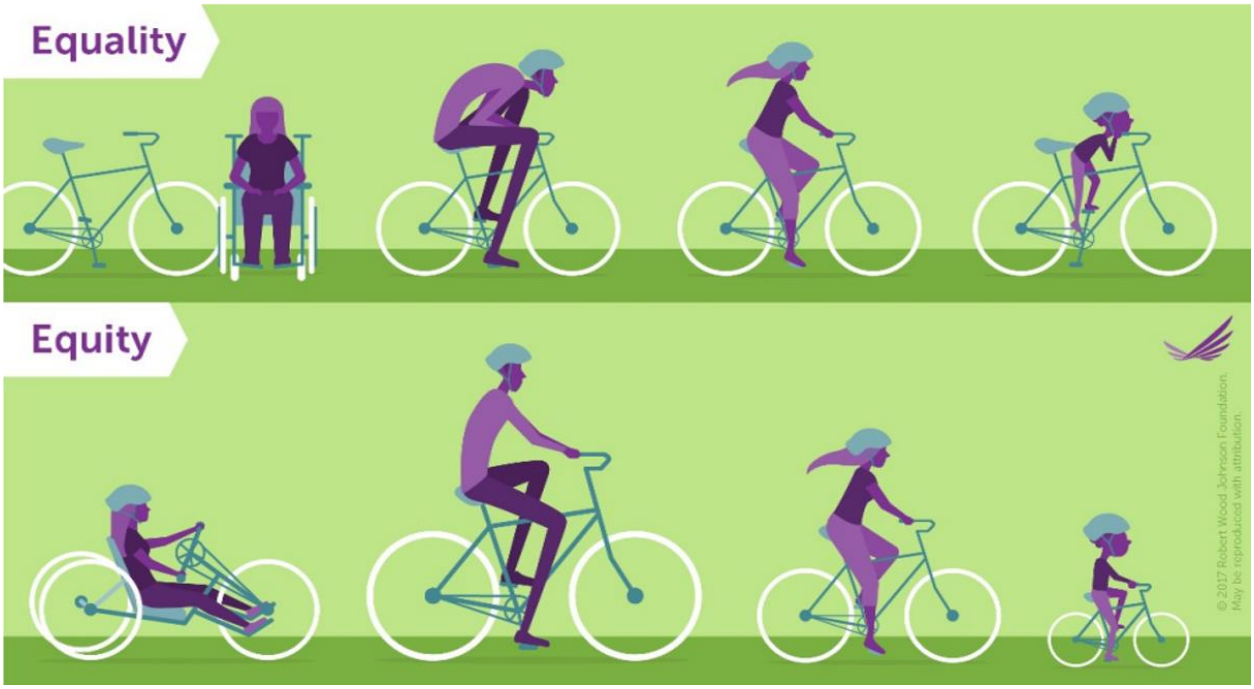
Health Equity

In discussing the health of our region, it is important to recognize that specific subpopulations may experience worse health outcomes than the general population. This chapter describes many of the sub-populations that will appear later in a health equity context. To understand the impact of these inequities, it is helpful to understand the variety of demographic characteristics represented in the LBL

region. This chapter includes information about geographic distribution, age, disability status, race and ethnicity, veteran status, and other categories.

Figure 2-1 defines equity by comparing it to equality. The top image shows equality, which is when everyone is given the same resources regardless of need. In this image, everyone has the same bike, but only the third person can ride the bike comfortably. The bottom image shows equity, in which we recognize that each person has different circumstances and needs. In this image, everyone is given the bike they need to ride comfortably. The goal of Partnership for Community Health is to promote equity across the region, recognizing that not everyone has the same opportunity to achieve health.

Figure 2-1: Visualizing health equity

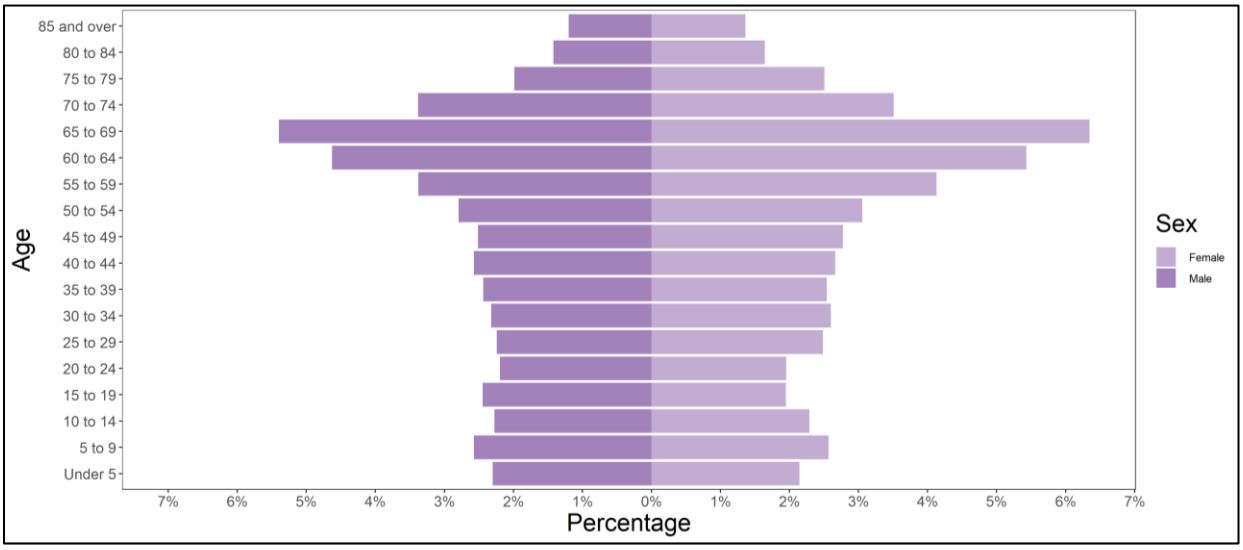


Source: Robert Wood Johnson Foundation
For more information: https://www.rwjf.org/en/insights/our-research/infographics/visualizing-health-equity.html

Population Size

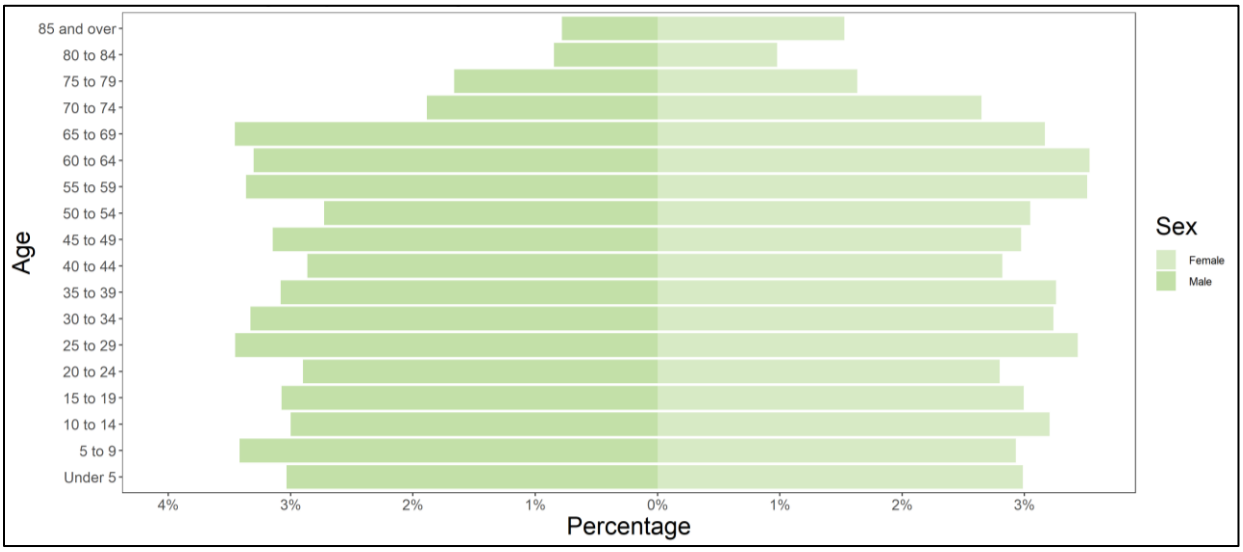
The LBL region is home to approximately 268,700 individuals. Linn County has the largest population with 127,216 individuals, followed by Benton County at 92,168 and Lincoln County at 49,336 individuals.[7] Within Benton County, the largest percentage of population is age 20 to 24, presumably from the large student population who attend Oregon State University. Lincoln County's largest percentage of population falls within the older age group of 60 to 69. Within Linn County, the percentage of population is spread out rather evenly between all age groups. The LBL region on average is racially/ethnically less diverse than the state of Oregon.

Figure 2-4: Population pyramid for Lincoln County



Data source: United States Census Bureau, America Community Survey, Table B01001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 2-5: Population pyramid for Linn County



Data source: United States Census Bureau, America Community Survey, Table B01001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-1: Population size by age group

Age Category	Benton	Lincoln	Linn	Oregon
Under 5	4.0%	4.4%	6.0%	5.5%
5-9	4.1%	5.1%	6.3%	5.8%
10-14	5.1%	4.6%	6.1%	6.0%
15-19	9.8%	4.4%	6.1%	5.9%
20-24	16.1%	4.1%	5.7%	6.4%
25-29	7.5%	4.7%	6.9%	7.1%
30-34	5.7%	4.9%	6.6%	7.1%
35-39	5.6%	5.0%	6.3%	6.9%
40-44	4.7%	5.2%	5.7%	6.5%
45-49	4.8%	5.3%	6.1%	6.3%
50-54	4.8%	5.8%	5.8%	6.0%
55-59	5.8%	7.5%	6.9%	6.3%
60-64	5.9%	10.1%	6.8%	6.7%
65-69	5.9%	11.7%	6.6%	6.2%
70-74	3.9%	6.9%	4.5%	4.5%
75-79	2.6%	4.5%	3.3%	2.9%
80-84	1.8%	3.1%	1.8%	1.9%
85+	1.8%	2.6%	2.3%	2.1%

Data source: United States Census Bureau, America Community Survey, Table S0101
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-2: Percent of population by race

Race	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	0.7%	2.5%	0.9%	1.1%
Asian	7.4%	1.1%	1.1%	4.5%
Black or African American	1.1%	0.3%	0.5%	1.9%
Native Hawaiian or Pacific Islander	0.2%	0.2%	0.1%	0.4%
Some Other Race	2.2%	3.0%	3.1%	3.4%
Two or More Races	4.9%	5.8%	5.4%	6.2%
White	83.4%	87.1%	88.8%	82.6%

Data source: United States Census Bureau, America Community Survey, Table B02001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-3: Percent of population by ethnicity

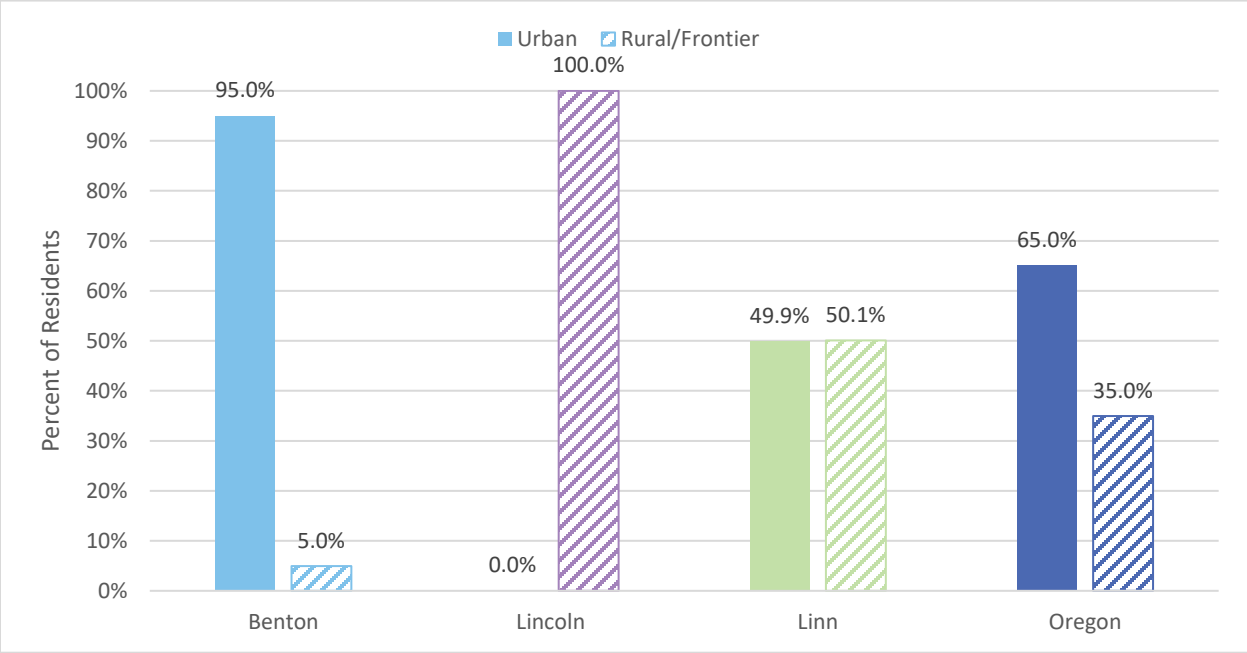
Ethnicity	Benton	Lincoln	Linn	Oregon
Hispanic or Latino	7.6%	9.4%	9.4%	13.2%
Not Hispanic or Latino	92.4%	90.6%	90.6%	86.8%

Data source: United States Census Bureau, America Community Survey, Table B03001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Rural & Urban Areas

The Oregon Office of Rural Health sets designations for urban, rural, and frontier Oregon areas. Rural is defined as any geographic area in Oregon ten or more miles from the middle of a population center of 40,000 people of more. Frontier is defined as any county with six or fewer people per square mile.8 65% of Oregon's population live in urban areas, 33% live in rural areas, and 2% live in frontier areas. Figure 2-5 shows the distribution of urban and rural areas by county. All cities/towns in Lincoln County are defined as rural whereas both Benton and Linn counties have urban and rural designations (no areas in Benton, Lincoln, or Linn counties are classified as frontier areas).

Figure 2-6: Percent of population residing in urban and rural/frontier areas



Data source: Oregon Office of Rural Health and Annual Population Report Tables, Portland State University Population Research Center
Time period: 2020
For more information: https://www.ohsu.edu/oregon-office-of-rural-health/about-rural-and-frontier-data

Table 2-4: Population size for cities with more than 5,000 residents in the region

Name	County	Population
Corvallis	Benton	57,601
Albany (excluding North Albany)	Linn	47,877
Lebanon	Linn	19,122
Newport	Lincoln	10,591
Lincoln City	Lincoln	10,067
Sweet Home	Linn	9,893
Albany (North Albany only)	Benton	9,322
Philomath	Benton	5,682

Data source: Annual Population Report Tables, Portland State University Population Research Center
Time period: 2021
For more information: https://www.pdx.edu/population-research/population-estimate-reports

Language, Disability, and Demographic Characteristics

Understanding the region's language, disability, and demographic characteristics offers the potential for advancements in health equity and improvements in health outcomes for diverse populations. Linn and Lincoln counties have a higher percentage of veterans when compared to Benton County and Oregon. Benton County has a larger foreign-born population than do both Linn and Lincoln counties, possibly due to Oregon State University (OSU), which attracts many international students. Both Linn and Lincoln counties have a greater percentage of residents ages five and older with a disability when compared to Benton County and Oregon. Additionally, the type of disability most seen varies significantly from one county to another.

Table 2-5: Percentage of specific demographic characteristics by location

	Benton	Lincoln	Linn	Oregon
Foreign born	9.9%	4.8%	4.2%	9.8%
Veterans	6.3%	12.9%	10.2%	8.3%

Data source: United States Census Bureau, America Community Survey (foreign born: Table DP02; veteran status: Table S2101)
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-6: Percentage of languages spoken at home by location

	Benton	Lincoln	Linn	Oregon
English only	86.3%	92.7%	91.8%	84.7%
Spanish	5.0%	5.6%	6.4%	8.9%
Other Indo-European languages	2.3%	0.9%	1.0%	2.6%
Asian and Pacific Islander languages	5.6%	0.6%	0.7%	3.2%
Other languages	0.9%	0.1%	0.1%	0.7%

Data source: United States Census Bureau, America Community Survey, Table S1601
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-7: Percent of population per age group with disability by location

Age	Benton	Lincoln	Linn	Oregon
Under 5 years	0.4%	0.0%	0.0%	0.7%
5 to 17 years	4.8%	7.9%	7.0%	6.2%
18 to 34 years	7.6%	12.9%	11.3%	8.4%
35 to 64 years	10.5%	22.2%	17.1%	13.6%
65 to 74 years	18.4%	30.1%	31.1%	26.0%
75 years and over	42.9%	51.4%	51.7%	49.6%

Data source: United States Census Bureau, America Community Survey, Table S1810
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-8: Percent of population with disability by disability type and location

Disability Type	Benton	Lincoln	Linn	Oregon
Hearing difficulty	3.9%	6.4%	6.0%	4.6%
Vision difficulty	1.7%	4.4%	2.8%	2.4%
Cognitive difficulty	5.1%	8.2%	7.5%	6.2%
Ambulatory difficulty	4.4%	12.4%	9.2%	7.0%
Self-care difficulty	1.9%	3.9%	23.8%	2.7%
Independent living difficulty	4.5%	8.5%	7.0%	6.1%

Data source: United States Census Bureau, America Community Survey, Table S1810
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Students

There are four institutions of higher learning in the LBL region: Oregon State University (OSU), Linn-Benton Community College (LBCC), Western University of Health Sciences Oregon (WesternU Oregon), and Oregon Coast Community College (OCCC).

Oregon State University (OSU) is located in Corvallis and draws people from all 50 states and more than 100 countries.[9] In fall 2022, OSU had a record-high enrollment of 35,239 students.[10] Linn-Benton Community College (LBCC) is based out of Albany, with additional campuses in Corvallis, Lebanon, and Sweet Home. LBCC had 6,451 students enrolled in fall 2022. Most of these students were enrolled in

classes held in Linn County, where LBCC's main campus is located. Considering dual enrollment with OSU and LBCC student populations, these figures may be subject to a small portion of double counting. Western University of Health Sciences Oregon (WesternU Oregon) has a campus in the Linn County city of Lebanon. WesternU Oregon offers a Doctor of Osteopathic Medicine program (through the College of Osteopathic Medicine of the Pacific – Northwest [COMP-NW]), Doctor of Physical Therapy program, and in 2023, the college will welcome its first occupational therapy students. WesternU enrollment for 2023 is projected to be 108 Doctor of Osteopathic Medicine students, 60 Doctor of Physical Therapy students, and 45 occupational therapy students. Oregon Coast Community College (OCCC) has locations in Lincoln City, Newport, and Waldport, all of which are in Lincoln County. During the fall 2022 term, OCCC had an enrollment of 933 students, the majority of which were enrolled in non-credit training and personal enrichment courses.

Education level is a strong predictor of health and will be explored further in Chapter 4: Social Determinants of Health. Benton County has a disproportionate number of students enrolled in college/graduate school when compared with Lincoln and Linn counties (Table 2-9).

Table 2-9: Number of enrolled students by education level and location

Education Level	Benton	Lincoln	Linn	Oregon
Students enrolled in early education	1,027	414	1,111	55,409
Students enrolled in K-12	11,162	6,111	19,954	627,934
Students enrolled in college/graduate school	21,248	1,737	5,574	264,831

Data source: United States Census Bureau, America Community Survey, Table S1401
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 2-10: Percent of students enrolled in K-12 by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	0.7%	4.5%	1.1%	1.2%
Asian	3.6%	0.7%	0.9%	4.0%
Black or African American	1.1%	0.5%	0.9%	2.3%
Hispanic or Latino	16.2%	23.9%	16.0%	25.0%
Multi-racial	8.2%	9.1%	7.2%	7.1%
Native Hawaiian or Pacific Islander	0.4%	0.2%	0.3%	0.8%
White	69.7%	61.0%	73.5%	59.7%

Data source: Oregon Department of Education, Fall Membership Report
Time period: 2021-2022
For more information: https://www.oregon.gov/ode/reports-and-data/students/Pages/Student-Enrollment-Reports.aspx

Table 2-11: Number of students enrolled in college (undergraduate) by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	101	6	35	2,107
Asian	2,052	15	134	17,401
Black or African American	332	0	28	6,154
Hispanic or Latino	1,455	154	592	33,014
Multi-racial	1,159	72	378	17,948
Native Hawaiian or Pacific Islander	101	0	18	1,178
White	13,449	1,006	3,654	160,427

Note: includes community college students
Data source: United States Census Bureau, America Community Survey, Table B14007A-B14007E, B14007G, B14007I
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

3 Environmental Health

The environments in which we live, work, learn, play and pray impact our health and well-being. The air we breathe, the water we drink, and the neighborhoods we live in can all promote or diminish health. Climate change impacts all of these and can also have direct impacts on health through impacts on mental health.

Climate impacts on our mental health include increased anxiety and depression, post-traumatic stress disorder, substance abuse for coping, and strains on social relationships. Climate anxiety, also called eco-anxiety, is an overwhelming sense of fear, sadness and dread in the face of a warming planet. Elderly and children, those with preexisting mental illness, mobility impaired, indigenous, Black and Latinx people, migrants and refugees, and those with close ties to the land are at higher risk.[11]

The full impact of climate change on the region is complex and interconnected. The effects of climate change in Western Oregon are expected to include heat waves, more precipitation in the winter and less in the summer, decreased snowpacks and increased drought, and increased frequency and intensity of both wildfires and floods. Historical and contemporary inequities will place the greatest burden of these changes on racially diverse and low-income communities. For a full accounting of the scientific consensus on climate change in Oregon, see the Oregon Climate Assessment published January 5, 2021.

Air

Landfill related

Poor air quality can exacerbate chronic conditions like asthma and can increase the likelihood of acute cardiac events like heart attacks. Individuals who are unable to remain indoors where air can be filtered have greater exposure to air pollution. These populations include farmworkers, road workers, individuals experiencing homelessness, and people who live in housing with inadequate air conditioning and may need to keep windows open during the hottest months of the year.

Fortunately, air quality is usually good or moderate in the LBL region, except during wildfire season (Table 3-1). Air quality is most often measured by the concentration of microscopic particles called particulate matter (PM) in the air. The major source of particulate matter in Oregon is from wildfire smoke, with a smaller portion coming from transportation and wood fireplaces. Particles less than 2.5 microns (PM2.5) in diameter can penetrate lungs and cause or exacerbate health problems. Wildfire smoke from other counties and states impact our local air quality. With climate change, wildfire season is becoming longer, and the risk of larger wildfires is increasing.

Oregon's Air Quality Index reports how clean the air is and provides information on potential health risks. It is based on three pollutants regulated by the federal Clean Air Act: ground-level ozone, particle pollution and nitrogen dioxide. The highest of the AQI values for the individual pollutants becomes the AQI value for that day. These are usually particulate pollution in our area.

Other sources of air pollution are industrial facilities which release air toxics. Please see Hazardous Waste section below for more information.

Table 3-1: Air quality status by year and location

Location	Air Quality	2018	2019	2020	2021
Benton: Corvallis	Good	340	332	330	363
	Moderate	23	33	25	2
	Unhealthy for Sensitive Groups	2	0	0	0
	Unhealthy	0	0	3	0
	Very unhealthy	0	0	5	0
	Hazardous	0	0	3	0
Linn: Sweet Home	Good	299	297	320	360
	Moderate	65	68	36	5
	Unhealthy for Sensitive Groups	1	0	1	0
	Unhealthy	0	0	1	0
	Very unhealthy	0	0	2	0
	Hazardous	0	0	6	0

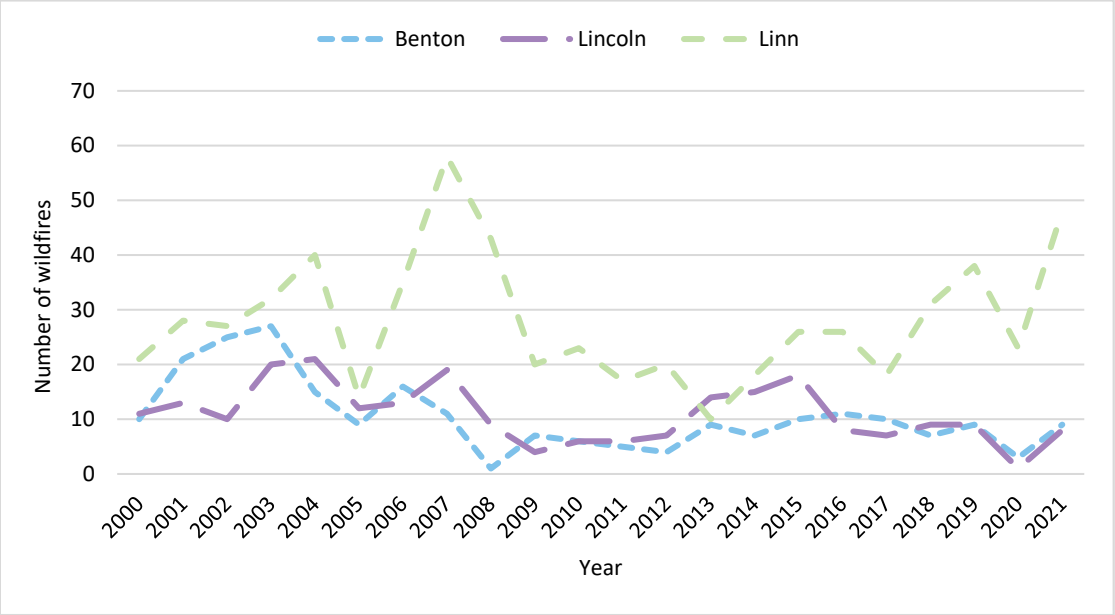
Note: Future updates will include new Lincoln County Toledo site data. 2020 was a leap year with 366 days.
Data source: Oregon Department of Environmental Quality air quality monitors
Time period: 2018-2021
For more information: https://www.oregon.gov/deq/aq/Pages/aqi.aspx, https://www.oregon.gov/deq/aq/Documents/2020AQMonitoringReport.pdf

Wildfires

Wildfires affect health in many ways other than air quality. People living near wildlands can be displaced by wildfires, lose their homes or other property, and experience mental and emotional distress. In the summer, winds often blow north to south along the Oregon Coast (Oregon Coastal Atlas), so we included Washington wildfire acres along with Oregon's below.

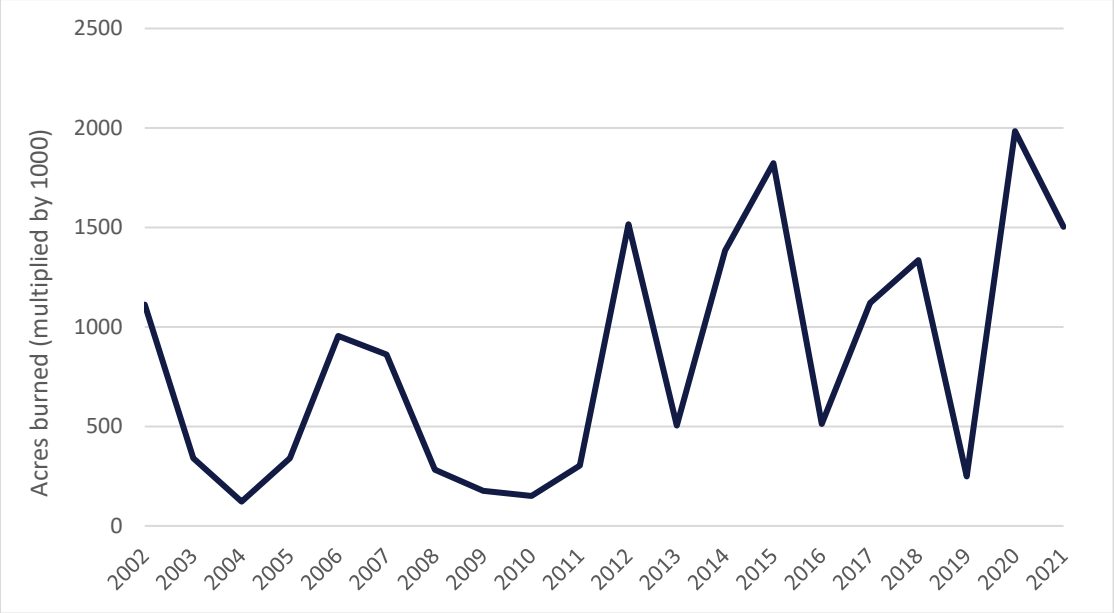
Fortunately, wildfires do not often kill many people in Oregon, but nine people died across the state of Oregon during the record-setting 2020 wildfire season. The 2020 Echo Mountain fire in Lincoln County displaced 532 families; 49 individuals were still being sheltered as of May 2022, and an additional 162 families continue to receive Disaster Case Management services.[12]

Figure 3-1: Number of wildfires by year and location



Data source: Oregon Department of Forestry
Time period: 2000-2021
For more information: https://oregon-department-of-forestry-geo.hub.arcgis.com/datasets/geo::odf-fire-2/about

Table 3-2: Total acres burned in thousands over time in Oregon and Washington



Data source: National Interagency Fire Center
Time period: 2002-2021
For more information: https://www.nifc.gov/fire-information/statistics

Heat

Extreme heat makes many populations, such as those with chronic disease, young children, older adults, and outdoor workers, vulnerable to heat-related illnesses such as heat stroke, fainting, heat exhaustion, and heat cramps. Wildfire smoke, air pollution, and pollen can make respiratory conditions such as asthma worse.[13]

Periods of extreme heat can exacerbate health conditions and cause deaths. The heat wave in June 2020 caused at least 96 deaths across the state of Oregon.[14] Climate change is increasing the likelihood and intensity of heat waves across the region, although the natural variability from year to year can obscure the trend over shorter time intervals.

Table 3-3: Number of high heat and extreme heat days by year and location of monitoring sites

Location	Heat Level	2017	2018	2019	2020	2021
Benton County (Hyslop Field Station)	High heat	57	47	29	43	58
	Extreme heat	12	10	3	8	11
Lincoln County (Otis)	High heat	11	2	5	4	4
	Extreme heat	4	0	0	0	0
Linn County (Marion Forks)	High heat	57	43	24	37	57
	Extreme heat	7	4	1	4	13

Note: high heat = daily maximum temperature above 84 degrees F; extreme heat = daily maximum temperature above 94 degrees F
Data source: National Oceanic and Atmospheric Administration
Time period: 2017-2021
For more information: https://www.climate.gov/maps-data/all

Marion Forks is located along Highway 22 in the eastern Linn County Cascade foothills. Hyslop Field Station is located along Highway 20 between Corvallis and Albany. Otis is located along Highway 18 in northwestern Lincoln County. Together, these three stations provide good coverage of the three different environments of the region (Cascades, Valley, and Coastal).

Water

Landfill related topic

Water quality and quantity are interdependent. Oregon is currently in the worst megadrought on record. Although there have been individual years of wet conditions over the past two decades, on average conditions have been drier than any other 22-year period in the past thousand years. Drought conditions impact water supplies, streamflow, agriculture productivity, wildfire danger, and ecosystem health.[15] For past, current and future drought conditions, please visit https://www.drought.gov/states/oregon.

Water quality is another factor that impacts health. Water quality varies greatly across geography, and even from source to source. The larger community drinking water systems in the three counties test regularly for many contaminants. Average water contaminant levels usually test below the EPA standards for the four listed contaminants in the three counties (Table 3-4). However, contaminant levels can vary widely, and there are no surveillance systems that monitor individual water sources such as private wells.

Arsenic is a known carcinogen, and there is no safe level of arsenic in drinking water. The EPA has set a standard of 10 µg/L in drinking water, but has a goal of 0 µg/L.

Nitrates can occur naturally in groundwater, but human sources such as fertilizer are the major source of high concentrations of nitrates. Nitrates can interfere with the blood's ability to carry oxygen, which can be a major risk for bottle-fed babies under six months old. The EPA standard for nitrates is 10 mg/L.

Haloacetic acids (HAA) and Trihalomethanes (TTHM) occur when chlorine used to disinfect water interacts with other naturally occurring chemicals in the water. There is some evidence that HAA5 (the 5 major compounds) and TTHMs can increase the risk of certain cancers or other diseases. The EPA regulatory standard is 60 µg/L in drinking water for HAA5 and 80 µg/L for TTHM.[16]

Table 3-4: Contaminants levels above federal standards in community public water systems, by contaminant and location

Contaminant & Regulatory Standard	Year	Benton	Lincoln	Linn
Arsenic (10 µg/L)	2020	0	0	0
	2019	0	0	0
	2018	0	0	0
Nitrate (10 mg/L)	2020	0	0	0
	2019	0	0	0
	2018	0	0	0
HAA5 (60 µg/L)	2020	0	0	0
	2019	0	0	0
	2018	0	0	0
TTHMs (80 µg/L)	2020	1	0	0
	2019	1	2	0
	2018	0	0	0

Note: Systems don't test every year.
Data source: Oregon Environmental Public Health Tracking
Time period: 2018-2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/CommunityWaterSystem_16680312416720/MapVisualization

Water fluoridation is a low cost and effective way of improving the oral health of populations. It protects every user of the water system against cavities, making it an important tool in improving health equity. Only 22% of Oregonians drink fluoridated water, compared to more than 50% of the total United States population. This is well below the Healthy People 2020 goal of 80%.

Table 3-5: Cities with fluoridated community public water systems by county

County	Cities
Benton	Adair Village, Corvallis, North Albany, and Philomath
Lincoln	No fluoridated public water systems in Lincoln County
Linn	Albany, Lebanon, and Sweet Home

Data source: Centers for Disease Control and Prevention (CDC)
Time period: website referenced January 2023
For more information: https://nccd.cdc.gov/DOH_MWF/Default/Default.aspx

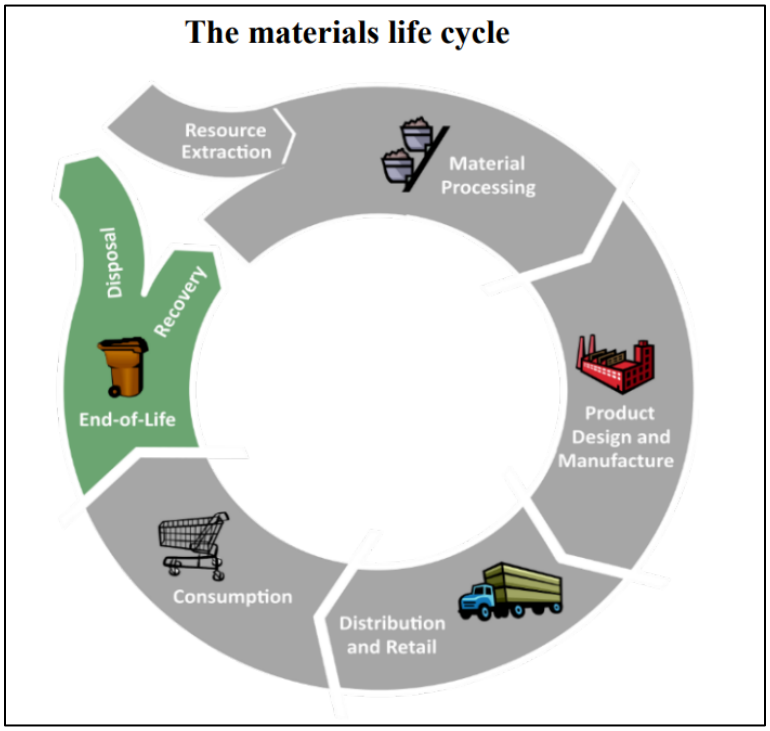
Solid Waste

Solid waste collection, recovery, disposal, and landfills are regulated to help protect our environment and public health. Reducing and recovering waste is important because each step in a product's life cycle takes raw materials, time, and energy (see the materials life cycle in Figure 3-2 below).

In Oregon we recover about 40% of the waste we generate, mostly through local recycling and composting efforts. Local manufacturers, governments and haulers are redesigning processes and systems. By 2024 we should see major headlines on improvements, thanks to Oregon's Recycling Modernization Act.[17]

Reducing food waste and plastic waste are two priorities due to their environmental impacts. Food production generates greenhouse gases, as does disposal in landfills. Plastic products break down in the environment into microplastics. These microplastics can end up in our food, water, air and lungs.[18] We can each do our part to reduce waste and pollution by buying less stuff, especially hazardous/toxic products. We can buy local products, look for packaging that is locally recyclable, and properly recycle and dispose of waste.

Figure 3-2: The materials life cycle



Source: Oregon Department of Environmental Quality
For more information: https://www.oregon.gov/deq/FilterDocs/2017mrwgrates.pdf

Hazardous Waste

Household and other hazardous wastes are collected and handled separately to protect environmental and public health. Household hazardous wastes include pesticides, herbicides, poisons, solvents, fuels, paints, motor oil, antifreeze, and mercury-containing wastes.

The Toxics Release Inventory (TRI)[19] includes certain toxic chemicals that may pose a threat to human health and the environment. Certain industrial facilities must report annually how much of each chemical is recycled, combusted for energy recovery, treated for destruction, and disposed of or otherwise released on- and off-site. In 2020, there were 287 of these facilities in Oregon including the following in the LBL region:

- One facility in Lincoln County that released on-site methanol, hydrogen sulfide, ammonia, nitrate compounds, acetaldehyde, and other chemicals.
- Four facilities in Benton County that released on-site barium compounds and zinc compounds.
- Seventeen facilities in Linn County that released on-site methanol, ammonia, nitrate compounds, manganese compounds, hydrochloric acid, acetaldehyde, and other chemicals.

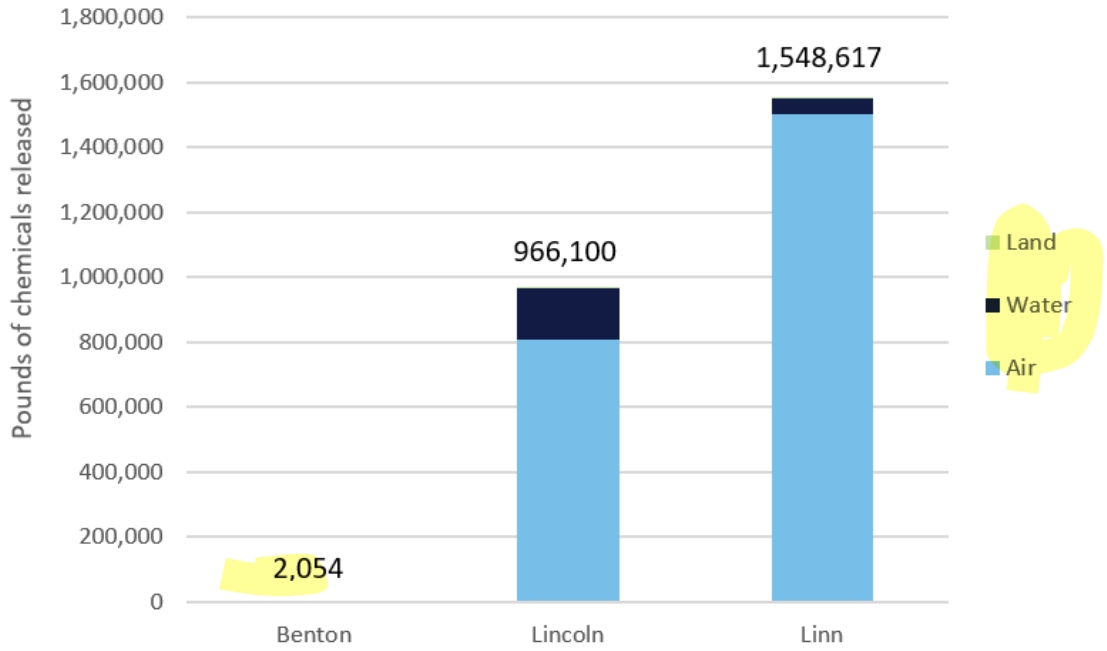
Likely not CB

Most of the facilities' on-site releases in Linn and Lincoln counties were to the air, consistent with Oregon. Benton County facilities released about 2,100 pounds on-site in 2020. This doesn't show up on the chart below because it's so much smaller than the approximately 966,000 pounds released on-site

by the facility in Lincoln County, and over 1.5 million pounds released on-site by facilities in Linn County, in 2020.

The Environmental Protection Agency and Oregon Department of Environmental Quality work with facilities on reducing waste and safer waste management by recycling, recovering energy from, and treating chemicals.[20, 21]

Figure 3-3: Pounds of chemicals released from industrial facilities in toxic release inventory



Data source: United States Environmental Protection Agency Toxic Release Inventory
Time period: 2020
For more information:
https://enviro.epa.gov/triexplorer/tri_factsheet.factsheet_forstate?pstate=OR&pyear=2020&pParent=TRI&pDataSet=TRIQ1

Neighborhood Environments

People need safe and healthy places to live, learn, work, play, and pray.[22] They need access to quality and affordable food, housing and transportation options, as well as the confidence that their local communities have not been contaminated with human-made pollutants.[23]

Populations including minoritized racial and ethnic groups, people experiencing poverty, people with disabilities, and people who experience language barriers are more likely to depend on public transit. However, they are more likely to live in areas with poor transit service, unsafe transportation conditions, fewer destinations, and poor connectivity. These burdens increase transportation costs and stress, and limit access to economic and educational opportunities, housing, healthy foods, and physical activity.

Transportation

Active transportation such as walking and biking increase physical activity, which has positive effects on overall health. Public transportation also involves active travel when walking or biking to and from stops or stations. 17.5% of Benton County's workforce used active transportation to and from work whereas 5.4% and 2.8% of Lincoln and Linn counties' workforce used active transportation respectively. There is a strong correlation between access to public transportation and using active transportation (which includes public transportation, cycling, and walking) to commute to work. Among Oregon counties with public transit systems, an increase of five percent of the population within one quarter mile of a bus station is associated with a one percent increase in the percent of the working population that commutes by active transportation.[24] This trend is reflected in regional statistics as well.

In comparison to Lincoln and Linn counties, Benton County community members have greater access to public transportation. This is due to the population concentration in Corvallis, which has the fareless Corvallis Transit System (CST). This provides a safe and reliable bus service to Corvallis community members. Benton County Dial-a-Bus provides transportation for seniors over 60 years of age and persons with disabilities who are unable to use public transit. Benton Area Transit provides the free 99 Express commuter bus services between Adair Village and Corvallis Monday through Friday.

Lincoln County's public transportation includes Lincoln City and Newport City Loops; north, south and east connecting routes; and Dial-a-Ride service.[25, 26] Linn County's public transportation includes Albany transit, which operates three fixed routes within the city of Albany; Linn-Benton Loop, which connects Albany and Corvallis; and Linn Shuttle, which provides public transportation service to East Linn County residents. There are additional transportation services available in Linn County by request or prior reservation.

The Coast to Valley Express is a regional bus service provided through a partnership between Benton Area Transit and Lincoln County Transit. This service provides four roundtrips everyday between Albany, Corvallis, and Newport.

Cascades West RideLine provides transportation services for eligible Oregon Health Plan (OHP) or Medicaid clients traveling to and from covered non-emergency medical services. Transportation is provided to those OHP eligible clients living in Linn, Benton, and Lincoln counties who have no other way to get to their medical Services.

Table 3-6: Percent of workforce 16 years and older by means of transportation to work and location

Transportation Type	Benton	Lincoln	Linn
Carpooled	7.4%	11.7%	10.2%
Drove alone	64.5%	73.0%	79.7%
Public transportation (excluding taxicab)	2.2%	0.6%	0.1%
Walked	7.9%	4.4%	1.9%
Biked	7.4%	0.4%	0.6%
Worked from home	9.4%	8.8%	6.2%

Data source: National Environmental Public Health Tracking Network
Time period: 2016-2020
For more information: https://ephtracking.cdc.gov/

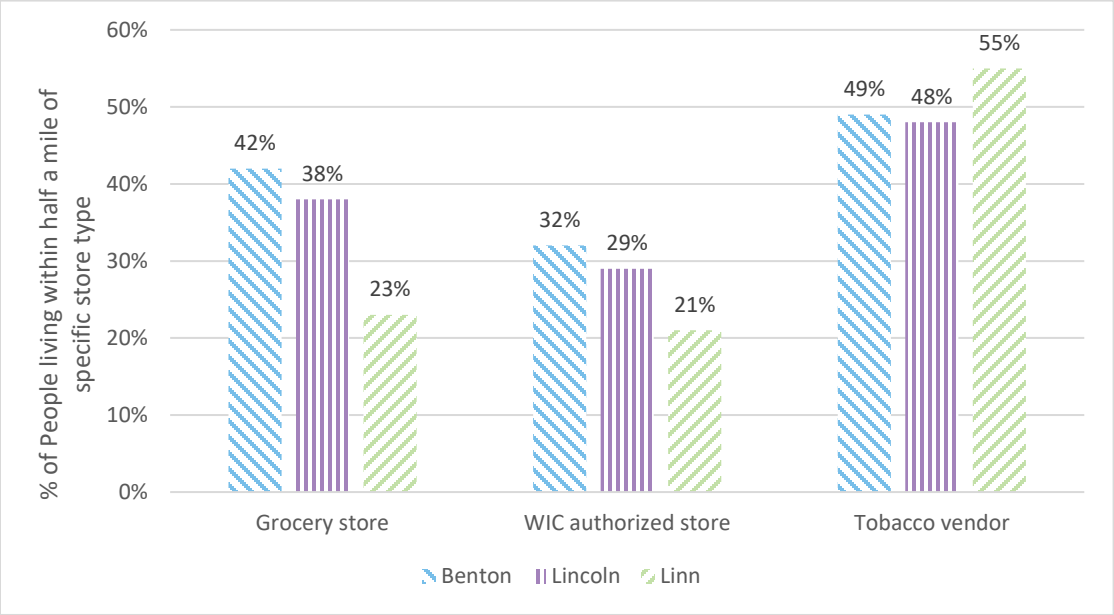
Food Access

Transportation options and limited public transportation for residents contributes to challenges in the region with regard to nutritious food access. For households without private vehicles, the ability to shop for food at grocery stores is highly dependent on proximity.

In all three counties, people are more likely to live within a half mile of a tobacco vendor than of a grocery store (Figure 3-4). Benton County community members have the greatest access to grocery stores as measured by proximity. This is due in part to the concentration of Benton County's population in one city (Corvallis), which has many grocery stores. In comparison, Linn and Lincoln counties' populations are more spread out among smaller communities, not all of which have full grocery stores with access to affordable and nutritious food.

All three counties belonging to the LBL region have farmers markets, which provide access to locally grown, nutritious foods. Benton County farmers markets include locations in Corvallis, Philomath, and North Albany. Lincoln County farmers markets include locations in Lincoln City, Newport, Toledo, Waldport, Yachats, and Siletz. Linn County has farmers markets in Albany, Lebanon, Brownsville, and Sweet Home. While these markets provide increased access to fresh and nutritious food, most only operate a single day a week during the spring and summer months. The outdoor Corvallis Market is open two days per week and operates an indoor market during the winter months.

Figure 3-4: Percent of people who live within half a mile of specific store types by location



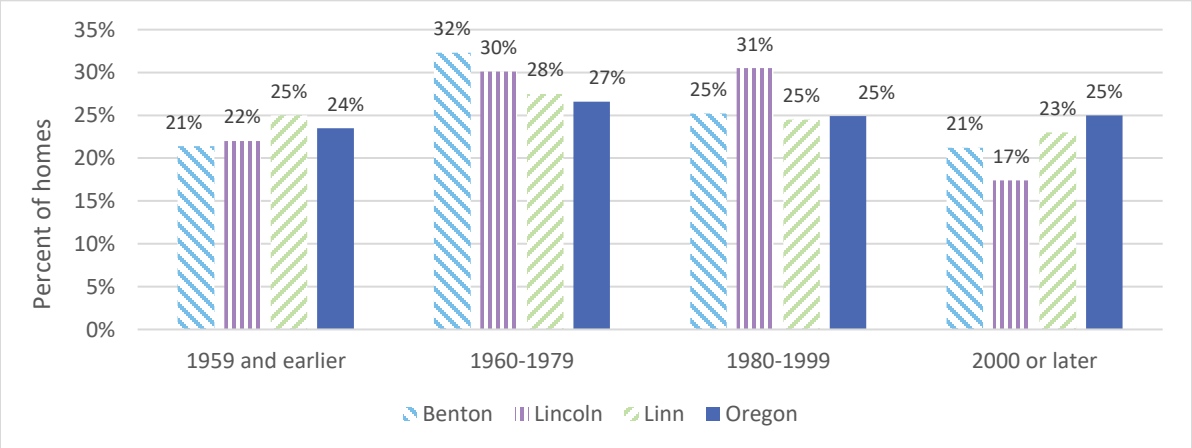
Data source: Oregon Public Health Assessment Tool
Time period: 2019
For more information: Contact Benton County Health Department

Housing

The age of a house can predict many other factors that affect the health of the occupants, including exposure to lead, asbestos, or other hazardous materials, mold or pest infestations, and weather resistance and temperature stability.

For additional housing data, see Chapter 4: Social Determinants of Health.

Figure 3-5: Percent of homes built by year and location



Data source: United States Census Bureau, America Community Survey, Table B25034
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Parks and Recreation

Research demonstrates a strong relationship between access to green outdoor spaces and physical activity and mental health and wellbeing among adults and children. Studies have shown that proximity to places with recreational opportunities is associated with higher physical activity and lower obesity levels.[27] Public recreation areas include parks, schools, public forests and trails, beaches, and waterfronts.

Publicly owned land is land managed by either federal, state, or local governments and is protected for natural resources, open spaces, and recreational areas. In 2019, 39.7% of Linn County's land was publicly held, 29.2% of Lincoln County's land was publicly held, and 26.4% of Benton County's land was publicly held.[28]

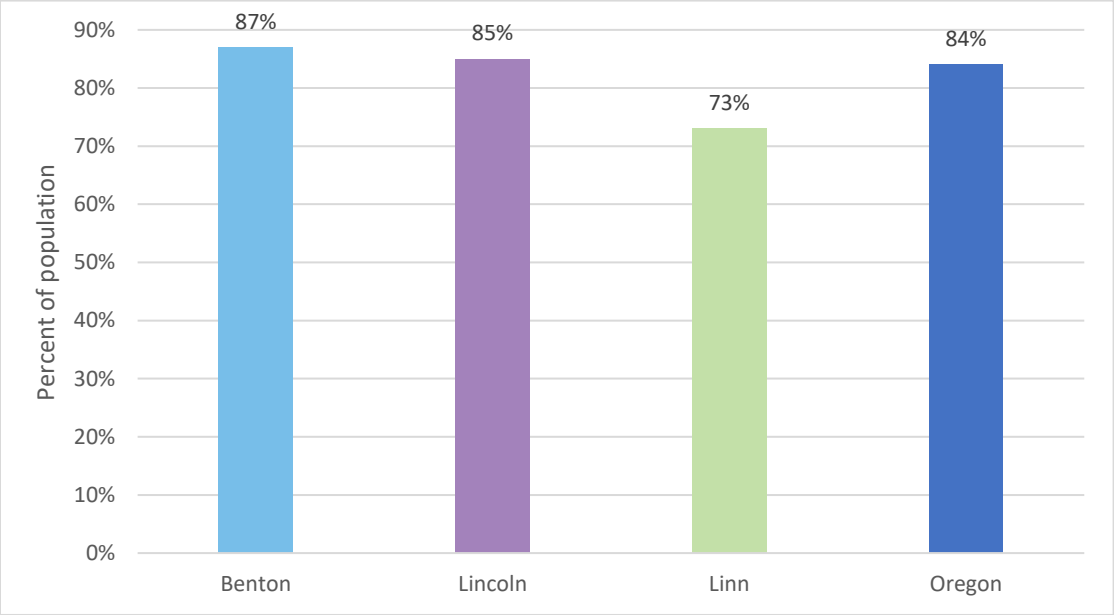
Both Benton and Lincoln counties have greater access to exercise opportunities than does the state of Oregon (Figure 3-6). Access to exercise opportunities is measured as census blocks where the border is a half mile or less from a park or 1 mile or less from a recreational facility in urban census blocks and 3 miles or less in rural census blocks.

Benton County has a plethora of outdoor recreational opportunities available county residents and visitors. The City of Corvallis Parks and Recreation Department manages 2,000 acres of parks, playgrounds, playing fields, trails, open spaces and beautification areas. Overall, there are 20 miles of trails in city natural areas and parks. The department has set a standard of 0.54 miles of trail per 100,000 people; it currently has 0.36 miles per 100,000 people, a deficit of 10 miles of trail. Benton County Natural Areas, Parks & Events (NAPE) works with private landowners, City of Corvallis Parks and Recreation, City of Philomath, Siuslaw National Forest, Oregon State University (OSU) Research Forests, Greenbelt Landtrust, Crestmont Landtrust, and others to offer a trail system that provides health and recreation benefits to the community. NAPE also manages over 1,400 acres of natural areas, open spaces, and parks, including forests, wetlands, boat landings, historic sites, and a campground.

Lincoln County has many public beaches and parks that provide free and low-cost places for the county's residents and many tourists to gather, hike, camp, fish, and more. The Lincoln County Parks department maintains 13 parks, which include campgrounds and waysides. Lincoln County's three recreation centers help advance community health and wellbeing through safe and accessible services, programs, and facilities for children, seniors, and families. Lincoln County benefits from the status of Oregon beaches, which are considered public parks and are open to all.

Linn County is home to 30 parks dotted throughout the heart of the Willamette Valley. Activities in these parks include camping, hiking, swimming, fishing and more. The non-profit organization Build Lebanon Trails is expanding trail access within the county, with the goal of building more than 50 miles of trail systems in the town of Lebanon.

Figure 3-6: Percent of population with access to exercise opportunities* by location



**Access to exercise opportunities is measured as census blocks where the border is a half mile or less from a park or 1 mile or less from a recreational facility in urban census blocks and 3 miles or less in rural census blocks.*

Data source: County Health Rankings

Time period: 2022

For more information: https://www.countyhealthrankings.org/explore-health-rankings/county-health-rankings-model/health-factors/health-behaviors/diet-and-exercise/access-to-exercise-opportunities

4 Social Determinants of Health

Social determinants of health (SDOH) are the non-medical factors found in an individual's environment that predict health outcomes and influence health inequities. The World Health Organization defines the social determinants of health as the "conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life."[29] When conducting and implementing public health work, it is essential that programs and policies prioritize improving the root causes of poor health. Without properly addressing these upstream factors, interventions will be unsuccessful at improving population health outcomes and reducing inequities. Chapter 2: Who We Are and Chapter 3: Environmental Health already introduced information on neighborhood and built environment as well as social and community context. In this chapter, additional data will be presented for three domains of social determinants of health: economic stability, education access and quality, and neighborhood and built environment in the context of Benton, Linn, and Lincoln counties. The other two domains, health care access and social and community context, will be addressed in other chapters.

Figure 4-1: Centers for Disease Control and Prevention (CDC) graphic on social determinants of health

For more information: https://www.cdc.gov/publichealthgateway/sdoh/index.html

Economic Stability

Financial stability impacts multiple facets of an individual's health and behaviors. Access to a high steady income allows people to purchase healthy foods and services, live in safe neighborhoods with better schools, and have greater access to healthcare resources. The overall median household income for Oregon between 2016-2020 was $65,667; the median household income for Benton, Lincoln, and Linn counties during the same time period was $65,142, $50,775, and $59,547 respectively.[30]

Despite Benton County having a high median household income, the income inequality ratio for the county was the largest in the state of Oregon in years 2016-2020. The larger the income inequality ratio, the more unevenly income is distributed within a population. This is associated with loss of social connectedness, and decreases in trust and sense of community, which can have broad health impacts including increased risk of mortality.[31] The ratio of income at the 80th percentile to income at the 20th percentile in Benton County was 5.5, compared to 4.5 for the state of Oregon overall. This means that households with higher incomes had incomes 5.5 times that of households with lower incomes. Benton County's high income inequality is partly driven by both high-salary positions among major employers (Oregon State University, Samaritan Health Services, Hewlett Packard) as well as the large number of students with relatively low incomes. From 2016-2020, over half of 18-24 year old's in Benton County were living in poverty (Table 4-2).

In Oregon, residents identifying as White were less likely to live in poverty. With a few exceptions, this trend is seen in the LBL region as well (Table 4-3). Disability status is also associated with poverty. Approximately 20% of those living with a disability in Linn, Benton, and Lincoln counties were living in poverty in 2016-2020 (Figure 4-2). This is consistent with the state of Oregon as a whole.

Table 4-1: Income inequality by location

Income Variable	Benton	Lincoln	Linn	Oregon
80th percentile of total income range	$132,226	$92,921	$104,041	$126,927
20th percentile of total income range	$23,937	$21,890	$26,925	$28,050
Income inequality ratio	5.5	4.2	3.9	4.5

Data source: County Health Rankings
Time period: 2016-2020
For more information: https://www.countyhealthrankings.org/explore-health-rankings

Table 4-2: Percent of age categories living in poverty by location

Age Category	Benton	Lincoln	Linn	Oregon
Under 5 years	14.5%	31.2%	15.5%	16.5%
5 to 11 years	13.6%	23.2%	15.5%	15.2%
12 to 17 years	16.3%	22.1%	11.4%	13.6%
18 to 24 years	51.6%	18.4%	20.1%	24.1%
25 to 34 years	20.3%	17.2%	14.0%	13.2%
35 to 44 years	11.2%	17.2%	11.4%	10.1%
45 to 54 years	7.3%	17.0%	10.6%	9.3%
55 to 64 years	7.4%	17.8%	11.6%	11.0%
65 to 74 years	4.7%	7.2%	7.3%	7.8%
75 years and over	5.9%	7.0%	7.7%	8.5%

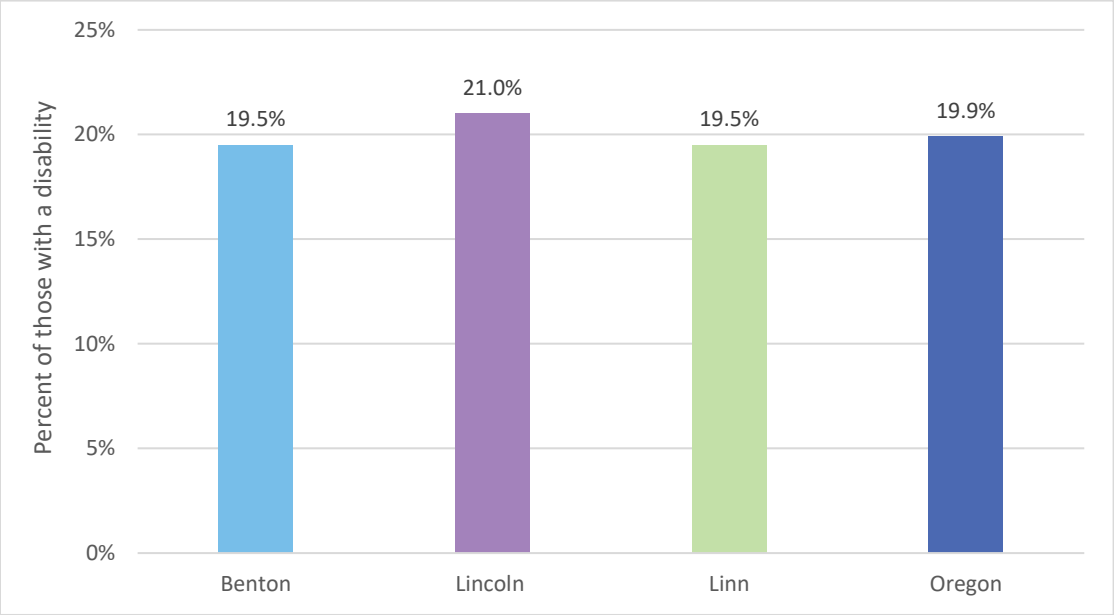
Data source: United States Census Bureau, America Community Survey, Table B17001
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 4-3: Percent of racial/ethnic groups below poverty level by location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	19.9%	26.7%	12.6%	22.1%
Asian	41.2%	40.6%	13.1%	13.1%
Black or African American	44.9%	26.6%	2.2%	27.4%
Hispanic or Latino	22.6%	19.0%	15.4%	17.8%
Native Hawaiian or Pacific Islander	16.0%	5.6%	10.3%	17.1%
Some other race	30.8%	5.4%	18.0%	16.5%
Two or more races	19.1%	20.9%	14.6%	15.3%
White	15.9%	15.1%	11.9%	11.5%

Data source: United States Census Bureau, America Community Survey, Table S1701
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-2: Percent of those with a disability living in poverty by location



Data source: United States Census Bureau, America Community Survey, Table C18130
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 4-4: Median household income by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	$49,167	*	$42,236	$48,225
Asian	$41,667	$50,337	$90,787	$83,125
Black or African American	*	$23,125	$58,462	$44,138
Hispanic or Latino	$54,375	$58,695	$45,281	$54,797
Native Hawaiian or Pacific Islander	$155,714	*	*	$69,547
Some other race	$36,974	$61,640	$45,058	$55,422
Two or more races	$73,684	$40,540	$58,679	$57,283
White	$67,298	$50,213	$59,841	$66,480

**Unreliable due to small numbers*
Data source: United States Census Bureau, America Community Survey, Table B19013A – B19013I
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Education

The LBL region has a diverse distribution of academic resources that result in differences in the educational profiles of the three counties. Benton County, home to Oregon State University (OSU), has a unique social and population demographic as the city of Corvallis is centered about the university. OSU is one of three land, sea, space, and sun grant universities in the United States and offers nearly 200 degree programs. The residents of Benton County are highly educated, with a high proportion of the population having received at least a bachelor's degree (Table 4-5). Both Linn and Lincoln counties have community colleges, however the populations are much less centralized around an academic institution. Oregon Coast Community College, located in Lincoln County, offers associate degree and certificate programs in aquarium science, nursing and allied health, accounting, and welding. Lincoln County is also home to Oregon State University's Hatfield Marine Science Center, a world-class marine laboratory located in Newport. Linn County is home to Linn-Benton Community College's (LBCC) main campus and the campus for Western University of Health Sciences Oregon (WesternU Oregon). LBCC is one of the largest community colleges in Oregon and offers seven meta majors. WesternU Oregon offers three graduate programs in the medical field. The majority of Linn and Lincoln County residents have at attended at least some college or received an associate degree (Table 4-5).

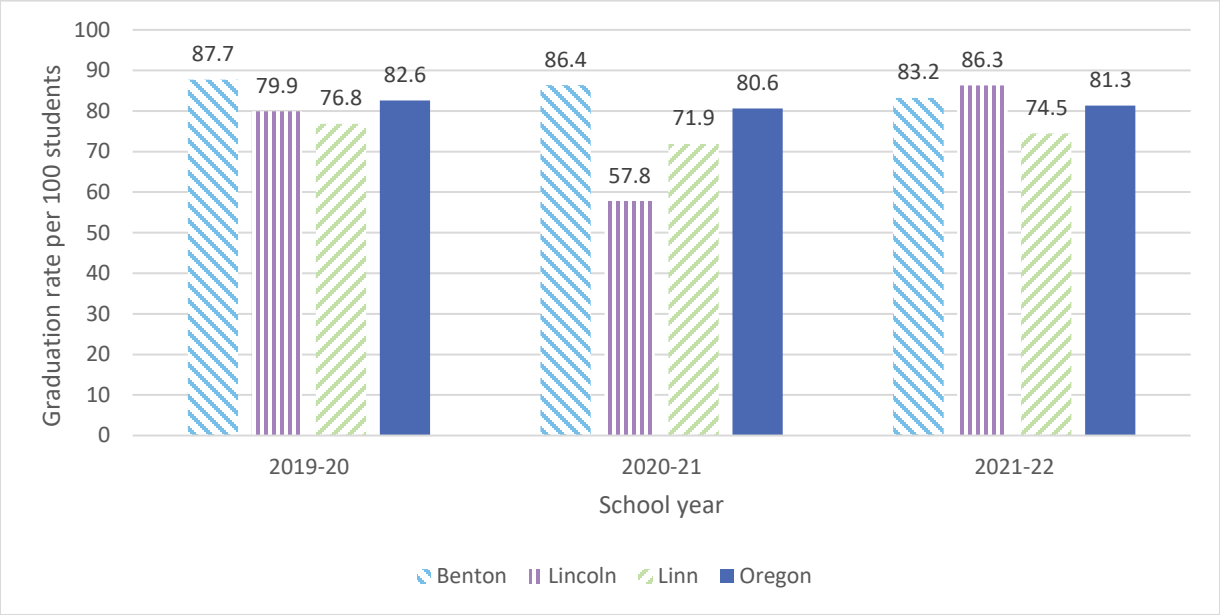
On average for years 2019-2022, Linn and Lincoln counties had similar high school graduation rates. Lincoln County's high school graduation rate during the 2020/2021 school year fell far below the Oregon state average, but by the following school year, its graduation rate exceeded that of Oregon. Benton County had a consistently high graduation rate, exceeding the state average for all three school years shown in Figure 4-3.

Table 4-5: Highest educational level achieved among adults age 25 years and over by location

Educational Level	Benton	Lincoln	Linn	Oregon
Less than high school	3.8%	7.7%	10.1%	8.9%
High school graduate	13.7%	24.9%	29.2%	22.7%
Some college or associate degree	29.2%	39.6%	41.1%	34.1%
Bachelor's degree	29.2%	17.2%	12.9%	21.3%
Graduate or professional degree	24.0%	10.5%	6.6%	13.1%

Data source: United States Census Bureau, America Community Survey, Table S1501
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-3: High School graduation rate per 100 students by school year and location



Data source: Oregon Department of Education, Cohort Graduation Rate
Time period: school year 2020-2021
For more information: https://www.oregon.gov/ode/reports-and-data/students/Pages/Cohort-Graduation-Rate.aspx

Table 4-6: Percent of high school students that graduate on time by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	*	80%	65.8%	68.9%
Asian	>95%	*	83.3%	92.1%
Black or African American	*	*	63.2%	73.7%
Hispanic or Latino	81.0%	82.6%	76.5%	78.7%
Native Hawaiian or Pacific Islander	*	*	*	74.6%
Multi-Racial	86.8%	92.7%	71.2%	79.7%
White	82.9%	87.9%	74.6%	82.5%

**Unreliable due to small numbers*
Data source: Oregon Department of Education, Cohort Graduation Rate
Time period: 2021-2022
For more information: https://www.oregon.gov/ode/reports-and-data/students/Pages/Cohort-Graduation-Rate.aspx

Food Insecurity

Access to healthy affordable food is an important predictor of health status. As the environmental effects of climate change become more severe in the future, public health practitioners are increasingly worried about production, higher prices, and obstacles in the global distribution of food. In the United States there are two primary federally funded health and nutrition programs. The Women, Infants, and Children Program (WIC) is a supplemental nutritional program that provides healthy foods to pregnant, breastfeeding gestational parents, infants, and children to promote optimal childhood development.[32] The Supplemental Nutrition Assistant Program (SNAP) provides access to healthy food for low-income families.[33] Linn and Lincoln counties had higher utilization of SNAP and WIC benefits compared to Benton County in 2020. Only about 10% of households in Benton County received SNAP benefits compared to 20.6% of households in Lincoln County and 18.6% of households in Linn County. Families with children under the age of 18 and/or with a disabled family member commonly utilize SNAP benefits across the LBL region (Table 4-9).

Food insecurity is a lack of consistent access to enough food for every person in a household to live an active, healthy life.[34] Estimates of food insecurity in the three counties making up the LBL region have remained fairly consistent from years 2018-2020. Based on these estimates, Lincoln County experienced the greatest food insecurity in the LBL region, followed by Linn County. All three counties have access to emergency food support thanks to community-based organizations operating in the LBL region.

Table 4-7: Use of WIC benefits by location

WIC Variables	Benton	Lincoln	Linn	Oregon
WIC participants	1,541	1,493	4,160	110,890
Families served by WIC	875	856	2,241	64,450
Percent of all pregnant women served by WIC	24%	41%	30%	27%

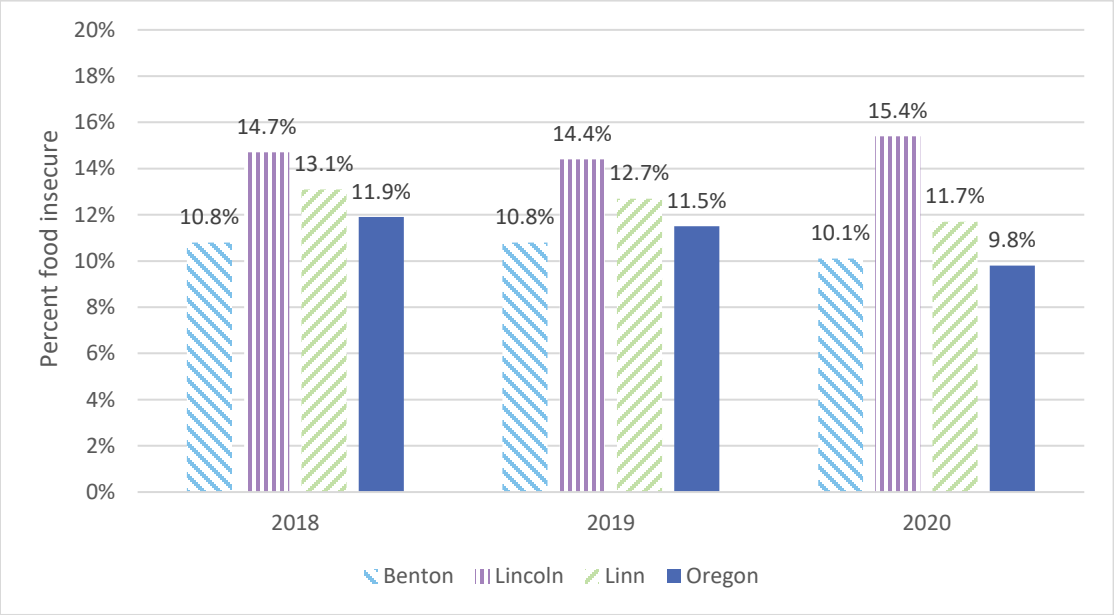
Data source: Oregon Health Authority, WIC Data Sheets
Time period: 2021
For more information: https://www.oregon.gov/oha/PH/HEALTHYPEOPLEFAMILIES/WIC/Pages/annual.aspx

Table 4-8: Use of SNAP benefits by location

SNAP Variables	Benton	Lincoln	Linn	Oregon
Percent of all households that use SNAP benefits	10.1%	20.6%	18.6%	15.0%
Percent of households with children under the age of 18 that use SNAP benefits	37.5%	29.5%	43.7%	40.8%
Percent of households with one or more people with a disability that use SNAP benefits	48.9%	58.5%	53.0%	49.9%

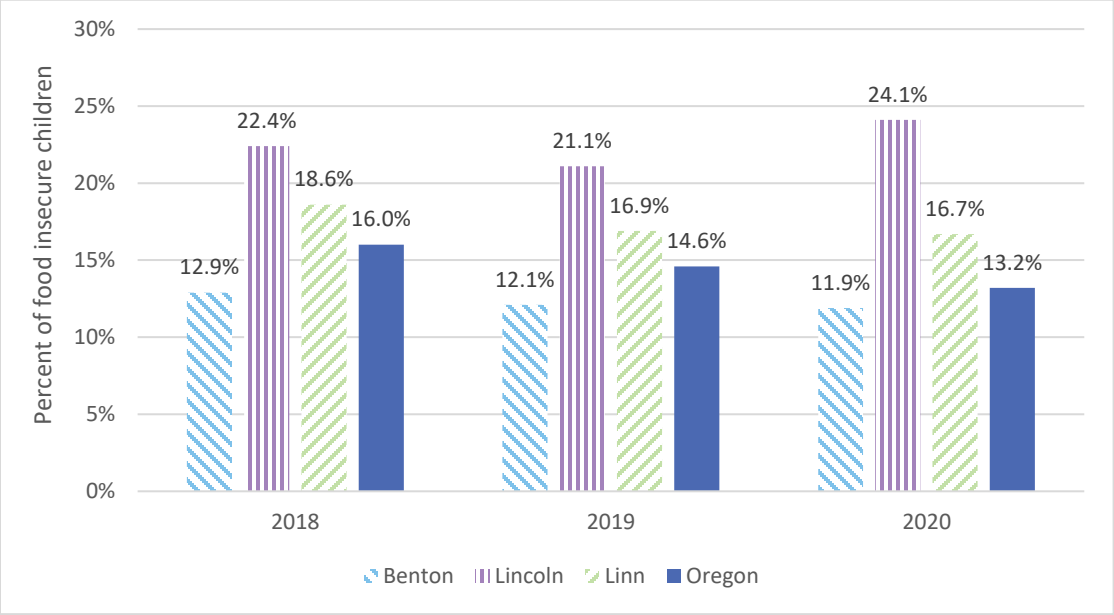
Data Source: United States Census Bureau, America Community Survey, Table S2201
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Figure 4-4: Estimated percent of population experiencing food insecurity by year and location



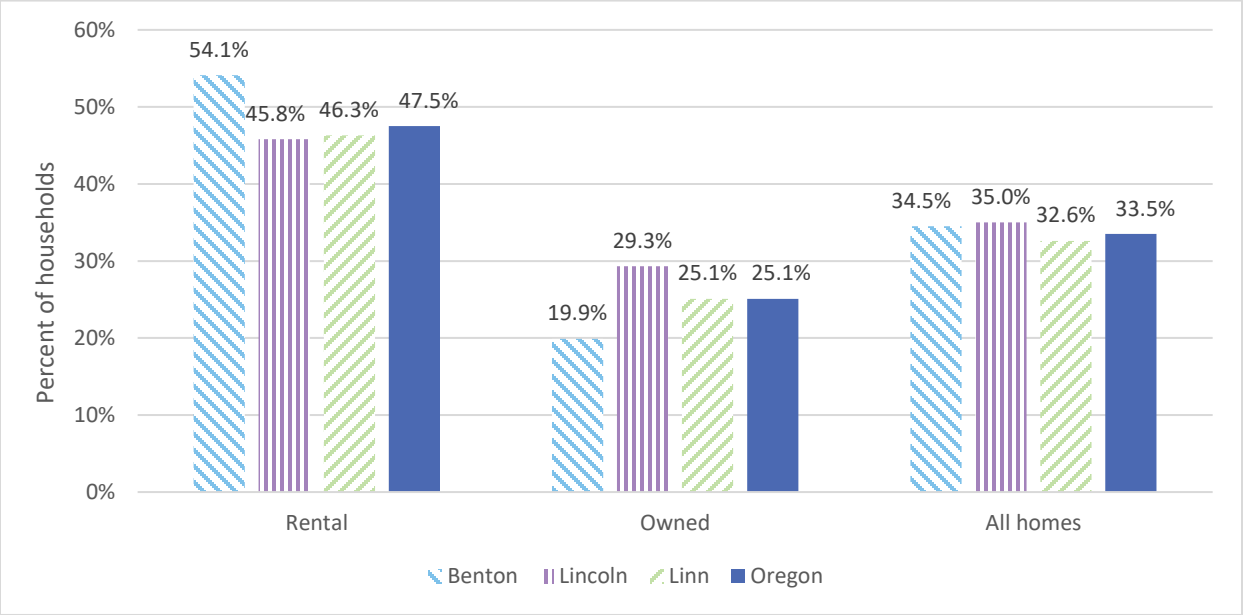
Data source: Feeding America, Map the Meal Gap
Time period: 2018-2020
For more information: https://map.feedingamerica.org/

Figure 4-5: Estimated percent of children under age 18 experiencing food insecurity by year and location



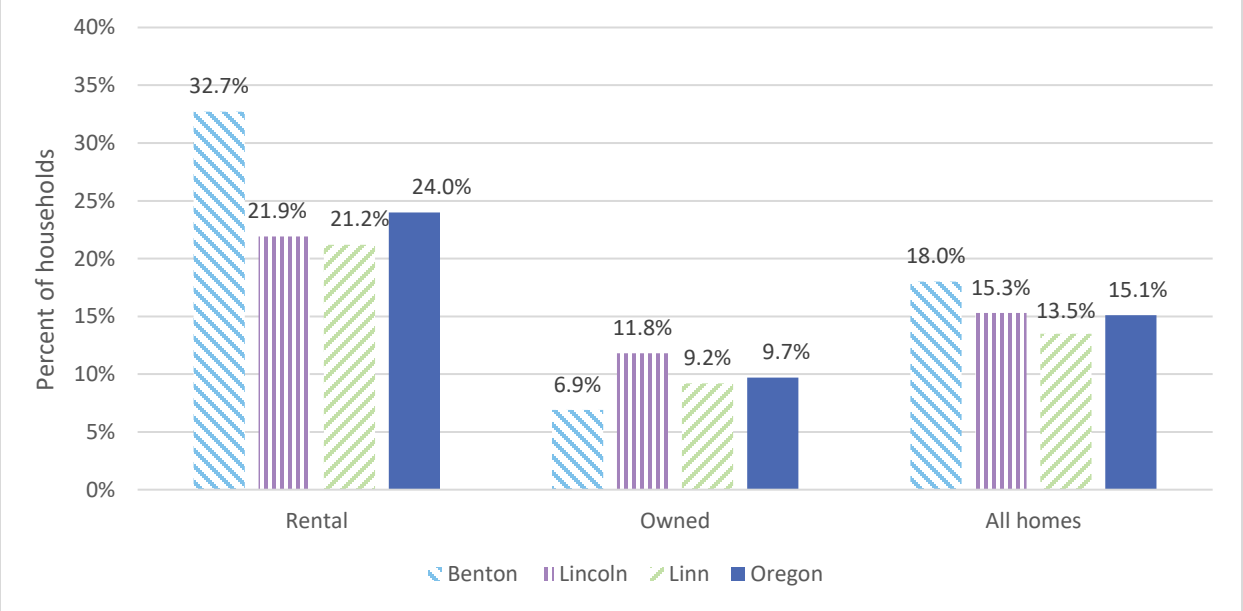
Data source: Feeding America, Map the Meal Gap
Time period: 2018-2020
For more information: https://map.feedingamerica.org/

Figure 4-6: Percent of households experiencing housing burden by ownership status and location



Note: Housing burden is defined as paying more than 30% of household income on rent, mortgage, and utilities.
Data Source: United States Census Bureau, America Community Survey, Tables B2507s & B25091
Time period: 2020
For more information: https://data.census.gov/cedsci/

Figure 4-7: Percent of households experiencing extreme housing burden by ownership status and location



Note: Extreme housing burden is defined as paying more than 50% of household income on rent, mortgage, and utilities.
Data source: United States Census Bureau, America Community Survey, Table B25070, B25091
Time period: 2020
For more information: https://data.census.gov/cedsci/

Table 4-10: Demographics of the populations experiencing chronic homelessness by location

Demographic	Benton	Lincoln	Linn	Oregon
Percent of unhoused persons experiencing chronic homelessness	31%	35%	42%	31%
Percent of Veterans who experience chronic homelessness	65%	67%	52%	43%

Note: Chronic homelessness is used to describe people who have experienced homelessness for at least a year — or repeatedly — while struggling with a disabling condition such as a serious mental illness, substance use disorder, or physical disability.

