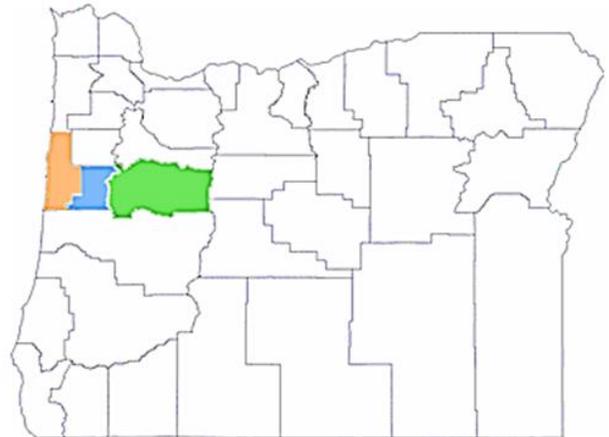


Regional Health Assessment Linn, Benton, & Lincoln Counties, Oregon 2015



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Chapter 1

Introduction and Overview

The 2015 Linn, Benton, and Lincoln County Regional Health Assessment (RHA) is the result of many dedicated hours of research, working in collaboration with community partners and agencies, leaders, and local residents across all three counties.

The World Health Organization defines health as a “state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”¹ Health is not just about individuals, but includes families, communities, and systems, and is a result of the interaction of complex networks of conditions and factors. Health starts long before illness occurs and is impacted by where and how we live, learn, work, play, worship and age.

The RHA incorporates this definition of health by describing a wide array of information about the conditions and factors affecting people’s health across the region as well as indicators of health status.

Assessment Goals and Objectives

The Linn, Benton, and Lincoln County Regional Health Assessment (RHA):

- Identifies and gathers health status indicators in order to determine the current health status of the community;
- describes areas for potential future health improvement while building upon ongoing community knowledge and efforts;
- identifies common strengths and challenges facing the region in regard to health status;
- recognizes and highlights the need for more detailed local data; and
- is a collaborative process that incorporates a broad range of community voices.

RHA data informs:

- Community, organizational, and local coordinated care organization decision-making;
- the prioritization of health problems;
- reporting requirements and funding opportunities for community partners; and
- the development, implementation, and evaluation of a range of plans, policies, and interventions to improve community health.

Report Organization

The Regional Health Assessment is presented in eight chapters:

Chapter 1: Introduction and Overview, including methodology and limitations.

Chapter 2: *People*, describing the people of Linn, Benton and Lincoln Counties including population demographics as well as a look at how the community has changed over time.

Chapter 3: *Environment*, which includes information about the physical spaces in which we live, work, and play.

Chapter 4: *Social Determinants of Health*, which includes the social, economic, and community factors that influence health.

Chapter 5: *Access to Medical Care*, exploring how we define and measure the ability of those in our community to get the medical care they need.

Chapter 6: *Morbidity and Mortality*, which covers a number of related health outcomes, from chronic conditions to violence and injury.

Chapter 7: *Health Across the Life Course*, exploring the ways in which individuals and communities act to protect and improve health at different stages in life.

Chapter 8: *Conclusion: Meeting Challenges with Strength*, discussing how this data can be used to understand the health of the region and recognize opportunities for positive changes to improve the health of the entire community.

Collaboration and Partnerships

The Linn, Benton, and Lincoln County Regional Health Assessment (RHA) could not have happened without the strong relationships that continue to develop through collaboration over time. The RHA engages a wide representation of key individuals in the community who shared their personal and professional knowledge while committing to help develop health improvement strategies suitable for the region.

Methodology

The Regional Health Assessment team reviewed county, regional, and state health assessments as well as current literature to better understand how best to conduct and design an assessment of the tri-county region. Staff also examined access indicators that have strong evidence for correlation with health status and outcomes. Data from secondary sources were identified through meeting with community partners, and through preexisting publications (e.g. community health assessments and hospital community health needs assessments). In addition, data sources were identified through literature research to include data ranging from local, regional, state and national levels. A variety of community partners were involved throughout this process. Staff conducted both in-person and phone presentations and consultations with members of regional and county-level governmental, nonprofit, and health system organizations. In addition, members of state and local research communities were contacted.

This process has included:

- Engaging county stakeholders and partners in the process of issue identification, data collection, data interpretation, editing, and dissemination of results;
- obtaining updated secondary data for the three counties, and aggregating this data into a regional total;
- synthesizing existing data reports; identifying areas in which more information is needed, and including data from other sources which address these gaps;
- identifying health needs and assets that will inform additional local and regional planning processes, including county-level Community Health Improvement Plans, Public Health Division strategic planning, public health accreditation, and health care transformation initiatives, among others; and
- consulting state and national resources for guidance in the development of this community health assessment, including the following: Oregon Health Authority technical reports (e.g. health equity,² asthma,³ chronic disease prevention⁴); the Centers for Disease Control and Prevention's data set directory of social determinants of health at the local level;⁵ King County's Equity and Social Justice Annual Report;⁶ and the Statewide Health Assessment of Minnesota.⁷

Limitations

While the RHA identifies many critical issues pertaining to community health, it is not inclusive of all health-related issues. As a result, it 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.

When considering the many factors that contribute to health, data are lacking in part because respective theoretical models are still being developed. 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.

Gaps in Data

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 the region and/or for individual counties were often not available for particular demographics, such as age, income, education-level, race/ethnicity, or zip code. This greatly limited the ability to explore differences or disparities within particular sub-populations.

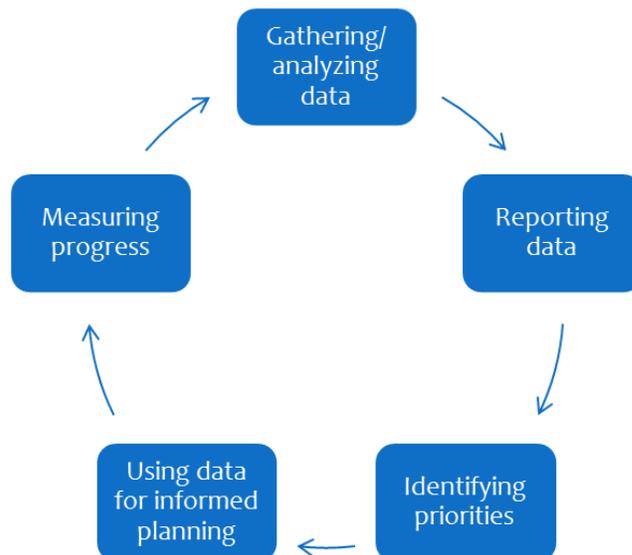
When race/ethnicity data are gathered, analysis may be further limited due to a lack of data stratification by more specific racial categories, such as U.S.-born versus foreign-born for the Latino population, or the many ethnicities and cultures represented in the category of Asian-Pacific Islander. There are limited data on disparate populations in the region however, as highlighted in later chapters, 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 particular 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.

The Role of Public Health Data and the Cycle of Assessment

Health assessment is a cyclical, data-informed process. Many organizations in Linn, Benton and Lincoln County are conducting assessments of some kind, on different timelines, and focused on diverse populations. Documents relating to this process are often called Community Health Assessments (CHA) and Community Health Improvement Plans (CHIP).

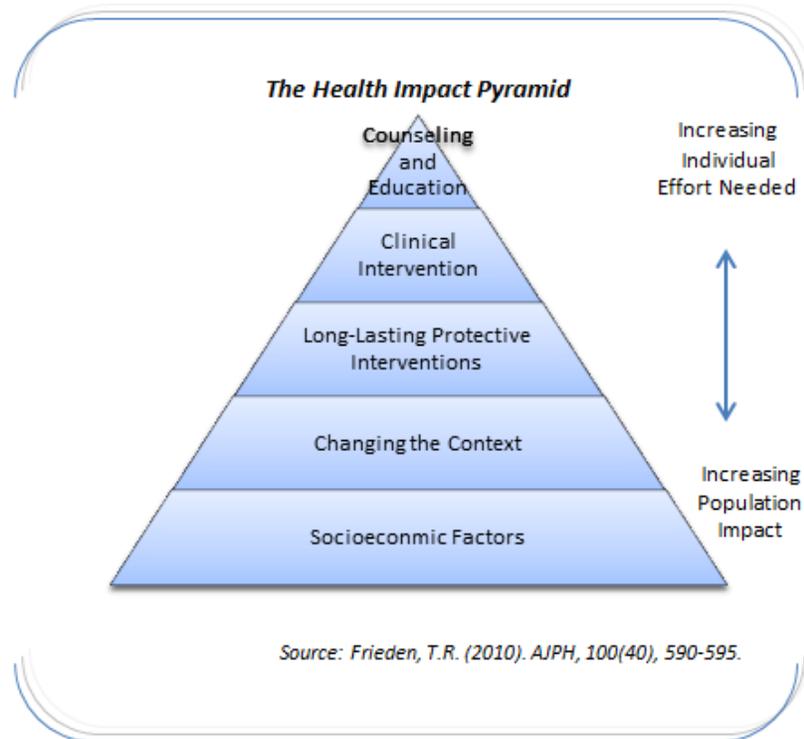
Shown below is a simplified 'cycle of assessment,' which helps to demonstrate the role that data (like the data included in this report) can play in the assessment process. Data can illustrate the health status and disparities within communities (needed for the CHA), and inform health priorities and measure progress (for the CHIP). In addition, data can be used to measure progress on projects and activities aimed at improving the health of the community.



A Framework for Public Health Action: The Health Impact Pyramid

Health is made up of many conditions and factors. Worldwide, a growing body of research reveals how conditions, and social and economic opportunities determine health outcomes.⁸

The Health Impact Pyramid⁹ framework, shown here, provides guidance for a comprehensive public health approach to community assessment and program development across multiple domains of behavioral influence. This model has been incorporated into the RHA to inform this assessment process. In this 5-tier pyramid, efforts to address socioeconomic factors are at the base, followed by public health interventions that change the context for health (e.g., smoke-free laws, safe parks, bike lanes), protective interventions with long-term benefits (e.g., immunization, smoking cessation) come next, followed by direct clinical care, and at the top, counseling and education. In general, public action and interventions represented by the base of the pyramid require less individual effort and have the greatest population impact overall.¹⁰ A similar model, called the Ecological or Social Ecology model, is used in a variety of disciplines in order to better understand the larger forces that impact individuals.¹¹



The movement from an understanding of health focusing on the individual to one focused on communities and systems is also evident in the development of the U.S. Department of Health and Human Services *Healthy People*.¹² *Healthy People 2020* is the most recent national 10-year agenda for improving health of all Americans with the goal of providing a framework for national, state and local health initiatives.

The Health Impact Pyramid aligns with the factors that the U.S. Department of Health and Human Services cite as influencing the development of healthy communities:

A healthy community is one that continuously creates and improves both its physical and social environments, helping people to support one another in aspects of daily life

and to develop to their fullest potential. Healthy places are those designed and built to improve the quality of life for all people who live, work, worship, and play within their borders- where every person is free to make choices amid a variety of healthy, available, accessible, and affordable options.¹³

These factors inform the selection of indicators the RHA team used to describe the health of residents, the neighborhoods in which they live, and the issues that most impact their well-being.

How to Use This Document

Timeframes for Data

This report attempts to balance the importance of comparing data from common years with the goal of presenting the most recent data. Different data sources update and release data on independent timeframes. The U.S. Census Bureau is the main source of data for demographic and socioeconomic information used in this report. The most recent data available for county-level demographic and socioeconomic data is the Census Bureau's American Community Survey (ACS) 2011-2013 three-year aggregates. This aggregation combines data from the three years in order to produce more accurate estimates.

In an effort to compare data from common years, many statistics reported are from 2013, even if more recent data is available. These statistics reflect measures of health that have historically changed gradually, so differences between 2013 and the present are likely to be minor. However, some measures of health have changed greatly in the past two years, such as the implementation of the Affordable Care Act in 2014, which had huge impacts on insurance coverage rates and Medicaid membership. In this case and for other rapidly changing measures, more contemporary data is reported in order to best reflect current health status and the current health system.

As with the ACS 2011-2013 3-year aggregates, many data sources aggregate statistics over a number of years to improve the reliability of the estimates. A common example of this is reporting the incidence (number of new cases) of cancer. For example, in the state of Oregon there were approximately 98,860 new cases of cancer in Oregon between 2008 and 2012. This statistic is reported as an incidence of 448 cases for every 100,000 people. This means that *each year*, for every 100,000 people in Oregon there were 448 cancer diagnoses. It does not mean that 448 cases per 100,000 people were diagnosed over the course of 5 years.

Regional and County-level Data

The RHA document is focused on the health status of the entire region of Linn, Benton, and Lincoln Counties. Therefore, whenever possible, data is presented that encompasses the three-county region. Important differences between counties exist and are identified when they represent a marked difference from the regional totals. This means that when county level data is not displayed, the regional totals are approximately representative of all three counties.

In the spirit of creating a regional understanding of health data, this document presents the most recent comparable data between the three counties. With differences in data collection from year to year, as well as differences in what is being measured, data can only be meaningful when compared between counties within the same time period. Meaning that if more recent data exist for one county, but not the others, those data are set aside in favor of data that can be compared between all three counties and aggregated to create a regional total.

For more information on time-trends, color-schemes and decisions around displaying regional and county-level data, please see the following 'Tables, Graphs, and Maps' section.

Benchmarking

Benchmarking is a very important tool in many fields, including public health. Benchmarking makes a comparison between data (in this case health status data) and a standard for best practice. In other words, benchmarking involves comparing a particular health status in our region, and what is possible for that health status. Major organizations like *Healthy People 2020* dedicate significant resources to providing benchmarks for use by local health authorities. As stated on their website, *Healthy People* has established benchmarks and monitored progress over time in order to:

- encourage collaborations across communities and sectors;
- empower individuals toward making informed health decisions; and
- measure the impact of prevention activities.

Healthy People 2020 has also taken a lead in developing a shared set of overarching goals for public health practice, which are listed in the following text.¹⁴

Healthy People 2020 Overarching Goals

- Attain high-quality, longer lives free of preventable disease, disability, injury, and premature death.
- Achieve health equity, eliminate disparities, and improve the health of all groups.
- Create social and physical environments that promote good health for all.
- Promote quality of life, healthy development, and healthy behaviors across all life stages.

Tables, Graphs, and Maps

When exploring the RHA document, a number of visuals are included to display data across the state, region, and counties. For consistency, color-coding has been used. Each county has been assigned a single color used throughout the document. Purple has been used as the color to designate data which covers the whole region (often in combination with individual county data), while teal is used for data restricted to state-level.

When working with time-trends, multiple years are included only when data was comparable across time. However, comparisons are not always possible, as methods for data collection can undergo significant changes.

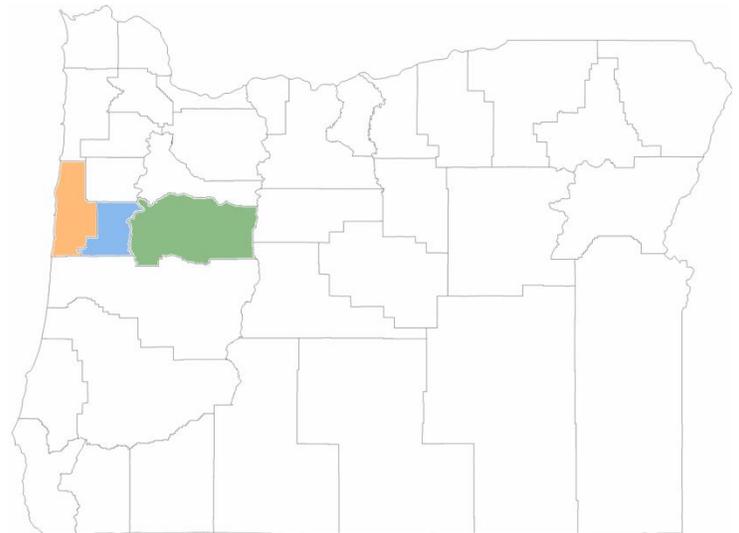
Some graphs and tables may not include certain geographies. As mentioned earlier, the counties are not included when their totals were similar and the region provided a good representation. Occasionally the regional total was not included, which meant it was not possible to aggregate the counties (usually because the data was age-adjusted at the county-level).

When creating all visuals, there were times that numbers were too small to be meaningful, or were small enough to be identifiable. In both of these cases, the data have been suppressed and it has been noted in the table, graph, or map accordingly. Finally, most maps included in this document require a full page, therefore narrative describing the data in the maps can be found in the pages before and after the maps.

Chapter 2

People

The history of Linn, Benton, and Lincoln Counties begin with the Native American tribes that have lived in the region for thousands of years. Native Americans lived in the valleys and the hills, along rivers and oceans.



Contact with non-native groups began with trappers and explorers in late 18th century, then with pioneers and settlers who moved to the Oregon Territory during the mid-1800s. In 1855, the United States established a 1.3 million acre reservation in what is now Lincoln County. The U.S. government moved many of the coastal and Willamette Valley tribes to this reservation, which at the time included Yaquina Bay. As a result, the areas that comprise Benton and Linn Counties developed without the presence of many Native American people, while Lincoln County was characterized by a larger Native American presence and interaction between Native Americans and immigrants.

Over the next 150 years, the three counties incorporated, grew in population, and developed strong local industries. Today, Linn County is a major agricultural producer, with additional industries in manufacturing and forestry. Oregon State Agricultural College, now Oregon State University, was designated as a land grant university in Benton County in 1868. The university is a major driver of economic and cultural activity in the region. In addition, Benton County is considered a regional health care hub, and is home to agriculture and technology industries. Natural resources are highly valued in Lincoln County. Industries such as commercial fisheries, logging, tourism, and agriculture are drivers of the local economy. The county is also home to state and national research centers and the Confederated Tribe of the Siletz Indians.

Health Disparities

In discussing residents of the region, it is important to recognize that specific subpopulations may experience worse health outcomes than the general population. These include: mental health consumers; individuals experiencing homelessness; rural residents; racial or ethnic minorities; those with low educational attainment; persons living in poverty; and lesbian, gay, bisexual, transgender, or queer (LGBTQ) persons, among other subpopulations.

For example, across the United States, rates of illness for adults in their 30s and 40s with lower incomes and education levels are comparable to affluent adults in their 60s and 70s. College graduates can expect to live at least five years longer than those who have not finished high school, and almost two years longer than those who did not finish college.¹⁵ People with mental health conditions and/or substance abuse issues in Oregon lose an average of 34.5

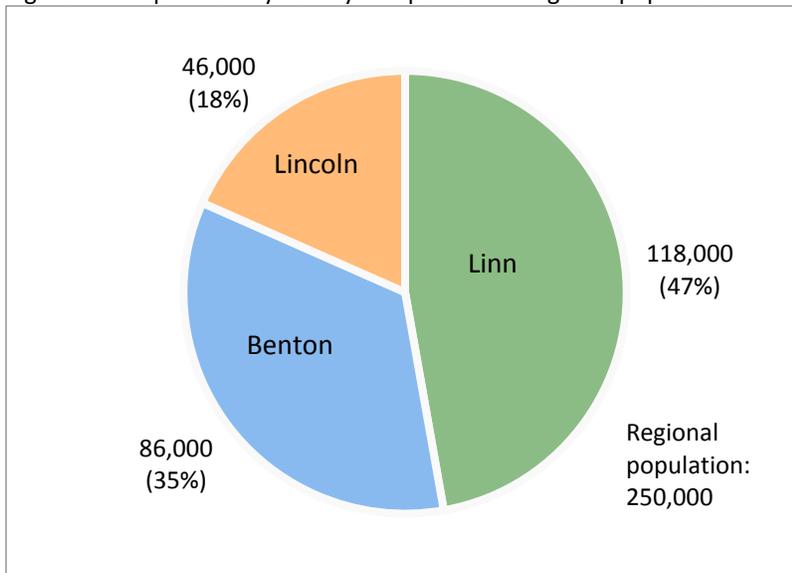
potential life years.¹⁶ Understanding health disparities in the context of the region is critical to improving health across the region.

This chapter serves as the foundation for understanding the different characteristics of the people in the region. Permanence of residency has important effects on health. However, currently there are no data detailing the mobility of residents within the region or into and out of the region. Consequently, it is more difficult to provide an accurate picture of changing population dynamics. Nevertheless, thanks in part to comprehensive data collected by the U.S. Census Bureau, we do have a strong understanding of the majority of residents of the region. This chapter will detail the regional population, its population distribution, population centers, and population characteristics of age, gender, race, ethnicity, disability and diversity.

Population Overview

The Linn, Benton, and Lincoln County region is home to approximately 250,000 residents.¹⁷ Linn County is the most populous county in the region, representing 47 percent of regional residents (Figure 2.1). Benton County is home to 35 percent and Lincoln County accounts for 18 percent of the region's population. When looking at regional data, it is important to note these differences.