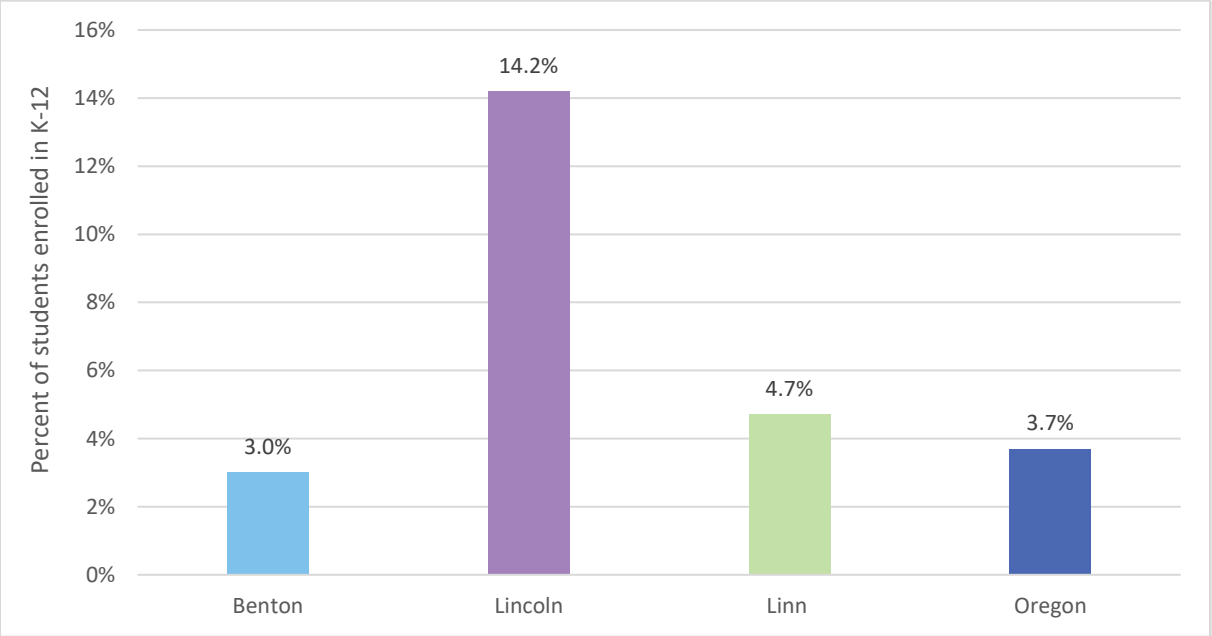
Data source: Point-in-Time Homeless Count

Time period: 2019

For more information:

https://public.tableau.com/app/profile/oregon.housing.and.community.services/viz/2019Point-in-TimeDashboard/Story1

Figure 4-8: Percent of students enrolled in K-12 experiencing homelessness



Data source: Oregon Department of Education, K-12 District Totals and Percent of Enrollment

Time period: 2019-2020

For more information: https://www.oregon.gov/ode/schools-and-districts/grants/esea/mckinney-vento/pages/default.aspx

Table 4-11: Percent of the homeless population by race and location

Race	Benton	Lincoln	Linn	Oregon
Asian	1%	0%	0%	4%
Black / African American	3%	1%	3%	2%
Native American	4%	7%	2%	1%
Native Hawaiian / Pacific Islander	1%	0%	1%	0.4%
Two or more races	7%	7%	6%	5%
White	83%	85%	85%	85%

Data source: Point-in-Time Homeless Count
Time period: 2019
For more information:
https://public.tableau.com/app/profile/oregon.housing.and.community.services/viz/2019Point-in-TimeDashboard/Story1

5 Access to Health Services

Being able to access high-quality health care when needed is important for everyone. However, access to affordable quality healthcare remains a systemic issue across the country. Gaps in care access have been attributed to costs, rurality, provider shortages, and a lack of trust in the medical community.

In the LBL region, Samaritan Health Services is the largest provider of healthcare services. Samaritan operates five hospitals (two acute care hospitals, in Corvallis and Albany, and three critical access hospitals, in Lebanon, Lincoln City, and Newport) and 80 outpatient clinics spread throughout Benton, Lincoln and Linn counties. The Community Health Centers of Benton & Linn Counties operate four Federally Qualified Health Centers (Alsea, Corvallis, Lebanon, and Sweet Home) and two school-based health clinics (Corvallis and Monroe) throughout the region. The Lincoln Community Health Center operates three Federally Qualified Health Centers (Newport, Lincoln City, and Waldport) and four school-based health clinics (Newport, Taft, Toledo, and Waldport).

The healthcare industry in the United States is undergoing substantial changes. Emerging issues related to access to health services include the rise of telemedicine; policy changes related to abortion; and gender-affirming care for transgender individuals.

Telemedicine presents the opportunity to provide convenient cost-effective care to all populations, minimizing existing barriers to accessible healthcare. Since the start of the COVID-19 pandemic, the occurrence of telemedicine encounters has drastically increased. However, recent studies have documented inequalities in telemedicine utilization based on race and ethnicity, household income, and age.[38] Future usage of telemedicine will require direct attention towards this issue to prevent worsening disparities from occurring.

On June 24, 2022, the United States Supreme Court announced its decision to overturn Roe v. Wade severely limiting abortion access in the United States. Shortly after the announcement, Oregon leadership declared that they would be participating in a pact with Washington and California to protect abortion and contraceptive access. In 2020, Oregon providers performed approximately 7,000 elective abortions, of which 4% were performed for gestational parents residing in the LBL region.[39] As abortion access in other regions of the country becomes severely limited, it is expected that there will be an increased demand among out of state residents seeking abortion care in Oregon. Subsequently, availability of reproductive services will need to increase to continually provide timely access to care for all gestational people seeking treatment.

Identification as transgender or gender nonconformity has become increasingly prevalent in younger generations. In Oregon, 1.2% of adolescents between 13 and 17 years of age identify as transgender. In comparison, only 0.6% of adults identified as transgender. In the United States, an estimated 1.6 million people identify as transgender with over a quarter of the transgender population residing in the Western region of the country.[40] Literature has shown an extensive history of health disparities and barriers to care among transgender populations. As transgender youth grow and become more active healthcare consumers it is essential that adequate infrastructure is established to readily provide necessary care.

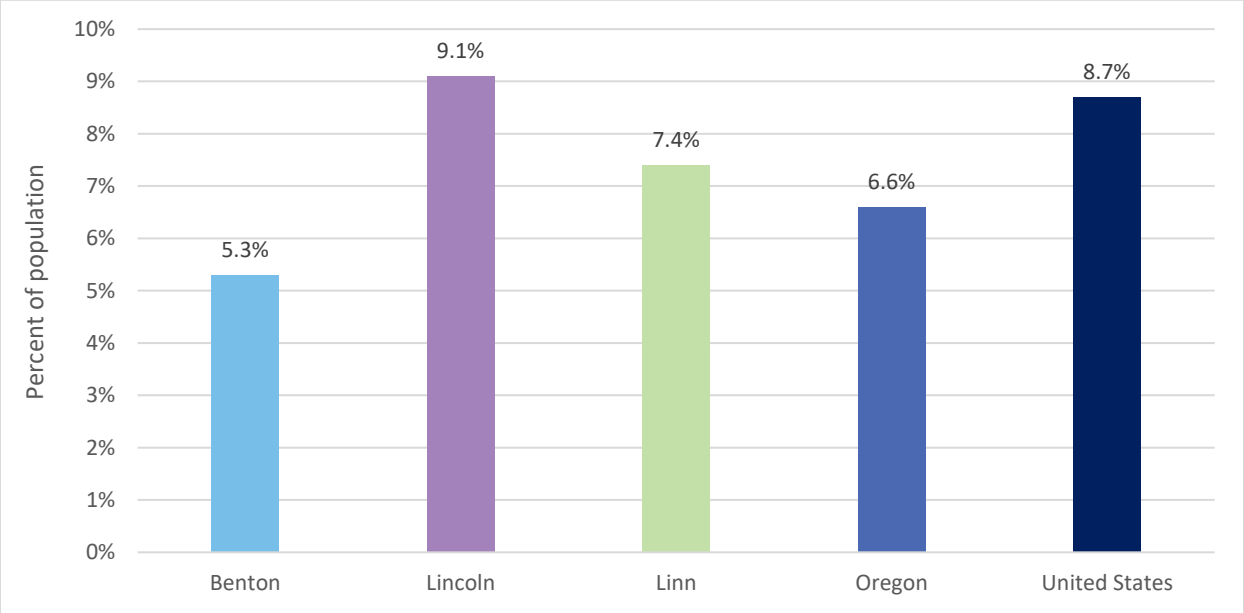
Locally, an issue related to access to care is increasing the primary care provider workforce. Samaritan Health Services created a new residency track for rural health (based in Newport) in 2022 as part of the

ACGME-accredited family medicine residency program based in Corvallis. This track offers two positions each year to enter the three-year program.

Insurance Coverage

Health insurance helps to guarantee a person can afford medical care in case of an emergency or when seeking preventative medicine. Between the three major types of health insurance (private insurance providers, Medicaid, and Medicare), 90% of the population residing in the LBL region has health insurance (Figure 5-1). LBL residents between the ages of 26 and 34 years of age had the lowest rates of insurance coverage (Table 5-1). This gap in coverage can be partially attributed to a stipulation in the Affordable Care Act (ACA), which only requires insurance providers to cover dependents until the age of 26. In the LBL region, Native Hawaiian/Pacific Islanders had the highest rates of insurance coverage (Table 5-2). Although insurance helps to reduce the financial burden of healthcare, the out-of-pocket cost of medical services is still a common issue reported by Americans.

Figure 5-1*:* Percent of the population without health insurance by location



Data source: United States Census Bureau, America Community Survey, Table S2701
Time period: 2016-2020
For more information: https://data.census.gov/all

Table 5-1: Percent of the population with health insurance coverage by age group and location

Age	Benton	Lincoln	Linn	Oregon
Under 6 years	98.4%	95.7%	91.5%	97.2%
6 to 18 years	95.9%	95.8%	93.3%	96.2%
19 to 25 years	93.2%	80.4%	87.6%	89.3%
26 to 34 years	88.7%	78.3%	87.8%	87.8%
35 to 44 years	93.0%	81.0%	88.9%	89.9%
45 to 54 years	93.1%	83.5%	93.3%	91.6%
55 to 64 years	96.0%	91.6%	93.1%	93.4%
65 to 74 years	99.3%	99.4%	99.1%	99.3%
75 years and older	100.0%	100.0%	99.5%	99.6%

Data source: United States Census Bureau, America Community Survey, Table S2701
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 5-2: Percent of the population with health insurance coverage by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native alone	64.1%	87.2%	93.9%	87.7%
Asian alone	92.8%	87.2%	96.8%	94.9%
Black or African American alone	83.9%	89.9%	100.0%	93.0%
Hispanic or Latino ethnicity (of any race)	84.9%	81.2%	86.3%	84.9%
Native Hawaiian or Pacific Islander alone	100.0%	100.0%	100.0%	88.9%
Some other race alone	78.6%	84.1%	85.5%	83.2%
Two or more races	94.4%	94.4%	92.2%	91.9%
White alone	95.6%	91.0%	92.8%	93.9%

Data source: United States Census Bureau, America Community Survey, Table S2701
Time period: 2016-2020
For more information: https://data.census.gov/cedsci/

Table 5-3: Percent of the population with health insurance coverage by income level and location

Income	Benton	Lincoln	Linn	Oregon
Under $25,000	89.6%	90.4%	89.3%	91.0%
$25,000 to $49,999	93.5%	91.8%	89.3%	90.2%
$50,000 to $74,999	95.0%	87.6%	90.8%	91.5%
$75,000 to $99,999	92.7%	88.5%	95.6%	93.8%
$100,000 or more	97.2%	94.7%	96.5%	96.3%

Data source: United States Census Bureau, America Community Survey, Table B27015
Time period: 2016-2020
For more information: https://data.census.gov/table?q=B27015&g=0500000US41003,41041,41043

Provider Availability

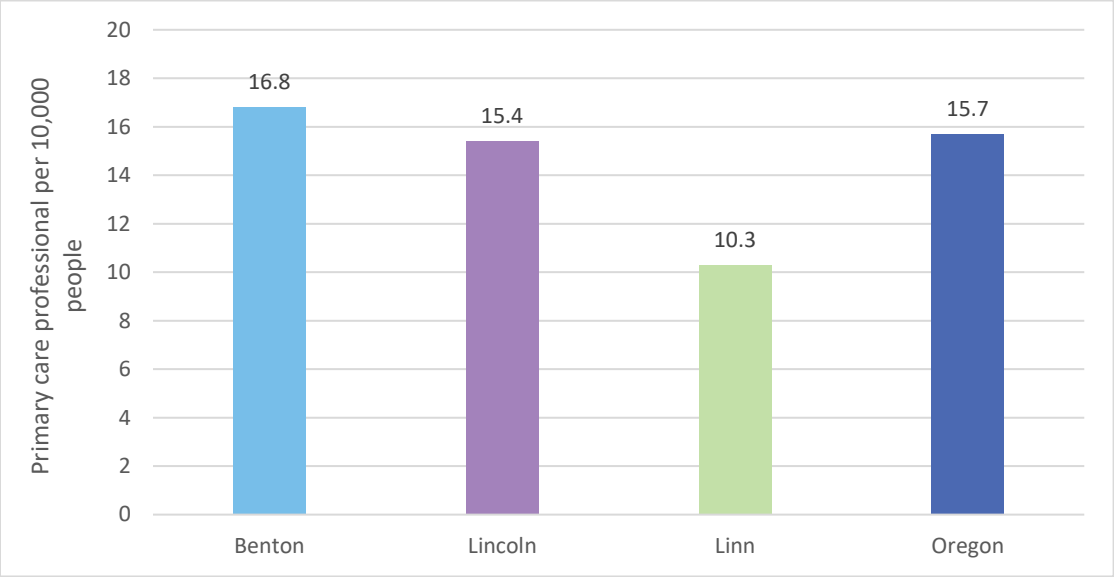
An adequate healthcare workforce is necessary for increasing access to care, improving patient experiences, and controlling service costs. The Association of American Medical Colleges has documented a growing concern in physician shortages due to an aging workforce, growing medical demands of served populations, and a limited number of new physicians being trained.[41] The COVID-19 pandemic has exacerbated the already dwindling number of physicians and has led to critical shortages in healthcare providers of all levels. It is anticipated that by 2034, an extra 37,800-124,000 physicians will be needed to adequately supply the American population with healthcare.[42]

Oregon's rural and frontier areas tend to have less access to healthcare providers and face greater barriers to accessing healthcare services.[43] Benton County has the greatest access to both primary care and behavioral health professionals. Despite making up only 35% of the LBL regional population, Benton County contains over 50% of all primary care physicians in the area. In contrast, Linn County residents make up 47% of the regional population but only 36% of the region's primary care physicians serve the area. Both Linn and Lincoln counties have fewer primary care professionals per 10,000 people than the state of Oregon (Figure 5-2). There is some overlap between the categorization of primary care and behavioral health professionals. Amongst the counties making up the LBL region, access to primary care and behavioral health providers follow similar trends, with Linn County having the least access per 10,000 people, followed by Lincoln County.

The terms 'mental health' and 'behavioral health' are at times used interchangeably, but while closely related, they do differ. Behavioral health describes the connection between a person's behaviors and the health and wellbeing of the body and mind,[44] while mental health refers only to one's emotional, psychological and social wellbeing.[45] There is some overlap between the categorization of mental health professionals and behavioral health professionals. In the LBL region, mental health providers were primarily located within city limits (Table 5-4). The city of Newport, located within Lincoln County, had the most mental health providers per 10,000 residents, although the county as a whole ranks below Benton County for access to mental health providers.

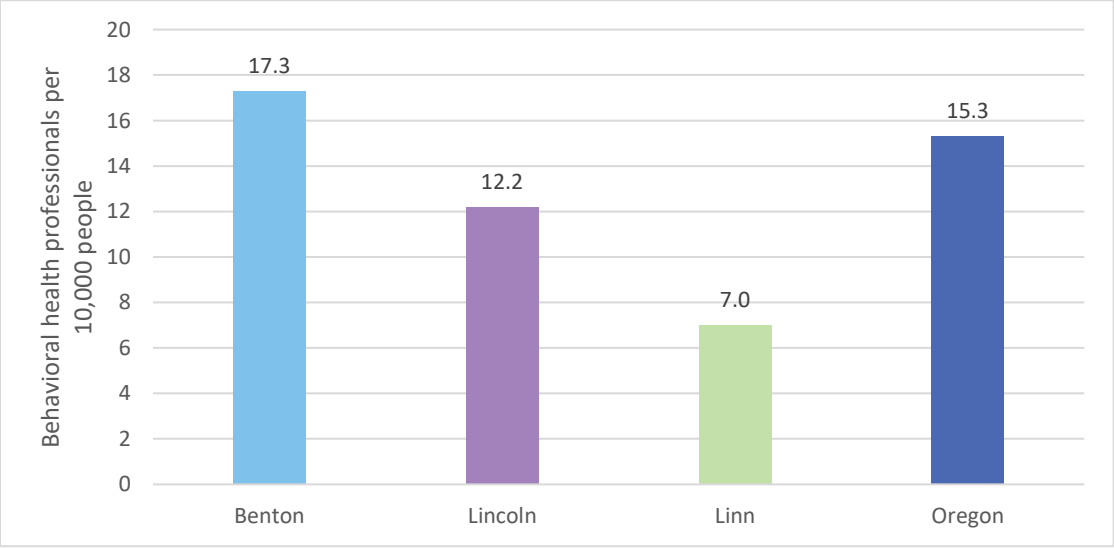
All three of the counties making up the LBL region had fewer dentists per 10,000 people than did the state of Oregon in 2020. Of the three counties, Lincoln has the greatest access to oral health providers, followed closely by Benton (Figure 5-4).

Figure 5-2. Primary care professionals per 10,000 people by location



Data source: Oregon's Health Care Workforce Reporting Program
Time period: 2020
For more information: https://www.oregon.gov/oha/HPA/ANALYTICS/HealthCareWorkforceReporting/2021-Workforce-Supply-for-web.pdf

Figure 5-3: Behavioral health professionals per 10,000 people by location



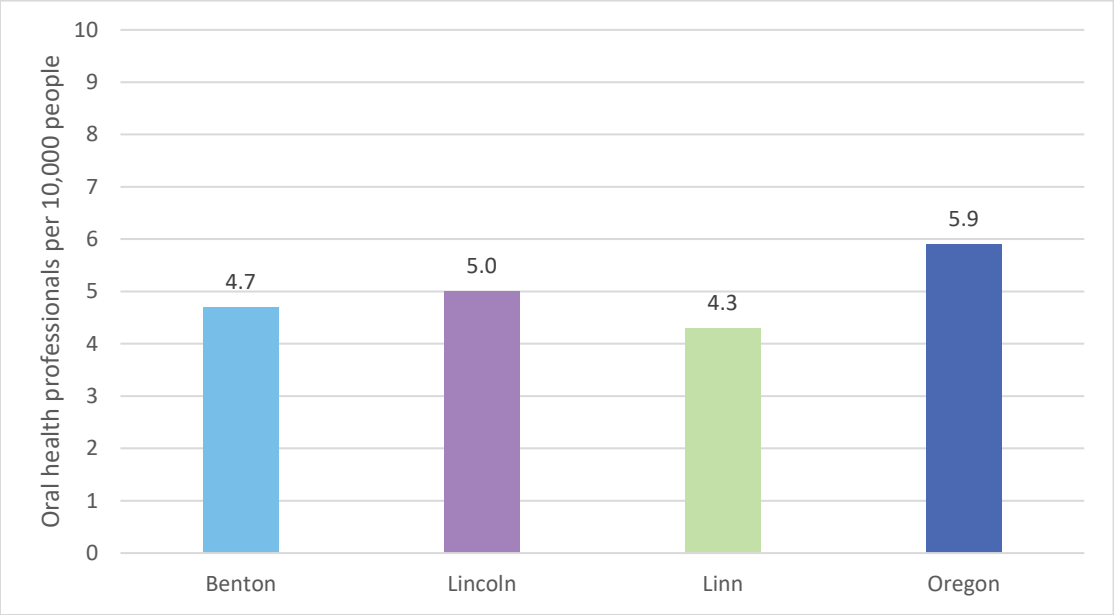
Data source: Oregon's Health Care Workforce Reporting Program
Time period: 2020
For more information: https://www.oregon.gov/oha/HPA/ANALYTICS/HealthCareWorkforceReporting/2021-Workforce-Supply-for-web.pdf

Table 5-4: Number of mental health professionals per 10,000 people by location

City	County	Mental Health Professionals per 10,000 people
Corvallis/Philomath	Benton	16.8
Monroe	Benton	0
Alsea	Benton	0
Newport	Lincoln	22.7
Lincoln City	Lincoln	9.7
Siletz	Lincoln	4.8
Waldport	Lincoln	3.5
Yachats	Lincoln	3.3
Toledo	Lincoln	2.8
Lebanon	Linn	3.0
Harrisburg	Linn	1.5
Sweet Home	Linn	1.0
Mill City/Gates	Linn	0.1
Brownsville	Linn	0
Scio	Linn	0
Albany	Linn/Benton	7.9
Oregon		12.5

Data source: Oregon Areas of Unmet Health Care Need Report
Time period: 2021
For more information: https://www.ohsu.edu/sites/default/files/2021-09/2021%20Areas%20of%20Unmet%20Health%20Care%20Needs%20Report%202.pdf

Figure 5-4: Number of oral health professionals per 10,000 people by location



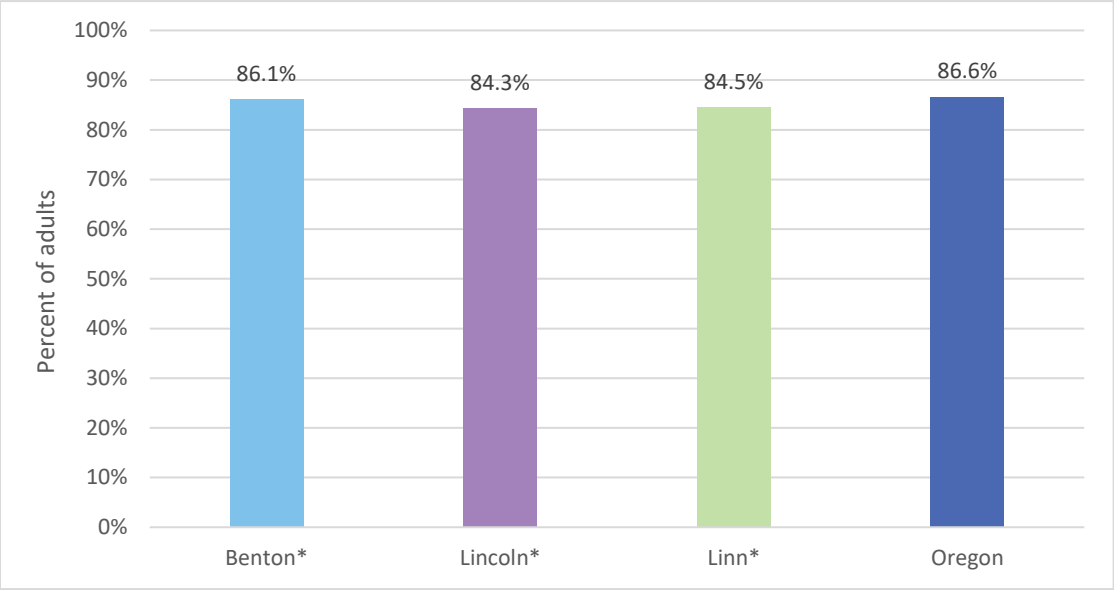
Data source: Oregon's Health Care Workforce Reporting Program
Time period: 2020
For more information: https://www.oregon.gov/oha/HPA/ANALYTICS/HealthCareWorkforceReporting/2021-Workforce-Supply-for-web.pdf

Preventive Services

The prevalence of chronic disease in the United States is an increasing concern among the medical community. Current statistics show that six out of every ten Americans will develop a chronic disease in their lifetime.[46] With the growing concern of chronic disease, medicine has shifted to focus on prevention. Screenings can identify the early warning signs of disease leading to improved prognosis and longer life expectancy. Current screening guidelines developed by American Heart Association recommend cholesterol screenings every 4-6 years beginning at age 20.[47] The United States Preventative Services Task Force recommends that women who are 50 to 74 years old and are at average risk for breast cancer get a mammogram every two years.[48] Although the percent of adults who follow screening guidelines varies by test, overall, Benton County residents were the most likely to follow screening guidelines in the region closely followed by Linn County. In addition to laboratory screenings, guidelines recommend routine annual exams with medical providers and annual prophylaxis dental cleanings to help prevent disease. Linn County had the highest percent of adults with a preventative doctor visit in the LBL region, and Benton County had the highest percent of adults who visited a dentist in the previous year.

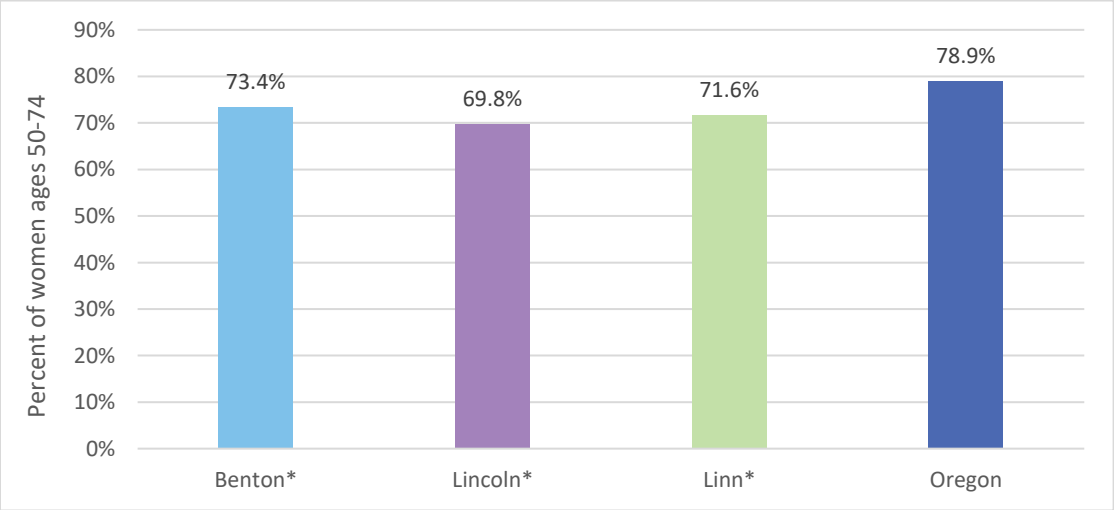
Much of the data in this section comes from the CDC's PLACES estimates based on the Behavioral Risk Factor Surveillance System (BRFSS). PLACES is a small area estimation approach that produces county-level results based on statistical modeling of all available survey responses. For more information on PLACES methodology, see https://www.cdc.gov/places/methodology/index.html.

Figure 5-5: Age-adjusted percent of adults who received cholesterol screening within the past five years by location



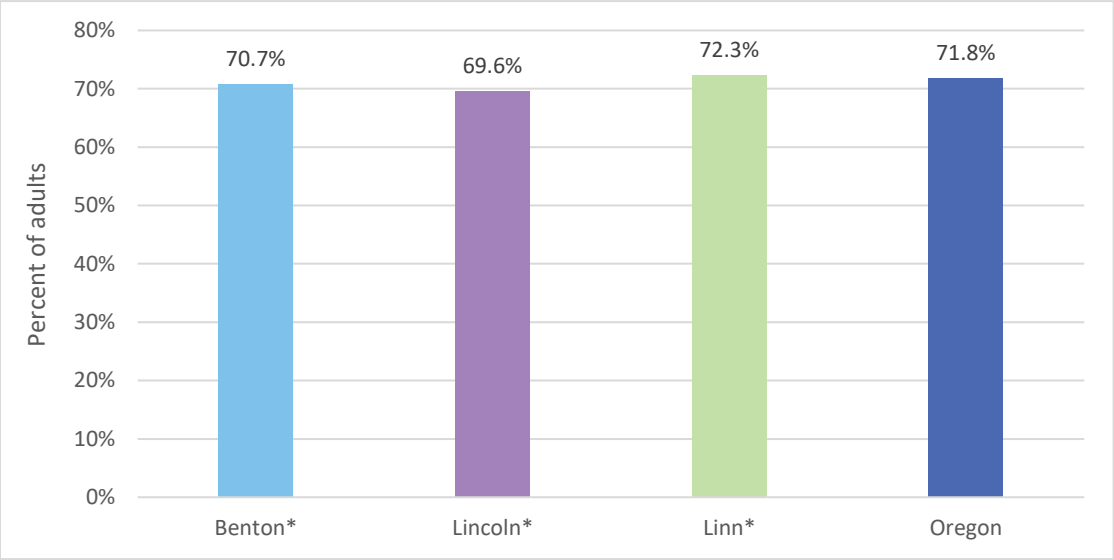
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 5-6: Age-adjusted percent of women ages 50-74 who received a mammogram within the past two years by location



**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 5-7: Age-adjusted percent of adults who visited a doctor for a routine check-up within the past year by location



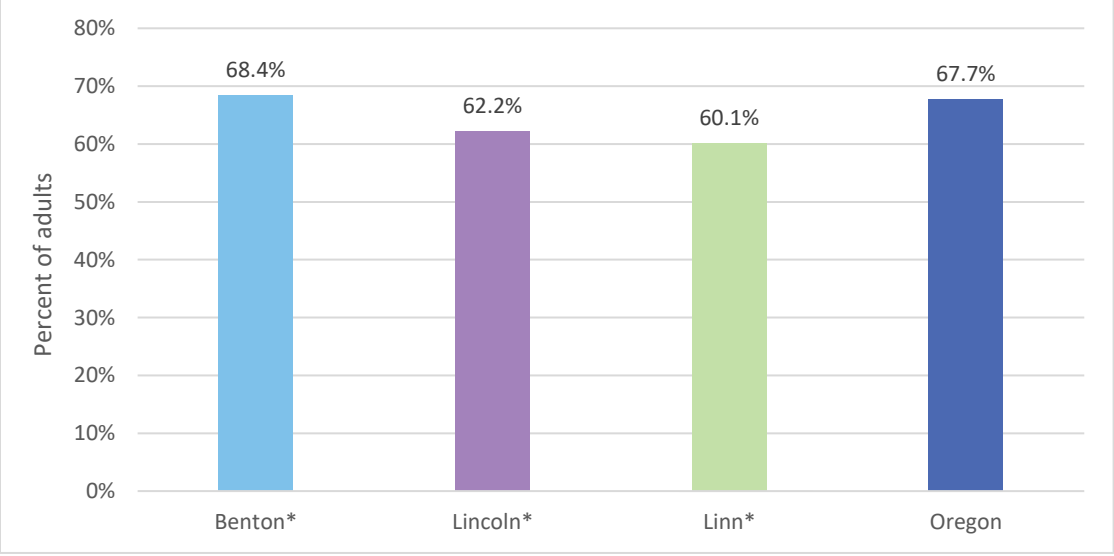
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*

Data source: Behavioral Risk Factor Surveillance System PLACES

Time period: 2020

For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 5-8: Age-adjusted percent of adults who visited the dentist within the past year by location



**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*

Data source: Behavioral Risk Factor Surveillance System PLACES

Time period: 2020

For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Oregon Health Plan (Medicaid): InterCommunity Health Network Coordinated Care Organization (IHN-CCO)

The Oregon Health Plan (OHP) is Oregon's Medicaid program. The Oregon Health Authority established a network of Coordinated Care Organizations (CCOs) as Medicaid managed care organizations to coordinate services for people covered by the Oregon Health Plan. InterCommunity Health Network Coordinated Care Organization (IHN-CCO), established in 2012, is responsible for managing care for OHP members in the LBL region. The Medicaid population in Oregon, like the rest of the country, is primarily low-income. Studies have found that Medicaid recipients face greater barriers to care and generally have worse health status than people with commercial insurance.[49, 50]

CCOs participate in an annual Consumer Assessment of Healthcare Providers Survey (CAHPS) to measure accessibility of healthcare services. Table 5-5 includes results for IHN-CCO members surveyed in 2021. Most surveyed IHN enrollees reported having adequate access to necessary health services in a timely manner, though perceived access to specialized therapy and medical equipment was lower.

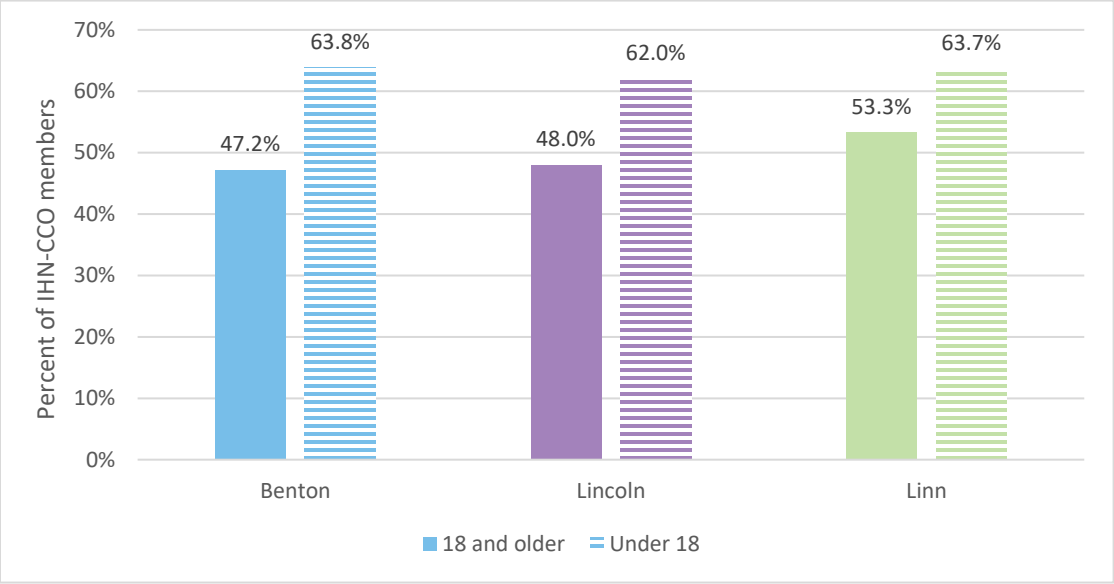
People covered by Medicaid have been shown to have greater emergency department utilization than persons insured through a private provider.[51] In 2021, approximately 23% of all IHN-CCO members visited an emergency department at least once (Figure 5-10).

Table 5-5: IHN-CCO Consumer Assessment of Healthcare Providers survey results

	Never	Sometimes	Usually	Always
How often did you get an appointment for a check-up or routine care as soon as you needed?	3.3%	16.8%	26.6%	53.2%
How often was it easy to get the care, tests, or treatment you needed?	2.2%	13.8%	32.8%	51.2%
How often did you get an appointment with a specialist as soon as you needed?	5.5%	15.6%	30.6%	48.2%
How often was it easy to get the special therapy you needed through your health plan?	13.7%	14.8%	26.2%	45.3%
How often was it easy to get the medical equipment you needed through your health plan?	18.5%	16.4%	20.8%	44.3%

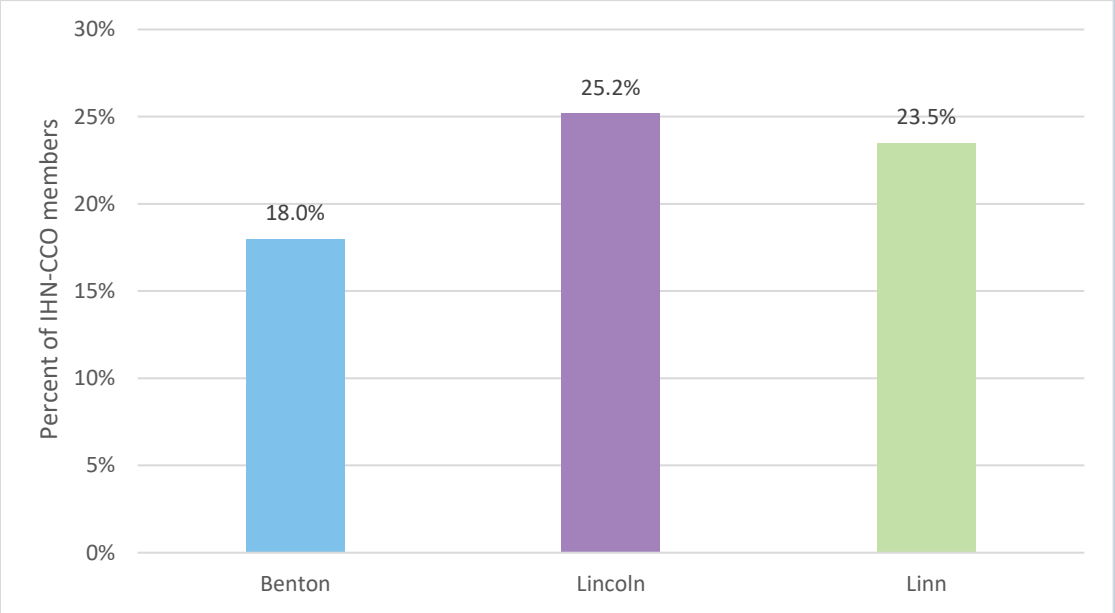
Data source: InterCommunity Health Network CCO 2021 Consumer Assessment of Healthcare Providers Survey
Time period: 2021
For more information:
https://www.oregon.gov/oha/HPA/ANALYTICS/CAHPS%20documents/InterCommunity%20Health%20Network%202020%20(Adult).pdf

Figure 5-9: Percent of IHN-CCO members with a dental claim in the past year by age category and location



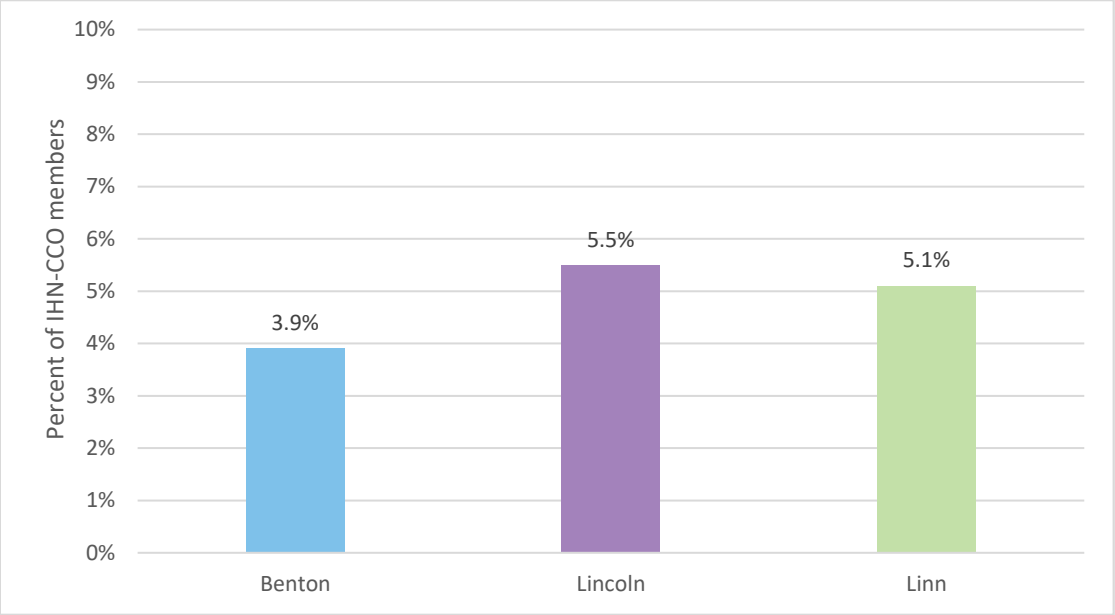
Data source: IHN-CCO claims data
Time period: 2021
For more information: email SHSresearch@samhealth.org

Figure 5-10: Percent of IHN-CCO members with at least one visit to an emergency department in the past year by location



Data source: IHN-CCO claims data
Time period: 2021
For more information: email SHSresearch@samhealth.org

Figure 5-11: Percent of IHN-CCO members with five or more visits to an emergency room in the past year by location



Data source: IHN-CCO claims data
Time period: 2021
For more information: email SHSresearch@samhealth.org

6 Morbidity and Mortality

Traditional measures used to evaluate the health of populations are morbidity (rate of disease) and mortality (deaths). Data on the leading causes of illness and death within a population can equip those seeking to improve the health of communities with information needed to prevent loss of life and improve quality of life. This chapter will present data on leading causes of death and occurrence of chronic and infectious disease with the exclusion of COVID-19 data, which can be found in Chapter 9: COVID-19.

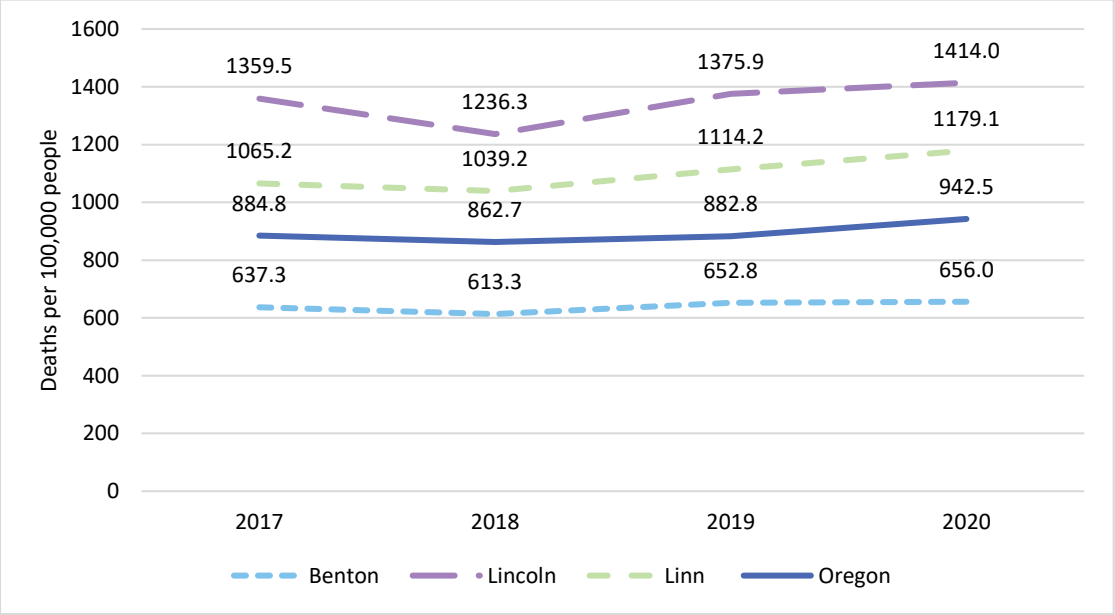
Mortality

Mortality is a measure of the number of deaths in a population. Crude death rate measures the number of deaths in a particular population per 100,000 people and is one way to capture mortality data. In 2020, all three counties making up the LBL region experienced their highest crude death rate since 2017. Lincoln County's crude death rate in 2020 was 1,414 deaths per 100,000 residents, the highest in the LBL region. Both Lincoln and Linn county's death rates exceeded that of the state average from years 2017-2020.

As would be expected, crude death rate increased substantially with age in all counties making up the LBL region. In 2020, men made up the greatest proportion of deaths in Linn County, Lincoln County, and the state of Oregon. Benton County's crude death rate was comparable between genders, with slightly fewer females having died in 2020.

Unfortunately, data on death rates by race/ethnicity were not available at the time of this report's release. The Oregon Health Authority (OHA) has a dashboard with county-specific mortality rates by race/ethnicity, but accurate data was not available when this report was drafted. Mortality data by race/ethnicity should be available at the following link once data has been updated and released by OHA:
https://visualdata.dhsoha.state.or.us/t/OHA/views/CountyDash/CountyDash_cause?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=

Figure 6-1: Number of deaths per 100,000 people by year and location (crude death rate)



Data source: OHA Center for Health Statistics
Time period: 2017-2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/CountyDash/CountyDash_cause?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Table 6-1: Number of deaths per 100,000 people by age group and location

Age (years)	Benton	Lincoln	Linn	Oregon
0-4	*	*	164.9	86.5
5-14	*	*	*	11.8
15-24	*	*	121.3	73.0
25-34	*	221.6	122.2	127.2
35-44	158.7	426.9	244.8	179.5
45-54	279.5	569.6	288.1	381.7
55-64	452.6	953.2	1,167.2	869.0
65-74	1,238.7	2,015.9	2,117.9	1,750.6
75-84	2,976.9	4,034.8	5,006.9	4,389.1
85+	11,326.1	13,572.0	17,032.4	14,121.4

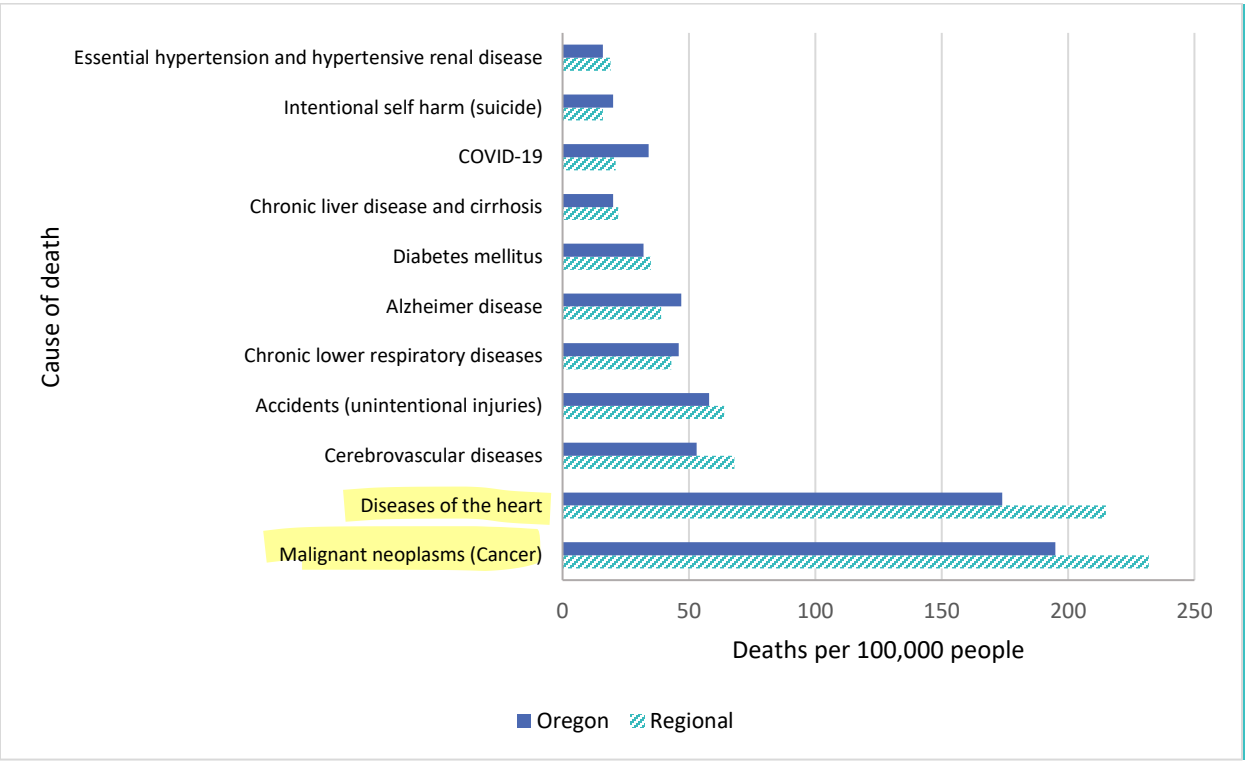
**Unreliable due to small numbers*
Data source: Oregon Public Health Assessment Tool
Time period: 2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/LeadingCausesDash/LeadingDash1?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Leading Causes of Death

The leading cause of death in the LBL region is cancer, followed by diseases of the heart and cerebrovascular diseases (Figure 6-3). Nationally, the most common disease of the heart is coronary heart disease, which occurs when arteries supplying blood to the heart narrow or harden from the formation of plaque. Cerebrovascular disease refers to a group of conditions that affect blood flow to the brain. Lack of sufficient blood flow affects brain tissue and may cause a stroke. Coronary heart disease, stroke, and many types of cancer are preventable with lifestyle changes.

The leading causes of death vary slightly across the three counties making up the LBL region. The leading cause of death in both Lincoln and Benton counties is cancer, followed by diseases of the heart. In Linn County, the leading cause of death is diseases of the heart, followed closely by cancer (Table 6-3).

Figure 6-2: Leading causes of death per 100,000 people comparison of Oregon and Linn-Benton-Lincoln Region



Data source: Oregon Public Health Assessment Tool
Time period: 2020
For more information: Contact the Benton County Health Department

Table 6-2: Number of deaths per 100,000 people by leading causes of death and location

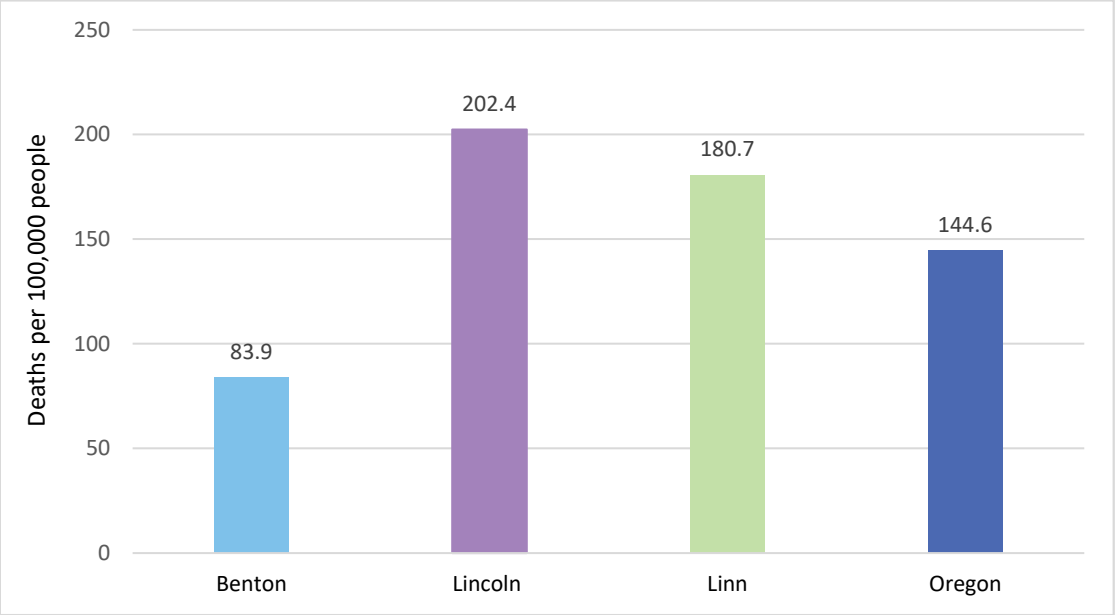
Cause of Death	Benton	Lincoln	Linn	Oregon
Malignant neoplasms (cancer)	152.1	356.1	253.7	194.2
Diseases of the heart	138.4	262.9	262.3	172.7
Cerebrovascular diseases	35.9	66.3	94.3	52.4
Accidents (unintentional injuries)	34.9	105.6	72.3	57.8
Alzheimer Disease	34.9	39.3	44.0	47.1
Diabetes mellitus	21.1	72.5	33.0	31.8
Chronic lower respiratory diseases	18.0	76.6	51.1	46.1
Chronic liver disease and cirrhosis	12.7	43.5	22.0	19.5
COVID-19	10.6	29.0	27.5	33.6
Essential hypertension and hypertensive renal disease	10.6	24.8	24.3	15.8
Intentional self-harm (suicide)	9.5	29.0	17.3	19.6

Data source: OHA Center for Health Statistics
Time period: 2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/CountyDash/CountyDash_cause

Tobacco-Related Mortality

Tobacco use is the number-one cause of preventable death and disease in Oregon.[52] Each year, tobacco use kills over 8,000 Oregonians and costs almost $5.7 billion in medical expenses and lost productivity. In Linn and Lincoln counties, tobacco was responsible for an average of 180.7 and 202.4 deaths per 100,000 people respectively from years 2017 to 2020. These rates exceeded that of Oregon and far exceeded that of Benton County, which experienced an average of 83.9 deaths related to tobacco use per 100,000 people from years 2017 to 2020 (Figure 6-4).

Figure 6-3: Age-adjusted number of deaths per 100,000 people related to tobacco use by location

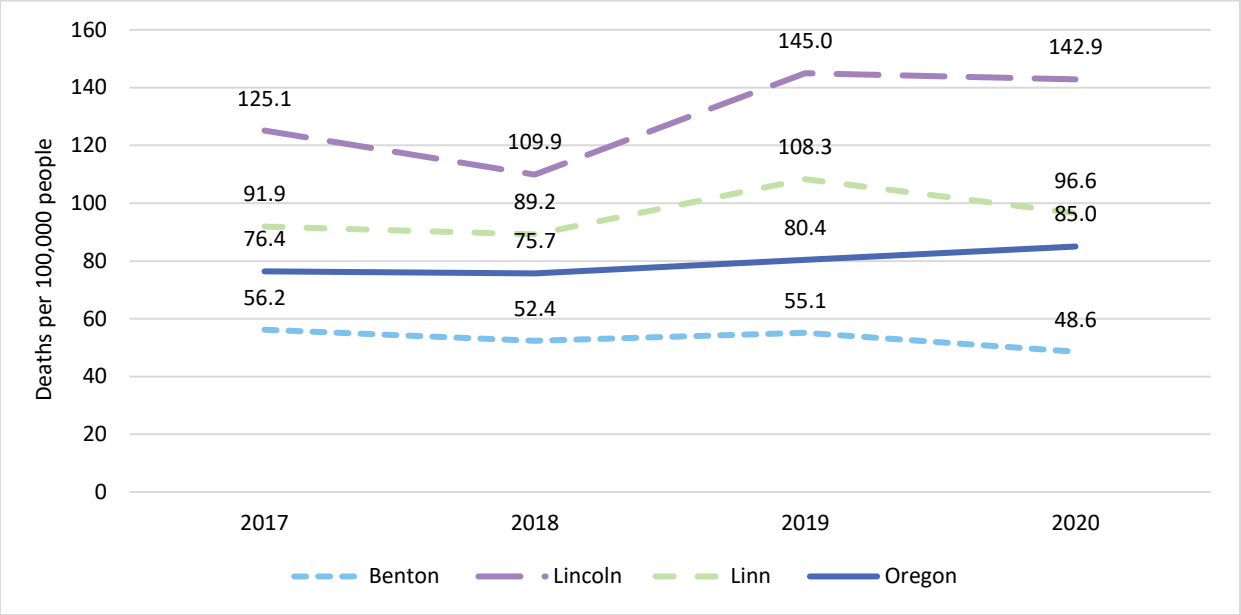


Data source: OHA Center for Health Statistics
Time period: 2017-2020
For more information: https://www.oregon.gov/oha/ph/preventionwellness/tobaccoprevention/pages/oregon-tobacco-facts.aspx

Injury

Injury is the leading cause of death for Oregonians between the ages 1 and 44. Unintentional injury is the fourth leading cause of death among those of all ages in the LBL region (Table 6-3). From years 2017-2020, Lincoln County experienced the highest rate of injury deaths in the LBL region, followed by Linn County. Falls accounted for the greatest number of injury deaths in the LBL region, but these rates vary drastically by county. In 2020, Lincoln County experienced 1.5 and 2.9 times the number of deaths from falls as Linn and Benton counties respectively. Overdose/poisoning is the second leading cause of injury death in the region and was the leading cause of injury death in Linn County in 2020. During that year, Linn County experienced 25.1 deaths from overdose/poisoning per 100,000 people (Table 6-4).

Figure 6-4: Number of injury deaths per 100,000 people by location



Date source: OHA Center for Health Statistics
Time period: 2017-2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/Oregondeathsfromexternalinjuries/CountyDash?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Table 6-3: Number of injury deaths per 100,000 people by leading causes of injury deaths and location

Cause of Injury Death	Benton	Lincoln	Linn	Oregon
Fall	23.2	55.9	19.6	19.5
Poisoning/Overdose	7.4	22.8	25.1	21.1
Transportation	7.4	22.8	19.6	13.6
Firearm	5.3	14.5	9.4	13.9
Suffocation	3.2	10.4	8.6	6.7
Drowning	0	8.3	4.7	2.0
Contact with Object	0	4.1	1.6	1.5
Medical Care Complications	2.1	0	0.8	1.9

Data source: OHA Center for Health Statistics
Time period: 2020
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/Oregondeathsfromexternalinjuries/CountyDash?%3Adisplay_count=n&%3Aembed=y&%3AisGuestRedirectFromVizportal=y&%3Aorigin=viz_share_link&%3AshowAppBanner=false&%3AshowVizHome=n

Homicide

Injuries can be split into two categories, intentional and unintentional. Intentional injuries are comprised of homicides, suicides, and some undetermined deaths. From years 2017 to 2020, the LBL region experienced 29 homicides total. During this time, Benton County experienced 4 homicides, Lincoln County experienced 5 homicides, and Linn County experienced 20 homicides. Suicides account for a greater number of deaths in the region than do homicides. The region's suicide deaths will be explored in Chapter 8: Mental and Behavioral Health.

Chronic disease

A chronic disease is a condition that lasts at least one year and requires ongoing medical attention. Chronic diseases including heart disease, cancer, and diabetes are the leading causes of death in the United States.[53] Many chronic diseases can be prevented through lifestyle changes that target risk behaviors like tobacco use, poor nutrition, lack of physical activity, and excessive alcohol use. These individual choices however can be greatly constrained by the characteristics of one's community and life circumstances. Chapter 4: Social Determinants of Health includes data on characteristics of the three counties that may influence community members' ability to make positive health choices.

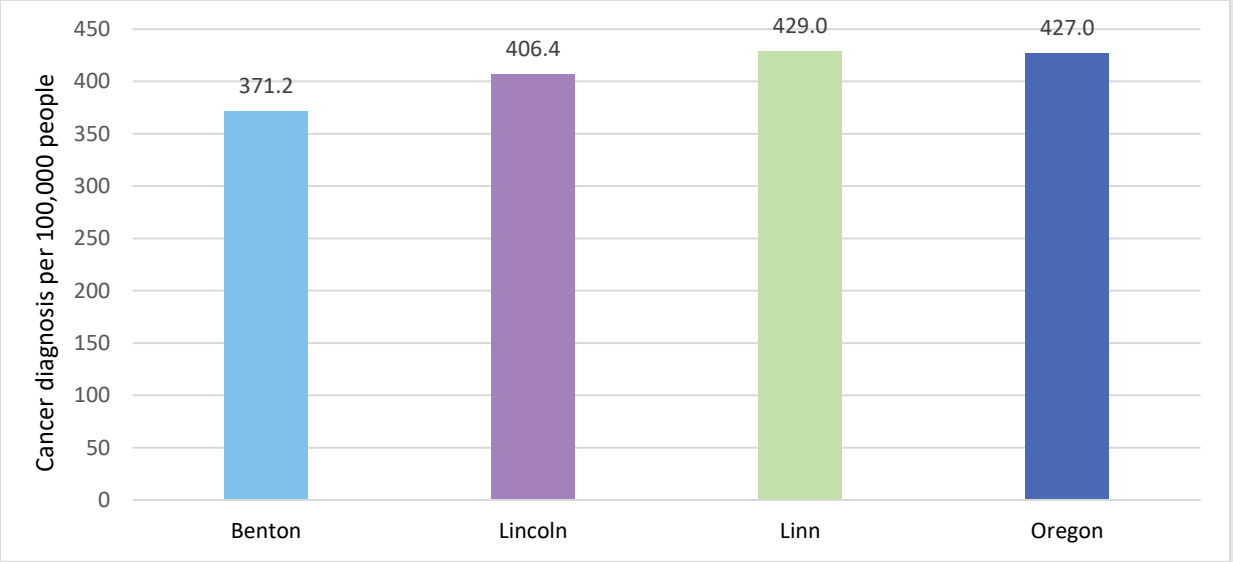
Cancer

Cancer is the leading cause of death in the LBL region and the state of Oregon. Each year, approximately 430 per 100,000 people in Oregon receive a cancer diagnosis and approximately 150 per 100,000 people die each year from cancer in the state. The LBL region's age-adjusted rate of newly diagnosed cancer cases range from 371.2 diagnoses per 100,000 people annually in Benton County to 429.0 diagnoses per 100,000 people annually in Linn County (Figure 6-5). On average, the LBL region experienced fewer cancer diagnoses than the state of Oregon. While Linn County's rate of cancer diagnosis is the highest in the region, its cancer mortality rate is comparable to that of Lincoln County. Annual cancer deaths ranged from 128.6 deaths per 100,000 people in Benton County to 172.5 cancer deaths per 100,000 people in Linn County over the years 2016-2020 (Figure 6-6). Note the difference between crude (unadjusted) mortality rates, as shown in Table 6-2, and age-adjusted mortality rates, as shown in Figure 6-6. The differences in mortality rates between Lincoln County and Benton County are much larger using crude mortality rates than with age-adjusted mortality rates, since the population in Lincoln County is substantially older than the population in Benton County. After adjusting for differences in the age of each county's population, the rates of cancer death experienced in each county of the LBL region are more similar.

Breast cancer makes up the largest proportion of cancer diagnoses in the LBL region, followed by prostate and lung and bronchus cancers (Table 6-4). From 2015 to 2019, Benton County experienced a high incidence (new occurrence) of breast cancer diagnosis, approximately 1.3 times higher than Linn and Lincoln counties. Despite its high incidence of breast cancer diagnosis, Benton County's breast cancer mortality rate was the same as the state of Oregon, and below that of Lincoln County during years 2016 to 2020. Lung cancer was the leading cause of cancer deaths in Oregon and in the LBL region from years 2016-2020. Both Linn and Lincoln counties experience higher rates of death from lung and bronchus cancers than the state and a far greater number than Benton County (Table 6-5). The leading

risk factor for lung cancer is smoking; it's estimated that about 80% of lung cancer deaths are the result of smoking.[54]

Figure 6-5: Age-adjusted number of cancer diagnoses per 100,000 people by location



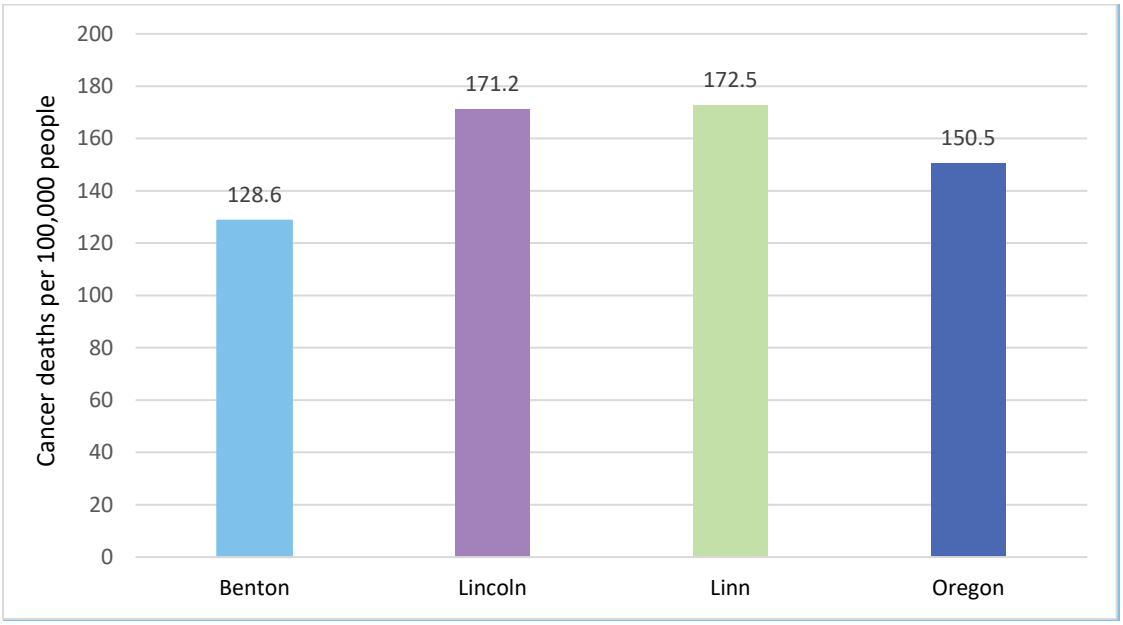
Data source: Oregon State Cancer Registry
Time period: 2015-2019
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

Table 6-4: Age adjusted number of cancer diagnoses per 100,000 people by cancer type and location

Cancer Type	Benton	Lincoln	Linn	Oregon (2019)
Breast	159.1	120.4	116.7	134.6
Prostate	91.0	97.7	109.6	96.4
Lung and Bronchus	31.7	53.8	57.0	46.5
Colon and Rectum	26.6	31.9	32.8	32.1
Corpus and Uterus (not otherwise specified)	29.4	25.6	33.9	30.2
Non-Hodgkin Lymphoma	15.8	19.1	19.2	16.9
Urinary Bladder	19.5	27.8	25.5	19.9

Data source: Oregon State Cancer Registry
Time period: Counties, annual average for 2015-2019; Oregon, 2019 only
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

Figure 6-6: Age adjusted number of cancer deaths per 100,000 people by location



Data source: OHA Center for Health Statistics
Time period: 2016-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

Table 6-5: Age-adjusted number of cancer deaths per 100,000 people by cancer type and location

Cancer Type	Benton	Lincoln	Linn	Oregon (2020)
Breast	18.5	22.4	17.3	18.5
Colon and Rectum	11.4	15.1	11.9	11.2
Lung and Bronchus	24.2	43.6	43.9	30.8
Liver and Intrahepatic Bile Duct	4.1	7.1	8.5	6.8
Ovary	7.8	8.3	8.8	6.1
Pancreas	11.2	13.3	11.9	10.9
Prostate	20.7	15.1	23.0	18.9

Data source: OHA Center for Health Statistics
Time period: Counties, annual average for 2016-2020; Oregon, 2020 only
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Cancer-Incidence.aspx

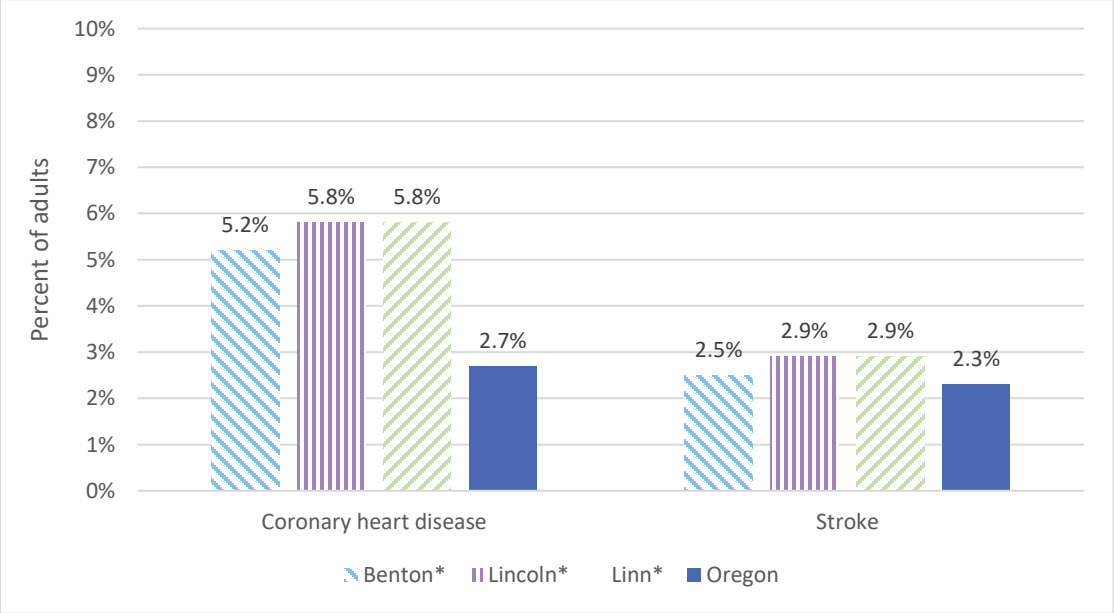
Heart Disease and Stroke

Heart disease is the leading cause of death in the United States and the second leading cause of death in Oregon and the LBL region (Figure 6-3). Heart disease refers to several types of heart conditions, including coronary heart disease, which is the most common type of heart disease. Coronary heart disease is more common in the LBL region than in the state of Oregon on average.

Stroke is the most common type of cerebrovascular disease, resulting from restriction of blood flow to the brain. Cerebrovascular diseases are a leading cause of death in the state of Oregon and in the LBL region (Figure 6-3). Based on PLACES county estimates from 2020, the three counties making up the LBL region experienced a comparable total number of strokes (Figure 6-8). Among those 35 and older, more people died from heart disease and stroke in 2018-2020 in Linn County than in Lincoln or Benton counties. Lincoln County's mortality rate for heart disease and stroke were similar to the state of Oregon, while Benton County's were lower (Figure 6-9).

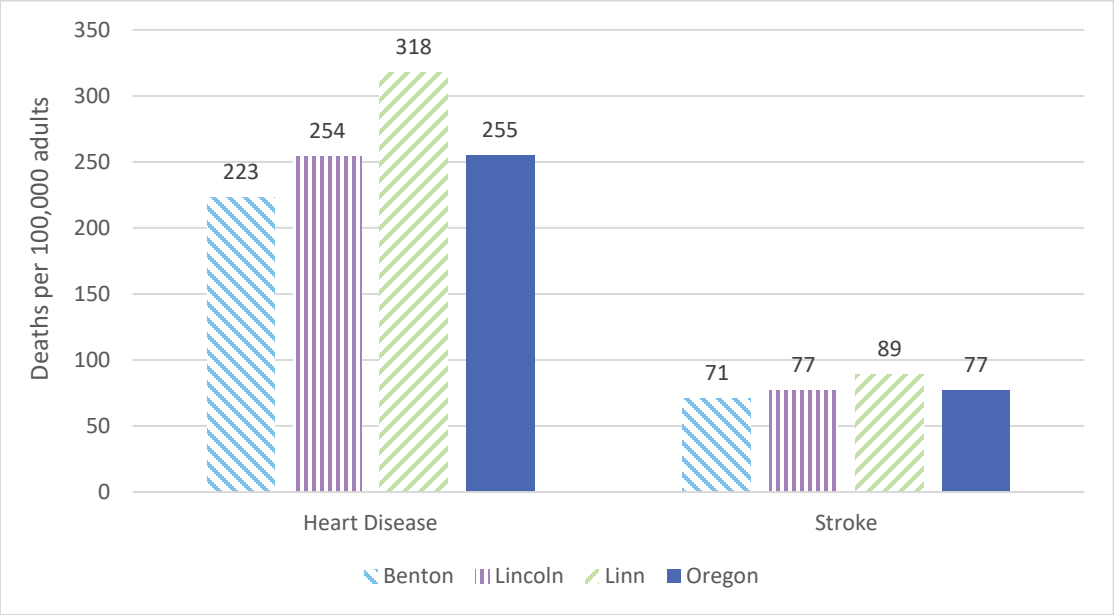
Oregon's Black population has the highest mortality rates from heart disease and stroke when compared to other race/ethnicity groups (Table 6-7 and 6-8). Due to insufficient data, trends in heart disease and stroke mortality by race/ethnicity in the LBL region can't be analyzed fully. Based on the data available, non-Hispanic Whites have the highest mortality rate from heart disease and stroke in the region. Rates of heart disease and stroke also vary by gender. In the region, men are much more likely to die from heart disease than are women, while women in the region (with the exception of Lincoln County) are more likely than men to die from stroke (Figure 6-10 and 6-11).

Figure 6-7: Age adjusted percent of adults who have ever experienced coronary heart disease or stroke by location



**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 6-8: Number of deaths per 100,000 adults 35 years and older from heart disease or stroke by location



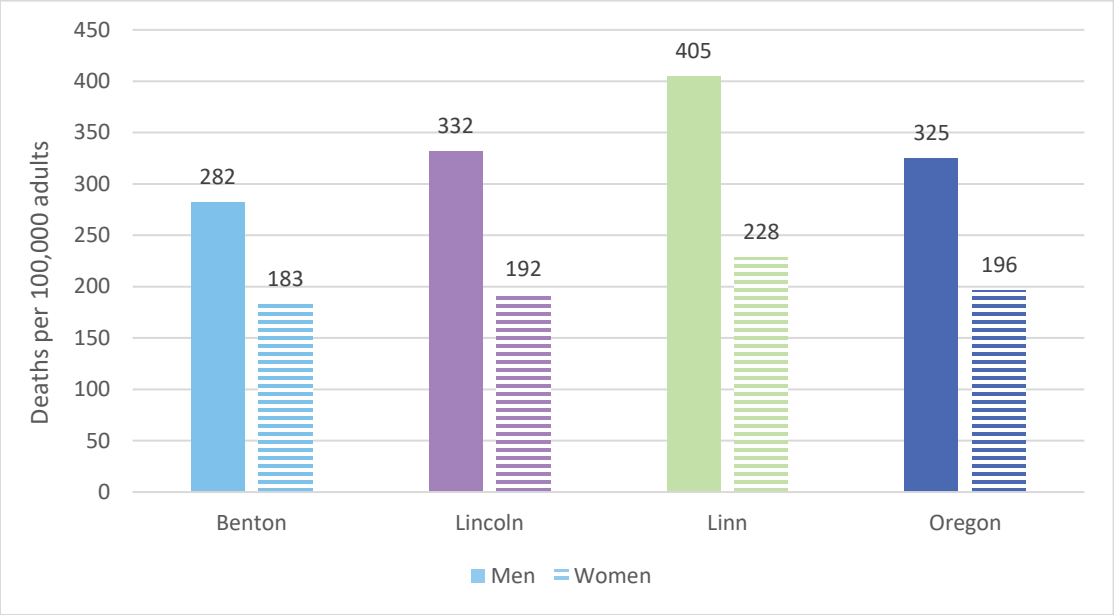
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Table 6-6: Number of deaths per 100,000 adults 35 and older from heart disease by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian / Alaska Native	195	173	247	208
Asian Pacific Islander	119	138	279	133
Black	219	*	241	287
Hispanic	115	164	97	133
White	234	260	325	264

**Unreliable due to small numbers*
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Figure 6-9: Number of deaths per 100,000 adults 35 and older from heart disease by gender and location



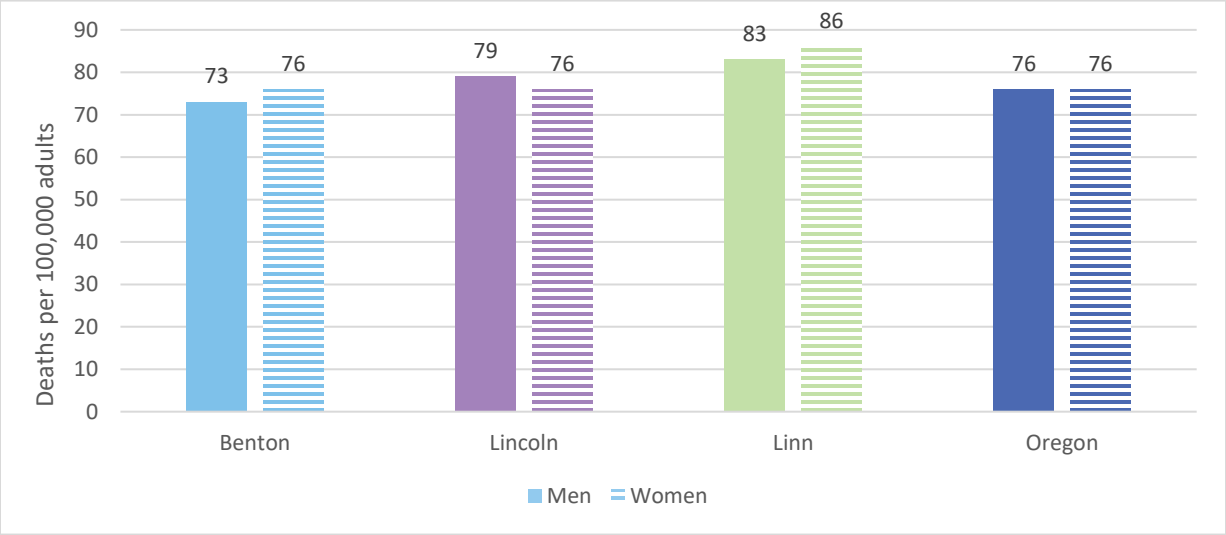
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Table 6-7: Number of deaths per 100,000 adults 35 years and older from stroke by race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	*	*	*	63
Asian or Pacific Islander	50	90	73	85
Black	*	*	*	118
Hispanic	53	50	65	60
White	76	78	87	76

**Unreliable due to small numbers*
Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Figure 6-10: Number of deaths per 100,000 adults 35 and older from stroke by gender and location



Data source: Interactive Atlas of Heart Disease & Stroke, CDC Division for Heart Disease and Stroke Prevention
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Pages/Heart-Disease-and-Stoke-Deaths.aspx

Both heart disease and stroke have risk factors that are largely modifiable with lifestyle change including high blood pressure, high cholesterol, diabetes, and obesity. PLACES estimates from years 2019 and 2020 find that the LBL region experienced rates of these risk factors similar to the state average. With the exception of high cholesterol, Benton County had the lowest estimated rates of these risk factors, falling below the state average in most conditions. Linn and Lincoln counties had similar estimated rates, in most cases with higher rates than the state average (Table 6-9). Smoking is another risk factor for heart disease and stroke, as well as numerous additional chronic diseases. Rates of smoking in the LBL region will be explored in Chapter 8: Mental & Behavioral Health.

Table 6-8: Age adjusted percent of adults with risk factors for heart disease and stroke by location

Risk Factor	Benton*	Lincoln*	Linn*	Oregon
High blood pressure	25.8%	28.8%	29.2%	27.5%
High cholesterol	25.8%	25.4%	24.2%	26.0%
Diabetes	8.2%	8.8%	8.8%	8.4%
Obesity	28.5%	32.4%	33.3%	28.1%

**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: Cholesterol and high blood pressure data 2019, diabetes and obesity data 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Infectious Illnesses (Non-COVID)

Prevention and control of infectious illnesses rank among the greatest health advances of the 20th century. The World Health Organization defines infectious diseases as those that are caused by bacteria, viruses, parasites, or fungi; and can be passed from person to person.[55] Some are transmitted via ingesting contaminated food or water, many are spread by microorganisms in coughs or sneezes, and others result from exposures in the environment or insect bites. Diseases that spread from animals are called zoonotic infections. Infectious illnesses are representative of the overall health and wellness of a community through prevention efforts and transition data represented below.

For reference, here are the diseases listed in the graphs below and their associations:

Campylobacteriosis. A bacteria carried by infected livestock which causes a food borne illness from underprepared, contaminated food. It is the most common bacterial cause of diarrheal illness in the United States. For more information visit https://www.cdc.gov/campylobacter/faq.html.

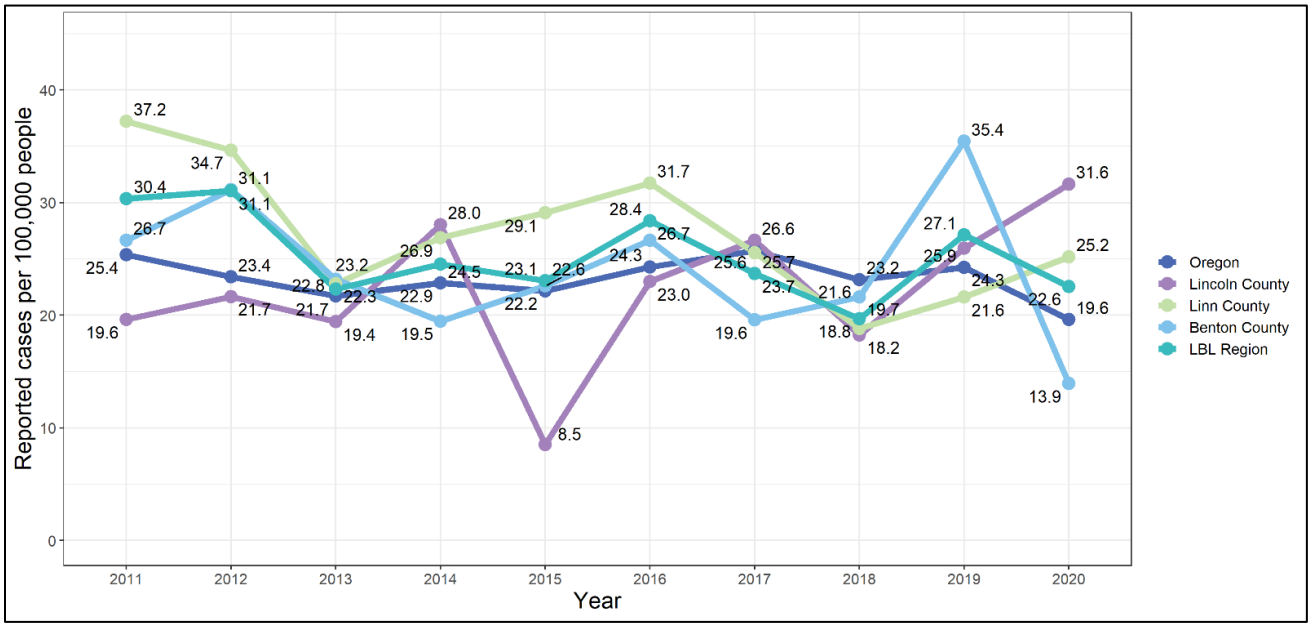
E.Coli. A group of large and diverse group of bacteria with many different strains, some of which can cause severe food borne illness, specifically Shinga Toxin-Producing E.Coli (STEC) from sources such as raw/undercooked meat and fecal contamination of vegetables. For more information visit https://www.who.int/news-room/fact-sheets/detail/e-coli.

Chlamydia. A common STD for both men and women that causes infection which can cause damage to the reproductive center of a woman if left untreated. For more information visit https://www.cdc.gov/std/chlamydia/stdfact-chlamydia.htm.

Gonorrhea. A common STD that causes infection in the genitals, rectum, and throat for both men and women. For more information visit https://www.cdc.gov/std/gonorrhea/Gonorrhea-FS.pdf.

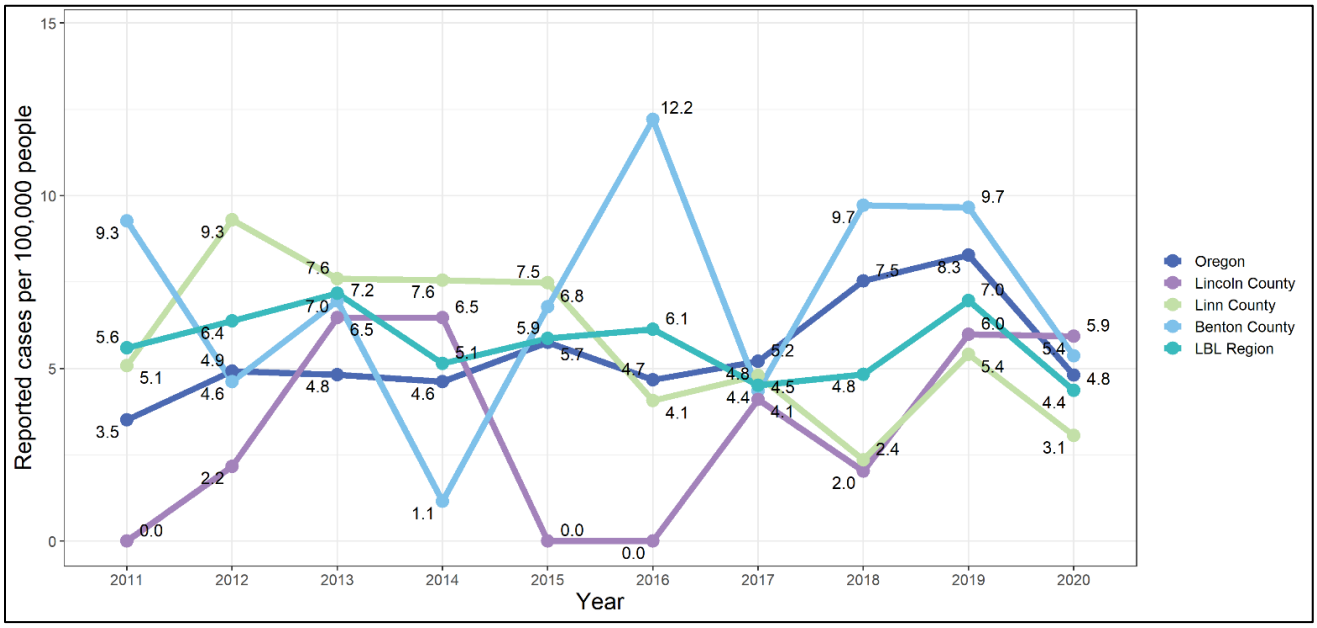
Syphilis. A STD that causes infection to develop in stages and can cause serious health problems without treatment. For more information visit https://www.cdc.gov/std/syphilis/stdfact-syphilis.htm

Figure 6-11: Reported cases of campylobacteriosis per 100,000 people by year and location



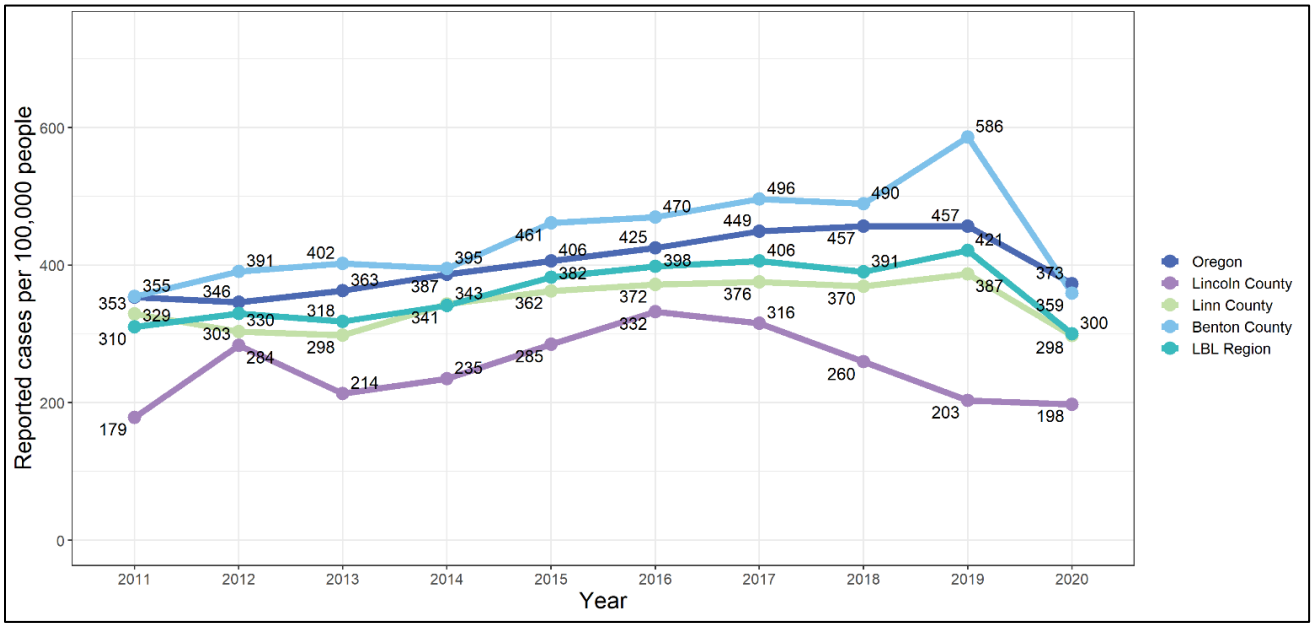
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-12: Reported cases of E. coli per 100,000 people by year and location



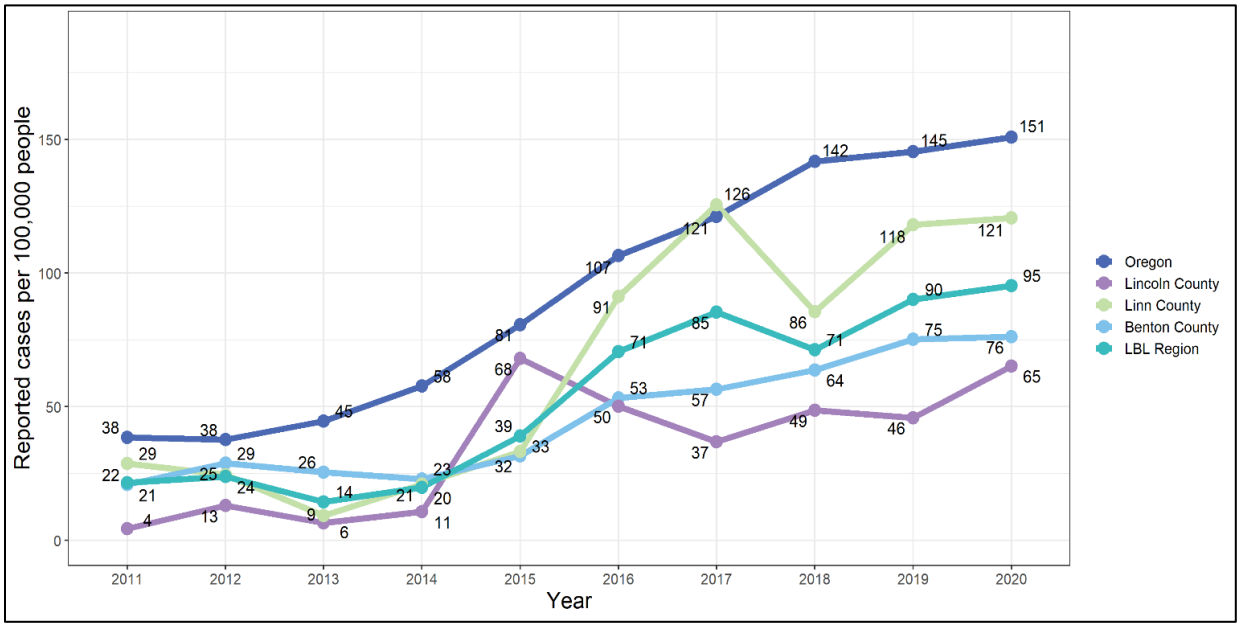
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-13: Reported cases of chlamydia per 100,000 people by year and location



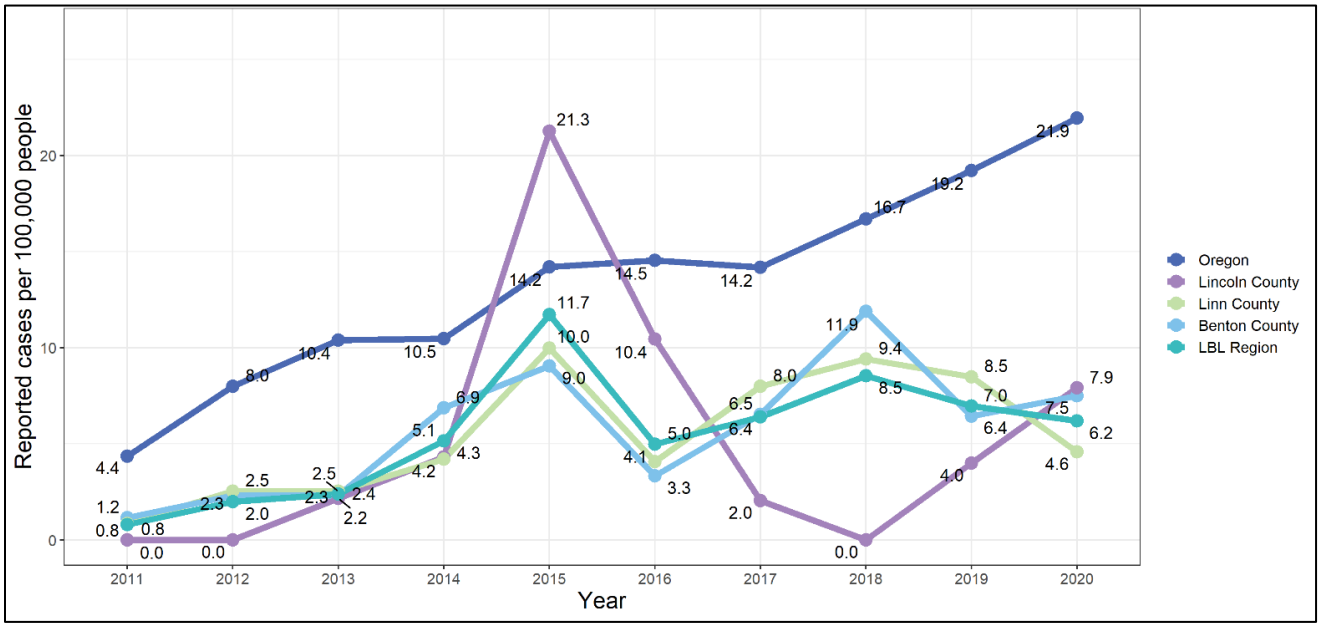
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-14: Reported cases of gonorrhea per 100,000 people by year and location



Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Figure 6-15: Reported cases of syphilis per 100,000 people by year and location



Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

7 Healthy Youth & Families

The wellbeing of gestational parents, infants, and children determines the health of the next generation and therefore is an important area for public health intervention. This section evaluates gestational parents and child health outcomes and numerous factors that influence these outcomes.

Throughout this section, we use the terms 'maternal' and 'women' as well as 'gestational parent' and 'pregnant parent.' We recognize that not all pregnant people identify as women. Often the choice of wording used in this report reflects the wording used by the data source being cited. We hope that inclusive language will become the standard in the future.

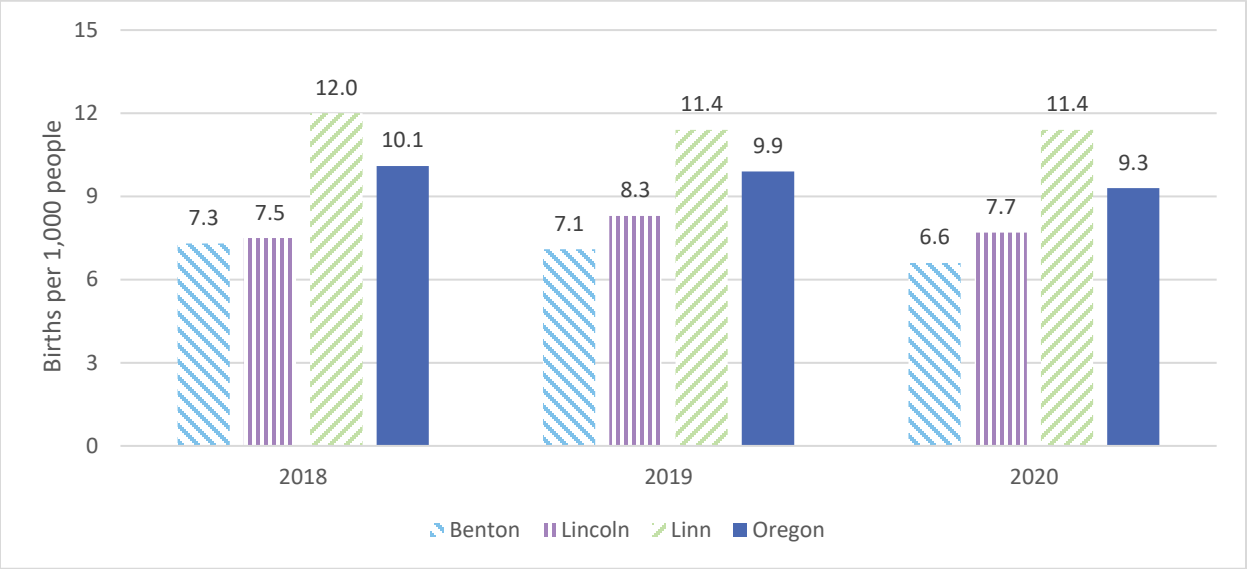
Pregnancy & Infant Health

Birth Rate

Birth rate is the total number of live births per 1,000 gestational parents each year. Overall, the birth rate in the LBL region decreased slightly from years 2018 to 2020. Linn County's birth rate is higher than that of Benton and Lincoln Counties and the state of Oregon (e.

Figure 7-1). Gestational parents in Benton County tend to give birth at a later age than gestational parents in Linn and Lincoln counties and the state of Oregon (Table 7-1). Gestational parents of Hispanic ethnicity had the highest birth rate.

Figure 7-1: Number of births per 1,000 people by year and location



Data source: Population data from Population Research Center, Portland State University; birth data from Vital Statistics, OHA Center for Health Statistics
Time period: 2018-2020
For more information: Population data: https://www.pdx.edu/population-research/population-estimate-reports, Birth data: https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/BIRTH/Pages/index.aspx

Table 7-1: Number of births per 1,000 population by maternal age group and location

Maternal Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0	< 1	< 1	< 1
15 to 17 years	1	7	6	5
18 to 19 years	4	46	42	26
20 to 24 years	12	97	99	58
25 to 29 years	60	100	115	83
30 to 34 years	93	76	87	87
35 to 39 years	54	41	39	48
40 to 44 years	11	12	8	11
45 to 49 years	1	0	0	1

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact local health department

Table 7-2: Number of births per 1,000 gestational parents by gestational parent's race/ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	28.1	37.8	35.2	35.6
Asian or Pacific Islander	24.7	36.2	35.6	36.9
Black	21.1	26.4	40.6	43.9
Hispanic	32.7	50.0	49.8	47.2
White	25.4	40.0	47.2	37.7

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Prenatal Care and Healthy Pregnancy

Prenatal care is the health care a gestational parent receives during pregnancy. Prenatal care can help parents have a healthy pregnancy for themselves and their baby and can help identify and treat complications. Pregnant people who don't receive prenatal care are three times more likely to have babies born at a low birth weight and five times more likely to have babies that die than pregnant people who do get prenatal care.[56]

Adequate prenatal care is defined as care that began before the third trimester and included at least five prenatal care visits. Pregnant people who identify as White, non-Hispanic are more likely to receive adequate prenatal care than are other racial/ethnic groups. This is consistent across Linn, Benton, and Lincoln counties as well as the state (Table 7-3).

Access to prenatal care also varies by age. Teen parents (pregnancies among people under the age of 20) are less likely to receive adequate prenatal care than are other age groups. When compared to Oregon, the LBL region tends to have more gestational parents with adequate access to prenatal care, with the exception of gestational parents ages 35-49 (Table 7-4).

Table 7-3: Percent of pregnancies with inadequate or no prenatal care services by gestational parent's race/ ethnicity and location

Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	20.0%	23.3%	14.5%	22.1%
Asian or Pacific Islander	11.2%	20.9%	18.6%	15.2%
Black	13.0%	23.3%	13.9%	19.6%
Hispanic	15.5%	17.5%	15.3%	16.3%
White	10.5%	14.1%	10.2%	11.3%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Table 7-4: Percent of pregnancies with inadequate or no prenatal care services by gestational parent's age group and location

Gestational Parent Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	0.0%	50.0%	48.0%
15 to 17 years	42.1%	17.2%	23.0%	26.4%
18 to 19 years	19.4%	24.5%	16.6%	21.3%
20 to 24 years	17.9%	18.2%	12.8%	17.6%
25 to 29 years	11.1%	14.3%	9.4%	12.8%
30 to 34 years	8.8%	12.2%	9.2%	10.0%
35 to 39 years	8.5%	13.9%	11.3%	9.8%
40 to 44 years	10.7%	17.8%	18.5%	12.5%
45 to 49 years	15.4%	20.0%	6.7%	11.1%

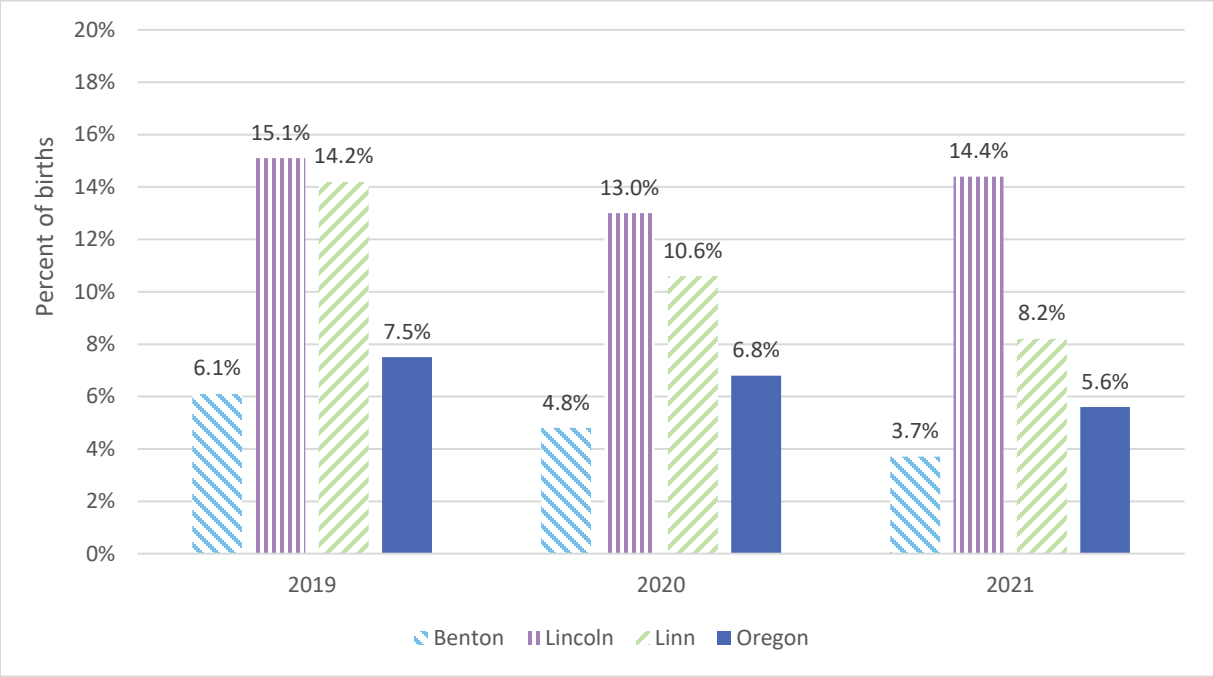
Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Prenatal Tobacco Use

Prenatal care includes an educational component in which the gestational parent can learn about behaviors that increase risk for complication such as tobacco use. Gestational parents who smoke are more likely to deliver their babies early, deliver low birth weight babies, and deliver babies with weaker lungs, increasing their risk for numerous health problems.[57]

From years 2018 to 2020, Lincoln County had the greatest percentage of births in which tobacco was used during pregnancy. Both Lincoln and Linn counties had rates of prenatal tobacco use far exceeding the Oregon state average during all three years (Figure 7-2). In the LBL region, younger gestational parents had higher rates of prenatal tobacco use (Table 7-5).

Figure 7-2: Percent of births in which tobacco was used during pregnancy by year and location



Data source: OHA Center for Health Statistics
Time period: 2019-2021
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/Oregonbirthsandpregnanciesbycounty/CountyDashboard

Table 7-5: Percent of maternal prenatal tobacco use by maternal age

Maternal Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	0.0%	50.0%	7.3%
15 to 17 years	7.9%	25.0%	23.2%	12.2%
18 to 19 years	21.9%	26.5%	26.7%	16.5%
20 to 24 years	14%	24.2%	21.2%	15.4%
25 to 29 years	7.1%	17.6%	14.3%	10.1%
30 to 34 years	4.2%	15.7%	10.8%	6.3%
35 to 39 years	3.6%	12.3%	11.8%	5.0%
40 to 44 years	4.4%	10.2%	9.8%	4.7%
45 to 49 years	0.0%	20.0%	0.0%	2.3%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

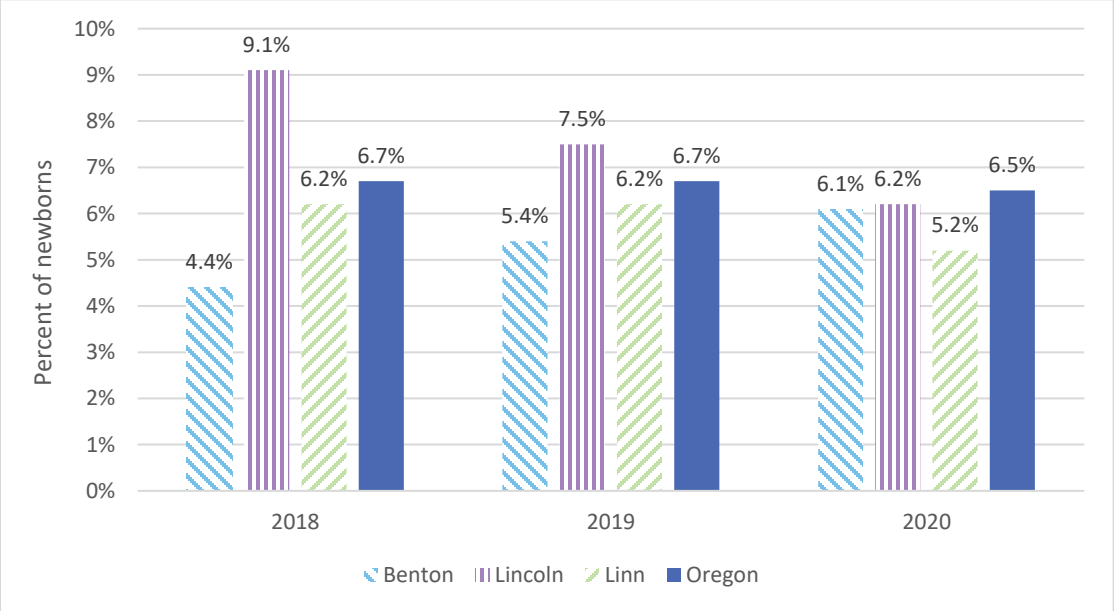
Premature Birth and Low Birthweight

Infant weight at birth is a strong predictor of health outcomes including chances of survival, risk of medical complications, and achievement of development milestones.[58] Low birthweight can be caused by numerous factors including premature birth, infection during pregnancy, smoking, and alcohol or drug use.

Low birthweight is defined as an infant whose weight at birth is 5.5 pounds or less. Lincoln County had the greatest percentage of low birthweight births from 2018 to 2020, although its rates have decreased drastically during this time period. Benton County's percentage of low birthweight births were below the Oregon state average for years 2018 to 2020 but its rates did increase during this time period (Figure 7-2).

Teen gestational parents (ages 10-19) and gestational parents of advanced gestational parent age (ages 35-49) have the highest percentage of newborns with low birthweight (Table 7-5). This may be in part driven by the region's rates of premature birth, which also exceed those of Oregon and follow a similar pattern when looking at gestational parent age. Premature birth is defined as birth that occurs before the 37th week of pregnancy. Black gestational parents are much more likely to both have a newborn with low birthweight and to experience premature birth (Table 7-6).

Figure 7-3: Percent of newborns with low birthweight by year and location



Data source: OHA Center for Health Statistics
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/VitalStatistics/birth/Pages/index.aspx

Table 7-6: Percent of newborns with low birthweight by maternal age group and location

Maternal Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	33.3%	0.0%	4.6%
15 to 17 years	7.9%	9.4%	10.2%	8.4%
18 to 19 years	9.0%	10.8%	7.5%	7.7%
20 to 24 years	6.4%	6.4%	6.4%	6.7%
25 to 29 years	5.1%	6.0%	5.4%	5.8%
30 to 34 years	4.3%	7.4%	5.4%	6.1%
35 to 39 years	6.0%	12.1%	8.1%	7.1%
40 to 44 years	10.2%	6.8%	10.9%	9.1%
45 to 49 years	15.4%	0.0%	20.0%	15.0%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Table 7-7: Percent of newborns with low birthweight by gestational parent's race/ethnicity and location

Gestational Parent Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	7.3%	8.3%	5.8%	7.5%
Asian or Pacific Islander	4.9%	7.0%	6.0%	7.8%
Black	11.7%	10.0%	10.2%	9.8%
Hispanic	6.6%	7.9%	6.3%	6.6%
White	5.1%	7.3%	6.1%	6.1%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact county health department

Table 7-8: Percent of premature births by gestational parent's age group and location

Gestational Parent Age	Benton	Lincoln	Linn	Oregon
10 to 14 years	0.0%	33.3%	0.0%	8.6%
15 to 17 years	5.3%	12.5%	9.7%	8.9%
18 to 19 years	11.6%	9.3%	8.8%	8.2%
20 to 24 years	5.9%	5.9%	7.7%	7.7%
25 to 29 years	5.9%	8.0%	6.9%	7.1%
30 to 34 years	5.4%	8.7%	7.4%	7.5%
35 to 39 years	7.2%	12.7%	10.8%	8.9%
40 to 44 years	10.3%	7.6%	13.4%	11.4%
45 to 49 years	38.5%	20.0%	46.7%	18.8%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

Table 7-9: Percent of premature births by gestational parent's race/ethnicity and location

Gestational Parent Race/Ethnicity	Benton	Lincoln	Linn	Oregon
American Indian or Alaska Native	10.9%	5.2%	7.5%	10.0%
Asian or Pacific Islander	4.9%	8.1%	4.7%	7.9%
Black	14.3%	10.0%	11.1%	9.7%
Hispanic	7.4%	9.5%	8.2%	8.2%
White	6.0%	8.3%	7.8%	7.5%

Data source: Oregon Public Health Assessment Tool
Time period: 2011-2020
For more information: contact the local health department

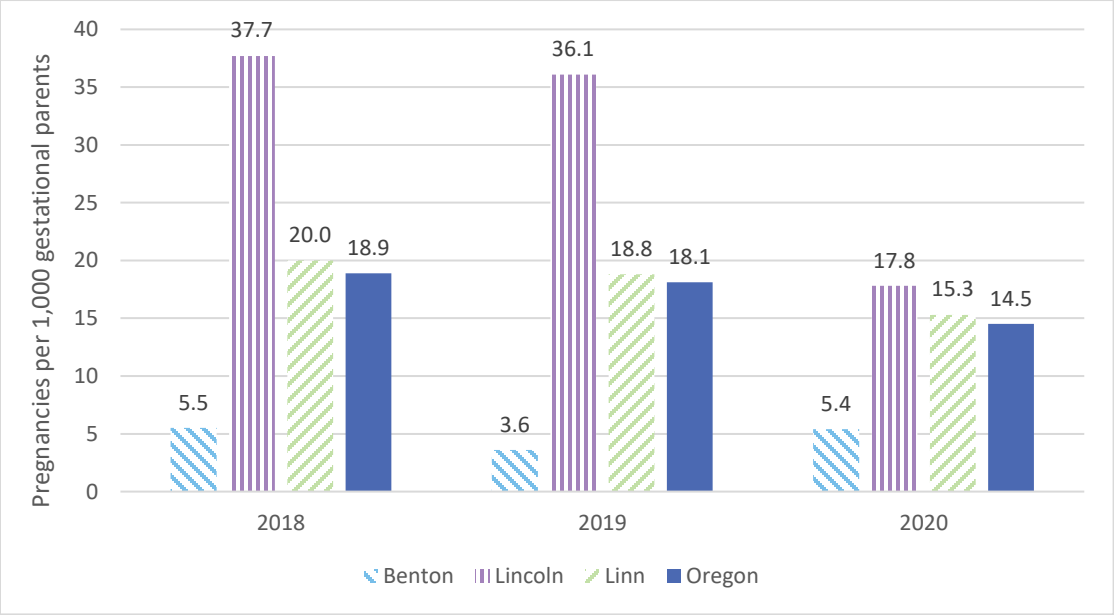
Teen Pregnancy

Teen pregnancy and childbearing have long-term social and economic costs on teen parents and their children. Only about 50% of teen gestational parents receive a high school diploma by age 22 compared to 90% of gestational parents who don't have children as a teen. The children of teenage gestational parents are more likely to drop out of high school themselves, have low academic achievement, have more health problems, be incarcerated as an adolescent, give birth during their teenage years, and face

unemployment as a young adult.[59] These long-term costs make teen pregnancy a pertinent public health issue.

In the United States, rates of teen pregnancy have been declining since 1991. On average, in the LBL region, teen pregnancy rates have been declining from years 2018 to 2020. Lincoln County experienced disproportionately high rates of teen pregnancy in years 2018 and 2019 but has seen a major reduction in rates of teen pregnancy in the year 2020. Linn County's rates of teen pregnancy are similar to those of the state of Oregon, while Benton County's teen pregnancy rates are lower (Figure 7-3).

Figure 7-4: Teen pregnancy rate by location, 2018-2020



Data source: Population Research Center, Portland State University
Time period: 2018-2020
For more information:
https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/TEENPREGNANCY/Pages/Teen-Pregnancy-YTD-and-Final.aspx

Breastfeeding

Breastfeeding has health benefits for both babies and gestational parents. Breast milk is the best source of nutrition for most babies and thanks to antibodies shared from gestational parent to baby through breast milk, breastfeeding can protect babies from some short and long-term illnesses and diseases. Breastfed babies have lower risk of asthma, obesity, type 1 diabetes, sudden infant death syndrome, ear infections, and stomach bugs. Breastfeeding can reduce gestational parent's risk of breast and ovarian cancer, type 2 diabetes, and high blood pressure.[60]

Data on breastfeeding are limited at both the state and county level. However, state programs, such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), give some insight into the percentage of participating gestational parents who breastfeed. In 2021, Lincoln County had the greatest percentage of pregnant gestational parents on WIC and the greatest percentage of gestational

parents who started out breastfeeding. After 6 months however, Lincoln County WIC gestational parents are the least likely to have exclusively breastfed. Benton County had the greatest percentage of gestational parents who breastfed exclusively for 6 months in 2021 (Table 7-10).

Table 7-10: Percent of gestational parents who utilized WIC during the postpartum period by breastfeeding duration and location

	Benton	Lincoln	Linn
Percent of WIC gestational parents who started out breastfeeding (initiation)	97%	99%	93%
Percent of gestational parents who breastfed exclusively for 6 months	43%	33%	39%

Data source: 2021 WIC Annual Report, Oregon Health Authority
Time period: 2021
For more information: https://www.oregon.gov/oha/PH/HEALTHYPEOPLEFAMILIES/WIC/Pages/annual.aspx

Child and Adolescent Health

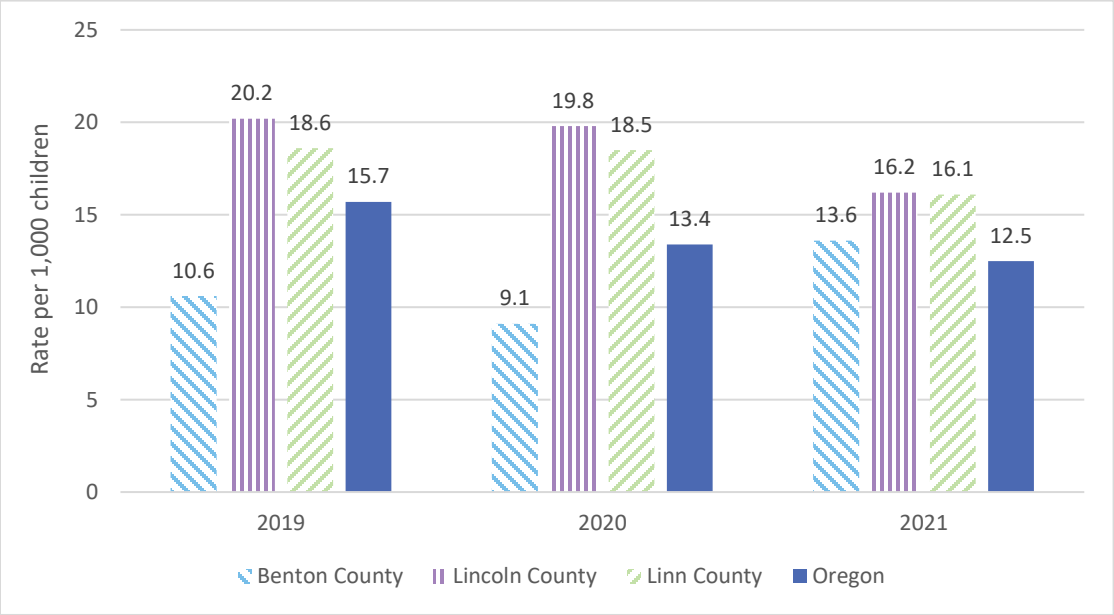
Childhood and adolescence are formative times in a person's life, and they set the stage for later health and wellbeing. The number and severity of adverse experiences during childhood affect an individuals' risk for alcoholism, depression, heart disease, liver disease, intimate partner violence, sexually transmitted infections, smoking, and suicide. Child and adolescent health include overall health and wellness involving child abuse, foster care, and youth immunization rates.

Child Abuse

Child abuse is one form of Adverse Childhood Experience (ACE). In 2021 there were a total of 5,576 reports of child abuse in the LBL region. Of those reports, 3,098 (53.6%) were referred to Child Protective Services. In 2021, neglect and threat of harm were the two most common forms of child abuse in the LBL region. In Oregon, leading family stress factors of abused children are substance use, domestic violence, and parental involvement with law enforcement.

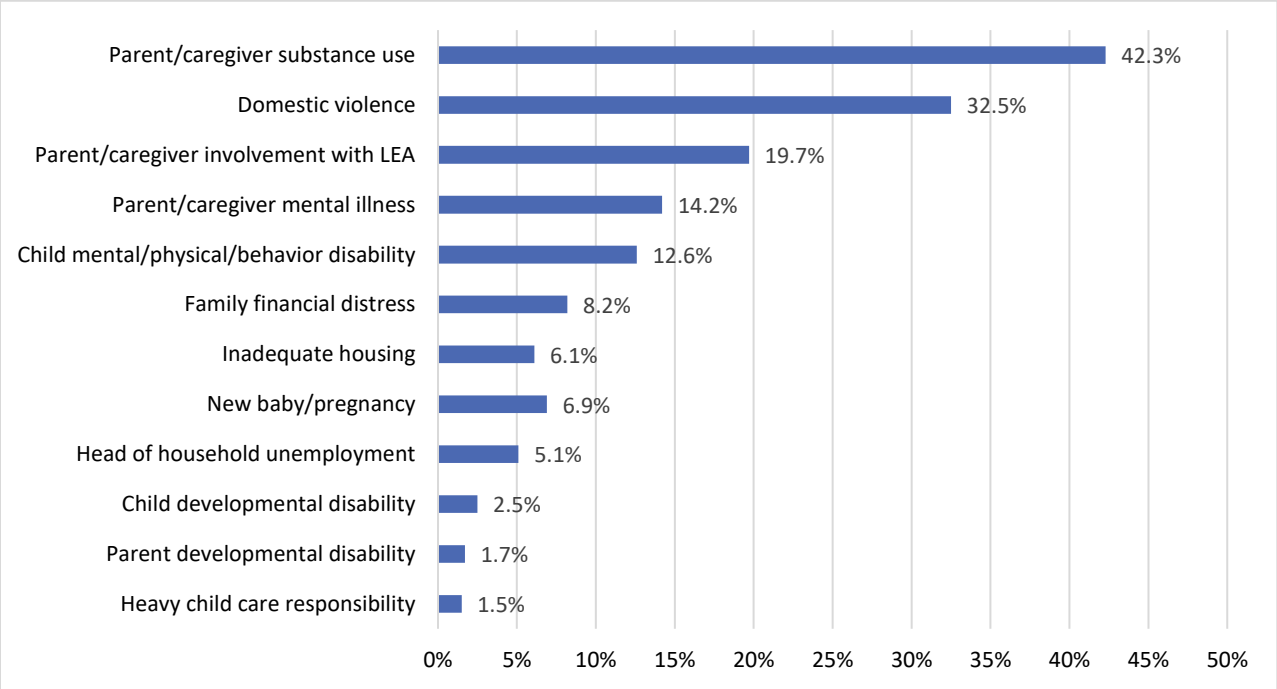
Lincoln and Linn counties had higher rates of child abuse compared to Benton County and the state of Oregon during years 2019 to 2021. Child abuse rates dropped in both Linn and Lincoln counties between 2019 and 2021, however did increase by 4.5% in Benton County from 2020 to 2021 (Figure 7-5). From 2019 to 2021, Lincoln County had many more children in foster care per 1,000 children than did Benton and Linn counties and the state of Oregon (Figure 7-7).

Figure 7-5: Number of child abuse victims per 1,000 children by location



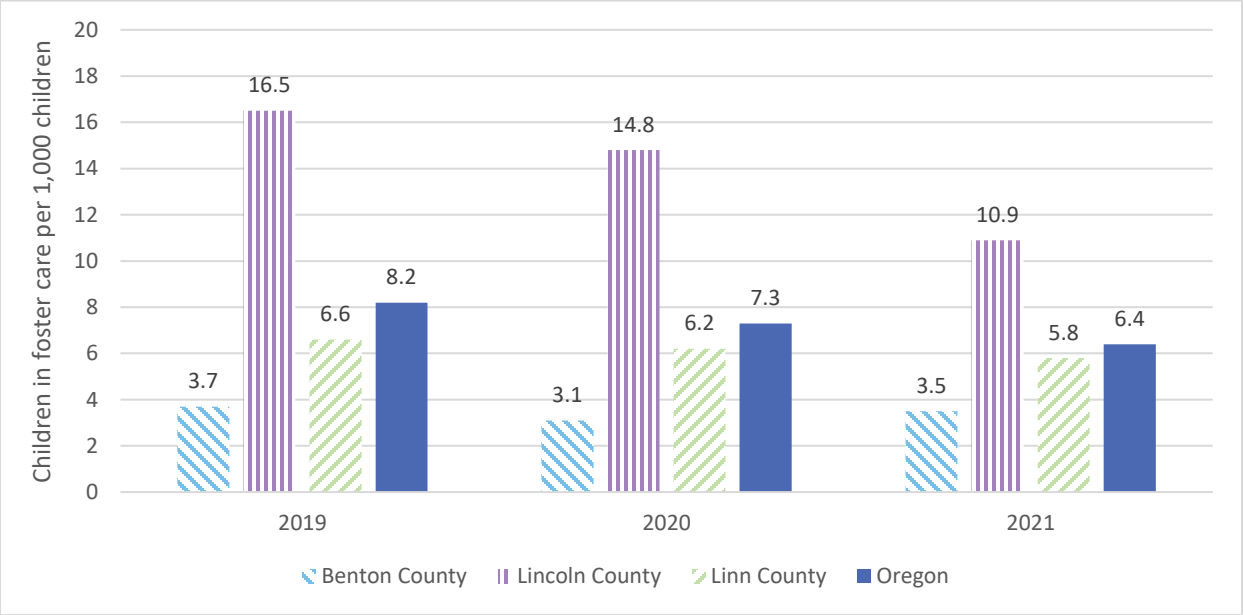
Data source: Child Welfare Data Book
Time period: 2019-2021
For more information: https://www.oregon.gov/dhs/CHILDREN/CHILD-ABUSE/Documents/2021-cw-data-book.pdf

Figure 7-6: Family stress factors among founded abuse cases, Oregon



Data source: Child Welfare Data Book
Time period: 2021
For more information: https://www.oregon.gov/dhs/CHILDREN/CHILD-ABUSE/Documents/2021-cw-data-book.pdf

Figure 7-7: Number of children in foster care per 1,000 children by location



Data source: Child Welfare Data Book
Time period: 2019-2021
For more information: https://www.oregon.gov/dhs/CHILDREN/CHILD-ABUSE/Documents/2021-cw-data-book.pdf

Youth Immunization Rates

Immunization against communicable diseases has been one of the greatest advancements in public health and has led to the elimination of numerous diseases in the United States including smallpox, polio, measles, and rubella. Each year, childhood vaccines save an estimated two to three million lives worldwide.[61]

The current Centers for Disease Control and Prevention (CDC) recommendations (as of 2022) are for children to be fully vaccinated by age two against:

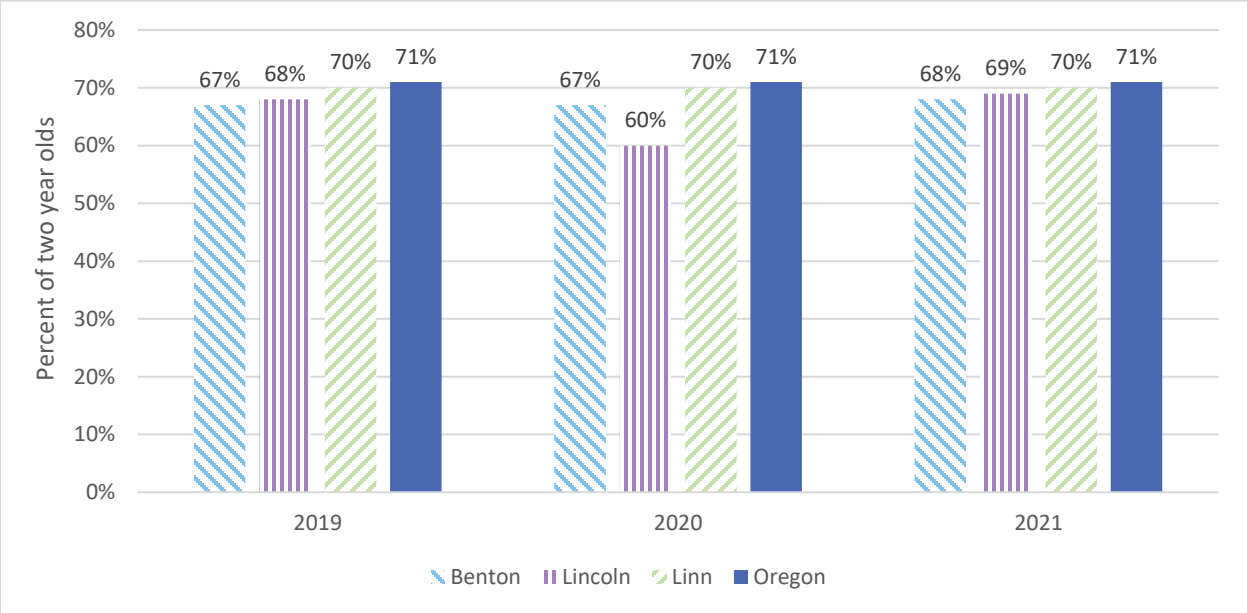
- Diphtheria, Tetanus, Pertussis
- Polio
- Measles, Mumps, Rubella
- Hib (a bacterial infection that can cause meningitis)
- Hepatitis B
- Varicella (Chickenpox)
- Pneumococcal conjugate

This is known as the 4:3:1:3:3:1:4 schedule. When compared to the state of Oregon, the LBL region had lower percentages of two year olds up to date with this vaccine schedule during years 2019 through 2021 (Figure 7-8). In years 2019 and 2021, the counties making up the LBL region had similar percentages of two year olds who completed the 4:3:1:3:3:1:4 vaccine schedule. In 2020, Lincoln County's percentage of two year olds who completed the 4:3:1:3:3:1:4 vaccine schedule declined, possibly due to COVID-19 healthcare interruptions.

Vaccination rates vary slightly among WIC clients. In 2019-2021, fewer two year olds enrolled in WIC services completed the 4:3:1:3:3:1:4 vaccine schedule in Benton and Linn counties when compared to the general population. In Lincoln County during these years, a greater or equal percentage of two year olds enrolled in WIC services completed the 4:3:1:3:3:1:4 vaccine schedule than the general population.

Starting at age 11 or 12, adolescents are recommended to receive Tdap, HPV, and Meningococcal vaccines. In 2021, adolescents in the LBL region received the Tdap vaccine at rates comparable to the state average. Adolescents in the LBL region received the Meningococcal and HPV vaccine at rates slightly lower than the state average in 2021 (Table 7-11).

Figure 7-8: Percent of two-year olds up to date with the 4:3:1:3:3:1:4 vaccine series by location



Data source: ALERT Immunization Information System (IIS)
Time period: 2019-2021
For more information:
https://www.oregon.gov/oha/ph/preventionwellness/vaccinesimmunization/pages/researchchild.aspx

Table 7-11: Percent of adolescents ages 13 to 17 immunized for specific diseases by location

	Benton	Lincoln	Linn	Oregon
Tdap (tetanus, diphtheria, acellular pertussis)	89%	87%	92%	90%
Meningococcal	75%	72%	76%	81%
HPV completion (2 or 3 doses depending on age at first dose)	50%	48%	44%	55%

Data source: Alert Immunization Information System (IIS)
Time period: 2021
For more information:
https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/VACCINESIMMUNIZATION/Pages/researchteen.aspx

8 Mental & Behavioral Health

The term "behavioral health" refers to a wide range of topics and is often used interchangeably with "mental health." Behavioral health describes the connection between a person's behaviors and the health and wellbeing of the body and mind,[62] while mental health refers only to one's emotional, psychological and social wellbeing.[63] This chapter explores topics that fall under the categorization of mental health and those that are categorized as behavioral health including substance use, nutrition and physical activity.

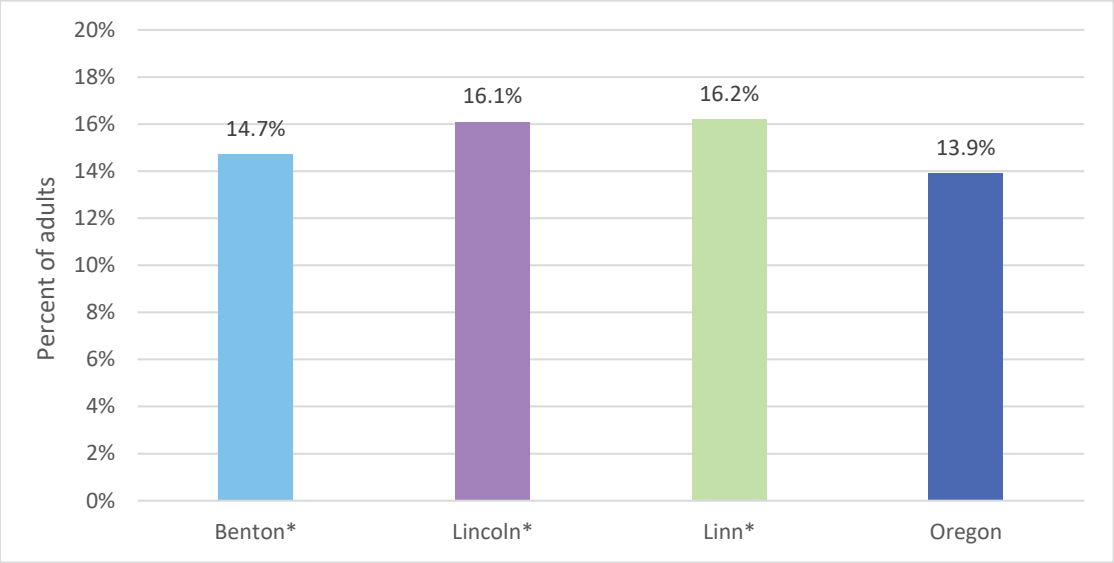
Mental Health

Mental health has a significant impact on overall health and is composed of emotional, psychological, and social factors. Poor mental health reduces one's ability to cope with stress, make healthy decisions, and recover from disease. The association between poor mental health and chronic disease has been well established in literature. Oregon has a considerably high prevalence of mental health illness and low access to mental health care. In 2020, Oregon ranked last in the United States for mental health.[64] Given the extreme burden of this public health issue, the 2020-2024 State Health Improvement Plan aims to improve behavioral health and reduce mental health stigma in Oregon communities.[65]

Based on PLACES estimates, a greater number of adults in the LBL region experienced 14 or more "not good" mental health days when compared to Oregon on average (Figure 8-1). Mental illness differs from poor mental health. A mental illness is a diagnosed condition that affects one's thoughts and behaviors. According to the CDC, more than 50% of Americans will be diagnosed with a mental illness in their lifetime. In 2020, 21.8% of Oregon's population had a diagnosis of depression.[66] PLACES estimates show the LBL region as having similar rates of depression as the state of Oregon, with Linn and Lincoln counties having slightly higher rates and Benton County having slightly lower rates (Figure 8-2). Benton County consistently outperformed the surrounding counties in regard to mental health indicators. From 2018-2020, Lincoln County had the highest rates of suicide deaths in the LBL region. The majority of suicide deaths in the LBL region were among those ages 25-44 (Figure 8-6).

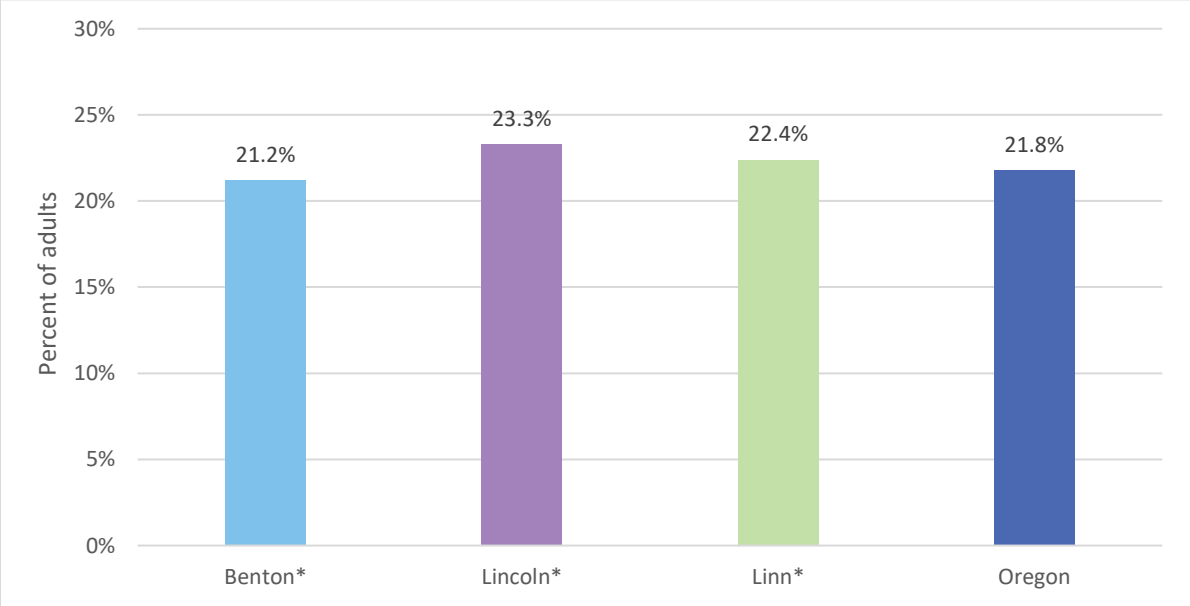
Mental health in adolescents and children is a growing problem that had been exacerbated by the COVID-19 pandemic. In the 2021 student health survey, 37% of surveyed high school students reported having poor mental health during the pandemic and 44% felt persistently sad or hopeless over the previous year.[67] To track health indicators in the adolescent population, the Oregon Health Authority administers the Oregon Healthy Teens Survey to eighth and eleventh graders across the state during in odd numbered years. In 2019, students residing in Lincoln County had a high prevalence of feeling sad and hopeless (Figure 8-3) and ranked consistently poor for other important mental health indicators. Close to a quarter of all eighth graders in Lincoln County reporting seriously considering suicide (Figure 8-7) and over 13% of the students reported attempting suicide (Figure 8-8). Lincoln County also had the highest percentage of eleventh graders who considered suicide, however eleventh grade students in Linn County more commonly reported attempting suicide. Benton County students had the lowest percentage of suicidal ideation and attempts in the region (Figures 8-7 and 8-8).

Figure 8-1: Age adjusted percent of adults who experienced 14 or more “not good” mental health days by location



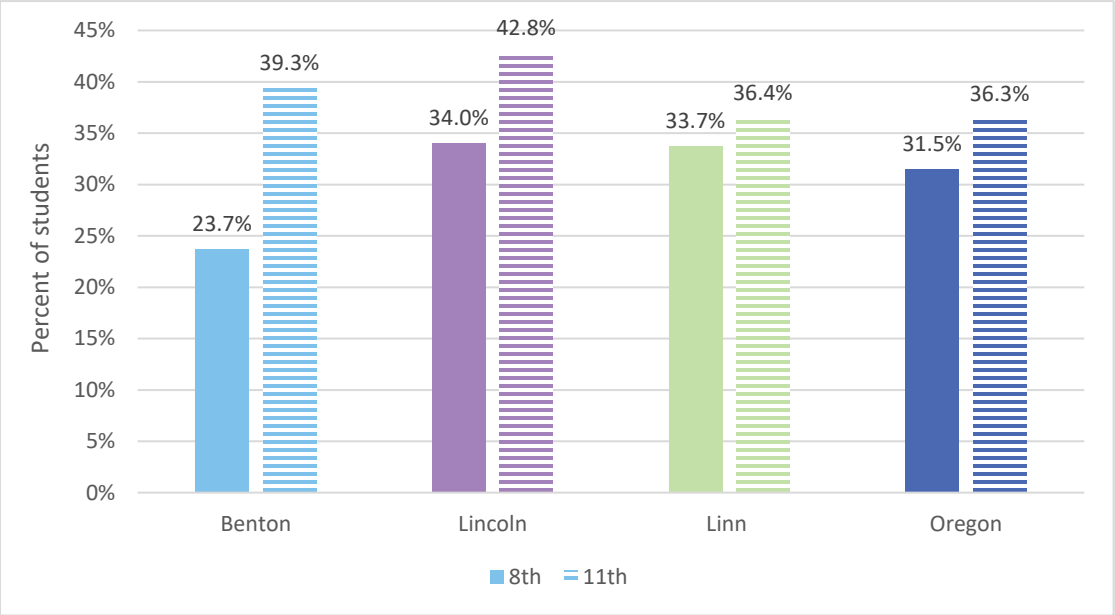
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 8-2: Age adjusted percent of adults that report being diagnosed with depression by location



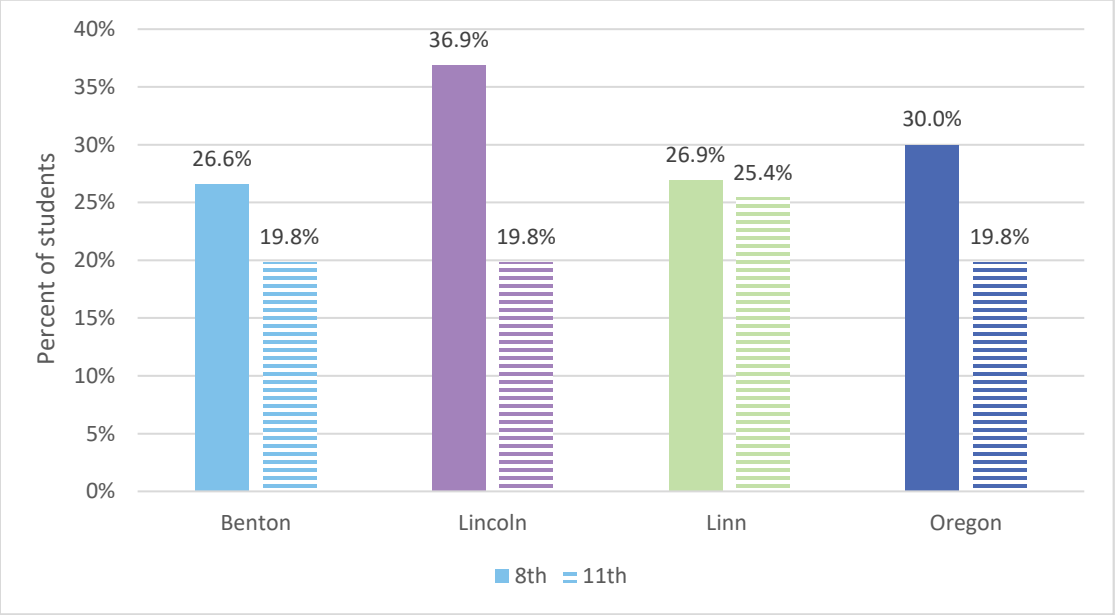
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*
Data source: Behavioral Risk Factor Surveillance System PLACES
Time period: 2020
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 8-3: Percent of students who reported feeling sad or hopeless almost every day for 2+ weeks in a row by grade and location



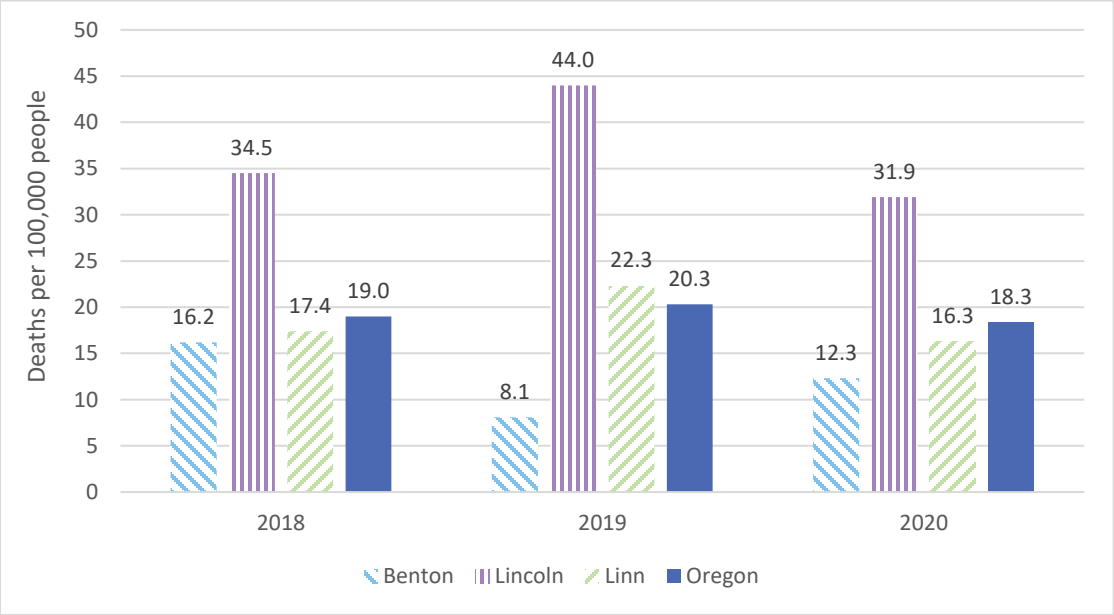
Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-4: Percent of students who reported being bullied at school in the last 30 days by grade and location



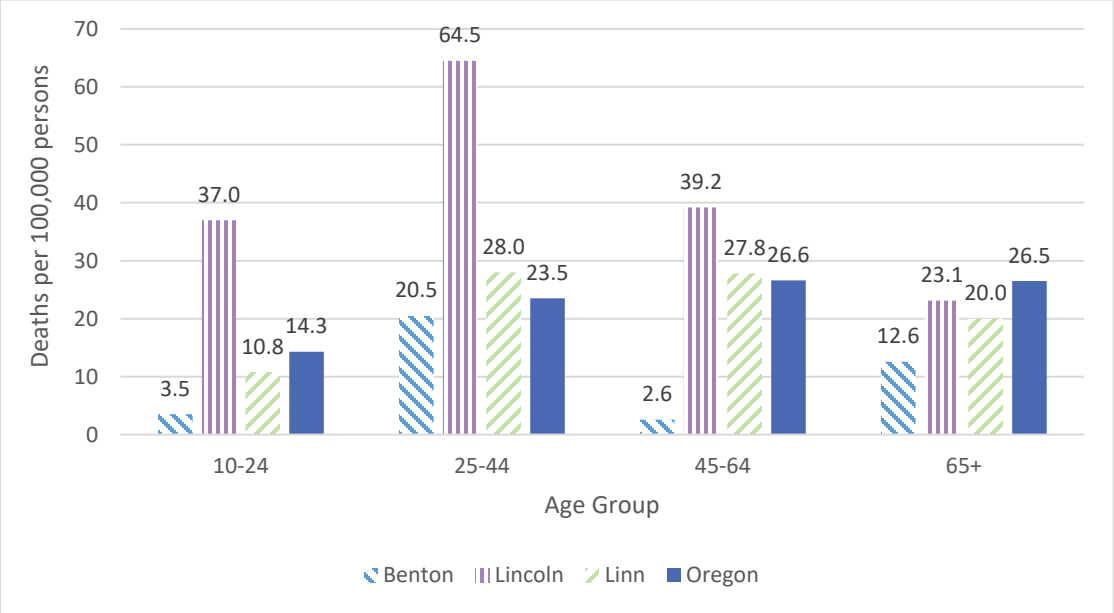
Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-5: Age adjusted number of deaths by suicide per 100,000 people by year and location



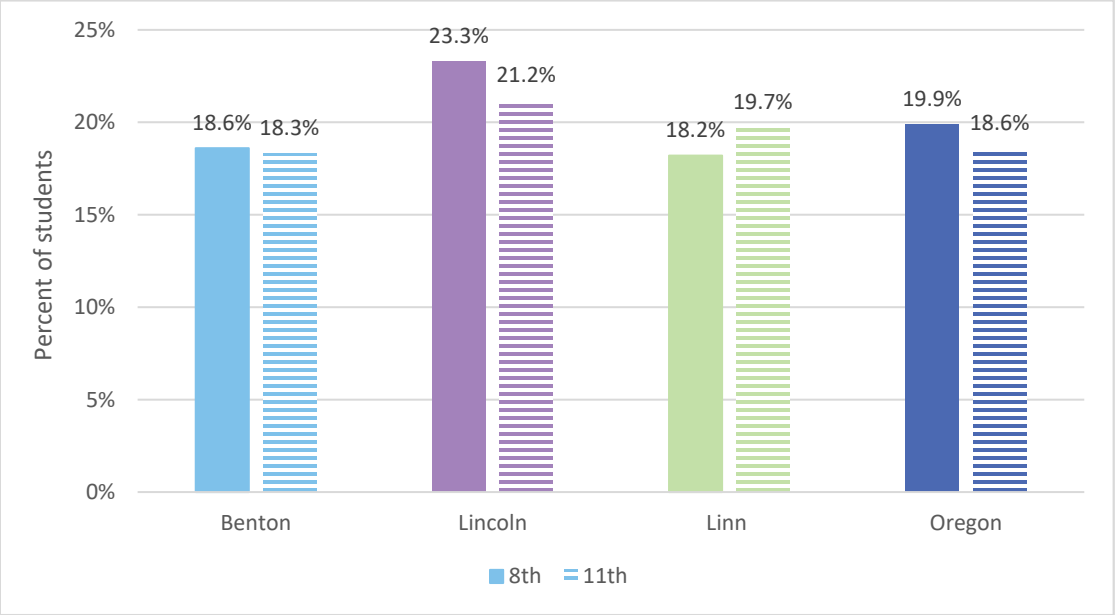
Data source: Oregon Violent Death Dashboard
Time period: 2018-2020
For more information: https://www.oregon.gov/oha/PH/DiseasesConditions/InjuryFatalityData/Pages/nvdrs.aspx

Figure 8-6: Number of deaths by suicide per 100,000 people by age group and location



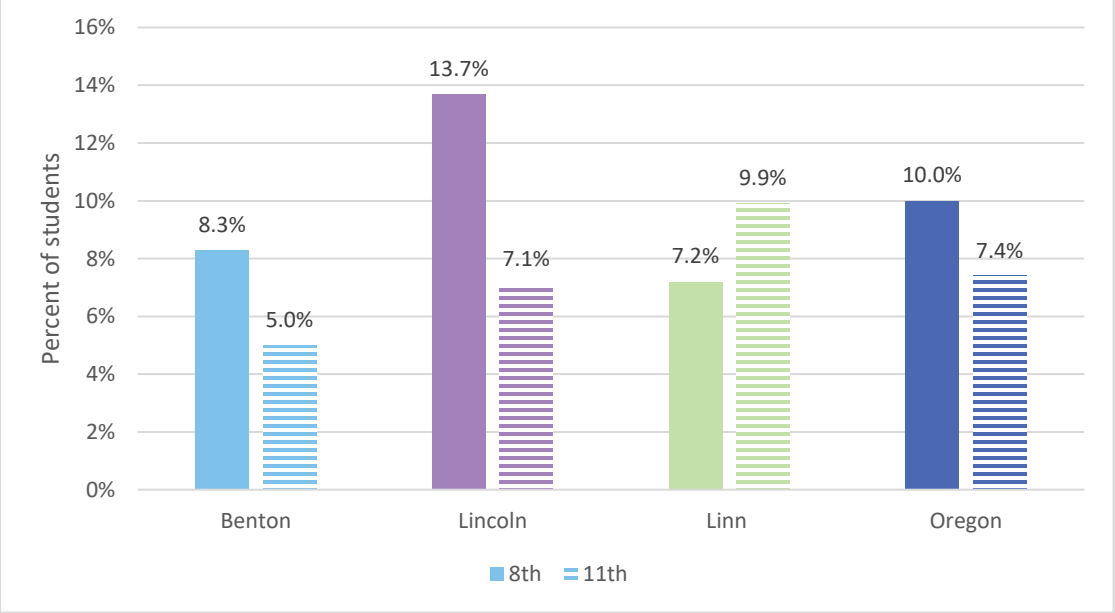
Data source: Oregon Violent Death Dashboard
Time period: 2019-2020
For more information: https://www.oregon.gov/oha/PH/DiseasesConditions/InjuryFatalityData/Pages/nvdrs.aspx

Figure 8-7: Percent of students who reported seriously considering attempting suicide by grade and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-8: Percent of students who reported attempting suicide by grade and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Substance Use

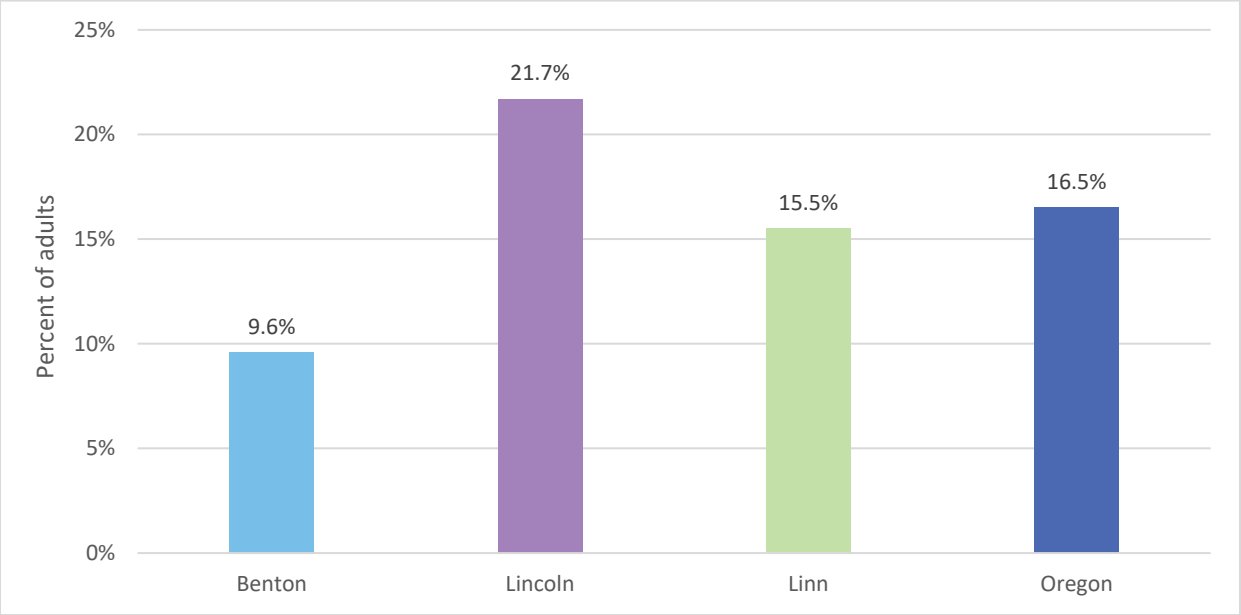
The dangers of tobacco use are well documented and include heightened risk for a myriad of diseases including cancer, heart disease, stroke, lung disease, diabetes, and chronic obstructive pulmonary disease.[68] For every person who dies because of smoking, at least 30 people live with a serious smoking-related illness. In 2020, 18.8% of Oregon residents living with one or more chronic diseases smoked cigarettes.[69] Lincoln County has the highest percent of adults who smoke cigarettes and a higher percentage than Oregon on average (Figure 8-9). Of those who smoke cigarettes in the LBL region, over half either want to quit smoking or have attempted to quit during the previous year (Table 8-1).

Alcohol and prescription medications are consumed appropriately and responsibly by most of the population. However, problems frequently occur when these substances are overconsumed, used inappropriately, combined with other substances, or consumed while engaging in risky activities such as driving or unsafe sexual activity. PLACES estimates show a greater percentage of Linn and Lincoln County adults engaging in binge drinking than the Oregon average (Figure 8-10). Binge drinking is defined as five or more drinks among men and four or more drinks among women per day.

Drug overdose deaths in the LBL region in years 2017 to 2019 were driven primarily by opioids and methamphetamine. The majority of Linn County's drug overdose deaths during these years were from methamphetamines while the majority of Benton and Lincoln County drug overdoses were from opioids.[70] In years 2017 and 2018, all counties belonging to the LBL region experienced fewer accidental/undetermined drug overdose deaths per 100,00 people than the state of Oregon. In 2019, drug overdose rates increased in all three counties and the state of Oregon (Figure 8-11). From 2018 to 2019, Lincoln County's drug overdose death rate increased 147%.

Misuse of substances at an early age (particularly before age 18) is shown to be an important predictor of substance use disorders later in life, making this period an important focus for prevention efforts. In 2019, Lincoln County had the greatest percentage of 8th grade students who had ever used cigarettes, alcohol, marijuana, and prescription drugs (Figure 8-12). Among 11th graders that same year, Linn County had the greatest percent of students who had ever used cigarettes, alcohol, marijuana, and e-cigarettes. In 2019, 37.4% of Linn County's 11th graders reported ever having used an e-cigarette (Figure 8-13). This is much higher than use in Lincoln and Benton counties and the state of Oregon.