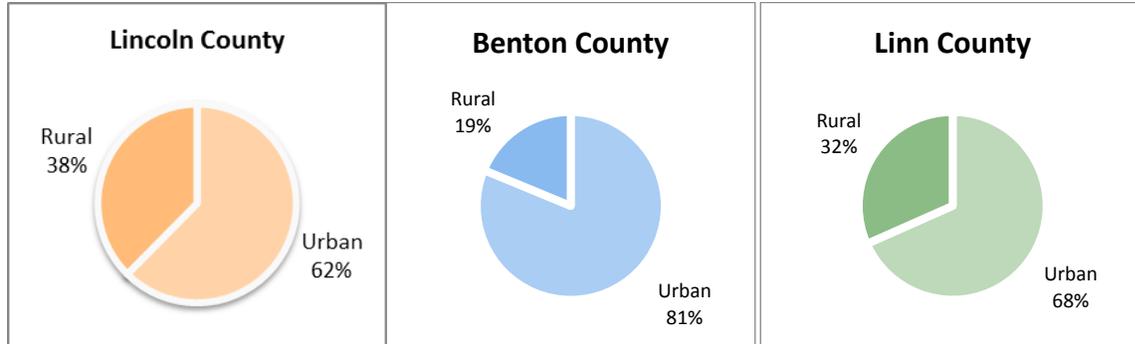
Figure 2.1: Population by county and percent of regional population



Source: U.S. Census Bureau American Community Survey, 2011-2013, Table DP05

Approximately 153,000 residents (61 percent) live in the six most populated cities of the region. Over 28 percent of individuals live in rural residences throughout the region.¹⁸ Benton County is the least rural county, with approximately 19 percent of residents living in rural areas (Figure 2.2). Thirty-two percent and 38 percent of households are rural in Linn and Lincoln Counties, respectively. This rural geography often isolates families through their limited daily interactions with other residents. Isolation is increased by limited public transportation options as well as the variable cost of gasoline.

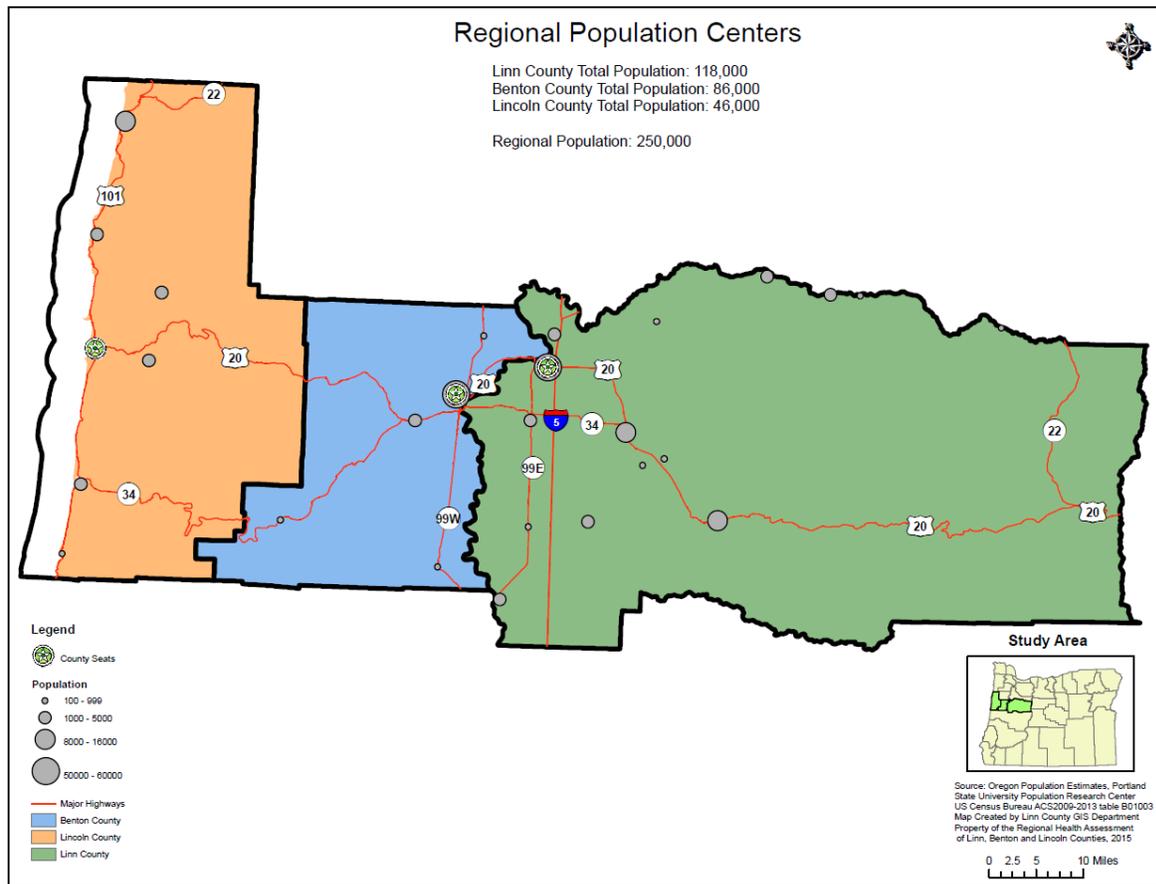
Figure 2.2: Urban versus rural population of Linn, Benton, and Lincoln Counties



Source: U.S. Census Bureau, 2010 Decennial Census, Table P2

Map 2.1 shows the distribution of population centers in the region. The county seats of Newport (Lincoln County), Corvallis (Benton County), and Albany (Linn County) are the largest cities within each county. Additional major population centers include Lincoln City in Lincoln County and Lebanon and Sweet Home in Linn County.

Map 2.1: Population centers in Linn, Benton, and Lincoln Counties, 2011-2013



Source: Portland State University 2015 population estimates

In 2013, there were 98,214 households in the tri-county region. Of those households, 45 percent, 34 percent, and 21 percent were in Linn, Benton, and Lincoln Counties, respectively.¹⁹ Household distribution follows roughly the same pattern as overall population distribution across the region. The average household size is 2.5 people. Linn County has the largest average household size at 2.6 people per household, compared to Benton County at 2.4 and Lincoln at 2.2. Families made up 63 percent of the total households. This figure includes both married couple families and other family households.²⁰ Regionally, 49 percent of households consist of married couple family households. Among persons 15 years of age and older, 51 percent of males and 48 percent of females are currently married.²¹ Benton County's married population is about 8 percent lower than Linn and Lincoln counties.

Non-family households made up 37 percent of all homes in the region. Most non-family households are composed of people living alone, but some are people living in households in which no one is related to the head of household.²² Benton County has over 10 percent more non-family households than the other two counties in the region. This may be because of the sizeable student population attending Oregon State University in Corvallis.

In the tri-county region, 27 percent of all households have one or more people under the age of 18. Linn County leads the region with 31 percent of households containing minors; Benton and Lincoln have 24 percent and 21 percent, respectively. Twenty-nine percent of regional households have one or more people 65 years and over. This number is largest in Lincoln County (38 percent), with Linn and Benton Counties trailing at 30 percent and 24 percent, respectively.²³

Student Population

There are three institutions of higher learning in the region: Oregon State University (OSU), Linn-Benton Community College (LBCC) and Oregon Coast Community College (OCCC). Oregon State University (OSU) is located in Corvallis, with 21,147 students enrolled as of spring 2014.²⁴ Linn-Benton Community College (LBCC) is based out of Albany, with additional campuses in Corvallis, Lebanon, and Sweet Home. LBCC had 20,419 students enrolled in the 2013-2014 school year.²⁵ Just under one third of LBCC students are enrolled in Benton County, with the other two thirds attending Linn County campuses. Considering dual enrollment with OSU and LBCC student populations, these figures may be subject to a small portion of double counting. Oregon Coast Community College (OCCC) has locations in Lincoln City, Newport, and Waldport, all of which are in Lincoln County. In the 2013-2014 academic year 1,856 students were enrolled at OCCC.²⁶

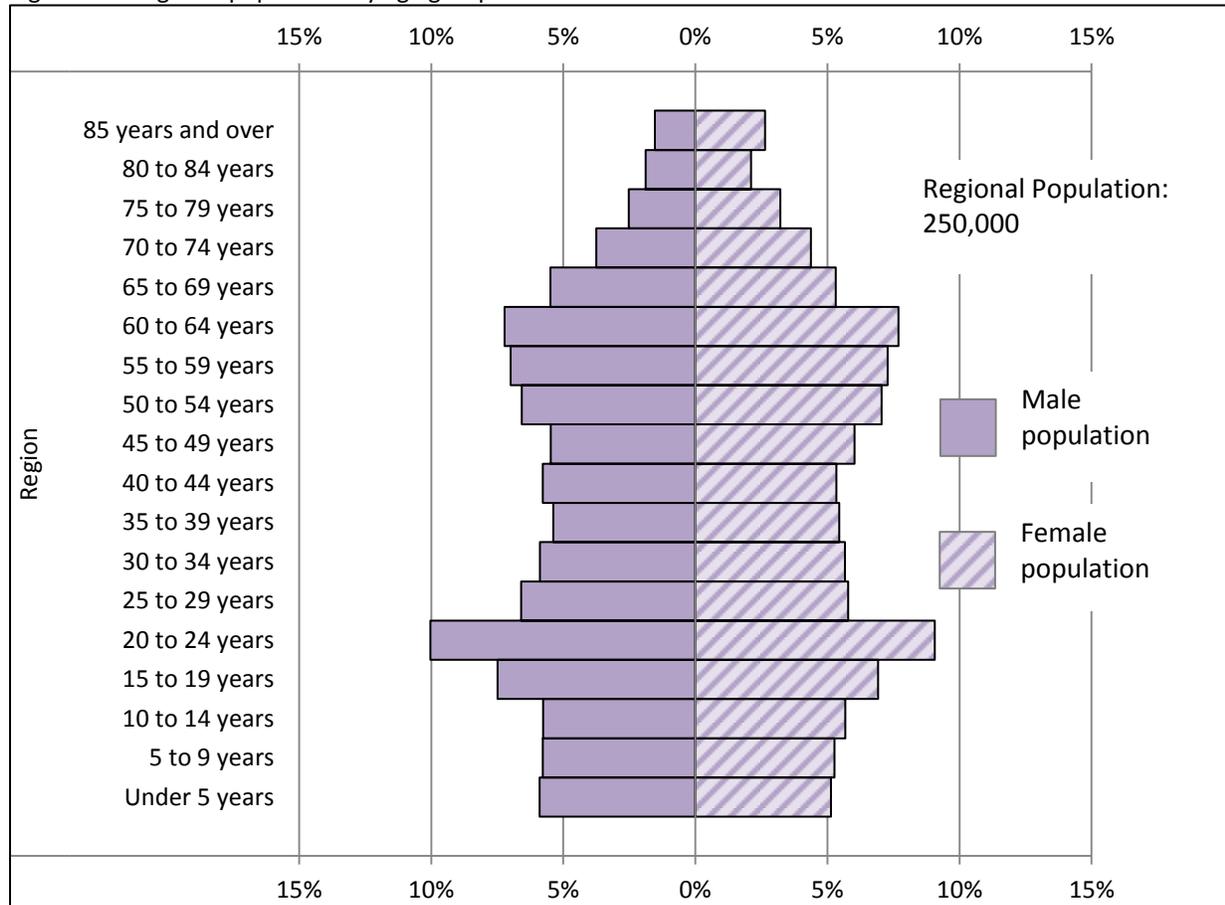
Veterans

The 2009-2013 American Community Survey (ACS) report the veteran population in Linn, Benton, and Lincoln Counties at 11,747; 5,561; and 5,793, respectively.²⁷ Veterans are defined as men and women who have previously served on active duty in the U.S. Army, Navy, Air Force, Marine Corps, Coast Guard, or who served in the U.S. Merchant Marine during World War II.²⁸ This amounts to a total of 23,101 individuals with veteran status, approximately 9 percent of the tri-county civilian population ages 18 years and older. As this population ages, the number of individuals with veteran status is expected to decrease over time.

Demographics: Population by Age and Sex

Based on U.S. 2013 Census data, the percentage of males and females in the tri-county region is approximately equal in most age groups.²⁹ Within the tri-county region, the age group of children under 18 years of age constitutes 20.3 percent of the population and the age group of adults 65 years and older constitutes 16.4 percent of the population. The median age in Linn, Benton, and Lincoln Counties, respectively, is 39 years, 33 years, and 50 years.³⁰ From 2000 to 2014, the population of the region grew 11.7 percent, from 225,701 to 250,920.^{31,32}

Figure 2.3: Regional population by age group



Source: U.S. Census Bureau, American Community Survey 3-year estimates, 2011-2013, Table S0101

The regional age distribution can be seen above in the form of a population pyramid (Figure 2.3). Nineteen percent of the total population is in the 20-24 year range, with another bulge in the 50-70 year age ranges. This unusual distribution can be explained once the counties are viewed individually. Young adults between 15 and 24 years of age make up a very large proportion of Benton County's population (32 percent), presumably due to the large university presence in Corvallis. Lincoln County is a known retirement location and its population reflects the trend of an older population. Approximately, 22 percent of its population falls within the 60-64 year range. Linn County, which is the largest contributor to the overall regional population, has a remarkably uniform age distribution in comparison, but all three counties have large elderly populations in terms of raw numbers. Figure 2.4 shows the 2013 population pyramids for the three counties.

Figure 2.4: Population pyramids of Linn, Benton, and Lincoln Counties



Source: U.S. Census Bureau, American Community Survey 3-year estimates, 2011-2013, Table S0101

Growing Diversity

Native and Foreign Born

In 2013, 94 percent of the people living in the tri-county region were native residents of the United States. Fifty-two percent of these residents were born in Oregon. Approximately seven percent of the people living in the tri-county region are foreign born. Of the foreign born population, 3 percent are naturalized U.S. citizens. Ten percent of foreign residents entered the country after the year 2009 and 96 percent of these recent immigrants live in Benton County.³³ Oregon State University has a large international student population, which likely contributes to this figure.

Race/Ethnicity

With an increasingly global view of health and a stronger understanding of research outlining the social constructs of race and ethnicity, a culturally sensitive definition of race should be considered. In order to do so, and following the CDC Office of Minority Health's lead, populations defined by race and ethnicity will more generally be referred to as 'specific population groups'. Mandated in 1997 by the Office of Management and Budget, data presented by the U.S. Census Bureau and the American Community Survey follow the U.S. Office of Management and Budget updated guidelines for race and ethnicity reporting. This update provided for the inclusion of individuals to self-identify as two or more races in the 2000 Census. It came after recognition and advocacy of race as a social construct and to include missed populations who identified with more than one racial category.³⁴ The inclusion of individuals to self-identify as two or more races has been adopted almost universally across other agencies collecting and reporting demographic data. It is important to understand the data for individuals along the lines of racial divide as later issues of health disparities will be presented. Without understanding the populations impacted by these health disparities, health authorities would be limited in their ability to address the specific issues creating the disparities.

U.S. Office of Management and Budget defines race and ethnicity categories accordingly:

White – people having origins in Europe, the Middle East, or North Africa.

Black or African-American – people having origins in the black racial groups in Africa.

Asian – people having origins in any of the original peoples of the Far East, Southeast Asia or the Indian subcontinent.

Native Hawaiian or Other Pacific Islander – people having origins in any of the original people of Hawaii, Guam, Samoa, or other Pacific Islands.

American Indian or Alaska Native – people having origins in any of the original peoples of North or South America (including Central America), and who maintain a tribal affiliation or community attachment.

Multiracial – people having origins in two or more of the federally designated racial categories.

Hispanic or Latino – a person of Cuban, Mexican, Puerto Rican, South or Central America, or other Spanish culture or origin, regardless of race.³⁵

In this report, the non-Hispanic categories are used for races, so, for example, the category denoted White includes white, non-Hispanic individuals.

As shown in Table 2.1, the largest ethnic population in the three counties is Latino (7.7 percent).³⁶ The Latino population increased by three percent from 2000 to 2011.^{37,38,39} The largest non-White racial group in the tri-county region is Asian (2.8 percent). However, this proportion is attributable mostly to Benton County, where 5.8 percent of residents are Asian. In Lincoln and Linn Counties, the predominant non-white racial group is American Indian and Alaska Native (2.7 percent and 1.7 percent, respectively). In general, the region’s population is less diverse than that of the state of Oregon (Figure 2.5).

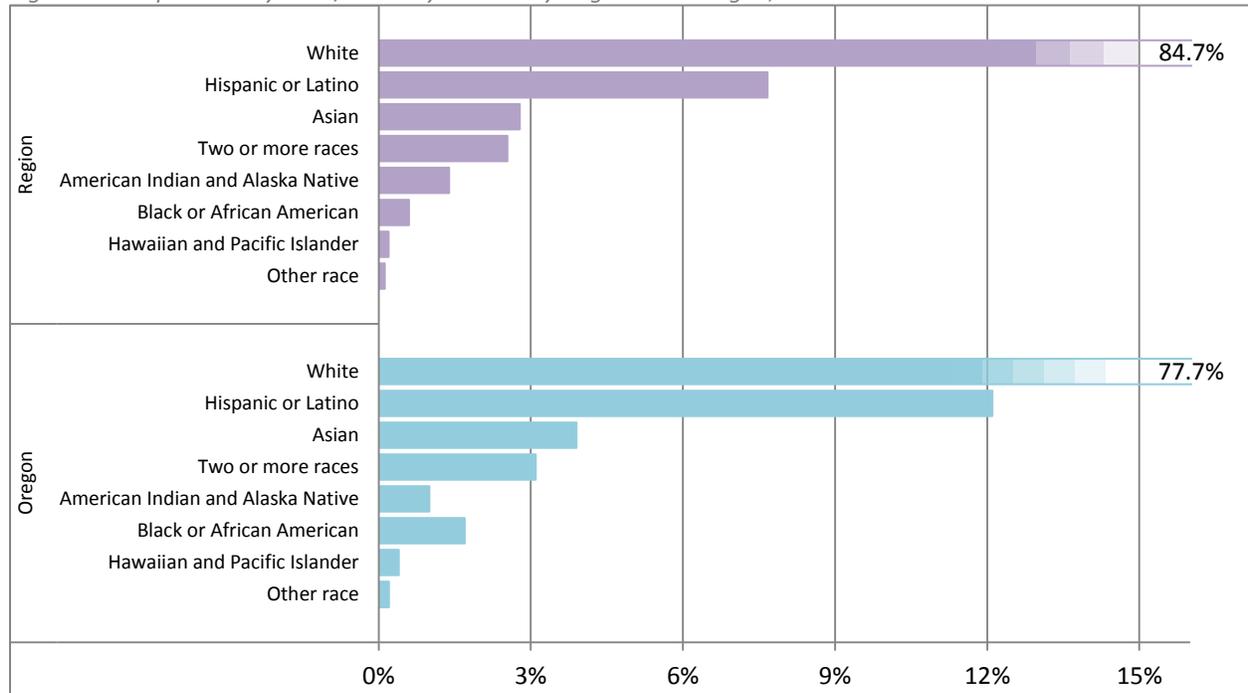
Table 2.1: Population by Race/Ethnicity Tri-County Region and Oregon, 2011-2013*

Race and Ethnicity	Region		Oregon
	Total Population	Percent	Percent
White	212,510	84.7%	77.7%
Hispanic or Latino	19,250	7.7%	12.1%
Asian	6,987	2.8%	3.9%
Two or more races	6,373	2.5%	3.1%
American Indian and Alaska Native	3,480	1.4%	1.0%
Black or African American	1,509	0.6%	1.7%
Hawaiian and Pacific Islander	500	0.2%	0.4%
Other race	311	0.1%	0.2%

Source: U.S. Census Bureau, American Community Survey 3-year estimates, 2011-2013, Table DP05

*Columns may not sum to 100% due to rounding error

Figure 2.5: Population by Race/Ethnicity Tri-County Region and Oregon, 2011-2013



Source: U.S. Census Bureau, American Community Survey 3-year estimates, 2011-2013, Table DP05

Native American Population

The Confederated Tribes of Siletz Indians are an important presence in the area and possess a rich history. The Confederated Tribes of the Siletz Indians is headquartered in Siletz, Lincoln County. The Tribe lists 5,001 members in its registry. This includes 720 members residing in Siletz, with an additional 444 members elsewhere in Lincoln County. Beyond Lincoln County, 174 members live in Linn and Benton Counties, and approximately 2,000 additional members live throughout Oregon.⁴⁰ The Tribe maintains a Federal Tribal Community Health Clinic and a USDA Food distribution center in Siletz. The Tribe also owns and operates the Chinook Winds Casino Resort in Lincoln City.

Now a federally recognized confederation of 27 bands, the Siletz tribes originated from the area spanning from Northern California to Southern Washington. The Tribe’s population was concentrated along the coastal areas of Lincoln, Tillamook, and Lane Counties. Termination was imposed upon the Siletz by the United States government in 1955. In November of 1977, they were the first tribe in the state of Oregon and second in the United States to be fully restored to federal recognition. In 1992, the Siletz tribe achieved self-governance. Self-governance allowed for direct agreements to be made with the US Government, ensuring control and accountability over tribal programs and funding, including provision of health services.⁴¹

The Siletz tribe occupies and manages a 3,666 acre reservation located in Lincoln County, including valuable resources of water, timber and fish. Geographically, this reservation is

contiguous with the city of Siletz on its east side and lies to the north and southeast of the city as well.⁴²

Other Native American residents of the region include members of the Confederated Tribes of Grande Ronde, which is headquartered in Polk County, north of Benton County and east of Lincoln County. Members of other Native American tribes based in Oregon and the United States also live in the region.

K-12 Population

During the 2013-2014 school year, the 12 school districts of the tri-county region served 36,677 students. These students include kindergarten through 12th grade in 88 public schools. This represents an increase in the number of students by 3.6 percent since 2010.⁴³ These statistics do not include private schools or homeschooled students. In Table 2.2 below, the racial and ethnic diversity for the county school districts are presented.