Figure 8-9: Percent of adults 18 years and older who smoke cigarettes by location



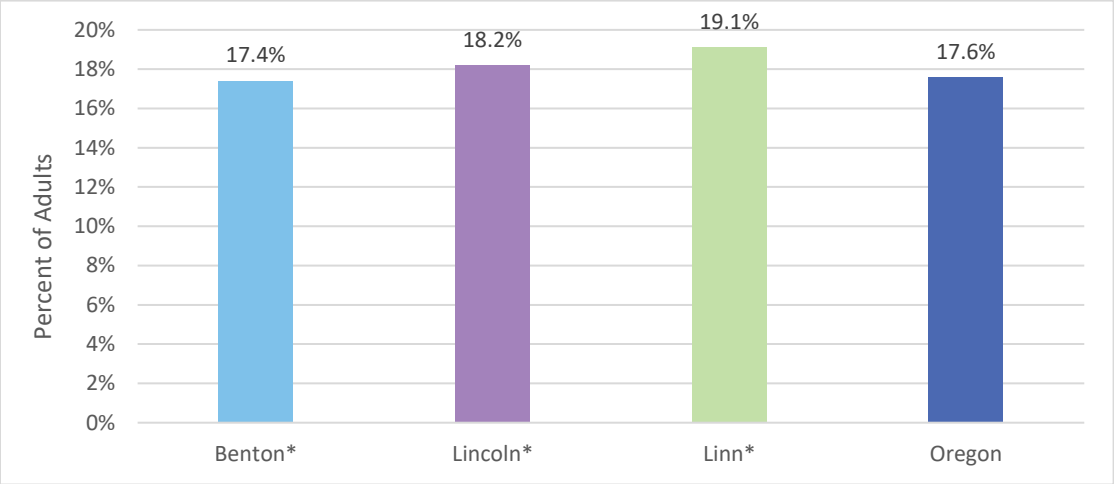
Data source: Oregon Behavioral Risk Factor Surveillance System County Combined dataset, 2016 –2019
Time period: 2016-2019
For more information: https://www.oregon.gov/oha/ph/preventionwellness/tobaccoprevention/pages/oregon-tobacco-facts.aspx

Table 8-1: Percent of adult smokers by quit status and location

	Benton	Lincoln	Linn	Oregon
Wants to quit cigarette smoking	55.9%	53.2%	59.5%	63.2%
Attempted to quit cigarette smoking during the previous year	51.9%	57.8%	51.0%	54.1%

Data source: Oregon Behavioral Risk Factor Surveillance System County Combined dataset, 2016 –2019
Time period: 2016-2019
For more information: https://www.oregon.gov/oha/ph/preventionwellness/tobaccoprevention/pages/oregon-tobacco-facts.aspx

Figure 8-10: Percent of adults 18 years and older who binge drink by location



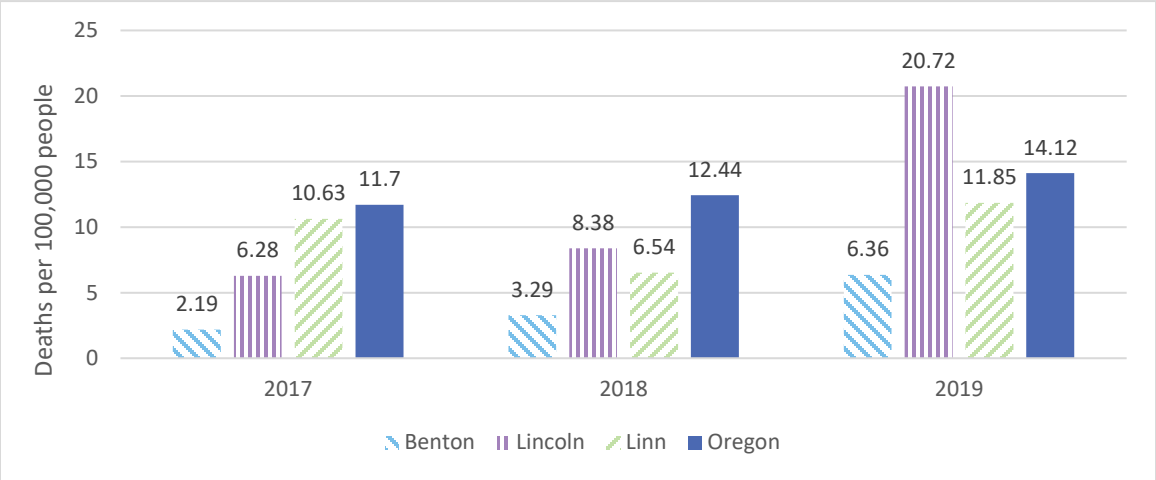
**Note: Calculated via small area estimation methods using all national 2020 BRFS survey responses statistically adjusted for county-level demographics.*

Data source: Behavioral Risk Factor Surveillance System PLACES

Time period: 2020

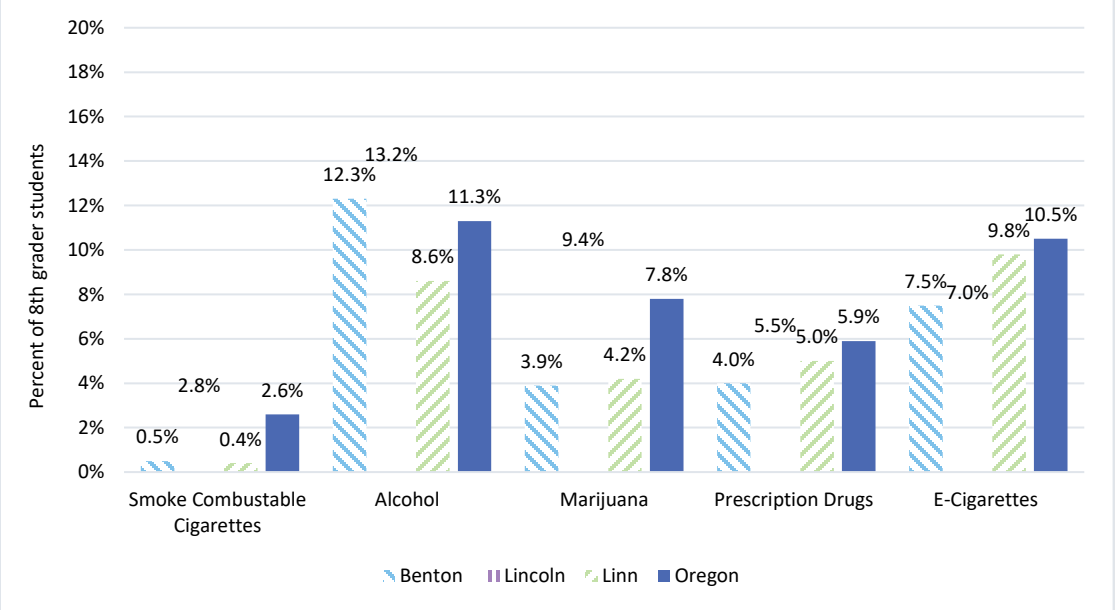
For more information: County-level data: https://www.cdc.gov/places/index.html. State-level data here: https://www.cdc.gov/brfss/brfssprevalence/index.html

Figure 8-11: Number of accidental/undetermined deaths from drug overdose per 100,000 people by year and location



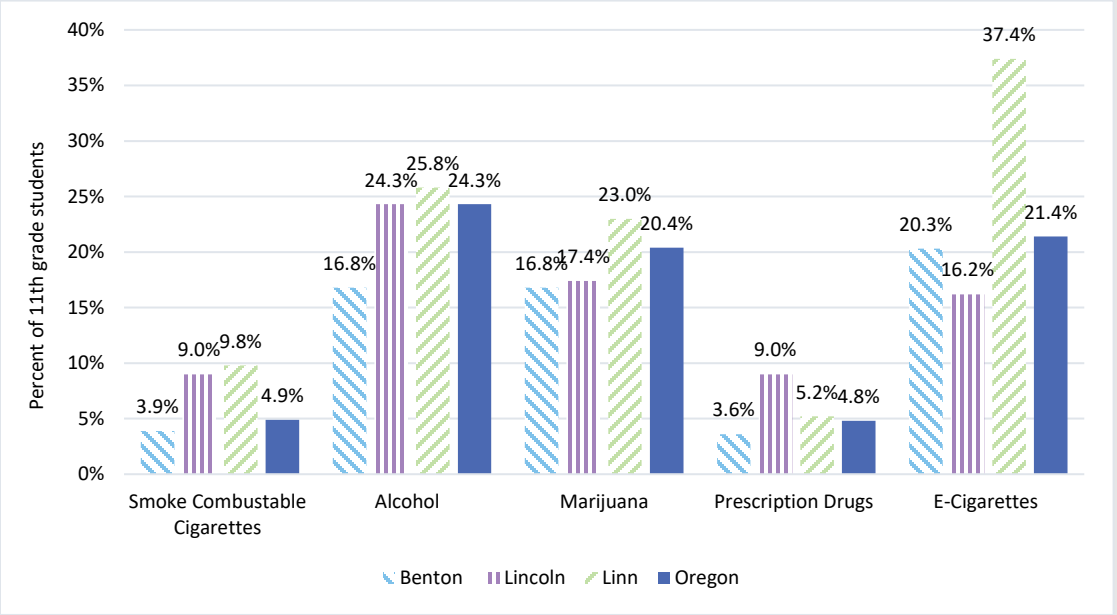
Data source: Oregon Prescribing Drug Overdose Data Dashboard
Time Period: 2017-2019
For more information:
https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/SUBSTANCEUSE/OPIOIDS/Pages/data.aspx

Figure 8-12: Percent of 8th grade students who reported ever using substances by substance and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-13: Percent of 11th grade students who reported ever using substances by substance and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Nutrition & Physical Activity

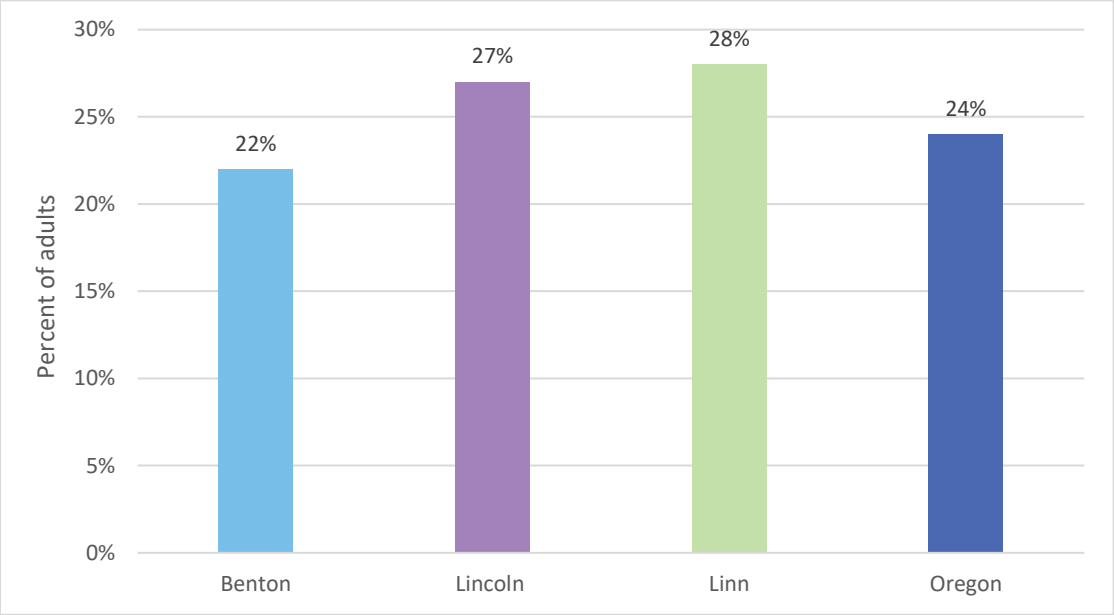
Healthy nutrition and physical activity promote lifelong health through improvement in body composition, musculoskeletal health, physical and cognitive health, and prevention of chronic disease.[71] However, the ability to make healthy choices related to nutrition and physical activity is greatly constrained by the characteristics of one's community and life circumstances (see Chapter 4: Social Determinants of Health.)

Physical inactivity is associated with several diseases and conditions, including type 2 diabetes, cancer, stroke, hypertension, cardiovascular disease, and premature mortality. The United States Department of Health and Human Services (DHHS) recommends that adults get at least 150 minutes of moderate-intensity physical activity per week, 75 minutes of vigorous-intensity physical activity per week, or a combination of both moderate-to-vigorous physical activity.[72] Leisure-time physical activity is physical activity that occurs outside of work hours and is often used as a population-level measure of physical activity. In 2019, a greater percentage of adults in Linn and Lincoln counties engaged in no leisure-time physical activity compared to the state of Oregon (Figure 8-14).

The DHHS recommends that adolescents get 60 minutes or more of physical activity every day.[73] In 2019, the percent of students meeting this recommendation was much lower among 11th graders than among 8th graders in both Linn and Benton counties. Lincoln County had the greatest percentage of 11th graders engaged in at least 60 minutes of physical activity a day in the LBL region, while Linn County had the greatest percentage of 8th graders meeting the guidelines in the LBL region.

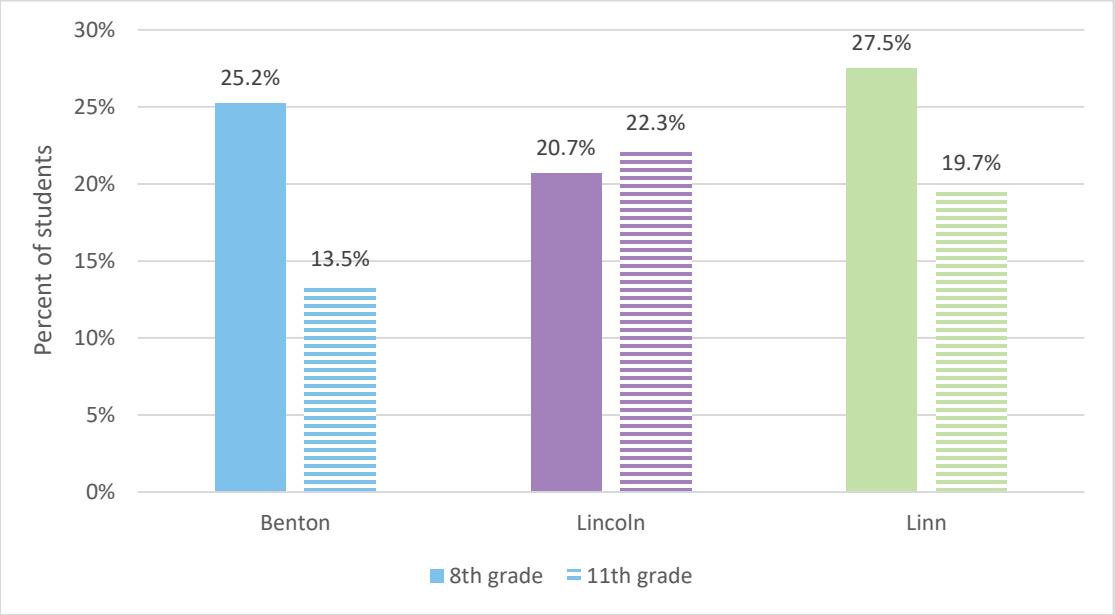
Eighth graders in the LBL region were more likely to consume five or more servings of fruits and vegetables per day than were 11th graders. Benton County had the greatest percentage of both 8th and 11th grade students who consumed five or more servings of fruits or vegetables per day in 2019. This is consistent with data that shows that Benton County residents have the greatest access to grocery stores (Figure 3-4).

Figure 8-14: Age-adjusted percent of adults 18 and over reporting no leisure-time physical activity in the past month by location



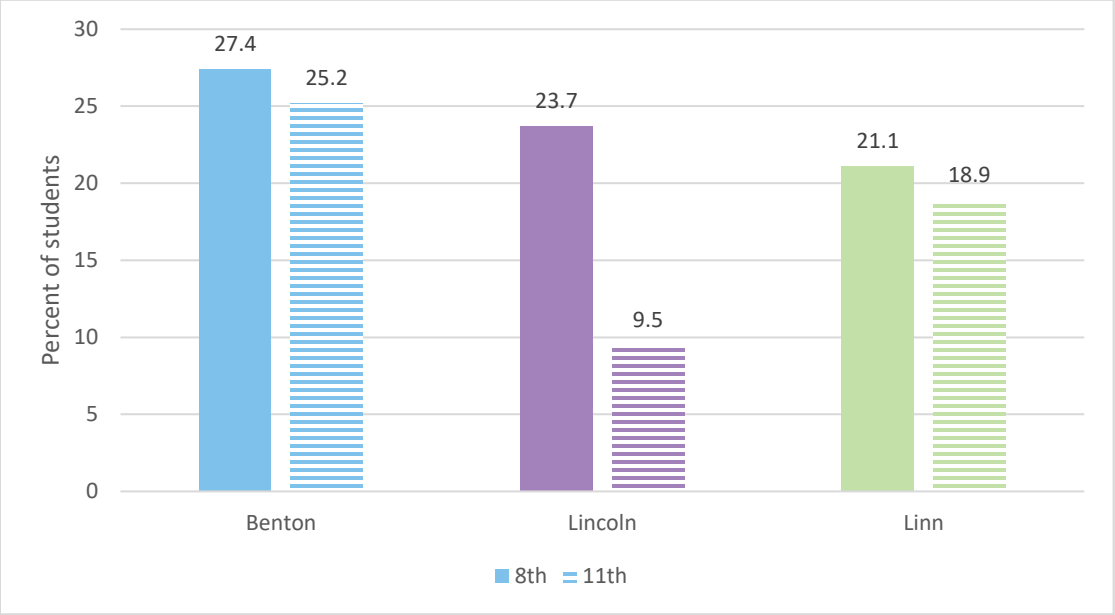
Data source: County Health Rankings
Time period: 2022
For more information: https://www.countyhealthrankings.org/explore-health-rankings/county-health-rankings-model/health-factors/health-behaviors/diet-and-exercise/physical-inactivity?state=41&year=2022#map-anchor

Figure 8-15: Percent of students who are physically active for at least 60 minutes per day by grade and location



Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Figure 8-16: Percent of students who consume 5 or more servings of fruits and vegetables per day by grade and location



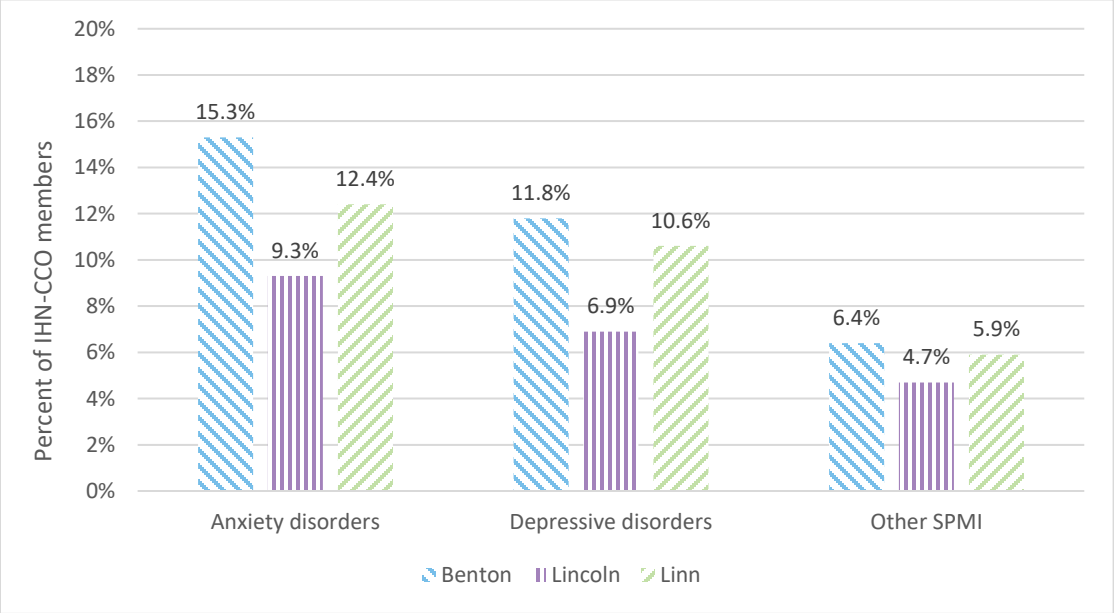
Data source: Oregon Healthy Teen Survey
Time period: 2019
For more information:
https://www.oregon.gov/oha/PH/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx

Oregon Health Plan (Medicaid): InterCommunity Health Network Coordinated Care Organization (IHN-CCO)

The Oregon Health Plan (OHP) is Oregon's Medicaid program. The Oregon Health Authority established a network of Coordinated Care Organizations (CCOs) as Medicaid managed care organizations to coordinate services for people covered by the Oregon Health Plan. The InterCommunity Health Network Coordinated Care Organization (IHN-CCO), established in 2012, is responsible for managing care for OHP members in the LBL region. Nationally, Medicaid recipients are disproportionately affected by mental health disorders and Medicaid is the largest payer for mental health services in the United States.[74] In 2021, 12.4% of all IHN-CCO members were diagnosed with an anxiety disorder and 10.6% had been diagnosed with depression (Figure 8-17). Over 70% of IHN-CCO members with a serious and persistent mental illness received at least one outpatient behavioral health visits in 2021, with persons residing in Lincoln County most likely to receive care (Figure 8-18).

It is important to note that the data below come from insurance claims. Claims are only available for health care services that were provided – meaning that individuals both sought care and were able to access care. The data below should be interpreted as a reflection of the services provided, not a reflection of the total need or frequency of health conditions among IHN-CCO members.

Figure 8-17: Percent of IHN-CCO members with a serious and persistent mental illness (SPMI)* diagnosis, by type and location



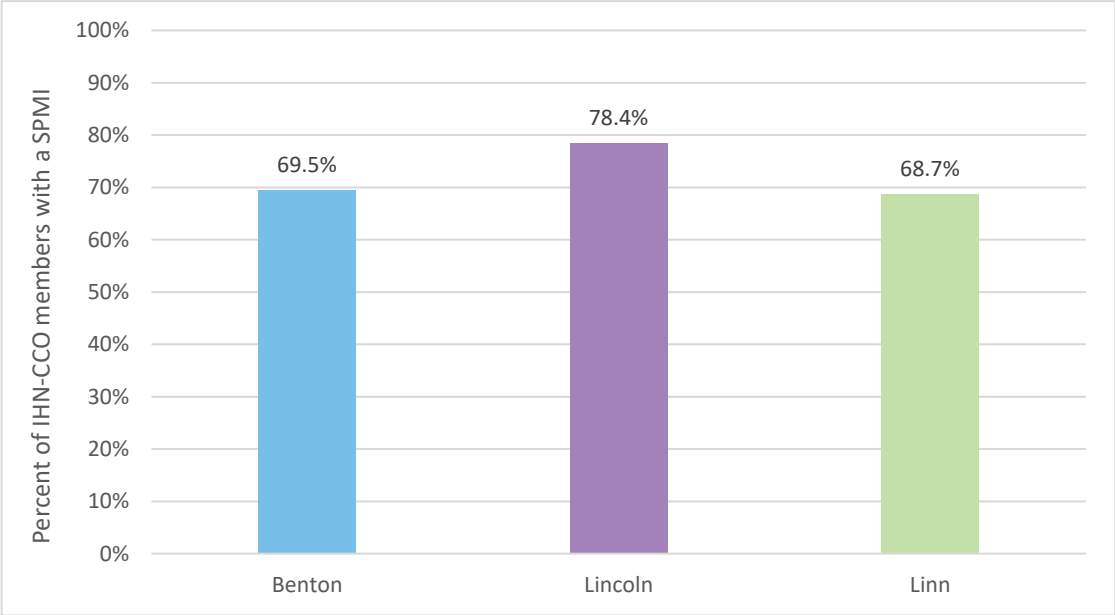
**SPMI, as defined by OHA, includes Schizophrenia; Major depressive disorder; Bipolar disorder; Anxiety, limited to obsessive compulsive disorder (OCD) or post traumatic stress disorder (PTSD); Schizotypal personality disorder; Borderline personality disorder*[75]

Data source: IHN-CCO claims

Time period: 2021

For more information: email SHSresearch@samhealth.org

Figure 8-18: Percent of IHN-CCO members with a serious and persistent mental illness (SPMI)* who had an outpatient behavioral health visit by location



**SPMI, as defined by OHA, includes Schizophrenia; Major depressive disorder; Bipolar disorder; Anxiety, limited to obsessive compulsive disorder (OCD) or post traumatic stress disorder (PTSD); Schizotypal personality disorder; Borderline personality disorder*[76]

Data source: IHN-CCO claims

Time period: 2021

For more information: email SHSresearch@samhealth.org

9 COVID-19

The COVID-19 pandemic has taken over a million lives in the United States as of May 31, 2022.[77] Of those, 7,635 were Oregonians, and 402 lived in Linn, Benton, and Lincoln counties.[78] Almost 750,000 Oregonians have had a confirmed case of COVID-19, which represents about 18% of the population in 2022. The burden of the pandemic has landed heavily on diverse populations, low-income groups, and the elderly. This chapter focuses on the disease itself, but the broader community effects, including education, mental health, economic distress, food insecurity, racism, and the effect on the health care system cannot be ignored. These effects are still being investigated and may take years to be fully revealed and understood.

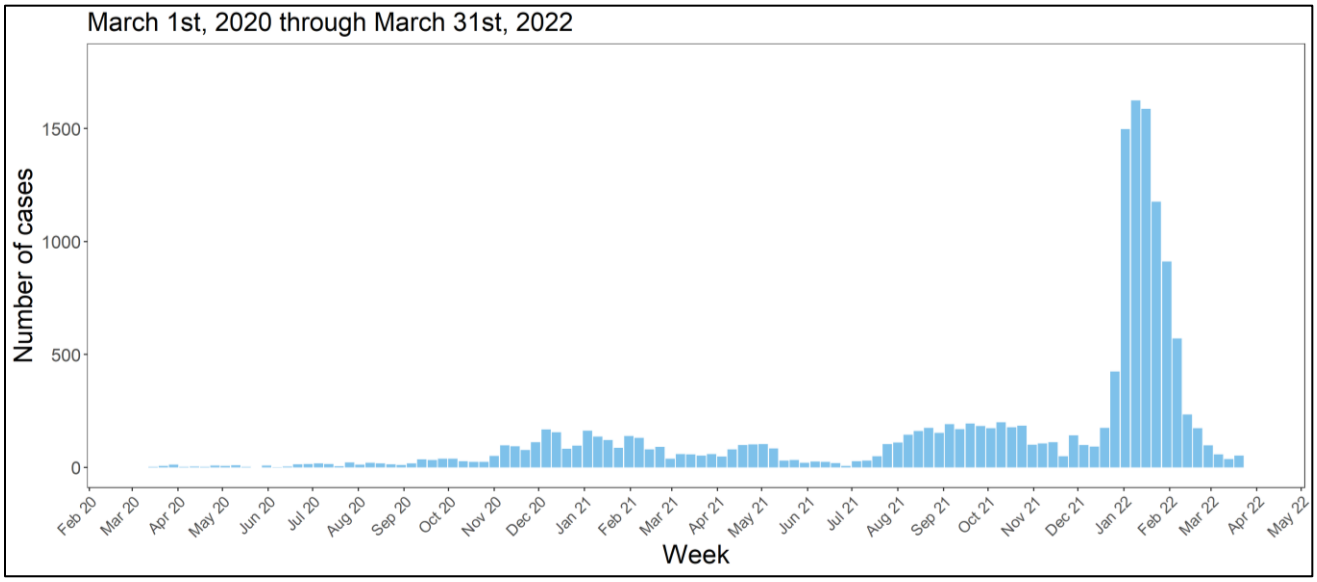
There are likely many cases of COVID-19 that have never been reported to public health authorities; therefore, all case rate data should be understood as reported cases only. However, in most cases hospitalizations and deaths that were caused by COVID-19 were accurately reported to public health, so those data are highly accurate.

Case Rates

The first recorded case of COVID-19 in Oregon was diagnosed on February 28, 2020 in Washington County.[79] Since that date, there have been over 50,000 diagnosed cases of COVID-19 in Linn, Benton, and Lincoln counties. The cases have come in waves as environmental conditions and emerging variants have sparked new surges. The following graphs show the number of reported cases each week from the beginning of the pandemic until March 2022. Linn County experienced the greatest number of COVID-19 cases in the LBL region, followed by Benton County (Figures 9-1, 9-2, and 9-3).

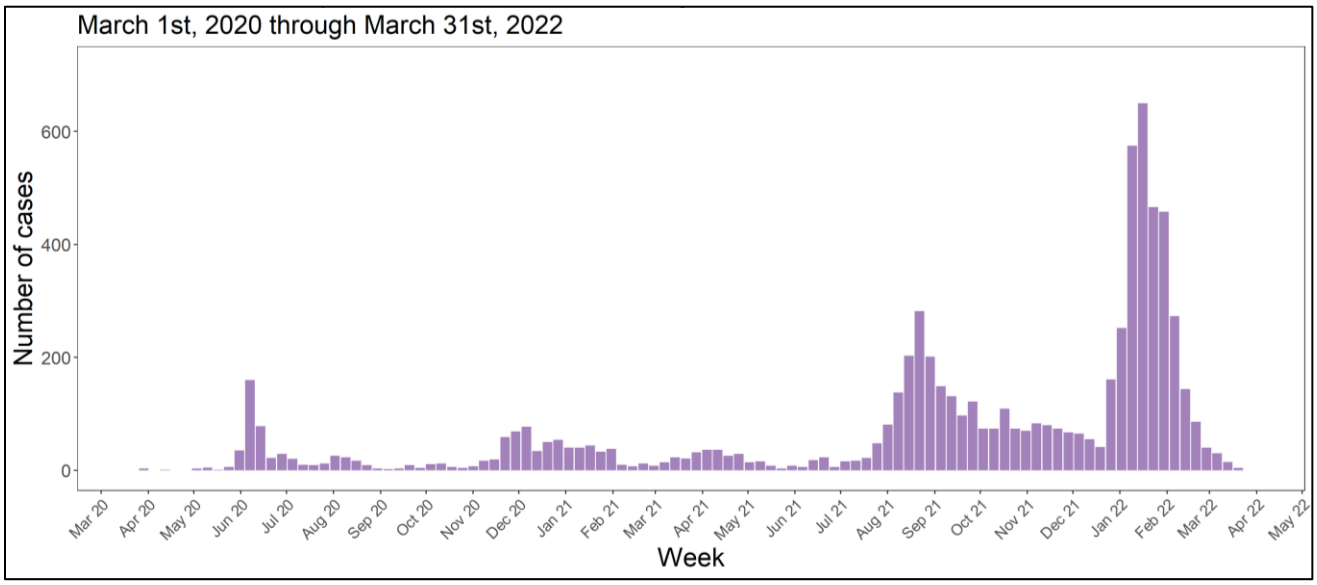
The disease dynamics are similar in all three counties. Lincoln County experienced a major outbreak at a seafood processing plant in June 2020, which explains the spike in cases during that month. The significant surges in August 2021 and January 2022 were caused by the Delta and Omicron variants, respectively.

Figure 9-1: Number of newly confirmed COVID-19 cases in Benton County by date



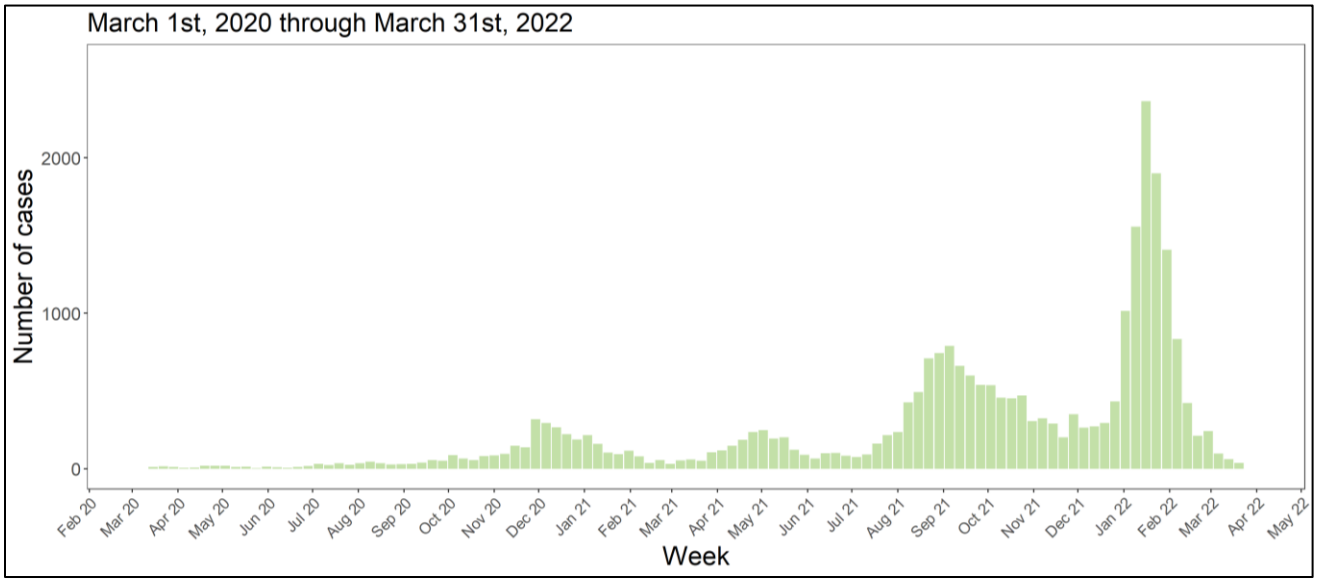
Data source: OPERA
Time period: 2020-2022
For more information: contact county health department

Figure 9-2: Number of newly confirmed COVID-19 cases in Lincoln County by date



Data source: OPERA
Time period: 2020-2022
For more information: contact county health department

Figure 9-3: Number of newly confirmed COVID-19 cases in Linn County by date



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

COVID-19 has affected demographic subgroups to different extents. The following two tables show the case breakdown by age group and by race/ethnicity. The tables show the number of cases in each subgroup and the percent of total cases that occurred in that subgroup. In order to compare subgroups, the percent of the total population in that subgroup is also listed. The column “Qualitative assessment of case count” indicates whether there were more or fewer cases in that subgroup than the population would lead one to expect. For example, if 10% of cases occurred in a subgroup, but 15% of the total population were in that subgroup, then the burden of COVID-19 would be lower than expected. If the percent of cases were equal to the percent of population, then the burden would be in line with what one would expect. The label of “close to the expected number of cases” is given when the percent of cases for a specified group is less than 2.5% above or below the percent of total population in the specified group.

When considering the population size of each age category, the 18 to 29 age group had much higher than expected case rates in all three counties, while the 65 and older age group had much lower than expected age rates in all three counties.

When considering the population size of each race/ethnicity category, the burden COVID-19 has been much higher in non-White populations compared to White populations in the three counties and beyond. All non-White subgroups had close to or higher than expected case rates, other than the Asian population in Benton County. In all three counties, the case rate among White populations has been below what would be expected given their share of the population.

Table 9-1: Newly confirmed COVID-19 cases by age group and location

County	Age group	Case count	Percent of cases in age group	Percent of population	Qualitative assessment of case count
Benton	Under 18	2,665	17.7%	16.4%	Close to expected # of cases
	18 to 29	6,269	41.5%	30.4%	Above expected # of cases
	30 to 49	3,310	21.9%	20.7%	Close to expected # of cases
	50 to 64	1,628	10.8%	17.0%	Below expected # of cases
	65 and older	1,189	7.9%	15.5%	Below expected # of cases
	Unknown	28	0.2%	N/A	N/A
Lincoln	Under 18	1,313	18.8%	16.9%	Close to expected # of cases
	18 to 29	1,277	18.3%	10.7%	Above expected # of cases
	30 to 49	2,239	32.0%	20.1%	Above expected # of cases
	50 to 64	1,199	17.1%	24.4%	Below expected # of cases
	65 and older	950	13.6%	27.9%	Below expected # of cases
	Unknown	19	0.3%	N/A	N/A
Linn	Under 18	4,846	18.4%	22.7%	Below expected # of cases
	18 to 29	5,555	21.1%	14.8%	Above expected # of cases
	30 to 49	8,283	31.4%	24.4%	Above expected # of cases
	50 to 64	4,538	17.2%	19.8%	Below expected # of cases
	65 and older	3,140	11.9%	18.3%	Below expected # of cases
	Unknown	12	0.0%	N/A	N/A

Data source: OPERA; United States Census Bureau, America Community Survey, Table B01001
Time period: 2020-2022; 2016-2020
For more information: contact the county health department

Table 9-2: Newly confirmed COVID-19 Cases by race/ ethnicity and location

County	Race/Ethnicity	Case count	Percent of all cases	Percent of population	Qualitative assessment of case count
Benton	American Indian or Alaska Native	169	1.1%	0.7%	Close to expected # of cases
	Asian	513	3.4%	7.4%	Below expected # of cases
	Black or African American	237	1.6%	1.1%	Close to expected # of cases
	Hispanic or Latinx	1,528	10.1%	7.6%	Above expected # of cases
	Native Hawaiian or Pacific Islander	42	0.3%	0.2%	Close to expected # of cases
	Multiple races	128	0.8%	4.9%	Below expected # of cases
	Other	2,311	15.3%	2.2%	Above expected # of cases
	White	9,539	63.2%	83.4%	Below expected # of cases
	Unknown/Refused	2,150	14.2%	N/A	N/A
Lincoln	American Indian or Alaska Native	337	4.8%	2.5%	Above expected # of cases
	Asian	66	0.9%	1.1%	Close to expected # of cases
	Black or African American	51	0.7%	0.3%	Close to expected # of cases
	Hispanic or Latinx	1,042	14.9%	9.4%	Above expected # of cases
	Native Hawaiian or Pacific Islander	28	0.4%	0.2%	Close to expected # of cases
	Multiple races	135	0.2%	5.8%	Below expected # of cases
	Other	629	9.0%	3.0%	Above expected # of cases
	White	4,519	64.6%	87.1%	Below expected # of cases
	Unknown/Refused	1,232	17.6%	N/A	N/A
Linn	American Indian or Alaska Native	357	1.4%	0.9%	Close to expected # of cases
	Asian	210	0.8%	1.1%	Close to expected # of cases
	Black or African American	163	0.6%	0.5%	Close to expected # of cases
	Hispanic or Latinx	2,330	8.8%	9.4%	Close to expected # of cases
	Native Hawaiian or Pacific Islander	53	6.6%	0.2%	Above expected # of cases
	Multiple races	191	0.7%	5.4%	Below expected # of cases
	Other	2,053	7.8%	3.1%	Above expected # of cases
	White	18,039	68.4%	88.8%	Below expected # of cases
	Unknown/Refused	5,308	20.1%	N/A	N/A

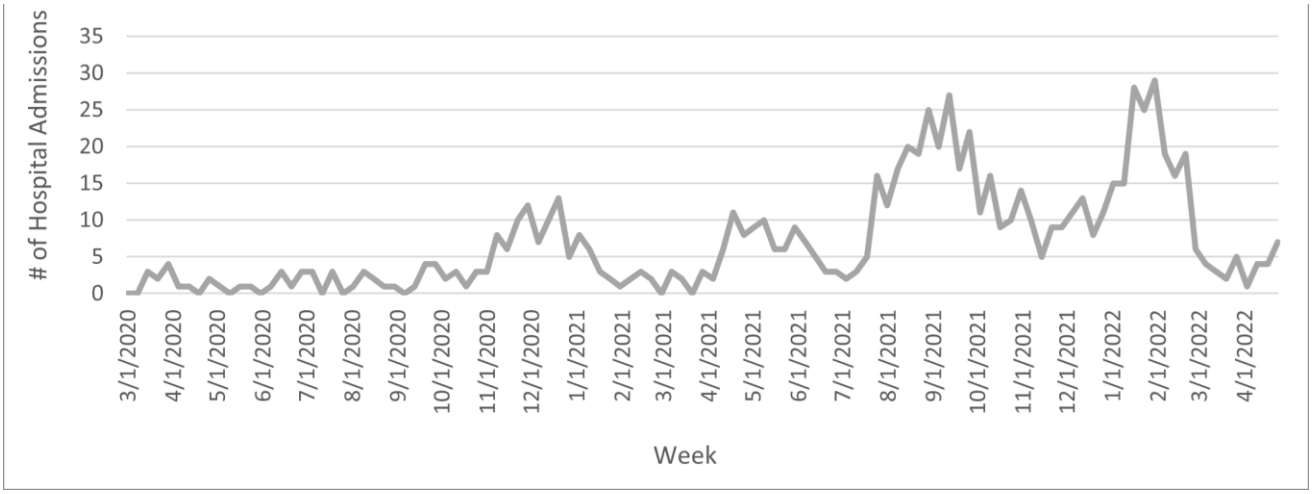
Data source: OPERA; United States Census Bureau, America Community Survey, Table B02001, B03003
Time period: 2020-2022; 2016-2020
For more information: contact the county health department

Hospitalizations

Severe COVID-19 disease can cause viral pneumonia and raise the risk of cardiac events. Across Oregon, about 4% of reported COVID-19 cases require hospitalization. However, that proportion has not remained constant throughout the pandemic. The graphs below show weekly COVID-19 hospital admissions in the three counties.

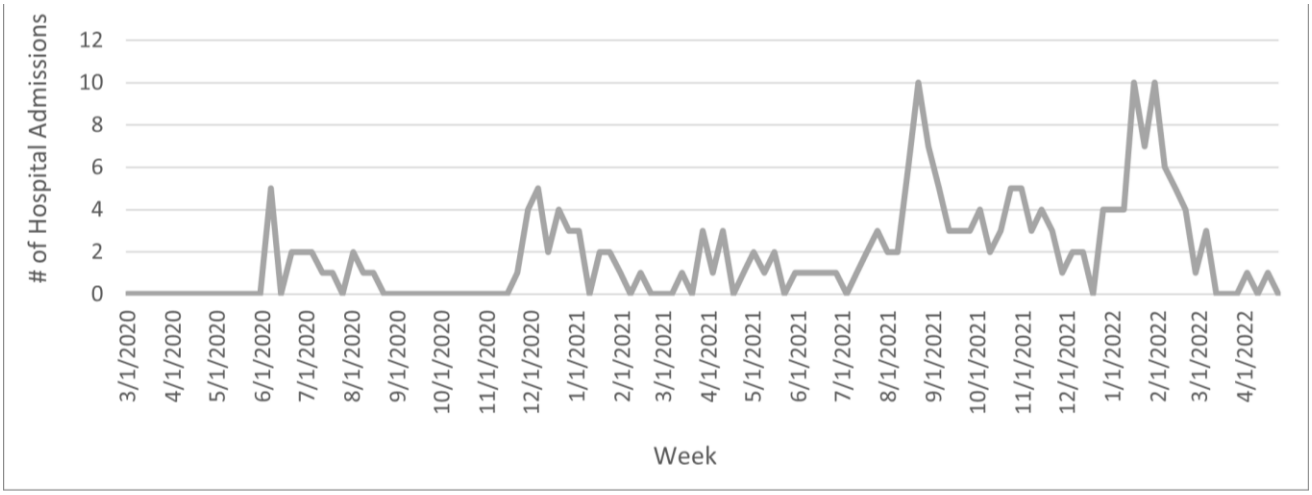
Hospitalization trends have largely mirrored case rates throughout most of the pandemic, with about 4% of reported cases resulting in a hospital admission. However, this trend broke during the Omicron-caused surge in January 2022. While the number of Omicron cases was between 3 and 6 times higher than the number of Delta cases during August 2021, the hospitalization rate was mostly the same during the two surges. This has been attributed to higher vaccination rates in January 2022, and to the likelihood that the Omicron variant caused less severe illness than the Delta variant for most people.

Figure 9-4: Number of COVID-19 hospital admissions in Benton County over time



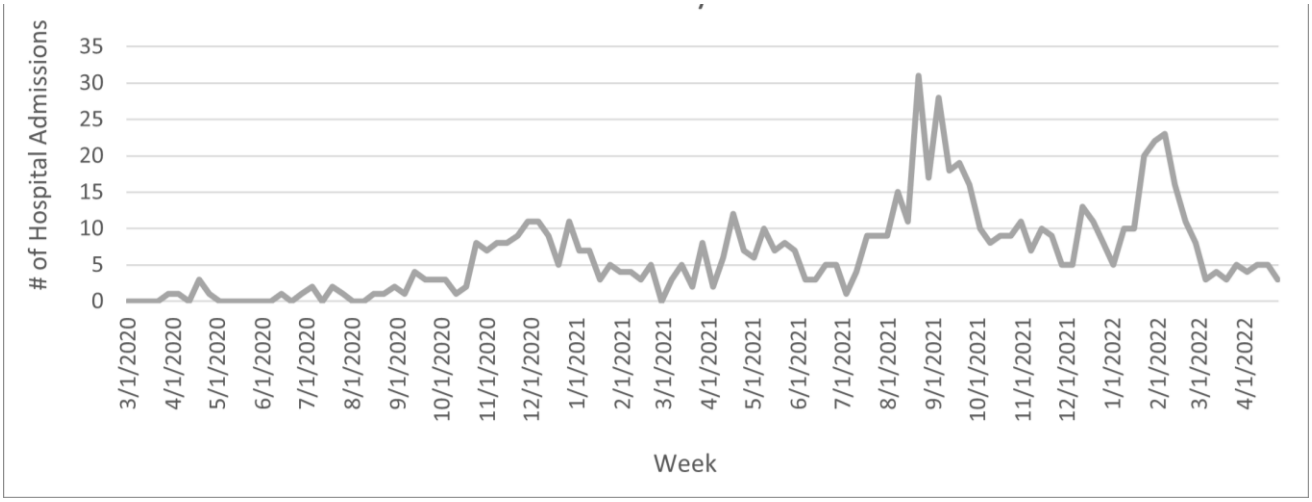
Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-5: Number of COVID-19 hospital admissions in Lincoln County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-6: Number of COVID-19 hospital admissions in Linn County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

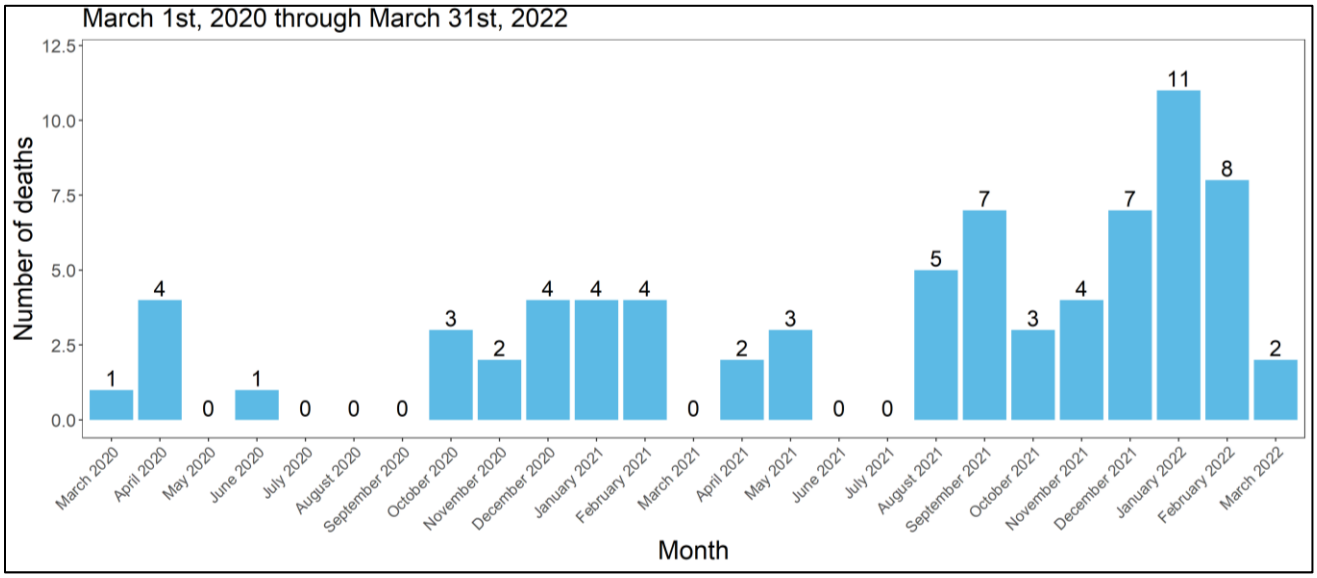
Mortality

During the period between the beginning of the pandemic until the end of March 2022, 437 people died of COVID-19 in the LBL region. Figures 9-7 to 9-9 below show the number of deaths each month, separated by county.

COVID-19 deaths follow the same trends as cases, with the exception of the much smaller than expected rise in the death rate during the January 2022 Omicron surge.

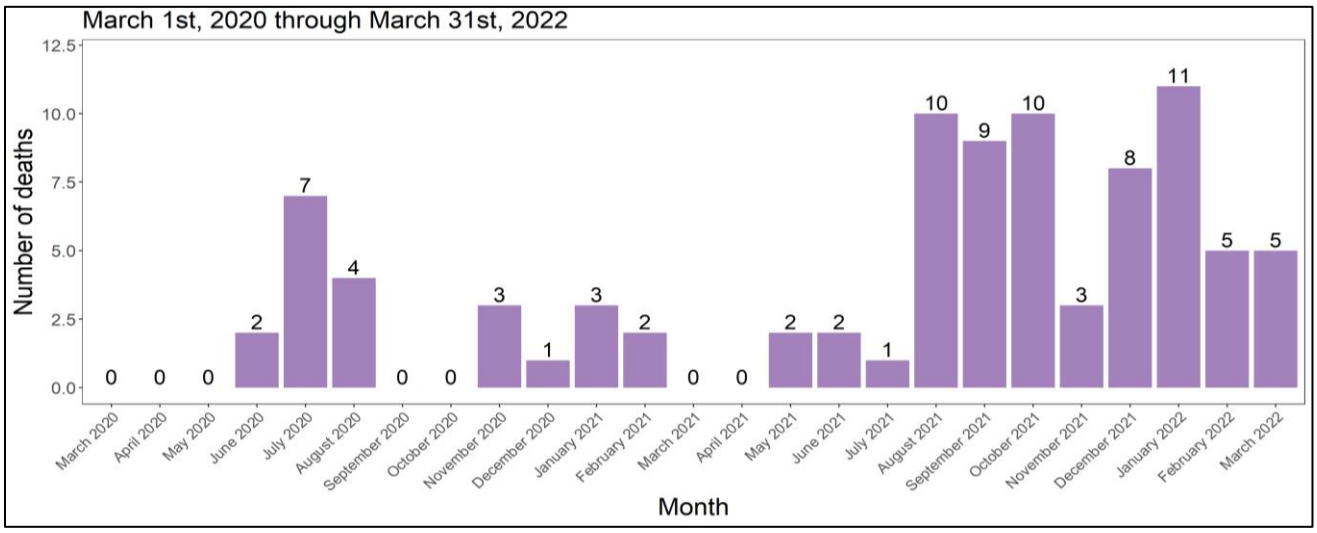
Benton County's number of COVID-19 deaths per 100,000 people is less than half of Lincoln County's number of deaths per 100,000 people, and 37% of Linn County's number of deaths per 100,00 people (Table 9-3). These numbers are not adjusted for age, and a large portion of Benton County's population is college age, which has a lower risk of death than older populations. However, this difference is still very stark.

Figure 9-7: Number of COVID-19 deaths in Benton County over time



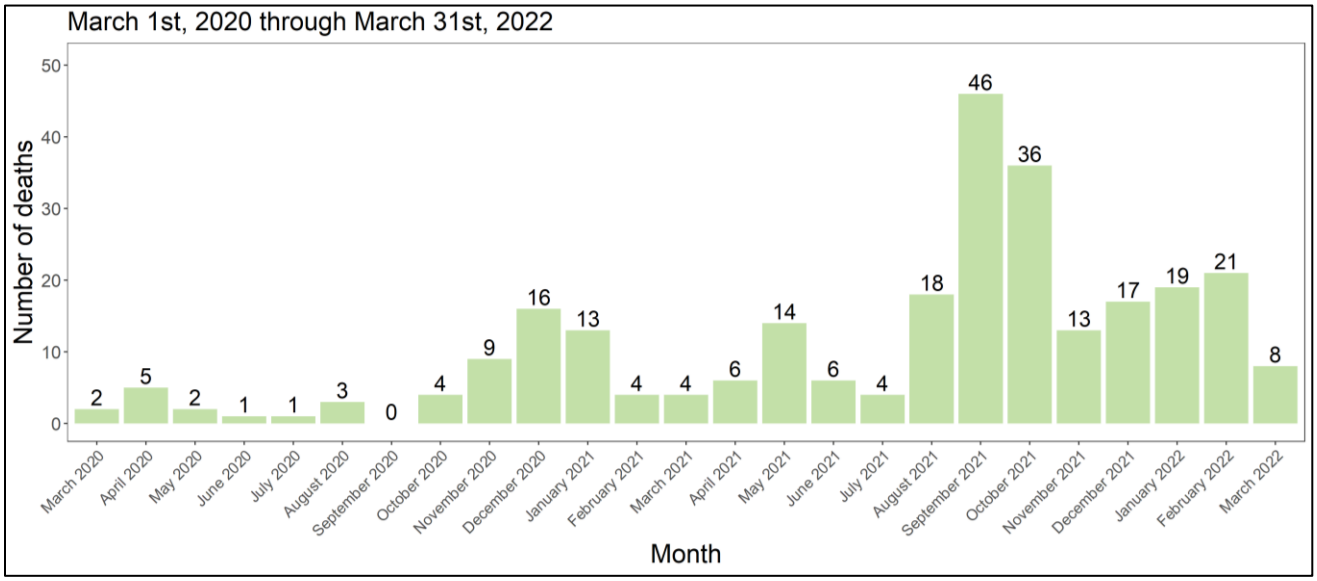
Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-8: Number of COVID-19 deaths in Lincoln County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the county health department

Figure 9-9: Number of COVID-19 deaths in Linn County over time



Data source: OPERA
Time period: 2020-2022
For more information: contact the local health department

Table 9-3: Number of COVID-19 deaths per 100,000 people by location

County	Number of deaths	Population	Deaths per 100,000 people
Benton	75	95,184	79
Lincoln	88	50,395	175
Linn	274	128,610	213

Data source: OPERA
Time period: March 2020-March 2022
For more information: contact the local health department

Vaccination

The first COVID-19 vaccines were developed in record time. Less than one year elapsed from the identification of the first United States case in January 2020 until emergency use authorization of the first vaccine in December 2020. Despite the rapid development, the vaccines were subject to rigorous and ongoing safety evaluations and have been authorized for wider segments of the population as additional safety and effectiveness studies have been submitted to the FDA. In May 2022, at least one COVID-19 vaccine was authorized for children as young as five years old. The CDC has recommended that most people complete a two-dose series of the COVID-19 vaccine, followed by a booster dose.

The rollout of the first COVID-19 vaccines in Oregon in January and February 2021 led to large vaccine uptake in the spring of 2021. There were both occupation and age-based eligibility requirements set by the Oregon Health Authority due to the limited supply of COVID-19 vaccines initially. Every couple of

weeks another population group became eligible for the vaccine, leading to consistently high demand for the first six months. After most individuals who wanted a vaccine received their first dose, vaccine uptake slowed, and has been growing slowly but steadily since around June 2021.

Benton County has the highest vaccination rate among the three counties in the LBL region. Linn County falls behind both Lincoln and Benton counties in the percent of community members with at least one dose of a COVID-19 vaccine. The COVID-19 vaccination data below utilizes Portland State University (PSU) population estimates, whereas the COVID-19 case and mortality data utilizes US Census population estimates. This accounts for the slight differences in population size.

COVID-19 vaccination rates vary by race/ethnicity and age. The LBL region's Native Hawaiian or Pacific Islander population had the highest rates of COVID-19 vaccination. Both Linn and Lincoln counties' Hispanic or Latinx populations had the lowest vaccination rates of any race/ethnicity group. In Benton County, the population with the lowest COVID-19 vaccination rate is the Black or African American population (Figure 9-5). Those ages 0-4 have the lowest rates of COVID-19 vaccination in the LBL region (Table 9-6). Those ages 6 months to 4 years became eligible for the COVID-19 vaccine in June 2022.

Table 9-4: Number of COVID-19 vaccinations by location

County	Number with 1+ dose	Population	Percent with 1+ dose
Benton	77,105	93,976	82.0%
Lincoln	40,065	50,903	78.7%
Linn	79,584	130,440	61.0%

Data source: Oregon Health Authority Workbook: Oregon Vaccine Metrics Summary Table (state.or.us)
Time period: January 2020 – February 2023
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/OregonVaccineMetricsSummaryTable/OregonCOVID-19VaccineProgressSummaryTable?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

Table 9-5: Number of people with at least one dose of a COVID-19 vaccination by rarest race/ethnicity and location

County	Race/Ethnicity	Number vaccinated	Estimated population size	Percent of population with at least one dose
Benton	American Indian or Alaska Native	1,997	2,422	82.5%
	Asian	5,604	6,871	81.6%
	Black or African American	1,274	1,812	70.3%
	Hispanic or Latinx	4,408	5,976	73.8%
	Native Hawaiian or Pacific Islander	639	609	104.9%*
	White	59,266	74,370	79.7%
	Other	*	*	*
Lincoln	American Indian or Alaska Native	2,391	3,313	72.2%
	Asian	749	904	82.9%
	Black or African American	539	761	70.8%
	Hispanic or Latinx	2,495	4,233	58.9%
	Native Hawaiian or Pacific Islander	303	303	100.0%
	White	31,923	39,787	80.2%
	Other	*	*	*
Linn	American Indian or Alaska Native	2,803	4,829	58.0%
	Asian	1,711	2,888	59.2%
	Black or African American	947	1,643	57.6%
	Hispanic or Latinx	5,267	11,292	46.6%
	Native Hawaiian or Pacific Islander	588	836	70.3%
	White	66,275	105,572	62.8%
	Other	*	*	*

** The Oregon Health Authority database uses the "Other" race category as a default when race is unknown. Because of this, the category includes many more individuals than those who would likely indicate "Other" race on the United States Census. Therefore, it is not possible to estimate the vaccination rate among "Other."*
**Vaccination rates over 100% is due to more individuals within race/ethnicity categories received a vaccine with a current address in Oregon than are estimated in the population.*
Data source: Oregon Health Authority Workbook: Oregon Vaccine Metrics Summary Table (state.or.us)
Time period: December 2020 - February 2023
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/OregonVaccineMetricsSummaryTable/OregonCOVID-19VaccineProgressSummaryTable?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

Table 9-6: Number of people with at least one dose of a COVID-19 vaccine by age group and location

County	Age group	Number vaccinated	Estimated population	Percent of population with at least one dose
Benton	0 to 4	988	3,642	27.1%
	5 to 11	3,392	5,746	59.04%
	12 to 17	4,323	5,372	80.47%
	18 to 49	38,447	51,002	75.38%
	50 to 64	12,995	15,491	83.89%
	65 and older	16,960	12,723	133.3%*
Lincoln	0 to 4	224	1,957	11.4%
	5 to 11	1,257	3,225	38.98%
	12 to 17	1,964	2,853	68.85%
	18 to 49	12,328	15,664	78.70%
	50 to 64	9,224	11,235	82.10%
	65 and older	15,068	15,970	94.35%
Linn	0 to 4	424	7,711	5.5%
	5 to 11	2,462	11,182	22.02%
	12 to 17	4,337	9,661	44.89%
	18 to 49	31,744	51,504	61.63%
	50 to 64	17,478	24,463	71.45%
	65 and older	23,139	25,920	89.27%

* *Vaccination rates over 100% are due to more individuals within an age category having received a vaccine with a current address in Oregon than are estimated in the population.*

Data source: Oregon Health Authority Workbook: Oregon Vaccine Metrics Summary Table (state.or.us)
Time period: December 2020 - February 2023
For more information: https://visual-data.dhsoha.state.or.us/t/OHA/views/OregonVaccineMetricsSummaryTable/OregonCOVID-19VaccineProgressSummaryTable?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

Table 10-1: Demographic information from the 2,812 Community Survey respondents

Respondent Characteristics	Percent of responses
County of residence	
Benton	37%
Lincoln	27%
Linn	27%
Other	9%
(Missing)	2%
Age	
Under 18 years old	1%
18 to 24 years old	6%
25 to 44 years old	35%
45 to 64 years old	36%
65 to 84 years old	17%
85 years or older	1%
(Missing)	4%
Race/ethnicity*	
African American or Black	3%
American Indian or Alaska Native	10%
Asian	3%
Pacific Islander	1%
White or Caucasian	80%
Hispanic or Latino	11%
Middle Eastern, North African, or Arab	1%
(Missing)	10%
Gender	
Female	75%
Male	22%
Non-binary or other gender	3%
(Missing)	1%
Languages spoken at home*	
English	88%
Spanish	4%
Arabic	1%
Other languages or multiple languages	5%
(Missing)	5%

**Respondents could check multiple categories, so percentages do not add up to 100%*

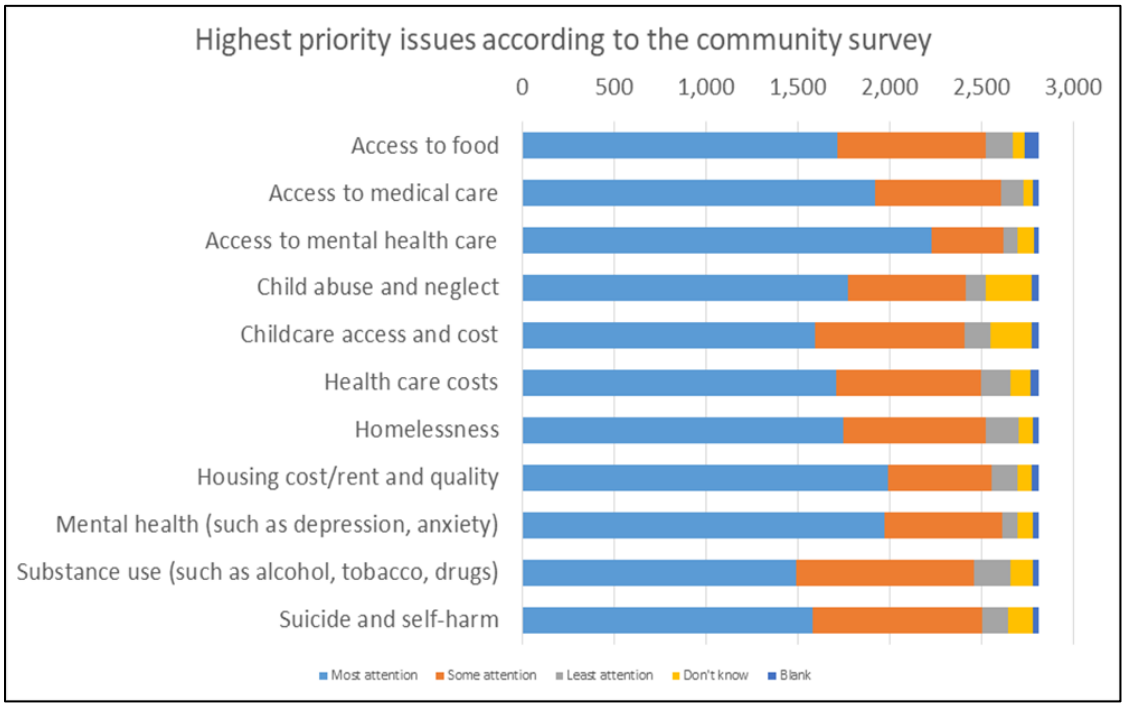
The Community Survey asked respondents to rate both the overall health of their community and their overall health as an individual. Most respondents felt that their community was 'healthy' (30%) or 'sort of healthy' (51%), while people felt that their individual health was overall slightly healthier (49% reported being 'healthy' while 30% reported being 'sort of healthy').

Table 10-2: Perceived health status among Community Survey respondents

Questions	Percent of responses
"How healthy is your community?"	
Very healthy	3%
Healthy	30%
Sort of healthy	51%
Unhealthy	13%
Very unhealthy	2%
"How healthy are you?"	
Very healthy	13%
Healthy	49%
Sort of healthy	30%
Unhealthy	7%
Very unhealthy	1%

Additionally, the Community Survey also asked respondents to consider 30 topic areas and rate each topic as deserving the 'least attention', 'some attention', or 'most attention' (or 'don't know') in their community. Figure 10-1 shows that the topics with the highest proportion of 'most attention' responses included access to mental health care (83%), housing cost/rent and quality (74%), mental health (such as depression, anxiety) (74%), child abuse and neglect (71%), and access to medical care (65%).

Figure 10-1: High priority issues from Community Survey respondents



Qualitative Engagement Sessions

Please see the Methodology section in Chapter 1: Introduction for more detailed information on how focus groups and key informant interviews were conducted.

Focus Groups

Sixteen focus groups were completed with community members of Linn, Benton, and Lincoln counties. The frequency in which a given topic was discussed was totaled across all focus group sessions. Access to quality care was brought up most frequently by participants, having nearly four times the occurrence of any other topic. Other topics that repeatedly came up across focus groups included 1) a lack of diversity, equity, inclusion, and cultural representation in the community, 2) pregnancy, child health, and child education, 3) access to affordable housing, 4) food insecurity, 5) mental health, 6) and substance use and misuse. Participants also discussed chronic disease, transportation, and access to information, although these topics were brought up less frequently than those listed above.

Key Informant Interviews

Thirty-one key informant interviews were completed with community representatives of Linn, Benton, and Lincoln counties. Significant words and phrases from each key informant interview were identified and placed into thematic groups. For example, the statement "the COVID-19 pandemic has been very challenging" would be placed under the thematic group, disease and disability. The thematic groups identified from the key informant interviews include (in no particular order) 1) community health & quality of life, 2) mental & behavioral health, 3) access to care & resources, 4) disease & disability. The topics included in each of these thematic groups can be found in Table 10-3. Mentions of the topics within each thematic group varied by county as seen in Figure 10-4.

Table 10-3: Thematic groups from key informant interviews and their associated topics

Thematic group	Topics included
Community health & quality of life	• Lack of safe/accessible housing • Poor nutrition/food insecurity • Overwork/time pressures • Lack of exercise/fitness • Lack of access to education
Mental & behavioral health	• Mental & behavioral health needs • Substance use disorder • Social isolation/lack of community • Suicidality in youth • Tobacco use • Teen births
Access to care & resources	• Lack of providers, appointments, and support • Lack of cultural and linguistic competence/trust • Cost of care/insurance • Lack of transportation

Disease & disability	• Diabetes • Disability/accessibility issues • COVID-19 impacts • Chronic health conditions • Senior health • Socioeconomic inequality

Table 10-4: Percent of key informant responses by thematic group and location

County	Thematic group	Percent of key informant interviews
Benton	Community health & quality of life	33%
	Mental & behavioral health	28%
	Access to care & resources	28%
	Disease & disability	12%
Lincoln	Community health & quality of life	11%
	Mental & behavioral health	43%
	Access to care & resources	24%
	Disease & disability	16%
Linn	Community health & quality of life	31%
	Mental & behavioral health	31%
	Access to care & resources	21%
	Disease & disability	14%

11 Summary

The 2022 - 2026 Regional Health Assessment (RHA) aimed to describe and compare the health status and conditions affecting residents in Linn, Benton, and Lincoln counties. Oregon is composed of 36 counties, 35 of which were ranked based on overall health outcomes and health factors in the 2022 County Health Rankings. Benton County ranked 1st among Oregon counties for health outcomes (including measures of length of life and quality of life) and 2nd for health factors (including health behaviors, clinical care, social and economic factors, and physical environment). [80] Linn County was ranked in the middle of the 35 Oregon counties that received a ranking (16th for health outcomes and 17th for health factors) while Lincoln County ranked 27th for health outcomes and 33rd for health factors. These summary rankings highlight the variability within the LBL region as well as the potential opportunities to improve community health.

The 2022 RHA also identified challenges that individual counties and the region face. Benton County has better health outcomes than Linn and Lincoln counties in regard to communicable disease, gestational parent and child health, mental health, and chronic disease indicators. Conversely, Benton County tends to have higher economic disparities compared to other counties in the region. The identification of areas of weakness helps to inform public health interventions, ensure high risk populations are being correctly targeted for community programs, and improve needed access to care and resources.

Key Themes

Based on review of the data presented in this report, the Partnership for Community Health identified seven key themes. The themes are presented below in alphabetical order, with a brief summary of key data points for each topic.

Access to affordable housing & homelessness

- The percent of the K-12 student population experiencing homelessness in Lincoln County was 3 times higher than the state percentage in 2019-2020.
- The LBL region had a total population of around 870 peoples experience homelessness in 2019.
- Half of rented regional households in the LBL region experienced a housing burden in 2020.

Access to quality care

- In Linn and Lincoln counties, the rates of Primary Care Physicians is lower than the Oregon in 2020.
- In the LBL region, the rate of dentists is the below Oregon in 2020.
- In Linn and Lincoln counties, the rates of Behavioral Health Providers is lower than the Oregon in 2020.
- 14 service areas in the LBL region had less than 5 mental health care providers per 10,000 individuals in 2021; 5 service areas in the LBL region had no mental health providers in 2021.

Equity, Diversity & Inclusion

- The percentage of individuals living in poverty with a disability within Linn and Lincoln County is higher than the state in 2021.
- 1 in 9 individuals within the region spoke another language at home in 2020.
- Minoritized racial and ethnic groups in the region are more likely to live in poverty than White individuals in 2020.

Food Insecurity/Access

- 1 in 10 households in Benton County utilized SNAP benefits. This is lower than the other two counties (1 in 5) and the state in 2020.
- In 2020, the LBL region experienced higher percentages of food insecurity (1 in 8 individuals) in comparison to the state.
- Only 3.5 out of 10 people in the LBL region lived within walking distance to a grocery store in 2019.

Healthy Youth & Families

- Prenatal tobacco use affects 1 of every 6 pregnancies in both Lincoln and Linn counties and 1 of every 10 pregnancies in Benton County.
- In Linn and Lincoln counties, the number of pregnancies per 1,000 ages 15 to 19 is higher than the state in 2020.
- The LBL region had higher numbers of child abuse victims per 1,000 compared to Oregon in 2021.
- Lincoln County had almost twice as many children in foster care per 1,000 in comparison to Oregon in 2021.

Mental Health

- Over 1 in 5 residents in the LBL region have a diagnosis of depression in 2020.
- The suicide rate in Lincoln County was double that of Linn and Benton counties in 2020.
- 1 in 3 eighth graders in Lincoln County report being bullied. This is higher than Oregon in 2019.
- 2 in 5 11^{th} graders felt sad or hopeless almost every day for two weeks in 2019.

Substance Use and Misuse

- Lincoln County drug overdose death rate per 100,000 persons is triple the rate of Benton County in 2019.
- In Linn and Lincoln counties, 1 in 6 individuals smoked cigarettes in 2020.
- 1 out of 3 eleventh graders report using E-Cigarettes in Linn County. This is higher than the other two counties and Oregon in 2019.
- 1 in 9 8th graders report using alcohol in the LBL region in 2019.
- In the LBL region, the percent of 11^{th} graders who report misusing prescription drugs is higher than the state in 2019.

Conclusion

Community partners in the LBL region have already implemented a variety of programs aimed at improving the health status of residents including tobacco prevention and education programs, crisis services, well water testing, among countless others. Future interventions will further improve environmental conditions and reduce the health disparities associated with adverse health outcomes through the Regional Health Improvement Plan.

This report was a collaborative project that would not have been possible without the help and dedication of Benton, Lincoln, and Linn County Public Health Departments, Samaritan Health Services, InterCommunity Health Network Coordinated Care Organization, the Confederated Tribes of Siletz Indians, and United Way of Linn, Benton & Lincoln Counties. The project not only provided a safe place for community partners to express their program needs and concerns but allowed for the growth of relationships and strengthening of communication bonds between agencies. With ongoing collaboration, we will continue to strive to eliminate disparities and improve the health of all LBL community members.

Appendix 1: Acronyms used

ACS	American Community Survey (data source)
CDC	Centers for Disease Control and Prevention
LBL	Linn, Benton, and Lincoln counties (the geographical area of focus for this assessment)
BRFSS	Behavioral Risk Factor Surveillance System (data source)
IHN-CCO	InterCommunity Health Network Coordinated Care Organization (a subsidiary of Samaritan Health Services that administers the Oregon Health Plan for beneficiaries living in Linn, Benton, and Lincoln counties)
OHA	Oregon Health Authority (Oregon's state health agency, which oversees statewide public health efforts as well as the Oregon Health Plan)
OHP	Oregon Health Plan (Oregon's Medicaid program, managed by the Oregon Health Authority)
OPHAT	Oregon Public Health Assessment Tool (data source)
RHA	Regional Health Assessment
SDOH	Social Determinants of Health
STD	Sexually Transmitted Disease

Appendix 2: Annotated list of select data sources

The following list provides more detail about some of the most common data sources used in the Regional Health Assessment report:

Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS, administered by the United States Centers for Disease Control and Prevention (CDC), continuously collects health data via telephone surveys. Adults residing in the United States are selected through random digit dialing conducted by public health departments and university partners. Approximately 400,000 adults residing in the United States are surveyed each year. Learn more at: https://www.cdc.gov/brfss/index.html

American Community Survey (ACS)

The American Community Survey is randomly administered to approximately 3.5 million United States households each year and collects information on socioeconomic, demographic, and housing characteristics. A two-phase systematic sampling scheme is utilized to select eligible housing units. If selected, participants are legally required to accurately complete the survey. In 2020, 74.2% of selected households in Oregon successfully responded to the survey. The data presented in this report was extracted from 5-year estimates between 2016 and 2020. Learn more: https://www.census.gov/acs/www/methodology/sample-size-and-data-quality/response-rates/index.php.

County Health Rankings

The County Health Rankings compiles and standardizes data from secondary sources to rank counties within states on important health indicators. The program was developed by the Wisconsin Population Health Institute with funding from the Robert Wood Johnson Foundation and uses data from reliable national and local data sources. The County Health Ranking's health indicator are regularly age-adjusted to allow comparability among counties and over time. Rankings are updated annually, though the data used to calculate rankings varies in recency. Learn more at: https://www.countyhealthrankings.org/explore-health-rankings/our-methods.

Oregon State Health Assessment

The Oregon State Health Assessment is conducted every five years with the aim of describing the health of Oregon residents. The assessment uses data extracted from a variety of primary data sources to collect information on health, demographic characteristics, and environmental factors. Learn more at: https://www.oregon.gov/oha/ph/about/pages/healthstatusindicators.aspx.

Oregon Healthy Teens Survey

The Oregon Healthy Teens survey is a comprehensive school-based survey that is administered to eighth and eleventh graders across the state during odd numbered years. Participation in the survey is confidential and voluntary. The survey covers a variety of topics, including but not limited to substance

use, healthy behaviors, and health conditions. The most recent available data is from 2019, including approximately 27,000 valid surveys were submitted by students. Learn more at: https://www.oregon.gov/oha/ph/birthdeathcertificates/surveys/oregonhealthyteens/pages/index.aspx

ALERT Immunization Information System

The ALERT Immunization Information System is a computerized registry that contains immunization records for children and adults across Oregon. Medical providers can directly input immunizations into the database to allow for efficient documentation across practices. One hundred percent of public clinics and ninety-two percent of private clinics utilize the database. All sites that administer COVID-19 vaccinations are required to report immunization administration to ALERT IIS. Learn more at: https://www.oregon.gov/oha/ph/preventionwellness/vaccinesimmunization/alert/pages/index.aspx.

Oregon Public Health Assessment Tool (OPHAT)

The Oregon Public Health Assessment Tool (OPHAT) is a web-based tool used by local and state public health agencies to access, analyze, and present data from multiple datasets.

Oregon Public Health Epidemiologist User System (Orpheus)

The Oregon Public Health Epidemiologist User System (Orpheus) is the electronic disease surveillance database used for all communicable diseases in the state of Oregon. Epidemiologists at the local and state level access the data when analyzing disease trends and conducting case investigations with sick persons.

Oregon Pandemic Emergency Response Application (Opera)

The Oregon Pandemic Emergency Response Application (Opera) is the Oregon electronic-disease surveillance system used to track all COVID-19 related health outcomes.

Oregon Environmental Public Health Tracking

Oregon Environmental Public Health Tracking complies data from the United States Environmental Protection Agency (EPA), hospital records, United States census data, and surveillance data from public health departments to improve the understanding of the role that environmental hazards and exposures have on health. The system is part of the larger CDC's National Tracking Network. Learn more at: https://www.oregon.gov/oha/PH/HealthyEnvironments/TrackingAssessment/EnvironmentalPublicHealthTracking/Pages/index.aspx

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CLIMATE + HEALTH

Adaptation Plan

Version 1.1

2023

Lincoln + Benton Counties

Acknowledgments

This report was produced by Rede Group in July 2023.

This Climate and Health Adaptation Plan was produced by Rede Group with Jessica Nischik-Long as a primary author on behalf of Lincoln County Health and Human Services and Benton County Health Department (hereafter, 'Lincoln and Benton counties').

Rede Group would like to thank Lincoln and Benton staff and community members for their valuable input, used to inform this plan.

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Letter from the Directors

We are excited to share the Lincoln and Benton Climate and Health Adaptation Plan.

We are excited to share the Lincoln and Benton Climate and Health Adaptation Plan. While each county has some unique climate characteristics and risks, we have much more in common. At the outset of this project, we believed there was much to be gained by coming together and inviting the community to the table from valley to coast. This plan represents an opportunity for our counties to share resources, collaborate, and learn from each other.

The evidence that a plan like this is necessary is undeniable. The Oregon Climate Change Research Institute has released its sixth assessment of what climate change means for Oregon, and the content is sobering. The intent of this document is to raise awareness about the array of health impacts of climate change we are facing, beyond those that our community has already experienced firsthand. Our hope is that this plan allows us to increase capacity and learning, through new conversations and actions.

There are many opportunities for us to take climate adaptation action. The list of ideas at the end of this document is not intended to be all-inclusive. Rather, it includes immediate actions as well as stretch goals that will require more resources to accomplish. We are grateful to our State Legislature for their continued investment in Public Health Modernization. These investments have enabled us to develop this plan, and continued funding will move this essential work forward. This and other public health

modernization initiatives are crucial to creating an equity-centered public health system in our modern, changing world.

We also recognize that our communities are diverse, driving our first strategy to plan in an equitable and culturally responsive way. If we are to truly strengthen our climate resilience, we will need to continue addressing systemic inequities that put some in our communities at higher risk of climate impacts than others. Some adaptation actions both improve health and reduce greenhouse gas emissions that are worsening climate change. Creating inviting, walkable communities is one example. Another is supporting our local agriculture and fishing industries to be more climate resilient. This strengthens our local food system, which is a public health as well as an economic and climate solution.

Together with our partners, we are working to address some of the greatest health challenges of our time. We invite everyone in our communities to collaborate with us on adaptation actions that will strengthen our overall resilience.

In partnership,

FLORENCE POURTAL
Public Health Director
Lincoln County Health & Human Services

SARA HARTSTEIN
Interim Public Health Director
Benton County Health Department

Together with our partners, we are working to address some of the greatest health challenges of our time. We invite everyone in our communities to collaborate with us on adaptation actions that will strengthen our overall resilience.

Contents

Executive Summary

Climate change is a global phenomenon that impacts communities differently depending on local conditions.

Climate change is a global phenomenon that impacts communities differently depending on local conditions. Human activities have substantially increased the amount of carbon dioxide and other greenhouse gasses in Earth's atmosphere, leading to increasingly warmer temperatures and warmer oceans. In turn, these changes to the climate are causing changes to ocean chemistry, sea level rise, and more intense and frequent drought, wildfires, and weather events.

The Oregon Climate Change Research Institute (OCCRI) is mandated by Oregon law to assess the state of climate change science and the likely effects of climate change on the state at least once each biennium. OCCRI also assesses climate effects by county. In January of 2023 they released their latest state assessment.

Projected impacts for Lincoln and Benton counties are increasing heat waves, heavy rains, flooding, and wildfire; loss of wetland ecosystems; coastal hazards and changes in ocean temperature and chemistry; expansion of non-native invasive species and increased invasive species risk; and reduced air quality.

These climate hazards create many changing health implications. These include displacement and migration due to wildfires (NOAA, 2017). The need

for Public Health to engage with partners and communities to address these issues is more important than ever.

Planning and action are key to adapting to our changing climate and can bring significant health and economic benefits (Balbus et al). According to the Lancet Countdown on Health and Climate Change, "Climate change is the greatest global health threat facing the world in the 21st century, but it is also the greatest opportunity to redefine the social and environmental determinants of health" (Lancet, 2022).

Lincoln and Benton County Public Health divisions ("Public Health") continue their commitment to improving health equity and community resilience. Equity is at the forefront of all public health climate change policy, planning, and action. Due to systemic inequities and racism, some populations in our communities are disproportionately affected by climate change and therefore need to be prioritized, including:

- young children,
- older adults (aged ≥ 65 years),
- people who are pregnant,
- people who are socially or geographically isolated,
- people living with chronic health conditions,
- people navigating poverty,
- people of color, and
- people who work outside.

Public Health planning and engagement to reduce the health risks associated with climate change will create more resilient and equitable communities, while also modeling these strategies and outcomes for other agencies beginning

Health equity is achieved when everyone can attain their full potential for health and well-being.

—WORLD HEALTH ORGANIZATION

Resilience is the capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.

—U.S. CLIMATE RESILIENCE TOOLKIT

this work. In 2013, Benton County released their first climate adaptation plan, which served as a catalyst for other county agencies to begin including climate change into their own planning. Lincoln and Benton counties are among the first few counties in Oregon working on a comprehensive climate and health adaptation plan.

This plan puts forward a framework aligned with public health modernization to guide Lincoln and Benton County climate and health work. This framework provides strategies and actions to increase public health expertise and capacity, prioritize work, and build on existing plans, initiatives, and community strengths.

Although some actions to address the health impacts of climate change are underway, particularly with emergency planning, further action will be difficult to achieve without long-term commitment and resources to support dedicated staff.

Public Health is essential to planning for and mitigating the climate impacts facing Lincoln and Benton counties. Now is the time to address the many impacts of climate change on health and equity.

A community prepared for the health impacts of climate change will be more resilient to them. This is the first joint plan for Lincoln and Benton County Public Health divisions. It aims to build on their communities' readiness for action and desire to protect cherished places and populations at higher risk of experiencing negative health impacts due to our rapidly changing climate.

Public Health is essential to planning for and mitigating the climate impacts facing Lincoln and Benton counties. Now is the time to address the many impacts of climate change on health and equity.

Key Strategies for Public Health to Address Climate Change and Health

Health Equity and Cultural Responsiveness

1. Standardize the use of an equity framework
2. Listen to new voices, empower new leaders, and build on existing relationships

Community Partnership Development

3. Ensure meaningful engagement in planning and action
4. Acknowledge and support programmatic activities that strengthen social networks and social cohesion

Assessment and Epidemiology

5. Prioritize, track, analyze, and share key climate and health indicators for Lincoln and Benton counties
6. Use mixed methods to assess resilience

Policy and Planning

7. Integrate climate and health considerations into planning efforts and policies
8. Promote and inform policies and planning that improve air quality and water quality and quantity
9. Promote and inform policies and planning that improve community resiliency and protect infrastructure

Emergency Preparedness and Response

10. Integrate climate and health information into coordinated emergency preparedness plans and activities
11. Support emergency planners in developing an equitable response for community members at highest risk including culturally and linguistically responsive ways
12. Identify resources to support community resiliency

Communications

13. Collaborate with community-based organizations and other partners to deliver climate and health messages
14. Use storytelling methods, such as case studies and story maps, to engage and learn from community members and interested parties

Leadership and Organizational Competencies

15. Provide active, positive, and bold leadership on climate
16. Improve internal operations to lower carbon footprint and save resources

Part One: Why is Public Health Action Needed Now?

Earth's climate is changing rapidly, challenging our ability to maintain healthy conditions for all in our community to thrive.

Earth's climate is changing rapidly, challenging our ability to maintain healthy conditions for all in our community to thrive. Climate change is becoming more visible in Lincoln and Benton counties, with the heat dome of 2021 and the wildfires of 2020. This visibility is increasing the level of concern across communities and they are looking to local authorities to not only have plans in place, but also to be actively working to protect beloved places, ways of life, and the health of community members.

The development of the Lincoln and Benton Climate and Health Adaptation Plan included an assessment of local climate hazards, a vulnerability assessment, an organizational capacity survey of Lincoln and Benton counties across multiple areas, and interviews, focus group discussions, and surveys sent to a diverse cross-section of community members, leaders, government officials, and county staff. This plan is intended to focus on local needs within the scope of Public Health, while acknowledging that the most effective approach to adapting to climate change must include efforts across all sectors.

Community engagement revealed that there is widespread concern about the impacts of climate change, especially for those community members with insufficient resources to adapt to the changes or to recover from severe weather events or other emergencies. While many participants had started to make the connection between climate change and human health

through their own experiences with wildfire smoke and loss of access to favorite places, there was further learning needed to connect climate change with other health impacts. This is an important finding because the primary climate impacts on people are health impacts in both the short- and long-term.

The organizational assessment demonstrated that while there is crucial support for this work by Public Health leadership, both counties have low funding capacity and there are few other agencies planning for climate change or taking climate action. This positions Public Health as a leader in climate work, but challenged by the need for more resources to advance strategies and build community resilience.