Table 2.2: Linn, Benton, Lincoln County School Districts and Regional Total by race/ethnicity, 2013-2014

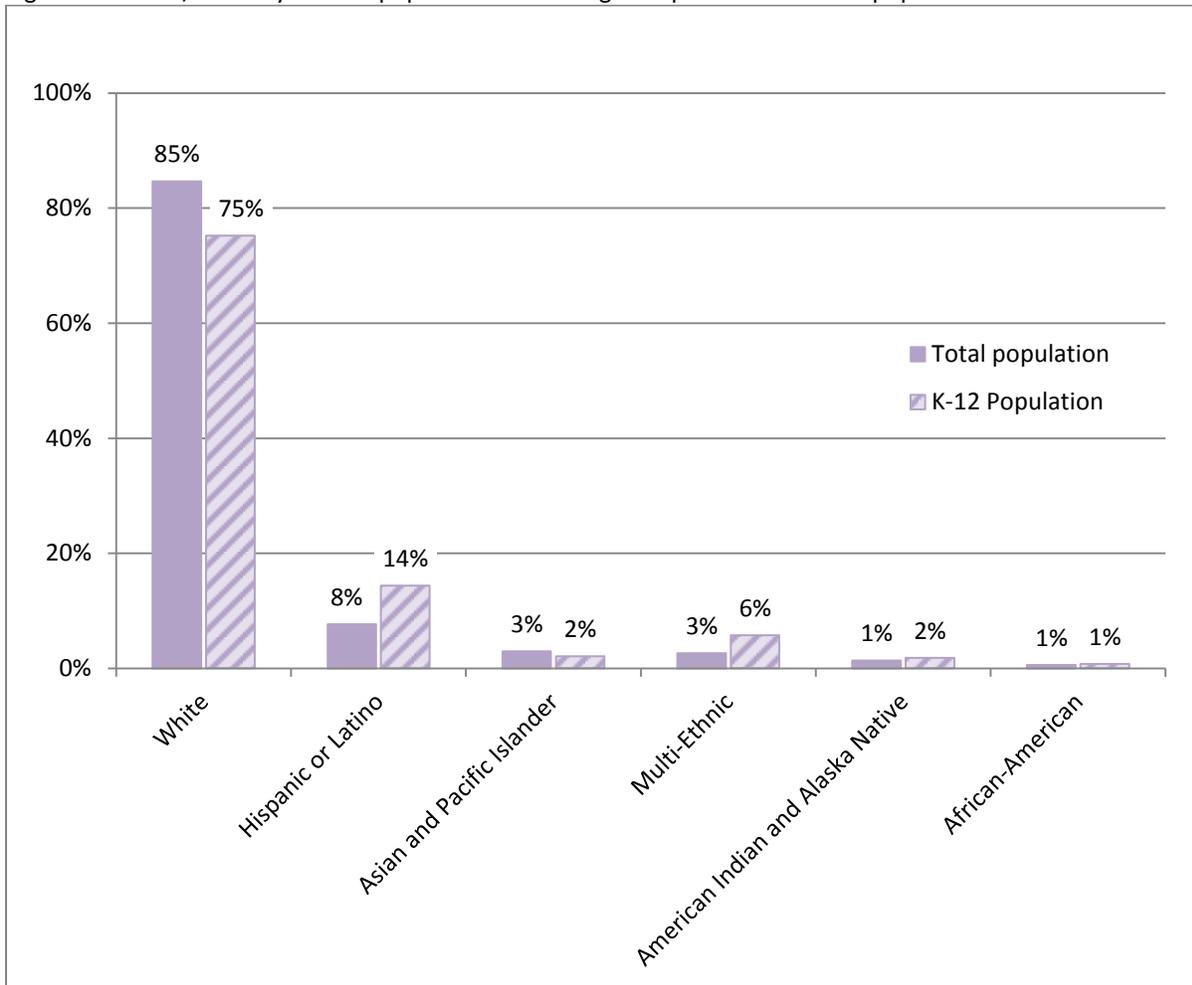
County	White	Hispanic/ Latino	Asian Pacific Islander	Multi- Ethnic	American Indian/ Alaskan Native	African American	Total Minority
Linn County Total	78.2%	13.5%	1.1%	5.3%	1.1%	< 1.0%	21.8%
Benton County Total	72.8%	14.2%	5.1%	6.1%	< 1.0%	< 1.0%	27.3%
Lincoln County Total	66.4%	18.5%	8.6%	6.9%	6.3%	< 1.0%	33.7%
Region Total	75.2%	14.4%	3.1%	5.7%	1.8%	< 1.0%	24.8%

Source: Oregon Department of Education, Student Ethnicity statistics, academic year 2013-2014

The K-12 population shows significantly higher racial and ethnic diversity than the regional population as a whole, particularly for Hispanic/Latino, American Indian/Alaska Native, and multi-ethnic* populations (Figure 2.6). The American Indian/Alaska Native population is much greater in the Lincoln County school district than in the other two counties; 6.3 percent, compared to less than one percent in Benton County and 1.1 percent in Linn County. The Oregon Department of Education uses a different racial/ethnic classification system than the U.S. Census Bureau; in particular, it aggregates Asian and Hawaiian or Pacific Islander into one group, and does not include a category for “Other race”.

* The Oregon Department of Education uses different race and ethnicity classifications than the Office of Management and Budget; therefore, the names of the groups are different in this section than in the rest of this chapter.

Figure 2.6: Race/Ethnicity of total population versus regional public school K-12 population

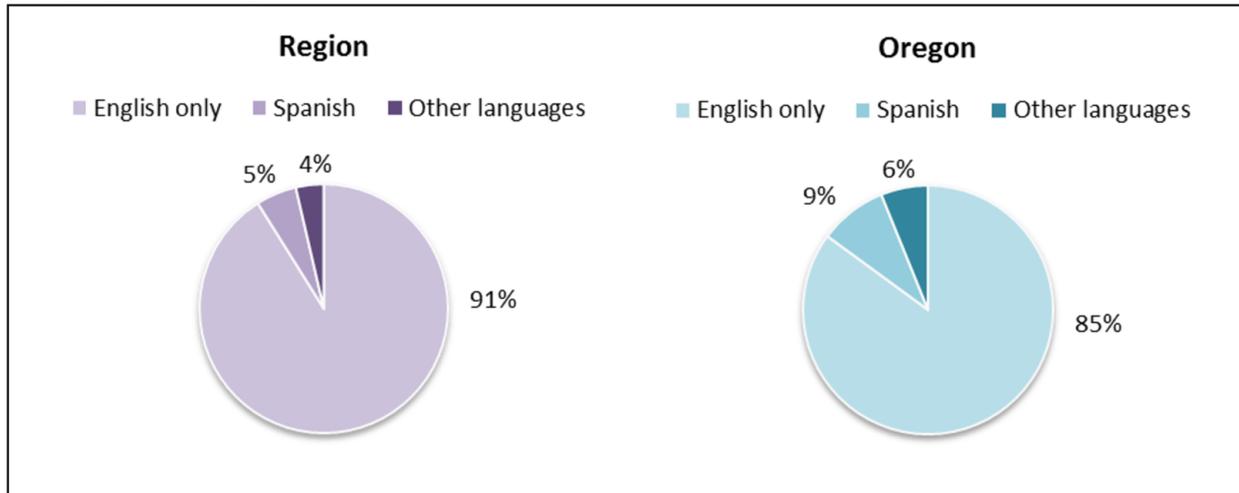


Sources: Oregon Department of Education, Student Ethnicity statistics, academic year 2013-2014
 U.S. Census Bureau, American Community Survey 5-year estimates, 2009-2013, Table DP05

Language Spoken at Home

2011-2013 U.S. Census data for the region reports that 9 percent of regional residents who are at least 5 years old spoke a language other than English at home (Figure 2.7). Of those speaking a language other than English at home, 59 percent spoke Spanish and 41 percent spoke some other language. This means that, after English, Spanish is the most frequently spoken language at home in the tri-county region. This is consistent in Linn (74 percent) and Lincoln Counties (79 percent) as well. In Benton County, however, only 41 percent of those speaking a language other than English spoke Spanish, indicating a greater diversity of spoken languages. Across the region, 30 percent of the population reported that they did not speak English “very well”. This number was higher in Lincoln County (42 percent) than in Benton (29 percent) or Linn (27 percent) Counties. In comparison with the region, 15 percent of Oregon residents at least 5 years old speak a language other than English in the home, and of those residents, 42 percent reported that they did not speak English “very well”.⁴⁴

Figure 2.7: Percentage of the population 5 years and over who speak English, Spanish, or another language; three county region and Oregon 2011-2013



Source: U.S. Census Bureau, American Community Survey, 2011-2013, Table DP02

Disabilities

Understanding and measuring disability is a very complex task. The complexity comes from the fact that the definition of “disability” includes a number of populations, and because the definition is still being discussed and further developed. Definitions of disabilities from a source such as the World Health Organization (WHO) can help shed light on the particular health issues facing these populations, but it must be noted that this definition is not the same as that used to gather many types of data.

Disability itself is not an indicator of poor health—rather, disability can (and often does) become a barrier to employment, adequate housing, social inclusion, transportation, access to health care, and other essential components of a healthy life.

According to the World Health Organization,

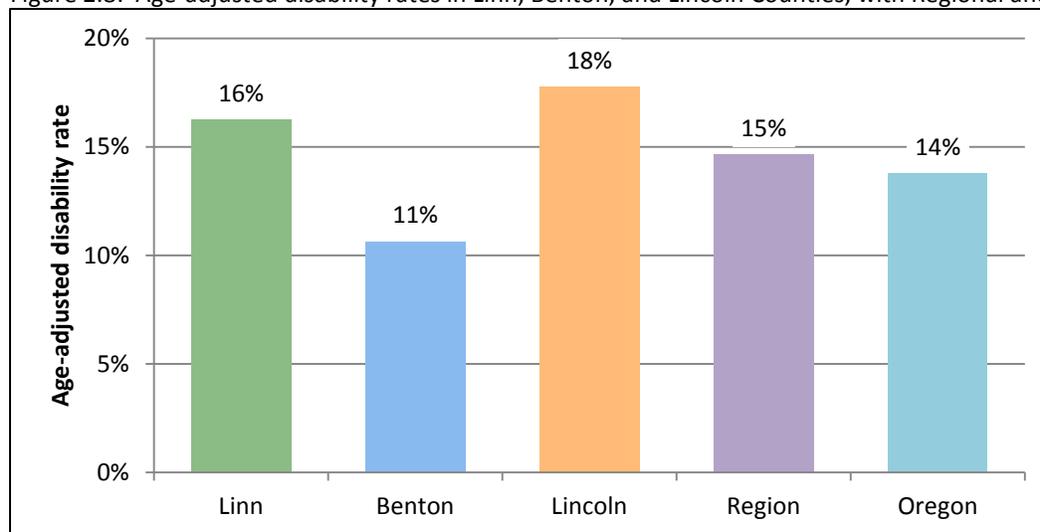
Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person’s body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers.⁴⁵

Mental illness, that substantially limits one or more major life activities, is also included in definitions of disability.⁴⁶ This is particularly worth noting, as institutionalized populations generally experience a greater prevalence and severity of mental illness than the broader population. However, these populations are not captured in much of the data collected around disability.⁴⁷

From 2011 to 2013, among the civilian non-institutionalized population, approximately 15 percent reported a disability in the three-county region,⁴⁸ where *disability* is defined as a person's risk of participation limitation when he or she has a functional limitation or impairment.⁴⁹ Disability encompasses many different conditions; for instance, the most common disability in the region among those aged 5-64 is cognitive difficulty, with ambulatory difficulty ranking the highest for the 65 and older population. The prevalence of disability increases with age, from 5 percent of people under 5 years of age, up to 12 percent 18 to 64 years of age, and 38 percent of those 65 and over. Age adjusted disability rates are 15 percent in the region (compared to 14 percent in Oregon as a whole), with Benton at 11 percent, Linn at 16 percent, and Lincoln at 18 percent (Figure 2.8).

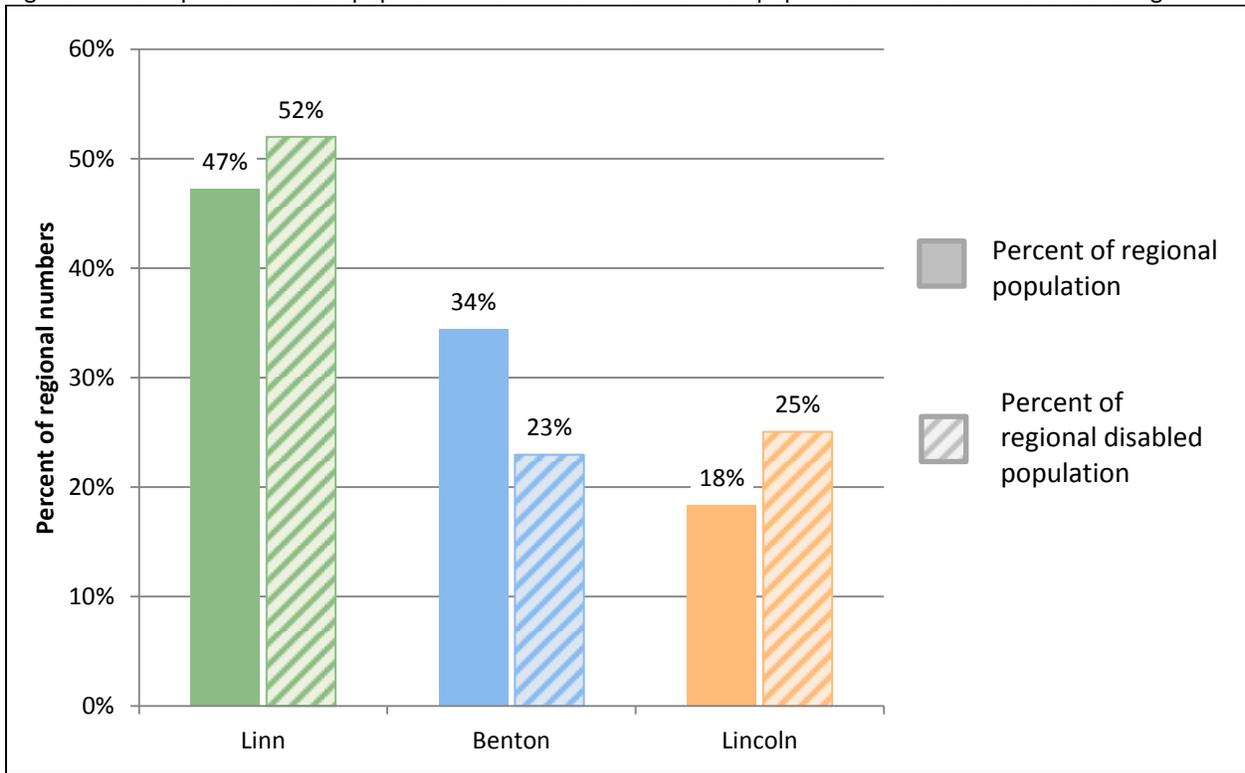
Figure 2.8: Age-adjusted disability rates in Linn, Benton, and Lincoln Counties, with Regional and State averages



Source: U.S. Census Bureau, American Community Survey 5-year estimates, 2009-2013, Table S1810

While Lincoln County has the highest age-adjusted disability rate in the region, Linn County has the largest number of disabled persons. Fifty-two percent of people with disabilities in the region live in Linn County, compared with 23 percent in Benton County and 25 percent in Lincoln County. This distribution is not the same as the overall distribution of the population; in particular, Linn and Lincoln Counties have proportionately larger disabled populations and Benton County has a proportionately smaller disabled population. Figure 2.9 illustrates these data.

Figure 2.9: Comparison of total population distribution with disabled population distribution across the region



Sources: U.S. Census Bureau, American Community Survey 5-year estimates, 2009-2013, Table S1810; U.S. Census Bureau, American Community Survey 3-year estimates, 2011-2013, Table DP02

Native Americans have the highest crude disability rate by race/ethnicity, at 19 percent in the region. African Americans have the next highest, with 17 percent of the population reporting a disability. The disability rate among Caucasians is 15 percent, with 11 percent for Pacific Islanders, 8 percent among Hispanic/Latinos, and 6 percent in the Asian population. Among those reporting two or more races, the regional crude disability rate is 1.1 percent, and those reporting a race of other have a 10 percent rate.⁵⁰

Aging Population

Among those living in the Tri-county region, 16 percent are 65 years of age and over, compared with 15 percent in Oregon overall.⁵¹ In particular, over 23 percent of Lincoln County residents are 65 and over. A number of health issues, needs, and concerns are associated with an aging population.

Ninety-five percent of adults in the region over 65 years of age are white and non-Hispanic.⁵² Of older adult households, 19 percent are renters and 42 percent of households have only one resident. Seven percent of aging residents live below the poverty line, and 10 percent of 65+ households receive Food Stamps/SNAP benefits. This population faces higher rates of disability

than other age groups, with a rate of 38 percent. Civilian veterans make up 27 percent of this group and 28 percent of adults aged 65 or older hold a bachelor's degree or higher.

Conclusion

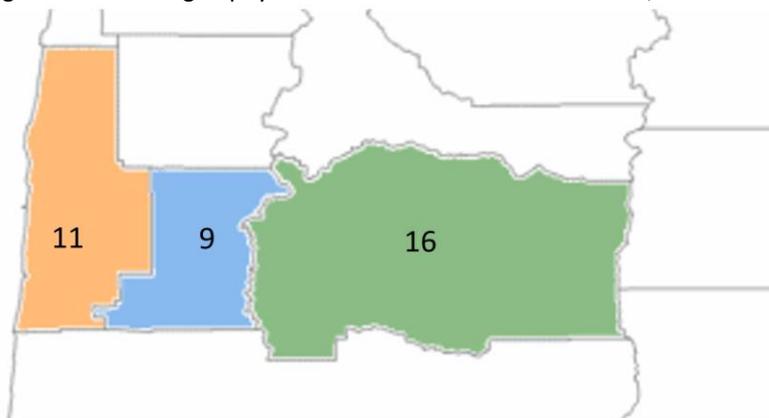
In order to understand the health of the region, it is vital to understand the people who live here. Differences in age, race or ethnicity, and geography all influence health. Vulnerable populations, such as individuals with disabilities or older adults, merit further description, both because they may require different services, and also because they may present different health concerns. The people of Linn, Benton, and Lincoln Counties are growing more diverse and represent many different groups, such as students, Native Americans, and retirees. The history of the region has shaped the residents of the three counties into its makeup today. In exploring the many determinants of health, it is evident that the people of Linn, Benton, and Lincoln Counties are deeply connected with the environments in which they live. The next chapter explores these environments and the effects they have on the health of the region.

Chapter 3

Environment

Human beings interact with their environment in everything they do. Some of these interactions have the potential to improve health, while others can negatively impact it. The natural environment is made up of the interactions of air, water, open spaces, and weather or geologic activity. The human-made environment consists of homes, communities, and infrastructure. These two environments are closely linked in their effects on human health. Humans benefit from clean water and air, places to exercise and enjoy the outdoors, safe living and working spaces, and opportunities to engage in healthy behaviors such as active commuting and consuming healthy food. However, when an environment lacks these characteristics, the complex interactions of health and environment can worsen health issues. Poor air quality can raise the risk of asthma, heart attack, or stroke;⁵³ poorly designed communities can limit opportunities for recreation or access to quality food;⁵⁴ and infrequent but intense natural disasters can disproportionately affect vulnerable populations.

Figure 3.1: Ranking of physical environments within the state, out of 34 ranked counties, 2015



Source: County Health Rankings, 2015

Linn, Benton, and Lincoln Counties have many similarities in their strengths and challenges, in regards to environmental factors. They have active populations that value open spaces for recreation, clean air, and clean water, while at the same time the counties face many food access and transportation issues. They also exhibit some clear geographical differences, with Lincoln County's coast and Linn County's Cascade Range dominating much of their recreation and natural environment, and Benton County's location in between. An understanding of the natural and human-made environments forms a foundation for an analysis of the health of the region.

Natural Environment

The natural environment changes slowly and usually influences health through long-term, cumulative effects. As a result, many of the data described in this section use longer time frames than elsewhere in this report. Furthermore, unlike many other determinants of health, it can be very difficult or impossible for individuals or health professionals to influence the natural environment on a local scale. Examples include global climate change or natural disasters. What can be controlled are the systems and practices put in place to react and adapt to the natural environment in order to improve health.

Terrain and Natural Resources

The area of the region comprising Linn, Benton, and Lincoln Counties is 3,944 square miles and spans from the Pacific coast to the top of the Cascade Mountain Range.^{55,56,57} The three-county region is bordered to the south by Lane County, to the north by Tillamook, Polk, and Marion Counties, and to the east by Jefferson and Deschutes Counties. Primary land cover types include mixed Douglas-fir coniferous forests, oak savannahs, agricultural land, and coastal temperate rainforests. Elevations range from sea level along the Lincoln County coast to the second highest peak in Oregon, Mount Jefferson (10,497 feet), on the eastern border of Linn County.

Linn County makes up over 58 percent of the region with 2,290 square miles of land. Situated in the middle of Willamette Valley and ascending the western slopes of the Cascades Mountain Range, the climate and soils in Linn County create ideal agricultural conditions. The county produces a variety of specialty crops and is the nation's leader in ryegrass production. Linn County is also home to major producers of rare and primary metals as well as the traditional logging and wood products industries.⁵⁸ Linn County is bordered to the west by the Willamette River, which also forms the eastern boundary of Benton County.

Benton County is the smallest county by land mass, covering just over 17 percent of the region with 676 square miles. Also located in the mid-Willamette Valley, its rich agricultural and forest land, mountains, valleys, rivers and wetlands are highly prized economically, culturally, recreationally, environmentally and aesthetically. The western side of Benton County climbs into the Coast Range, where the highest point in Benton County, Mary's Peak (4,097 feet), is located.