While this plan focuses on Public Health, we acknowledge that the health challenges of climate change will require coordinating and mobilizing with all sectors that impact the health of our communities. Public Health engagement on climate change has been limited in Benton County and is just beginning in Lincoln County due to lack of dedicated funding, staff capacity, and subject matter expertise. A community prepared for the health impacts of climate change will be more resilient.

This is the first joint plan for Lincoln and Benton County Public Health divisions. It aims to build on their communities' readiness for action and desire to protect cherished places and populations at higher risk of experiencing negative health impacts due to our rapidly changing climate.

Climate Change in Lincoln and Benton Counties

There is near unanimous agreement around the world that human influence has warmed the atmosphere, ocean, and land. As a result, widespread and rapid changes have occurred in the atmosphere, ocean, and all areas of the Earth where life exists. The scale of recent changes across the climate system as a whole – and the present state of many aspects of the climate system – are unprecedented over many centuries to many thousands of years (IPCC, 2022).

Lincoln and Benton counties are not immune from these changes and are experiencing climate change. Locally, air and ocean temperatures and sea levels have risen. Ocean chemistry has changed as more carbon dioxide from the air has dissolved into the water. Sea levels are rising, threatening infrastructure and housing and contributing to larger storm surges that can damage boats and marinas. We are experiencing more frequent and intense heat waves and wildfires that blow harmful smoke across wide swaths of the land. Drier air and fewer days without rain contributes to less moisture in the soil leading to drought and strain on forests and crops. 2021 was the warmest in Oregon's history so far, and conditions experienced that year are predicted to become more common by mid-century. The snowpack and glaciers that contribute snowmelt to the Willamette River are decreasing and more precipitation falls as rain rather than snow, leading to less water available during longer and drier summers. Certain plants produce more pollen in an atmosphere with more carbon dioxide. Warmer temperatures combine with

2021 was the warmest in Oregon's history so far, and conditions experienced that year are predicted to become more common by mid-century.

tailpipe emissions to create ground level ozone. All of these contribute to poor air quality (Fleishman et al, 2023, Dalton 2020, Dalton et al, 2022).

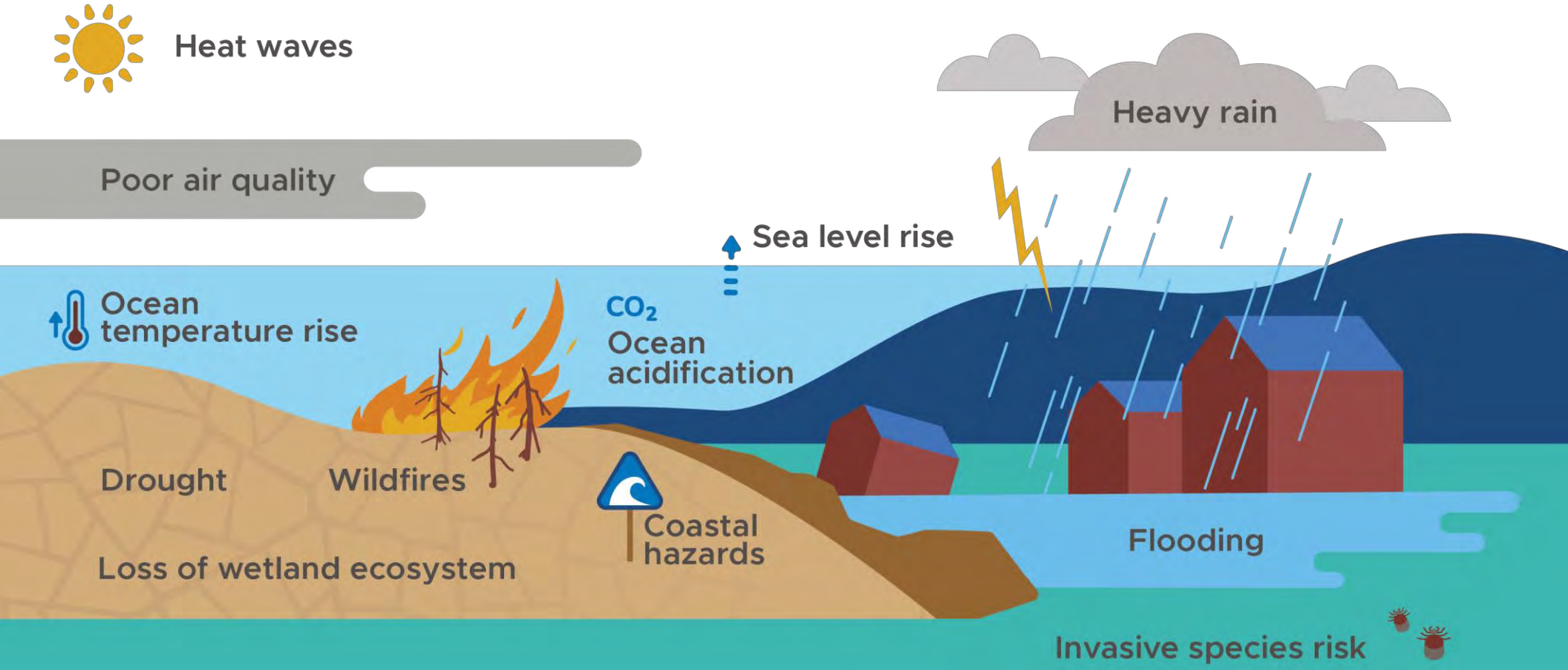
It is important to note that climate change is a long-term phenomenon that is not just evidenced by extreme, short-term events. "Weather" refers to short term atmospheric conditions, while "climate" is the weather of a specific region averaged over a long period of time. "Climate change" refers to long-term changes, most often 30 years or longer (USGS, 2023; National Academies, 2023). We can still have cool days, clouds, and rain while also having a warming climate (National Academies, 2023). Evidence collected in Oregon over decades and at many locations support this trend, showing dramatic declines in glaciers and warmer temperatures across the state (Fleishman et al, 2023). This means that long-term changes to our climate are still happening even if some weeks, seasons, or even a year seem to be the opposite of those trends.

Human activity and land use can affect the local climate as well. Urban areas with few trees and large amounts of pavement become "heat islands," much hotter than surrounding areas, and often align with households navigating poverty and communities of color. Changes in land use have contributed to loss of wetlands, which protect our infrastructure from floods and high tides, and impact water quality. Dry soils can amplify extreme heat events through less evaporative cooling of the surface. Soil-moisture may have played a role in the June 2021 heat dome which followed the driest spring in Oregon's recorded history (Fleishman et al, 2023). See the glossary at the end of this document for a list of climate and health related definitions.

Long-term changes to our climate are still happening even if some weeks, seasons, or even a year seem to be the opposite of those trends.

Climate Hazards in Lincoln and Benton Counties

The illustration below summarizes the projected climate hazards in the region.



Health Impacts of Climate Change in Lincoln and Benton Counties

All of these changes to our climate bring new and worsening threats to our health. Some impacts are felt directly and immediately, and some are indirect or occur over time. Working with mental and physical health care providers, community-based organizations, community members, and across local governments to understand the health impacts of climate change and collaborate on adaptation plans will strengthen resilience.

Systemic inequities and racial disparities

While everyone in our counties will be impacted by climate change, not everyone will be impacted in the same way, to the same degree, or have the same ability to respond (Oregon Health Authority, 2015). Oregonians navigating poverty, communities of color, tribal communities, and rural communities face considerable inequities in the social, economic, and environmental aspects of life that affect health, otherwise known as the "social determinants of health."

Heat-related impacts

Heat is the leading weather-related killer in the United States, even though most heat-related deaths are preventable through outreach and intervention (U.S. Environmental Protection Agency, 2021). Extreme heat can cause heat exhaustion, heat stroke (which can be fatal), and contribute to heart attacks and other cardiovascular, respiratory, kidney, and cerebrovascular (brain and circulation) conditions. Research conducted by the Oregon Health Authority indicates that emergency department visits go up during heat events.

"Well, [people experiencing houselessness], because they have no roof over their heads, they have no way to shelter from extreme heat or extreme cold or respiratory challenges like wildfire smoke, or... And they are already more stressed just because they don't know necessarily where their next meal's going to come from or whether they're going to be safe sleeping or you name it."

—INTERVIEWEE

There is evidence that, due to consistently lower temperatures of coastal climates compared to non-coastal climates, residents of Lincoln County are more sensitive to heat and begin experiencing severe impacts at lower temperatures than elsewhere in the state (Rubado, 2011).

Heat can have significant impacts on mental health as well, including increases in irritability, symptoms of depression, and suicide. It can also affect behavior, contributing to increased aggression, incidence of domestic violence, and use of alcohol or other substances to cope with stress. Research has also linked high temperatures to problems with memory, attention, and reaction time. Sleep difficulties associated with extreme heat can contribute to and further exacerbate mental health symptoms (American Psychiatric Association, 2021).

Wildfire smoke and air quality

Wildfires are becoming more frequent and intense, and the fire season has lengthened. Wildfire smoke contains particulate matter (called PM 2.5) that is so small it can lodge in the lungs and even pass through the lungs into the bloodstream. Smoke exposure increases cardiovascular and respiratory illness and exacerbates existing illness. When air quality is hazardous for longer periods of time, it begins to impact mental health for residents that are staying indoors to protect their health. It is particularly hazardous for outdoor workers and others that cannot stay indoors to work.

Most outdoor pollution that affects health is produced by burning fossil fuels. Stopping the burning of fossil fuels would not only stop the production of greenhouse gas emissions causing climate change, but it would also dramatically improve our health, particularly for those living closest to pollution

"Thinking about that extreme weather, a lot of us will have heaters, but might not have air-conditioned spaces. So we've been struggling a lot during the heat waves, finding long- term air conditioned spaces for folks who need it. Not only unhoused, but also just the general population. They can survive a 90-degree day once, but if we're getting over or close to 100 degrees, multiple days in a row, we start to have a lot more problems."

—INTERVIEWEE

sources. Furthermore, when emissions from the burning of fossil fuels are produced in warm weather, ground level ozone is produced which is linked to asthma, bronchitis, heart attacks, and premature death.

More warm days, overall warmer weather, and a high carbon dioxide environment lead to higher pollen production and longer allergy seasons. Rising temperatures combined with wetter weather can also increase mold indoors and result in more asthma-like conditions.

Water impacts from sea level rise, changing ocean chemistry, loss of wetlands, heavy rain, flooding, and drought

As our climate warms, more of our precipitation falls as rain rather than snow. Changes to the amount of water available, and the timing of that availability, bring potential health impacts. Heavy rain and floods can cause direct injury and landslides that threaten infrastructure like roads, bridges, homes, and businesses. Combined with sea level rise, the impacts can be even more severe. Flooded buildings can develop mold and may pose a health risk. Heavy rain and floods can also increase waterborne disease outbreaks by carrying pathogens into recreational waters, shellfish harvesting water, and drinking water sources. Warmer air also alters the season of growth for freshwater and marine toxin-producing harmful algae, Vibrio bacteria, and other toxins and pathogens that can bring a variety of illness.

Drinking water in Lincoln and Benton counties comes from wells and surface water. Both groundwater and surface water can be contaminated by wildfires, landslides, and floods that carry toxins from the land such as certain

"When we had the wildfires, that was really a problem for a lot of people, and we didn't seem prepared or equipped here to help people with that in their homes. And so that was a big deal for people with just underlying medical conditions because even though they come here, we don't have a lot of health care here."

—INTERVIEWEE

agricultural herbicides. In turn, drought can also impact drinking water quality by concentrating toxins and reducing the available amount, both of which contribute to water insecurity.

Food insecurity and economic impacts

Fishing and agriculture are significant components of the economies in Lincoln and Benton counties. Drought, heat, flooding, rising sea levels, and changing ocean chemistry are all detrimental to these industries causing income loss and food insecurity. Sea level rise also threatens infrastructure and beaches and has already impacted some coastal areas. These can lead to chronic stress, malnutrition, chronic disease (such as diabetes), and mental health impacts that can be severe.

Vector-borne disease

A vector-borne disease is a disease that requires a host, such as a mosquito, tick, or flea. Climate influences the interaction between where that insect can survive and the diseases it may carry. It is a complex relationship, but the geographical and seasonal distribution of key vectors is changing. Ticks that carry Lyme disease are moving northward in the United States, and rising temperatures, changing precipitation patterns, and extreme weather events are impacting mosquitoes and mosquito-borne illness.

Mental health impacts

Climate change can impact mental health through many pathways bringing a range of responses from mild distress to depression, anxiety, post-traumatic stress disorder (PTSD), and suicidality. Specific groups of people are at higher risk including children, older adults (aged ≥ 65 years), women, pregnant and

"The levels of domoic acid in crab… if it's too high, crabbing is suspended until it goes lower, so we lose days of fishing because of that. What happens is [domoic acid] reduces the size of the meat inside them, so they're not considered marketable"

—INTERVIEWEE

postpartum people, people experiencing mental illness, first responders, and those whose livelihood is reliant on the local natural environment.

Our local economies depend on the natural environment for sustenance and livelihood, particularly farming, fishing, tourism, and recreation. Extreme heat in particular is a risk factor for all of these groups of people, but especially for those living with or experiencing mental illness, older adults (aged ≥ 65 years), and for people taking medication that makes body temperature more difficult to regulate (Crimmins, A., J. et al, 2016).

"Mental health is a big issue. When the people from the community told us they want to be prepared for a climate emergency, that is a reflection and expression of some level of anxiety they're going through. Saying 'What do I do if there is a fire in my neighborhood or I lose my house?' So there is already a mental health effect that I think is represented in terms of anxiety, to deal with the uncertain. So that is why it's so important to start preparing now."

—INTERVIEWEE

"I'm concerned about future generations and what they're going to have to cope with."

—INTERVIEWEE

Climate Impacts on Human Health

Adapted from: OHA, Public Health division. Climate and Health Program.

Allergies

Increasing pollen counts and potency result from rising temperatures and carbon dioxide levels. Increasing mold growth following storms and flooding also causes higher rates of allergic rhinitis and asthma attacks.

Respiratory disease and illness

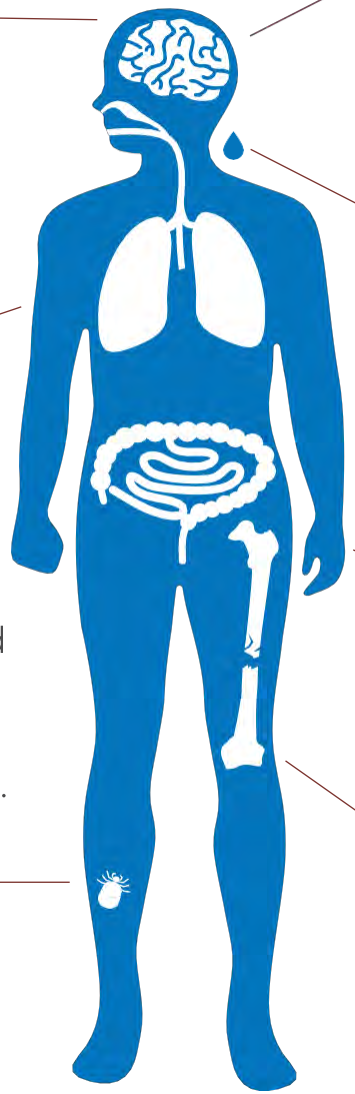
Air pollution and wildfires smoke can exacerbate preexisting conditions and cause new respiratory diseases.

Violence

Heat waves can increase heart rate, blood circulation, and sweating, and influence metabolic changes linked to the fight or flight response; increasing violent behavior.

Vector-borne disease

Stagnant water bodies caused by heat or drought provide a habitat for pests, such as mosquitoes and ticks. Higher temperatures also change the life cycle of certain pests that transmit diseases.



Mental health

Displacement, illness, and injury because of environmental changes can lead to anxiety, depression, suicidal ideation, and disruption of social networks.

Heat-related illness

Increasing temperatures and heat wave days result in elevated body temperatures; leading to heat stroke, heat syncope (fainting), heat exhaustion, heat cramps, and heat rash.

Gastrointestinal disease

Winter storms, flooding, and harmful algal blooms can contaminate drinking water with viruses, parasites, and bacteria; increasing GI illness.

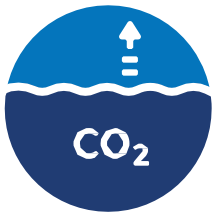
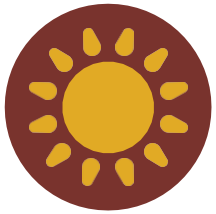
Injury

Winter storms, flooding and landslides can cause injuries from falling trees, electrical hazards, unsafe structures, and flying debris.

Climate impacts, health outcomes, and populations at increased risk

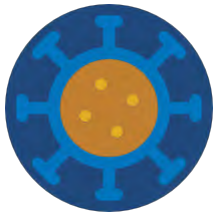
The following table summarizes primary and secondary data collected during the Lincoln and Benton Climate and Health Assessment. The table includes climate hazards, health impacts associated with those hazards, and populations who are at increased risk of experiencing these health impacts due to climate change.

Climate hazard	Health impact	Populations at increased risk
Indirect Impacts of All Climate Events 	**Economic instability and income loss for forestry, fisheries, agriculture, and tourism industries** – Food insecurity, mental health, chronic disease	– People navigating poverty – People who are economically dependent on forestry, fishing, agriculture, or tourism industries – People living in rural areas – People living in coastal areas – Native Americans/American Indians – Communities of color
	Mental and behavioral health – Chronic stress, anxiety, depression, suicide	– People navigating poverty – People who are economically dependent on climate stability – Parents – Youth – People living with existing chronic diseases – People living with existing mental health conditions
	Migration – Infectious disease	– Uncertain. The number of people migrating due to severe climate change in their home area is likely to increase
	– Displacement – Communicable disease in crowded evacuation centers, mental illness, stress	– People navigating poverty – People living in low-lying/coastal high-risk landslide areas – Native Americans/American Indians – People living in wildland/urban interface areas

Climate hazard	Health impact	Populations at increased risk
Sea Level Rise and Ocean Acidification 	**Income loss** –Food insecurity, chronic disease	–People living in coastal areas
	Displacement –Anxiety, depression, suicide	– People living in coastal areas – Native Americans/American Indians
	Mental and behavioral health –Anxiety, depression, suicide	– People living in coastal areas – Native Americans/American Indians
	Income Loss for fisheries –Food insecurity, chronic disease	– Native Americans/American Indians – People who are economically dependent on fisheries
Heatwaves and Heat Dome 	**Heat related illness and death** – Illness: Heat rash, heat cramps, heat exhaustion, heat syncope (fainting), heat stroke – Death: Cardiovascular disease, renal failure, heart attack, stroke, heat stroke, deaths from respiratory illness	– Young children – Older adults (aged ≥ 65 years) – People navigating poverty – People who are socially isolated (living alone and far away from familial support) – People who work outdoors (particularly people working in agriculture, forestry, and construction, especially migrant and seasonal workers) – People living with chronic diseases – Pregnant people – People who are not used to hotter weather (e.g., coastal communities) – Communities of color – People living in urban areas
	Violence –Intentional injury, homicide	–Children and young adults

Climate hazard	Health impact	Populations at increased risk
Heatwaves and Heat Dome continued	**Air pollution (respiratory illness)** – Chest pain, coughing, throat irritation, congestion, reduced lung function, exacerbation of emphysema, bronchitis and asthma, cancer deaths	– People living near heavy traffic – People living with existing chronic respiratory illness – Children and young adults
	Harmful algal blooms – Rash, paralytic shellfish poisoning, gastrointestinal illness, neurotoxic shellfish poisoning, food insecurity	– People who eat shellfish – People who are economically dependent on the seafood industry or coastal tourism – Native Americans/American Indians
	Recreational risk – Drowning, dehydration	– Children – Males
Wildfire 	**Air quality (respiratory illness and visibility)** – Cardiopulmonary disease, ischemic heart disease, asthma, bronchitis, pneumonia, cancer, motor vehicle crash injury due to low visibility	– People living with existing chronic illness – Children – Older adults (aged ≥ 65 years) – People who work outdoors (particularly migrant and seasonal workers) – Wildland firefighters
	Water quality – Increased flows of sediment, elevated temperatures – Gastrointestinal illness, Methemoglobinemia	– Infants – People who use private wells
	Occupational Risks – Heat stress, respiratory illness, heat-related illness, unintentional injury, hearing loss, rhabdomyolysis, death	– Wildland firefighters – People who work outdoors (particularly migrant and seasonal agricultural workers)

Climate hazard	Health impact	Populations at increased risk
Drought 	**Income loss** – Stress, chronic disease, premature death	– Farmers and others who work in agriculture – People living in rural areas – Native Americans/American Indians
	Food insecurity – Malnutrition, obesity, chronic diseases	– Communities of color – Native Americans/American Indians – People living in rural areas – Expectant parents and children
	Water insecurity – Water-borne disease (microorganisms, biotoxins and toxic contaminants) – Dehydration	– People living in rural areas – People navigating poverty – People who use private wells – Native Americans/American Indians – Infants
	Mental and Behavioral health – Stress, anxiety, depression, suicide	– Farmers and others who work in agriculture – People living in rural areas – People navigating poverty
Heavy rain, flooding 	**Landslides** – Stress, injury, death – Blockage/destruction of critical roadways, damage to infrastructure including drinking water/sewer Systems	– People living, working, or spending time in buildings near steep slopes – First responders
	Flooding – Injury, water-borne disease, respiratory illness, exposure to toxins, death	– People living in coastal areas – People living in low-lying areas

Climate hazard	Health impact	Populations at increased risk
Infectious Disease 	**Vector-borne disease** – Ex. West Nile virus, Lyme disease	– People who work outdoors – People in routine contact with animals, people living in areas with ticks
	Food-borne disease – Ex. gastroenteritis, campylobacteriosis, salmonellosis, V. parahaemolyticus	– People who consume shellfish, possibly through improper food storage and handling during hot weather
	Fungal disease – Ex. Cryptococcus gattii cryptococcosis	– Research is still exploring this

Climate Resilience Builds Community Resilience

"Climate change is the greatest global health threat facing the world in the 21st century, but it is also the greatest opportunity to redefine the social and environmental determinants of health" (Lancet, 2022). The changing climate impacts our landscapes, waters, community members, and ultimately, our way of life. While we cannot undo the greenhouse gas emissions of the past, reducing emissions going forward still has tremendous benefits and will greatly impact the climate in the next few decades and beyond. We can also invest in our community strengths and advance adaptation strategies to protect the health of all community members, particularly those who are disproportionately affected by climate events. A community prepared for the health impacts of climate change will be more resilient.

We can also invest in our community strengths and advance adaptation strategies to protect the health of all community members, particularly those who are disproportionately affected by climate events. A community prepared for the health impacts of climate change will be more resilient.

Climate change is a "threat multiplier," making existing health threats worse (United Nations, Weller et al). Communities in Lincoln and Benton counties that already bear the biggest burden of disease and poor health, including communities of color and households navigating poverty, are also more at risk of climate-related threats. Starting from a point of poor health means more severe impact from events such as heat waves and hazardous air from wildfire smoke. Not only are these community members more susceptible, these same groups often have fewer resources and opportunities to prepare for, recover from, and adapt to climate impacts.

Key to maintaining a healthy community will be planning ahead to help community members remain safe and healthy at home as much as possible. When this is not possible, we must have safe emergency spaces with sufficient capacity so as not to overwhelm local health care and other resources. Participants in the assessment already felt that health care resources, especially in Lincoln County, were insufficient and were concerned about its ability to care for large numbers of people in a climate emergency.

Community leaders acknowledged that Public Health engagement is extremely important for adaptation planning and expressed interest in the idea that mitigation efforts that reduce greenhouse gas emissions can also bring health improvements. They are ready to engage and want to be part of solutions. This assessment and plan is a key step, but this effort must be sustained in order to be impactful and maintain community trust. Following through on action steps will be an important demonstration that Public Health is fulfilling its role in protecting and promoting healthy communities for all.

Key to maintaining a healthy community will be planning ahead to help community members remain safe and healthy at home as much as possible.

Part Two: Developing Bold Leadership for Action

Over 150 people or organizations were invited to participate in the assessment.

Developing the Lincoln and Benton Climate and Health Adaptation Plan

The Lincoln and Benton Climate and Health Adaptation Plan was developed based on the values, concerns, and priorities of Public Health, community members, other partner agencies, and community-based organizations. On behalf of Lincoln and Benton counties, Rede Group conducted an assessment that included an organizational readiness survey for both counties, individual interviews, group interviews, focus groups, and a survey of community members and leaders to assess broader knowledge and concerns.

Over 150 people or organizations were invited to participate in the assessment, with an emphasis on priority populations in the region that would be most impacted by the health impacts of climate change based on existing state and national vulnerability indices (OHA, 2015). Other community members and leaders; organizations that are actively involved in environmental advocacy; those who provide health services to the region; and city, county, and state government representatives were also invited to participate. A total of 13 interviews were conducted, 16 people participated in focus groups, and 22 people completed surveys. A data party was hosted to share results with Public Health staff from Lincoln and Benton counties as

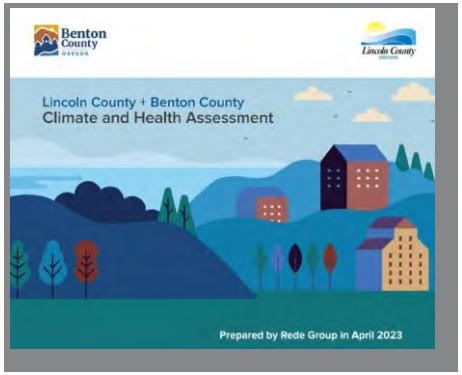
well as all the organizations and individuals that were invited to participate in the assessment.

Data parties allow collaborators and interested individuals to reflect on findings and delve deeper into questions. This is a valuable step in community engagement, allowing attendees to ask for further clarification on findings and share how the information found can be best used to guide their work. Rede provided preliminary findings from the initial data analysis at the data party and facilitated a discussion among participants to answer questions and elevate key take-aways.

Rede also completed a climate hazards assessment using reports produced by the Oregon Climate Change Research Institute (OCCRI), the Oregon Fifth and Sixth Climate Assessments and Future Climate Projections for Lincoln, Lane, Linn, and Marion counties. OCCRI anticipates its projections for Benton County will be complete later in 2023. As advised by OCCRI's Director, Rede analyzed Lane, Linn, and Marion County climate projections as a proxy for Benton County, given that all are located within the Willamette Valley.

Furthermore, Rede completed a climate and health profile report for Lincoln and Benton counties which describes the health impacts associated with each climate hazard and the populations at increased risk of experiencing these health impacts (see pages 21-25 of this report). The framework and health impacts draw from the Oregon Climate and Health Profile Report, which was developed based on multiple data indicators and academic research. The climate and health profile report includes a list of climate and health indicators for the region and can be found in the appendix of the assessment linked above.

To access the full Lincoln and Benton Climate and Health Assessment, click the image below.



Key Themes that Emerged from the Assessment:

Knowledge: Overall, community members, Public Health staff, and other city and county staff who participated are concerned about climate change. However, few had begun connecting health impacts with climate change except for instances where they'd already had a direct impact including wildfire smoke and extreme heat. When people were presented with potential health impacts, they did express concern and sometimes highly so. A few participants also recognized the compounding nature of climate change on health, connecting existing respiratory illness, COVID-19, Long COVID, and wildfire smoke. The majority of people that participated in the assessment were interested in learning more about health impacts and what they could do to preserve both their own health and the health of community members, particularly those at higher risk.

Readiness: A majority of respondents indicated readiness for action and felt that we are not moving quickly enough. A few participants expressed frustration that existing county or city plans (not developed by Public Health) have not resulted in significant action. Some participants noted that this assessment and plan is a key step, while others wondered if this effort will be sustained and impactful.

Capacity, roles, and action: The organizational capacity survey showed both counties have key support from Public Health leadership. However, in all other aspects of capacity there is either a different level of capacity between the counties or a need for more. Lincoln County generally has lower capacity than Benton, but their partnership allows Lincoln to learn from Benton, and models

The majority of people that participated in the assessment were interested in learning more about health impacts and what they could do to preserve both their own health and the health of community members, particularly those at higher risk.

creative intergovernmental partnership. Crucially, both counties indicate low applicable funding and few other agencies planning or taking action in their communities. This indicates a need for Public Health to be a bold leader on climate change throughout its own work and across sectors, and to prioritize creative funding methods.

Priorities: Addressing climate change is a priority across sectors of the community and government who participated. Generally, the findings from the assessment on health impacts align with the scientific findings of climate hazards from OCCRI, although very few community members living on the coast mentioned sea level rise as a concern. Top health concerns from community members were respiratory illness from wildfire smoke and extreme heat effects.

Top health concerns from community members were respiratory illness from wildfire smoke and extreme heat effects.

Across data collection methods, participants highlighted their concerns about the social and economic impacts of climate change and how this will affect health. Food insecurity stemming from ocean warming and acidification, drought, poor water quality, and extreme weather, displacement (people being forced to leave) and migration (people choosing to leave), and recreation access were uplifted by participants as key considerations for climate and health resilience. Participants were also concerned about mental health, especially for youth and people working in agriculture or fishing. While interventions in these areas might not always be squarely within the scope of Public Health, these responses provide important context and guidance for shaping the priorities of broader regional adaptation and implementation plans.

Equity: Public Health should maintain its equity approach, integrating it across their work as well as supporting other agencies in learning and incorporating equity. Climate change does not impact all people equally and planning must be made with this key concept as its foundation. Racism has burdened communities of color in particular with higher rates of disease and illness that are exacerbated by climate change. Ensuring equity as the foundation of any climate planning will increase preparedness and community resilience.

Ensuring equity as the foundation of any climate planning will increase preparedness and community resilience.

Role of Public Health in Preparing for Climate Change and Supporting Community Resilience

Public Health is concerned with protecting the health of entire populations. These populations can be as small as a local neighborhood, or as big as an entire country or region of the world (CDC Foundation, 2023).

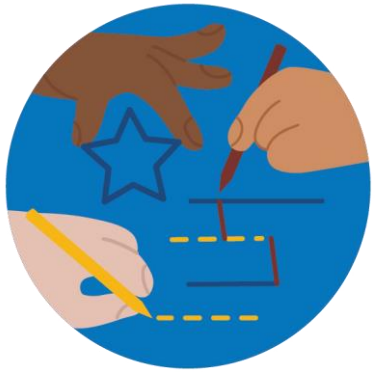
In Lincoln County, Public Health is a division of Lincoln County Health and Human Services (HHS) that serves as the local authority to protect and promote the health of Lincoln County residents (Lincoln County, 2015). In Benton County, Public Health is a division of the Benton County Health Department.

Given that climate change has such a tremendous impact on the health of all the people that live, work, and play in our two counties, Public Health has an important role to play.

The strategies and ideas for action in this plan align with the foundational capabilities of public health, which guides all of our work. This plan will allow Public Health to contribute our unique understanding of the health implications of climate change to the policies, systems, and environments that shape the daily lives of all who live in and visit Lincoln and Benton counties.

Moving Forward: Key Strategies and Ideas for Action

These key strategies and actions build upon the recommendations for local Public Health in the Oregon Health Authority's Oregon Climate and Health Resilience Plan. They were further informed by feedback from the Lincoln and Benton Climate and Health Assessment, local climate and health plans from around the Northwest, research findings, and community-based groups around Oregon focused on building climate resilience. The following illustration summarizes the strategy areas, for a detailed summary of the strategies, see page 9 of this report.



Health Equity and Cultural Responsiveness

Strategy 1: Standardize the use of an equity framework

- 1.1 Work across programs to identify, adopt, and use an equity lens or framework.
- 1.2 Increase local health department staff knowledge and understanding of equity including mechanisms for putting equity into practice.
- 1.3 Participate in and promote environmental justice trainings for local health department staff, governmental partners, and community partners.
- 1.4 Consult and collaborate with the regional health equity coalition and other equity-based community organizations to learn and develop culturally responsive climate and health messaging.

Strategy 2: Listen to new voices, empower new leaders, and build on existing relationships

- 2.1 Align with organizational equity and inclusion goals that increase institutional resilience through best practices in hiring and retaining a diverse workforce.
- 2.2 Investigate creative staffing for climate related work, such as the AmeriCorps VISTA program or internships with local community colleges and universities.
- 2.3 Increase the flexibility of Public Health programming for more culturally responsive approaches, promising practices and community pilot projects.
- 2.4 Support staff to foster and strengthen authentic relationships with culturally specific organizations to increase community climate resilience.

Community Partnership Development

Strategy 3: Ensure meaningful engagement in planning and action

- 3.1 Actively work to reduce barriers to engage community partners and support involvement including economic, language, transportation and other social considerations.
- 3.2 Actively work to ensure that the voices of "front line" community members and groups who have been socially marginalized are included in climate adaptation and action plans.
- 3.3 Continue to invite partners that informed the climate and health assessment to meaningful engagement opportunities.
- 3.4 Pursue policy, systems, and environmental changes identified through partnerships with affected communities and other interested parties.
- 3.5 Explore methods to increase community member and community organization capacity such as a resilience hub.
- 3.6 Partner with other county and city agencies and local community groups to host conversations about the health implications of climate change, how they can contribute to community resilience, and the health co-benefits of reducing greenhouse gas emissions.

Strategy 4: Acknowledge and support programmatic activities that strengthen social networks and social cohesion

- 4.1 Learn about the relationship between social networks, social cohesion, and Public Health programming.
- 4.2 Expand programs that address loneliness and increase social connection for older adults and households that may be isolated for other reasons such as language, economics, or other social or geographical factors.

Assessment and Epidemiology

Strategy 5: Prioritize, track, analyze, and share key climate and health indicators for Lincoln and Benton counties

- 5.1 Prioritize local climate risks and indicators, including co-benefits such as social connectedness.
- 5.2 Build capacity for improved data collection and monitoring health impacts such as from extreme heat, air pollution, wildfire smoke, and infectious disease (e.g., foodborne, waterborne, vector-borne) to inform emergency response and preparedness.
- 5.3 Include climate data with existing monitoring work (e.g., heat events/temperature, changing ocean temperature and chemistry/frequency of harmful algal blooms).
- 5.4 Monitor indicators and use Oregon's syndromic surveillance system (ESSENCE) to inform Public Health interventions for climate change.
- 5.5 Create an annual action evaluation plan, adjusting the objectives and activities as needed.

Strategy 6: Use mixed methods to assess resilience

- 6.1 Increase the number of jurisdictions with local resilience assessments and plans.
- 6.2 Engage diverse partners, including indigenous communities, in identifying and generating meaningful quantitative and qualitative data to inform local and culturally appropriate climate action.
- 6.3 Partner with government agencies, academic institutions, and community groups to develop new tools for focused climate and health interventions, such as GIS mapping of local climate and health indicators to visualize communities at increased risk.

Policy and Planning

Strategy 7: Integrate climate and health considerations into planning efforts and policies

- 7.1 Integrate climate considerations into community health assessments, community health improvement plans (CHIPs), and other community and environmental health assessments.
- 7.2 Provide climate and health perspective in local planning projects being led by non-public health agencies in the city or county.
- 7.3 Educate local elected officials on the health impacts of climate change and the health co-benefits of climate action.
- 7.4 Engage partners, youth, older adults, tribal nations, and communities of color in identifying policy actions and implementation methods.

Strategy 8: Promote and inform policies and planning that improve air quality and water quality and quantity

- 8.1 Develop tools and provide technical assistance to support local jurisdictions' efforts to reduce exposure to air pollution.
- 8.2 Help to inform new policies and plans to protect and improve air and water quality, including health impact assessment of proposed land use and transportation projects.
- 8.3 Join partners to support land use and active transportation improvements to decrease air pollution.

Strategy 9: Promote and inform policies and planning that improve community resilience and protect infrastructure

- 9.1 Support community partners with developing and implementing healthy food system policies.
- 9.2 Provide climate and health input in planning to protect infrastructure from sea level rise and other climate hazards.
- 9.3 Incorporate food system and community resilience strategies into community health improvement plans (CHIPs).
- 9.4 Engage partners, youth and older adults in identifying policy and planning actions to work on together.

Emergency Preparedness and Response

Strategy 10: Integrate climate and health information into coordinated emergency preparedness plans and activities

- 10.1 Review and use climate and health guidance and tools for local preparedness planners including establishing or strengthening a relationship with the National Weather Service.
- 10.2 Incorporate local climate hazard, health risk, and climate resilience considerations from the assessment into hazard mitigation planning.
- 10.3 Inform and support changes in local land use and zoning code to improve the safety of future development and strengthen community resilience against climate hazards.

Strategy 11: Support emergency planners in developing an equitable response for community members at highest risk including culturally and linguistically responsive ways

- 11.1 Participate in training to incorporate trauma-informed and strengths-based approaches to preparedness planning and response such as Community Resilience, Climate Adaptation Planning for Emergency Management, and other National Disaster Preparedness Training Center (NDPTC) trainings.
- 11.2 Strengthen relationships with community-based organizations that represent and serve diverse populations.
- 11.3 Provide the health equity perspective in local cross-sector emergency planning and invite community-based organizations to the table.

Strategy 12: Identify resources to support community resiliency

- 12.1 Investigate possibilities from current partnerships, existing government programs, or external funds.
- 12.2 Identify community resources needed to help address climate impacts, such as funding for heat pumps, air filters, and other tools to stay safe and healthy at home.

Communications

Strategy 13: Collaborate with community-based organizations and other partners to deliver climate and health messages

- 13.1 Embed the connections between climate and health throughout our work.
- 13.2 Ensure website contains easy to find climate and health information and remains up to date for timely community member and partner use.

- 13.3 Partner with mental and physical health care providers and other direct service providers to develop and share messages and/or materials.
- 13.4 Prioritize relationships with providers that serve populations at increased risk of climate-related health impacts (e.g., pregnant people, young children, older adults (aged ≥ 65 years), people who are socially or geographically isolated).
- 13.5 Host relevant guest speakers and invite direct service providers and those working in the health care sector to learn about climate and health actions.
- 13.6 Use lessons learned from the COVID-19 response to improve timeliness and cultural responsiveness of messages to improve accessibility and ensure messaging is delivered to emerging multilingual households, and households that are socially or geographically isolated.

Strategy 14: Use storytelling methods, such as case studies and story maps, to engage and learn from community members and interested parties

- 14.1 Participate in story project training.
- 14.2 Use case studies and story projects to engage with diverse stakeholders and advance climate and health work.
- 14.3 Engage youth in storytelling work to elevate their concerns and connect with policy makers.

Leadership and Organizational Competencies

Strategy 15: Provide active, positive, bold leadership on climate

- 15.1 Build climate and health literacy among Public Health and other county agency leaders and employees by providing access to learning

opportunities including online trainings and materials, and local, northwest regional and national climate and health events.

- 15.2 Increase buy-in from Public Health staff by offering opportunities to learn and share together about how climate change impacts them, their families and the people they serve, and ways we can adapt.
- 15.3 Provide clear leadership on climate and health issues through formal statements and by signing on to joint declarations and resolutions that call for climate action.
- 15.4 Develop (or participate in) a cross-sector climate change work group at the local level.
- 15.5 Participate in and sustain the network of Oregon local Public Health staff working on climate change.
- 15.6 Seek opportunities to represent public health and health equity concerns on commissions, councils, or other committees.

Strategy 16: Improve internal operations to lower carbon footprint and save resources

- 16.1 Emphasize health co-benefits of reducing carbon emissions.
- 16.2 Support Public Health employee participation in an internal and/or inter-agency sustainability committee.
- 16.3 Include sustainability considerations in worksite wellness efforts and other decisions that affect worksite environments, practices, and policies.
- 16.4 Share information on cost savings of reducing the organizational carbon footprint with local elected officials.

Implementing and Evaluating Climate and Health Strategies

Partnerships are essential to strengthening the resilience of our communities.

Vision for Implementation

This plan demonstrates the urgent need for action within local Public Health planning and programs, but also across Lincoln and Benton counties. Furthermore, meaningful and culturally responsive partnerships are essential to strengthening the resilience of our communities.

Public Health has been a leader on climate action in Benton County since publishing its first climate and health adaptation plan in 2013. While Lincoln County is just beginning to plan for climate change, Public Health is an emerging leader there, too. Grounded in protecting and promoting health and principles of equity, Public Health brings key perspectives to the work. However, Public Health cannot carry the entire load of adapting to climate change. Our role is to inform and influence policies that can reduce greenhouse gas emissions that in turn bring health co-benefits. This plan can be used as a tool for policy makers, highlighting where policy change is needed. Public Health can also help policy makers explore the health co-benefits that come with reducing emissions, which not only improve health but bring significant cost savings.

Lincoln and Benton County Public Health will implement this plan, focusing first on the most immediate climate impacts. This includes developing and implementing comprehensive heat adaptation plans. It also includes

preparing for and responding to urgent climate needs while building resilience in our community with actions in the short, medium, and long term. Providing learning opportunities for staff will help them bring climate considerations into their work. With designated and consistent resources, climate and health knowledge, and partner collaborations, Public Health can more fully develop and implement the actions included in this plan.

Guidance for Evaluation

Lincoln and Benton counties will each be responsible for developing their own specific action plans and evaluation metrics for the strategies included in this adaptation plan. This section provides a template to help develop action plans for each climate hazard identified in the climate and health assessment, as well as some guiding questions to assess progress on the strategies under each Public Health foundational competency. Together, these tools can be used by Lincoln and Benton counties to operationalize their strategies and identify important milestones in their ongoing climate and health adaptation work.

This action plan template was adapted from the Bay Area Regional Health Inequities Initiative (BARHII) assessment tool, and a Word document version was provided to Lincoln and Benton counties for future use. The action plan template is intended to assist each county in outlining the steps, resources, contributors, and timeframe to address climate hazards identified in the climate and health assessment. An example plan has been provided on the following page to show how to use each column. Each county may need to adjust this table for their individual needs and preferences.

"In this community, actually, there's all sorts of opportunity to collaborate. Once you tell people what you want to do, it's a community that really likes to volunteer, really likes to throw out things, really likes to chew it apart, but it needs to be focused. If we tell people, 'this is the issue we want to do, what all can you do?' You'll see private industry, you'll see nonprofits, you'll see all sorts of people jump in on that."

—INTERVIEWEE

Example Climate hazard:
Health impact: Heat exhaustion
Vulnerable population: Unhoused individuals

Action	Resource	Partners	Leader	Timeline	Monitoring	Result
What is the action?	What do we need?	Who should we consult, inform, or collaborate with?	Who will serve as the point person for making this happen?	What are the steps, and when will we aim to achieve them?	What are the milestones of progress, and how will we measure them?	What change do we want to see? What does success look like?
Stand up cooling centers when temperatures are above 100 degrees.	Venue/space, electrolyte packs, water bottles, sunscreen, cooling towels, transportation plan for those without their own vehicle or money for transit	[CBO] who serves unhoused individuals in our county	[insert names]	[name] will connect with CBO to discuss available and needed resources and determine a start date for cooling centers. CBO and PH will promote the cooling centers through existing channels	– Regular venue secured – Promotional channels established – Transportation plan prepared	– Qualitative feedback from unhoused individuals that the cooling centers are welcoming and effective – Qualitative feedback about what modes of transportation – Meeting community need, no one was turned away, sufficient supplies

How can the organization show that their climate and health work has improved the quality of life in their community?

The following questions are meant to prompt each county to reflect on their progress within the strategies (organized by foundational competency). "Internal capacity building" is not a foundational competency, but was added to this evaluation plan as it is a key component of advancing all other strategies. Similar to the action plans, these questions may be adapted to fit the needs of each county as they build out their individual evaluation plans and metrics.

Internal Capacity Building

- ***a.*** Have key staff attended trainings or conferences to build their knowledge and capacity for climate and health work?
- ***b.*** What additional resources have been acquired/leveraged to build Public Health's capacity for climate and health work?
- ***c.*** Have any creative staffing solutions been implemented?
- ***d.*** How has Public Health leveraged intergovernmental partnerships? Are agencies and partners coordinating on climate strategies?

Health Equity and Cultural Responsiveness

- ***a.*** Has the organization adopted the use of an equity framework? How have they applied it to their climate and health work?
- ***b.*** Do organization leaders, administrators, and staff understand how to better account for equity and health impacts in climate decision-making?
- ***c.*** Can the organization point to ways that climate actions have contributed to decreasing disparities, especially among identified populations at increased risk?
- ***d.*** How can the organization show that their climate and health work has improved the quality of life in their community?

Community Partnership Development

a. Has the organization hosted public events, including presentations, teach-ins, or knowledge exchanges, to build local knowledge of the connection between climate change and health?
b. What kinds of feedback have community partners provided to help increase/sustain collaboration?
c. Have key partners been involved in developing shared understanding of climate and health impacts among community members? How so?
d. Have key partners been involved in developing climate and health action plans with the county?
e. How have the county and key partners engaged populations that are socially or geographically isolated to improve social cohesion?

Assessment and Epidemiology

a. Does the organization have a structure to track, analyze, and share key climate and health indicators for their county?
b. How has the community been engaged in conversations about the health impacts of climate change and resilience to these impacts? Does the organization have both quantitative and qualitative data?
c. In what ways is Public Health and their partners continuing to assess health impacts and resilience among identified populations at increased risk?
d. Can the organization point to injuries, illnesses, and/or deaths that have been reduced or prevented due to their efforts?

Policy and Planning

a. How have the climate and health strategies in this plan been integrated into other existing policy and planning efforts?

How have the climate and health strategies in this plan been integrated into other existing policy and planning efforts?

Has the organization developed a preparedness and/or action plan for each climate hazard identified in the climate and health assessment?

b. How has the organization promoted and informed policies and planning that improve air quality and water quality and quantity?
c. How has the organization promoted and informed policies that improve community resilience and protect infrastructure?
d. Have there been changes in policy, systems, and environments that reflect recommendations in this plan? How did Public Health contribute?

Emergency Preparedness

a. How has the organization integrated climate and health strategies into coordinated emergency preparedness plans and activities?
b. What resources have been identified to support community resilience to natural disasters? Were those resources deployed to the community? How was the need determined and how many households were served? How have they been utilized?
c. Has the organization developed a preparedness and/or action plan for each climate hazard identified in the climate and health assessment?
d. How have Public Health and Emergency Preparedness collaborated to develop a more equitable response for people at increased risk that addresses cultural, linguistic, developmental, and other needs?

Communications

a. Has the organization collaborated with community partners to develop and/or share climate health information and messaging?
b. How has the organization incorporated storytelling methods (e.g., case studies and story maps), to engage community members on topics of climate and health? What was done with the stories? How did the storytelling impact community health?

What opportunities have Public Health staff and leadership had to learn and share together about the impacts of climate change on themselves, their families, and the people they serve?

c. Do community members and partners have a mechanism to provide feedback and recommendations to Public Health to improve the climate and health response in their community? How is it used by Public Health?

Leadership and Organizational Competencies

a. What opportunities have Public Health staff and leadership had to learn and share together about the impacts of climate change on themselves, their families, and the people they serve?

b. Has the organization issued formal statements or signed on to joint declarations or resolutions that demonstrate their commitment to climate action?

c. What cross sector climate change work has Public Health engaged in?

d. How has the organization adapted internal operations to lower their carbon footprint?

e. In what other ways has the organization demonstrated themselves to be an emerging or established leader in climate and health adaptation?

Glossary

This document uses the following terms and definitions.

Adaptation: The adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects. Definition from the U.S. Global Change Research Program.

Climate and Health Adaptation: The *intentional* adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative health effects.

Climate: Climate is the weather of a specific region averaged over a long period of time. "Climate change" refers to long-term changes, most often 30 years or longer. Definition from National Academies.

Co-benefits: Co-benefits in this document refer to the health benefits that come from mitigation efforts that reduce greenhouse gas emissions. Health co-benefits can arise from many actions but include cleaner air and water. Learn more from the Lancet.

Community-Based Organization (CBO): Community-based organizations in this document refer to local organizations that are often not for profit that partner with governmental public health in a variety of ways to improve the health of communities. One academic definition is: Community-based organizations are important health system partners as they provide numerous, often highly valued programs and services to the members of their community. A community can be defined in many ways - geographic, cultural, racial, spiritual, etc. In addition, networking and/or developing partnerships between organizations is often particularly important in contexts where organizations may need to build coalitions, exchange/ share resources, partner, and avoid service duplication. Furthermore, community-based organizations often provide services and support to the most marginalized, disadvantaged, and stigmatized sections of society.

Definition adapted from Wilson, M.G., Lavis, J.N. & Guta, A. Community-based organizations in the health sector: A scoping review. Health Res Policy Sys 10, 36 (2012).

Environmental Justice: Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies. Definition from US Environmental Protection Agency.

Environmental Justice Movement: Environmental justice is an important part of the struggle to improve and maintain a clean and healthful environment, especially for those who have traditionally lived, worked, and played closest to the sources of pollution. Definition from Natural Resources Defense Council.

Equity: Equity is the absence of unfair, avoidable, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other dimensions of inequality (e.g., sex, gender, ethnicity, disability, or sexual orientation). Definition from the World Health Organization (WHO).

Health Equity: Health equity is achieved when everyone can attain their full potential for health and well-being.

Health and health equity are determined by the conditions in which people are born, grow, live, work, play and age, as well as biological determinants. Structural determinants (political, legal, and economic) with social norms and institutional processes shape the distribution of power and resources determined by the conditions in which people are born, grow, live, work, play, and age.

People's living conditions are often made worse by discrimination, stereotyping, and prejudice based on sex, gender, age, race, ethnicity, or disability, among other factors. Discriminatory practices are often embedded in institutional and systems processes, leading to groups being under-represented in decision-making at all levels or underserved.

Progressively realizing the right to health means systematically identifying and eliminating inequities resulting from differences in health and in overall living conditions. Definition from the World Health Organization (WHO).

Mitigation: Processes that can reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing them from the atmosphere. Definition from the U.S. Climate Resilience Toolkit.

Resilience: The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption. Definition from the U.S. Climate Resilience Toolkit.

Public Health Modernization: Public Health Modernization is a framework for ensuring local public health departments (LPHAs) across Oregon can serve their communities through:

- Tracking and preventing the spread of communicable (infectious) diseases
- Promoting community resilience in the face of climate change
- Responding to public health emergencies
- Promoting health and well-being
- Ensuring Oregonians have access to health care
- Providing clear, timely, and culturally relevant communication to their communities on public health concerns
- Building relationships and collaborating with community partners (such as community-based organizations, faith communities, health care providers, schools, and more) to deliver public health services
- Building a well-trained, diverse public health workforce
- Creating policies that support health and well-being
- Advancing health equity by lifting up the voices of people who are harmed the most by the health issues we face and intentionally undoing systems that treat people differently because of their race, ethnicity, language, class, disability, gender identity, sexuality, or any intersections of these identities.

Definition from Oregon Coalition of Local Health Officials.

Social Determinants of Health: Social determinants of health (SDOH) are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks. SDOH can be grouped into 5 domains: Economic Stability, Education Access and Quality, Health Care Access and Quality, Neighborhood and Built Environment, Social and Community Context. SDOH have a major impact on people's health, well-being, and quality of life. Examples of SDOH include:

- Safe housing, transportation, and neighborhoods
- Racism, discrimination, and violence
- Education, job opportunities, and income
- Access to nutritious foods and physical activity opportunities
- Polluted air and water

- Language and literacy skills

Definition from U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion.

Vectors: Vectors are living organisms that can transmit infectious pathogens between humans, or from animals to humans. Many of these vectors are bloodsucking insects (e.g., mosquitos, ticks), which ingest disease-producing microorganisms during a blood meal from an infected host (human or animal) and later transmit it into a new host, after the pathogen has replicated. Often, once a vector becomes infectious, they are capable of transmitting the pathogen for the rest of their life during each subsequent bite/blood meal. Definition from World Health Organization.

Vector-borne diseases: Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. Distribution of vector-borne diseases is determined by a complex set of demographic, environmental, and social factors. Local examples are Lyme disease and West Nile Virus. Definition from World Health Organization.

Vulnerable: Vulnerable or vulnerability in this document is used in the context of vulnerability to the impacts of climate change. Climate vulnerability describes the degree to which natural, built, and human systems are at risk of exposure to climate change impacts. Vulnerable communities experience heightened risk and increased sensitivity to climate change and have less capacity and fewer resources to cope with, adapt to, or recover from climate impacts. These disproportionate effects are caused by physical (built and environmental), social, political, and/or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality. Definition from Governor's Office of Planning and Research, State of California.

Weather: Weather refers to short term atmospheric conditions. Definition from US Geological Service.

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2040 Thriving Communities Initiative

Sean McGuire
Sustainability Program, BOC

Benton County OREGON

Today's Briefing

- Origins of the 2040 Thriving Communities Initiative
- 2040 Thriving Communities Council
- Public Engagement to Identify Our Communities' Core Values
- Operationalizing Core Values for Benton County Government
- Where We Are & Where We're Going

Benton County OREGON

Commitment to Sustainability

- 2002: County established sustainability policy & Sustainability Committee (now, Resource Efficiency Committee)
- 2002-15: Focused on reducing environmental impacts on County operations
- 2015: Full-time Sustainability Coordinator hired to expand scope to the public & explore 2040 Initiative

Benton County OREGON

Sustainability for Benton County

- Social Well-Being & Equity
- Environmental Quality & Resiliency
- Economic Prosperity & Vitality
- Community Livability & Opportunity

Benton County
OREGON

Why the Need for 2040 Initiative?

- Pressure internally & countywide from population increases; Demographic shifts
- Land use changes & increased need for affordable housing
- Reduced carrying capacity
- Human & environmental effects from climate change
- Lack of meaningful public engagement

Benton County
OREGON

2040 Council

In Spring 2016, the 2040 Council is convened as a group of individuals representing a variety of interests, including agricultural industries, Oregon State University, regional development, municipalities, private sector, and multiple community organizations.

Benton County OREGON

Guiding Principles & Desired Outcomes

- Build Relationships & Public Trust; Open Dialogue; Transparency
- Inclusivity of Disenfranchised & Populations Not Usually Reached
- Does Not Have To Be Everything for Everyone Forever; Iterative Process
- Collaboration, Integration, & Long-Term Solutions

Benton County OREGON

Phase 1: Public Engagement

1. *What do you like and value about living in Benton County?*
2. *What do you want Benton County to be like between now and 2040?*
3. *What needs to happen to achieve your vision?*

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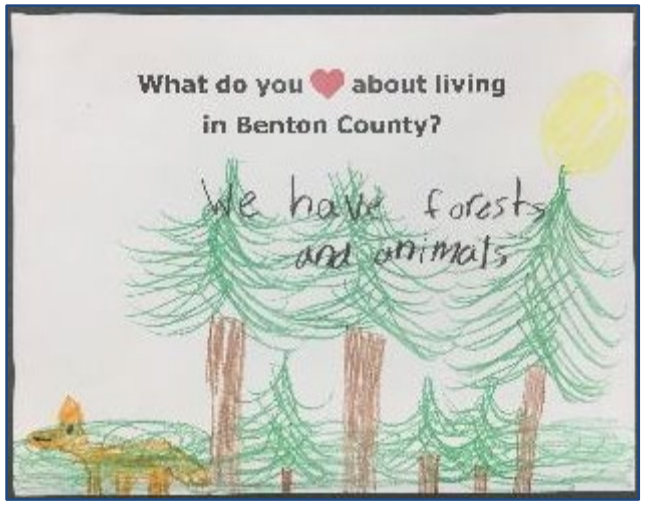
Phase 1: Public Engagement

1. Public Events
2. Online Surveys
3. Listening Sessions
4. Imagine Corvallis 2040
5. Community Plans



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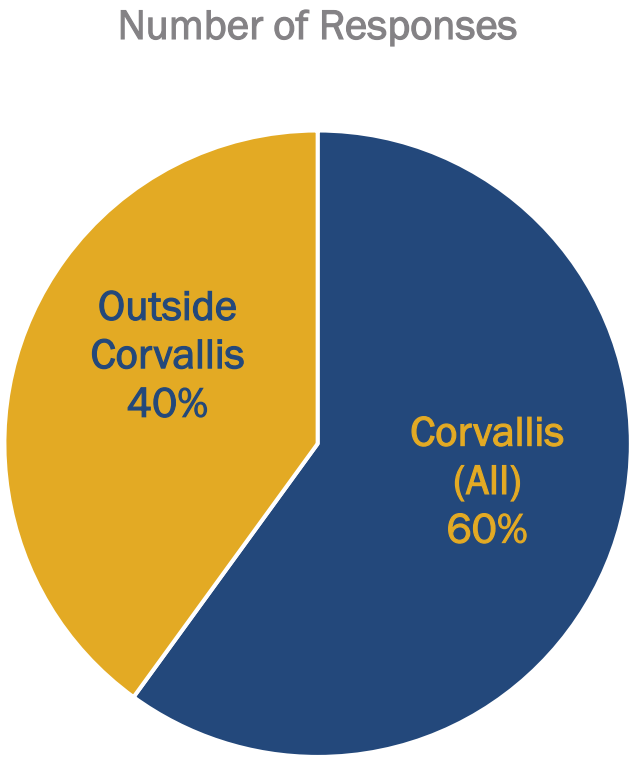
Who We Heard From

Demographics from Online Survey

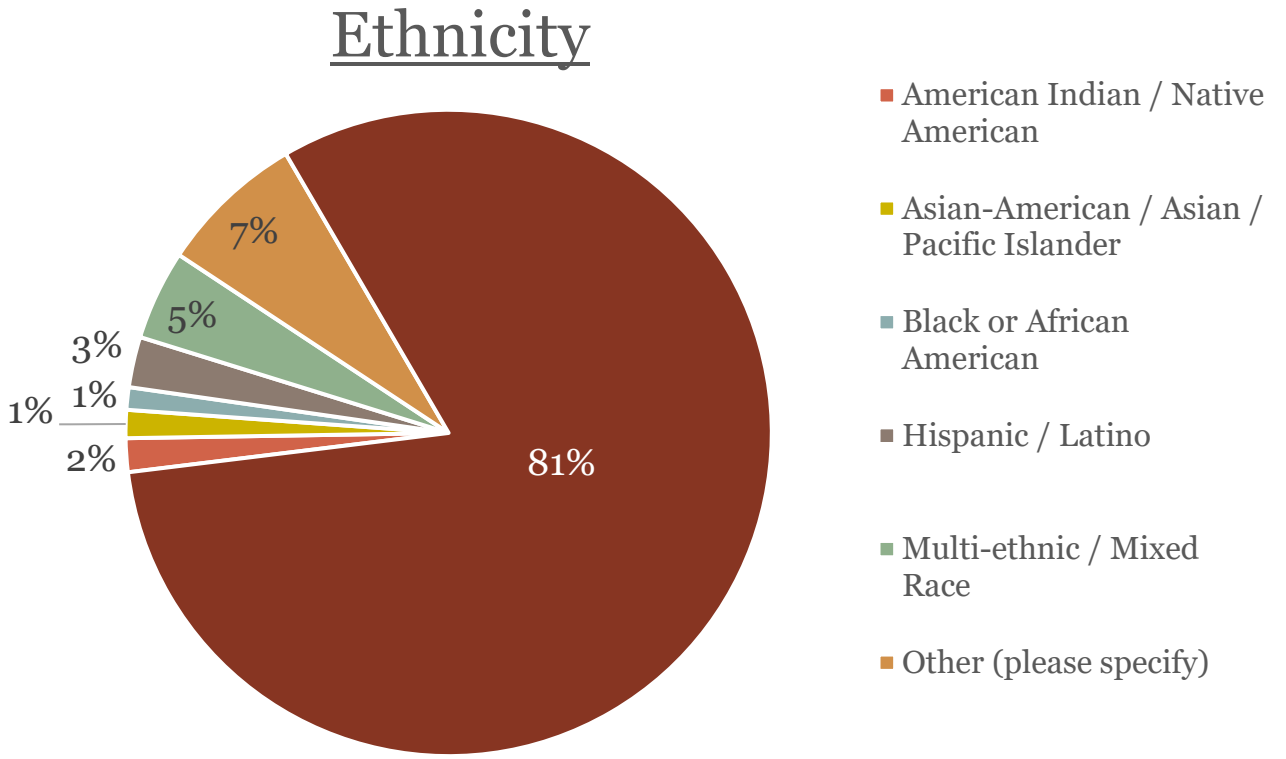
What City or Area Do You Live In?	Responses
Adair Village	2
Albany	14
Alsea	2
Bellfountain	2
Benton County/Rural	22
Corvallis	182
Greenberry	1
Kings Valley	1
Lewisburg	4
Monroe	22
North Albany	38
North Corvallis	13
Outside Benton County	3
Philomath	24
South Benton County	5
South Corvallis	18
Wren	2



Benton County OREGON

Who We Heard From

Demographics from Online Survey

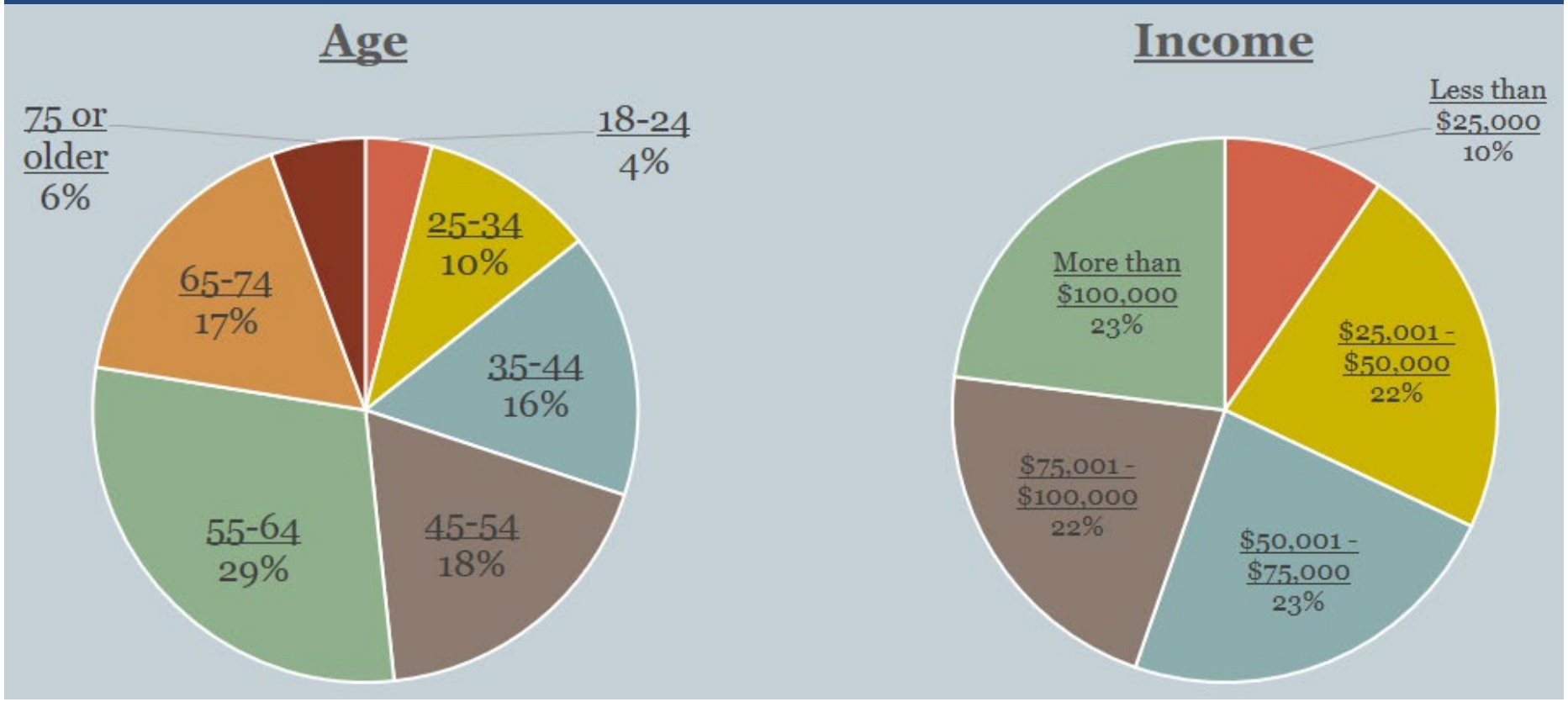


Census Data: 88% White
Spanish-written entries **not** included.

Benton County OREGON

Who We Heard From

Demographics from Online Survey



Benton County OREGON

2040 Core Values

1st Draft: Summer, 2017

Phase 2: Fall, 2017

Final Version: February, 2018

Benton County OREGON

Benton County's 2040 Thriving Communities Initiative's Core Values

Based on the Principles of Equity & Health, Benton County Strives to Ensure:

"Vibrant, Livable Communities"

Vibrant, Safe, & Livable Communities that Promote Creativity, Forward-Thinking, a Sense of Place, & High Quality of Life

"Supportive People & Resources"

Welcoming Communities that Actively Build Social Connections, Personal Interactions, & Community Resources that Foster Belonging

"High Quality Environment & Access"

High Environmental Quality, Conservation of Natural Resources, Consideration of Carrying Capacity, and Easy Access to the Outdoors

"Diverse Economy that Fits"

A Diverse, Robust Economy that Inspires & Stimulates Local Business, Entrepreneurship, Innovation, & Opportunities

"Community Resilience"

Communities & Individuals are Prepared to Respond to & Recover from Natural & Human Caused Threats, & Disasters, & Changes

---

Equity for Everyone

We Appreciate the Inherent Value of Each Community Member, Honor Differences, Celebrate Diversity, & Foster Inclusion

Health in All Actions

We Recognize & Will Address the Well-Being of our People by Including Health Considerations in all Policies, Practices, Activities, & Operations

Operationalizing the Core Values

Benton County's 2040 Thriving Communities Initiative's Core Values

Based on the Principles of Equity & Health, Benton County Strives to Ensure:

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Operationalizing the Core Values

2040 Implementation Steering Committee

- Comprised of staff from most Departments & multiple levels
- Tasked with operationalizing Core Values into Government operations, initiatives, policies, services, & budget
- Specific actions include engaging staff, embedding Core Values into Departmental goals, & identifying cross-Department goals

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Focus Areas & Vision Statements

Benton County Government endorses and will operationalize the Core Values identified by the 2040 Thriving Communities Council and will specifically recognize and promote Health, Equity, and Resource Efficiency.

- Community Safety
- Emergency Preparedness
- Outdoor Recreation
- Prosperous Economy
- Environment & Natural Resources
- Mobility & Transportation
- Housing & Growth
- Arts, Entertainment, Culture, & History
- Food & Agriculture
- Lifelong Learning& Education

Benton County OREGON

Developing Vision Statements

Vision Statements per Focus Areas

Benton County Government endorses and will operationalize the Core Values identified by the 2040 Thriving Communities Council and will specifically recognize and promote Health, Equity, and Resource Efficiency.

COMMUNITY SAFETY	
Vision Statement	Benton County commits to ensure all people enjoy safe, just, welcoming, and supportive communities.

EMERGENCY PREPAREDNESS	
Vision Statement	Benton County commits to secure resilient communities where individuals and the County government can survive and recover from emergencies, shocks, and disasters by appropriate levels of threat awareness, preparation, mitigation, response, & capacity for recovery.

OUTDOOR RECREATION	
Vision Statement	Benton County actively promotes a range of outdoor recreation activities and will responsibly protect, manage, and develop our parks & natural areas.

PROSPEROUS ECONOMY	
Vision Statement	Benton County commits to support a prosperous, balanced, equitable, and sustainable economy.

ENVIRONMENT & NATURAL RESOURCES	
Vision Statement	Benton County commits to protect, conserve, & enhance our treasured, limited natural resources & prepare for future environmental challenges.

MOBILITY & TRANSPORTATION	
Vision Statement	Benton County will ensure people are efficiently connected to the places they work, play, shop, learn, enjoy, and receive services through transportation options that promote activity, reduce congestion, & build community.

HOUSING & GROWTH	
Vision Statement	Benton County will strive for access to affordable, safe, and stable housing for all while retaining a sense of place in the face of growth pressures.

ARTS, ENTERTAINMENT, CULTURE, & HISTORY	
Vision Statement	Benton County will actively promote vibrant, inviting, and enriching artistic & entertainment opportunities while recognizing our history & celebrating our communities.

FOOD & AGRICULTURE	
Vision Statement	Benton County supports local agriculture and forestry and celebrates our rural communities.

LIFELONG LEARNING & EDUCATION	
Vision Statement	Benton County recognizes that learning never stops and will ensure professional and personal education opportunities for all ages.

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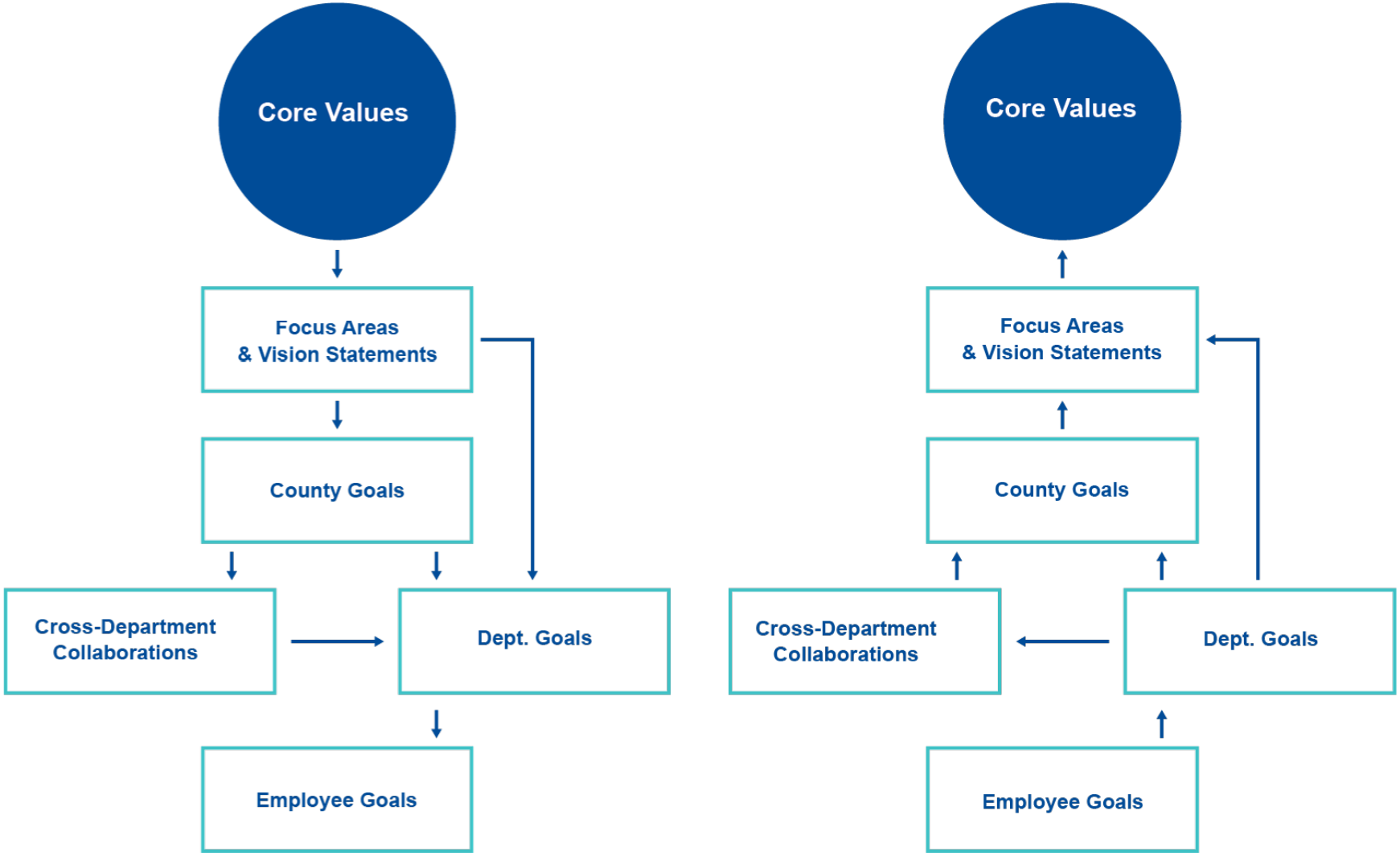
Operationalizing the Core Values



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Operationalizing the Core Values

BOC Checklists

- All presentations to BOC must complete Agenda Checklist
- Checklist includes Core Values & Focus Areas that must be identified & addressed

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Operationalizing the Core Values

2020: Identify Goals

- C.A. directs Leadership to identify 3-5 Goals for Budgets & 2040 Initiative
- Progress is tracked

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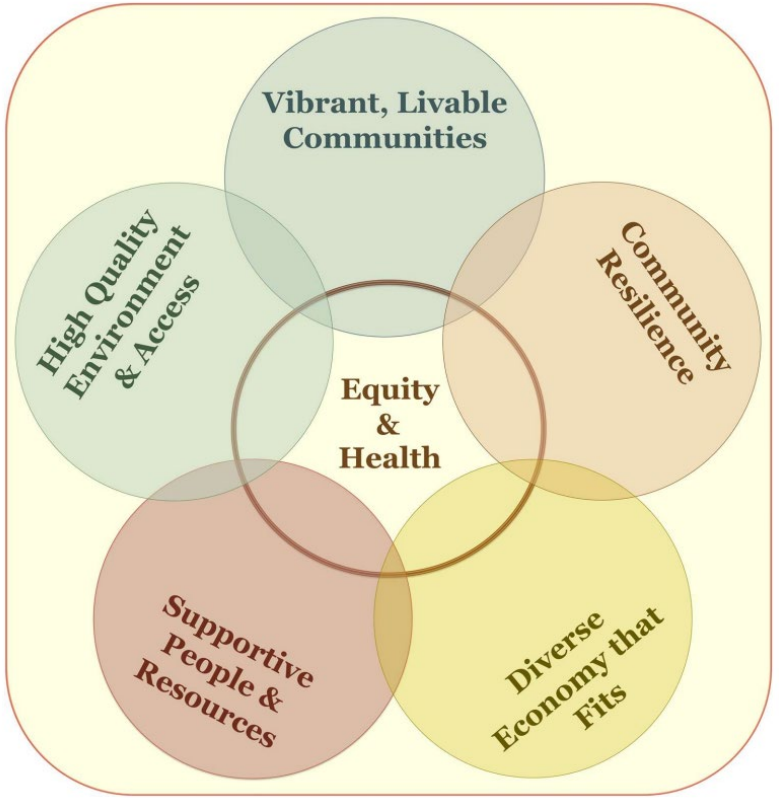
Operationalizing the Core Values

Externally, Our Communities' Core Values are Not a Set of Criteria for Evaluating Specific Projects;

Rather, They Serve as a Lens for Evaluating and a Guide for Addressing Long-Term, Complex Issues



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At your service, *every day.*

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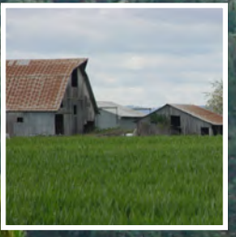
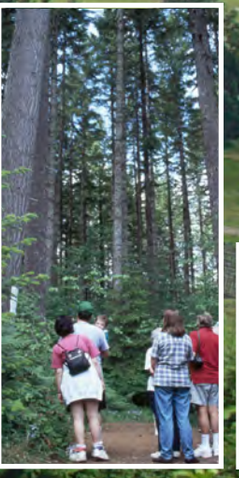
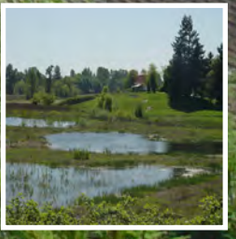
Benton County

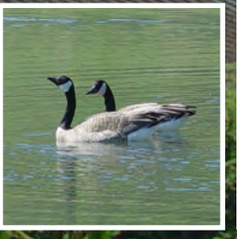
Benton County Comprehensive Plan

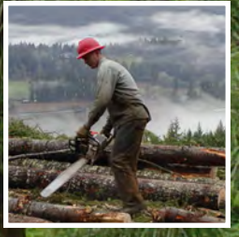
Adopted 2007

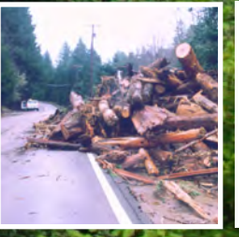












Benton County Comprehensive Plan

Adopted by Ordinance No. 2007-0217

First Reading:
February 6, 2007

Second Reading:
February 20, 2006

Effective Date:
March 22, 2007

Additional copies available from:
Benton County Community Development Department
360 SW Avery Avenue Corvallis, OR 97333
541-766-6819
Also available on our website: **www.co.benton.or.us**

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Credits

The contribution of the following individuals was critical to the Comprehensive Plan review and revision process.

Citizen Steering Committee - Phase I

Larry Earhart, Planning Commissioner
Karen Fleck Harding, Wren Citizen Advisory Committee
Liz Frenkel, member-at-large
Wayne Giesy, member-at-large
Bob Hogensen, member-at-large
Ken Kenaston, Planning Commissioner
Doug Killin, member-at-large
Jay Sexton, Parks Advisory Board Member
Jean Worth, Planning Commissioner

Citizen Steering Committee - Phase II

Larry Earhart, Planning Commissioner
Karen Fleck Harding, Wren Citizen Advisory Committee
Liz Frenkel, member-at-large
Wayne Giesy, member-at-large
Ken Kenaston, Planning Commissioner
Jay Sexton, Parks Advisory Board Member
Jean Worth, Planning Commissioner

Technical Advisor-Willamette River Greenway

Robert Frenkel

Consultant - Phase I

David Reed, David Reed and Associates

Consultant - Phase II

David Dodson, Willamette Valley Planning

Steering Committee Facilitator

Cynthia Solie, Cascades West Council of Governments

Project Manager

Peter Idema, Development Department Director

Credits

Planning Commission

John Bolte, Chair
Rick Barnett, Vice-Chair
Paul Dickey
Larry Earhart
Eldon Erickson
Peter Kenagy
Ken Kenaston
Amy Schoener
Jean Worth

Board of County Commissioners

Jay Dixon, Chair
Linda Modrell, Vice-Chair
Annabelle Jaramillo

Technical Advisory Committee (TAC)

Mike Bamberger, Emergency Services Manager
Chris Bentley, Associate Planner, Community Development
Jerry Davis, Director, Natural Areas & Parks
Bill Emminger, Deputy Administrator, Environmental Health
Peter Idema, Director, Community Development
Roger Irvin, Director, Public Works
Cynthia Solie, Cascades West Council of Governments
Greg Verret, Senior Planner, Community Development

Recorder

Terry Nix

Editor

Karen Fleck Harding

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Plan Elements

Goal 1 - Citizen Involvement

Goal 2 – Land Use Planning

Goal 3 – Agricultural Lands

Goal 4 – Forest Lands

Goal 5 – Natural Resources, Scenic & Historic Areas, Open Spaces

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Additional Adopted Documents

(Complete documents located at the Community Development Department)

Amending the Comprehensive Plan

Appendix

Introduction

Benton County Mission

Making Benton County a better place to live.

Benton County Government brings to its citizenry the authority, structure, and services to respond to public concerns and opportunities and provide a means for local decision-making.

Introduction

The Comprehensive Plan is the official policy guide for decisions about growth, development, services, and resource management in Benton County – outside of incorporated cities. The policies of the Comprehensive Plan serve as the basis for developing the implementing regulations of the Development Code. The policies of the Comprehensive Plan are not in themselves implementing regulations and are not applied to individual applications except as provided by the Development Code.

The Comprehensive Plan is based on the physical, economic and social characteristics of the county; the desires and needs of county citizens, state laws, and programs and polices of other local, state, and federal governmental agencies. Overall, the Plan is intended to provide a framework for consistent and coordinated public and private land use decisions.

The policies in the Comprehensive Plan involve a commitment by the County to responsible management of the county's land use and resources. The policies are implemented by a variety of tools including the Benton County Development Code, the Urban Fringe Management Agreements, Area Plans (such as the North Corvallis Plan), and other plans and projects.

The plan before you, while an update of the previous Comprehensive Plan (effective July 2, 1982) is essentially a new document. Some of the original policies have been retained or revised, and some of the original background information has been used. However, the value statements, the Benton County goals, and most of the policies and findings are new – developed during the 2004-2006 update. This plan replaces the previously adopted Comprehensive Plan, and is effective March 22, 2007.

Related Documents

- Benton County Strategic Plan
- Comprehensive Plans of the Cities of Adair Village, Albany, Corvallis, Monroe, and Philomath
- North Corvallis Plan
- Corvallis Area Metropolitan Transportation Plan: Destination 2030

Planning Commission Work Session

History of Planning in Benton County

Benton County's planning program began in the mid-1960s with the appointment of a Planning Commission. A land use plan was developed for the Philomath, Corvallis and North Albany areas, and the northern portion of the county. Zoning was adopted in 1968 by a county-wide public vote and was administered through a contract with the City of Corvallis.

In 1970, following the passage of legislation mandating local planning, the Board of Commissioners established the County Planning Department. Thirteen Citizen Advisory Committees were established throughout the county to promote citizen input on the development of a Comprehensive Plan. Over the next several years, staff, citizen committees and public officials worked together to develop the Plan. After 40 public hearings held throughout the county, the first Benton County Comprehensive Plan was adopted in 1974.

Changing laws and public needs prompted an update to the Plan in 1978, and again in 1980. In addition to the type of information included in the earlier Plans, the 1980 Plan was designed to comply with the Statewide Planning Goals. Several subsequent amendments were necessary to establish compliance. In 1987, the Comprehensive Plan was acknowledged by the State as complying with the Statewide Planning Goals. More information about the Statewide Planning Goals can be found on the following pages.

The Oregon Statewide Planning Program requires local jurisdictions to update their plans from time to time, to reflect changing conditions and changes in state laws. This process is called "periodic review". Benton County's most recent update of the Comprehensive Plan through periodic review was conducted between 1990 and 1992.

The process to conduct this most recent revision of the Benton County Comprehensive Plan began in the Fall of 2001. The Planning Commission formed four subcommittees, each subcommittee evaluated specific Plan elements. Through that process, policy revisions were recommended. However, it was not until 2004, that the County budgeted funds necessary for a complete review process to be undertaken. This process included hiring a consultant and facilitator and forming a steering committee. After more than two years of work by the Steering Committee, Planning Commission, citizens, staff, consultants and public officials, the Plan received further citizen input at public hearings prior to its adoption by the Board of County Commissioners.

The Planning Commission is a volunteer body appointed by the Benton County Board of Commissioners to make land use decisions and provide policy direction regarding land use in Benton County. The Planning Commission is established pursuant to ORS 215.020 and 215.030, and consists of nine members. The Commission's duties, which are specified in the Development Code, include making recommendations to the Board of Commissioners on amendments to the Comprehensive Plan text and map, the Development Code, and the Zoning Map, and hearing appeals of land use decisions made by the Planning Official. All actions of the Planning Commission occur through public meetings.

Legal Framework

Senate Bill 100 (ORS 197), which was adopted in 1973 and later amended in 2003, substantially altered the legal framework for planning in Oregon. This state law requires that cities and counties adopt comprehensive plans and zoning ordinances that meet statewide goals and guidelines. ORS 197 is implemented through the Land Conservation and Development Commission (LCDC).

Specifically, ORS 197.175 requires that:

"...each city and county in this state shall:

(a) Prepare, adopt, amend and revise comprehensive plans in compliance with goals approved by the commission;

(b) Enact land use regulations to implement their comprehensive plans;

(c) If its comprehensive plan and land use regulations have not been acknowledged by the commission, make land use decisions and limited land use decisions in compliance with the goals;

(d) If its comprehensive plan and land use regulations have been acknowledged by the commission, make land use decisions and limited land use decisions in compliance with the acknowledged plan and land use regulations; and

(e) Make land use decisions and limited land use decisions subject to an unacknowledged amendment to a comprehensive plan or land use regulation in compliance with those land use goals applicable to the amendment."

State law also requires, under ORS 195.025, that "...each county, through its governing body, shall be responsible for coordinating all planning activities affecting land uses within the county, including planning activities of the county, cities, special districts and state agencies, to assure an integrated comprehensive plan for the entire area of the county".

Statewide Planning Goals

The Land Conservation and Development Commission (LCDC) adopted the Statewide Planning Goals to provide a legal framework for local land use planning.

See ORS 197.175 on previous page.

Note:

Statewide Planning Goals 16-19 pertain only to coastal areas.

Goal 1 **Citizen Involvement:** To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Goal 2 **Land Use Planning:** To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Goal 3 **Agricultural Lands:** To preserve and maintain agricultural lands.

Goal 4 **Forest Lands:** To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

Goal 5 **Natural Resources, Scenic and Historic Areas, and Open Spaces:** To protect natural resources and conserve scenic and historic areas and open spaces.

Goal 6 **Air, Water and Land Resources Quality:** To maintain and improve the quality of the air, water and land resources of the state.

Goal 7 **Areas Subject to Natural Hazards:** To protect people and property from natural hazards.

Goal 8 **Recreational Needs:** To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Goal 9 **Economic Development:** To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Goal 10 **Housing:** To provide for the housing needs of citizens of the state.

Goal 11 **Public Facilities and Services:** To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Goal 12 **Transportation:** To provide and encourage a safe, convenient and economic transportation system.

Goal 13 **Energy Conservation:** To conserve energy.

Goal 14 **Urbanization:** To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

Goal 15 **Willamette Greenway:** To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

Components of the Plan

Oregon's Statewide Planning Goals

This Benton County Comprehensive Plan is structured to reflect Oregon's Statewide Planning Goals. The Statewide Planning Goals were developed in 1973 and express the State's policies on land use and related topics, such as citizen involvement, housing and natural resources. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. Local comprehensive plans must be consistent with the statewide planning goals and are reviewed by Oregon's Land Conservation and Development Commission (LCDC) to assure this consistency. When LCDC officially approves a local government's plan, the plan is said to be "acknowledged". Benton County's Comprehensive Plan was originally acknowledged by LCDC on February 5, 1987.

Value Statements

The Comprehensive Plan Value Statements articulate important community values that provide guidance throughout the development and implementation of County goals and policies. The initial draft of the Value Statements was developed through public meetings in the fall of 2003 and February 2004. The Comprehensive Plan Steering Committee clarified wording to produce the final recommended version.

Benton County's Goals

Fifteen of Oregon's 19 Statewide Planning Goals relate to Benton County. Benton County's goals are consistent with Oregon's goals and are a statement of the outcome toward which local efforts are being directed; they are a vision of a preferred future. While reflecting the Statewide Planning Goals, Benton County's goals respond to the physical, economic and social characteristics of the county.

The compartmentalization of issues and policies into categories based on the fifteen applicable Statewide Planning Goals, in some ways conflicts with the integrated nature of land use concerns. While working within the goal-based structure, Benton County nonetheless attempts to approach land use management and planning from a holistic perspective. To that end, we have provided cross-referencing to related policies of other goal chapters.

Components of the Plan

Policies

The policies of the County's Comprehensive Plan provide the framework – the principles and guidelines – for consistent decision making that will lead the County in a strategic direction toward accomplishing its stated goals. The policies respond to the findings, issues and areas of concern that were identified throughout the development of the Plan. The policies of the Comprehensive Plan are adopted by ordinance and have the force of law. However, the policies are directly applicable only to certain types of land use decisions, such as zone changes and legislative amendments. For land use applications such as conditional uses and subdivisions, it is the Development Code – the codified form of the Comprehensive Plan – that applies. In addition to the policies contained in this document, the County has adopted a set of policies that pertain only to the Corvallis Urban Fringe. These are contained in a separate document referenced in Chapter 16 of this plan.

Findings & References

As the goals and policies of the Comprehensive Plan were developed, a great deal of research took place that establishes the basis for the Plan. Official reports were reviewed, agencies and organizations were consulted, and County staff provided comment during the development of goal and policy recommendations. In addition, the background reports prepared during the development of the Plan in 1979 continue to provide reference for review and update of the Comprehensive Plan. A variety of mapped data also provides background for the Plan, including agricultural capability class, forest site class, slope, tax districts, geology, flood plain and tax deferral status. This research is documented in the form of findings and references and is cited at the end of each goal chapter of the Plan.

Maps

The Comprehensive Plan Map defines and locates primary land use designations within the unincorporated portions of Benton County, including agricultural, forest, rural residential, commercial, industrial, and significant public lands. The land use designations apply County and State goals and policies to the landscape and provide the basis for decisions regarding future land use activities in Benton County. Within urban growth boundaries, the Comprehensive Plan Map is jointly developed and adopted by Benton County and the corresponding city.

The Zoning Map further defines permitted land uses within primary zones that are consistent with the Comprehensive Plan Map designations. The Zoning Map is adopted within the Development Code.

The **Comprehensive Plan Map** can be found in Chapter 16 – Additional Adopted Documentation.

The **Comprehensive Plan Map** and **Zoning Map** are available at the Benton County Community Development Department office.

Components of the Plan

Additional Adopted Documents

There are several separate documents that are adopted as part of the Comprehensive Plan. These documents have status equivalent to the Comprehensive Plan document, and include such things as the Comprehensive Plan Map, the goal exception document, and inventories of Goal 5 resources. All documents adopted as part of the Comprehensive Plan are referenced and summarized in Chapter 16.

Definitions

Definitions of terms used in the Comprehensive Plan goals and policies that require explanation may be found in the appendix of this document. A list of defined words used within each goal chapter is provided within the respective chapter.

Implementation

The policies of the Comprehensive Plan serve as the basis for the implementing regulations of the Development Code. The Development Code sets out the review criteria, land development and design standards, and administrative procedures for application of the policies to land use decisions within the county.

While the Development Code provides the regulatory basis for implementing land use actions, many other activities of the County provide critical support to the implementation of the policies. Other County plans, such as the Natural Areas and Parks Plan, the Pre-Disaster and Natural Hazards Mitigation Plan, and the Historic Context Statement are instrumental to policy implementation. Citizen groups, such as Citizen Advisory Committees, the Historic Resource Commission and the Solid Waste Advisory Committee are influential in achieving policy directives. In addition, the strategic work plans of County departments reflect the overall direction provided within the Comprehensive Plan.

The **Benton County Development Code** can be found at the Community Development Department office.

Plan Development Process

The adoption of this County Comprehensive Plan is the culmination of an intensive public process that occurred over a period of more than two years. The process attempted to capture the spirit and intent of the citizens of the county, to thoroughly consider the current issues and opportunities and to reflect the values of county residents. It was designed to provide a local context for the Statewide Planning Goals and to translate that into goals and policies that will serve as the framework for local decision making.

Draft Comprehensive Plan Value Statement

In the fall of 2003, the Board of Commissioners, the Planning Commission and representatives of various advisory groups met together to consider core values to uphold in the Comprehensive Plan. Discussions generated a draft Comprehensive Plan Value Statement.

Public Kickoff Meeting

A public open house was held to launch the Plan update process in February 2004. The meeting was attended by a County Commissioner, Planning Commission members, County staff, Citizen Advisory Committee members and many members of the general public. Attendees identified issues and concerns to be considered in updating the Plan. The Draft Comprehensive Plan Value Statement was reviewed and suggestions were made of additional important values.

Steering Committee Appointed

The Board of Commissioners appointed a nine-member steering committee comprised of Planning Commission members, members of County committees and citizens-at-large. The steering committee was established to represent county residents' interests and values, to participate in the entire update process and to recommend goals and policies for review by the Planning Commission.

Technical Advisory Committee (TAC)

Made up of staff from Benton County Community Development, Public Works, and Natural Areas & Parks Departments, the TAC provided input and advice throughout the process of drafting the goals and policies of the Comprehensive Plan. The TAC consulted with outside experts and staff from other departments, as needed.

Plan Development Process

Research and Information Gathering

County staff, with the assistance of a consultant, gathered information about the Statewide Planning Goals, statutes, rules and amendments pertinent to county planning. The original background reports of the 1979 Comprehensive Plan were reviewed to identify current information. Additional background information was assembled from official reports, agencies and organizations, and County staff to prepare preliminary background and findings.

Public Outreach Meetings

Public outreach meetings were hosted by Citizen Advisory Committees in the rural communities of Alsea and Wren during the Spring of 2004. Citizens were invited to respond to the value statement and to identify the critical issues and interests of their communities.

Outreach to Board-Appointed Groups and Committees

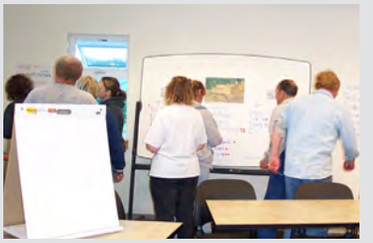
Staff met with several County committees, including the Historic Resource Commission, Environmental Issues Advisory Committee, Roads Advisory Committee, Solid Waste Advisory Committee, and Parks Advisory Board to introduce the Plan update. Committee members were asked to identify current goals and policies from existing plans and documents that could be incorporated into the Comprehensive Plan. Discussions identified policy issues of particular relevance to each committee.

Synthesizing, Reporting, Framing

Reports of findings, policy issues, draft goals and policies were prepared by a consultant under the advice of the Technical Advisory Committee. These reports were presented to the steering committee for review and discussion.

Steering Committee Recommends Goals and Policies to Planning Commission

Beginning in March of 2004, the steering committee met monthly for two years, reviewed background information and reached consensus agreement on a set of recommended goals and policies. The steering committee recommendations were presented to the Planning Commission for consideration. The Planning Commission approved the draft goals and policies to present to the public for comment.



Plan Development Process

Comprehensive Plan Public Outreach

Alsea Public Open House Themes and Comments. 15 April 2004.

Benton County Park and Open Space: Themes and Issues.

Benton County Public Comments. Public Kick-Off and Open House Meeting. 25 February 2004.

Benton County Value Statement Themes. Public Kick-Off and Open House Meeting. 25 February 2004.

Bicycle Advisory Committee Input. 11 March 2004.

Environmental Issues Advisory Committee Input. 18 March 2004.

Historic Resources Committee Draft Issues and Policy Statements. 2004.

Public Hearings and Adoption of the Plan

A draft of the Plan was printed in June, 2006 for public review. The Planning Commission conducted a public hearing on August 1, 2006. After hearing public testimony, the Planning Commission forwarded a recommendation to the Board of County Commissioners that the Plan be adopted, with specific modifications.

The Board of County Commissioners conducted its first public hearing on October 24, 2006 and continued the public hearing on December 12, 2006. At the continued public hearing the Board of Commissioners, upon consideration of the entire public record, voted 3-0 to approve the Plan with modifications. The Board directed staff to prepare a final version of the document along with findings of fact, conclusions of law, and order to demonstrate that the document complies with all applicable Statewide Planning Goals as set forth in Oregon Revised Statues, Chapter 197 and Oregon Administrative Rule 660 Division 022 (Statewide Goals 1-5); and Benton County Comprehensive Plan Chapter IV, *Monitoring the Plan.*

The Board of Commissioners conducted a first reading of Ordinance No. 2007-0170 on February 6, 2007 and a second reading on February 20, 2007. The Plan became effective on March 22, 2007.

Benton County Board of Commissioners

Using the Plan

In simple terms, the Comprehensive Plan is a tool for dealing with change. It can be used in multiple ways, including:

1. As a basis for the development of public programs and regulations, e.g., capital budgets for schools, parks, streets and sewers; zoning regulations; land division regulations; etc.

2. To guide public decisions on land use changes as reviewed through implementing regulations such as zoning and land division ordinances, such as the Development Code.

3. As a basis for the measurement and evaluation of changes in the physical, social or economic makeup of the county. Modifications of the Plan itself may result from this process.

4. To promote intergovernmental coordination.

5. To strengthen communications with the public.

6. As a basis for private decision-making regarding the nature and timing of land development and conservation activities.

Future Updates

In order to keep pace with changing needs, the best of plans needs to be updated and amended periodically. This includes revising the data base and re-evaluating the policies. The State calls for a periodic review to ensure the plan stays current with changes in State statutes and rules. The entire plan should be updated at least every 20 years (Benton County Comprehensive Plan Policy 2.1.1). All Plan update processes take place with the benefit of a full range of citizen involvement, including public hearings before the Benton County Planning Commission and the Board of Commissioners.

The procedures for amending the Comprehensive Plan are outlined in Chapter 17.

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Value Statements

Background

The Benton County Comprehensive Plan Value Statements provide an overall framework for planning to ensure that the values and visions of the county's citizens are supported through planning efforts. The Value Statements were developed through a citizen participation process that initiated the overall 2003-06 Plan review.

In Fall of 2003, a meeting was held with the Board of Commissioners, the Planning Commission, and representatives from County advisory groups. A

ttendees were asked to complete the following sentence: "Above all else, the residents of Benton County value…". From this input, draft value statements were developed to define the core values of county residents and a vision for a preferred future.

County citizens provided comments on the draft Value Statements at a public meeting on February 25, 2004. These were presented to the Citizen Steering Committee, who provided clarifications and recommended the Value Statements to the Planning Commission. The Planning Commission recommended adoption of the Value Statements by the Board of Commissioners, who, after public hearings, adopted the Value Statements for the Comprehensive Plan.

Value Statements

Residents of Benton County value

The land – its beauty and life-sustaining qualities

Agricultural and forest lands provide sustenance for residents of the Willamette Valley. These lands and the larger systems of mountains, valleys, rivers and wetlands of which they are part continue to be highly prized economically, culturally, recreationally, environmentally and aesthetically.

Maintenance of rural character

The residents of Benton County value the rural character that still exists in much of the county, the distinction that has been maintained between settlement areas and resource lands and open spaces, and the manageable scale of the cities, towns, and rural centers.

A healthy environment

The residents of Benton County value clean air, water and healthy natural systems and recognize their importance in sustaining the quality of life that residents value for themselves, their children and grandchildren.

Economic security and opportunity

The residents of Benton County recognize the importance of education and productive work and respect the rights and needs of individuals to pursue livelihoods of their choice that offer sufficient and sustainable material reward and personal satisfaction.

Residents of Benton County value

Supportive human systems

The residents of Benton County recognize the importance of nurturing and sustaining public infrastructure and human systems that address adequate and affordable food, shelter, transportation, education, health care, public safety, and other vital services.

Public and private interests

The residents of Benton County recognize that their government exists to support the rights of individuals to pursue the lifestyles of their choice and at the same time to ensure that the pursuit of those individual dreams does not jeopardize the safety, security, opportunities and rights of others. Our residents recognize the importance and value of the demographic and cultural diversity present in Benton County. They expect that actions in the public interest will be cost effective and efficient and not place an undue burden on themselves or any segment of the community.

Engagement between citizens and government

The residents of Benton County seek to create and sustain responsive government agencies that offer meaningful opportunities for public service and effective participation in policy and decision making.

Connection to place

The residents of Benton County value this place they call home for its sense of history, sense of community and for its unique physical presence. The residents of Benton County value the capacity of this place to nurture and sustain in its residents a sense of belonging.

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Goal 1
Citizen Involvement

The residents of Benton County seek to create and sustain responsive government agencies that offer meaningful opportunities for public service and effective participation in policy and decision-making.

Benton County Comprehensive Plan Value Statement

Goal 1
Citizen Involvement

Overview

Citizen involvement is a critical component of effective land use planning. This is reflected in the fact that it is Goal 1 in the statewide planning program. The policies in this chapter outline a structure that assures citizens have the opportunity to be involved in all phases of the planning process. Opportunities for participation are provided for individuals, organizations and various citizen committees. Further, the policies provide for regular evaluation of the citizen involvement program, and for educational materials that promote a better understanding and more meaningful involvement in county affairs.

In developing these policies, the Steering Committee reviewed the original bylaws, standards and procedures of Citizen Advisory Committees and considered several options for the structure of citizen committees.

Wren Citizen Advisory Committee

Historical Perspective

Public participation has long been important to both the citizens and policymakers of Benton County. In 1972, Benton County's commissioners established thirteen Citizen Advisory Committees to represent the interests of designated geographic areas of the county. Five community members were appointed to each of these committees and were charged with the task of working with County staff to prepare recommendations of policies and zoning for the 1980 Comprehensive Plan. The committees were also given the opportunity to review and comment on land use issues considered by the Planning Commission that impacted their area. County staff provided support to these committees for recordkeeping, mailings and technical assistance.

By the early 1990's, the active Citizen Advisory Committees had dwindled to only those representing Wren, Alsea and North Benton County.

The current policies reflect a renewed interest by Benton County to engage its citizens in meaningful ways.

Goal 1

Statewide Planning Goal 1

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

The governing body charged with preparing and adopting a comprehensive plan shall adopt and publicize a program for citizen involvement that clearly defines the procedures by which the general public will be involved in the on-going land use planning process.

Excerpt from
OAR 660-015-0000(1)

Cross-Reference

Additional policies related to this goal:

Goal 2 Land Use Planning

Defined Terms

- Citizen Advisory Committee
- Committee for Citizen Involvement

See **Appendix** for definitions

Benton County Goal

Citizen Involvement

To ensure opportunities for citizens to be involved in the development of public policies and all phases of the planning process.

Alsea Citizen Advisory Committee – Community Meeting

Policies

1.1 General Policies

1.1.1 Benton County shall have a Committee for Citizen Involvement (CCI) with membership that includes representation from Citizen Advisory Committees, other boards, committees, and commissions, and members at large. The CCI shall be appointed by and report to the Board of Commissioners and shall meet at least twice a year to evaluate citizen involvement activities and to develop and implement an annual action plan. The County shall provide staff support to the CCI.

1.1.2 Benton County shall encourage both self-organized and County-organized community oriented Citizen Advisory Committees (CAC) and promote their formation. The Committees shall be structured and operated according to County established guidelines and shall be officially recognized by the County. The County shall provide staff support and incentives to the CAC's.

1.1.3 Benton County shall seek input from County appointed Boards and Committees, local organizations, and individual citizens, and shall strive to refine procedures, improve communication, and respond to citizen concerns.

1.1.4 Benton County shall develop educational materials to promote a better understanding of County government and to encourage citizen involvement.

1.1.5 Benton County shall maintain and periodically review guidelines for Citizen Advisory Committees.

County Boards & Committees

- Citizen Advisory Committees
- Benton County Planning Commission

Goal 1

Findings and References

1.1.a Benton County established 13 Citizen Advisory Committees (CAC's) in 1972, each consisting of 5 members. Today only the Alsea and Wren CAC's are active. The existing policy from this section addresses the need to continue to utilize CAC's, while providing some financial support and staff support.

1.1.b Continued public awareness of and citizen participation in the ongoing planning process is essential to responsible decisions which recognize public concerns and priorities.

1.1.c Potential CAC's include: Wren, Alsea, North Benton, South Benton, Alpine-Bellfountain, Soap Creek, Blodgett-Summit, and Kings Valley.

1.1.d Benton County established a Committee for Citizen Involvement in 1979, made up of members appointed by the CAC's plus a Planning Commission delegate. The existing policy from this section addresses the need for this committee to implement and evaluate the County's citizen involvement program.

1.1.e Citizen Advisory Committees provide a vital link between County government and it's citizenry.

1.1.f The residents of Benton County seek to create and sustain responsive government agencies that offer meaningful opportunities for public service and effective participation in policy and decision-making.

Benton Co. Comprehensive Plan Value Statement 2006

1.1.g Many residents do not understand how County land use decisions are made and would benefit if educational materials were available.

References

Benton County. Administrative Services Department. *Benton County Strategic Plan*. 1995.

Benton County. *Background Information: Summary of Conclusions Prepared by 13 Citizen Advisory Committees*. Benton County Comprehensive Plan. 1978.

Benton County. Community Development Department. *Background Reports for the Benton County Comprehensive Plan*. December, 1979.

Benton County. Community Development Department. *Benton County Citizen Participation*. Background Report for the Comprehensive Plan. 1979.

Benton County. Community Development Department. *Benton County Comprehensive Plan Value Statement*. Steering Committee, Benton County Plan Update. December 6, 2004.

Benton County. Community Development Department. *Benton County Comprehensive Plan*. Last printed October 8, 1992.

Benton County. Community Development Department. *Summary of Conclusions Prepared by 13 Citizen Advisory Committees*. Background Report for the Comprehensive Plan. 1979.

Oregon. Department of Land Conservation and Development. *Goal 1: Citizen Involvement*. Oregon's Statewide Planning Goals and Guidelines.

Correspondence

Karen Fleck Harding – Wren CAC

Peggy Lynch – Citizen

Goal 2
Land Use Planning

The residents of Benton County seek to create and sustain responsive government agencies that offer meaningful opportunities for public service and effective participation in policy and decision-making.

Benton County Comprehensive Plan Value Statement

Goal 2
Land Use Planning

Overview

This chapter establishes the overall framework for the development and implementation of plans and policies for land use within the county. Statewide planning guidelines require each county to establish a land use planning process that is based on current issues, factual information and evaluation of alternatives. The policies in this chapter assure that the County's land use policies are current, fact-based, and responsive to change. They respond to the need for coordination between the cities and the county and provide for full public access to plan documents and the information upon which land use decisions are based.

Benton County Planning Commission - Work Session

Goal 2

Statewide Planning Goal 2

To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

City, county, state and federal agency and special district plans and actions related to land use shall be consistent with the comprehensive plans of cities and counties and regional plans adopted under ORS Chapter 268.

All land use plans shall include identification of issues and problems, inventories and other factual information for each applicable statewide planning goal, evaluation of alternative courses of action and ultimate policy choices, taking into consideration social, economic, energy and environmental needs. The required information shall be contained in the plan document or in supporting documents. The plans, supporting documents and implementation ordinances shall be filed in a public office or other place easily accessible to the public. The plans shall be the basis for specific implementation measures. These measures shall be consistent with and adequate to carry out the plans. Each plan and related implementation measure shall be coordinated with the plans of affected governmental units.

All land-use plans and implementation ordinances shall be adopted by the governing body after public hearing and shall be reviewed and, as needed, revised on a periodic cycle to take into account changing public policies and circumstances, in accord with a schedule set forth in the plan. Opportunities shall be provided for review and comment by citizens and affected governmental units during preparation, review and revision of plans and implementation ordinances.

Excerpt from OAR 660-015-0000(2)

Benton County Goal

Land Use Planning

To maintain a transparent land use planning process in which decisions are based on factual information.

Cross-Reference

Additional policies related to this goal:
Goal 1 Citizen Participation

2.1 General Policies

Policies

2.1.1 Benton County shall update its Comprehensive Plan periodically as needed but at least every 10 years, in order to ensure it responds to current issues, opportunities, and concerns.

2.1.2 At a minimum, copies of the Comprehensive Plan shall be available for review at the public libraries, the Community Development Department, and on the County's website.

2.1.3 Benton County shall maintain updated urban fringe management agreements in order to facilitate coordination between the cities and the County.

2.1.4 In order to preserve farm and forest land, Benton County shall limit rural residential development to areas where goal exceptions have been allowed. Criteria shall be established to accommodate residential development at appropriate densities based on the carrying capacity of the land and public infrastructure.

2.1.5 Benton County shall consider coordinated future population projections when undertaking long range planning efforts.

2.1.6 Benton County shall maintain records of the background information and findings upon which its Comprehensive Plan and land use decisions are based. These records shall be available to the public.

Defined Terms

- goal exception
- urban fringe management agreement

See **Appendix** for definitions

Community Development Department

Goal 2

Findings and References

2.1.a Land use plans are required to be adopted by the governing body after public hearings and shall be reviewed and revised on a periodic cycle to take into account changing public policies and circumstances.

OAR 660-015-0000(2)

2.1.b Comprehensive Plans are required to be filed in a public office or other location easily accessible to the public.

OAR 660-015-0000(2)

2.1.c The County's Comprehensive Plan, all affected city plans, and agreements established between the County and the cities must all be consistent with one another.

OAR 660-015-0000(2)

2.1.d Oregon's statewide planning program was established in order to preserve farm and forest lands and limit rural residential development to areas where goal exceptions have been allowed. Rural residential goal exceptions are typically found where dwellings existed prior to adoption of the statewide planning program.

2.1.e In 2004, Benton County had a population of 81,750. The Office of Economic Analysis forecasts the County's population to increase to 91,982 by 2020 and 99,886 by 2040.

State of Oregon, Office of Economic Analysis

2.1.f Access to public records gives County citizens, staff, and public officials the ability to better understand the basis for policy direction and decisions.

References

Benton County. Community Development Department. *Background Reports for the Benton County Comprehensive Plan*. December, 1979.

Benton County. Community Development Department. *Benton County Comprehensive Plan Value Statement*. Steering Committee, Benton County Plan Update. December 6, 2004.

Benton County. Community Development Department. *Benton County Comprehensive Plan*. Last printed October 8, 1992.

Forecasts of Oregon's County Populations and Components of Change, 2000-2040. Population Research Center, Portland State University. April, 2004.

Oregon. Department of Land Conservation and Development. *Goal 2: Land Use Planning*. Oregon's Statewide Planning Goals and Guidelines.

Goal 3
Agricultural Lands

The residents of Benton County value...the land – its beauty and life-sustaining qualities.

Agricultural and forest lands provide sustenance for residents of the Willamette Valley. These lands and the larger systems of mountains, valleys, rivers and wetlands of which they are part continue to be highly prized economically, culturally, recreationally, environmentally and aesthetically.

Benton County Comprehensive Plan Value Statement

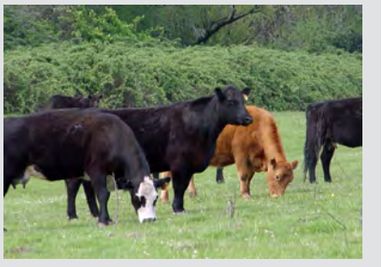
Goal 3
Agricultural Lands

Overview

A significant portion of Benton County is situated within one of Oregon's most productive agricultural areas - the Willamette Valley. It is important to county citizens that productive agricultural lands are available to meet current needs as well as provide resources for future generations.

One of the founding concepts of the statewide planning program was a priority for preserving the agricultural land base. Reflecting this statewide value, Oregon statutes and administrative rules mandate exclusive farm use zoning for lands meeting certain characteristics. Most of the land use regulations affecting agricultural land are dictated by state laws; nonetheless, there are limited areas where Benton County can influence how agricultural lands are managed.

The policies within this chapter define the manner in which agricultural lands are preserved and maintained in Benton County. The County's land development regulations, which must comply with Oregon Revised Statutes, Chapter 215, provide the primary basis upon which this goal is accomplished. These policies provide for additional methods that promote sustainable practices, minimize conflicting uses and protect valued features and habitats as viable means to preserve and maintain agricultural lands. The County recognizes and supports the essential role of other key organizations in accomplishing this goal.



Cross-References

Additional policies related to this goal:

- Goal 2 Land Use Planning
- Goal 5 Natural Resources
- Goal 9 Economic Development
- Goal 15 Willamette River Greenway

Goal 3

Statewide Planning Goal 3

To preserve and maintain agricultural lands.

Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.

PLANNING GUIDELINES

Urban growth should be separated from agricultural lands by buffer or transitional areas of open space.

Plans providing for the preservation and maintenance of farm land for farm use, should consider as a major determinant the carrying capacity of the air, land and water resources of the planning area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.

Excerpt from
OAR 660-015-0000(3)

County Boards & Committees

Farm Board of Review

Benton County Goal

Agricultural Lands

To preserve and maintain agricultural lands and to support agriculture for production and conservation.

3.1 General Policies

Policies

3.1.1 Agricultural lands as defined by Statewide Planning Goal 3, which are not developed or committed to non-farm uses, shall be protected with appropriate resource designations on the Comprehensive Plan and Zoning Maps. Comprehensive Plan Map amendments from "Agriculture" to a non-resource designation shall require an exception to Goal 3.

3.1.2 Benton County shall encourage open space and conservation uses as an appropriate means to preserve natural resources on agricultural lands and to retain options for future agricultural activities.

3.1.3 The "Multi-Purpose Agriculture" Comprehensive Plan designation and zone shall be applied only to areas in the Alsea and Lobster Valleys.

3.1.4 Benton County shall minimize conflicts between residential development and agricultural lands by requiring setbacks for residences adjacent to agricultural lands.

3.1.5 Benton County shall encourage sustainable agricultural practices.

3.1.6 Benton County shall participate in programs that allow property owners to maintain agricultural property tax deferral where valued habitat areas are protected.

3.1.7 Benton County shall encourage the preservation of valued natural features such as wetlands and wildlife habitat.

3.1.8 Benton County shall provide support for organizations such as the Oregon State University Benton County Extension Service and the Benton County Soil and Water Conservation District, which implement special projects and provide technical assistance to farm and forest owners.

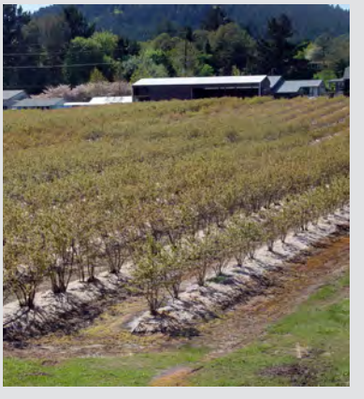
3.1.9 Benton County shall encourage locally grown and marketed agricultural products.

3.1.10 For agricultural lands, soil capability shall be a prime factor used by Benton County in making land use decisions.

Defined Terms

- conservation
- exception
- Multi-Purpose Agriculture
- open space
- sustainable
- tax deferral
- wetlands
- wildlife habitat
- zone

See **Appendix** for definitions



Goal 3

Findings and References

3.1.a The mild climate and fertile soils make the Willamette Valley one of the state's most productive agricultural areas. Between 1982 and 1992, a total of 88,900 acres of agricultural land statewide were converted to residential and urban use.

U. S. Soil Conservation Service, 1994 Natural Resource Inventory (unpublished)

3.1.b Out of 36 Oregon Counties, Benton County ranked 12th in gross farm and ranch sales for 2003, at $90,790,000.

Oregon Department of Agriculture

3.1.c Oregon Statewide Planning Goal 3 requires a minimum parcel size of 80 acres for Exclusive Farm Use (EFU) lands, in compliance with ORS 215.243, and a minimum parcel size of 20 acres for Multi-Purpose Agricultural (MPA) lands.

3.1.d Some agricultural lands, especially those that are marginal, may be better suited to conservation or open space uses. Retaining agricultural land in an undeveloped state allows for future agricultural uses.

3.1.e The narrow valley widths, steep hillsides, and social and economic factors limit the agricultural capabilities of farm land in Alsea and Lobster Valley. Parcel sizes less than the 80 acres required by ORS 215.243 have been allowed (minimum parcel size is 20 acres) in these areas.

3.1.f Rural residential activities adjacent to agricultural lands can result in compatibility conflicts.

3.1.g The Benton County Sustainability Policy encourages County residents to use, develop, and protect our resources at a rate and in a manner that enables people to meet their current needs and also preserve resources for future generations.

Benton County Sustainability Policy, 2002

3.1.h Property zoned for exclusive farm use or mixed farm and forest use is eligible for the Wildlife Habitat Conservation and Management Program. Landowners who manage their property for wildlife habitat may receive a property tax benefit through this program.

Oregon Department of Fish and Wildlife

3.1.i Some lands designated for agricultural use contain natural features such as rock outcroppings, wetlands, and wildlife habitat.

3.1.j The Oregon State University Benton County Extension Service and the Benton Soil and Water Conservation District provide education and assistance to county farmers and forest owners.

31.k Out of 36 Oregon Counties, Benton County ranked 3rd in production of Christmas trees for 2003.

National Agricultural Statistics Service

References

Benton County. Administrative Services Department. *Benton County Sustainability Policy*. Administrative Policy No. 02-01. 2002.

Benton County. Community Development Department. *Background Reports for the Benton County Comprehensive Plan*. December 1979.

Benton County. Community Development Department. *Benton County Comprehensive Plan Value Statement*. Steering Committee, Benton County Plan Update. December 6, 2004.

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Goal 4
Forest Lands

The residents of Benton County value...the land – its beauty and life-sustaining qualities

Agricultural and forest lands provide sustenance for residents of the Willamette Valley. These lands and the larger systems of mountains, valleys, rivers and wetlands of which they are part continue to be highly prized economically, culturally, recreationally, environmentally and aesthetically.

Benton County Comprehensive Plan Value Statement

Goal 4
Forest Lands

Overview

The Coast Range of Oregon, in which the forest lands of Benton County are predominately located, has some of the most productive native forests in the world. The majority of the land within Benton County is forest land, and it is important economically, ecologically and socially that the productivity of these lands be sustained. The policies within this chapter define the manner in which forest lands are preserved and maintained for multiple functions within the economy and ecosystem of Benton County.

As with agricultural lands, preserving forest lands is a statewide priority reflected in the Statewide Planning Goals. Oregon statutes and administrative rules require certain lands to be protected for forestry, with limitations on conflicting uses such as dwellings. Because of the degree to which state law dictates allowable land uses on forest land, Benton County has limited purview. The policies of this chapter reflect Benton County's approach to conserving forest land in a manner consistent with the statewide mandates.

The Benton County Development Code provides the primary basis upon which these policies are implemented. Additional policies found in Goal 5 and Goal 7 provide for methods to reduce risks of wildfire, promote sustainable yields, minimize conflicting uses and protect fish and wildlife habitat within the forest lands of the county. The County further recognizes and supports the essential role of the Oregon Department of Forestry in regulating forest practices and in accomplishing this goal.

Courtesy of Starker Forests, Inc.

Goal 4

Statewide Planning Goal 4

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

Forest lands are those lands acknowledged as forest lands as of the date of adoption of this goal amendment. Where a plan is not acknowledged or a plan amendment involving forest lands is proposed, forest land shall include lands which are suitable for commercial forest uses including adjacent or nearby lands which are necessary to permit forest operations or practices and other forested lands that maintain soil, air, water and fish and wildlife resources.

Forest lands should be inventoried so as to provide for the preservation of such lands for forest uses.

Plans providing for the preservation of forest lands for forest uses should consider as a major determinant the carrying capacity of the air, land and water resources of the planning area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.

Excerpt from OAR 660-015-0000(4)

Benton County Goal

Forest Lands

To preserve and maintain forest lands for growing and harvesting trees and other forest products, watershed functions, conservation, recreation, and agriculture.

4.1 General Policies

Policies

4.1.1 Forest land shall be reserved for forest uses which include production and harvest of timber and other forest products, forest operations and practices; uses that conserve soil, water, and air quality, and provide for fish and wildlife resources; and agriculture and recreational opportunities appropriate in a forest environment.

4.1.2 Forest lands as defined by Goal 4, which are not developed or committed to non-forest uses, shall be protected with zoning designations. Comprehensive Plan Map amendments from Forestry to a non-resource designation shall require an exception to Statewide Planning Goal 4.

4.1.3 Benton County shall maintain residential dwelling siting and defensible space standards to reduce the risk of wildfire and negative impacts to fish and wildlife habitat.

4.1.4 Benton County shall promote the management of resource lands to ensure a sustained yield of forest products.

4.1.5 Benton County shall ensure that conflicts between residential development and forest lands are minimized by requiring setbacks for residences adjacent to resource lands.

Defined Terms

- defensible space
- exception
- resource lands

See **Appendix** for definitions

Hull-Oakes Lumber Mill

Cross-References

Additional policies related to this goal:

Goal 2 Land Use Planning
Goal 5 Natural Resources
Goal 7 Natural Hazards
Goal 9 Economic Development
Goal 15 Willamette River Greenway

Courtesy of Starker Forests, Inc.

Goal 4

Findings and References

4.1.a Oregon is the nation's leading lumber producer. In 1994, Oregon's forest industries produced 5.7 billion board feet of lumber, or approximately 15% of the nation's production. More than three-fourths of Oregon's timber supply now comes from private forest lands, employing a large share of the 63,300 people who work in the wood products industry.

Warren, D.D. Production, Prices, Employment, and Trade in Northwest Forest Industries, 1st quarter 1996. PNW-RB-215. Portland, OR: U.S.D.A. Forest Service, Pacific Northwest Research Station. 1996.

4.1.b Wood growing productivity in the Coast Range of Oregon is some of the highest of any native forests in the world. A typical Douglas-fir site may produce 15-20 cubic meters per hectare per year, which ranks it about twice as productive as Canada and Scandinavia, and three times more productive than most of Russia, which are major coniferous timber regions in the world. Growth rates over time also exceed those of pine forests in the southeastern states, often touted as a high forest production area. Only the Redwood region of northern California exceeds growth potentials of our best sites in the Coast Range.

Rick Fletcher, OSU College of Forestry, personal communication, July 2005

4.1.c Between 1982 and 1992, the Natural Resources Conservation Service (formerly, Soil Conservation Service) estimated that 65,000 acres of forest land in the United States shifted from forest use to urban use.

Natural Resource Conservation Service, 1992 Natural Resources Inventory, January 1995

4.1.d Residential development within forest zones has increased the risk of wildfire and in some cases negatively impacted fish and wildlife habitat. A 1993 Oregon Department of Forestry study on wildfires found that residential development on forest land significantly increases the risk of wildfire and significantly increases the cost of wildfire control.

"Wildlife Prevention and Control in Areas of Residential Forest Land Development: An Analysis of Fire Data" Oregon Dept. of Forestry Technical Bulletin, March, 1993

4.1.e The Benton County Sustainability Policy encourages County residents to use, develop, and protect our resources at a rate and in a manner that enables people to meet their current needs and also preserve resources for future generations.

Benton County Sustainability Policy, 2002

4.1.f Rural residential activities adjacent to forest lands can result in conflicts between the residential uses and forest activities. An example would be the increased threat of wildfire when homes are constructed in close proximity to forest lands.

References

Benton County. Administrative Services Department. *Benton County Sustainability Policy*. Administrative Policy No. 02-01. 2002

Benton County. Community Development Department. *Background Reports for the Benton County Comprehensive Plan*. December 1979.

Benton County. Community Development Department. *Benton County Comprehensive Plan Value Statement*. Steering Committee, Benton County Plan Update. December 6, 2004.

Benton County. Community Development Department. *Benton County Comprehensive Plan*. Last printed October 8, 1992.

Goal 5
Natural Resources, Scenic & Historic Areas, Open Spaces

Agricultural and forest lands… and the larger systems of mountains, valleys, rivers and wetlands of which they are part continue to be highly prized economically, culturally, recreationally, environmentally and aesthetically.

Benton County Comprehensive Plan Value Statement

Goal 5
Natural Resources, Scenic & Historic Areas, Open Spaces

Overview

The natural resources of Benton County are central to the long term sustainability of the economy, environment and livability of the county. Protection of natural features and functions, as well as the sustainable use of natural resources, are priorities for Benton County. Goal 5 provides the framework for the County's role in protecting its natural resources, including scenic and natural areas, open space, groundwater resources, rivers and waterways, riparian areas, wetlands, aquatic and wildlife habitats, historic resources and mineral and aggregate resources.

Protection of these diverse natural resources calls for a variety of approaches. In most cases, the resources themselves are protected or conserved (e.g., wetlands, historic structures). However, in the case of mineral and aggregate resources, the ability to extract the resource is protected.

- Natural areas, scenic areas and open space are to be managed to preserve their essential character, through Benton County's direct management of its lands and by encouraging private landowners to manage appropriately.
- Ecosystem components such as wetlands and riparian areas provide multiple utility functions benefiting humans and the environment, and require cooperation among landowners in order to maintain healthy systems. Inventory, analysis and development of protection plans and landowner education programs guide the management of these important resources.
- Historic structures, sites, and areas provide a tangible physical connection with the past. Historic resources are managed and protected through a largely voluntary program overseen by an appointed commission.
- Protection of groundwater resources and wildlife habitat requires the cooperation and participation of local, state and federal agencies. Benton County's policies support the work of those agencies through collaboration on land use decisions and promotion of conservation efforts.
- A distinctly different approach to protection is applied to mineral and aggregate resources. In this case, the statewide program requires protection of the ability to extract these resources, rather than the resource being protected in its natural state. The policies of the County strive to assure the availability of this resource while minimizing conflicts with and impacts from its extraction and processing.

The statewide planning program directs counties to inventory natural resources and identify significant sites for which protection plans are to be developed. In some cases, significant sites have been identified by state or federal agencies.

Interagency coordination and cooperation with local, state and federal programs is particularly important in the implementation of the Goal 5 policies.

Goal 5

Statewide Planning Goal 5

To protect natural resources and conserve scenic and historic areas and open spaces.

Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. These resources promote a healthy environment and natural landscape that contributes to Oregon's livability. The following resources shall be inventoried:

a. Riparian corridors, including water and riparian areas and fish habitat;
b. Wetlands;
c. Wildlife Habitat;
d. Federal Wild and Scenic Rivers;
e. State Scenic Waterways;
f. Groundwater Resources;
g. Approved Oregon Recreation Trails;
h. Natural Areas;
i. Wilderness Areas;
j. Mineral and Aggregate Resources;
k. Energy sources;
l. Cultural areas.

Local governments and state agencies are encouraged to maintain current inventories of the following resources:
a. Historic Resources;
b. Open Space;
c. Scenic Views and Sites.

Following procedures, standards, and definitions contained in commission rules, local governments shall determine significant sites for inventoried resources and develop programs to achieve the goal.

In conjunction with the inventory of mineral and aggregate resources, sites for removal and processing of such resources should be identified and protected.

Excerpt from OAR 660-015-0000(5)

Benton County Goals

5.1-4 Natural Areas, Scenic Areas, Open Space

To protect and maintain Benton County's unique scenic, open space and natural areas.

5.5 Historic Resources

To promote appreciation and preservation of Benton County's diverse historic resources.

5.6 Riparian Resources and Fish Habitat

To preserve aquatic systems and their riparian areas to provide for productive ecological function.

5.7 Wetlands

To identify locally significant wetlands and protect their natural functions.

5.8 Groundwater Resources

To maintain high quality and long-term sustainability of groundwater resources in Benton County.

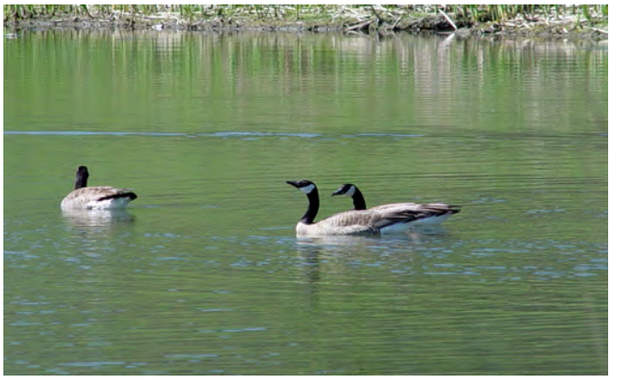
Benton County Goals

5.9 Wildlife Habitat

To conserve and protect wildlife habitats and to promote habitat management that maintains wildlife diversity.

5.10 Mineral and Aggregate Resources

To protect and utilize appropriately the mineral and aggregate resources of Benton County, while minimizing adverse impacts of extraction and processing.



Cross-References

Additional policies related to this goal:

Goal 3 Forest Lands
Goal 4 Agricultural Lands
Goal 6 Air, Water and Land Resource Quality
Goal 7 Natural Hazards
Goal 8 Recreational Needs
Goal 15 Willamette River Greenway

Defined Terms

- aquifer
- best management practices
- conditional use permit - CUP
- conservation easement
- Corvallis Federal Urbanized Area
- density transfer
- Drinking Water Protection Area
- ecological function
- ecological health
- ecosystem
- ESEE analysis
- floodplain
- green infrastructure
- greenspace
- groundwater
- groundwater recharge area
- headwaters
- habitat
- Historic Context Statement
- historic resources
- hyporheic
- invasive species
- natural area
- open space
- post-acknowledgement plan amendment (PAPA)
- restoration
- riparian area
- significant
- sustainability
- watershed
- wetland

See **Appendix** for definitions

Goal 5

5.1 Natural Areas

Goal:

To protect and maintain Benton County's unique scenic, open space and natural areas.

Bellfountain Park

Policies

5.1.1 Benton County shall continue to work with scientific experts to identify valued natural areas that are representative of major vegetation types and ecosystems in the county, particularly those that are regionally rare, and develop priorities and strategies for protection.

5.1.2 Benton County shall work to maintain and enhance ecological health of valued natural areas throughout the county by preserving and restoring natural habitats and maintaining the integrity and stability of these areas.

5.1.3 Benton County shall place high priority on eradication and removal of invasive vegetation in cooperation with residents and land managers.

5.1.4 Benton County shall use county-owned or managed natural areas as demonstration and testing sites for restoring degraded areas to achieve desired habitat conditions.

5.1.5 Benton County shall work with watershed councils, land managers, property owners, and others to protect, maintain, and/or enhance healthy functioning ecosystems and watersheds through conservation incentive programs including property tax benefits, income tax credits, regulatory streamlining, direct funding, voluntary agreements, and technical assistance.

5.1.6 Benton County shall establish regulatory protection of significant natural areas identified on the Register of Oregon Natural Heritage Resources.

5.2 Rivers and Waterways

Policies

5.2.1 Benton County shall work with landowners, state and federal agencies, and non-profit organizations along rivers and waterways to support efforts to restore natural functions, improve public access and improve fish habitat.

Marys River

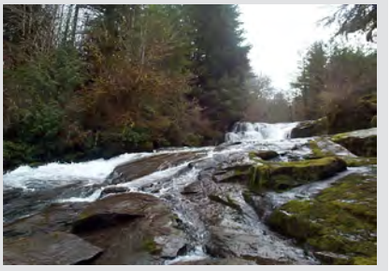
5.3 Scenic Areas and Views

Policies

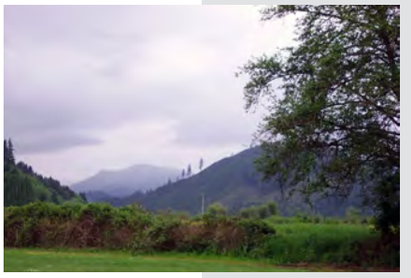
5.3.1 Benton County shall work with public and private organizations, landowners, and the general public to identify, record, and protect valued scenic and open space resources.

5.3.2 Benton County shall provide incentives for the protection of valued scenic resources.

5.3.3 Benton County shall recognize the scenic and natural values of greenspace surrounding rural and urban communities, and encourage, with community input, protection of these important community assets.



Alsea Falls



View from Alsea Highway

Goal 5

5.4 Open Space

Policies

5.4.1 Benton County shall recognize the need for protection of open spaces, especially along natural drainage courses.

5.4.2 Benton County shall promote private land stewardship of farm and forest lands, respect private property rights, and work with non-profit groups and others to maintain a comprehensive system of connected open spaces that will protect the most valued natural, scenic, and recreational areas of the county.

5.4.3 Benton County shall work to protect ecological and hydrological functions of open space, promoting best management practices and green infrastructure.

5.4.4 To protect valued open spaces, Benton County shall use a variety of methods such as land purchase, conservation easements, riparian protection ordinance, open space tax deferrals, gifts and donations, and density transfers.

Fitton Green Natural Area

Cardwell Hill Valley - Wren

5.5 Historic Resources

Goal:

To promote appreciation and preservation of Benton County's diverse historic resources.

County Boards & Committees:

- Courthouse Preservation Committee
- Historic Resources Commission

Policies

5.5.1 Benton County shall maintain a Historic Resources Commission that advises the Board of Commissioners on historic preservation goals and requirements and reviews and acts on requests for listing, alteration, and demolition of sites and structures on the Benton County Register of Historic Resources.

5.5.2 Benton County, through its Historic Resources Commission and in cooperation with other preservation groups, shall actively promote identification, preservation, restoration, and protection of historic resources. Incentive programs shall assist in implementing these objectives.

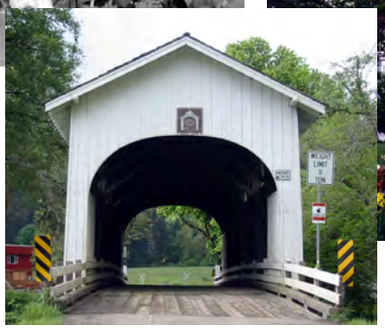
5.5.3 Benton County shall periodically update its Historic Resources Inventory, and Register of Historic Resources.

5.5.4 Benton County shall periodically review and assess its Historic Context Statement to assure that it is consistent with the goals and objectives of the Historic Resources Commission.

5.5.5 Benton County shall provide outreach and information to maintain public awareness of state and federal laws protecting historic and prehistoric resources, including deposit of prehistoric artifacts and records with appropriate institutions.

Fort Hoskins

Benton County Courthouse



Harris Covered Bridge

Benton County Historical Museum

5.6 Riparian Resources and Fish Habitat

Goal:

To preserve aquatic systems and their riparian areas to provide for productive ecological function.

Photo courtesy of Marys River Watershed Counciil

Photo courtesy of Starker Forests

Policies

5.6.1 Benton County shall undertake the Goal 5 process and adopt a protection program for significant riparian areas within 18 months of adoption of the Plan amendments..

5.6.2 Benton County shall not regulate commercial timber management and commercial farming for potential impacts to water bodies and riparian areas; the Oregon Department of Forestry and Oregon Department of Agriculture have the responsibility for these activities.

5.6.3 Benton County shall require land development and transportation projects to be designed to minimize incursions and other impacts to floodplains, wetlands, and riparian areas. When no reasonable option exists, roads, bridges, and access ways may be allowed, provided fish passage is assured, channel capacity is maintained, and removal of riparian vegetation is minimized.

5.6.4 Benton County shall use Best Management Practices in County-owned riparian areas and along public rights of way to protect native vegetation and natural functions.

5.6.5 Benton County shall provide educational information regarding the importance and protection of riparian areas and water bodies, the existence of county and state regulations concerning these areas, and where feasible shall develop incentives to encourage preservation and/or restoration of these resources.

5.6.6 Benton County shall encourage landowners to maintain and enhance native vegetation and remove invasive species growing along the banks of surface water areas (streams, creeks, lakes, sloughs, and marshes) with incentives such as the Wildlife Habitat Conservation and Management Program (OAR 635-430).

5.6.7 Benton County's riparian planning process shall place particular emphasis on identifying and protecting headwater areas from adverse impacts of development.

5.6.8 Benton County shall work with the Oregon Department of Fish and Wildlife, and other agencies and nonprofit organizations to promote salmon recovery through non-regulatory approaches such as voluntary incentives, encouraging appropriate species management, coordinated planning, habitat protection and restoration, and other means as appropriate.

5.7 Wetlands

Goal:

To identify locally significant wetlands and protect their natural functions.

County Advisory Committee:

- Jackson-Frazier Wetland Advisory Committee

Policies

5.7.1 Benton County shall protect wetlands that have been identified as significant pursuant to the Goal 5 process, utilizing federal and state inventories and other available information.

5.7.2 Benton County shall utilize federal, state, and local inventories and other available information to determine if a proposed development is located in a wetland. The Division of State Lands will be notified when development is proposed in wetland areas.

5.7.3 Benton County shall recognize Jackson-Frazier Wetland (JFW) as a unique wetland prairie by implementing the JFW Management Plan, and collaborating with the City of Corvallis, Greenbelt Land Trust, Good Samaritan Hospital, and adjacent property owners to achieve a watershed approach to wetland management in the basin.

5.7.4 Benton County shall work with others to conserve and protect natural functions of the county's most important wetland habitats.

Jackson-Frazier Wetland

Goal 5

5.8 Groundwater Resources

Goal:

To maintain high quality and long-term sustainability of groundwater resources in Benton County.

Policies

5.8.1 Benton County shall work with the Oregon Department of Water Resources to address groundwater supply problems including monitoring as necessary.

5.8.2 Benton County shall require developers to provide sufficient information to enable Benton County to evaluate whether a proposed use could adversely affect the sustainability of aquifer production when reviewing land use applications.

5.8.3 Benton County shall promote efficient use and conservation of water, including requiring conservation plans when approving public water systems.

5.8.4 Benton County shall support research efforts to identify important local groundwater recharge areas, especially in the foothills areas, and take appropriate actions to protect these areas to sustain their function.

5.8.5 Benton County shall minimize adverse affects of land use actions in or adjacent to Drinking Water Protection Areas.

5.8.6 Benton County shall encourage the use of public water systems in areas of density to protect and manage the groundwater resource.

Courtesy of Wren Community Hall and Corvallis Well Drilling

5.9 Wildlife Habitat

Goal:

To conserve and protect wildlife habitats and to promote habitat management that maintains wildlife diversity.

Policies

5.9.1 Benton County shall actively participate with appropriate local, state, and federal agencies to identify, conserve, and protect fish and wildlife habitat.

5.9.2 Benton County shall maintain and periodically update a list of sensitive fish and wildlife habitat types, and through the Goal 5 process assure appropriate levels of protection of those habitats.

5.9.3 Benton County shall collaborate with the Oregon Department of Fish and Wildlife in developing a non-regulatory approach to integrated species and habitat conservation.

5.9.4 In making land use decisions, Benton County shall protect identified sensitive wildlife habitat types and wildlife corridors from adverse impacts.

5.9.5 Benton County shall notify the Oregon Department of Fish and Wildlife (ODFW) early in the review process and collaborate with that agency regarding zone and plan amendments, conditional use permits, and subdivision and series partition applications in areas that include habitat types identified by ODFW as Habitat Conservation Priorities: in-stream habitat, native prairie grasslands, oak woodlands and savannas, riparian floodplains and wetlands.

5.9.6 Benton County shall encourage and support cooperative road management programs on public and private forest lands to protect sensitive wildlife habitat areas.

5.9.7 Benton County shall coordinate with Oregon Department of Fish and Wildlife to minimize conflicts between transportation infrastructure and wildlife migration routes.

5.9.8 Siting standards in the Forest Conservation zone shall limit housing density in the major and peripheral game ranges at a level that will enable cost-effective game management strategies.

Fenders blue butterfly
Credit: Karen Fleck Harding

Western Pond Turtle
Credit: Gary Blanchard

Roosevelt Elk
Credit: Starker Forests

Goal 5

5.10 Mineral & Aggregate Resources

Goal:

To protect and utilize appropriately the mineral and aggregate resources of Benton County, while minimizing adverse impacts of extraction and processing.

Policies

5.10.1 Benton County shall provide for a sufficient supply of aggregate and mineral resources by providing a process for protection of significant sites by implementing Goal 5 Post-Acknowledgement Plan Amendment (PAPA) requirements contained in OAR 660-023-0180.

5.10.2 Benton County shall maintain an inventory of mineral and aggregate resources, consisting of sites added to the Benton County inventory pursuant to Goal 5 prior to September 1, 1996, and sites determined to be significant pursuant to OAR 660-023-0180 subsequent to September 1, 1996.

5.10.3 Consistent with OAR 660-023-0180, Benton County shall allow mining on sites demonstrated to be significant and where conflicts with existing surrounding uses can be minimized or an analysis of environmental, social, economic and energy consequences (ESEE) determines that the mining should be allowed despite the conflicts. The County shall protect approved significant sites from future conflicting uses where an ESEE analysis determines such conflicting uses should be limited or prohibited.

5.10.4 Benton County shall determine post-mining uses of approved rock and gravel sites through the conditional use (CUP) or PAPA process. The applicant shall provide operation and reclamation plans to show how they are commensurate with the intended subsequent site use.

5.10.5 Benton County staff shall work with landowners, aggregate operators, and State agencies to coordinate site reclamation operations.

5.10.6 Benton County shall determine whether expansion of a nonconforming aggregate site is permitted in the "Rural Residential" zone, by applying conditional use procedures. Consideration will be given to the impact of the expanded use on adjacent residential lands, and whether the two uses can be compatible. Any approval shall contain conditions regarding buffering, setbacks and hours of operation in order to mitigate conflicts.

5.10 Mineral & Aggregate Resources

Policies

5.10.7 Benton County shall determine whether small aggregate sites on significant farmland are permitted, applying conditional use procedures, and limit post-mining uses to those listed in OAR 660-023-0180(4)(f).

5.10.8 Benton County shall allow gravel mining in and near riparian areas, if it can be demonstrated through the Goal 5 or CUP process that such activities will avoid de-watering of riparian areas, will not adversely impact river meanders, and will not result in significant impacts to fish and wildlife habitat. This review shall be done in accordance with OAR 660-023-0180, 2(b), (c), and (d).

5.10.9 Benton County shall collaborate with state and federal agencies and require conditions to enforce regulations pertaining to mining reclamation and fill and removal of materials in waterways including channels, floodways, and floodplains.

Courtesy Green & White Rock Products

Goal 5

Findings and References

5.1 Natural Areas

5.1.a Once a widespread habitat type, less than 2% of the native prairie remains in the Willamette Basin. Fitton Green Open Space/Natural Area ranks among the top 5-6 upland prairie sites in the Willamette Valley and a portion of Jackson Frazier Wetland includes wet prairie. These ecosystems provide habitat for rare species including Kincaid's lupine (host for endangered Fenders blue butterfly) and the Willamette Valley daisy, and have outstanding potential as demonstration restoration projects.

Mark Wilson, OSU, 2002
Willamette Basin Habitat Cons. Priorities,
Willamette Restoration Initiative, 2001

5.1.b Oak savannas, grasslands with scattered Oregon white oak trees, once covered 1/2 of the Willamette Valley and are now rare due to conversion to agriculture and urban development. Savannas and woodlands provide habitat for 200 wildlife species. Several Benton County parks and open space sites include remnant oak savannas.

Willamette Basin Habitat Cons. Priorities,
Willamette Restoration Initiative, 2001

5.1.c Riparian and bottomland forests provide habitat for a diversity of terrestrial and aquatic species, improve water quality, shade lowland rivers and streams, provide natural flood control with side channels and sloughs, help store floodwater in adjacent wetlands, and provide rearing areas for endangered wild salmon.

Willamette Basin Habitat Cons. Priorities,
Willamette Restoration Initiative, 2001

5.1.d River bottomlands have extensively been cleared for agricultural use, especially along the Willamette and Marys Rivers.

Background Report
1979 Benton Co. Comp Plan

5.1.e Only 14 known populations of the rare Taylor's checkerspot butterfly are known to exist in the Pacific Northwest, 4 known populations exist in Oregon, and the population at Fitton Green and Beazell Memorial Forest is probably the largest in the Northwest (about 75% is in Benton County; the rest in Washington).

The Xerces Society, Portland

5.1.f The Willamette River and its riparian zone provide the needs of a wider variety of wildlife species than any other habitat occurring in the Willamette Valley. The main stem is a major route of the Pacific Flyway, and nesting habitat for Great Blue Herons, Bald Eagles, and Osprey.

Background Report
1979 Benton Co. Comp Plan

5.1.g Benton County Natural Areas & Parks Department staff are working on a segment of the Willamette River to restore floodplain forests and increase flood storage, collaborating with adjacent property owners, Cascades West Resource Conservation and Development, Inc., the Oregon Department of Parks and Recreation, and others.

Benton Co. Natural Areas & Parks Dept.

5.1.h The Juday Report (1979) and the USFS Research Natural Needs of the Pacific Northwest (1975) outlined the need for Research Natural Areas representative of the Oregon Coast Range and Western Oregon Interior Valleys. The Juday report concluded that Coast Range province preservation needs will largely be met by state and federal agencies on existing public lands. Main efforts for county natural area preservation activities should be the Willamette and interior valley: a restored riparian forest buffer project (Cascades West Resource Conservation and Development, Inc.), a model riparian hardwoods site on the

Findings and References

Willamette River; Adair Park – Willamette Valley shrub thicket habitat; Kings Valley/ Wren sites for prairie and oak savanna (Fort Hoskins, Beazell, and Fitton Green County lands). Two additional types are the Alsea Valley Oakwoods/Douglas-fir and the south county Douglas-fir/Madrone. Preservation of old growth forest in the Corvallis Watershed is also highlighted.

Background Report
1979 Benton Co. Comp Plan

5.1.i The U.S. Fish and Wildlife Service has recently recognized Benton County as a potential demonstration site for a county-wide Habitat Conservation Plan (HCP), with funding provided by the federal agency.

Benton Co. Natural Areas & Parks Dept.

5.1.j Benton County has achieved wide recognition for a variety of habitat restoration projects involving state and federal agencies, natural scientists, volunteers, and non-profit organizations.

Benton Co. Natural Areas & Parks Dept

5.1.k Benton County is in the process of identifying significant biological areas within the Willamette River corridor, using information from the Willamette River Basin Planning Atlas.

Benton Co. Natural Areas & Parks Dept

5.2 Rivers and Waterways

5.2.a Benton County rivers and waterways are valued for their scenic, recreation, and biological qualities.

Background Report
1979 Benton Co. Comp Plan

5.2.b Sloughs and oxbow lakes along the Willamette River provide some of the best warm-water fishing in the state, but there is little public access to much of this water.

Background Report
1979 Benton Co. Comp Plan

5.3 Scenic Areas and Views

5.3.a Residents place a high value on the scenic qualities of the Benton County landscape including farmland and forestland, mountains, hillsides, valleys, rivers and streams, and wetlands.

Background Report 1979 Benton Co. Comp Plan; Value Statement

5.3.b Views from improved roadways, highways, and trails are important to Benton County residents.

Background Report 1979
Benton Co. Comp Plan

5.4 Open Space

5.4.a A connected system of open spaces is highly valued by Benton County residents, including protection of a broad range of functions including productive farmlands and forestlands, the urban fringe, waterway corridors, and significant natural areas.

Background Report 1979
Benton Co. Comp Plan

5.4.b The Greenbelt Land Trust prepared an Open Space Plan (1998) and an Open Space Report (1990), outlining priorities and a vision for a greenbelt and connected open space system for the Corvallis and Philomath urban interface area. Emphasis was placed on scenic hillsides including McDonald Forest, the Marys River corridor, existing and proposed public open space lands, the Willamette River corridor, and trail linkages.

Open Space Plan, Greenbelt Land Trust, 1998

Findings and References

5.5 Historic Resources

5.5.a Historic structures, sites, and areas provide a tangible, physical connection with the past and are a nonrenewable educational resource. This link provides a sense of permanence, continuity, and perspective to people's lives, as well as providing a context within which change can occur.

Background Report
1979 Benton Co. Comp Plan

5.5.b Historic properties and sites offer architectural and landscape richness and diversity for the visual environment, providing a sense of place and personal enjoyment. State and federal requirements must be followed in protecting historic and prehistoric resources, for example during site excavation.

Background Report
1979 Benton Co. Comp Plan;
Benton Co. Community Development Dept.

5.5.c Historic preservation should not be confined to museums and libraries, but should be an integral element in all areas of community life including housing, transportation, agriculture, economy, energy conservation, recreation, education, and public service.

Background Report 1979
Benton Co. Comp Plan

5.5.d Residents of Benton County have been actively involved and interested in historic resource protection over the years, beginning with identification of historical resources by 13 rural advisory committees in 1979.

Background Report 1979
Benton Co. Comp Plan

5.5.e The inventory of historical and cultural resources in Benton County is largely based on the 1980 Reynolds "Survey of Historic Standing Structures in Benton County" and the Gallagher report "Benton County Cultural Resource Inventory 1984-86." The Benton County Register of Historic Resources includes 50-60 sites, and will likely not be amended except on a case-by-case basis.

Benton Co. Community Development Dept.

5.5.f The Benton County Historic Context Statement is the County's historic preservation plan, which is the basis for code guidelines and regulations for the inventory, listing, demolition, alteration, and removal of historic resources.

Benton Co. Community Development Dept.

5.5.g Owner consent is required for historic resources to be listed on the Benton County Register and considered designated for protection.

Benton County Historic Context Statement

5.6 Riparian Resources & Fish Habitat

5.6.a Streams and other water bodies together with their associated riparian areas are valuable resources, providing numerous ecological functions and processes important for environmental sustainability and quality of life in Benton County.

Draft Goal 5 ESEE Analysis
Riparian Protection Program.

5.6.b Benton County streams provide habitat for Coho salmon, Chinook salmon, and steelhead, including populations that are listed as threatened under the federal Endangered Species Act.

ODFW Maps; NOAA Fisheries definition of listed species.

5.6.c Benton County streams also support Cutthroat trout (resident, and migratory), a small number of sturgeon (Willamette River),

Findings and References

non-native warm-water game species, and other non-game fish (e.g. sculpin).

Background Report 1979 Benton Co. Comp Plan

5.6.d In Benton County, the Alsea River, Marys River and Willamette River are listed as water-quality-limited on the Oregon Department of Environmental Quality 303(d) List.

Oregon DEQ

5.6.e Intact riparian areas filter pollutants from runoff, moderate stream temperature, stabilize streambanks, provide large wood for fish habitat, and provide leaf litter, invertebrates, and other organic material to support the in-stream food chain.

Background Report 1979 Benton Co. Comp Plan

5.6.f Riparian areas provide the greatest percentage of habitat needs for the greatest number of wildlife species of any habitat type.

Background Report 1979 Benton Co. Comp Plan

5.6.g The Willamette River and its riparian zone provide for the needs of a wider variety of wildlife species than any other habitat occurring in the Willamette Valley. The main stem is a major route of the Pacific Flyway, habitat for Great Blue Heronries, Bald Eagle, and Osprey nests. Sensitive areas for fish production include Willamette Basin, Luckiamute system, Marys River Basin, and Alsea River Basin.

Background Report 1979 Benton Co. Comp Plan

5.6.h Riparian wetlands provide water quality filtration functions, high water habitat for fish, valuable habitat for wildlife, and water quantity regulation (both at times of high water and low water).

Background Report 1979 Benton Co. Comp Plan

5.6.i Riparian and bottomland forests provide habitat for a diversity of terrestrial and aquatic species, improve water quality, shade lowland rivers and streams, provide natural flood control with side channels and sloughs, help store floodwater in adjacent wetlands, and provide rearing areas for endangered wild salmon.

Willamette Basin Habitat Conservation Priorities, Willamette Restoration Initiative, 2001

5.6.j Land uses that remove riparian vegetation, disrupt floodplain hydrology, or destroy wetlands can impact fish, water quality, water quantity, and wildlife. Loss of riparian functions can increase costs for management of stormwater quality and flood mitigation, can contribute to extirpation of fish and wildlife species, and can reduce the aesthetic characteristics of Benton County.

Background Report 1979 Benton Co. Comp Plan

5.6.k River bottomlands have extensively been cleared for agricultural use, especially along the Willamette and Marys Rivers.

Background Report 1979 Benton Co. Comp Plan

5.6.l The floodplain is an important element of riparian areas, providing high-flow refuge for aquatic life, stream-floodplain interchange of water and material, stream channel migration, highly valuable wildlife habitat, and hyporheic zone water processes.

Background Report 1979 Benton Co. Comp Plan

5.6.m Benton County has prepared a draft "Riparian Protection Program" applying the safe-harbor Goal 5 process for determining significant riparian resources, including amendments to the Development Code with setback requirements as well as comprehensive plan

Findings and References

policies for consideration. For resource lands, determination of geologic hazards, floodplains, or wetland requirements would be on a case-by-case basis.

Benton Co. Community Development Dept.
ORS 660-23-090; ORS 660-23-110

5.7 Wetlands

5.7.a More than half of the Willamette Valley's wetlands have been lost to agriculture and urban development, and most remaining wetlands have been significantly degraded. Wetlands help regulate water levels, provide food and habitat for wildlife, reduce flood damage, and improve water quality. Tyee Wine Cellars is listed as an example of wetlands, bottomland forest and oaks, and Jackson-Frazier Wetlands is widely recognized as one of the most ecologically and scientifically significant wetlands in western Oregon. Jackson-Frazier Wetland is also listed on the Oregon State Register of Natural Heritage Resources.

Willamette Basin Habitat Cons. Priorities, Willamette Restoration Initiative, 2001; Natural Heritage Website, Dept.of Agriculture

5.7.b Wetlands contribute to water quality by filtering sediment and pollutants from waters. Loss of wetlands can necessitate costly infrastructure and facilities to maintain water quality.

Background Report
1979 Benton Co. Comp Plan

5.7.c Wetlands store water during periods of flooding, reducing flood heights and thus the risk to life and property. One acre of marsh is capable of holding 300,000 gallons of water. Wetlands also serve as a source of water during dry periods, maintaining a more stable water table to support fish, wildlife and vegetation.

Background Report
1979 Benton Co. Comp Plan

5.7.d Some wetlands are groundwater recharge areas, helping to maintain water availability for domestic and agricultural well-users.

Background Report
1979 Benton Co. Comp Plan

5.7.e Wetlands provide essential breeding, nesting, resting, and feeding grounds, and predator-escape cover for numerous wildlife and fish species.

Background Report
1979 Benton Co. Comp Plan

5.7.f Land uses that disrupt the flow of water into or out of a wetland impair functions that the wetland provides, and may lead to vegetation and other changes, which may cause it to cease to be a wetland.

Background Report
1979 Benton Co. Comp Plan

5.7.g Land uses that remove the vegetation, disturb the soil, or fill the wetland will limit, disrupt or destroy elements of wetland function.

Background Report
1979 Benton Co. Comp Plan

5.7.h In rural areas, counties may rely on existing state inventories, but must notify Division of State Lands (DSL) about proposed development affecting inventoried wetlands.

ORS 660-23-100

5.8 Groundwater Resources

5.8.a The Oregon Water Resources Department (WRD) and Water Resources Commission are charged with maintaining and protecting water resources.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.b Groundwater supply issues continue to develop in aquifers within the Willamette Basin. It may be many years before the

Findings and References

Oregon Water Resources Department develops the scientific data and analysis needed to support problems after they emerge and are identified.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.c Groundwater users are required to obtain a Water Resources Department permit to withdraw all but the smallest quantities of water. Smaller uses of water are exempted from the permitting requirement, including single or group domestic use up to 15,000 gallons per day, non-commercial irrigation of up to ½ acre, stock watering, and commercial & industrial use up to 5,000 gallons per day.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.d Because exempt water uses are not subject to state permitting, the possibility exists for considerable withdrawal in rural residential areas without a review of the status of ground water resources and their sustainability.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.e According to the WRD, there are no "critical ground water areas" or aquifers that are "groundwater limited" in Benton County. Known groundwater problems in the County are primarily high salinity, which is common, and low-yield conditions where sands and gravels are thin or absent.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.f 1996 amendments to the Safe Drinking Water Act require states to develop a Source Water Assessment Program for public water systems, requiring protection of both surface and groundwater, which has resulted in an extension of the Wellhead Protection Program. All public water systems in Benton County are required to protect from contamination the surface and subsurface areas surrounding a water well, well field, or surface water source.

Oregon Water Resources Dept., Water Protections and Restrictions: Managing Water Appropriations

5.8.g Land use decisions may exacerbate water supply problems if it is assumed that groundwater is adequate because the WRD has not restricted development. WRD and land use planners must work together to prevent rural water supply problems.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.h Statewide Planning Goals 2 and 5 provide local governments with the best tools to establish measures to help assure that a reliable source of groundwater is available for planned development and to provide a reasonable level of certainty that the carrying capacity of the groundwater supply will not be exceeded.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.8.i Examples of possible land use regulations to protect groundwater supply include education and conservation, requirements for subdivision applicants to demonstrate long-term water supply sustainability, and encouragement of alternatives to individual exempt use wells for rural residential development.

Ground Water Supplies in the Willamette Basin, Oregon Water Res. Dept. & DLCD, Sept. 2002

5.9 Wildlife Habitat

See also "5.6 Riparian Resources"

5.9.a Benton County has an abundance and diversity of wildlife, which adds to the quality of life enjoyed by residents.

Background Report 1979 Benton Co. Comp Plan; Benton County Value Statement

Findings and References

5.9.b To maintain wildlife and the recreational, aesthetic, and economic benefits that wildlife provides, land use and resource management decisions must be made to protect and perpetuate habitat, the key to wildlife survival.

Background Report
1979 Benton Co. Comp Plan

5.9.c Sensitive wildlife habitat areas are being lost by filling and draining aquatic habitats and wetlands, clearing riparian zones, and by removing and burning roadside vegetation, hedgerows, and other unused areas.

Background Report
1979 Benton Co. Comp Plan

5.9.d Forest lands and adjacent agricultural edges are sensitive big game habitat; riparian zones are sensitive habitats for upland game. Waterfowl habitats of particular importance include the Willamette River, Long Tom River, Marys River, Luckiamute River, and Muddy Creek. Non-game wildlife include heronries, osprey, and eagle nests near streams and lakes. The Willamette River is a major route of the Pacific flyway and sloughs are of highest value.

Background Report
1979 Benton Co. Comp Plan

5.9.e Goal 5 rules require local governments to update habitat inventories using information from state and federal agencies. Governments must determine significance of habitat areas through either the standard Goal 5 process or application of a standard setback for structures and certain land uses through the "safe harbor" provision.

ORS 660-23-110

5.9.f The Comprehensive Wildlife Conservation Strategy, prepared by the Oregon Department of Fish and Wildlife, provides a non-regulatory, statewide approach to species and habitat conservation in Oregon, including grant programs.

Oregon Dept. of Fish and Wildlife

5.9.g The U.S. Fish and Wildlife Service has recently recognized Benton County as a potential demonstration site for a county-wide Habitat Conservation Plan (HCP), with funding provided by the federal agency.

Benton Co. Natural Areas & Parks Dept.

5.10 Mineral and Aggregate Resources

5.10.a Benton County and Statewide Planning Goal 5 recognize the importance of maintaining mineral and aggregate resources necessary to supply an adequate quantity of rock materials for the needs of the county.

1992 Benton Co. Comp. Plan policy statement.

5.10.b Mineral and aggregate resources are given special protection because of their importance to a healthy and growing economy, and in some areas because of their limited availability, their site specific location characteristics, and their non-renewable nature.

Other county comprehensive plans

5.10.c Mining operations may result in housing, transportation, and environmental quality impacts and potential conflicts.

Typical impact issues

5.10.d Benton County has been working on a draft of "Amendments for Surface Mining" as part of periodic review and to comply with new Goal 5 rules. The draft includes a new chapter in the Development Code, adds 6 new mineral extraction sites to a total inventory of 150 sites, and proposes a surface

Findings and References

mining overlay and new additional policies. The process is considered 95% complete with details to be worked out with DOGAMI and DLCD.

Benton Co. Community Development Dept.

5.10.e Goal 5 rules require local government to determine the post-mining use and provide for this use in the comprehensive plan and land use regulations. Post-mining use must be limited to farm-related use and fish and wildlife habitat uses including wetland banking.

ORS 660-023-0180

5.10.f Goal 5 rules require a reclamation plan to be coordinated with DOGAMI as well as post-mining use unless otherwise exempt.

ORS 660-023-0180

5.10.g Recent rule amendments reinstate a Conditional Use Permit process for small mineral and aggregate mine sites, which gives local governments more flexibility for siting small aggregate mines on prime agricultural lands.

LCDC, June 11, 2004

Oregon Recreation Trails

See Goal 8 Recreational Needs

Oregon Scenic Waterways

There are no State scenic waterways in Benton County.

Wilderness Areas

There are no federally designated wilderness areas in Benton County.

Federal Wild and Scenic Rivers

There are no federally designated wild and scenic rivers in Benton County.

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Findings and References

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Goal 6
Air, Water & Land Resource Quality

The residents of Benton County value clean air, water and healthy natural systems and recognize their importance in sustaining the quality of life that residents value for themselves, their children and grandchildren.

Benton County Comprehensive Plan Value Statement

Goal 6
Air, Water & Land Resource Quality

Overview

The maintenance and improvement of air, water and land resource quality are important considerations in all phases of land use management and planning. The policies in this section of the Plan provide the framework for evaluating land use actions for their potential impact on the county's natural environment and guide the management of County operations, consistent with Benton County's commitment to protecting these valuable resources.

Cooperation among all levels of government and citizens is critical to protecting air, water and land resources. State and federal agencies, including the federal Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ), have a primary role in monitoring and enforcing quality standards. The policies in this chapter define the responsibility of the County to work in partnership with others to achieve the highest level of air, water and land resource quality.