Taking up just over one quarter of the region's total landmass at 980 square miles, Lincoln County is located on the central Oregon Coast between the Pacific Ocean to the west and the Coast Mountain Range to the east. Natural resources are highly valued in Lincoln County; many residents depend on commercial fisheries, logging, tourism, and coastal agriculture. Newport is home to one of the most important fishing ports in the United States. It is also utilized by many local agencies including the U.S. Coast Guard, the National Oceanic and Atmospheric

Administration, Oregon Department of Fish and Wildlife, and Oregon State University, among others.

Annual Weather Patterns

Lincoln County's location along the Pacific Coast moderates its annual weather patterns. Temperatures typically range from 40 to 80 degrees Fahrenheit over the course of the year.⁵⁹ There is an average of 187 days of precipitation per year, which falls as rain in most of the county year round. Lincoln County receives an average of between 70 and 100 inches of rain per year depending on location, with 30 or more heavy rainfall events (one or more inches per day) in some parts of the county.

In contrast to Lincoln County, Benton and Linn Counties experience more seasonal variation, with hot, dry summers, and cold, wet winters. On average, 44 inches of rain fall per year in the valley and 75 inches in the mountains, some of which falls as snow or ice. Most of the counties' annual precipitation occurs from October to March. Temperatures frequently dip below freezing from November through April in the lower elevations, while highs above 90 degrees Fahrenheit are common in July and August. In the higher elevations of the Cascade Range, precipitation has historically fallen as snow or ice from November through April, although recent years have seen a shift toward rain.^{60,61,62}

Recreation and Outdoor Spaces

Linn, Benton, and Lincoln Counties are favored with a great variety of recreational assets and outdoor spaces. The large geographic area, from the Pacific Ocean to the crest of the Cascade Range, hosts an extremely diverse set of environments.

Lincoln County's coastline stretches 60 miles from south to north, encompassing beaches, headlands, tide pools, and estuaries. The shallow and deep ocean off the coast of Lincoln County is frequented by recreational and commercial fishers. In 1913, the governor of Oregon declared all beaches a public highway, which began a legacy of public access to the oceanfront. In 1967, the state legislature mandated free and uninterrupted use of the beaches along Oregon's 362-mile coastline.⁶³ Along the coastline, there are a large number of state parks with camping and day-use areas, as well as Beaver Creek State Natural Area south of Newport. Farther inland, the Siuslaw National Forest covers 172,000 acres in Lincoln County and an additional 18,000 acres in Benton County. The forest is networked with hiking trails and hosts deer and elk hunts. Many Lincoln County rivers are open to seasonal fishing, including the Yaquina, Alsea, Siletz, and Salmon.

Benton County's open spaces stretch from the highest peak in the Coast Range (Mary's Peak) to the Willamette River. Mary's Peak (4,097 feet) is situated in the Siuslaw National Forest. It hosts many hiking trails, which are also open to mountain bikes and horses. Mary's Peak is also

the source of the Rock Creek Watershed, which provides much of the drinking water to Corvallis, and Mary's River, which is the source of Philomath's drinking water. Near Alsea, the Alsea Falls Recreation Site (managed by the Bureau of Land Management), is a popular hiking and day-use area. Recently a network of mountain biking trails was constructed for novice and experienced mountain bikers within the Alsea Falls Recreation Site. The most popular large recreation site in Benton County is the McDonald-Dunn Research Forest, which is owned and managed by Oregon State University. It runs along a ridge of the Coast Range that extends along the northern edge of Corvallis. The 11,250 acre forest has 175,000 visits per year and hosts cross-country races in the spring and fall.⁶⁴ South of Corvallis, the Finley National Wildlife Refuge was established in 1964 to provide overwintering habitat for dusky Canada geese. The 5,325 acre refuge hosts some of the last wet prairies in the Willamette Valley, 12 miles of hiking trails, camas meadows, and a herd of Roosevelt Elk.⁶⁵

Forming the border of Benton and Lincoln Counties, the Willamette River is a major recreation site, used by boaters, paddlers, and fishers. The Willamette River Trail maintains a network of 11 campsites and 7 boat ramps between Harrisburg and Albany. However, the Willamette River also has a history of contamination from agricultural runoff, storm water drainage, and industrial byproducts. This contamination has limited the healthy use of the river, but efforts are continuing to clean up the river and restore it to health.⁶⁶

Beginning at the Willamette River, Linn County transitions from floodplain to the foothills of the Cascade Mountains. Much of the eastern half of the county is national or state forestland. An extensive network of trails traverses these forests, which include approximately 600,000 acres of the Willamette National Forest and over 25,000 acres of the Santiam State Forest. The slopes of the Cascades are dotted with lakes and reservoirs, including Detroit Lake on the North Santiam River, Green Peter Lake on the Middle Santiam, and Foster Lake at the confluence of the Middle and South Santiam Rivers. The South Fork of the Santiam River runs through Cascadia State Park, while the Middle Fork of the Santiam River is designated a National Wild and Scenic River. The North Fork of the Santiam River, which forms the border with Marion County, is a popular rafting waterway. The Pacific Crest Trail runs along the eastern border of Linn County. Other trails provide access to rock climbing and mountaineering destinations such as Three-Fingered Jack and Mount Jefferson, the second highest point in Oregon. During the winter, Hoodoo Ski Resort, located at the eastern edge of Linn County in the Willamette National Forest, is popular with skiers and families due to its accessibility from the Willamette Valley.

Recreational Access

Access to recreational facilities and opportunities demonstrates the intersection of natural and human-made environments. Research demonstrates a strong relationship between access to recreational facilities and physical activity among adults and children. Studies have shown that proximity to places with recreational opportunities is associated with higher physical activity and lower obesity levels.⁶⁷ Public recreation areas include parks, schools, public forests and

trails, beaches, and waterfronts. As mentioned previously, the region's rural areas are largely accessible to residents.

Recreational opportunities that include walking and bicycling are efficient, low-cost, and available to most anyone. By walking and bicycling, residents can help develop and maintain livable communities, make neighborhoods safer and friendlier, save on motorized transportation costs, and reduce transportation-related environmental impacts, auto emissions, and noise. They can also create transportation system flexibility by providing alternative mobility options, particularly in combination with transit systems. Furthermore, creating walkable and bikeable communities can lead to healthier lifestyles.⁶⁸

Due to the public nature of Oregon's beaches, 55 percent of Lincoln County residents live within one half mile of a public recreation area, as defined by the CDC.⁶⁹ This is the 5th highest percentage in the state. Benton County, where 45 percent of residents live within one half mile of a public recreation area, and Linn County, where 39 percent of residents live within one half mile of a public recreation area, are ranked 8th and 12th, respectively.^{70,71}

Water Quality

The quality of water sources has a significant impact on population health. Drinking water, recreation, manufacturing processes, and irrigation all rely on clean, safe water.

Water quality in the region is considered to be good overall. Water quality problems may include issues around sedimentation due to soil erosion, warm water temperatures occurring as a result of low summer flows, and over-use by private and municipal water systems. Potential sources of contamination in watersheds can be mitigated by proper and effective management practices.

Lincoln County is characterized by many rivers that flow from the west slope of the Coast Range to the Pacific Ocean. The communities of Lincoln County rely on various water sources, including the Yachats, Alsea, Yaquina, and Siletz rivers, as well as the Devil's Lake/Moolack Frontal Watershed.⁷² Benton County derives its drinking water from watersheds that flow east from the Coast Range to the Willamette River and from the Willamette River itself. There are two primary sub-basins in Linn County that provide drinking water to residents: the North Santiam sub-basin and the South Santiam sub-basin.⁷³ Numerous streams and rivers flow directly into the various watersheds that make up these two sub-basins. Each watershed falls under a specific public water system depending on its location in its respective county. The Oregon Department of Environmental Quality (DEQ) maintains monitoring stations at many locations along major Oregon rivers, including waterways that provide water to communities in Linn, Benton, and Lincoln Counties. Average measurements of water quality in the rivers of the region are generally good to excellent, with annual trends improving over time (Table 3.1).

Table 3.1: Water Quality in major regional rivers, 2005-2014 averages and trends

River	Sample Site	County	Water Quality Rating	2005-2014 Trend
North Santiam River	Idanha	Linn*	Excellent	Consistent
North Santiam River	Gates	Linn	Excellent	Consistent
North Santiam River	Jefferson	Linn*	Excellent	Consistent
South Santiam	Crabtree	Linn	Excellent	Consistent
Calapooia River	Albany	Linn	Fair	Improving
Calapooia Creek	Tangent/Albany	Linn	Good	N/A
Willamette	Harrisburg	Linn	Excellent	Improving
Willamette	Albany	Linn	Good	Improving
Willamette	Corvallis	Linn/Benton	Excellent	Improving
Mary's River	Corvallis	Benton	Good	Improving
Muddy Creek	South of Corvallis	Benton	Poor	N/A
Long Tom River	Monroe	Benton	Fair	Improving
Salmon River	Otis	Lincoln	Good	Improving
North Beaver Creek	Ona Grange	Lincoln	Good	Consistent
Yaquina River	Eddyville/Toledo	Lincoln	Fair	Consistent
Siletz River	Siletz	Lincoln	Excellent	Consistent
Alsea River	Thissell Road	Lincoln	Excellent	Consistent

Source: Oregon Department of Environmental Quality, Water Quality

* The towns of Idanha and Jefferson are in Marion County, but the North Santiam River forms the northern border of Linn County, so Linn County residents come in contact with the water in these areas

Note: The Yachats River was not sampled by the DEQ between 2005 and 2014

The Oregon Department of Environmental Quality also conducts periodic surveys of water-borne toxic pollutants. In past years, the department has issued algal bloom advisories for lakes in the region, including Detroit Lake on the northern border of Linn County (1 advisory in 2015), Devil's Lake in Lincoln City (4 advisories between 2008 and 2015), and Big Creek Reservoir (1 advisory in 2012).⁷⁴

As of 2015, approximately 2.8 percent of the regional population was affected by health-based drinking water violations, as recorded by the Environmental Protection Agency. Although water violations in general are concerning, the regional population affected was smaller in comparison to the statewide population affected. Statewide in 2015, 16.3 percent of the population was impacted by health-based drinking water violations.⁷⁵

Fluoridated Water

Water fluoridation is the controlled addition of a fluoride compound to a public water supply, intended to prevent tooth decay. Community water fluoridation is an evidence-based practice recommended by the Community Preventive Services Task Force based on strong evidence of effectiveness in reducing dental cavities across populations.⁷⁶ It is an effective, affordable, and safe way to protect children from tooth decay and is recognized as one of the 10 greatest public health achievements of the 20th century.⁷⁷ Water fluoridation complements, but does not replace other efforts to improve oral health. Water fluoridation is a valuable tool in addressing oral health disparities, since everyone who can access public water benefits from it regardless of age, income level, or race or ethnicity. As of 2012, Oregon was ranked very low in the United States (48th out of the 50 states) for the percentage of people receiving fluoridated water. About 75 percent of the U.S. population served by community water systems received fluoridated water, while about 23 percent of Oregon's public water supplies are fluoridated.⁷⁸ This low state fluoridation rate is a direct consequence of some of Oregon's most densely populated regions lacking fluoridation, including Portland and Eugene.

There are no public water systems in Lincoln County that fluoridate water. In Benton County, two thirds of residents are served by public water systems that fluoridate water, most of whom live in Corvallis, Philomath, North Albany, or Adair Village. In Linn County, three of the 43 public water systems provide fluoridated water for residences, including Albany, Lebanon, and Sweet Home, covering approximately 58 percent of the county's residents.⁷⁹

Beaches and Ocean Water

Ocean beaches are a popular location for recreation; bringing residents of Lincoln County and visitors from across the region and state into contact with near-shore ocean water. In addition, Lincoln County fisheries are an important source of income for many Lincoln County residents. The quality and safety of the catch impacts the health of seafood consumers in the region. The state of Oregon Department of Environmental Quality monitors the water quality at 15 Lincoln County sampling sites distributed among four beaches. DEQ issues health advisories when tests reveal high levels of toxics, including bacteria, algal blooms, and sewage spills. Presence of the bacterium *enterococcus* can indicate an increased risk of bacterial infection from contact with seawater. Bacteria levels fluctuate with time, temperature and location. Current Oregon statute requires that a public health advisory be issued when a water sample contains more than 158 bacteria colonies per 100 milliliters. Between 2003 and 2014, Lincoln County had 54 bacterial contamination advisories, with an average duration of five days.⁸⁰ In 2017, DEQ will

adopt a new standard for advisories of 70 colonies per 100 milliliters of water. This tighter standard would have roughly doubled the number of advisories between 2003 and 2014. The state also issued three advisories for ocean sewage spills and 17 storm advisories along the coast during the 11 year span.⁸¹

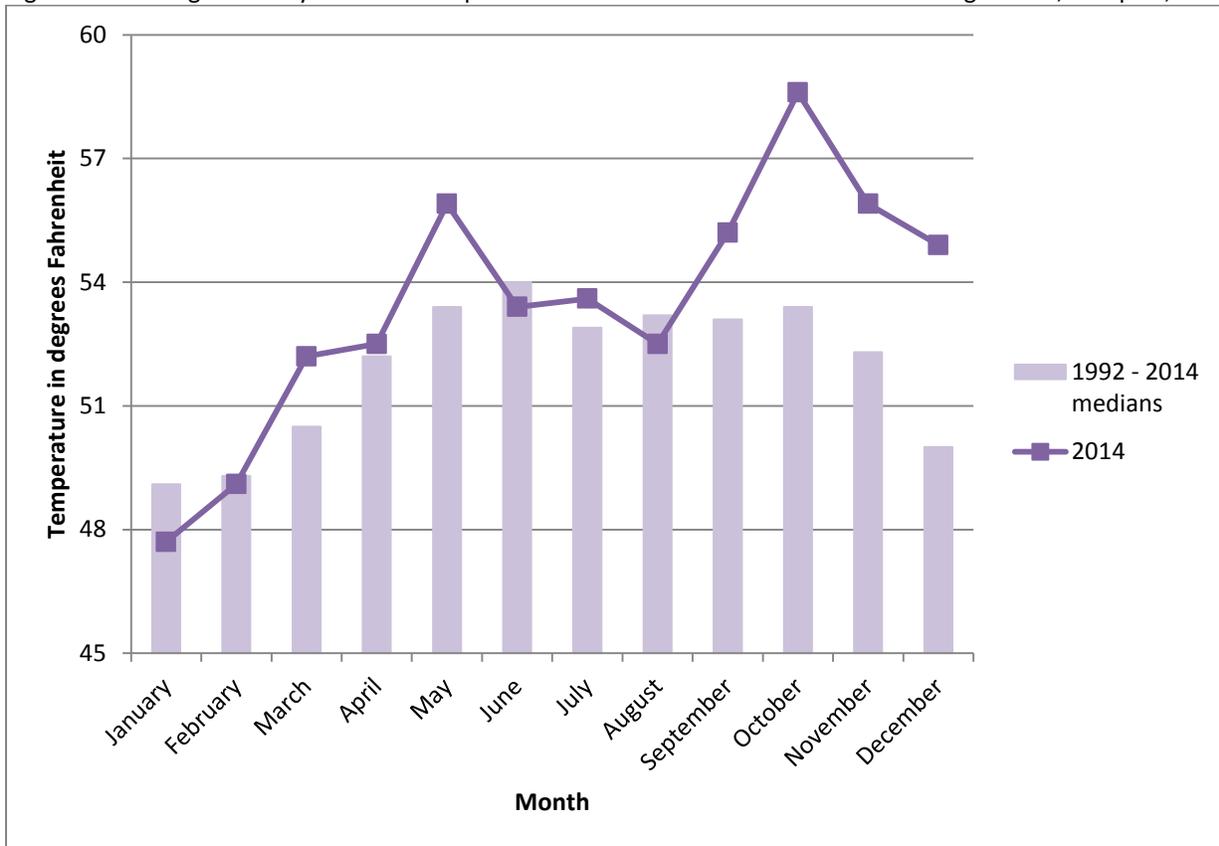
Ocean Temperature

Excessively warm ocean temperatures can have direct and indirect effects on human health. Warm water promotes bacterial and algal growth, which can lead to increased risks of direct exposure from seawater or secondary exposure from consumption of seafood. Indirectly, other marine life can be negatively affected by warm water, including important economic crops such as fish, oysters, and crabs.

The National Oceanic and Atmospheric Administration (NOAA) has collected 20 years of ocean water temperatures at South Beach in Lincoln County (Figure 3.2). Over the past 20 years, median ocean water temperatures off the coast of Lincoln County have ranged between 49 degrees Fahrenheit in January and 54 degrees Fahrenheit during June. The strong El Niño weather phenomenon in 1997 produced significantly warmer water temperatures, averaging 57.8 degrees from July-September 1997 and 52.4 degrees between December 1997 and February 1998. Within any given year, temperature fluctuations tend to be greater than average differences between years. In 2014, the minimum monthly median water temperature was just under 48 degrees, and the maximum water temperature, recorded in October, was 58.6 degrees. This late season spike was exceptional, as maximum water temperatures usually occur in June.⁸²

Independent of seasonal fluctuations, there have been no long term warming or cooling trends, and the high October 2014 water temperature should not be interpreted as part of a trend without additional, future data.

Figure 3.2: Average monthly seawater temperatures at the NOAA South Beach monitoring station, Newport, 2014

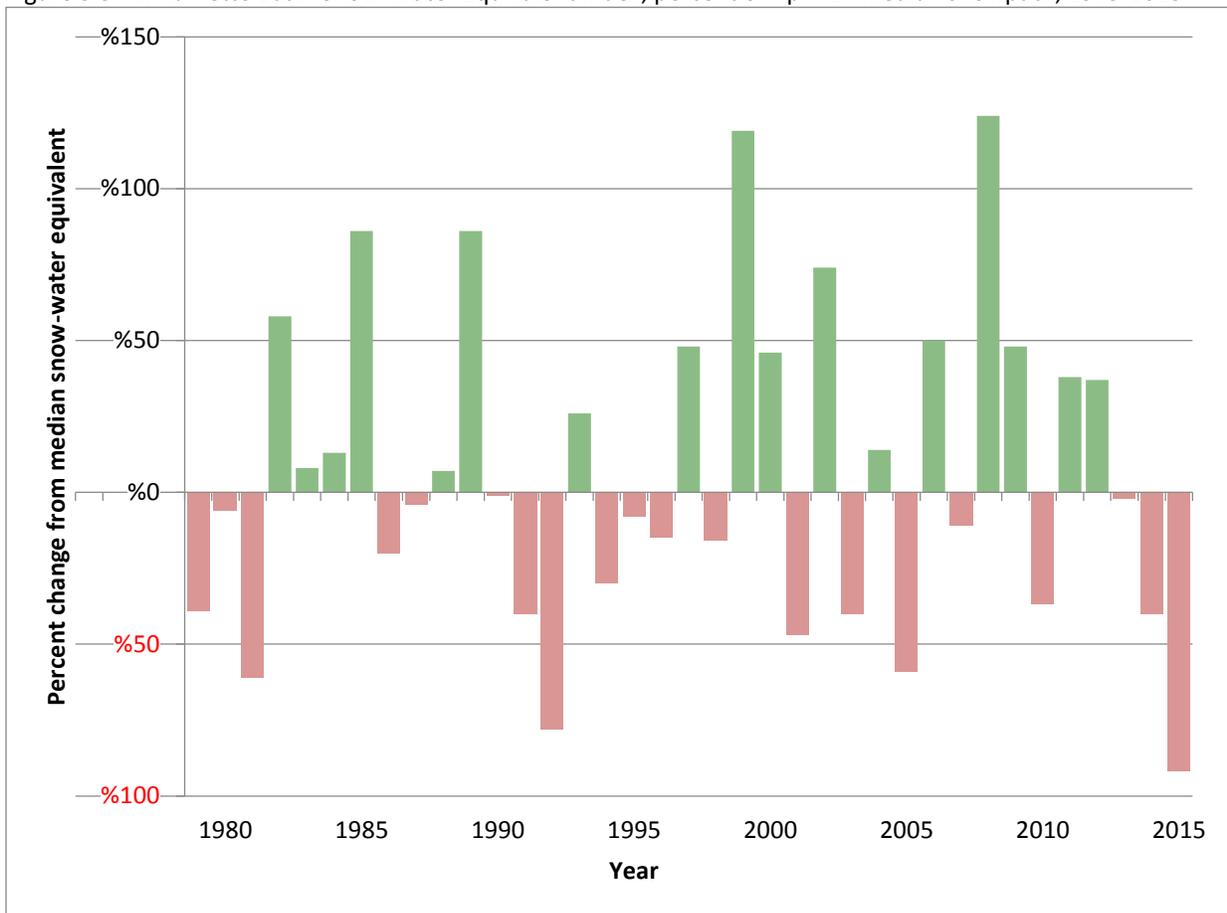


Source: National Oceanic and Atmospheric Administration, Tides and Currents historical data, 2015

Annual Snow-pack and Summer Water Flows

Annual Cascade snowpacks are measured in a number of places in Linn County. Snowpack levels are reported as snow water equivalent – the inches of water that could be melted out of the column of snow. The April 1st snowpack is typically an indicator of water supplies and quality for the summer. There is no evidence of a significant trend in snowpacks between 1979 and 2015 (Figure 3.3), but the large year-to-year variability causes uncertainty and hardship for the agriculture, fishery, and forestry industries. There have been years in which the snowpack at various monitoring stations in the Willamette Basin was well below the 30-year median. Most recently, the Willamette Basin 2015 April 1st snowpack was the smallest recorded, at only 8 percent of the 30-year median snowpack.⁸³

Figure 3.3: Willamette Basin Snow-Water Equivalent Index, percent of April 1st median snowpack, 1979-2015



Source: USDA Natural Resource Conservation Service, SNOTEL historical data and 30 year medians, 2015
 Note: Median snowpack is computed using the years 1981-2010

As climate change takes hold, snowpacks in higher elevations of the Cascade Range are expected to be smaller and to disappear more quickly in summer. This will have the effect of reducing summer water flows and increasing the temperature of snow-melt fed rivers, such as the Santiam and Willamette river systems. Since the winter snowpack largely determines how much water is available from May through October in the Willamette Valley each year, reduced flows and higher temperatures put increased pressure on fish stocks and agriculture. This results in losses in biodiversity and more challenging conditions for farmers. Additional impacts of climate change are discussed in more detail later in this chapter.

Air Quality

Air quality has a direct impact on the health of individuals. According to the Environmental Protection Agency (EPA), small particles (less than 10 micrometers in diameter) can be inhaled deeply into the lungs and may even penetrate into the bloodstream. Exposure to particle pollution has been linked to many serious health problems, including:

- Premature death in people with heart or lung disease,

- Nonfatal heart attacks,
- Irregular heartbeat,
- Aggravated asthma,
- Decreased lung function, and
- Increased respiratory symptoms.⁸⁴

Sensitive groups, including infants, the elderly, and individuals with preexisting conditions, are at heightened risk of complications from breathing particulate matter. Furthermore, unhealthy air days can prevent individuals from participating in other healthful activities such as exercise or enjoying the outdoors. The EPA conducts a National Air Toxics Assessment every three years that evaluates 178 high priority toxic air pollutants to help provide a better understanding of the air quality in Oregon.⁸⁵ The Oregon Department of Environmental Quality then prioritizes areas of Oregon to determine air toxics reduction strategies, if needed. The three counties in the region are not priority areas in Oregon, presumably due to their low levels of toxic air pollutants.

The tri-county region enjoys very clean and healthy air. The Oregon Department of Environmental quality records a qualitative measure of air quality each day at three locations in the region: Corvallis, Albany and Sweet Home. The qualitative measure is based on the level of fine particulate matter (PM_{2.5}; particulate matter less than 2.5 micrometers in diameter) and ozone levels in the air. The measure has six levels ranging from Good to Hazardous.* Between 2004 and 2013, Corvallis averaged 335 days of Good air quality each year. Albany averaged 330 days and Sweet Home averaged 308 days of Good air quality. Most of the remaining days were of Moderate air quality, with at most a few Unhealthy days in any given year.⁸⁶ There are currently no air quality monitoring stations in Lincoln County, but regionally air quality generally improves from east to west. This is due in part to the influence of ocean breezes in Lincoln County sweeping out pollutants, as well as Linn County's proximity to the wildfire prone regions of the state. However, different areas can experience good or poor air quality due to local factors such as topography or local polluters.

Between 2002 and 2011, the level of fine particulate matter (PM_{2.5}) measured in the air in the region averaged 9.81 micrograms per cubic meters (µg/m³). This is well below the national standard of 12 µg/m³. Furthermore, between 2002 and 2011 the three counties averaged just 2.1 to 2.4 days per year with PM_{2.5} levels above the 12 µg/m³ standard.⁸⁷

Contributors to poor air quality include wildfires, inversion events, and seasonal pollen. The main driver of poor quality air in the region is wildfire, which can increase the level of fine particulate matter levels on smoky days. However, the available data does not specify on which days the fine particulate matter levels spiked, so it is not possible to determine the differential effect of summer versus winter on air quality. The worst wildfire season between 2001 and 2014 was in 2007. During that wildfire season, Benton County averaged 10.7 µg/m³ and Linn County averaged 10.9 µg/m³ over the course of the year.⁸⁸ In addition to smoke from summer

* The full list is Good, Moderate, Unhealthy for Sensitive Groups, Unhealthy, Very Unhealthy, and Hazardous

wildfires, the Willamette Valley can experience high levels of particulate matter in the winter when an inversion of cold air traps exhaust and other pollutants close to the ground.

Seasonal allergies caused by pollen also have a major health impact in the Willamette Valley and the surrounding foothills. A combination of wet springs, warm summers, and large acreage devoted to grass cultivation causes the Willamette Valley to routinely have the highest seasonal pollen counts in the United States. Based on 2015 data, pollen counts begin to rise strongly in May, peaking in late June or early July before slowly tapering off for the rest of the year.⁸⁹ However, day-to-day weather patterns can affect both pollen counts and the impact they have on allergy sufferers.

Natural Hazards

The thri-county region is generally considered to be at low risk of frequent natural disasters. Unlike many communities in the United States, the counties are not at risk from tornados, hurricanes, or other major storms. Nevertheless, localized flooding and ice or snowstorms are an annual occurrence in some parts of the region, and there are risks from wildfire, major flooding, drought, and earthquakes.

The risk of a natural hazard depends both on the characteristics of the hazard, such as magnitude, duration, probability of occurrence and spatial extent, and also on the systems that are vulnerable to the disaster. These can include individuals, infrastructure, community assets, and also the ability and resources available to respond to the hazard.⁹⁰ Many of the social and demographic factors that put people at risk for health issues also make them more vulnerable to natural disasters, including age, income, race or ethnicity, and access to health care.

The major natural hazard in the region is flooding. Lincoln County's many coastal rivers flood almost annually, as up to 100 inches of rain can fall in the Coast Range each year, swelling the waterways beyond their capacities. The eastern slopes of the Coast Range in Benton County do not receive as much precipitation as the Lincoln County side does. However, localized flooding of the Mary's River and other tributaries of the Willamette is common every couple of years. Linn County's steep mountain slopes lead to increased rainfall and higher risks of mudslides and flooding. More rare winter flood events in the region can lead to the Willamette River itself causing flood damage in urban and rural areas along waterways in Benton and Linn Counties.

Other natural hazards include winter storms, wildfires, and earthquakes. Winter storms bring strong winds and storm surges to the coastline, which can damage structures, trees, and exacerbate coastal erosion. On the steep slopes of the Coast Range, these storms and rainfall events can also lead to landslides, which can block roads and destroy homes. Ice storms and landslides are frequent in Benton and Linn Counties during the winter and can lead to temporary power outages in urban and rural areas.

Most wildfires in Oregon occur east of the Cascades, but many of the largest wildfires in Oregon history occurred in the Coast Range. The Siletz and Yaquina fires together burned over 1,200,000 acres in the mid-1800s.⁹¹ However, with today's emphasis on fire prevention and suppression, major wildfires are now exceedingly rare in Lincoln County. Between 1960 and 2015, the Oregon Department of Forestry (ODF) recorded 747 fires under its jurisdiction in Lincoln County, with an average size of just over six acres. The risk from wildfires is lower in Benton County, with the ODF recording 580 wildfires that burned an average of 2.8 acres in Benton County in the same time period. Linn County has a greater risk from summer wildfires. Between 1960 and 2015, 1,417 wildfires have burned an average of seven acres each, with the largest fire consuming just over 2,000 acres. In addition to the number and size of fires, the other main difference between the counties' fire profile is the cause; approximately 19 percent of Linn County wildfires are naturally (non-human) caused, while less than 11 percent of Benton County and less than three percent of Lincoln County wildfires are due to natural causes. In all, about 25 square miles of land under ODF jurisdiction has burned since 1960, or 0.63 percent of the land area of the region.

Earthquake and Tsunami Hazards

One of the most high-profile natural hazards, whose notoriety has grown recently, is the potential for a Cascadia Subduction Zone earthquake occurring off the Oregon coast. Geologists estimate a 40 percent chance of an earthquake of magnitude 8.0 or larger, and a 10 to 14 percent chance of an earthquake of magnitude greater than 9.0 within the next 50 years (before 2065).⁹² The last Cascadia Subduction Zone earthquake occurred in the early 1700s. Although the impact of such an event would likely be larger than any other natural disaster in the written history of the West Coast, the rarity of the event itself makes it difficult for communities and individuals to internalize its potential for destruction.

Such an earthquake would cause immediate destruction to much of the infrastructure in western Oregon, and also cause a devastating tsunami. The Lincoln County Department of Planning and Development maintains a tsunami inundation zone map and estimates that a magnitude 8.8 earthquake during high tide would inundate Siletz Bay with 40 feet of water, Depoe and Newport Bays with 31 feet of water, and areas of Waldport and Yachats with close to 30 feet of water. Approximately 50 percent of developed land in Waldport and Yachats are in the inundation zone, and a correspondingly large percentage (between 30 and 40 percent) of the residents of these communities live in the inundation zone. Owing to their larger sizes, Newport and Lincoln City have smaller percentages, but larger quantities of developed land areas and populations in the inundation zone. In all, over 5,300 residents of Lincoln County may live in tsunami inundation zones.^{93,94} Many coastal cities and towns also have critical infrastructure and services located within inundation zones.

In addition to Lincoln County, much of the health and service infrastructure in Benton and Linn Counties are located on liquefaction zones (where the ground would behave like a liquid during a major earthquake) or are not constructed to withstand a large earthquake. In 2012, the Oregon Department of Transportation identified three structurally deficient bridges in the

region, in Newport, Siletz, and Waldport. The majority of the other bridges are listed in fair condition.*

While it remains difficult to address the potential destruction of the Cascadia Earthquake, individuals and communities are still able to prepare for lesser disasters, including earthquakes. This can include anything from ensuring infrastructure is strong enough to weather a lesser disaster, to storing survival supplies at home for use during an emergency.

Climate Change

Climate change is having subtle but significant effects on the environment and health of the region. Global warming is a worldwide phenomenon with global causes and many potential regional and local effects. The effects of rising temperatures will be felt locally in:

- Rising sea levels, leading to eroding beaches and more damaging storm surges;
- warmer, dryer summers, creating a higher risk for heat-related illness;
- decreased winter and summer snowpack leading to more potential for drought and groundwater stress;
- greater variability in weather, as storms are predicted to be more intense and less predictable;
- greater risk of larger, more intense, and more frequent wildfires;
- higher prices for goods dependent on climates affected by global climate change;
- changes in how and what agricultural goods are produced in the region;
- effects on recreational activities dependent on current climate, including fishing, skiing, and summer outdoor activities; and
- potential increase in human and agricultural diseases associated with vectors and organisms that require a warmer climate.⁹⁵

Many of the environmental indicators already discussed have been linked with climate change, both theoretically and through modeling. These include wildfires, air quality, ocean temperatures, and winter snowpack. However, the variability of annual weather and the complexity of the interactions that influence climate change effects make it difficult to demonstrate these links without many years of observable data. As a result, this report emphasizes the acute effects of these indicators rather than their long term trends.

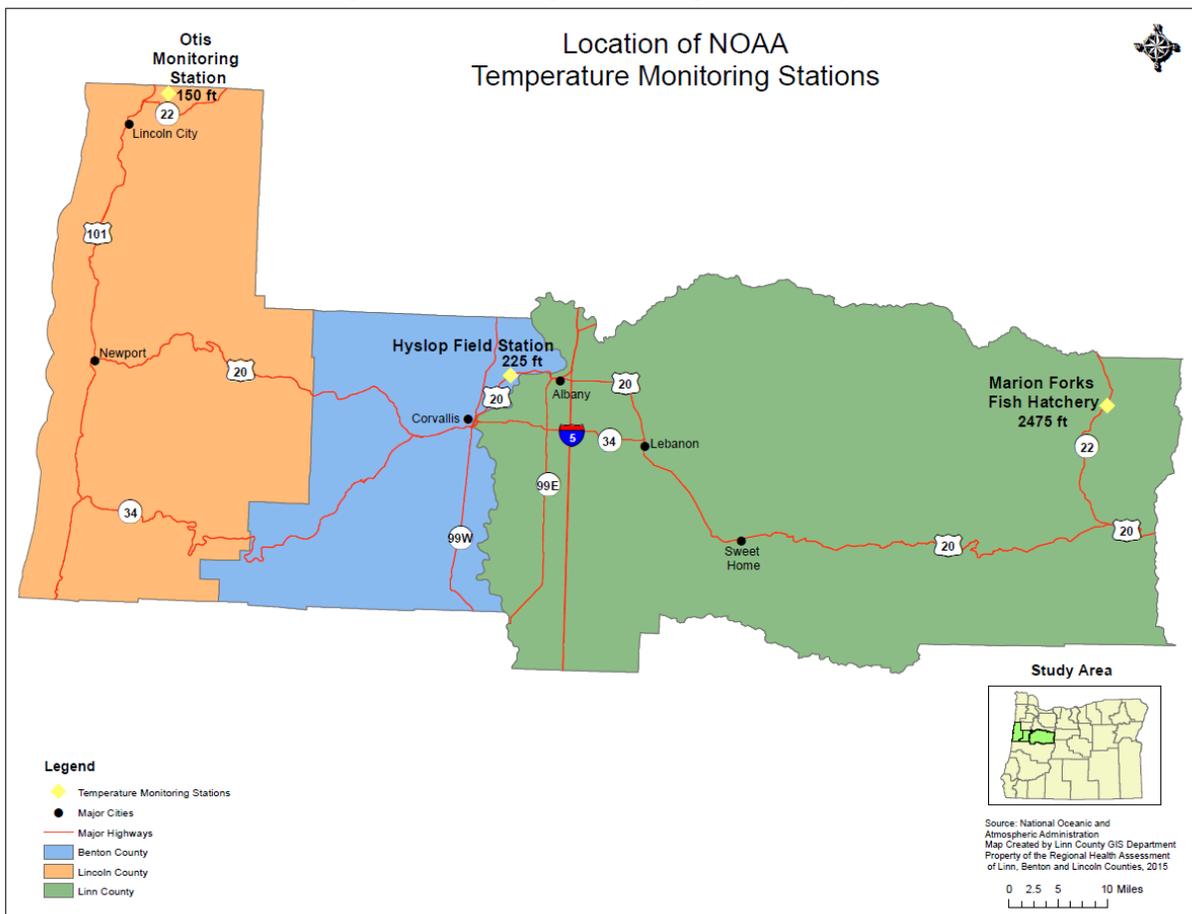
One of the few indicators of global warming for which there is a long record of data is air temperature. Seasonal temperatures have shown long-term upward trends both globally and locally for as long as data has been recorded. The National Oceanic and Atmospheric Administration maintains monitoring stations at many locations in the region that track temperatures and record daily maximum temperatures. Daily maximum temperatures above

* Fair condition is the 3rd of 5 levels; Very Good, Good, Fair, Poor, and Very Poor

90 degrees Fahrenheit constitute extreme heat from a health standpoint. Extreme heat can have a number of harmful effects on health. Heat-related illnesses tend to strike those whose health is already fragile, such as infants, elderly, and the infirm.

The moderating effect of the ocean typically keeps temperatures from reaching extremes in Lincoln County. Fewer than half of the years between 1948 and 2014 saw temperatures rise above 90 in Otis, at the northern end of Lincoln County. Temperatures fluctuate much more in the Willamette Valley and the Cascade Range. On average, there are eleven above-90 degree days at the Hyslop Field Station northeast of Corvallis, while the Marion Forks Fish Hatchery weather station on the eastern edge of Lincoln County (2,438 feet above sea level) records on average 10 days of temperatures above 90 degrees each year. Map 3.1 below shows the location and elevation of these stations.

Map 3.1: Temperature monitoring stations in the region operating continuously since 1948



Source: National Oceanic and Atmospheric Administration

One approach to assessing long term temperature trends is to measure the number of extreme heat days. The National Oceanic and Atmospheric Administration defines an extreme heat day as one where the maximum temperature on that day exceeds the maximum temperatures of 90 percent of summer days between 2000 and 2010. This relative measure means that all three counties will have extreme heat days, even though the absolute temperatures in Lincoln County may not be as high as in Linn or Benton Counties.

Temperatures have been rising in all parts of the region. Between 1948 and 2014, the number of days above the 90th temperature percentile rose at a rate of about 1 day every 10 years in the inland part of the region, as measured at the Marion Forks Fish Hatchery and Hyslop Field Station. This represents an increase of about 7 more days of extreme heat in 2014 than in 1948. On the coast, the rate of growth was slower, about 1 day every 20 years, leading to an increase in 3-4 days above the 90th temperature percentile between 1948 and 2014. All three trends are statistically significant, notwithstanding fluctuations from year to year. Figures 3.4, 3.5, and 3.6 illustrate this progression. These trends are expected to continue as global warming accelerates in the 21st century.⁹⁶

Figures 3.4, 3.5, and 3.6: Days with extreme heat, May – September, for the period of 1948 – 2014

Figure 3.4: Marion Forks Fish Hatchery (eastern Linn County)

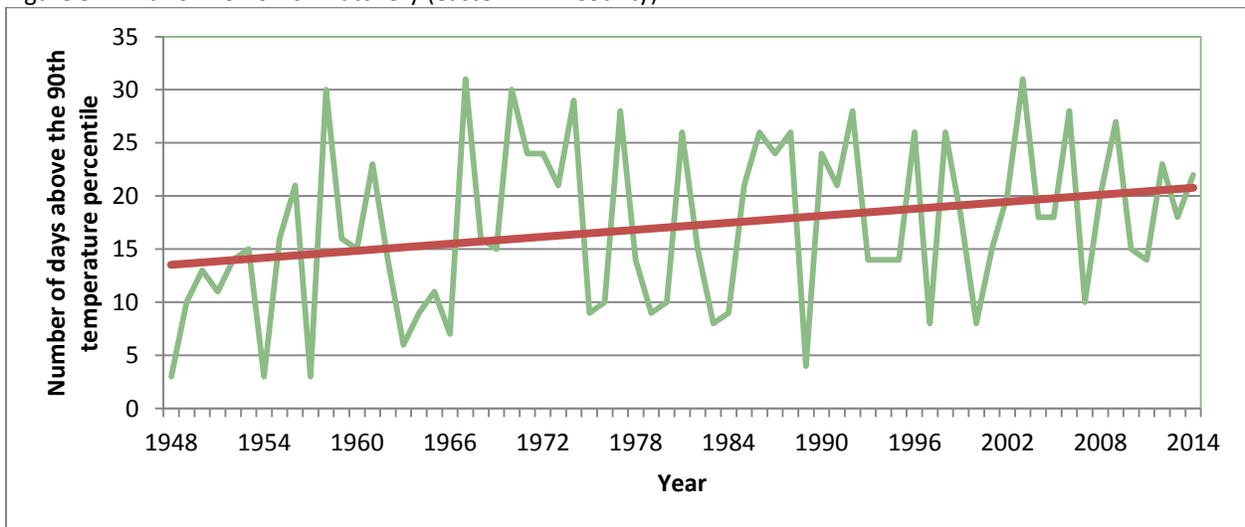


Figure 3.5: Hyslop Field Station (between Corvallis and North Albany)

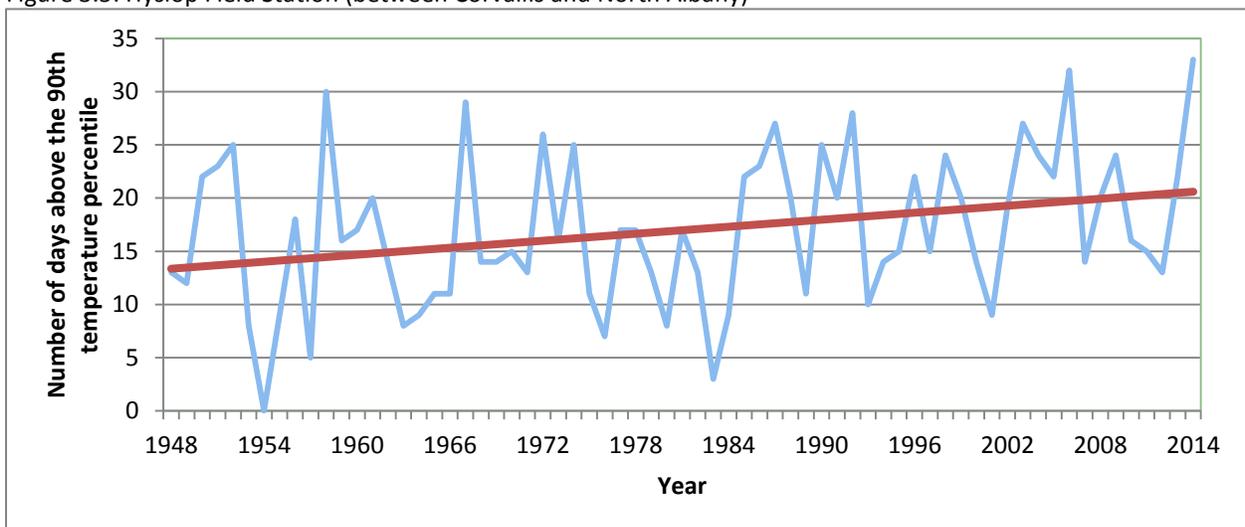
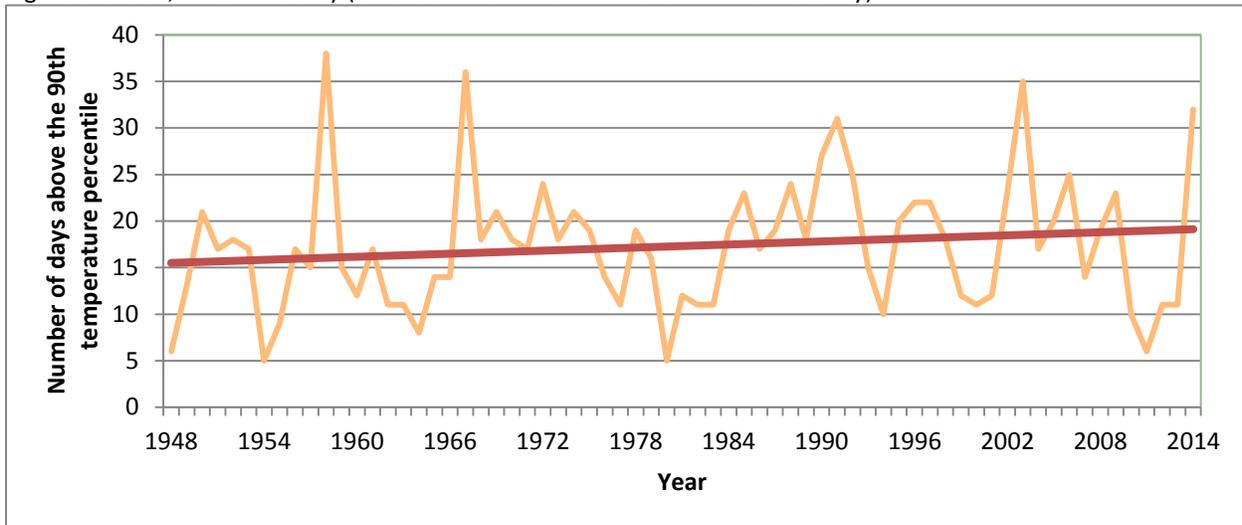


Figure 3.6: Otis, Lincoln County (on the Salmon River in northern Lincoln County)



Source: NOAA, Climate Data Online, 2015

Extreme heat is defined as a maximum temperature higher than 90% of recorded May-September temperatures for that station between 2000 and 2010.