In developing these policies, the Steering Committee reviewed information provided by Benton County's Environmental Health Department and by the Oregon Departments of Environmental Quality, Agriculture and Water Resources as well as relevant information included in the Environmental Quality Background Report of 1979.

Marys River

Goal 6

Statewide Planning Goal 6

To maintain and improve the quality of the air, water and land resources of the state.

All waste and process discharges from future development, when combined with such discharges from existing developments shall not threaten to violate, or violate applicable state or federal environmental quality statutes, rules and standards. With respect to the air, water and land resources of the applicable air sheds and river basins described or included in state environmental quality statutes, rules, standards and implementation plans, such discharges shall not (1) exceed the carrying capacity of such resources, considering long range needs; (2) degrade such resources; or (3) threaten the availability of such resources.

Excerpt from
OAR 660-015-0000(6)

Benton County Goal

Air, Water & Land Resource Quality

To maintain and improve the quality of air, land, and water resources in a manner that will meet current needs and preserve resources for future generations.

Policy Sections

Cross-References

Additional policies related to this goal:

Goal 5 Natural Resources
Goal 7 Natural Hazards

Policies

6.1 General Policies

6.1.1 Benton County shall provide by example and leadership a commitment to air, water, and land resource quality by demonstrating sustainable, "best management practices" in all County operations and capital projects.

6.1.2 In cooperation with appropriate agencies, Benton County shall manage its air, water and land resources to insure their protection, conservation, restoration, or enhancement.

6.1.3 Benton County, in cooperation with the Oregon Department of Environmental Quality (DEQ), Oregon Department of Human Services and other appropriate agencies, shall conduct periodic environmental health assessments and develop and update an environmental assessment priority list to identify, monitor and evaluate potential health hazards relating to sewage disposal, drinking water and solid waste. Benton County shall take appropriate steps to minimize resource degradation, and shall work with OSU Extension and others to increase public understanding and awareness around these issues.

6.1.4 In reviewing land use actions, Benton County shall evaluate potential impacts on air, surface water, groundwater, noise and glare levels, and land quality, where possible utilizing existing studies and prioritizations such as the County's Environmental Assessment Priority List. Appropriate steps shall be taken to minimize degradation.

6.1.5 Benton County shall work with local citizens and appropriate local, state and federal agencies to establish partnerships to achieve enforcement of air, land, and water quality standards.

6.1.6 Through its maintenance and operations, Benton County shall demonstrate use of "best management practices" and promote their use through public education and awareness to assure that sediment transport is minimized and pesticides and herbicides are not dispersed so as to adversely affect human health and land and water resources.

6.1.7 Benton County shall consider the physical capacity of the land and water to accommodate land uses when planning for the location, type, and density of rural development.

6.1.8 Benton County shall place a high priority on public education and enforcement related to environmental rules and regulations.

6.1.9 Benton County shall use "green builder" construction methods and materials in the construction of County-owned buildings.

6.1.10 Benton County shall encourage the use of "green builder" construction methods and materials in private construction.

County Boards & Committees

- Environmental Issues Advisory Committee
- Solid Waste Advisory Council/Disposal Site Advisory Committee

Defined Terms

- best management practices
- conservation
- green builder
- groundwater
- restoration
- sustainable
- watershed

See **Appendix** for definitions

Goal 6

6.2 Water Resources

Policies

6.2.1 Benton County shall encourage collaborative efforts involving state agencies, municipalities, users of surface waters and environmental interests, to preserve and enhance surface water quantity during low-water periods.

6.2.2 Benton County shall incorporate vulnerability assessments and source protection for the public's water supply as part of the land use process. The source of such assessments and information shall be state agencies and other qualified entities.

6.2.3 Benton County shall assure that public water systems and private wells meet minimum water quality standards.

6.2.4 Benton County shall place a high priority on maintaining natural systems and processes as a biological method for maintaining and protecting clean water.

6.2.5 Benton County shall collaborate with others to promote watershed management practices that protect and enhance water quality and quantity.

6.2.6 Benton County shall require development to be designed or located in a manner that will result in no net degradation of water quality and quantity.

6.2.7 Benton County shall cooperate with and request state and federal agencies to undertake hydrological studies to determine the location, quantity, quality, and estimated consumption of groundwater within the county.

6.2.8 Benton County shall encourage protection of water quality by developing a septic management system to monitor existing systems and by working with DEQ, municipalities, and others to identify point and non-point sources of pollution and encourage effective abatement.

6.2.9 Benton County shall achieve efficient use of water and water conservation through the land use permitting process, operation of County-managed water systems, and a public information program.

6.2.10 Water resources shall be managed wherever possible on a watershed or landscape scale to assure continuity and integrity of practices to the waterway.

Alsea River

6.3 Air Resources

Policies

6.3.1 Benton County shall develop and implement programs necessary to meet or exceed air quality standards. This effort will include but not be limited to: considering air quality implications when reviewing capital improvement projects and making land use decisions, developing and implementing controls, reducing vehicle miles traveled (VMT), and monitoring and promoting proper burning practices.

6.4 Subsurface Sewage Disposal Systems

Policies

6.4.1 Benton County shall maintain standards for the siting of septic systems and promote proper use and maintenance through education and enforcement.

6.4.2 Benton County shall encourage the Oregon Environmental Quality Commission to adopt rules allowing flexible technologies for waste disposal and recycling, such as composting toilets and gray water systems.

6.4.3 Benton County shall work with county neighborhood groups, municipalities, and central water and sewer system providers to correct area wide health hazards caused by multiple septic system failures.

6.4.4 Benton County shall perform sanitary surveys and prioritize problem areas, as needed.

Courtesy Wren Community Club

Goal 6

6.5 Landfills and Solid Waste

Policies

6.5.1 Benton County shall pursue a variety of approaches to waste reduction and recovery and strive to meet or exceed state-mandated goals for the recovery of waste materials.

6.5.2 Benton County shall assure compliance with county and state ordinances pertaining to the unlawful storage, collection, and disposal of solid waste materials.

6.5.3 Benton County shall increase, to the maximum degree possible, the salvage reclamation, recycling, and reuse of materials from solid waste.

6.5.4 Benton County shall provide for the safe, efficient, and sanitary storage, collection, transportation, and disposal of solid waste.

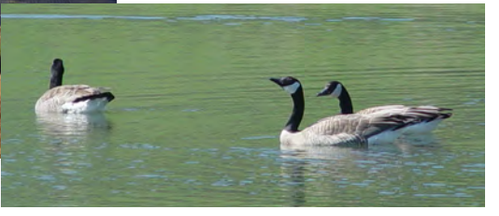
6.5.5 Benton County shall strive for the safe storage, collection, reduction, reuse, recovery, and appropriate disposal of hazardous waste materials.

6.5.6 Benton County shall plan for the safe and efficient transportation, storage, recovery, and disposal of disaster debris.

6.5.7 Benton County shall maintain a committee that advises the Board of Commissioners on solid waste and disposal site issues.

6.5.8 Benton County shall assure safe, accessible, and environmentally sound disposal of solid waste at the Coffin Butte Regional Sanitary Landfill.

6.5.9 Benton County shall explore incentives such as financial assistance to address cleanup of solid waste problem areas.



Coffin Butte Landfill

6.6 Noise and Glare

Policies

6.6.1 Benton County shall identify excessive noise sources and, with the cooperation of DEQ, develop and implement a noise ordinance to mitigate or eliminate those sources, when practicable.

6.6.2 Benton County shall not regulate sounds associated with generally accepted farming and forest practices in "Exclusive Farm Use" and "Forest Conservation" zones.

6.6.3 Benton County shall develop and maintain standards to minimize noise pollution and noise trespass as part of land use decisions.

6.6.4 Benton County shall develop and maintain standards to minimize light pollution, glare, and light trespass as part of land use decisions.

6.6.5 Benton County shall encourage public awareness and establish programs that promote energy conservation and lighting alternatives to minimize light pollution and glare.

Goal 6

Findings and References

6.1 General

6.1.a The high value placed on clean air and water by Benton County residents is reflected in local commitments to plans and programs directed toward reducing air and water pollution.

Background Report
1979 Benton Co. Comp Plan

6.1.b The Benton County Environmental Health Assessment Priority List-2002 identifies areas and conditions in Benton County that represent known or suspected health hazards or environmental problems.

Benton County Environmental Health Division

6.1.c Benton County acts in cooperation with the Oregon Department of Environmental Quality (DEQ) to assure land use activities are consistent with state and federal environmental regulations.

Background Report
1979 Benton Co. Comp Plan

6.1.d DEQ administers many air and water quality site and non-site specific programs that affect land use. To maintain consistency between DEQ regulations and Benton County land use decisions, DEQ is consulted before land use decisions are made. Also, an applicant for a DEQ air or water discharge permit must first demonstrate that the proposed use is consistent with the comprehensive plan and zoning ordinance.

Background Report
1979 Benton Co. Comp Plan

6.1.e Benton County also cooperates with the Oregon Department of Forestry (Oregon Forest Practices), Oregon Water Resource Department, the Benton Soil and Water Conservation District, watershed councils, other counties, and local citizens and jurisdictions in working to solve air, land, and water quality problems.

Background Report
1979 Benton Co. Comp Plan

6.1.f The Board of Commissioners adopted a "Benton County Sustainability Policy" in 2002: " We must use, develop, and protect our resources at a rate and in a manner that enables people to meet their current needs and also preserve resource for future generations.

Admin. Policy No. 02-01

6.2 Water Quality

6.2.a The "Benton County Environmental Health Assessment Priority List" includes eight areas in the county with on-site sewage problems, seven drinking water problem areas, and other environmental problem areas including watersheds. A health hazard assessment is provided and proposed actions are recommended.

Benton County Environmental Health Assmt.
Priority List-2002

6.2.b The DEQ is required by the federal Clean Water Act to maintain a list of stream segments that do not meet water quality standards. This list is called the 303(d) List because of the section of the Clean Water Act that makes the requirements. These Benton County rivers and streams are on the List: Alsea River, Lobster Creek, Long Tom River, Luckiamute River, Marys River, Muddy Creek, and the Willamette River.

DEQ Water Quality Website

6.2.c Water quality has improved in the Willamette Valley as point sources have come under regulation in the past 30 years. However, recent studies have found that much of the Willamette River mainstem is still water quality limited for bacteria, fish

Findings and References

deformities, temperature, and dissolved oxygen (Leland et. al. 1997). With an increasing population, more industry, and a trend toward more intensive agriculture, non-point source pollution has become the major challenge.

Restoring the Willamette Basin. Willamette Restoration Initiative.1999.

6.2.d Groundwater supplies 90% of rural residential drinking water in Oregon and 2,500 public water systems obtain water exclusively from ground water.

Oregon Ground Water Conditions, Oregon Dept. of Water Resources, 2003

6.2.e Oregon DEQ is preparing Total Maximum Daily Load (TMDL) allocations for the Willamette Basin for mercury, bacteria, and temperature. This will likely require Benton County to develop methods to limit additions of these pollutants to streams in the county.

Improving Water Quality TMDL in Oregon Fact Sheet. Oregon DEQ. January 2003

6.2.f Groundwater in the Willamette Valley shows signs of contamination by human activities, with early assessments showing a high percentage of wells with a high concentration of nitrate in the water, which poses a health risk. Potential nitrate sources include septic systems, agricultural amendments, confined animal feeding operations, fertilizers for lawns and golf courses, and bulk fertilizer facilities. The DEQ is in the process of declaring the area between Eugene and Albany a "Groundwater Management Area" because of contamination. The area in Benton County is bounded by Highway 99W on the west between Monroe and Corvallis.

Southern Willamette Valley Groundwater Summary Report, DEQ Water Quality Website, 2004

6.2.g Population growth, irrigated agriculture, and industry continue to place increasing demands on water supply and water quality in the Willamette Valley, including both surface and groundwater.

Oregon Department of Water Resources Website

6.2.h Groundwater contamination and surface water pollution suggest that siting of residential development is becoming more important in terms of water availability and protecting water quality. There is a lack of information pertaining to groundwater to assist in this effort.

Oregon Water Resources Dept, Groundwater Supplies in the Willamette Basin Sept.2002

6.3 Air Quality

6.3.a The Oregon Clean Air Act establishes air quality standards that exceed federal standards, to "protect public health" and to "provide for the public welfare."

Background Report 1979 Benton Co. Comp Plan

6.3.b The Oregon Department of Environmental Quality, through its Air Quality Surveillance Network, monitors air quality throughout Oregon. Air sampling is conducted at a monitoring station in Corvallis located at Corvallis Fire Station #3. Benton County currently meets all federal ambient air quality standards and is less at risk than a number of other Oregon cities.

Benton County Environmental Health Assessment Priority List-2002 Oregon DEQ

6.3.c In 2000, Corvallis had the second lowest particulate matter levels out of 21 cities. The highest level was in November, likely from wood stoves.

Benton County Environmental Health Assessment Priority List-2002

Findings and References

6.3.d Air pollutants of greatest concern in Oregon are ground-level ozone (smog), carbon monoxide (mostly from motor vehicles), and fine particulate matter (mostly from wood smoke and dust).

DEQ Website

6.3.e Industrial pollution is less significant in Benton County due to the amount and type of industry, but individual actions such as driving cars, using woodstoves, gas-powered lawn mowers and motorboats, and outdoor burning are major causes of most of the local air pollution.

Air Quality Data Summaries 1992-2002, DEQ

6.3.f Benton County is located in the Willamette Valley air shed, and because of geologic features, pollution generated in the valley often becomes trapped. Pollution from automobile emissions and industry in the metropolitan areas and from field burning, slash burning, and other agricultural and forestry practices in rural areas combine in the atmosphere and are dispersed the entire length of the valley.

Background Report
1979 Benton Co. Comp Plan

6.3.g Because of high air pollution potential for much of Benton County, land use decisions must consider effects on air quality. Automobiles, industry, and agricultural burning cause most of the air pollution problems, and therefore land use policies must be developed to minimize pollution problems.

Background Report
1979 Benton Co. Comp Plan

6.3.h More compact urban designs and proximity of jobs and services to residences are examples of land use issues that can limit pollution from the automobile, which is by far the largest polluter in Oregon. To continue to meet air quality standards, Benton County residents must help change the way their automobiles are used.

Background Report
1979 Benton Co. Comp Plan

6.3.i In the past seven years, smoke intrusions from open field burning (thermal sanitation) have been reduced by the Oregon Department of Agriculture's Smoke Management Program, and by maximum allowable acreage set by the 1995 Legislature. Corvallis recorded no days of smoke impact attributable to open field burning in 2003. Several regional fires created a ban on field burning several times during the field burning season to protect the air shed from additional smoke impacts.

Summary of the 2003 Field Burning Season
Oregon Department of Agriculture

6.3.j Oregon has been identified as a "clean air corridor" providing clean air to the Grand Canyon and other Class 1 areas such as Crater Lake.

DEQ Air Quality Website

6.3.k The DEQ adopted the first Regional Haze Plan for Oregon in 2003, which requires tracking of sources, such as road dust, motor vehicle and industrial emissions, and forestry and agricultural burning, and development of pollution prevention strategies.

DEQ Air Quality Website

6.4 Subsurface Sewage Disposal System

6.4.a The Benton County Environmental Health Department is responsible as an agent for DEQ to assure that subsurface sewage disposal systems are located in areas where waste can be properly disposed and not endanger health, water sources, or waterways.

Findings and References

6.4.b The "Benton County Environmental Health Assessment Priority List" includes eight areas in the county with on-site sewage problems, seven drinking water problem areas, and other environmental problem areas including watersheds. A health hazard assessment is provided and proposed actions are recommended.

Benton County Environmental Health Assessment. Priority List-2002
Benton County Health Dept. Website

6.5 Landfills and Solid Waste

6.5.a DEQ's Underground Storage Tank Cleanup List includes approximately 226 underground storage and home heating tanks with reported releases of petroleum products in Benton County. Locations are predominantly in the Corvallis area, with sites also in Adair Village, Alsea, Monroe, and Philomath.

DEQ Underground Storage Tank Cleanup List 2004 Website

6.5.b Five Corvallis cleanup sites are listed on the DEQ Environmental Cleanup Program "Active Site List." They include an electric power plant site, a fiber manufacturing plant, an industrial chrome plating company, and two dry cleaners.

DEQ Environmental Cleanup Program Active Site List, 2004 Website

6.5.c Benton County successfully worked with the DEQ and the EPA's Brownfield Program to remove contaminants from an abandoned auto wrecking site, which was acquired by the County through foreclosure. A Brownfield Corporation cleaned up the site in preparation for redeveloping the site for housing, and the DEQ released the site in 2001.

DEQ Brownfield Website

6.5.d Chemical waste disposal has potential for endangering human health, life, and property.

Lincoln County Comprehensive Plan

6.5.e Land use decisions at the Coffin Butte Sanitary Landfill have provided another 43 years of capacity to the site, continuing to serve as a regional landfill serving Linn, Polk, Lincoln, and Benton Counties.

Benton Co. Environmental Health Dept.

6.5.f The Coffin Butte Landfill is currently in compliance with permits and is heavily monitored by the County. Leachate is collected and treated. A leak detection system is in place to monitor the bottom liner of the landfill for leaks. Monitoring wells surround the perimeter of the landfill.

Benton Co. Environmental Health Dept.

6.5.g Illegal dumping occurs in the county. Sites that are reported to Benton County are investigated.

Background Report
1979 Benton Co. Comp Plan

6.6 Noise and Glare

6.6.a Exposure to excessive noise levels over prolonged periods can be a threat to health.

Background Report
1979 Benton Co. Comp Plan

6.6.b Excessive noise can reduce the livability of nearby dwellings; examples are wind turbines and rifle ranges.

DEQ Noise Website

Goal 6

Findings and References

6.6.c The Oregon Noise Control Act authorizes counties to adopt and enforce noise ordinances and standards. DEQ's Noise Program was terminated in 1991 by the legislature as a cost-cutting measure, but regulations establishing allowable noise limits are still in effect that pertain to motor vehicles, ATVs, industrial and commercial noise sources, motor racing facilities, and airport-related noise.

DEQ Noise Website

6.6.d Engineers, medical professionals, and amateur astronomers are concerned about the effects of light pollution including health effects on humans and wildlife from not sleeping in total darkness, driving hazards from road glare, misdirected light, wasted energy, increase in crime rather than crime prevention, and light-polluted night skies. Specific effects of concern are from lighted billboards, unshielded lights, necklace lights, and floodlights.

Oregon Dark Skies Website
International Dark-Sky Association Website

6.6.e Satellite images dramatically reveal that roughly a third of the light used outdoors escapes upward, totally wasted, into the night sky. The International Dark-Sky Association estimates that each year in the United States, more than $1 billion is spent to generate this wasted light -- resulting in the needless burning of some 6,000,000 tons of coal annually.

Sky and Telescope, October 24, 2002**6.6.f** Excessive glare has become a safety concern, as well as wasteful unshielded lights near natural areas and homes. Advances in illumination are helping solve light pollution problems.

New England Light Pollution
Advisory Group Website

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Goal 7
Natural Hazards

The residents of Benton County recognize the importance of nurturing and sustaining public infrastructure and human systems that address adequate and affordable food, shelter, transportation, education, health care, public safety, and other vital services.

Benton County Comprehensive Plan Value Statement

Goal 7
Natural Hazards

Overview

In Benton County, natural hazards include flooding, landslides and slope erosion, stream erosion and deposition, earthquakes, and wildfire.

Informed by an understanding of natural hazards, Benton County can reduce the risks to property, environmental quality, and human safety by planning broad land use patterns and site-specific development. The policies in this section of the Plan provide the framework for evaluating land use actions for their exposure to potential harm from natural hazards. The policies guide the identification of areas subject to natural hazards, regulation of development in those areas, and protection of citizens, property and the environment from the effects of natural hazards. The protection methods prescribed by these policies include prevention and preparedness, land use regulation, use of natural systems to mitigate hazards, public education, and collaboration with other organizations. These policies also guide the development of the County's Pre-Disaster and Natural Hazards Mitigation Plan.

A primary reference for development of these policies was the 2002 Benton County Hazard Analysis, the official assessment of potential natural and human-caused hazards affecting Benton County, prepared by the Benton County Emergency Management Division. This analysis indicates that flooding, wildfire, and landslides are the natural hazards most likely to occur in Benton County. Severe weather (excluding flooding) and earthquake risks are rated highest for the need for emergency preparedness.

In developing these policies, the Steering Committee also reviewed information from other county, state and federal programs and departments and from the background report to the 1979 Comprehensive Plan. The publication "Planning for Natural Hazards: Oregon Technical Resource Guide" (Department of Land Conservation and Development) is a particularly useful tool in planning for hazards.

Related Plans and Documents

- Benton County Pre-Disaster and Natural Hazards Mitigation Plan.
- Benton County Hazard Analysis
- Benton County Geological Hazards Study (DOGAMI)
- Benton County Emergency Operations Plan
- Corvallis Stormwater Master Plan
- Benton County's Floodplain Management Program
- Water-Induced Landslide Hazard Map (DOGAMI)
- Relative Earthquake Hazard Maps

Cross-References

Additional policies related to this goal:

Goal 5 Natural Resources

Goal 6 Air, Water & Land Resource Quality

Goal 7

Statewide Planning Goal 7

To protect people and property from natural hazards.

Local governments shall adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards.

Natural hazards for purposes of this goal are: floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis, coastal erosion, and wildfires. Local governments may identify and plan for other natural hazards.

PLANNING GUIDELINES

1. In adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider:

a. the benefits of maintaining natural hazard areas as open space, recreation and other low density uses;

b. the beneficial effects that natural hazards can have on natural resources and the environment; and

c. the effects of development and mitigation measures in identified hazard areas on the management of natural resources.

2. Local governments should coordinate their land use plans and decisions with emergency preparedness, response, recovery and mitigation programs.

Excerpt from
OAR 660-015-0000(7)

Benton County Goal

Natural Hazards

To protect Benton County citizens, critical public facilities and infrastructure, private property, and the environment from natural hazards, and to guide the county toward building a safer, more sustainable community.

Policy Sections

Policies

7.1 General Policies

7.1.1 Benton County shall protect property and lives by encouraging or requiring homes, business, infrastructure, and critical facilities to be resistant to losses from natural hazards.

7.1.2 Benton County shall use the most current hazard assessment inventories to discourage development in hazardous areas and promote preventative measures for existing development to minimize risk to life, property, and the environment.

7.1.3 Benton County shall increase public awareness of the risks associated with natural hazards.

7.1.4 Benton County shall integrate watershed management, natural resource management, and natural hazard mitigation into its land use planning process. Public education shall be a high priority.

7.1.5 Benton County shall develop programs to preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

7.1.6 Benton County shall strengthen emergency preparedness and operations for addressing natural hazards by maintaining a Pre-Disaster Mitigation Plan.

7.1.7 Benton County shall develop mechanisms to address liability for development in high-risk areas (fire, flood, earthquake, landslide) so that property owners and the insurance industry bear the costs of the risks incurred, thereby avoiding public liability to the maximum degree possible.

County Boards & Committees

Emergency Medical Advisory Committee

Defined Terms

- 100-year flood
- floodplain
- habitat
- landslide
- mitigation
- natural hazard
- watershed
- wetland

See **Appendix** for definitions

7.2 Floodplain

Policies

7.2.1 Benton County's floodplain management policies and actions will continue to emphasize more preventive than corrective measures. Flood damage prevention methods shall be non-structural to the degree possible, and include a combination of land use and code regulations, non-regulatory practices such as incentives, and a comprehensive emergency preparedness program.

7.2.2 Benton County shall allow accessory structures to be constructed within the floodplain; however, new primary structures shall not be allowed within the floodplain unless a parcel has insufficient buildable land outside the floodplain. Accessory structures shall not be located in the floodway.

7.2.3 Benton County shall only allow land divisions within the floodplain when it can be demonstrated that each buildable lot or parcel has a suitable site for development outside of the floodplain boundary. Non-residential uses shall be excepted.

7.2.4 Benton County shall strive to maximize open and undeveloped land in the 100-year floodplain to achieve flood mitigation, fish and wildlife habitat, and water quality objectives.

7.2.5 Benton County shall work to ensure that harmful runoff is not discharged directly into streams.

7.2.6 Benton County shall adopt standards to reduce peak runoff from impervious areas and not exceed pre-development storm flows.

7.2.7 Benton County shall establish parameters and/or objectives for managing stormwater drainage and shall encourage new development to use vegetated swales or open channels as an alternative to piping, where appropriate.

7.2.8 Benton County shall take measures to assure that wetland mitigation does not compromise existing stormwater functions of the land being used for the mitigation.

7.2.9 Benton County shall develop stream corridor width and other standards and programs to preserve the properly functioning condition of streams. These standards can be varied by reach or basin and shall be based on functional objectives.

7.2.10 Benton County shall restrict development for human occupancy in those areas where access by standard emergency vehicles such as fire or ambulance is prevented by flood waters of 100-year flood levels.

Alsea-Deadwood Highway

7.3 Landslide and Slope Erosion

Policies

7.3.1 To minimize risk to life, property, and the environment, Benton County shall prohibit or restrict development on steep hillsides that have landslide or slope erosion hazards.

7.3.2 Benton County shall develop and maintain new land use regulations for siting dwellings, other structures, and infrastructure based on the best available mapping and other information concerning landslide hazards.

7.3.3 To protect citizens of Benton County from natural disasters and geologic hazards, Benton County shall work with the Oregon Department of Forestry and Department of Geology and Mineral Industries (DOGAMI), and make efforts to share information and coordinate land use and development decisions in areas identified as high landslide risk locations.

7.3.4 Benton County shall allow development in areas of known or suspected landslide or on steep slopes only when a geotechnical report concludes such areas can be safely developed through engineering and other methods.

7.3.5 To minimize surface water runoff, prevent erosion, and reduce landslide hazards, Benton County shall regulate development activities that create major disturbance to soil and vegetation in flood and slide prone areas.

7.3.6 Benton County shall require properly designed protective measures for proposed land uses on sites that have severe use limitations because of soil conditions described in the Benton County Geological Hazards Study or soil surveys.

Alsea Slide

7.4 Earthquake

Policies

7.4.1 Benton County shall use the most current information from geologic research relative to seismic hazards in the county, and shall encourage careful study and design of development in areas such as along the Corvallis Fault.

7.5 Stream Erosion and Deposition

Policies

7.5.1 Benton County shall minimize the damaging effects of stream erosion and deposition by limiting alterations of the natural stream channels. To avoid increase in flood heights and velocities and avoid risk from stream meandering and braiding, building setbacks shall be required, riparian vegetation shall be retained, and partnerships encouraged with soil conservation agencies such as the Benton Soil and Water Conservation District and watershed councils to restore natural stream characteristics. Streambank hardening tends to shift erosion problems rather than solve them; therefore, non-structural or non-bank-hardening solutions shall be given preference.

7.6 Wildfire

Policies

7.6.1 Benton County shall work with the Oregon Department of Forestry and fire agencies to identify high wildfire hazard areas.

7.6.2 Benton County shall reduce fire risk to life and property, using non-regulatory and regulatory programs that respond to local and state uniform fire codes.

7.6.3 Benton County shall identify and map all areas within the county that are unprotected by structural fire protection agencies.

7.6.4 Benton County shall work together with Oregon Department of Forestry and the Benton County Fire Defense Board to develop a Wildfire Protection plan.

7.6.5 Benton County shall require that plans for new development adequately provide for fire protection.

7.6.6 Benton County shall adopt standards for wildfire protection of structures and resource land.

Goal 7

Findings and References

7.1 General

7.1.a The 2002 Benton County Hazard Analysis was prepared as the first part of the County's Emergency Operations Plan and is the official assessment of potential natural and human-caused hazards affecting Benton County.

Adopted June 25, 2002

7.1.b Flooding, wildfire, and landslides are natural hazards that are most likely to occur in Benton County. Severe weather (excluding flooding) and earthquake risks are rated highest for emergency preparedness.

Background Report
Benton County Hazard Analysis, 2002

7.1.c Benton County's Emergency Management program is preparing a Pre-Disaster and Natural Hazards Mitigation Plan.

Benton County Emergency Services

7.1.d A need exists for more collaboration between the City of Corvallis and Benton County in the urban interface area; for example, lack of inclusion of the Jackson-Frazier Wetland in the city's natural features inventory is a concern.

Benton Co. Natural Areas & Parks Department

7.1.e In Benton County there are no active faults that have been identified to be significant earthquake sources. Earthquake activity on the Corvallis Fault is uncertain. The probability of activity on the Corvallis Fault is not clearly established, "perhaps very low."

Department of Geology and Mineral Industries (DOGAMI), 2001

7.2 Floodplain

7.2.a The 1964 event was a 100-year flood. Throughout the Willamette Valley, it caused $157 million in damages and 20 persons lost their lives. The 1996 flood on the Willamette River at Salem was recorded as a 44-year flood event. The Benton County Emergency Management Office states that damage to Benton county residences was estimated at $1.2 million. As a result of this flooding, 33 claims were filed under the Federal Emergency Management Agency (FEMA) from Benton County residents and businesses.

Benton Co. Community Development Dept.

7.2.b A combination of rapid snow melt and prolonged, heavy rainfall has caused flash flooding, numerous road washouts, and substantial property damage due to several floods over the last 30 years. These events have created overflow of the Willamette and Marys Rivers, flash flooding from quickly rising streams, and overflow of storm sewer systems.

Background Report; Benton County Hazard Analysis, 2002

7.2.c Filling, grading, dredging, and other development may increase flooding and flood damage. Development within the floodway fringe (the part of the floodplain having a one percent per year chance of being flooded, also known as a 100-year floodplain) is subject to hazards to life and property from flooding. Special precautions may reduce these hazards.

Background Report
1979 Benton Co. Comp Plan

7.2.d Flood hazard areas are subject to periodic inundation that has potential to result in loss of life and property, health and safety hazards, disruption of commerce and

Findings and References

governmental service, extraordinary public expenditures for flood protection and relief, and impairment of the tax base; all of which adversely affect public health, safety and general welfare.

Federal Emergency Management Agency, 2000

7.2.e Benton County is a participant in the National Flood Insurance Program. FEMA Flood Insurance Rate Maps for Benton County and subsequent amendments are the official data source for determining if a property is within a flood hazard area. Some areas of the county are subject to flooding but not mapped; more site-specific information may be required to determine presence of flood hazards at these locations. The 1996 flood extent was mapped for Benton County.

Benton Co. Community Development Dept.

7.2.f In 2002, Benton County improved its National Flood Insurance Program rating from a Class 10 to a Class 7, resulting in a premium rate reduction of 15% for purchasers of flood insurance. This was accomplished through enhanced public outreach and implementation of existing regulations, rather than through additional regulations. Existing regulations are also responsible for the County's low incidence of flood-related damage to structures since 1979.

Benton Co. Community Development Dept.

7.2.g To help reduce the need and subsequent cost of building dams, levees, and other structures in the county and in others downriver, Benton County has been moving toward floodplain management through policy and action with a more preventive than corrective emphasis. Flood damage prevention methods include a combination of non-structural methods, land use and code regulations, and emergency preparedness.

Background Report
1979 Benton Co. Comp Plan

7.2.h The Board of Commissioners recently adopted policies from the Corvallis Stormwater Master Plan that apply to the Corvallis Urban Fringe and are to be considered for application county-wide. One of these policies pertains to reducing peak runoff from impervious areas. The Board deferred seven policies for future consideration to apply both in the urban fringe and countywide, one of which would prohibit development of new buildings within the floodplain portion of undeveloped properties.

Benton Co. Community Development Dept.

7.2.i Many portions of the floodway fringe contain natural assets, such as significant vegetation, wetlands, wildlife and scenic areas, and productive agricultural lands and are therefore valuable for open space and recreation.

Background Report
1979 Benton Co. Comp Plan

7.2.j Parts of eastern Benton County are subject to ponding and high ground water. Areas of critical ponding are generally unacceptable for dense development. Reduction of infiltration arising from ponding and other aspects of urbanization can increase runoff and lead to local flooding. These soil conditions are typically problematic for on-site sewage disposal systems. The South 3rd Street health hazard area in Corvallis is an example.

Background Report
Planning for Natural Hazards
Oregon Tech. Resource Guide, 2001
Benton Co. Community Dev. Department

Findings and References

7.2.k At times, rain and snowfall events have caused localized flooding unrelated to the Willamette River. In 2006, for example, both Muddy Creek and Marys River experienced substantial flooding while the Willamette River never reached flood stage.

7.2.l Within the Corvallis UGB, the County has adopted the City's 0.2 foot rise floodway standard. Elsewhere in the county, the floodway standard is a 1.0 foot rise.

7.3 Landslide and Slope Erosion

7.3.a Water-related landslide hazards in Benton County are low in the eastern part, low to moderate in the northwestern part, and moderate to high in the southwestern part of the county.

DOGAMI, 2001

7.3.b Since 1972, 75 landslides have been recorded in Benton County. In 1998, a house was damaged by a landslide near Alsea and 3 occupants escaped with minor injuries. In 1996, 45 roads were closed in Benton County due to flooding, washouts, or landslides.

Benton County Hazard Analysis, Analysis, 2002

7.3.c More than 9,500 landslides were triggered in Oregon by storms in 1996-97, mostly in the Coast Range and Cascade Mountains, and caused $100,000 in damage. Since 1975, landslides have killed 25 people. A Water-Induced Landslide Hazard Map has been prepared for Benton County.

DOGAMI, 2000, 2002

7.3.d A detailed slide map has been compiled for areas within and surrounding the Corvallis-Philomath urban growth boundary. 110 possible sites were mapped, mostly outside the UGB in areas with steep slopes. A notable slide complex occurs at Vineyard Mountain.

DOGAMI, 2001

7.3.e Oregon Department of Forestry (ODF) now places greater emphasis on public safety as a component of forest practices in Benton County, including landslide and debris flow hazards. High landslide and debris-flow hazard locations have been mapped at a coarse scale in Benton County and are used as a screening tool for field-based analysis. Timber harvests may be prohibited or restricted if they represent potential hazards to dwellings and roads. ODF has expressed interest in collaborating with Benton County in land use and development decisions to reduce landslide risks.

Oregon Dept. of Forestry
Philomath and Salem Offices

7.3.f The Forest Service uses a landslide susceptibility risk model as a screening tool for identifying high landslide hazard areas; slope information is at a broad scale. Oregon State University is in the process of preparing a debris torrent model for two watersheds on the Siuslaw National Forest; this model is also at a large scale.

U.S. Forest Service, Siuslaw National Forest

7.3.g Human-induced causes of landslides are the result of improper land use or lack of proper engineering such as undercutting steep slopes, indiscriminate blasting, improper handling of runoff, or improper placement or excessive fill.

Background Report
1979 Benton Co. Comp Plan

7.3.h Disturbance of hillsides can reduce slope and soil stability, increase erosion,

Findings and References

remove vegetation, increase runoff, alter drainage patterns, and affect scenic qualities of the landscape.

Background Report
DLCD, Landslide Program, 2003

7.3.i Senate Bill 12 (1999) requires local governments to protect the public from rapidly moving landslides, and to reduce risk of serious bodily injury or death. DOGAMI landslide hazard maps are being revised, and a model Landslides Hazards Ordinance and Landslide Overlay Zone has been developed for Douglas County to help local governments implement SB 12.

DLCD, Landslide Hazards Program, 2003

7.3.j House Bill 3375 (2003) directs local governments to adopt new land use regulations for siting dwellings and other structures once DOGAMI issues final maps of rapidly moving landslide hazard areas. The bill clarifies that local government may deny a request for a building permit if a geotechnical report discloses information about landslide hazards.

DLCD, Landslide Hazards Program, 2003

7.4 Earthquakes

7.4.a Ground shaking hazards that could significantly affect Benton County are from sources outside the county, especially from the Cascadia subduction zone along the Pacific Northwest Coast, which poses potentially significant seismic hazard and risk to Benton County. The last known occurrence was in 1700.

DOGAMI, 2001

7.4.b DOGAMI maps show that areas with high ground amplification and liquefied soil hazards concentrated along the Willamette River, while areas with high earthquake-induced landslide hazards are spread out over the western part of the county in the Coast Range. Relative Earthquake Hazard Maps have been prepared for the Benton County.

DOGAMI, 2001

7.6 Wildfires

7.6.a Wildland fire is a growing concern in the urban interface and in rural or unincorporated areas. Areas of greatest concern for wildfire hazard are forested rural residential developments with limited access, steep and narrow roads, inappropriate building materials, limited water supply, and long periods of dry weather during the summer. Uncontrolled burning increases the risk of wildfire.

Benton County Hazard Analysis, 2002;
Background Report, Oregon
Technical Resource Guide, 2001

7.6.b During dry periods the potential for major wildfires is significant in Benton County. For the past five years of recorded wildfire incidents in Benton County, the database shows a sharp rise in the past two years. Incidents of wildfires reached 29 in Benton County in 2002, the highest in the database.

Background Report,
Benton County Hazard Analysis, 2002

7.6.c Locations reporting more than two wildfire incidents in the past five years include the Philomath vicinity (14), Alsea vicinity (7), Bellfountain Road (5), and Monroe vicinity (3).

Benton County Hazard Analysis, 2002

Findings and References

7.6.d Wildfire incidents have occurred at a number of parks and recreation areas in Benton County over the last five years with one incident reported at each of these locations: Alsea Falls, Bellfountain Park, Chip Ross Park, Finley Wildlife Refuge, Pioneer Playground, and McBee Park. Two incidents were reported at Fort Hoskins (Benton County Hazard Listing). With increased recreational use of public open space, there is a concern for greater risk of wildfire. Management plans for parks and natural areas provide an opportunity to develop fire protection programs and action strategies, and the ODF is willing to collaborate as a partner.

Benton County Emergency Services
Wildfire Data Base, 2004

7.6.e Much of the county's rural and suburban development has occurred in small valleys and gulches that run along creeks extending out from valley floors. These areas tend to have limited access, little water during the fire season, and severe fuel loading problems such as accumulation of brush, scrub oak, etc.

Background Report
1979 Benton Co. Comp Plan

7.6.f Some rural areas of Benton County are unprotected by structural fire protection agencies (approximately 234 houses or 3% of the total), and these areas should be identified and mapped.

Benton County Emergency Management

7.6.g Mapping of high fuel build-up areas in Benton County was done by the ODF several years ago, but did not result in an official map. Areas mapped included the hills surrounding Philomath and Corvallis, Kings Valley, the corridor to Alsea, and out to the coast. Areas considered to have the greatest risk for wildfire are hillsides with south and southeast aspect due to exposure to the sun and prevailing east and northeast winds in the fall.

Oregon Department of Forestry,
Philomath Office 2004

7.6.h Department of Environmental Quality (DEQ) is responsible for developing a Wildfire Natural Events Action Plan for Oregon, in response to the wildfire smoke that impacted Oregon cities during the summers of 2002 and 2003. Fuel buildup and fire hazard in the Wildland Urban Interface is one of the elements of the plan. Oregon Department of Forestry is the lead agency that is currently developing pilots for how to map the Wildland Urban Interface area.

DEQ Wildlfire Website, 2004
DLCD, 2004

Findings and References

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Goal 8
Recreational Needs

The residents of Benton County value the land – its beauty and life-sustaining qualities. Agricultural and forest lands provide sustenance for residents of the Willamette Valley. These lands and the larger systems of mountains, valleys, rivers and wetlands of which they are part continue to be highly prized economically, culturally, recreationally, environmentally and aesthetically.

Benton County Comprehensive Plan Value Statement

Goal 8
Recreational Needs

Overview

The goals and policies included in the chapter address planning and management of parks, open space, natural areas and trail systems within Benton County.

Statewide planning directs the County to inventory recreation needs and opportunities and to develop long range plans for meeting the recreational needs of its citizens in coordination with private interests and public agencies.

The Benton County Parks System Comprehensive Plan, adopted by the Board of Commissioners in 1995, provides an assessment of the recreation resources and an outline of opportunities and implementation strategies.

The Benton County Parks Advisory Board is appointed by the Board of Commissioners to enable citizen involvement in all aspects of planning and development for natural areas and parks.

"Benton County Parks Division serves the interests and pursuits of county residents by providing access to natural, historic and recreational areas and conserving, restoring, and developing parkland investments."

Benton County Parks System Comprehensive Plan, 1995

Historical Perspective

In 1957, the Benton County Board of Commissioners established a parks board of citizens familiar with rural properties in Benton County and land appropriation. Following a belief that property could be acquired at little or no cost to the taxpayers, Parks Board members T.J. Starker, Margaret Hull, Dr. Quisenberry, Otto Vollstedt, Dee Simpson, and Dr. Peffer, worked countless hours identifying undeveloped sites and negotiating donations or reasonable purchases. In 1960, Benton County held six parks. Development was primarily the responsibility of the Board members who worked with volunteers and donated materials to accomplish their goals. Benton County Public Works Department was responsible for park maintenance once improvements had been made.

The first park planning effort at the County level was a preliminary report prepared in 1967 for the Benton County Planning Commission entitled Benton County Urban Area Park Plan. This document outlined general park needs for the urbanizing areas of Corvallis, Philomath, and North Albany. The report recommended a study of the entire county at a later date.

In early 1970, four additional park sites increased the size of the parks system by two and one-half times (to 245 acres). Development of these sites was considerably more complex and expensive than before. From a recommendation of the Parks Board, the Benton County Board of Commissioners established a separate parks department.

In 1974, the Parks Board developed a comprehensive parks plan. In the late 1970's the Citizens for Benton County Parks Committee was formed and worked to pass a capital improvement levy for county parks. The five-year levy provided $100,000 per year from 1977 to 1981 for park development. The 1982 revision of the Comprehensive Parks Plan provided guidelines for park development, identified system deficiencies and recommended improvements.

During the early 1990's, a series of public needs assessments identified interest in traditional recreational activities as well as interest in conserving areas of natural and historic value. Soon after, Jackson-Frazier Wetland, Open Space Park (Fitton Green Natural Area) and Fort Hoskins were acquired.

In 1995, the Board of Commissioners adopted the Benton County Parks System Comprehensive Plan. In 2003, the Commissioners changed the name of the Parks Division to the Natural Areas and Parks Department, in response to increasing emphasis on the management and protection of natural, cultural, and historical areas.

Goal 8

Statewide Planning Goal 8

To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

The requirements for meeting such needs, now and in the future, shall be planned for by governmental agencies having responsibility for recreation areas, facilities and opportunities: (1) in coordination with private enterprise; (2) in appropriate proportions; and (3) in such quantity, quality and locations as is consistent with the availability of the resources to meet such requirements. State and federal agency recreation plans shall be coordinated with local and regional recreational needs and plans.

Excerpt from
OAR 660-015-0000(8)

Benton County Goal

Recreational Needs

To maintain a park and open space system that represents the heritage and natural and scenic qualities of Benton County and provides outdoor recreation opportunities that contribute to healthy individuals, children, and families.

Policy Sections

Beazell Memorial Forest - Meadow Enhancement

Cross-References

Additional policies related to this goal:

Goal 2 Land Use Planning
Goal 5 Natural Resources
Goal 15 Willamette River Greenway

8.1 General Policies

Policies

8.1.1 Benton County shall establish a policy framework for planning and managing Benton County parks and natural areas that emphasizes maintaining scenic and outdoor recreation opportunities for present and future generations, protecting and restoring significant natural and historic areas and resources, supporting sustainable growth and development, and developing collaborative partnerships with residents and others.

8.1.2 Benton County shall actively participate in updates of the Oregon Statewide Comprehensive Outdoor Recreation Plan, which will assist in providing current information on county and regional outdoor recreation needs and priorities.

8.1.3 Benton County shall maintain a distinct role and mission for county parks and natural areas that complements programs of urban service providers and places a high priority on public access to and protection and restoration of significant scenic, outdoor recreation, historic, cultural, and natural resources. Education, public awareness, and interpretive programs are integral to this mission.

8.1.4 Benton County shall respect private property rights and landowner concerns, maintain a good-neighbor philosophy, and develop partnerships and creative solutions that meet mutual objectives when acquiring, developing, and managing parks and natural areas.

8.1.5 Benton County shall work with the Forest Service and ODOT to provide public access opportunities for winter recreational activities at Marys Peak.

8.1.6 Benton County shall place a high priority on collaboration with citizens and others by creating and maintaining partnerships, cultivating volunteers, and promoting a sense of ownership, pride, and respect for natural, historic, recreational, and cultural resource values.

Defined Terms

- conservation easement
- historic areas
- natural area
- open space
- restoration
- sustainable
- transportation modes

See **Appendix** for definitions

Fitton Green Natural Area

Goal 8

8.2 Planning/ Collaboration

Associated Plans

- Oregon Comprehensive Outdoor Recreation Plan, 2004
- Benton County Parks System Comprehensive Plan, 1995
- Oregon Statewide Trails Plan
- Benton County Trails System Plan, 2003
- Corvallis 2020 Vision Statement

County Boards & Committees:

- Benton County Parks Advisory Board
- Fort Hoskins Technical Advisory Committee

Policies

8.2.1 When Benton County acquires new natural area or park sites, the County shall prepare management plans to provide policy direction for visitor use, maintenance, restoration and protection, interpretation, and education for these areas. These plans shall be periodically updated.

8.2.2 Benton County shall avoid overlap and duplication of services by coordinating its park planning and management programs with federal and state agencies, local municipalities, and other providers, recognizing the important role of multiple providers as part of a comprehensive park and open space system.

8.2.3 Benton County shall strive to develop a strong working relationship with the cities of Corvallis, Albany, Philomath, Adair, and Monroe, the development community, landowners, and non-profit organizations to assure protection of scenic, natural and recreational values in the urban interface area.

8.2.4 Benton County shall actively support unincorporated communities in developing and implementing strategic plans to incorporate scenic amenities and outdoor recreation opportunities.

Benton County Parks Advisory Board

8.3 Management

Policies

8.3.1 Benton County shall work with volunteers, park visitors, community organizations, and public agencies to minimize conflicts among recreational users, as well as minimize recreational impacts on natural resources.

8.3.2 Benton County shall pursue a variety of avenues to fund, acquire, rehabilitate, and maintain County parks and facilities to maintain high standards and desired level of service.

8.3.3 Benton County shall make environmental, cultural and historic interpretation, education, and research key elements of the park and open space system, providing opportunities for learning and information exchange in creative and attractive ways.

8.3.4 Benton County shall foster relationships with Native American Tribes to enhance cultural resource opportunities.

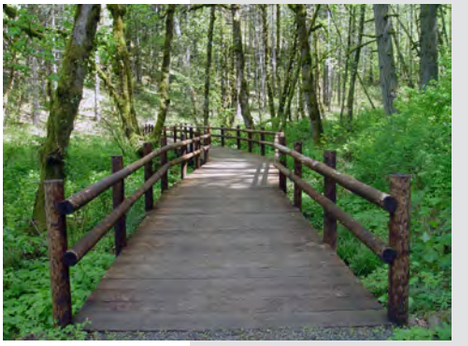
Fort Hoskins

8.4 Accessibility

Policies

8.4.1 Where appropriate, Benton County shall make its parks, natural areas, and open spaces accessible to persons with disabilities, in keeping with the American with Disabilities Act.

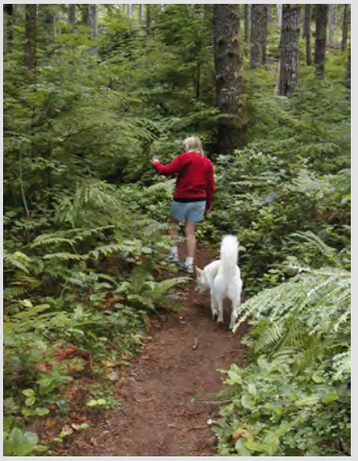
8.4.2 Benton County shall ensure that a portion of the recreational opportunities it provides are available free of charge or for minimal fee.



Beazell Memorial Forest

Goal 8

8.5 Recreational Trail System



Policies

8.5.1 Benton County shall establish a policy framework for maintaining a network of trails that provide connections between public open space, natural areas, and communities, designed for a variety of non-motorized recreation and transportation modes.

8.5.2 Benton County shall coordinate with the Oregon Recreation Trails Plan in efforts to link local trails with the state trails system.

8.5.3 Benton County shall cooperate with landowners when developing a trail system. Emphasis will be placed on managing public access to avoid trespass and/or other impacts on private property, such as wildfires.

8.5.4 When feasible, Benton County shall obtain trail easements and develop trails prior to, or simultaneously with, residential development.

8.5.5 When siting new trails, Benton County shall prioritize locating trails independently from roadways and shall emphasize use of existing rights-of-way (such as railroad right-of-way).

8.5.6 Benton County shall coordinate trail planning, funding, construction, and maintenance with the Benton County Transportation System Plan as well as among all levels of government including municipalities, Oregon State University, U. S. Forest Service, Bureau of Land Management, interested organizations, and the general public.

8.5.7 Benton County shall continue to actively participate in efforts to develop a water trail along the Willamette River, with public lands serving as public access, while working with willing landowners to acquire access and conservation easements.

8.5.8 Benton County shall maintain a Comprehensive Trail System Plan that is adopted by the Board of Commissioners.

Findings and References

8.1 General

8.1.a The 2003-2007 Oregon Statewide Comprehensive Outdoor Recreation Plan identifies three top statewide outdoor recreation needs: (1) recreation trails and trail connectivity, (2) land acquisition, and (3) water-based recreation resources and facilities. Top funding priorities for Benton County include: (1) major rehabilitation of existing outdoor recreation facilities, (2) non-motorized trail connectivity, and (3) river corridor acquisition.

2004 State Comp. Outdoor Recreation Plan

8.1.b Parks provide intrinsic environmental, aesthetic, recreation, and positive economic benefits. They enhance property values, increase revenue from tourism, and attract homebuyers and retirees. Parks are a good financial investment.

American Planning Association, Economic Development, 2002

8.1.c Benton County has achieved wide recognition for a variety of habitat restoration projects involving state and federal agencies, natural scientists, volunteers, and non-profit organizations.

Benton Co. Natural Areas & Parks Dept.

8.1.d The Willamette River and its tributaries are central to daily life in Corvallis and Eugene.

Willamette Restoration Initiative, 1999

8.1.e In 1976, it was estimated that the economic value of anadromous fishing amounted to over $900,000 annually in Benton County. The major anadromous fisheries occur in the Alsea system, and heaviest angling takes place on the mainstem Alsea River and on the North Fork Alsea below the hatchery.

Background Report
1979 Benton Co. Comp Plan

8.1.f Residents place a high value on the scenic qualities of the Benton County landscape, including views of farms and forestlands, mountains, rivers, and wetlands.

Background Report
1979 Benton Co. Comp Plan

8.1.g Views from improved roadways, highways, and trails are important to Benton County residents.

Background Report
1979 Benton Co. Comp Plan

8.2 Planning/Collaboration

8.2.a In 2003, the Board of Commissioners changed the name of the Benton County Parks Division to the Benton County Natural Areas and Parks Department, in response to increasing emphasis on management and protection of natural, cultural, and historical areas.

8.2.b The Benton County Parks System Comprehensive Plan adopted in 1995, establishes a policy framework for planning and managing parks and natural areas, with emphasis on: (1) growth and development and land use, including orderly and efficient transition in the urban interface; (2) open space, scenic, historic, scientific, and archeologic preservation, including education and interpretation; (3) maintaining opportunities for recreational use of scenic and recreational parkland for present and future generations; and (4) coordination, cooperation, and collaboration with others.

Benton Co. Parks System Comprehensive Plan, 1995

Goal 8

Findings and References

8.2.c The Benton County Trails System Plan, adopted in 2003, establishes priorities for a network of trail linkages including water trails, abandoned railroad rights-of-way, rails with trails, and connections between communities and public-owned open space and natural areas.

Benton County Trail System Plan, 2003

8.2.d Benton County prepares management plans for county park sites and natural areas, including a mission statement, identification of recreation uses and activities suited to the site, and management policies and strategies.

Benton Co. Natural Areas & Parks Dept.

8.2.e The Corvallis 2020 Vision Statement envisions a green necklace of parks, scenic hillsides, natural habitats, and farm and forest lands surrounding the city.

Corvallis 2020 Vision Statement

8.2.f Benton County has been successful in collaborating and partnering with others and establishing positive working relationships with user groups, professionals, other agencies, volunteers, and non-profit groups.

Parks Board Workshop, 2004

8.2.g Federal lands: U. S. Forest Service – Marys Peak Scenic Botanical Area, Bureau of Land Management – Grass Mountain ACEC, Marys Peak ACEC, Marys Peak SRMA, Alsea Falls, Missouri Bend (Alsea River). Willamette River Parcels: scenic management areas along the main stem of the Willamette River (islands and shore lands within the Willamette River Greenway). U.S. Fish & Wildlife – Finley Wildlife Refuge. State – Washburne Wayside Park; Anderson State Park, Luckiamute State Park, E.E. Wilson Wildlife Area - Dept. of Fish and Wildlife.

Background Report
1979 Benton Co. Comp Plan
Oregon State Comprehensive Outdoor Rec. Plan

8.2.h Several miles of the N. and S. Fork Alsea River have been assessed by the Forest Service and BLM as suitable for potential addition to the National Wild & Scenic Rivers System, recognized for having scenic, fish, wildlife, and geologic values. The State has also identified the Alsea River as a potential study river. The Alsea and Lobster Creek community opposed federal or state designation of the Alsea River for scenic or wild river designation.

BLM, USFS Resource Management Plans
Alsea Public Outreach Mtg, 2004

8.3 Management

8.3.a Advanced technology, increased sales, and use of ATVs and other Off Road Vehicles are creating impacts on natural resources in rural areas, especially on federal lands. Some of the activity takes place in areas officially closed to motorized recreation.

Letter from Barry Wulff, Chair
Marys Peak Group, Sierra Club

8.3.b Trespass for hunting and target practice has historically been a problem, particularly in the Kings Valley area.

Benton Co. Natural Areas & Parks Dept.

8.3.c Increasingly trail users are experiencing conflicts. Benton County promotes the "Share the Trail" concept among mountain bikers, equestrian users, and hikers. Benton County places seasonal closures on some of its trails through private property to assure compatibility with adjacent land management activities.

Benton Co. Natural Areas & Parks Dept.

8.3.d Providing recreational access to the Willamette River faces a number of challenges, including lack of funding for management of 93 state-owned sites along the river (the Willamette Greenway has received limited financial commitment in

Findings and References

spite of widespread popular support) and impacts of recreational use on the natural resource base - e.g. conflict between popular swimming holes and fish refuge on hot days.

Willamette Restoration Initiative, 1999

8.3.e In 2002, the Oregon Department of Parks and Recreation adopted "A Framework for a Sustainable Future," in response to the Governor's Executive Order and the Oregon Sustainability Act (HB 3948). The framework outlines guiding principles and best management practices for achieving sustainability for parks and natural areas.

Oregon Dept. of Parks and Recreation Website

8.5 Recreation Trail System

8.5.a Benton County is working toward a comprehensive system of trails including bicycle routes, walking and hiking trails, and equestrian trails. Emphasis is placed on partnerships with private property owners involving a variety of methods including easements.

Benton County Trails System Plan, 2003

8.5.b The Oregon Department of Parks and Recreation has completed a Statewide Trails Plan 2005-2014 that includes priorities for non-motorized, motorized, and water trails for regions of the state. Public forums and a telephone survey show a high interest in recreation trails in Oregon. The state acknowledges the Benton County Trails System Plan.

Oregon Dept. of Parks and Recreation Trails Planning Program, 2004

8.5.c Economic benefits are derived directly from the development and operation of recreation trails. Direct benefits include employment created and money spent on trails. Indirect benefits include the savings to community taxpayers when comparing the expense of trails to the expense of developing, operating, and maintaining other types of public recreational facilities.

Oregon Parks & Recreation Dept., Economic Benefits of Trails Statewide Trails Planning Program, 2004

8.5.d Communities with trails often benefit in terms of improvements in corporate relocation and retention rates, since quality of life is an important factor in choosing sites for business and industry.

Oregon Parks & Recreation Dept. Economic Benefits of Trails Statewide Trails Planning Program, 2004

8.5.e There is an economic benefit as property values increase due to proximity to green space and increased overall community livability.

Oregon Parks & Recreation Dept., Economic Benefits of Trails; Statewide Trails Planning Program, 2004

8.5.f The Mid-Willamette Connections program is a grass-roots effort that is exploring potential for better connections of communities in the Mid-Willamette Valley to the river. A water trail is proposed from Corvallis to Newberg, based on existing public lands.

Willamette Restoration Initiative, 1999

Note: These findings also are supported by results of a workshop held April 14, 2004 with the Benton County Parks Advisory Board.

Goal 8

Findings and References

References

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Goal 9
Economic Development

The residents of Benton County recognize the importance of education and productive work and respect the rights and needs of individuals to pursue livelihoods of their choice that offer sufficient and sustainable material reward and personal satisfaction.

Benton County Comprehensive Plan Value Statement

Goal 9
Economic Development

Overview

Benton County's economy is expected to remain stable over the next ten years. The total employment of Benton County in April 2000 was estimated to be 39,997. The total employment for April 2005 was estimated to be 40,152. This is a total growth of 0.3% over the past 5 years and an annualized growth rate of 0.08% per year.

Existing industrial sectors prominent in the county's economy are expected to decline slightly, while employment in lumber and wood products industries is expected to remain stable, with increasing emphasis on value added products.

Job loss is expected to continue in the manufacturing sector of the economy as a result of downsizing at Hewlett Packard's Corvallis site. Recent reductions have resulted in the loss of approximately 1,000 jobs. These reductions may have a multiplier effect of additional job losses around the state and in the Corvallis area.

Jobs in government, including positions at Oregon State University, the county's largest employer with approximately 8,000 employees, are expected to remain relatively flat over the next ten years (2004 -2014) according to industry employment projections from the Oregon Employment Department.

The relatively low annual average unemployment rate within Benton County is deceiving, with higher unemployment in neighboring counties as a result of the lack of entry level and affordable housing in Benton County.

The Bureau of Census and Population Research at Portland State University estimated the county's population in 2005 at 82,835 – an increase of 4,682 since the 2000 Census or a 1% annual rate of growth.

Marples, May 2005, names the Corvallis Metropolitan Statistical Area (MSA) as the slowest growing of the 26 MSA's in the northwest.

Population projections assume that the available labor supply has been largely absorbed within the county and projected new jobs will require new residents. A 0.86% annual rate of population growth is expected between 2005 and 2010 and a 0.80% annual rate of population growth between 2005 and 2015. This translates into a county population forecast of approximately 85,721 residents in 2010, and 88,995 residents in 2015.

The number of those 62 years of age or older in Benton County continues to increase (14.3% from 1990 to 2000) at a higher rate than nationally (9.6% from 1990 to 2000). An increase in the number of people of retirement age creates an increase in the availability of employment in healthcare and social service sectors.

The population of those 18 years and under increased by only 2.6% in Benton County compared to the national increase of 10.9%. Enrollment in Corvallis School District 509J has decreased from 7,328 in 2000 to 6,842 in 2004. Enrollment in Philomath School District 17J has declined from 1885 in 2000 to 1741 in 2005.

Future growth will largely be the result of private investment decisions and new or expanded enterprise. The County is working to establish a climate that fosters private investment through its participation in cooperative economic development efforts. The County is concerned with the economic, social and environmental impacts of development.

The following policies are designed to further guide the County in meeting economic development objectives. The policies lay the framework to encourage diversified markets and sustainable business practices and support research activities, commercialization of research, workforce training, tourism, home-based businesses and an efficient transportation system.

Goal 9

Statewide Planning Goal 9

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Comprehensive plans and policies shall contribute to a stable and healthy economy in all regions of the state. Such plans shall be based on inventories of areas suitable for increased economic growth and activity after taking into consideration the health of the current economic base; materials and energy availability and cost; labor market factors; educational and technical training programs; availability of key public facilities; necessary support facilities; current market forces; location relative to markets; availability of renewable and non-renewable resources; availability of land; and pollution control requirements.

Excerpt from
OAR 660-015-0000(9)

Cross-References

Additional policies related to this goal:

- Goal 2 Land Use Planning
- Goal 3 Agricultural Land
- Goal 4 Forest Land
- Goal 12 Transportation

Benton County Goal

Economic Development

To support a stable and sustainable local economy, vital to the health, welfare, and prosperity of County residents.

Courtesy of Tyee Wine Cellars

Policies

9.1.1 Benton County shall work regionally and locally to promote sustainable economic development.

9.1.2 Benton County shall encourage the expansion of industries that bring outside dollars into the local economy.

9.1.3 Benton County shall encourage the retention and expansion of businesses that are committed to sustainable practices.

9.1.4 Benton County's local and regional transportation network should operate efficiently and effectively in order to economically move materials and products to and from markets.

9.1.5 Benton County shall encourage economic development activities that utilize the innovative strengths and knowledge derived from research.

9.1.6 Benton County shall promote tourism by encouraging preservation and enhancement of cultural, historical, and recreational resources.

9.1.7 Industrial and commercial uses in or near resource lands which are accessory to a resource use shall be located as near as is practical to that resource use.

9.1.8 Benton County shall support educational institutions and work force training programs in order to maintain an educated work force and low unemployment rates, and to meet the needs of existing and future businesses and industries.

9.1.9 Benton County shall support organizations in their efforts to coordinate economic development programs.

9.1.10 Benton County shall encourage home based businesses and shall provide standards that remove barriers and ensure neighborhood compatibility.

9.1.11 Benton County shall support the continuation and expansion of rail service throughout the County.

9.1.12 Benton County shall support Oregon State University's research efforts that improve farm and forest practices and related businesses.

9.1 General Policies

Multi-Jurisdictional Boards:

- Workforce Investment Board
- Economic Development Partnership Organization

Gathering Together Farms


Georgia Pacific - Philomath

Defined Terms

- historic resources
- resource lands
- sustainable
- sustainable economic development

See **Appendix** for definitions

Goal 9

Findings and References

9.1.a A number of organizations within the county promote economic development and diversification of the local economy.

9.1.b Currently a number of employers sell materials and products outside the county and internationally. Diversifying markets provides stability to employers when downturns occur in the local marketplace.

9.1.c The Benton County Sustainability Policy encourages county residents to use, develop, and protect our resources at a rate and in a manner that enables people to meet their current needs and also preserve resources for future generations.

9.1.d An efficient transportation system (including ODOT highways and rail lines) is important for moving products to and from their markets and is also important to maintaining the county's economy.

9.1.e There were 54.15 patents for every 10,000 people in Benton County verses 7.7 in the U.S. Patent growth between 1990 and 2001 was 14.96% in Benton County vs. 5.9% in the U.S.

EDP Economic Facts

9.1.f In 2003, visitors spent 65.1 million dollars in Benton County. The visitors helped support 1,180 travel related jobs in Benton County.

Dean Runyan Associates,
Travel Oregon Online 2004

9.1.g Oregon Statewide Planning Goals encourage urban uses to locate within the cities urban growth boundaries in order to preserve resource lands in the county. Commercial and industrial activities are generally better suited to locations inside urban growth boundaries where urban services and a labor pool are available. However, industrial activities that relate to natural resources should be given the opportunity to locate near the resource that is being utilized.

9.1.h Benton County has historically maintained one of the lowest unemployment rates in the state. In addition, residents have the highest education of any county in the state, with 47.4% of adults over 25 having a bachelor's degree or more.

US Bureau of Labor Statistics, May 31, 2005

9.1.i A significant portion of the nation's research in the fields of forestry and agriculture takes place at Oregon State University.

9.1.j Organizations such as the Economic Development Partnership provide economic development services and support to Benton County and the cities of Corvallis, Philomath, Monroe, and Adair Village.

9.1.k Home businesses continue to grow across the country and provide an economically viable alternative for many business start-ups.

9.1.l Rail transportation is more energy efficient than trucking and in the long term will result in a more sustainable transportation network.

Findings and References

References

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Goal 10
Housing

The residents of Benton County recognize the importance of nurturing and sustaining public infrastructure and human systems that address adequate and affordable food, shelter, transportation, education, health care, public safety, and other vital services.

Benton County Comprehensive Plan Value Statement

Goal 10
Housing

Overview

The Benton County policies on housing provide the framework within which the County manages the development of lands for residential uses. These policies provide guidance to assure that services, such as water, sewage disposal and access, are adequate and sustainable for residential development. The policies further delineate the role of the County in facilitating the availability of an affordable and quality housing stock within both urban and rural communities.

Multi-Jurisdictional Board

Linn-Benton Housing Authority

Goal 10

Statewide Planning Goal 10

To provide for the housing needs of citizens of the state.

Buildable lands for residential use shall be inventoried and plans shall encourage the availability of adequate numbers of needed housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density.

Excerpt from
OAR 660-015-0000(10)

Benton County Goal

Housing

To work with the cities within Benton County and other entities to meet the housing needs of County residents.

Cross-References

Additional policies related to this goal:

- Goal 2 Land Use Planning
- Goal 7 Natural Hazards
- Goal 13 Energy Conservation
- Goal 14 Urbanization

10.1 General Policies

Policies

10.1.1 Lands designated for residential uses in the Benton County Development Code may be developed when found to be in compliance with all applicable State and County code provisions, including but not limited to water, septic suitability, access and natural hazards.

10.1.2 Benton County shall encourage sustainable construction practices such as "LEED (Leadership in Energy and Environmental Design) Certified" construction.

10.1.3 Benton County shall give priority to addressing affordable housing needs on residentially zoned property it owns before disposing of the property.

10.1.4 Benton County shall assist unincorporated communities in planning for housing needs of their residents.

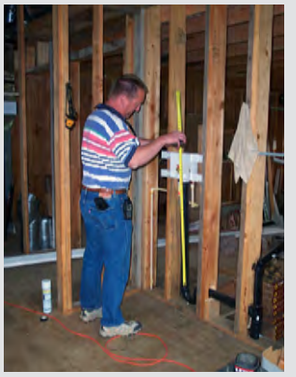
10.1.5 Benton County shall develop standards for accessory dwelling units, considering factors such as zoning, size limitations, occupancy, and proximity to the principal dwelling.

10.1.6 Benton County shall continue its program of using block grant funds to provide housing rehabilitation loans for low and moderate income homeowners.

Defined Terms

- accessory dwelling
- LEED certification
- sustainable
- unincorporated communities

See **Appendix** for definitions



Goal 10

Findings and References

10.1.a In order for rural residential development to be sustainable, the property must have an adequate supply of potable water, be suitable for septic disposal, and have proper access.

10.1.b The Benton County Sustainability Policy encourages county residents to use, develop, and protect our resources at a rate and in a manner that enables people to meet their current needs and also preserve resources for future generations.

10.1.c The County can support creation of affordable housing when it disposes of residentially zoned surplus property. Examples of successful partnerships include Camas Commons and CoHo Cohousing.

10.1.d The 1995 Benton County Needs Assessment Survey indicated that 75% of the respondents were satisfied with their home meeting their needs. Reasons with the highest percentages regarding why their present home did not meet their needs included the house's physical condition needing repairs (30% in Greater Alsea) and being too small, (21% in Philomath).

10.1.e Accessory dwelling units can provide additional housing options in the county with limited compatibility impacts.

10.1.f Rehabilitating existing residential dwellings contributes to the supply of low and moderate income housing.

References

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Goal 11
Public Facilities & Services

The residents of Benton County recognize the importance of nurturing and sustaining public infrastructure and human systems that address adequate and affordable food, shelter, transportation, education, health care, public safety, and other vital services.

Benton County Comprehensive Plan Value Statement

Goal 11
Public Facilities & Services

Overview

Public facilities and services provide the basic support systems for urban and rural development. These systems include water and sewer systems, storm drainage facilities, police and fire protection, health and social services, schools, and library service. Transportation is also a public facility and is addressed separately under Goal 12. The County is primarily responsible for planning for public services in non-urbanized areas.

There are several important issues relating to the provision of public facilities and services:

a. Meeting the needs of county residents while supporting overall growth management strategies and the protection of resource lands;
b. Maintaining health, safety, and security throughout the county;
c. Ensuring efficient use of energy, materials and space in the provision of services and the operation of public facilities;
d. Applying uniform standards in the design and evaluation of services for new development;
e. Providing accessibility of services; and
f. Cooperating and collaborating among the various providers of public services.

The following policies provide the framework for County responsibility for planning for needed services and managing the impacts of development on existing facilities and services.

County Boards & Committees

- Benton Community Health Center
- Fair Board
- Law Enforcement Review Committee

Multi-Jurisdictional Boards

- Public Health Planning Advisory Committee
- Local Public Safety Coordinating Council
- Corvallis-Benton County Library Board

Benton County Fairgrounds

Goal 11

Statewide Planning Goal 11

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Urban and rural development shall be guided and supported by types and levels of urban and rural public facilities and services appropriate for, but limited to, the needs and requirements of the urban, urbanizable, and rural areas to be served. A provision for key facilities shall be included in each plan. Cities or counties shall develop and adopt a public facility plan for areas within an urban growth boundary containing a population greater than 2,500 persons. To meet current and long-range needs, a provision for solid waste disposal sites, including sites for inert waste, shall be included in each plan.

Counties shall develop and adopt community public facility plans regulating facilities and services for certain unincorporated communities outside urban growth boundaries as specified by Commission rules.

Excerpt from
OAR 660-015-0000(11)

Benton County Goal

Public Facilities & Services

To plan, develop, and maintain public facilities and services that serve the needs of Benton County in an orderly and efficient manner.

Policy Sections

Cross-References

Additional policies related to this goal:

- Goal 6 Air, Water & Land Resource Quality
- Goal 8 Recreational Needs
- Goal 10 Housing
- Goal 12 Transportation
- Goal 13 Energy Conservation
- Goal 14 Urbanization

11.1 General Policies

Policies

11.1.1 Benton County shall recognize that cities are the appropriate provider of urban level facilities.

11.1.2 Benton County shall develop and adopt public facility plans for officially designated unincorporated communities, to ensure that the facilities function safely and efficiently.

11.1.3 Benton County shall manage the use of the public right-of-way.

11.1.4 Benton County shall strengthen functional links between Public Health, Emergency Management, and Law Enforcement to enhance emergency preparedness and response capabilities.

Defined Terms

- community water system
- community sewage system
- Corvallis Federal Urbanized Area
- green infrastructure
- municipal water system
- public water system
- unincorporated communities
- urban growth boundaries
- watershed

See **Appendix** for definitions

11.2 Domestic Water

Policies

11.2.1 Benton County shall require a conditional use permit for any new public or community water system to ensure it is adequately designed and constructed, is compatible with uses on neighboring properties, and that it will be maintained.

11.2.2 Benton County shall allow municipal water systems to be extended outside urban growth boundaries when found to be consistent with Statewide Planning Goals.

11.2.3 Benton County shall require developers to demonstrate that water supplies are adequate and sustainable for the scale of development proposed.

11.2.4 Benton County shall evaluate the need to provide new standards that would require public water systems in lieu of individual wells and adopt standards appropriate to address that need.

11.3 Sanitary Sewer

Policies

11.3.1 Benton County may permit the creation of community sewage systems to serve uses within the boundaries of officially designated unincorporated communities.

11.4 Storm Drainage

Policies

11.4.1 Benton County shall require proposed developments to address on-site and off-site stormwater runoff to minimize impacts to downstream properties.

11.4.2 Benton County shall use watershed management strategies and green infrastructure to reduce stormwater impacts, by utilizing and enhancing natural drainage systems, in order to ensure a healthy environment and minimize the risk of flooding.

11.4.3 In coordination with the cities of Corvallis and Philomath, Benton County shall develop a stormwater management plan for the unincorporated portion of the Corvallis Federal Urbanized Area that is consistent with state and federal guidelines; and, where appropriate, Benton County shall develop similar plans, or elements thereof, for other areas of the county.

11.5 Utilities

Policies

11.5.1 Benton County shall establish standards – such as encouraging collocation of wireless facilities – to minimize visual and other impacts of utilities.

11.5.2 Benton County shall encourage coordination between all utilities, both public and private, to minimize conflicts, cost, damage to public facilities, and future need for relocation.

11.6 Law Enforcement & Fire Protection

Policies

11.6.2 Benton County shall consider law enforcement and fire protection needs when reviewing the physical design of development plans.

11.6.3 Benton County shall promote crime prevention techniques to reduce the demand for public law enforcement services.

11.6.4 Benton County shall collaborate with the fire districts in establishing and applying uniform standards and procedures to ensure new development will be provided with adequate fire protection.

Hoskins - Kings Valley Rural Fire Protection District

11.7 Health & Social Services

Alsea Rural Health Clinic

Policies

11.7.1 Benton County shall work to increase access to health and social services, especially for those disadvantaged by age, income, or disability.

11.7.2 Benton County shall encourage public and private agencies to cooperate in planning and providing for health and related social services.

11.7.3 Benton County shall encourage and support health, mental health, and social services that are responsive to changes in demographics, socioeconomic status, and public health indicators within the county's population.

11.7.4 Benton County shall increase public awareness of public health emergency preparedness and encourage or require residences, businesses, and critical infrastructure facilities to increase resistance to communicable disease threats.

11.7.5 Benton County shall encourage health and social service providers to use methods that are based upon documented best practices, maximize resources, and promote preventive health approaches.

11.8 Education

Inavale School

Policies

11.8.1 Benton County and the school districts shall collaborate as part of any land use decision that impacts the districts.

11.8.2 Benton County and colleges and universities shall collaborate as part of any land use activities that impact these institutions.

11.8.3 Benton County shall encourage schools serving primarily urban areas to be located within urban growth boundaries.

11.8.4 Benton County shall encourage the utilization of schools, especially in rural areas, as community centers for activities such as public meetings, continuing education, recreation, and cultural events.

11.8.5 Benton County shall discourage locating schools adjacent to arterial and major collector roads.

11.9 Public Buildings

Policies

11.9.1 Benton County shall encourage the consolidation of public buildings in centralized locations to increase the convenience to the public and decrease the amount of travel between public offices.

11.9.2 Benton County shall encourage, through design and policy, the use of public buildings for multiple purposes.

11.9.3 Benton County shall encourage clustering of public uses and public services in unincorporated communities.

11.9.4 Benton County shall maximize energy conservation and minimize environmental impacts in the design, construction, and use of public buildings.

11.10 Public Library

Policies

11.10.1 Benton County shall continue support for the regional library system.

11.11 Fairgrounds

Policies

11.11.1 Benton County shall continue to support the county's annual fair and the fairgrounds as a special events center in a rural setting.

Goal 11

Findings and References

11.1 General

11.1.a Cities are required to develop and maintain facility master plans for public facilities within their urban growth boundaries. In addition, the County maintains urban fringe management agreements with each city.

11.1.b Existing water and sewer facilities in unincorporated communities have sometimes become a public burden, resulting in the County taking over and operating these facilities.

11.1.c Uncoordinated utility installations in the public right-of-way can result in multiple street cuts and increased public costs to maintain such facilities.

11.2 Domestic Water

11.2.a The Benton County Health Department is authorized by the state to conduct inspections of public and community water systems every 3-5 years. The Oregon Water Resources Department is responsible for ensuring the system provides (a) an adequate water supply, (b) a mechanism by which each user is assessed, and (c) assurance that the system will be installed properly and maintained.

11.2.b The state allows municipal water systems to be extended outside urban growth boundaries, i.e. to remedy a health hazard.

11.2.c Individual water wells in subdivisions have drawn down groundwater supplies and created supply problems for residents.

11.2.d Benton County is interested in the sustainable use and management of groundwater supplies. The State Water Resources Board oversees water allotment for public and community water systems.

11.3 Sanitary Sewer

11.3.a Private and publicly owned sewage treatment facilities offer an alternative to septic systems in some unincorporated communities. The County is restricted by the State as to where these systems are allowed and not allowed.

11.3.b Statewide Planning Goal 11 states that local governments shall not allow the establishment or extension of sewer systems outside urban growth boundaries or unincorporated community boundaries, or allow extensions of sewer lines from within urban growth boundaries or unincorporated community boundaries to serve land outside those boundaries, except where the new or extended system is the only practicable alternative to mitigate a public health hazard and will not adversely affect farm or forest land.

11.4 Storm Drainage

11.4.a The cumulative effects of stormwater discharge from development projects can negatively impact downstream properties, water quality, and fish habitat.

11.4.b Existing watersheds and natural drainage systems that are maintained and enhanced ensure a healthy environment and minimize the risk of flooding.

11.4.c The National Pollution Discharge Elimination System (NPDES), Phase 2, requires Benton County to develop a stormwater management plan for the Corvallis "federal urbanized area" in coordination with the cities of Corvallis and Philomath. The stormwater management plan must address erosion control at construction sites, illicit discharges into the stormwater system, pollution prevention

Findings and References

from municipal operations, long-term/broad-scale development effects on stormwater, and education and outreach.

11.5 Utilities

11.5.a The demand for wireless telecommunication services is growing rapidly. The infrastructure needed to support wireless telecommunication services has not kept up with consumer demands.

11.6 Law Enforcement & Fire Protection

11.6.a The physical design of rural development can impact the County's ability to provide law enforcement and fire protection services.

11.6.b Coordination between law enforcement and fire protection agencies will improve the County's ability to respond to major disasters.

11.6.c County residents can practice crime prevention techniques as a means to reduce the need for public law enforcement, such as property security, lighting, identification of possessions, and surveillance of neighboring properties.

11.6.d Insurance rates for rural areas can be kept at a minimum if adequate fire protection is provided. The International Fire Code includes minimum fire protection standards; however, the fire districts do not uniformly apply the standards.

11.7 Health & Social Services

11.7.a The elderly, low income, and disabled who reside in rural areas often have the greatest need for public health and social services. Benton County has developed health clinics in rural communities and currently operates special transit service to these areas.

11.7.b Cooperation among public health and social service providers can result in a more efficient and comprehensive delivery system.

11.7.c 2000 census data showed that 11 percent of Benton County population identified itself as non-white, up from 8 percent in 1990. Additionally, agriculture in Benton County is attracting a growing population of migrant and seasonal laborers. The resultant changes in demographic diversity within the county will have a significant impact on the range and type of health and social service needs.

11.7.d Medical and public health science are creating new and different circumstances where the percentage of Benton County residents living with morbid obesity, diabetes, organ failure and transplants, HIV, joint replacements, blindness, mobility challenges and other problems will continue to increase. This presents new and significantly different challenges to public services and facilities than those faced in recent decades.

11.8 Education

11.8.a Reductions in state school funding have resulted in consolidation of schools, particularly those with low enrollment. Major rural land use decisions can impact the school district's ability to maintain rural schools.

11.8.b Oregon State University conducts farm and forest research activities throughout Benton County.

11.8.c Schools serving urban areas are used more frequently by the community and have more cost effective bus routes when they are centrally located.

Findings and References

11.8.d Schools can serve as community centers and be used for other uses in rural communities.

11.8.e Schools located on major roads have resulted in undesirable traffic congestion and safety concerns.

11.9 Public Buildings

11.9.a Locating public offices in centralized locations is the most cost effective and convenient way to serve the public.

11.9.b Joint use and round-the-clock use of public buildings reduces the need for costly expansions or construction of new buildings.

11.9.c In outlying areas, clustering of public services is a cost effective and convenient way of serving rural residents.

11.9.d Energy conservation saves money and will likely result in less environmental impact.

11.10 Public Library

11.10.a Library patrons demand expanded collections of both traditional and electronic information resources and services. The library's taxing district funds roughly 1/3 of library services, with remaining funds from the Corvallis general fund. The buildings that house the libraries are owned by the local communities.

11.10.b The regional library includes the central library, branch libraries, bookmobile, and the mobile branch library.

11.11 Fairgrounds

11.11.a The fairgrounds provide affordable rental facilities for local businesses and residents.

11.11.b The fairgrounds support youth and family activities in partnership with Oregon State University Extension and other community partners.