Human-made Environment

Human-made (or built) environments contribute to health in a variety of ways. People need schools, workplaces, and homes that do not expose them to physical or chemical hazards and places to walk and recreate outdoors that are clean, safe, and free of debris. They also need access to quality and affordable food and transportation options, as well as the confidence that their local communities have not been contaminated with human-made pollutants.⁹⁷

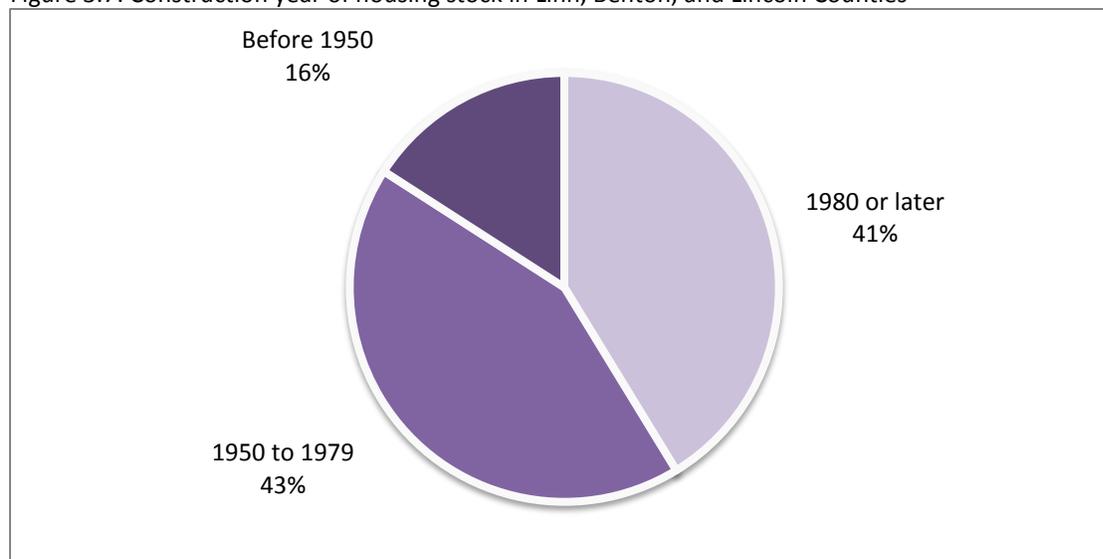
Healthy Homes

Indoor environmental quality, as defined by the Centers for Disease Control and Prevention, is the quality of a building's environment in relation to the health and well-being of those who occupy the space within it. Key factors that influence a structure's indoor environmental quality include dampness and mold in buildings, building ventilation, construction and renovation, chemicals and odors, indoor temperatures, and relative humidity.⁹⁸ Buildings in the region are often exposed to winter storms with winds in excess of 30 mph and heavy rainfall, with 24 hour accumulations of greater than three inches. This combination often results in moisture entering buildings, creating conditions for the growth of mold. Examining the health effects of specific contaminants in buildings is very complex, but research has shown that some respiratory symptoms and illnesses can be associated with damp buildings.⁹⁹ According to County Health Rankings, 19 percent of households in the region have severe housing problems.

Housing Characteristics

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. Fifty-nine percent of the houses in the region were built before 1979, the year when lead paint was banned from use in homes. The three counties are similar in the age composition of the housing stock (Figure 3.7).

Figure 3.7: Construction year of housing stock in Linn, Benton, and Lincoln Counties



Source: U.S. Census Bureau American Community Survey, 2011-2013, Table DP04

Lead Screening

Lead poisoning is a significant health concern. Laws and regulations are in place to help protect people; however, lead poisoning still threatens many Oregonians, especially children. The Centers for Disease Control and Prevention reports that “even low levels of lead in blood have been shown to affect IQ, ability to pay attention, and academic achievement.”¹⁰⁰ Blood levels between 1 and 9.9 micrograms per deciliter ($\mu\text{g}/\text{dl}$) are of medical concern; concentrations of ten $\mu\text{g}/\text{dl}$ or above are considered lead poisoning.

Although leaded paint and gasoline can no longer be legally sold in the United States, many children are still exposed to dangerous amounts of lead. Lead paint dust is the most common way children are exposed, and it is common inside and outside homes built before 1978.¹⁰¹ Ordinary household repair and maintenance activities can stir up lead-contaminated dust. People can also get lead in their bodies by eating foods contaminated with lead from exposure to soil or lead paint chips.

Oregon has a relatively low overall prevalence of lead poisoning compared to other states, and prevalence rates have declined through the years. This decline is consistent with national trends. In Oregon an estimated 1,000-2,000 children have blood lead levels equal to or greater

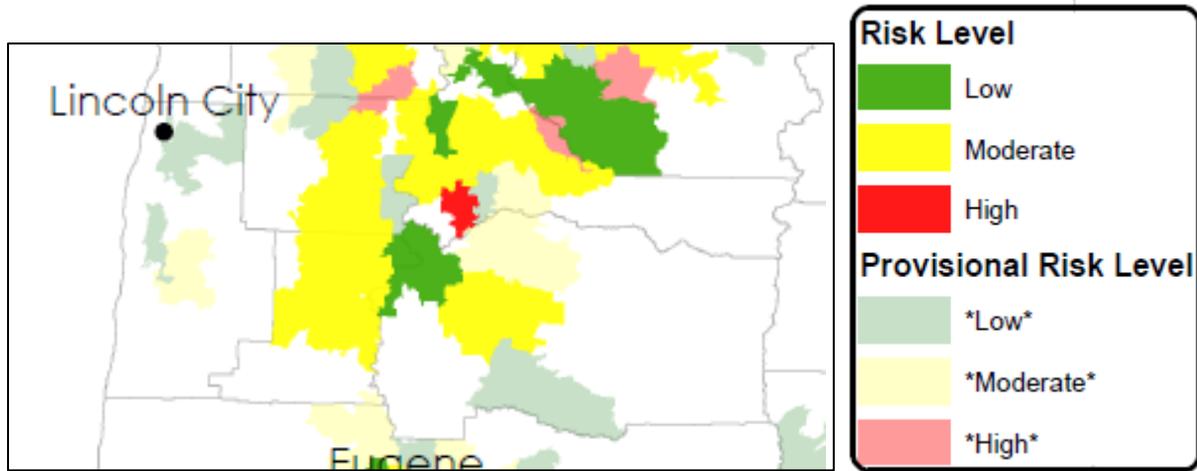
than ten µg/dl.¹⁰² This gives a rate of 1.16 – 2.32 children per 1,000 children. In 2014, there were a total of 10 cases of lead poisoning in the region (blood levels equal to or greater than ten µg/dl), five of which were children under the age of five.¹⁰³ Eight of these cases occurred in Linn County, and two cases occurred in Lincoln County.

Radon

Radon is a gaseous radioactive element that occurs from the natural breakdown of uranium in the soil and rocks. It is colorless, odorless, and tasteless. In indoor settings, radon poses a risk by emitting atomic particles that can enter the lungs and alter the DNA, increasing a person's lung cancer risk. Radon is the second leading cause of lung cancer in the nation and, according to the Environmental Protection Agency, is classified as a Class A carcinogen. Radon levels in homes are measured by the Oregon Public Health Division. Radon levels of four picocuries of radon per liter (pCi/L) of indoor air are considered dangerous to health.¹⁰⁴ Radon is found in varying concentrations throughout the United States with moderate levels found in Oregon, generally under the four pCi/L level. Four to ten percent of Oregon homes are estimated to have radon gas incursion at higher concentrations. When the annual average concentration in a home exceeds four pCi/L, it is recommended that measures be taken to lower the concentration to below the four pCi/L level.¹⁰⁵

The average indoor radon level in the region, as determined by radon test results conducted by the Oregon Public Health Division, is 1.3 pCi/l, with a range of 0.1 to 8.7 pCi/L.¹⁰⁶ This coincides with average national indoor radon levels. Indoor testing conducted by the Oregon Department of Health in 2014 suggests that two areas within Linn County are at moderate risk for unsafe radon levels, specifically Lebanon and Scio. In addition, much of Benton County, including Corvallis, is at moderate risk.¹⁰⁷ Map 3.2 on the following page is an extract of the state radon risk map.

Map 3.2: Radon risk levels in Linn, Benton, and Lincoln Counties, 2014



Source: Oregon Public Health Division – Radon Gas

Risk levels determined by percent of households with a result of 4 pCi/L or greater, where 20 or more households were assessed

Provisional risk levels assigned for areas with between 5 and 19 results

Tobacco-free Spaces

Tobacco use is still the leading preventable cause of death and disability in the region. Statistics on tobacco related diseases and deaths are discussed in Chapter 6: Morbidity and Mortality.

As stated in Benton County’s Tobacco Prevention and Education program, “the list of diseases linked to tobacco use is expanding well beyond the general health risks of coronary heart disease, stroke, cancer and chronic lung disease.” Tobacco use is also directly linked to additional health and environmental concerns such as exposure to second hand smoke; fire related death and injury; increased risks of wildfires; and littering of toxic cigarette filters. In order to reduce these health and environmental impacts, each county in the region, and the state, has taken steps to reduce exposure to tobacco and cigarette smoke in public places.

Currently, Oregon law prohibits smoking and other tobacco products in most workplaces, schools, bars, and other indoor public spaces. County property in Benton County is 100 percent tobacco free. This includes both structures and open spaces. Lincoln County allows smoking on county property at some county parks and waysides, but has restricted it on all other county-owned property. Lebanon, Corvallis, and Newport have banned smoking at city parks. Many governmental bodies are expanding smoke- or tobacco-free policies to explicitly include e-cigarettes.^{108,109,110}

Within the region, number of non-governmental entities also restrict or ban tobacco on their properties. Oregon Coast Community College, Linn Benton Community College, and Oregon State University are all 100 percent tobacco free, and smoking is not allowed in OSU research forests. Samaritan Health Services, the Corvallis Clinic, and other health providers ban tobacco

products, as does Willamette Neighborhood Housing Services and other low-income housing services. Linn-Benton Housing Authority is smoke free at most of its units, with restrictions in place on the few that permit smoking.^{111,112,113}

Transportation

Transportation links people and places, making it possible to get to work, to school, to recreational opportunities, and to the grocery store. Transportation includes more than roads, walkways, or bridges. It also encompasses public transit systems, policies that dictate the location and construction of roads, and guidelines for accommodating different kinds of users. Guidelines are important for providing avenues for physical activity, and for reducing the potential of driver, cyclist, and pedestrian injury.

Access to Public Transportation

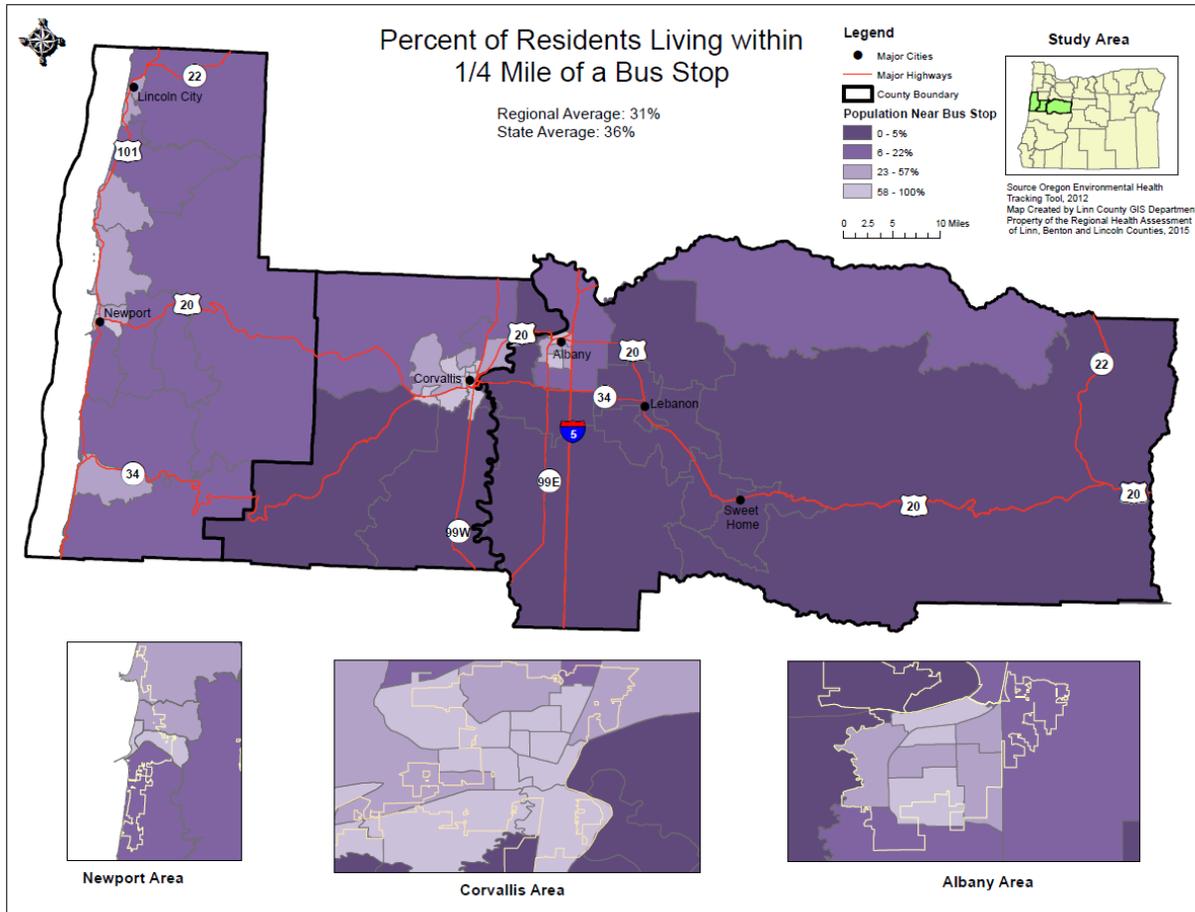
Access to public transportation is an important public good. Not only does taking public transportation provide additional opportunities for exercise, but the presence of public transportation also makes it easier for individuals and families without private transportation to access goods and services vital to maintaining health. These include grocery stores, health and dental care, and recreation facilities. In Oregon, counties with large metropolitan areas relative to county population size tend to have more public transportation options. Approximately 50 percent of Benton County residents live within one quarter of a mile from a bus stop. Most of those residents live in Corvallis and Philomath. This is the second highest percentage in the state, following only Multnomah County (comprised largely of Portland). Twenty-nine percent of Lincoln County residents live within one quarter mile of a bus stop (ranked 8th in the state). Linn County's large land area and the greater distances between its small cities and towns pose challenges for county and city public transit. Seventeen percent of Linn County residents live within one quarter of a mile of a bus stop (ranked 19th).¹¹⁴ Although distance to a public transportation route is one measure of the strength of a public transportation system, additional factors impact the strength of public transport, including frequency and hours of operation, direct routes, and connections to other routes.

People of color, people experiencing poverty, people with disabilities, and people who experience language barriers are more likely to depend on public transit. However, they often live in areas with poor transit service, fewer destinations, and poor connectivity. These unfair burdens increase transportation costs and stress, and limit access to economic and educational opportunities, housing, healthy foods, and physical activity. Vulnerable populations often have unsafe transportation conditions, including limited safe crossings, areas with high-speed traffic, and poor sidewalk and bicycle infrastructure.

As Map 3.3 demonstrates, public transportation is confined to urban areas in the region. Sixty percent or more of residents in most of Corvallis and parts of Albany, Lincoln City, and Newport

live within one quarter of a mile of a bus station, but in the rest of the region, including the larger towns of Lebanon and Sweet Home, access is much less prevalent.

Map 3.3: Percent of residents living within ¼ mile of a bus stop, 2012



Source: Oregon Environmental Public Health Tracking Tool, 2012

Active Commuting

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.¹¹⁵ This trend is reflected in regional statistics as well. Approximately 19 percent of Benton County residents commute using bus, bicycle, or foot travel, compared to 7 percent of Lincoln County residents and 4 percent of Linn County residents.¹¹⁶

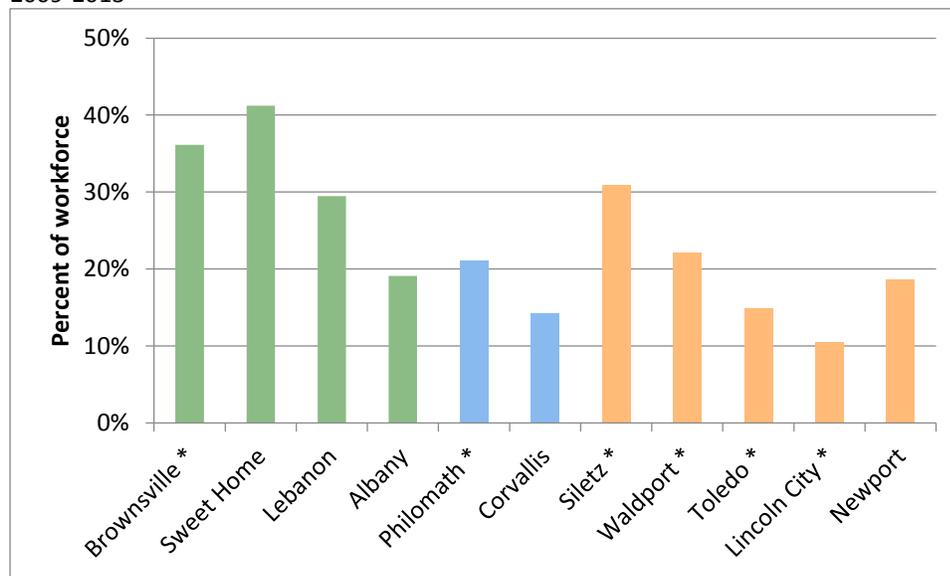
Commuting Patterns

Most workers in the region drive to work. In the three counties, 72 percent of the workforce drives to work alone, with an additional ten percent carpooling.¹¹⁷

Commuting to jobs outside of one's city of residence is common for many members of the regional workforce. Twenty-four percent of regional workers report driving alone for 30 minutes or more to work, compared to twenty-six percent statewide.¹¹⁸ A longer commute is associated with negative health effects in a number of ways. Longer commutes have been associated with greater levels of stress. Car commuting has also been linked with physical ailments such as lower back pain, increased likelihood of obesity, and less time for recreation, relaxation, or sleep. Working outside one's city of residence can also make it more difficult to access medical care, either for the worker or his or her family.

Workers in the region average a 21 minute commute, however the travel time varies greatly between cities. Smaller cities generally have more workers who travel long distances for work. Brownsville, Sweet Home, Siletz, and Waldport, are all smaller communities that are 15-30 minutes away from their closest metropolitan areas (Figure 3.8) and all have correspondingly higher rates of long-distance commuting. Albany, Corvallis, Lincoln City, and Newport have fewer workers who commute for more than 30 minutes each way.¹¹⁹

Figure 3.8: Percent of regional workers who report commuting 30 or more minutes for work, by city of residence, 2009-2013



Source: U.S. Census Bureau, American Community Survey, Table B08303

* The sample size is small and the data may be unreliable

The location where residents work compared to where they live also influences transportation choices. Workers who must travel outside of the region may find that public transportation and ride sharing is not an option due to distance, time and availability. The majority of residents 16

years and older in the three counties live and work in their county of residence, although there is variation between the individual counties (Table 3.2).

Table 3.2: Percent of workforce that works in county of residence, 2011-2013

	Linn	Benton	Lincoln	Oregon
Percent of workforce that works in county of residence	70%	77%	94%	77%

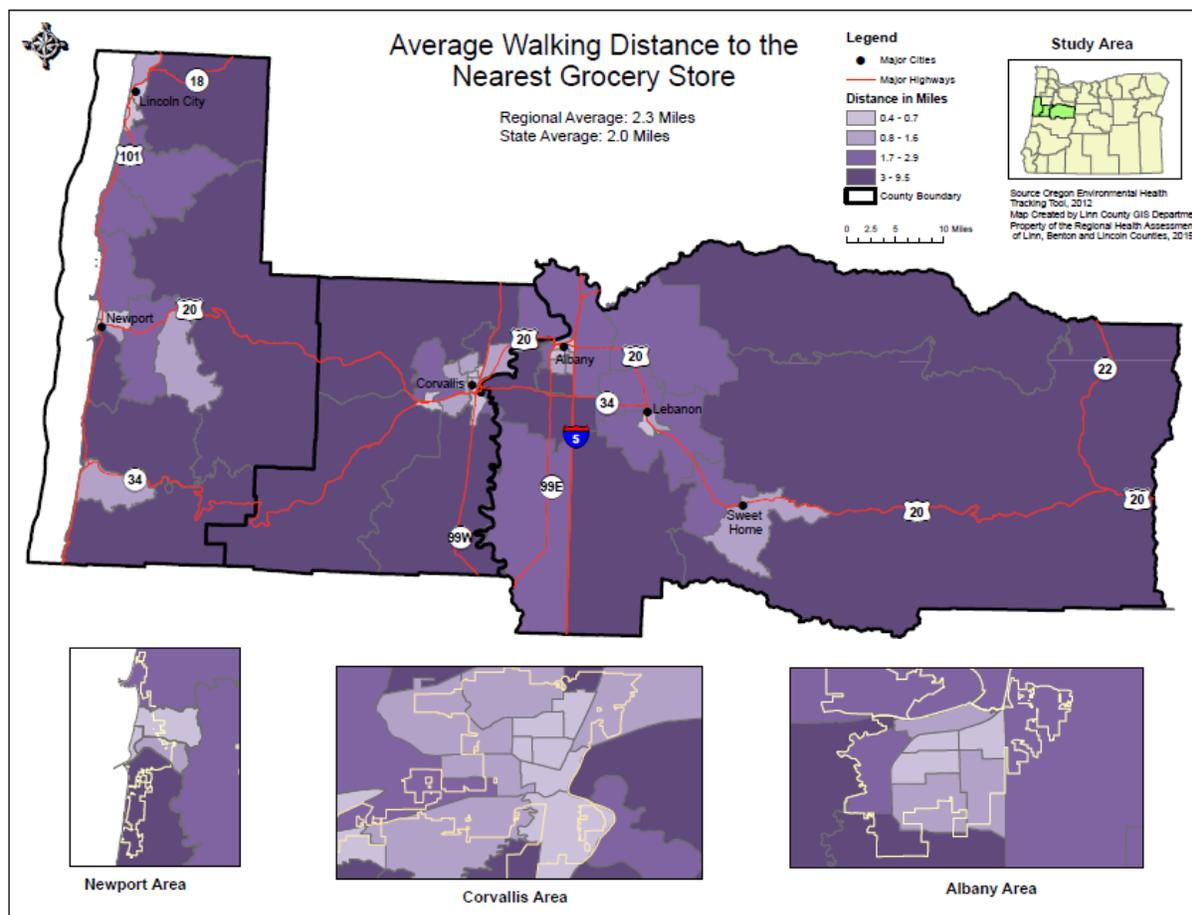
Source: U.S. Census Bureau, American Community Survey, 2011-2013, Table B08007

There is no data available for workers who travel outside their county but stay within the region. However, the main population centers in Benton and Linn Counties are located within the I-5 corridor, making commutes across county lines fairly easy. In contrast, Lincoln County’s location on the coast makes travel to the Willamette Valley more difficult.

Access to Healthy Foods

Transportation options and limited public transportation for regional residents contributes to challenges in the tri-county 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. Regionally, 17 percent of households are within one half mile of a grocery store, compared to 19 percent statewide. The average distance between a household and the nearest grocery store is 2.3 miles.¹²⁰ However, since grocery stores tend to be located in larger towns, the county average may overestimate the urban average and underestimate the rural average. The following map demonstrates the variation in proximity to grocery stores.

Map 3.4: Average walking distance to the nearest grocery store, 2012



Source: Oregon Environmental Public Health Tracking Tool, 2012

Access to nutritious foods can be particularly difficult for residents with unreliable transportation or tight budgets. A rural community is considered to have low access to food when it is ten or more miles from a supermarket or large grocery store. Rural residents must often travel long distances for food. For rural residents in the three counties this could mean traveling as much as 20 miles to the nearest full service grocery store. Rural grocery stores throughout the county report barriers that may limit rural low-income families' access to healthy food. These include: administrative barriers to becoming an authorized vender for SNAP and WIC programs, economic barriers to offering fresh fruits and vegetables, meat, dairy and other refrigerated foods.¹²¹

As a comparison, more than twice as many residents live within one half mile of a tobacco vendor than live within one half mile of a grocery store; nearly three times as many residents live within one half mile of a tobacco vender compared to those who live within one half mile of a WIC authorized store (Table 3.3). Approximately nine percent of Linn County residents are low income and do not live close to a grocery store.^{*122} The proportions of Benton and Lincoln

* "Close" is defined as within 1 mile for urban areas and within 10 miles for rural areas

County residents who are low income and do not live close to a grocery store are somewhat smaller, at five and six percent, respectively.¹²³

Table 3.3: Proximity to grocery stores compared to tobacco vendors in the region, 2012

Vendor	Average (mean) walking distance in miles	Percent of population living within ½ mile
Grocery stores	2.3	17 %
WIC-authorized stores	2.5	14 %
Tobacco vendors	1.4	36 %

Source: Oregon Environmental Public Health Tracking, 2012

In addition to access to nutritious food, proximity to fast food can affect the health of the community. Although complex in nature, the food environment can impact what people eat, and providing healthy options is vital for the health of the community. Although not causal, studies have shown an increase in the prevalence of obesity and diabetes with increased access to fast food outlets in a community. Forty-six percent of restaurants in Benton County are fast food vendors, compared to 21 percent in Lincoln County and 38 percent in Linn County.¹²⁴

Food Safety and Health Inspections

Food safety falls under the jurisdiction of county health departments when food is served in restaurants or from mobile vendors. The Centers for Disease Control and Prevention has five categories of foodborne illness risk factors. In order of frequency, these are:

- Improper holding temperatures (41 percent of violations);
- Contaminated equipment (33 percent);
- Poor personal hygiene (22 percent);
- Unsafe sources (3 percent); and
- Inadequate cooking (1 percent).¹²⁵

County health inspectors in the region inspected nearly all of the 753 restaurants in the region in 2013. There were 98 food complaints, 73 foodborne illness complaints, and one foodborne illness investigation. There were five failure-to-comply notices, one summary closure, and two voluntary closures, all of which occurred in Linn County.¹²⁶

Food sold in grocery stores is under the jurisdiction of the Oregon Department of Agriculture. A total of 824 facilities are licensed by the Oregon Department of Agriculture, which includes grocery stores, bakeries, distilleries, and shellfish harvesters.¹²⁷

Environmental Hazards

The majority of the regional population does not come into contact with large-scale, human-caused environmental hazards on a regular basis. However, the presence of contaminants in the community, such as sewage overflows, environmental clean-up sites, and pesticide applications, demonstrates some of the broader potential for health exposures that can impact the health of the region.

Domestic Sewage Systems

The majority of waterborne disease outbreaks are caused by bacteria and viruses present in domestic sewage. Septic tanks are the largest contributor to bacterial and viral groundwater contamination. Health risks are higher in areas where older, failing septic systems discharge untreated or partially treated sewage above or below ground, potentially contaminating nearby streams and wells.

As of April 2015, there were 132 certified wastewater system collection operators and 129 certified wastewater system treatment operators in the tri-county region.¹²⁸

The Oregon Department of Environmental Quality (DEQ) has 321 active permits for wastewater disposal in the three counties as of April 2015.¹²⁹ These permits are designed to limit storm water run-off, industrial wastewater, sewage, and other sources of water pollution.

Environmental Clean Up Sites and Leaking Underground Storage Tanks

The Oregon Department of Environmental (DEQ) Cleanup Program protects human health and the environment by identifying, investigating, and remediating sites contaminated with hazardous substances. The program's objective is to improve sites to the point where no further cleanup action is necessary.

The Oregon Community Right to Know and Protection Act (ORS 453.307-453.414) is a law that makes information about hazardous materials in Oregon available to emergency service personnel, emergency planners, health officials, and the public. Facilities throughout Oregon that are storing a reportable quantity of hazardous substances are required to annually report this information to the State Fire Marshal.¹³⁰ Incidents that release hazardous materials into the environment may occur in facilities that manufacture, use, or store these substances. Incidents may also occur during transport of these materials or by equipment malfunction.¹³¹

The DEQ is tracking and monitoring 43 environmental clean-up sites in the three counties.¹³² Sites contain different levels and types of contamination from hazardous substances including petroleum from residential heating oil tanks, regulated tanks at gas stations, and other commercial facilities. Some sites may have one contaminant in a small area of shallow soil,

while others may have high concentrations of many substances in soil, surface water, sediments or groundwater.

The DEQ's Land Quality Division also runs Oregon's Leaking Underground Storage Tank Program. An underground storage tank system is a tank or any underground piping that is attached to the tank and has about ten percent of its combined volume underground.¹³³ These underground storage tanks may store petroleum or other hazardous substances that can pose a risk to groundwater quality if leakage occurs. Oregon's program handles issues related to clean up of soil and groundwater contamination from spills or releases and enforces state and federal rules. In 2014, the three counties had 24 documented leaking underground storage tanks.¹³⁴

Pesticide Exposure

Residents of the region may come into contact with pesticides either through personal use or as a by-product of commercial use for agriculture or forest management. Many pesticides have the potential to harm humans, birds, fish and aquatic organisms, and land-based vertebrates and invertebrates. Due to this potential for harm, the Oregon Department of Agriculture restricts the use of 495 distinct pesticide products, comprising over 100 different active ingredients.¹³⁵ Some well-known compounds include atrazine, permethrin, and organophosphates. The most recent publicly available study of aerial spraying of herbicides in private forests lists glyphosate as the most common active ingredient.¹³⁶ Glyphosate is also widely available in home products. Many agricultural operations also rely on herbicides, such as wheat, annual rye-grass, and other cash crops. Grass and crop fields are sprayed on an annual basis to clear the fields for a new crop the following year.

In the 2009-2011 period, Benton County reported seven cases of acute pesticide related illness, and Linn County reported eight cases. These illness rates are near the middle of Oregon counties in terms of pesticide exposures per 100,000 people. Lincoln County did not report any cases. Statewide, the majority of pesticide related illness occurs in residential use (69 percent), as opposed to work, agricultural, or industrial use. The majority of residential illnesses were due to exposures not related to actual use of a pesticide (63 percent), but rather as accidental contact with pesticides applied earlier. A further 28 percent of residential exposures occurred during application of pesticides. These proportions were similar for work-related pesticide exposures.¹³⁷ Anyone using pesticides should take reasonable precautions to avoid direct contact or inhalation, and limit secondary exposure through accumulation on clothes or equipment.

Conclusion

From particulate matter to ocean temperature, the health and stability of the environment that we live in creates opportunities and hazards for our own health. We rely on the natural resources of our region to maintain our livelihoods while being available for our enjoyment.

We expect our built environment to function in our day-to-day lives and help us make healthy lifestyle choices. Our environment shapes who we are, even as we shape our environment. Slow trends and sudden disasters can have wide-reaching effects for everyone living in our region. Intersections between individual health and environmental factors are often complex but undeniable. In subsequent chapters, the complex nature of environmental factors will be better understood and highlighted through the lens of social determinants of health and health across the life course.

Chapter 4

Social Determinants of Health

Opportunities for health among residents of the three counties begin within their communities including their homes, neighborhoods, places of worship, workplaces, and schools. A growing body of scientific research shows that all people benefit when communities invest in health.

The World Health Organization defines 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”.¹³⁸ These non-medical factors contribute to a large percent of preventable poor health outcomes. Social determinants include influences such as: “early years’ experiences, education, economic status, employment and decent work, housing and environment, and effective systems of preventing and treating ill health.”¹³⁹ These aspects of health are often referred to as “upstream factors” since their effect occurs well before illness manifests and curative intervention becomes necessary. In this chapter regional data will be presented for education, employment, income, poverty, economic challenges, food security, home ownership, and homelessness. Environmental factors have been presented in Chapter 3, and access to medical systems will be presented in Chapter 5.

Income, Poverty, and Economic Challenges

Income and Poverty

Income is the strongest predictor of health among all social determinants of health. Not only are there many studies showing a strong association between income and health,¹⁴⁰ but income also affects all other social determinants of health, including education, food security, and housing. The National Longitudinal Mortality Survey found that people in the top five percent of incomes had life expectancies 25 percent longer than people in the bottom five percent of incomes.¹⁴¹ While income is not a “one size fits all” measure of health, understanding the income of the region provides a solid foundation for measuring social determinants of health in Linn, Benton, and Lincoln Counties.

Income

Income incorporates more than money earned from a job. It also includes assets, such as bank accounts or equity in a home, and access to other economic resources. Income influences peoples’ ability to choose where to live, what food to eat, participation in physical activities (especially those that require fees or special equipment), and availability of leisure time.

Regional data is highlighted here, as the story of economic disparity is similar across all three counties.

Median and Per Capita Incomes

The median income of a population is one measure of the overall income in that population; 50% of the population earns more than the median income, and 50% of the population earns less. The median (inflation-adjusted) household incomes in the region are lower than that of Oregon’s median household income (Table 4.1).

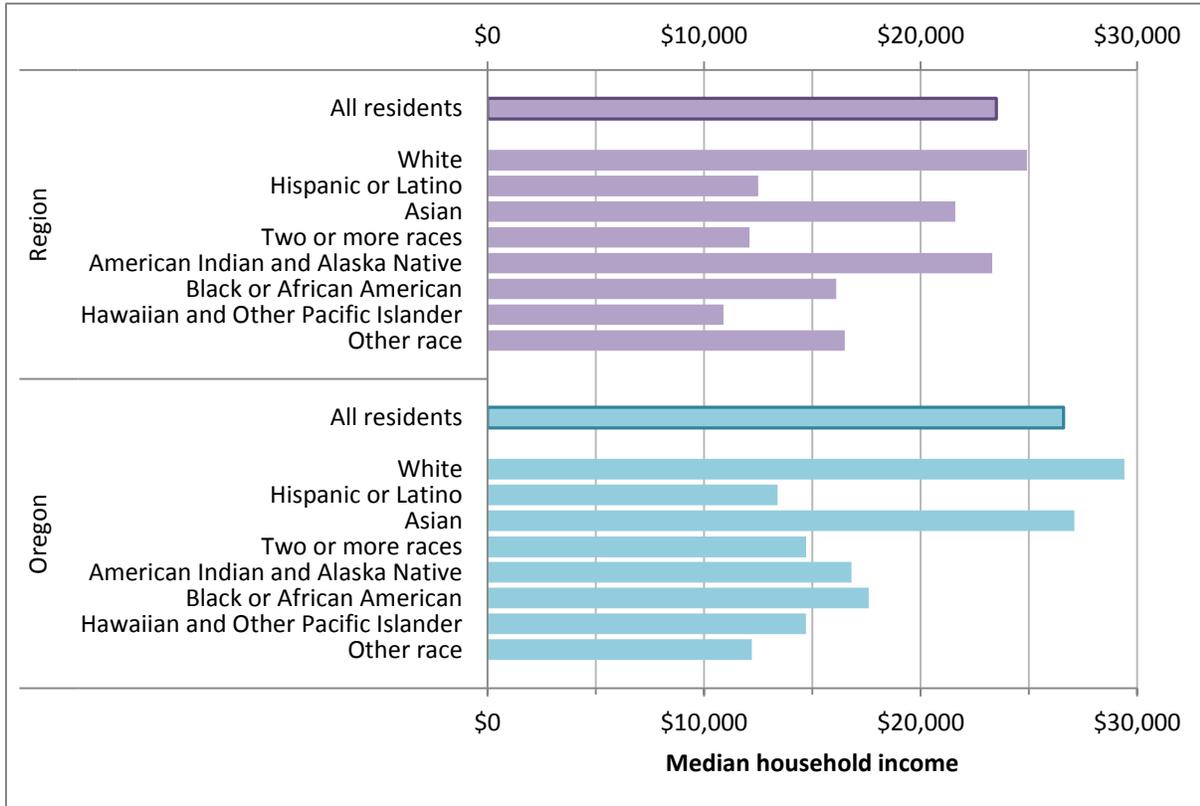
Table 4.1: Median household income of Linn, Benton, and Lincoln Counties and Oregon, 2011-2013

	Linn	Benton	Lincoln	Oregon
Median household income	\$45,145	\$47,587	\$42,395	\$49,519

Source: U.S. Census Bureau American Community Survey, 2011-2013, Table B19013

Per capita income is another measure of income. It is the average income of a person. Per capita income is lower than median household income because it is per person, not per household. Figure 4.1 on the following page displays the per capita income of the three counties in comparison to the state, according to the subpopulation group.

Figure 4.1: Per capita income by subpopulation group in the Linn, Benton, and Lincoln County Region and Oregon, 2011-2013



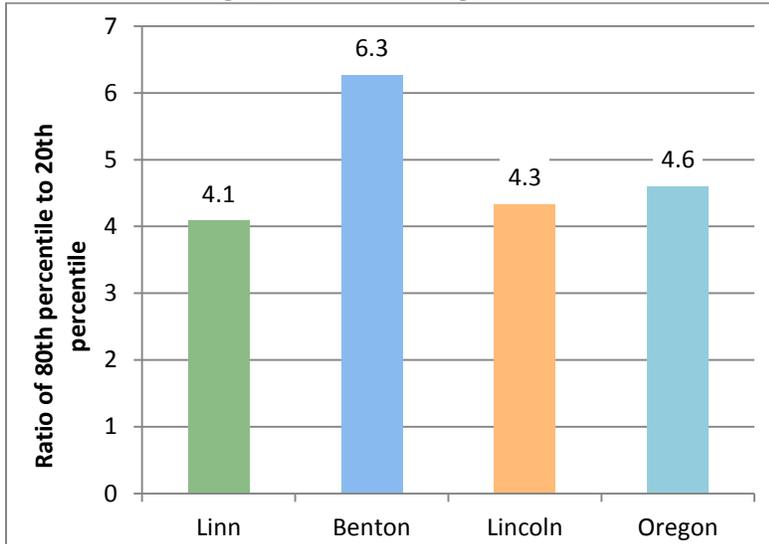
Source: U.S. Census Bureau American Community Survey, 2011-2013, Table B19301

Income Inequality

Income inequality (the distribution of wealth between richer and poor segments of the population) is associated with many health outcomes. Regions with higher inequality are more likely to experience increased infant mortality, lower life expectancy, higher rates of depression, and lower health status overall. Income inequality is commonly measured by calculating the ratio of the 80th income percentile to the 20th income percentile of the population.^{*,142} In Oregon, the 80th income percentile is 4.6 times the 20th income percentile (Figure 4.2). Both Linn (a ratio of 4.1) and Lincoln (a ratio of 4.3) have lower ratios than the state (meaning less inequality), and are ranked 7th and 13th, respectively, among counties in Oregon (Table 4.2). Benton County (a ratio of 6.3) has the highest income inequality in the state, and is among the two percent of counties in the United States with the highest income inequalities when measured in this way.

* The 80th income percentile is the income of the individual who earns more than 80 percent of the population. The 20th income percentile is the income of the individual who earns more than 20 percent of the population. Those who earn more than the 80th income percentile are the richest 20% of the population; those who earn less than the 20th percentile are the poorest 20% of the population.

Figure 4.2: Ratio of the 80th income percentile of residents to 20th income percentile of residents in Linn, Benton, and Lincoln Counties, and the state of Oregon, 2009-2013 average



Source: Robert Wood Johnson Foundation, County Health Rankings, 2015

Table 4.2: Income inequality rankings

County	Rank out of 31 Oregon counties
Linn	7
Benton	31
Lincoln	13

Source: Robert Wood Johnson Foundation, County Health Rankings, 2015
(Smaller rank corresponds to lower inequality)

Poverty

Poverty is inextricably linked to poor health outcomes. Poverty is related to both limited income and lack of economic stability, limited choices in education, employment, and living conditions, and reduced access to safe places to live, work, and play. It can also frequently hinder choices and access to healthy food.

The United States Census Bureau determines the Federal Poverty Level (FPL) each year. The FPL was originally an estimate of the amount of money required to meet the cost of living for individuals or families. Currently, the FPL is a statistical threshold of poverty.¹⁴³ It is not generally recognized as an accurate measure of true poverty, but it is used for determining eligibility for assistance programs. Below, in Table 4.3, the FPL for individuals and families is presented, as well as specific FPL ratios that are used for eligibility and comparison purposes.