References

Benton County. Administrative Services Department. *Benton County Sustainability Policy*. Administrative Policy No. 02-01. 2002

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Goal 12
Transportation

The residents of Benton County recognize the importance of nurturing and sustaining public infrastructure and human systems that address adequate and affordable food, shelter, transportation, education, health care, public safety, and other vital services.

Benton County Comprehensive Plan Value Statement

Goal 12
Transportation

Overview

The Benton County Transportation System Plan (TSP) adopted by the Board of Commissioners effective August 9, 2001, is an element of this Comprehensive Plan. The policies for Goal 12 are extracted from that TSP. The adopted TSP itself is located in a separate binder in the Community Development Department library.

In the fall of 1995, Benton County initiated a study of its transportation system to comply with the State's Transportation Planning Rule (Oregon Administrative Rule 660-12-015). This process was completed in 2001 by adoption of a Transportation System Plan and revisions to the Transportation element of the Comprehensive Plan.

This Plan element is intended to provide the framework for an efficient and effective transportation system in Benton County. Transportation policies are implemented through the County's Transportation System Plan (TSP) and the Benton County Development Code.

The Transportation System Plan and the following policies address various forms of transportation, including pedestrian, bikeways, motorized vehicles, public transportation, air and water transportation, and railroads. The objective is to achieve a balanced system that develops and utilizes each of these types of transportation.

Through implementation of these policies, the County seeks to:

- Provide choices of alternative travel modes;
- Maximize the efficiency of existing facilities;
- Intertwine quality of life, land use and transportation decision-making; and
- Provide equitably funded, safe, efficient, cost-effective mobility and accessibility to all County residents, businesses, and emergency services within and across County boundaries.

The following policies are based on information included in the Transportation System Plan, which was previously adopted as part of the Comprehensive Plan. The complete TSP exists in a separate document available at the Community Development Department.

County Boards & Committees:

- Bicycle Advisory Committee
- Roads Advisory Committee
- Special Transportation Advisory Committee
- 12 Road Districts

Multi-Jurisdictional Boards

- Linn-Benton Loop Transit Commission
- Area Commission on Transportation
- Corvallis Area Metropolitan Planning Organization (CAMPO)

Cross-References

Additional related policies :
Goal 2 Land Use Planning
Goal 5 Natural Resources
Goal 9 Economic Development
Goal 11 Public Facilities & Services
Goal 13 Energy Conservation
Goal 14 Urbanization

Goal 12

Statewide Planning Goal 12

To provide and encourage a safe, convenient and economic transportation system.

A transportation plan shall (1) consider all modes of transportation including mass transit, air, water, pipeline, rail, highway, bicycle and pedestrian;
(2) be based upon an inventory of local, regional and state transportation needs; (3) consider the differences in social consequences that would result from utilizing differing combinations of transportation modes;
(4) avoid principal reliance upon any one mode of transportation; (5) minimize adverse social, economic and environmental impacts and costs; (6) conserve energy;
(7) meet the needs of the transportation disadvantaged by improving transportation services; (8) facilitate the flow of goods and services so as to strengthen the local and regional economy; and
(9) conform with local and regional comprehensive land use plans. Each plan shall include a provision for transportation as a key facility.

Excerpt from
OAR 660-015-0000(12)

Benton County Goal

Transportation

The County seeks to preserve, protect, and promote the county's livability, sustainability, and vitality by:

- **Providing choices of alternative travel modes,**
- **Maximizing the efficiency of existing facilities,**
- **Intertwining quality of life, land use, and transportation decision-making, and**
- **Providing equitably funded, safe, efficient, cost-effective mobility and accessibility to all county residents, businesses, and emergency services within and across county boundaries.**

Policy Sections

Monroe

12.1 Mobility, Circulation and Safety

The viability of the railroad in Benton County is interdependent with the whole WPRR system. If rail service were terminated, truck traffic could increase throughout the county, depending on the reason service was terminated (obviously, closure of a mill would cease all freight movement from that location, whether by rail or by truck). This truck traffic would use the road corridors that already carry the most traffic and experience the greatest congestion. Therefore, it is in the County's interest to encourage continued rail freight service, whether or not the county ever develops as a more significant freight generator. Passenger rail service from Corvallis east to Albany or north to McMinnville and Portland is not economically viable at this point; however, the County should encourage more frequent and convenient public transit connections to existing passenger rail service, particularly when high speed rail service begins operating in the Willamette Valley.

Policies

12.1.1 Benton County shall develop a transportation system to facilitate appropriate travel modes including:

a. Providing safe interactive multi-modal facilities.
b. Ensuring mobility to the transportation disadvantaged.
c. Coordinating with local agencies and providers to expand transit services.
d. Seeking ways to provide public transportation choices within the commuter corridors within the county.

12.1.2 In order to promote the viability of rail transportation, and to facilitate its operation, Benton County should:

a. Minimize rail crossings of the automobile roadway system;
b. Maintain safe operations at rail crossings for all modes;
c. Minimize delays to rail operations due to conflicts with the automobile roadway system;
d. Discourage residential development near rail lines; and
e. Actively plan for and promote the idea of commuter rail service between Albany and Philomath at the earliest possible time.

12.1.3 Benton County shall develop plans and projects in accordance with roadway classification and functions.

12.1.4 Benton County shall support Oregon Department of Transportation's (ODOT) efforts to maintain highway mobility and implement access management standards.

12.1.5 Benton County shall ensure an adequate truck route network for hauling local farm and forest products.

12.1.6 Benton County shall not encourage diversion of through truck traffic from State highways onto the County system

12.1.7 Benton County shall ensure that major new developments provide both primary and secondary access for emergency services.

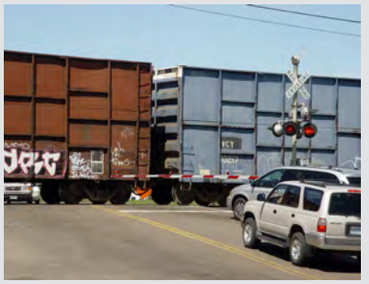
12.1.8 County bicycle facilities shall be developed with ongoing citizen and community involvement.

12.1.9 In bicycle facility planning, high priority will go to projects that complete needed links or otherwise eliminate obstacles to full use of existing facilities. Priority shall be given to completing commuter routes.

12.1.10 Land division rules and road standards shall address the need for bike and pedestrian accessways that ensure connections between activity centers through the use of easements or right-of-way dedication. The Oregon Bicycle and Pedestrian Plan (1995) may be used for reference in creating appropriate standards.

Goal 12

12.1 Mobility, Circulation and Safety



Policies

12.1.11 Where possible, community activity centers such as schools, parks, employment centers, shopping areas and major transit stops shall provide bicycle and pedestrian facilities in their site design.

12.1.12 Traffic impacts of development will be mitigated by requiring:

a. A traffic analysis that identifies adverse impacts to transportation flow caused by development and demonstrates how adverse impacts will be mitigated.
b. Rights-of-way dedication of land where existing rights-of-way are inadequate or are needed for future roadways as development occurs.
c. Developers to make roadway improvements for their portion of the roadway based on: 1) existing conditions, 2) rough proportionality to the impacts of the development and 3) the functional classification of the road.
d. Bonding or agreement to participate in future improvements when the development has a significant impact that is identified through a traffic analysis and which impact cannot be mitigated in conjunction with or through design of the particular development.

12.1.13 Benton County shall seek ways to provide public transportation choices within the commuter corridors in the county.

12.1.14 The formation of a Transit District is the preferred means of providing intercity and rural transportation services within the region

12.1.15 Land use actions affecting state highways shall be consistent with the Oregon Highway Plan.

12.1.16 Benton County shall use volume/capacity ratios and spacing standards from the Oregon Highway Plan (OHP) for projects and development proposals affecting state highway facilities. Decisions on alternatives shall be evaluated in accordance with the OHP.

12.1.17 Benton County commits to making necessary transportation policy changes to the Transportation System Plan (TSP) in the next periodic review cycle as follows: existing and projected traffic volumes will be updated, and traffic capacity analysis will be changed from level of service (LOS) to volume/capacity (V/C) ratios.

12.2 Capital Improvement

Policies

12.2.1 Benton County shall maximize the useful life of existing facilities by implementing a pavement management system and evaluating how proposed uses will impact traffic circulation.

12.2.2 Benton County shall work towards achieving adequate and equitable long-term funding mechanisms.

12.2.3 Benton County shall maintain a Transportation Improvement Program.

12.2.4 Project scheduling shall be considered in a systematic manner, based on a priority rating process, ODOT's funding strategies, and available financial resources. Consideration shall include safety and economic factors.

12.2.5 Projects impacting state highway facilities are identified in the plan, but identified solutions are suggestions and will be evaluated and determined through ODOT's planning and project development process.

Alexander Bridge

Hayden Bridge

12.3 Community

Policies

12.3.1 Benton County shall provide transportation services that preserve and protect the scenic and natural resources and rural character of Benton County to the extent possible.

12.3.2 The Transportation System Plan will be periodically evaluated and updated, to assure consistency with changing needs and philosophies**.**

12.3.3 When considering major transportation projects, Benton County will address the following concerns:

a. the more energy efficient alternative shall be preferred whenever practical.
b. the economic analysis shall consider long-term user costs, travel time, construction costs and maintenance costs, and other economic factors.
c. minimizing adverse social, economic and environmental impacts shall be considered including alternative mode considerations.
d. transportation needs of persons with disabilities shall be considered in design of facilities.
e. coordination shall be pursued with adjacent governmental jurisdictions.

12.3.4 Benton County shall coordinate development of its transportation planning and project development with all affected jurisdictions, including federal, state, regional, county, and cities. One part of the ongoing coordination will be to notify public agency transportation providers (metropolitan planning organization, public transit operators, municipal airport, and ODOT) of the following land use actions:

a. land use applications that require a public hearing;
b. subdivision and partition applications;
c. other applications which affect private access to roads; and
d. other applications within airport noise corridors and imaginary surfaces, which affect airport operations.

12.3.5 Comprehensive Plan amendments affecting land use designations, densities and design standards shall be consistent with capacities and levels of service of facilities identified in the Benton County TSP.

12.4 Economic Development

Policies

12.4.1 Benton County shall preserve and protect transportation corridors essential to the economic vitality of the county.

12.4.2 Benton County shall promote the use of freight rail and air service to reduce trucking activity on County roads.

12.4.3 In order to promote the viability of rail transportation, and to facilitate its operation, Benton County should:

a. Minimize rail crossings of the automobile roadway system;
b. Maintain safe operations at rail crossings for all modes;
c. Minimize delays to rail operations due to conflicts with the automobile roadway system; and
d. Discourage residential development near rail lines.

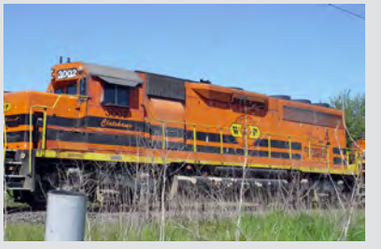
12.4.4 Benton County shall promote efficient and affordable transportation to existing regional airports (Portland and Eugene).

12.4.5 Major transportation facilities shall be located so as to avoid dividing existing economic farm units and urban social units, unless no feasible alternative exists.

12.4.6 Benton County shall cooperate with the Oregon Department of Transportation in the programming, environmental review, design, and where appropriate, construction of state highway improvement projects within the county. [Ord 91-0080]

12.4.7 Any proposal to designate an area for residential development within the Airport Overlay Zone's Approach Safety Zone shall be subject to an assessment of the impact of the proposed development on airport operations and expansion in accordance with the Corvallis Airport Master Plan.

12.4.8 Benton County shall provide for the protection of the Corvallis Airport by ensuring that lands within the surrounding area will not develop so as to conflict with airport operations or programmed expansion. [Ord 91-0080]



Goal 12

Findings and References

12.1.a The Transportation Planning Rule requires the Transportation System Plan (TSP) address the following elements:

a. A bicycle/pedestrian plan
b. An air, rail, and pipeline plan.
c. A transportation finance plan
d. Policies and ordinances for implementation.

12.1.b The majority of roadway congestion will occur on the state highway system.

12.1.c Limited new road construction to improve connectivity could allow the County road system to relieve some congestion.

12.1.d Even with improved connectivity and aggressive efforts to decrease dependence on the automobile, U.S. 20 between Albany and Corvallis and U.S. 20/Highway 34 between Corvallis and Philomath will need to be widened to provide operational capacity that complies with state capacity standards for the next 20 years.

12.1.e Financial constraints will require the lowest-cost alternatives suitable for meeting the needs of the next 20 years and may require a compromise of the vision and/or goals.

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Goal 13
Energy Conservation

The residents of Benton County value clean air, water and healthy natural systems and recognize their importance in sustaining the quality of life that residents value for themselves, their children and grandchildren.

Benton County Comprehensive Plan Value Statement

Goal 13
Energy Conservation

Overview

State and national energy policy controls much of the energy situation in Benton County. In consideration of concerns about potential future problems, the citizens of Benton County can, of course, influence that policy by exercising their rights as members of the state and national electorate. In addition, citizens and their local governments can influence the situation more directly by taking action on the local level.

The purpose of this element of the Comprehensive Plan is to identify actions that Benton County can take locally to improve present and future energy prospects. These policies establish the importance of energy efficiency as a consideration in all County planning and management decisions. Through efficient and sustainable management of its own energy use and support for public energy conservation efforts, the County will serve as a leader in accomplishing this goal.

The Benton County Sustainability Policy encourages County residents to use, develop, and protect our resources at a rate and in a manner that enables people to meet their current needs and also preserve resources for future generations.

Administrative Policy No. 02-01. 2002.

Goal 13

Statewide Planning Goal 13

To conserve energy.

Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles.

Excerpt from
OAR 660-015-0000(13)

Benton County Goal

Energy Conservation

To conserve energy through sound planning and pursuit of sustainability.

Cross-References

Additional policies related to this goal:

Goal 6 Air, Water & Land Resource Quality

Goal 11 Public Facilities

Policies

13.1 General Policies

13.1.1 Benton County shall consider energy efficiency when making decisions affecting County operations.

13.1.2 Benton County shall be a leader in encouraging the development and use of local renewable energy resources and alternative energy systems.

13.1.3 Benton County shall encourage the use of active and passive solar systems and shall develop provisions that protect solar access for owners of existing and future buildings.

13.1.4 Benton County shall take advantage of reusing and recycling materials whenever possible.

13.1.5 Benton County shall consider life-cycle costing and implications of energy demands when making decisions.

13.1.6 When developing long-range plans, Benton County shall consider the energy consequences of the resulting land development patterns.

13.1.7 Benton County shall encourage a regional reduction in single occupant vehicles (SOV's) through mechanisms such as ridesharing, public transit, carpools, etc.

13.1.8 Benton County shall encourage and publicize programs that offer incentives and promote energy efficiency.

13.1.9 Benton County shall develop siting and design criteria that promote energy conservation for buildings, roads, and other facilities.

13.1.10 Benton County shall consider the environmental impacts of purchasing, recycling, and disposal of new products.

13.1.11 Benton County shall conduct periodic audits of their facilities for energy efficiency.

Defined Terms

- life-cycle costing
- sustainability
- zero net energy building

See **Appendix** for definitions

Goal 13

Findings and References

13.1.a Local governments can take a role in energy conservation.

13.1.b Reducing the county's reliance on imported non-renewable energy sources will result in a more stable economy and less vulnerability when imported energy supplies are constrained.

13.1.c Technology continues to change, providing improvements to both active and passive solar energy systems that can result in zero net energy buildings.

13.1.d Opportunities exist in County operations for reusing and recycling materials such as oils, asphalt, base rock, and metals.

13.1.e County staff would like to see an evaluation of energy impacts before community decisions are made. For example, adding a 4-way stop sign might improve intersection safety; however, the vehicles decreased fuel efficiency is rarely considered.

13.1.f Life-cycle costing evaluates the acquisition, operating, and maintenance costs over the life of the purchase.

13.1.g Plans that effectively limit development in some areas and encourage it in other areas can influence energy consumption by affecting factors such as driving distance.

13.1.h Rural county residents often commute long distances and the Department of Energy reports that Oregon uses more energy (41%) for transportation than any other use.

13.1.i Local utility providers, state and federal agencies, and other organizations often offer incentives that encourage energy efficiency.

13.1.j The siting and design of buildings, roads, and other facilities can affect the energy required to maintain such facilities.

13.1.k Disposal of products (particularly electronics) can result in an undesirable impact on the environment.

13.1.l Public utility providers offer energy audits to determine improvements that can result in energy savings.

References

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Goal 14
Urbanization

The residents of Benton County value the rural character that still exists in much of the County, the distinction that has been maintained between settlement areas and resource lands and open spaces, and the manageable scale of the cities, towns, and rural centers.

The residents of Benton County recognize the importance of nurturing and sustaining public infrastructure and human systems that address adequate and affordable food, shelter, transportation, education, health care, public safety, and other vital services.

Benton County Comprehensive Plan Value Statement

Goal 14
Urbanization

Overview

This chapter of the Comprehensive Plan defines the overall structure within which the County works with cities and communities to accommodate growth while preserving the rural character and resource lands of the county.

State land use guidelines require that each city establish and maintain an urban growth boundary to provide land for urban development needs and to identify and separate urban and urbanizable land from rural land. Guidelines further require that these boundaries be adopted by both the city and county within which it is located.

Urban Growth Management Agreements have been established with the cities of Corvallis, Philomath, Albany, Adair Village and Monroe as the primary mechanism for coordinating planning and review of land use actions in the urban fringe.

The Corvallis Comprehensive Plan contains policies that guide development and land use both within the city limits and the urban fringe. Those policies pertaining to the Corvallis Urban Fringe were adopted by the Benton County Board of Commissioners in 1999 as part of the County Comprehensive Plan. Further information about these policies may be found in Chapter 16 - Additional Adopted Documents.

State land use guidelines also establish planning and zoning requirements for unincorporated communities outside established urban growth boundaries. Benton County is responsible for developing plans for the communities of Alpine, Alsea, Bellfountain, Greenberry, and Wren. As plans for these rural unincorporated communities are developed, they will be incorporated into the Comprehensive Plan by reference in accordance with Oregon Administrative Rules (OAR 660-22-000).

Philomath Boulevard

Kings Valley Store

Cross-References

Additional policies related to this goal:

- Goal 2 Land Use Planning
- Goal 10 Housing
- Goal 11 Public Facilities
- Corvallis Urban Fringe

Goal 14

Statewide Planning Goal 14

To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

PLANNING GUIDELINES

Plans should designate sufficient amounts of urbanizable land to accommodate the need for further urban expansion, taking into account (1) the growth policy of the area; (2) the needs of the forecast population; (3) the carrying capacity of the planning area; and (4) open space and recreational needs.

The size of the parcels of urbanizable land that are converted to urban land should be of adequate dimension so as to maximize the utility of the land resource and enable the logical and efficient extension of services to such parcels.

Plans providing for the transition from rural to urban land use should take into consideration as to a major determinant the carrying capacity of the air, land and water resources of the planning area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.

Comprehensive plans and implementing measures for land inside urban growth boundaries should encourage the efficient use of land and the development of livable communities.

Excerpt from
OAR 660-015-0000(14)

Benton County Goal

Urbanization

To provide for an orderly and efficient transition from rural to urban land use; to accommodate urban populations and employment inside urban growth boundaries, to preserve rural character outside urban growth boundaries, and to preserve small town character.

14.1 General Policies

Policies

14.1.1 Benton County shall coordinate planning efforts with the cities to ensure that lands within urban growth boundaries (UGB) are efficiently and effectively developed so that urban densities will ultimately result. Urban fringe management agreements will be developed and maintained to clarify implementation roles and responsibilities

14.1.2 Benton County shall periodically allocate county-wide population forecasts to all of its cities and unincorporated areas, in coordination with the cities. Such allocated forecasts shall be adopted in accordance with the applicable State statutes and administrative rules.

14.1.3 Benton County shall require all new lands added to an urban growth boundary to be designated with a minimum lot size of at least 10 acres in order to preserve the land for future urbanization.

14.1.4 Benton County shall work with municipalities to contain future urban development within the geographical limits of a mutually adopted urban growth boundary.

14.1.5 Benton County shall base establishment and change of urban growth boundaries on the following factors:

a. Demonstrated need to accommodate long range urban population, consistent with a 20-year population forecast coordinated with affected local governments; and
b. Demonstrated need for housing, employment opportunities, livability or uses such as public facilities, streets and roads, schools, parks or open space, or any combination of these categories.

14.1.6 Benton County shall require local governments to demonstrate that needs cannot reasonably be accommodated on land already inside the urban growth boundary, prior to expanding an urban growth boundary.

Defined Terms

- unincorporated communities
- urban conversion plan
- urban fringe management agreement
- urban growth boundary (UGB)

See **Appendix** for definitions

14.1 General Policies

Policies

14.1.7 Benton County shall evaluate changes to urban growth boundaries by considering alternative boundary locations, consistent with ORS 197.298, and with consideration of the following factors:

a. Efficient accommodation of identified land needs;
b. Orderly and economic provision of public facilities and services;
c. Comparative environmental, energy, economic and social consequences; and
d. Compatibility of the proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB.
e. Protection of productive resource lands.

14.1.8 Benton County shall require, as a condition of final approval, land divisions within urban growth boundaries to be accompanied by an urban conversion plan. The conversion plan shall ensure that the proposed action will not preclude future development from achieving urban densities with the necessary public facilities to support them.

14.1.9 Benton County shall designate unincorporated communities outside urban growth boundaries and shall develop and maintain up to date plans for the housing, facilities, and economic viability of these areas in order to preserve and enhance their rural "small town" character.

14.1.10 The policies of unincorporated community plans, adopted or modified by the Benton County Board of Commissioners pursuant to OAR 660 Division 22, shall be considered analogous to Comprehensive Plan policies for the particular community, and shall guide drafting of Development Code provisions specific to that community.

Findings and References

14.1 General

14.1.a Urban growth boundaries (UGB) are intended to accommodate growth and reduce pressure to urbanize rural lands. An urban fringe management agreement is one of the principal tools for the County to use when managing and coordinating growth issues with the cities.

14.1.b Urban growth boundaries are established and maintained by cities and counties to provide land for urban development needs and to identify and separate urban and urbanizable land from rural land.

14.1.c Statewide Planning Goal 14 requires local governments to evaluate land need before establishing or changing UGBs.

14.1.d The cities and the county are required to maintain urban fringe management agreements, which describe the procedures for considering UGB expansions.

14.1.e Benton County is required to evaluate changes to UGBs consistent with Statewide Planning Goal 14 and ORS 197.298.

14.1.f County partitions and subdivisions on land within UGBs can inhibit the efficient urbanization of these areas.

14.1.g The Department of Land Conservation and Development (DLCD) uses criteria to determine which rural towns qualify as unincorporated communities. Currently Alpine, Bellfountain, Alsea, Wren, and Greenberry are officially designated unincorporated communities in Benton County.

14.1.h Oregon Administrative Rules require counties to develop unincorporated community plans. These planning efforts help address local community issues. Unincorporated communities in Benton County provide valuable public services and meet the daily needs of rural residents.

14.1.i Rural residential lands are intended to provide rural housing opportunities for county residents.

References

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Benton County. Community Development Department. *Corvallis Urban Fringe Management Agreement*.

Goal 14

Findings and References

Cascade West Council of Governments. *Community Strategic Plan for Monroe, Alpine, Bellfountain, and Irish Bend*. Community Strategic Planning Task Force. 1995.

City of Corvallis. Community Development Department. *Corvallis 2020 Vision Statement*. 1998.

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City of Corvallis. *North Corvallis Area Plan*. July 2001.

Wren Community Plan. Benton County Community Development Department. 1996.

Goal 15
Willamette River Greenway

The residents of Benton County value the land – its beauty and life-sustaining qualities.

Agricultural and forestlands provide sustenance for residents of the Willamette Valley. These lands and the larger systems of mountains, valleys, rivers and wetlands of which they are part continue to be highly prized economically, culturally, recreationally, environmentally and aesthetically.

The residents of Benton County value the rural character that still exists in much of the County, the distinction that has been maintained between settlement areas and resource lands and open spaces, and the manageable scale of the cities, towns, and rural centers.

The residents of Benton County value clean air, water and healthy natural systems and recognize their importance in sustaining the quality of life that residents value for themselves, their children and grandchildren.

Benton County Comprehensive Plan Value Statement

Goal 15
Willamette River Greenway

Overview

The Willamette River Greenway was originally established by the 1967 Oregon Legislature as a grants program to State Parks for land acquisition along the Willamette River. The Greenway evolved from a state parks and recreation program in 1970 to a corridor program in 1972. Finally, in 1973 it developed into a land use program under the joint administration by State Parks & Recreation Division, Land Conservation and Development Department and local jurisdictions, such as Benton County. Since 1970, the program has shifted its focus from park acquisition to its present cooperative planning and partnering program, accommodating many uses but limiting intensification of development. During this same time, data and understanding of the nature and values of the Greenway have undergone profound advances.

In recent years the Willamette River and Greenway have become a focal point for excellence in Benton County's quality of life. This value has developed as a consequence of several factors: increased scientific knowledge about the river system, its relationship to riparian functions and the role of the floodplain; a proliferation of recreational river use; and a growing appreciation for the scenic value of a river that meanders through diverse agricultural and urbanized lands.

Citizens increasingly support maintenance and restoration of the Willamette River as a biologically rich, dynamic, natural river system. The river provides a network of interconnected channels, sloughs, alcoves, and tributaries that offer high-quality habitat for fish. Farm and forest activities, which are highly productive in the Willamette Valley, play key roles in both the local economy and in maintaining the values associated with the river. Those roles have been honored in the development of management plans for Greenway riparian areas.

The Greenway has been enhanced by the development of flourishing communities, providing residents and others with scenic vistas and access to safe swimming, boating, fishing, picnicking, camping, water trails and riverside hiking.

Over time, uses of the river and adjacent land have expanded and altered demands for the Greenway, calling for a set of progressive policies. The following policies provide the framework for the evaluation, planning, protection, management, and collaboration required to responsibly address key issues.

The Willamette Basin Planning Atlas (Hulse, et al, 2003) and Willamette Greenway Parklands Strategy (Oregon Dept. of Parks & Recreation, 2005) have served as primary references in the development of key management concepts, including:

- Recognition of the Greenway as an integrator of Willamette Valley quality of life emphasizing a healthy river, progressive cooperative planning, and balanced economic, social and ecological values;
- The need for available water to support domestic, industrial, agricultural, recreational, and fish and wildlife uses;
- Continued need for water quality cleanup;
- Alternatives to hardened shorelines in a dynamic river system;
- Increased understanding of riparian and wetland system functions and values;
- Support for fish habitat and threatened salmonid populations;
- Importance of restoration and rehabilitation of riverine and riparian systems; and
- Meeting the demands of a proliferation of river users and recreational uses.

Goal 15

Statewide Planning Goal 15

To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

The qualities of the Willamette River Greenway shall be protected, conserved, enhanced and maintained consistent with the lawful uses present on December 6, 1975. Intensification of uses, changes in use or developments may be permitted after this date only when they are consistent with the Willamette Greenway Statute, this goal, the interim goals in ORS 215.515(1) and the statewide planning goals, as the case may be, and when such changes have been approved as provided in the Preliminary Greenway Plan or similar provisions in the completed plan as appropriate.

COMPREHENSIVE PLANS OF CITIES AND COUNTIES

Each city and county in which the Willamette River Greenway is located, shall incorporate the portions of the approved DOT Greenway Plan in its comprehensive plan and implementing ordinances and other implementation measures.

1. Boundaries: Boundaries of the approved Willamette River Greenway shall be shown on every comprehensive plan.
2. Uses: Each comprehensive plan shall designate the uses to be permitted for the rural and urban areas of each jurisdiction, which uses shall be consistent with the approved DOT Greenway Plan, the Greenway Statutes and this Goal.
3. Acquisition Areas: Each comprehensive plan shall designate areas identified for possible public acquisition and the conditions under which such acquisition may occur as set forth in the approved DOT Willamette Greenway Plan and any other area which the city or county intends to acquire.

Excerpt from OAR 660-015-0000(15)

Benton County Goal

Willamette River Greenway

To protect, conserve, restore, enhance and maintain the ecological, natural, scenic, historical, agricultural, economic, and recreational qualities and resources along the Willamette River.

Policy Sections

Willamette River

Policies

15.1.1 Benton County shall cooperate, coordinate and build collaborative partnerships with State, Linn County and other neighboring county and federal agencies, non-governmental organizations, and private landowners to achieve the County's Greenway Goal.

15.1.2 Benton County shall accept the present County-adopted Greenway Boundary as defining the planning area within which special greenway considerations shall be taken into account and refer to this area as the Greenway Management Area. The County may periodically amend the Greenway Boundary consistent with the Greenway Goal, identified needs, and resource inventories of Greenway lands.

15.1.3 Benton County shall give priority to the protection, conservation and maintenance of the ecological, natural, scenic and historical qualities of lands in the Greenway Management Area when balancing uses regulated by other goals within the Greenway Boundary.

15.1.4 Benton County shall support agricultural uses and commercial forest operations that are respectful of the Greenway goal.

15.1.5 Benton County recognizes that Statewide Planning Goal 3 - Agricultural Lands and Goal 4 – Forest Lands are common land use classifications in the Greenway Management Area but that certain allowable land uses in these zones will be considered conditional or not allowable in the Greenway because of incompatibility.

15.1.6 Benton County shall permit intensification of uses, proposed changes in use, or development only when demonstrated to be consistent with the Willamette River Greenway Goal.

15.1.7 Benton County shall work with willing land owners when acquiring Greenway lands or interests in lands for scenic, conservation, recreation and access purposes.

15.1.8 Benton County shall convene a Greenway Advisory Team including technical experts and greenway landowners to assist the County in developing a Willamette River Greenway management plan.

15.1.9 Benton County shall restrict new and minimize replacement residential development in the Greenway Management Area and 100-year floodplains. The County shall also actively identify opportunities – for example, after flood damage occurs – to reverse past development of buildings and other structures within floodplains.

15.1 General Policies

Defined Terms

- biodiversity
- conditional use
- conservation
- conservation easement
- ecological processes
- ecosystem
- floodplain
- Greenway Boundary
- Greenway Management Area
- habitat
- historic resources
- meander rehabilitation
- mixing zone
- point discharge site
- post-acknowledgement amendment (PAPA)
- riparian
- water rights
- wetland

See **Appendix** for definitions

Cross-References

Additional policies related to this goal:

Goal 2 Land Use Planning
Goal 3 Agricultural Land
Goal 5 Natural Resources
Goal 6 Air, Water & Land Resource Quality
Goal 8 Recreational Needs

Goal 15

15.2 Environment

Policies

15.2.1 Benton County shall provide leadership for the protection of ecosystem services using a range of measures, including incentives.

15.2.2 Benton County shall develop an inventory and report addressing Greenway ecological functions and processes, resources, and needs that affect the health of the river, as the bases for developing management plans.

15.2.3 Benton County, in cooperation with private and public land owners, shall establish high priority areas for protection and restoration within the Greenway Management Area. High priority areas include but are not limited to confluences of major streams and side channels, alcove and island habitats, remnant riparian forests, and wetlands.

15.2.4 Benton County shall create partnerships with willing owners of high priority areas to achieve mutual land conservation and management goals.

15.2.5 Benton County shall request the Department of Environmental Quality to periodically review all point discharge sites to protect recreational users. The County shall request the DEQ to post warning notices near regulatory mixing zones that have had repeated violations.

15.2.6 Benton County shall focus efforts to revitalize the Greenway in those areas with less development, infrastructure, and lower population density.

Policies

15.2 Environment

15.2.7 Benton County shall work with land owners in the Greenway Management Area to use conservation practices that minimize soil loss and land loss by protecting non-hardened river banks and low gradient gravel river margins, using non-structural means.

15.2.8 Benton County shall discourage landowners and the Corps of Engineers from using riprap or constructing revetments for bank stabilizing except for emergency purposes or where it can be demonstrated that non-structural solutions will likely be ineffective.

15.2.9 Benton County shall encourage landowners to establish flood resistant vegetation, tree groves, or their equivalent in the Greenway Management Area where soils are suitable.

15.2.10 Benton County shall encourage protection of the Willamette River Greenway as an intact river system with dynamic riparian gravel substrates by recognizing the benefits of gravel as essential fish habitat and the importance of subsurface water flow through gravel substrates in maintaining cool summer water temperatures.

15.3 Economic Resources

Policies

15.3.1 Benton County shall cooperate with farm owners and federal and state agencies in promoting farm enterprises that enhance the quality of the Greenway.

15.3.2 Benton County shall give priority to the protection and conservation of farmland soils and will encourage farmers to retain and protect these valuable resources within the Willamette River Greenway.

15.3.3 Benton County shall encourage farmers and landowners within the Greenway Management Area to convert low-lying flood-prone agricultural land to natural areas in order to reduce floods, improve floodplain functions and wildlife habitat.

15.3.4 Benton County recognizes the protection given to mining under Statewide Planning Goal 5 but shall work with DOGAMI and mining operators to ensure that the ecological, agricultural, and recreational values within the Greenway Management Area are addressed and protected through the conditional use or post-acknowledgement amendment process for the purpose of minimizing conflicts

Courtesy of Green & White Rock Products

15.4 Recreational, Historic, and Scenic Resources

Policies

15.4.1 Benton County shall request the Department of Environmental Quality to monitor and promote water quality standards for recreation within the Willamette River and its side channels.

15.4.2 Benton County shall take a leadership role in developing and implementing a collaborative and coordinated plan for recreational use and public access along the Willamette River Greenway. The County shall work with willing landowners to establish access to public Greenway sites and to develop trail linkages between park units and access points, using a variety of methods such as purchase, easement, and cooperative agreements.

15.4.3 Benton County shall foster a positive working relationship with private landowners in the Greenway Management Area to protect farmlands and other economic uses, to avoid public use impacts such as trespass, and to achieve mutual land management objectives such as protection of scenic values through incentives and cooperative programs.

15.4.4 Benton County shall collaborate with the Oregon State Marine Board and other public agencies to enforce no-wake zones and other regulations along existing parklands and publicly owned natural areas.

15.4.5 Benton County shall notify the State Historic Preservation Office and the Commission on Indian Services for review of development activities within the Willamette River Greenway to ensure preservation of historical and archaeological resources.

15.4.6 Benton County recognizes that the scenic qualities of the Willamette River Greenway are a treasured legacy and shall actively protect and make accessible this heritage by cooperating with appropriate public agencies and willing land owners in establishing and maintaining scenic viewpoints and interpretive facilities.

Goal 15

Findings and References

15.1 General

15.1.a Goal 15 established by LCDC, clearly guides the Greenway policies. See Oregon Statewide Planning Goals and Guidelines. Goal 15: Willamette River Greenway OAR 660-015-0005, 7 pp.

Oregon Department of Land Conservation and Development. 2004.

15.1.b The Greenway boundary, published and mapped by the Oregon Department of Transportation, Oregon State Parks & Recreation Branch3 in 1976, was accepted by Benton County in the original Comprehensive Plan and again is accepted as amended in the present plan. However, boundary changes may be required because of channel shifts or other special circumstances.

A proposal for the Willamette River Greenway, Benton-Linn Counties, Oregon Department of Parks & Recreation Willamette Greenway Parklands Strategy Final Report, 2005

15.1.c Certain land uses that are permitted outright in Goal 3 Agricultural Lands and Goal 4 Forest Lands are in conflict with the Benton County Willamette River Greenway Goal and need to be treated as not allowable or conditional uses.

15.1.d Many decisions for management of the Willamette River Greenway depend on technical advice and there is a need for Benton County to have a knowledgeable advisory team that includes greenway land owners.

15.2 Environment

15.2.a Benton County recognizes that the Willamette River and Greenway Management Area can provide many ecosystem services such as flood protection, sediment trapping, water quality enhancement, thermal cooling, and fish habitat.

15.2.b Riparian vegetation and wetlands aid in purifying agricultural and storm water runoff, while river confluences and side channels contain the greatest biodiversity. High priority areas also allow for sediment and nutrient trapping, shade, gravel accumulation, flow reduction, and flood amelioration.

Hulse, D. et al. 2003. Willamette River Basin Planning Atlas. Trajectories of Environmental and Ecological Change, 2nd Ed.

15.2.c Tools for implementing Willamette River Greenway Goals currently include easements, habitat plans, incentives, and stewardship agreements.

15.2.d DEQ relies on regulatory mixing zones to dilute end-of-pipe toxicity so as not to impair river water quality, not to kill aquatic life, and not to endanger human health. Typically, regulatory mixing zones are not permitted in recreation areas, however they are allowed along other stretches of the river. Since most of the Willamette River Greenway is considered a water trail with frequent canoe, raft, and kayak travel, special water quality monitoring is needed to protect human health.

15.2.e Non-urbanized Greenway lands have less infrastructure, less capital development, and more opportunity to provide restoration projects.

Hulse, D. et al. 2003. Willamette River Basin Planning Atlas. Trajectories of Environmental and Ecological Change, 2nd Ed.

Findings and References

15.2.f A number of Greenway policies are derived from the Willamette River Basin Planning Atlas. Central to reducing soil erosion and improving fish habitat, as recommended in this Atlas, is to reconnect the river to its floodplain by reducing hardened levees and instead rely on non-structural means such as meander rehabilitation, side channel restoration, and vegetation bank stabilization to stabilize embankments and reduce flooding.

Hulse, D. et al. 2003. Willamette River Basin Planning Atlas. Trajectories of Environmental and Ecological Change, 2nd Ed.

15.2.g Tree plantations are semi-natural, often profitable, plantings that substitute for lost riparian forest; they contribute to soil retention, flood protection, and wildlife habitat.

15.2.h Gravel deposits in the river channel and in the riparian strip are integral to a healthy river and especially to fish habitat and populations.

Hulse, D. et al. 2003. Willamette River Basin Planning Atlas. Trajectories of Environmental and Ecological Change, 2nd Ed.

15.2.i Sufficient water flows within the Willamette River are necessary to support water uses such as domestic, industrial, agricultural, recreational, resident and anadromous fish populations. The viability of water dependent uses is dependent on the protection of water and irrigation access rights to the river, and the right to use irrigation equipment within the Greenway Management Area.

15.3 Economic Resources

15.3.a Farmland forms the matrix of the Willamette Valley fabric and its continuity is essential to the quality of the Greenway.

~~15.3.b~~ The mild climate and fertile soils make the Willamette Valley one of the state's most productive agricultural areas.

15.3.c Educational materials, incentives, and assistance are available for converting low-lying flood-prone agricultural lands to natural areas, such as mitigation banking and conservation easements.

15.3.d Revised Goal 5, Mineral and Aggregate Resources regulating mineral and aggregate extraction allows mining of these resources while minimizing adverse impacts of extraction and processing and where there are significant conflicts, imposes an ESEE analysis to determine whether conflicting uses should be limited or prohibited. For permitted mineral and aggregate extraction activities, Benton County must work with operators to minimize damage to Greenway resources.

15.4 Recreational, Historic, and Scenic Resources

15.4.a Deteriorating water quality in the Willamette River has been documented in Hulse, D. et al. 2003. *Willamette River Basin Planning Atlas. Trajectories of Environmental and Ecological Change, 2nd Ed.* and in Oregon Parks & Recreation Department, 2005. *Willamette Greenway Parklands Strategy.* Final Report from the Task Force on Willamette River Greenway Parklands Strategy.

Goal 15

Findings and References

15.4.b Responsibility for recreational resources is laid out in Oregon Parks & Recreation Department. 2005. *Willamette Greenway Parklands Strategy.* Final report from the Task Force on Willamette River Greenway Parklands Strategy, 70 pp. Coordination efforts should include but not be limited to the Oregon Parks and Recreation Department, Oregon State Marine Board, Linn County, the cities of Albany and Corvallis, and private landowners.

15.4.c The Oregon Parks & Recreation Department, 2005. *Willamette Greenway Parklands Strategy.* Final Report from the Task Force on Willamette River Greenway Parklands Strategy, 70 pp. recommends specific needs for access to recreation sites, priorities for acquisition and expansion, and the need for safe day use river sites. The Oregon State Parks & Recreation Department. 2002. *Willamette River Recreation Guide*. Oregon State Parks & Recreation Department and Oregon State Marine Board, 33 pp. describes the water trail program, a segment of which is planned for Benton County. This is also identified in the *Oregon Trails 2005-2014 Statewide Action Plan.*

15.4.d The Willamette River Greenway program seeks to provide suitable public access to the Willamette River and its shoreline for day-use recreation activities such as boating, fishing, swimming, and nature enjoyment, and a system of water trails along and/or near the river, in coordination with the Oregon Statewide Trails Plan and the Benton County Trails System Plan.

15.4.e The Oregon State Marine Board contracts with the Benton County Sheriff's office for law enforcement along the Willamette River.

15.4.f The State Historic Preservation Office and the Commission on Indian Services maintain an inventory of significant historical and archaeological sites throughout Oregon.

References

Allen J. et al. *Restoring the Willamette Basin: Strategic Issues and Challenges.* Willamette Restoration Initiative, 82 pp. 1999. [report providing a planning interpretation of the concomitant study by Hulse et al. 2003]

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Benton County. Natural Areas and Parks Department. *Jackson-Frazier Wetland Management Plan.* 2005.

Findings and References

Hulse, D. et al. *Willamette River Basin Planning Atlas. Trajectories of Environmental and Ecological Change, 2nd Ed.* Pacific Northwest Ecosystem Research Consortium, Oregon State Univ. Press. 2003. [definitive research summary of the environment and ecological base of the Willamette Valley, displayed in large scale format with analysis by river mile (kilometer strips)]

Oregon. Department of Land Conservation and Development. *Goal 15: Willamette River Greenway OAR 660-015-0005*. Oregon's Statewide Planning Goals and Guidelines.

Oregon. Department of Land Conservation and Development. *Planning for Aggregate: A Guide to Planning for Aggregate Resources in Oregon*. November 2001. 64 pp. and Appendices. [comprehensive discussion of the application of the 1996 revision of Goal 5 (OAR 660-023- et seq.) as it relates to aggregate mining]

Oregon. Department of Transportation, Oregon State Parks & Recreation Branch. *A proposal for the Willamette River Greenway, Benton-Linn Counties, Book 3, 6 pp.*, River Mile Maps, Appendices. 1976. [document displaying WRG land use boundary by river mile on photo mosaics.]

Oregon. Parks & Recreation Department. *Willamette Greenway Parklands Strategy*. Final Report from the Task Force on Willamette River Greenway Parklands Strategy, 70 pp. 2005

Oregon. Parks & Recreation Department. *Willamette River Recreation Guide*. Oregon State Parks and Recreation Department and Oregon State Marine Board, 33 pp. 2002. [river mile description of Buena Vista to Wheatland ferry reach]

Rohse, M. *Land-Use Planning in Oregon*. Oregon State University Press, Corvallis. pp. 267-273. 1984. [a concise statement of the unique status of Goal 15 among other statewide planning goals]

Sinclair, M. *Willamette River Basin – Challenge of Change*. The Willamette Partnership, 40 pp. 2005. [popular illustrated description of Hulse et al. 2003]

Willamette Restoration Initiative. *Willamette River Water Trail Implementation Plan*. Willamette Restoration Initiative, Salem, 9pp. 2004. [short description of water trail proposal from Willamette Mission State Park to Buena Vista Ferry]

Wing, M.G. and E. Pearson. *Willamette River and Greenway Survey*. Unpublished Report prepared for Oregon Parks & Recreation Department, 44 pp. and Appendices. 2005. [on-site and mail survey conducted by OSU students, June – Sept. 2004, under guidance by OP&RD and OSU Survey Research Center of a small number of onsite users per site and approx. 220 valid mail responses]

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Additional Adopted Documents

Comprehensive Plan Map

Goal Exceptions

Corvallis Urban Fringe Policies

Natural Features Program

Inventory of Mineral & Aggregate Sites

Adopted ESEE Analyses

Willamette River Greenway Map

Unincorporated Community Plans

Big-Game Wildlife Habitat Map

Transportation System Plan

The documents referenced in this section are officially adopted as elements of the Benton County Comprehensive Plan. Full versions of these documents are located in the Benton County Community Development Department library.

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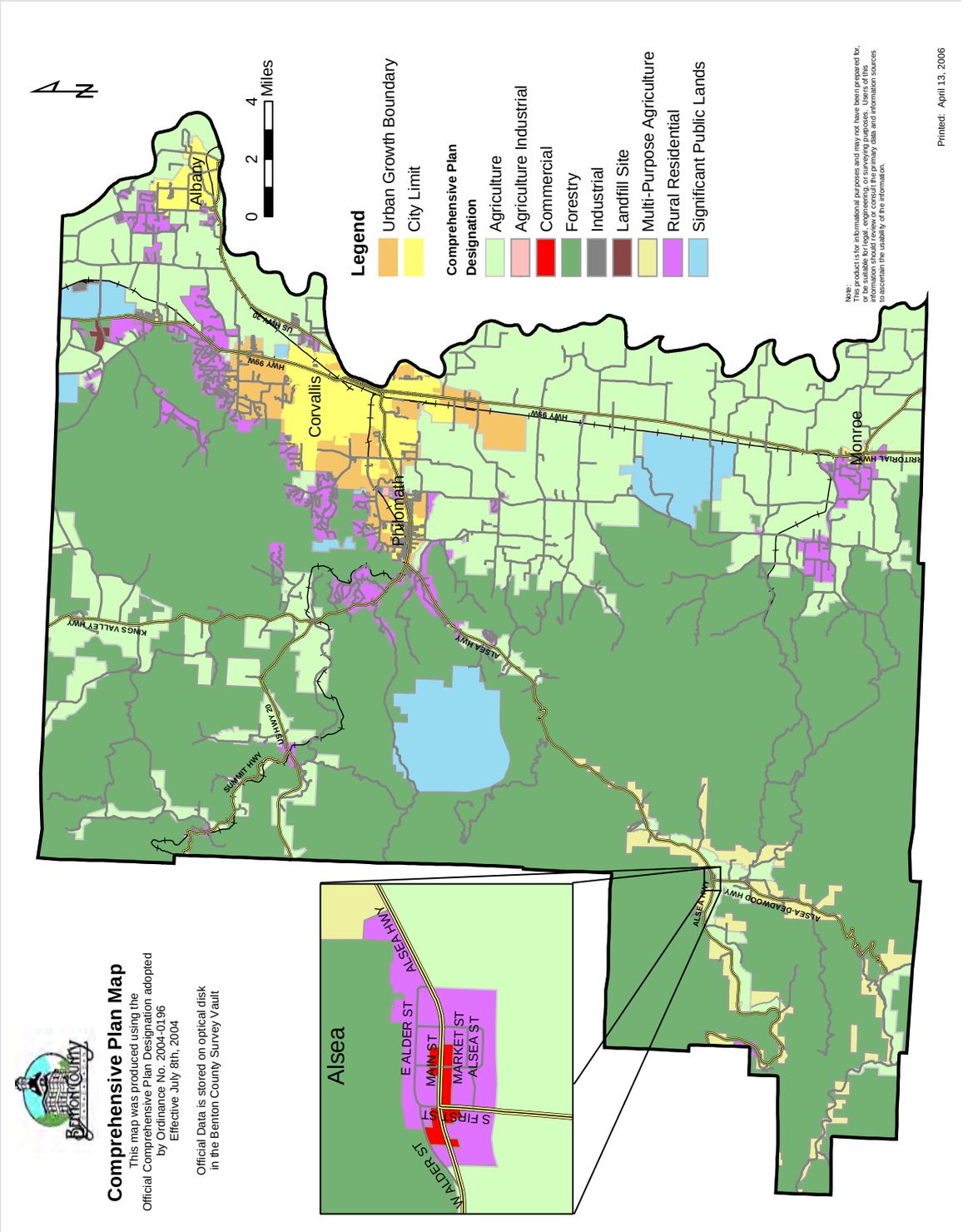
Comprehensive Plan Map

The Comprehensive Plan Map on the following page identifies general land use designations for all areas of the county, based on the categories of resource lands, urban growth boundaries, unincorporated communities, rural exception areas, and public ownership. Following the Comprehensive Plan Map is a legend describing the various designations.

The Zoning Map is derived from the Comprehensive Plan Map designations, applying specificity to allowed land uses and minimum sizes for creation of new lots or parcels of land.

The map on the following page is a small-scale representation of the Comprehensive Plan Map. Larger-scale printed versions are available from the Benton County Community Development Department. The official version of the Comprehensive Plan Map is in digital form; in other words, it is the geographic information system data used to create a map such as the one on the following page. This data is available from the Benton County Community Development Department.

Comprehensive Plan Map



Larger-scale versions of this map are available from the Benton County Community Development Department.

Map Legend

Comprehensive Plan Map Designation	Description	Corresponding Zoning Map Designations
Agriculture	Lands designated as agricultural lands under Statewide Goal 3, to be preserved and maintained to encourage their utilization for agricultural production. These lands are designated Exclusive Farm Use on the Benton County Zoning Map.	Exclusive Farm Use
Agriculture Industrial	Lands to be used for commercial and industrial uses related to agriculture.	Agricultural Industrial
Commercial	Lands to be utilized to provide for the buying and selling of goods and services within various regions of the county. The Commercial designation is used primarily to accommodate existing commercial uses in rural areas. This designation at these locations contributes to energy conservation by providing some retail services within the rural areas.	Commercial
Forestry	Lands designated as forestlands pursuant to Statewide Goal 4, to be conserved and maintained for forest uses.	Forest Conservation
Industrial	Lands to be utilized for general industrial uses, including large scale business operations such as manufacturing.	Industrial
Landfill Site	Lands designated for solid waste disposal and other associated or complementary uses.	Landfill Site

Comprehensive Plan Map

Map Legend

Comprehensive Plan Map Designation	Description	Corresponding Zoning Map Designations
Multi-Purpose Agriculture	Lands designated as agricultural lands under Statewide Goal 3, to be preserved and maintained to encourage their utilization for agricultural production. Applied to certain lands in the Alsea and Lobster Valley areas, where a 20-acre minimum parcel size is appropriate when considering the predominant size of farms in the area.	Multi-Purpose Agriculture
Rural Residential	Lands outside of urban growth boundaries and unincorporated communities, for which an exception to the statewide goals has been adopted. Rural Residential lands shall be utilized to provide a variety of rural housing opportunities for the County's citizens.	• Rural Residential – 2-acre Minimum • Rural Residential – 5-acre Minimum • Rural Residential – 10-acre Minimum • Rural Residential – 20-acre Minimum
Significant Public Lands		• Public • Open Space

POST-ACKNOWLEDGMENT GOAL EXCEPTIONS

In 1982, Benton County adopted a Goal Exception document that was the basis for zoning of nonresource lands outside of urban growth boundaries. Below is a list of the ordinances that adopted subsequent goal exceptions. Together, the 1982 document and the subsequent goal exception ordinances constitute the Benton County Comprehensive Plan Goal Exception Element. These documents are located in a separate document from the main Comprehensive Plan, located in the Benton County Community Development Department.

Ordinance Number	Effective Date	Change*	Acres	Affected Properties
85-0004	May 17, 1985	EFU to RR	66.66	11-4-7 Tax Lots 502, 501, 500, 506, 505, 503, 590, 602, 603, 605, 604. 600, 609, 606, and 608.
85-0005	May 17, 1985	FC to RR-5	75.93	10-4-7 Tax Lots 300 (partial), 202, 601, 600, 500, 400, 700, 800, 900, and 701.
85-0007	May 31, 1985	FC to RR-10 and RR-2	57	12-6-10 Tax Lots 1200, 1300, 1400, 1500, 1600, 1700, 1701, 2200, 1802, 1805, 1804, 1803, 1801, and 2100.
85-0008	May 31, 1985	EFU to RR-10	54.77	12-6-23 Tax Lots 102, 109, 107, 106, 191, 192, 190, 105, 103, 100 and 101.
85-0009	June 14, 1985	FC-40 and EFU to RR-5	72.43	10-5-14B Tax Lots 1600, 1500, 1400, 1300, 1900, 2000, 2200, 2300, 2400, 1200, 1100, 1000, 900, 800, 700, 600, 500, 400, 300, 200, 902, 901.
85-0009	June 14, 1985	EFU to RR-10	87	10-5-14 portions of Tax Lots 100, 101, 102, 120, 122 and 124.
85-0010	June 14, 1985	RR-2 to EFU	4.18	11-5-24 Tax Lot 1401.
85-0011	June 14, 1985	EFU to RR-2	10.20	11-4-18D Tax Lots 100, 200, 300, 400, 500, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 3200, 3300, 3400, 3500, 3600, 3700 and 3800.

Goal Exceptions

Ordinance Number	Effective Date	Change*	Acres	Affected Properties
85-0012	July 5, 1985	EFU to OS; RR-5 to EFU	39.60; 3.75	11-5-31 Tax Lots 400 and 600.
85-0013	July 5, 1985	FC-40 to RR-2; RR-2 to RR-5	564.14	Numerous properties in 11-5-30 and -30B; and 11-6-25, -25A, -25C, and -25D.
85-0015	August 5, 1985	EFU to RR-5	96.68	Numerous properties in 12-5-30A and -30B.
85-0016	August 2, 1985	EFU and FC-40 to RR-5	89.39	Several properties in 12-6-21 and -21BC.
85-0019	September 6, 1985	EFU to RR-5	39.78	Several properties in 12-5-30, -30DA and -30DD.
85-0020	September 6, 1985	EFU to RR-5	14.68	Several properties in 13-5-06AD.
85-0021	September 6, 1985	EFU to RR-2	14.40	Several properties in 14-5-9 and -10.
85-0023	September 20, 1985	EFU to RR-5	22.79	Several properties along the Lane County line in 15-5-09.
85-0024	September 20, 1985	EFU, FC-40 and MPA to RR-1; FC-80 to C	7.86	Several properties in the community of Alsea.
85-0028	November 1, 1985	EFU to AI	2.00	11-6-22 Tax Lot 403.
85-0030	January 3. 1986	I/PUD to C	4.64	11-6-28 Tax Lot 201.
86-0040	October 4, 1986	EFU to I	4.00	11-5-12D Tax Lot 200.
87-0045	November 6, 1987	EFU to I	16.06	14-8-12 Tax Lots 1100 and 1200.
Order, recorded in Benton County Records at M-101306	June 15, 1988	Allow municipal sewer to serve rural industrial site.	Approx. 154	10-4-8 Tax Lots 300 and 400; 10-4-17 Tax Lots 300, 301, 302 and 400.
88-0056	October 7, 1988	EFU to AI	2.58	14-5-33 Tax Lot 300.

Ordinance Number	Effective Date	Change*	Acres	Affected Properties
97-0126	May 9, 1997	Allow municipal sewer to serve rural school.	8.33	10-4-35 Tax Lot 600
2000-0156	May 4, 2000	EFU to RR-5	11.42	12-6-24 Tax Lots 300 and 301.
2003-0185	June 26, 2003	EFU to C	1.4	11-5-12BA Tax Lot 400 (portion).
2005-0207	July 30, 2005	FC to RR-10	10.84	12-6-11 Tax Lot 200 (portion).

***Zone designations are abbreviated as follows:**

AI = Agriculture Industrial

C = Commercial

EFU = Exclusive Farm Use

FC = Forest Conservation

I = Industrial

OS = Open Space

PUD = Planned Unit Development

RR = Rural Residential

Corvallis Urban Fringe Comprehensive Plan Policies

Comprehensive Plan Policies

Additional policies apply to the land in the Corvallis Urban Fringe – the area outside the city limits and inside the urban growth boundary. These policies are contained in a separate volume located at the Benton County Community Development Department.

The Urban Fringe policies were derived from the Corvallis Comprehensive Plan and were adopted by the Benton County Board of Commissioners in 1999 as elements of the Comprehensive Plan. The policies cover the fifteen applicable statewide planning goals.

Subsequent to their adoption in 1999, the Corvallis Urban Fringe policies have been amended through adoption of the Corvallis Stormwater Master Plan and the Corvallis Natural Features Program.

Natural Features Program

Natural Features Program

The Natural Features Program resulted from a five-year project to inventory and assess natural hazards and resources within the Corvallis Urban Growth Boundary, and develop a program to minimize hazards, protect resources, and ensure efficient development of the city and urban fringe. The program was developed through a collaborative effort between the City and County. Stakeholders and property owners were involved throughout the process and approximately one hundred public meetings were conducted. The result was two programs – one for City jurisdiction, one for County jurisdiction – that work in a coordinated fashion to protect steep slope and landslide hazard areas, floodplains, riparian areas and wetlands, and areas of rare habitat and significant vegetation, while at the same time preserving property rights. The County program includes policies (contained in the Corvallis Urban Fringe Policies and adopted in 2005), land use regulations (contained in the Development Code), and incentives (also in the Development Code).

Inventory of Mineral and Aggregate Sites

Contents:

a. Summary of Inventoried Sites.
b. Ordinances for Post-Acknowledgment Plan Amendments.
c. 1978 Publication by Oregon Dept. of Geology and Mineral Industries: Rock Material Resources of Benton County, Oregon.

Mineral and Aggregate Sites

Adopted ESEE Analyses

Analyses of the economic, social, environmental and energy consequences of protecting or not protecting a particular resource under Goal 5.

Contents:

a. Jackson-Frazier Wetland ESEE Analysis; adopted effective March 3, 1991.
b. Corvallis Urban Fringe Natural Features; adopted effective October 6, 2005.

Note: ESEE Analyses adopted in conjunction with mineral and aggregate post-acknowledgment plan amendments are included in the mineral and aggregate section of this document.

ESEE Analyses

Willamette River Greenway Map

The adopted Willamette River Greenway Map, dated August 24, 1981, consists of a set of annotated aerial photographs and is located in the Benton County Survey Records Vault.

Willamette River Greenway

Unincorporated Community Plans

Unincorporated Community Plans

As stated in the Goal 14 chapter of this Comprehensive Plan, "The policies of unincorporated community plans, adopted or modified by the Benton County Board of Commissioners pursuant to OAR 660 Division 22, shall be considered analogous to Comprehensive Plan policies for the particular community, and shall guide drafting of Development Code provisions specific to that community."

Contents:

a. Alsea Community Plan. [not yet adopted]
b. Wren Community Plan. [not yet adopted]

Big-Game Wildlife Habitat

Big-Game Wildlife Habitat Map

This map, prepared by Benton County in collaboration with the Oregon Department of Fish and Wildlife, was adopted by the Benton County Board of Commissioners, effective August 17, 1984. The map contained in the reference volume is a small-scale representation of the Big-Game Wildlife Habitat Map. Larger-scale printed versions, including the original adopted hardcopy, as well as digital versions, are available from the Benton County Community Development Department.

Transportation System Plan

Transportation System Plan

Adopted by Ordinance No. 2001-0173.
Effective August 9, 2001.

The Transportation System Plan is located in the Community Development Department library. It is also available through the Board of County Commissioners office, referenced by the ordinance number.

Amending the Comprehensive Plan

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Amending the Comprehensive Plan

Procedure for Amending the Comprehensive Plan

1. Initiation of Amendments:

a. A Comprehensive Plan Map or Text amendment may be initiated by the Board of Commissioners, either on the Board's own volition or in response to petition from the Planning Commission, Planning Official, Citizen Advisory Committees (CACs), or private individuals.

b. Private individuals may request a Plan map or text amendment by completing a County application form and paying the established fee.

2. Amendment Review Procedures:

a. If a proposed amendment to the Comprehensive Plan would (A) result in or require a property to be rezoned in order to comply with the amended Comprehensive Plan, or (B) limit or prohibit a use or uses currently allowed on a property, the Planning Official shall mail notice of the proposed amendment to affected property owners pursuant to ORS 215.503.

b. The staff will be responsible for preparing a background report which describes the proposed amendment and provides other information needed for proper consideration. This report will be forwarded to affected CACs and agencies for comment. Following public review, a full staff report will be prepared analyzing the impacts of the amendment.

c. The Planning Commission will hold at least one public hearing before determining whether or not the application warrants approval. The Planning Commission shall either forward a recommendation for approval to the Board of Commissioners, or shall deny the proposed amendment. In the case of an application from a private individual, the applicant may appeal the Planning Commission's denial. Upon receipt of a Planning Commission recommendation or an applicant's appeal, the Board shall schedule the matter for hearing. The Board will hold at least one public hearing before adopting an ordinance amending the Comprehensive Plan. After the first reading of the ordinance to amend the Comprehensive Plan, the Board shall either deny the request or schedule the matter for a second reading.

Procedure for Amending the Comprehensive Plan

3. Criteria for Amendments:

a. Text Amendments:

Amendment to the text may be considered to correct an error, improve the accuracy of information, expand the data contained in the Plan, bring the Plan into compliance or more into compliance with statewide land use planning goals, or to reflect a public need in compliance with the State goals.

b. Map Amendments:

Amendments to the Plan map may be approved when compliance with all elements of the Comprehensive Plan and with statewide land use planning goals can be shown. Map amendments requiring goal exceptions shall comply with procedure and standards of OAR 660 Division 4 and State goals. [Ord 91-0080]

4. Correction of Errors:

If the Board of Commissioners becomes aware of an error in either map or text of the adopted Comprehensive Plan, the Board may cause an immediate amendment to occur to correct the error. Such a correction shall be in the form of an ordinance. Public hearings before the Planning Commission shall not be required where an amendment is intended specifically to correct an error.

Appendix

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DEFINITIONS

100-year flood – a flood event anticipated to occur on average once every 100 years (i.e., having a 1% chance of occurring in any given year)

aquifer – a saturated underground body of rock or similar material capable of storing water and transmitting it to wells or springs.

accessory dwelling – a dwelling secondary and subordinate to the primary dwelling on a property

agricultural qualities – mostly privately owned and associated with farming enterprises; form the matrix of the valley fabric – their continuity is critical to the quality of the greenway

amelioration – to make better or improve

Benton County Environmental Assessment Priority List – a list of areas and conditions that represent known or suspected health hazards or environmental problems in Benton County – the list is updated every year or two by the Benton County Environmental Health Division

Benton County Fire Defense Board – a coalition of local fire protection agencies including special districts and municipal departments that are working to coordinate and improve fire protection and response activities

best management practices – a preferred set of methods or practices for accomplishing a given task, which, when followed, will accomplish the task with a desired outcome – commonly used in relation to water quality; for example, roadside maintenance best management practices may prescribe mowing (rather than spraying herbicide) and ditch-cleaning during certain times of the year

biodiversity/biological diversity – the variety of living organisms within and between species, communities and ecosystems in a given area.

Citizen Advisory Committee (CAC) – committees representing citizens from designated areas throughout the county that are outside of incorporated city boundaries – the role of the CAC is to seek citizen participation throughout the county

Committee for Citizen Involvement (CCI) – committee responsible for implementing and evaluating the County's citizen involvement program – this committee is the responsibility of the Planning Commission

community water system – a public water system that has 15 or more service connections used by year-round residents, or that regularly serves 25 or more year-round residents

community sewage system – a system owned and operated by a private or non-profit entity

conditional use/conditional use permit (CUP) – process by which the County may approve a proposed use for a particular property if the use meets criteria concerning compatibility with neighboring properties and with the purpose of the zone

conservation – limiting or minimizing the use or depletion of natural resources, including such things as land, energy, water, wildlife habitat

conservation easement – a legal restriction that landowners voluntarily place on their property to meet conservation objectives, with potential for benefits including tax relief – easements can be purchased by government agencies or non-profit organizations and provide income to the landowner

Definitions

Corvallis Federal Urbanized Area – a continuous urban area as designated by the United States Bureau of the Census having a population of at least 50,000 and an overall population density of at least 1,000 people per square mile – the Corvallis Federal Urbanized Area includes the cities of Corvallis, Philomath, and Adair Village, as well as intervening and adjacent areas

defensible space – an area around a home or structure, which is either man-made or natural, where the vegetation is modified and maintained to slow the rate and intensity of an advancing wildland fire – it also provides room for firefighters to work and helps protect the forest from becoming involved should a structure fire occur

density transfer – general concept that can be implemented in a variety of ways, all of which result in relocating development rights away from one area and increasing the development rights (i.e., density) in another area – often used to reduce development pressure on sensitive sites and correspondingly increase development opportunities on well-suited sites, thereby protecting sensitive sites while keeping the overall density unchanged

Drinking Water Protection Area – designation to protect from contamination the surface and subsurface areas surrounding a water well, well field, or surface water source that supplies a public water system – an extension of the Wellhead Protection Program to include surface water sources – the designated protection area results from a voluntary plan developed by the operator of a public water system and Oregon Department of Environmental Quality

ecological function – physical, chemical and/or biological process(es) that constitute a definable role in maintaining the integrity of an ecosystem – as scientific understanding of ecosystems increases, the concept of ecological function evolves

ecological health – the status of an ecosystem in terms of its long-term ability to self-regulate and self-perpetuate, including maintenance of plant and animal populations

ecological process – physical, chemical and/or biological process(es) whose effects shape and form the ecosystem

ecological qualities – ecological processes, functions and services that embrace biological values such as fish and wildlife habitats and physical features e.g. channel morphology, oxbows and off-channel habitats

economic qualities – include agriculture, aggregate mining and forestry – these resources are protected by their respective statewide planning goals: Goal 3 Farming, Goal 4 Forestry, and Goal 5 Natural Resources

ecosystem – the physical and biological components and processes occurring in a given area, which interact to create a dynamic equilibrium

ecosystem services – processes by which the environment produces or regulates resources such as clean water, timber, fish habitat, and pollination of native and agricultural plants

ESEE analysis – a part of the process of planning for natural resources under Statewide Planning Goal 5, in which the County analyzes the Environmental, Social, Economic and Energy (ESEE) consequences

of prohibiting, limiting, or allowing uses that would conflict with protection of a specified Goal 5 resource – for certain resource categories, the local government has the option of forgoing the ESEE analysis and adopting generalized provisions developed by the state

exception – see **goal exception**

FEMA - Federal Emergency Management Agency – agency that produced the floodplain maps and promulgated the floodplain regulations which Benton County has incorporated into the Development Code

finding – a fact, determination or reason, based on existing information, which, by itself or in conjunction with other findings, leads to a particular conclusion or course of action

floodplain – the area inundated by a flood - floodplains are mapped based on hydrologic modeling of the anticipated recurrence interval or the probability of occurrence in a given year – the "100-year floodplain", which is referenced by most Benton County floodplain regulations, is the area that would be inundated by a flood event anticipated to occur on average once every 100 years (i.e., having a 1% chance of occurring in any given year)

flow regimes – the volume of stormwater runoff (or streamflow) over time, considered in terms of a long-term pattern in a given drainage or system

goal – a desired condition or circumstance toward which the planning effort is directed; a "destination" that is by nature generalized; used to give policy direction and indicate intention

goal exception – a land use process through which a local jurisdiction justifies, based on factual evidence, that a policy embodied in a particular statewide planning goal should not apply to a particular property or set of properties – a common example is demonstrating that land developed in small-lot residential outside urban growth boundaries (UGBs) should not be subject to Goals 3 and 4, which generally require land outside UGBs to be zoned for farm or forest use

green builder – person employing design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants – such practices may include but are not limited to demolition and construction debris recycling, energy efficient design, engineered lumber, recycled-content materials, low-toxic paints and finishes, and water-conserving landscape design

green infrastructure – a strategically planned and managed network of natural areas, parks, greenways, drainage ways, conservation easements, and working lands with conservation value that supports diverse native plant and animal species, maintains natural ecological processes, sustains air and water resources, absorbs and filters storm water, and contributes to the health and quality of life for communities and people

greenspace – undeveloped lands, especially those in naturally occurring vegetation, located in and around communities

Greenway Boundary – a boundary line shown on the County Zoning Map which includes lands along the Willamette River that are necessary to carry out the purpose and intent of Statewide Planning Goal 15

Definitions

Greenway Management Area – the land and water area within the Greenway Boundary and the associated county segment of the Willamette River

groundwater – water that sinks into the soil and either moves toward a surfacing location (e.g., a spring or a stream), or is stored in slowly flowing and slowly renewed underground reservoirs called aquifers

groundwater limited areas – one of eleven areas in the northern Willamette Valley, established in 1992 by the Oregon Water Resources Commission, where additional pumping is restricted to prevent excessive water declines, restore aquifer stability, and preserve aquifers with limited storage capacity for designated high public-value uses

groundwater recharge area – the area where water soaks into the ground and enters an aquifer; the area where groundwater recharge can occur varies depending on the soil, bedrock and aquifer characteristics: areas with permeable layers overlying an aquifer experience rainfall percolating directly through to the aquifer; areas with impervious surface, shallow bedrock or impermeable clay will likely cause rainfall to move (on the ground surface or within the soil) to more permeable areas where the water can infiltrate to the aquifer

habitat – a place that provides seasonal or year-round food, water, shelter, and necessities for an organism, community, or population of plants and animals

headwaters – the upper-reaches of watersheds, where ephemeral and intermittent streams form

high priority areas – areas within the Greenway Management Area in which important ecological functions and services occur, such as sediment trapping, shade, gravel accumulation and flow reduction

historic areas – land with sites, structures, and/or objects that have local, regional, statewide or national historical significance

Historic Context Statement – a document summarizing the history of Benton County, from Euro-American settlement through 1945, with a focus on the historical patterns of growth and development as they pertain to the built environment; the document also identifies the types and quality of historic resources, and provides an outline of preservation activities that will be undertaken in the future – the Context Statement was prepared under the guidance of the Benton County Historic Resources Commission and approved by the Board of County Commissioners

historic resources – those buildings, structures, objects, sites, or districts that have a relationship to events or conditions of the human past

historical qualities – covers a broad range of features including archeological, historic structures, remnants of past eras such as abandoned riprap and cutoff dams

hyporheic – the underground zone near and beneath a stream or river where groundwater mixes with the surface water of the stream

invasive species – plants, animals, and microbes not native to a region which, when introduced either accidentally or intentionally, out-compete native species for available resources, reproduce prolifically, and dominate regions and ecosystems –

because they often arrive in new areas unaccompanied by their native predators, invasive species can be difficult to control – left unchecked, many invasives have the potential to transform entire ecosystems as native species are displaced

landslide – any of the various geologic hazards involving downslope movement of soil and/or rock, including earthflow, rockfall, rockslide, slump, debris flow

LEED certification – one of several certification standards developed to define "green building" and establish a common standard of measurement – the LEED (Leadership in Energy and Environmental Design) Green Building Rating System is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings

life-cycle costing – a method of evaluating alternative building projects and products based on initial, operating, and maintenance costs over the economic life of the project, including disposal

mass movement – the downslope movement of earth material in response to gravity, including falling rock, soil creep, earth flow, slumping, landslide and debris-flow (landslide mixed with streamflow)

meander rehabilitation – restoring a river's natural tendency to establish a migrating, sinuous channel

mitigation – reducing the impact of an event or activity, or reducing the potential of an event occurring – for example: planting a hedge could mitigate the visual impact of an industrial use, installing an engineered retaining wall when excavating on a steep slope could mitigate the risk of landslide

mitigation banking – a program for offsetting impacts to wetlands at a landscape or watershed scale, wherein a property owner is allowed to negatively impact a wetland in one location in exchange for the property owner paying into a "bank" that subsequently pays to create, restore or enhance wetlands elsewhere

municipal water system – a system owned and operated by a municipality that distributes potable water through pipes

natural area – land and/or water that has substantially retained its natural character and that, even if altered in character, is important as habitat for plant, animal or aquatic life, for the study of its natural historical, scientific or paleontological features, or for the appreciation and enjoyment of its natural characteristics

natural hazard – natural events or processes that can harm people, property and/or environmental quality – both the risk of natural hazards occurring and the potential for an occurrence to cause harm are affected by human land use activities

nonpoint source – any source of pollution that does not result from a discharge at a specific, single location or point source (such as a pipe) but generally is distributed by runoff, precipitation, groundwater flow, or atmospheric deposition

open space – consists of lands used for agricultural or forest uses, and any land area that, if preserved and continued in its present use, would achieve the following:

a. conserve and enhance natural or scenic resources,
b. protect air or streams or water supply,
c. promote conservation of soils, wetlands, or other natural functions,

Definitions

d. enhance the value to the public of parks, forests, wildlife preserves, natural areas or sanctuaries or other open space,
e. conserve landscaped areas such as public or private golf courses that reduce air pollution and enhance the value of abutting or neighboring property, or
f. promote orderly urban development

open space tax deferral – the assessed value of lands with open space uses having public benefits is determined to be less than fair market value (Note: Benton County does not offer a general open space tax deferral program.) Property owners may qualify for more specific programs such as the Wildlife Habitat Conservation and Management Plan special assessment program, in which farm or forest tax rates may be maintained for property that is converted from those resource uses to wildlife habitat through a plan approved by Oregon Department of Fish and Wildlife.

point (source) discharge site – a discernable, confined, and discrete conveyance, including but not limited to a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or leachate collection system from which pollutants are or may be discharged – point source does not include agricultural storm water discharges and return flows from irrigated agriculture [from DEQ Administrative Rules]

policy – a course of action or statement of priority selected from among alternatives, and in light of given conditions and findings, to guide and influence present and future decisions

pollution – the addition to water, air, or soil of matter or energy that has a negative or injurious impact to human, plant, or animal life

post-acknowledgement plan amendment (PAPA) – an amendment to the Comprehensive Plan adopted subsequent to LCDC's acknowledgment of the County's Comprehensive Plan (which occurred on Feb. 5, 1987) – the term is most frequently used in relation to the procedure for adding a mineral or aggregate site to the list of significant resources, allowing mining and possibly protecting the mine from conflicting uses

pre-disaster mitigation plan – a plan for determining areas that are vulnerable to natural disasters and for determining ways to reduce or eliminate injuries, loss of life, and property damage; also emergency preparedness

primary structure – a structure containing or relating to the primary use of a property; for example, in a residential zone, a dwelling would be a primary structure; in an industrial zone, a warehouse or factory would be a primary structure – distinguished from "accessory structure"

properly functioning condition – state of the physical, chemical and biological aspects of watershed ecosystems that will sustain healthy native fish and wildlife populations

public water system – a system for the provision to the public of piped water for human consumption, when such system has more than three service connections, or supplies water to a public or commercial establishment that operates a total of at least 60 days per year, and is used by 10 or more individuals per day. Public water system can

also be a system that provides water to the public through constructed conveyances other than pipes serving at least 15 service connections or regularly serving at least 25 individuals daily at least 60 days of the year. A public water system can be either a Community Water System, a Transient Non-Community Water System, a Non-Transient Non-Community Water System or a State Regulated Water System.

Community Water System is a public water system that has 15 or more service connections used by year-round residents, or that regularly serves 25 or more year-round residents.

Non-Transient Non-Community Water System (NTNC) is a public water system that is not a Community Water System and that regularly serves at least 25 of the same persons over 6 months per year.

Transient Non-Community Water System is a public water system that serves a transient population of 25 or more persons.

State Regulated Water System is a public water system, which serves 4 to 14 service connections or serves 10 to 24 people. Monitoring requirements for these systems are the same as those for Transient Non-Community water systems.

recreational qualities – boating, water trails, camping, picnicking, swimming and general enjoyment; public access being key to Greenway recreational use

regulatory mixing zone – a river reach in which, rather than imposing strict end-of-pipe concentration requirements for NPDES, water quality permits are relaxed for conventional and toxic discharges

resource land – land with existing or potential resource value for uses such as forestry, agricultural, unique natural or scenic areas, etc.

restoration – reestablishment of pre-disturbance habitat functions and related physical, chemical, and biological characteristics, for the purpose of increasing native species density and diversity and/or improving naturally occurring ecosystem processes

riparian area – the zone of interaction between a waterbody and the adjacent land in which processes on land affect the waterbody and vice-versa – examples of these interactions include but are not limited to: erosion of land causing sedimentation in the waterbody; the moderating effect of the waterbody on adjacent soil and air temperature; vegetation on the land shading the waterbody and thereby maintaining cooler water temperatures; water and land combining to form highly valuable habitat for numerous wildlife species

Safe Harbor – an optional course of action for satisfying Goal 5 process requirements to identify and protect Goal 5 resources, usually involving a more simplified process such as applying standard setback requirements or determining significance based on existing listings, mapping, or other documentation of significance

scenic area – land that is valued for its aesthetic appearance

significant – in its specific sense, this term refers to a resource that has been determined to be of substantial value to the community, region or state, through a procedure specified in Goal 5

statewide planning goals – goals that express the state's policies on land use and related topics, such as natural resources – local comprehensive plans must be consistent with the statewide planning goals

Definitions

structural fire protection – protecting dwellings and accessory buildings as distinguished from wildfire abatement

sustainable/sustainability – simultaneously meets environmental, economic, and community needs throughout the county – using, developing, and protecting resources at a rate and in a manner that meets the current needs of people, maintains natural systems in the short and long term, and does not compromise the ability of future generations to meet their needs (from Benton County Sustainability Resolution)

sustainable economic development – improvement to an economy – not necessarily involving growth – that achieve economic and social goals over the long term and adheres to the following principles:

conservation of resources and protection of the environment

ensuring human health and welfare

quality of life is at least as important as standard of living

retaining local dollars within the local economy

tax deferral – a preferential property tax rate, such as that applied to land in commercial farm or forest use

transportation modes – categories for the means by which people and goods are transported, including: automobile, foot, bicycle, mass transit, rail, air, etc.

unincorporated communities – defined in OAR 660-022-0010 as a settlement with the following characteristics:

a. made up primarily of lands subject to an exception to Statewide Planning Goal 3, Goal 4, or both;
b. either identified in a county's acknowledged comprehensive plan as a "rural community", "service center", "rural center", "resort community", or similar term before this division was adopted (October 28, 1994), or it is listed in the Department of Land Conservation and Development's January 30, 1997 "Survey of Oregon's Unincorporated Communities";
c. located outside the urban growth boundary of any city;
d. not incorporated as a city; and
e. meets the definition of one of he four types of unincorporated communities in sections (6) through (9) of this rule, and included the uses described in those definitions, prior to the adoption of this division (October 28, 1994)

urban conversion plan – a plan showing how a parcel can ultimately be developed at urban densities, including natural features, utility corridors, roads, and other urban facilities

urban fringe management agreement – a formal agreement between Benton County and one of the four cities located in Benton County, detailing responsibilities and procedures relating to land use within the urban fringe of the city

urban fringe – the area outside of city limits and inside the urban growth boundary of a city

urban growth boundary – for each incorporated city, a boundary established to define the land area needed to accommodate 20 years of growth of the city – the location of the UGB is agreed to by the affected city and county(ies); only lands within the UGB are potentially eligible for annexation to the city

water rights – a right to use the publicly owned waters of the state of Oregon, granted by the Oregon Water Resources Department: all water, whether surface water or groundwater, is publicly owned; to use water, the user must apply for a water right, obtain a permit to use the water, begin use of the water, and then have a water rights examiner report on how and where the water is being used; if the water has been used according to the provisions of the permit, a water right certificate is issued based upon the report findings – certain uses are exempt from needing a water right, such as domestic wells not exceeding a certain usage

watershed – all the land area that drains to a given point – typically, the term is used to denote the area drained by a given river or stream; the watershed includes all land from the ridgetop to the mouth of the stream

water trail – a designated and signed route of travel along a river providing access, landing, picnic and camping sites to allow people in small boats to explore a waterway – a segment of the Willamette River Water Trail extends from River Mile 72 to 107

wetland – an area of land in which the soil is saturated for a sizable portion of the year, resulting in ecological processes that contribute to water quality and wildlife habitat – wetlands are generally identified by: the presence of water at the ground surface during a portion of the growing season; soils that show evidence of repeated, long periods of saturation; and vegetation adapted to life in saturated conditions

Willamette River Greenway Management Plan – a plan that outlines the preferred management practices within and along the Willamette River Greenway

zero net energy building – a building that is capable of producing as much energy as it uses

zone – a governmental designation applied to land, defining the uses that are allowed and not allowed, and typically containing standards for the uses and subdivision of the land

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