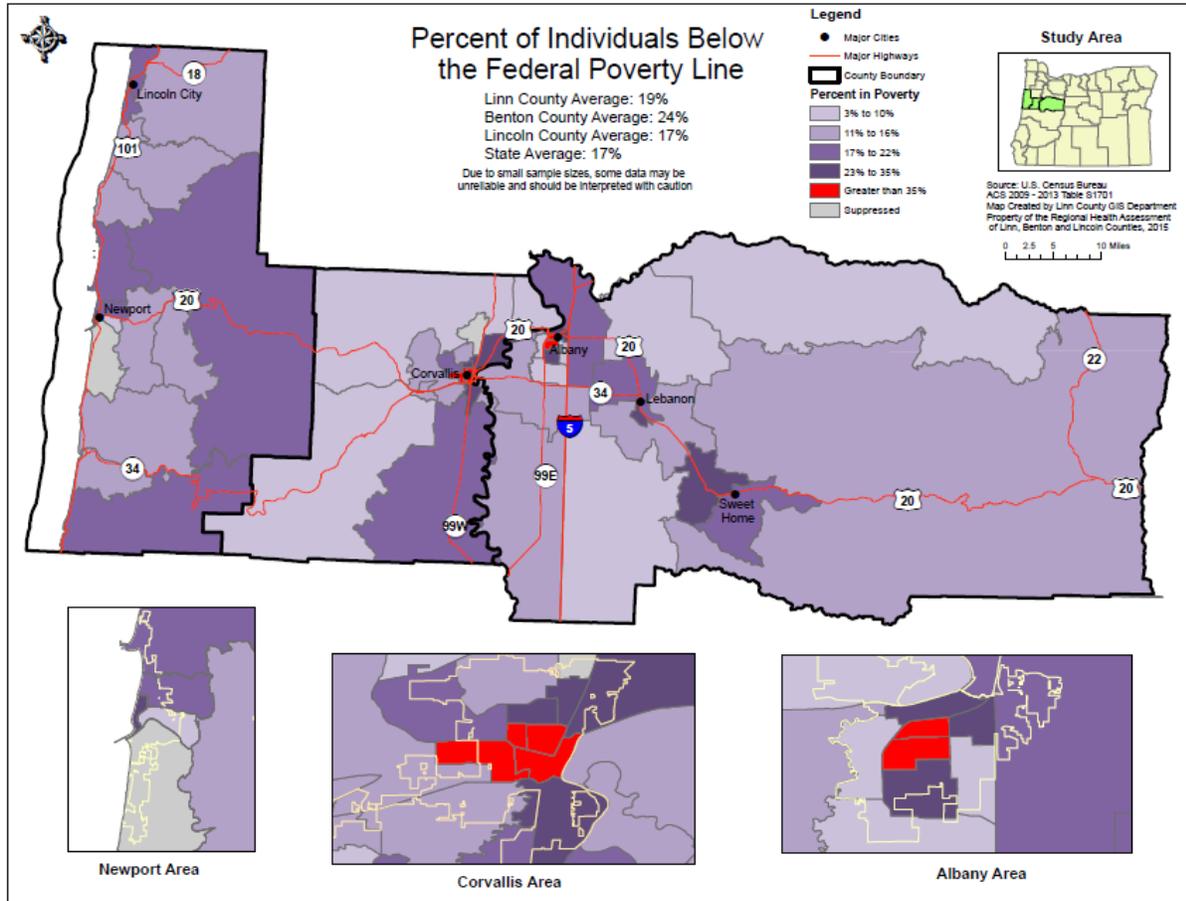
Table 4.3: Annual Income and Federal Poverty Levels and related ratios for 2013

Family size	Percent of Federal Poverty Level					
	50%	100%	138%	185%	200%	400%
Individual	\$5,940	\$11,880	\$16,394	\$21,978	\$23,760	\$47,520
Three person family	\$9,277	\$18,554	\$25,605	\$34,325	\$37,108	\$74,216
Four person family	\$11,922	\$23,844	\$32,905	\$44,111	\$47,688	\$95,376

Source: U.S. Census Bureau, Historical Poverty Threshold Table

Map 4.1 on the following page illustrates the geographic distribution of the region’s residents that are at or below 100 percent of the federal poverty line. The geographic boundaries in this map are determined by U.S. Census Bureau 2010 census tracts. Poverty rates range from 3 percent to over 35 percent; the census tracts with the highest poverty rates are in Corvallis and Albany. Generally poverty rates are higher in more urban census tracts, with the exception of some rural areas in Lincoln County.

Map 4.1: Percent of individuals in U.S. census tracts below the federal poverty line, 2013

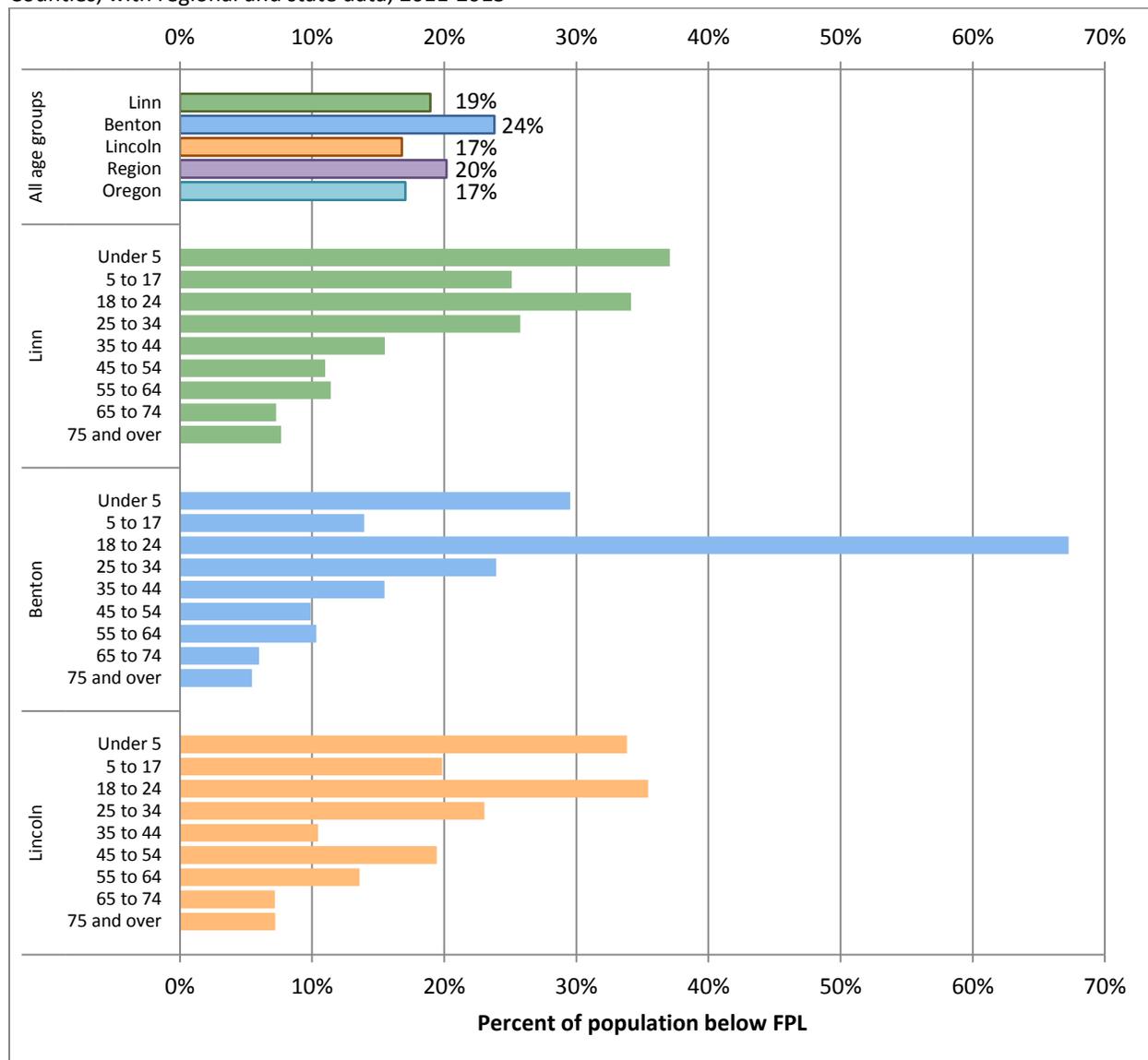


Source: U.S. Census Bureau, American Community Survey, 2011-2013, table S1701

Approximately 20 percent of the regional population lives below the federal poverty line, compared to 17 percent of Oregon’s total population. Lincoln County has 17 percent of its population living below the federal poverty line, while Linn County’s is at 19 percent, and Benton County is at 24 percent. Benton County’s greater percent of the population living below the federal poverty line is largely due to poverty among 18 to 24 year olds, which is nearly twice that among individuals of the same age group in Linn and Lincoln Counties (Figure 4.3). The poverty rate among this age group, combined with the very large proportion of Benton County residents that are between age 18 and 24, is the reason that Benton County’s poverty rate is

higher than in Linn or Lincoln Counties. Another worrisome statistic is that children less than five years of age are among the age groups with the highest percentage living below the federal poverty level across all three counties. This indicates opportunities for improvement at the regional level.¹⁴⁴ Figure 4.3 on the below illustrates each age group’s contribution to the overall poverty rate.

Figure 4.3: Percent of population living below the federal poverty line by age group in Linn, Benton, Lincoln Counties, with regional and state data, 2011-2013



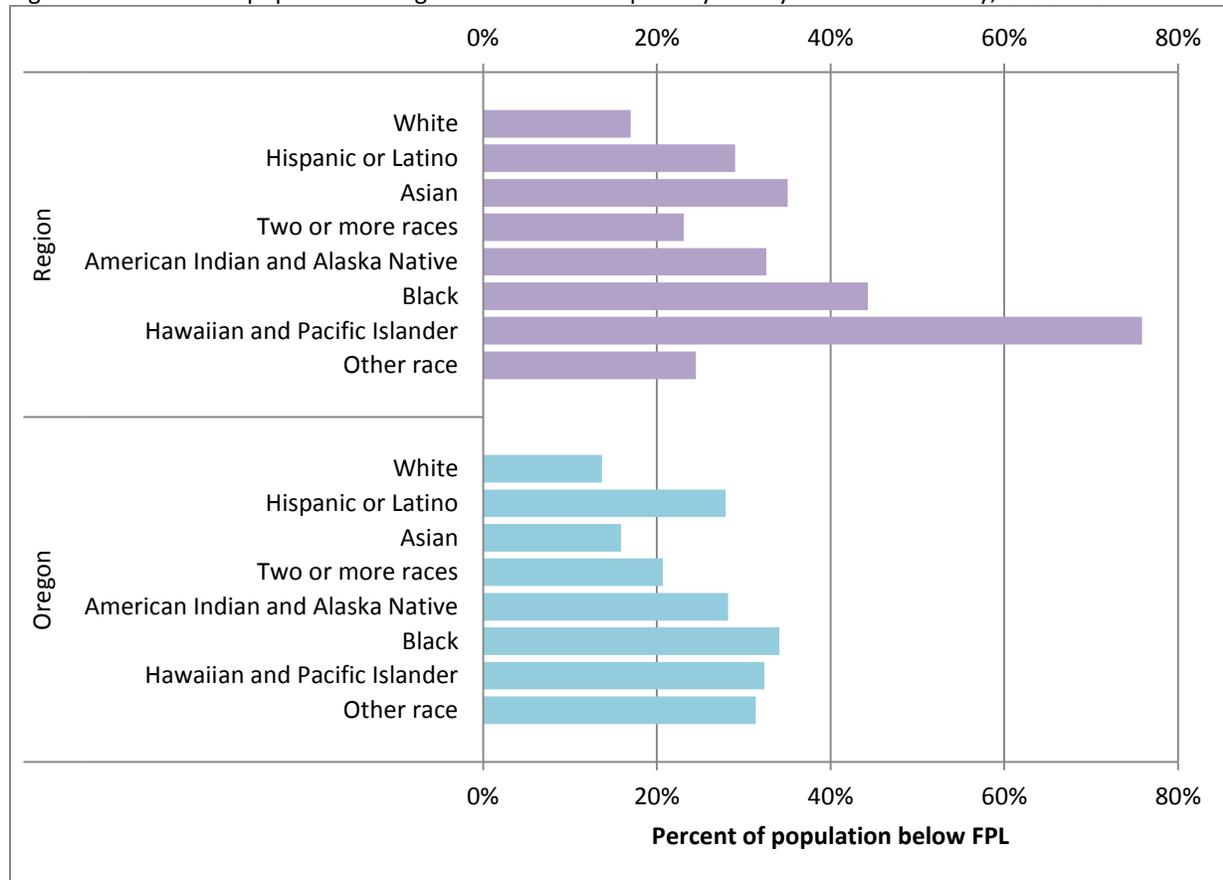
Source: U.S. Census Bureau, American Community Survey, 2011-2013, Table S1703

Earning less than a high school education increases the risk of experiencing poverty.¹⁴⁵ Regionally, 27 percent of adults over the age of 25 who did not complete high school are below the federal poverty line, compared with 14 percent of those who completed high school. These figures are consistent across all three counties, with the exception of Benton County. Benton

County has 38 percent of its adult population over the age of 25 that did not complete high school living below the federal poverty line.¹⁴⁶

Variation also exists between racial/ethnic groups, although racial/ethnic groups within the region consistently have a higher percentage of population living below the federal poverty line compared with equivalent groups in Oregon. As shown in Figure 4.4, all racial and ethnic groups in the region have a higher poverty rate than the White, non-Hispanic/Latino population, which is similar to Oregon overall. Individuals in the region who identify as Hawaiian or Pacific Islander and Black or African American are among the racial/ethnic groups with the highest poverty rates with 76 percent and 44 percent, respectively.¹⁴⁷ It is important to note, however, that the population for these racial/ethnic groups, in addition to the American Indian and Asian populations, is small relative to other groups within the region.

Figure 4.4: Percent of population living below the federal poverty line by race and ethnicity, 2011-2013



Source: U.S. Census Bureau, American Community Population, 2011-2013, Table S1701

Children Living in Poverty

Across the region, nearly one in four children were living in poverty (24 percent) in 2013, though child poverty rates vary among the three counties. Nearly one in three children in Linn

County (28 percent), one in four children in Lincoln County (24 percent) and more than one in six children in Benton County (18 percent), are below the federal poverty line.¹⁴⁸

A growing body of research shows that children who are raised in families experiencing long-term poverty are at greater risk of significant and long-term deficits in health.¹⁴⁹ From 2011-2013, 28 percent of children under 18 years of age in the region were living in households earning less than the federal poverty level.¹⁵⁰ This accounts for approximately 7,700 regional residents. In comparison, Oregon and the United States have slightly lower rates of childhood poverty (each 22 percent).

Low Income and Cost of Living

Many regional residents earn incomes higher than the federal poverty level but still struggle economically to meet their everyday needs. Nearly 38 percent of the regional population earn less than 185 percent of the federal poverty level (\$21,775 annually for an individual or \$44,863 annually for a family of four in 2015).^{151,152} This is the threshold that many assistance programs, such as the Supplemental Nutrition Assistance Program (SNAP), use for income eligibility.

Research suggests that the cost of living in Linn, Benton, and Lincoln Counties is well above the federal poverty level. Table 4.4 below shows the cost of living for three family types in each county, and the corresponding poverty level. These figures take into account costs such as housing, child care, food, transportation health care, and taxes.¹⁵³

Table 4.4: Cost of living as a percent of the federal poverty level, 2014

County	One adult, one preschooler		One adult, one preschooler, one school-age		Two adults, one preschooler, one school-age	
	Annual cost of living	Annual cost of living as percentage of FPL	Annual cost of living	Annual cost of living as percentage of FPL	Annual cost of living	Annual cost of living as percentage of FPL
Linn	\$29,415	187%	\$33,809	171%	\$41,866	176%
Benton	\$44,684	284%	\$55,389	280%	\$62,671	263%
Lincoln	\$32,390	206%	\$36,624	185%	\$45,918	193%

Source: *The Self-Sufficiency Standard for Oregon, 2014*

Employment

Stable and secure employment influences health, not only by being a source of income, but also by providing access to health insurance. Compared to unemployed workers, individuals who are employed fulltime have higher incomes and standards of living, less stress, and may be less

likely to turn to unhealthy coping behaviors such as alcohol consumption or smoking.¹⁵⁴ Regionally, the unemployment rate in 2013 was 10.3 percent, compared with 10.7 percent statewide.¹⁵⁵ The unemployment rate has been decreasing steadily in recent years.¹⁵⁶ As of April 2015, the seasonally adjusted unemployment rates in Linn, Benton, and Lincoln Counties were 6.3, 4.1, and 6.5 percent, respectively.¹⁵⁷ Generally an unemployment rate of 5 percent is considered “full employment” as there is always a certain amount of turnover in the labor force.

Economic Opportunities

Regionally, the education, healthcare, and social assistance sector employs approximately one-third of the population (27 percent), compared with just under one-quarter of the population statewide (23 percent). Lincoln County’s top business sector comprises the arts, entertainment, recreation, accommodation and food services (21 percent). Linn and Benton both follow the regional trend of education, health care, and social assistance; at 27 and 37 percent employed, respectively, compared to 19 percent in Lincoln County. Other important business sectors across the region are retail trade; manufacturing; and professional, scientific, management, administrative, and waste services.¹⁵⁸

Education

Health and education are closely connected. Educational access and attainment are very important predictors of health status. Individuals with higher levels of education are less likely to die prematurely or report acute diseases. They also report positive health behaviors, like maintaining healthy weight, and fewer risky behaviors, like smoking.¹⁵⁹ Furthermore, education levels are the strongest predictor of income and wealth, which strongly influence lifelong health.¹⁶⁰

Early Learning

Early childhood development supports nurturing relationships and learning opportunities that foster children’s readiness for school. The early years are crucial for influencing health and social well-being across a child’s lifetime. Research evidence accumulated over the past 40 years supports the conclusion that children who participate in high-quality early childhood development (ECD) programs benefit from a broad range of immediate and long-term health benefits.¹⁶¹

The Head Start Program is one such federal program that promotes the school readiness of children from low-income families by enhancing their cognitive, social, and emotional development. Head Start programs provide a learning environment that supports children’s growth from birth to age five in several areas, such as language, literacy, and social and emotional development. Head Start programs also emphasize the role of parents as their

child’s first and most influential teacher and support the development of healthy familial relationships and well-being.¹⁶² In Oregon, Head Start programs include at least the Oregon Head Start Prekindergarten (OHS PreK) program, which serve children ages three to five from low-income families. Some Head Start programs also include Early Head Start (EHS), which is a comprehensive program for children below the age of three and pregnant women from low-income families. Oregon children whose families are below the federal poverty level (\$24,250 for a family of four) are eligible for these benefit programs.¹⁶³ The OHS PreK and EHS programs that serve children and families in the region are shown in Table 4.5 below:

Table 4.5: Oregon Head Start PreK and Early Head Start programs and enrollment by county, 2013-2014

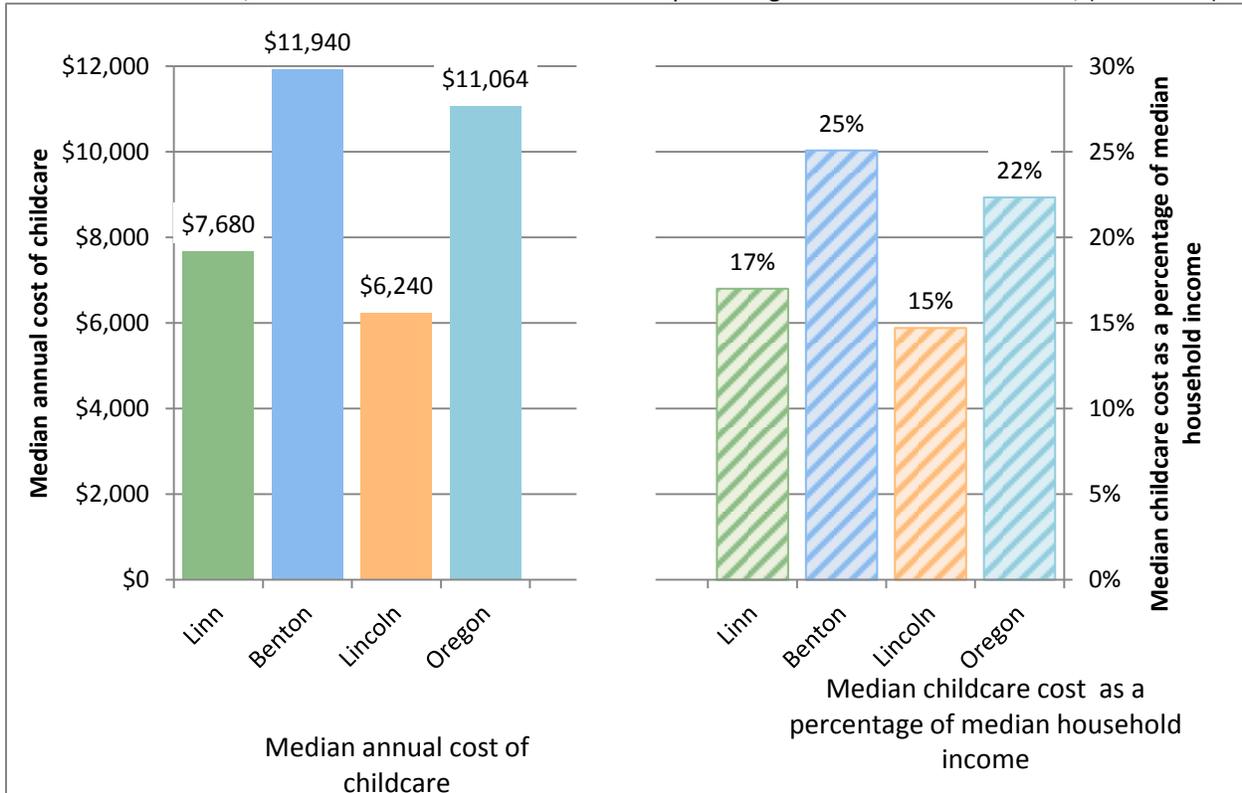
OHS PreK and EHS program	County	OHS PreK enrollment	EHS enrollment	Total enrollment
Kids and Company of Linn County (KidCo) Head Start	Linn and Benton	449	52	501
Oregon State University Child Development Center	Benton	75	--	75
Community Services Consortium	Lincoln	154	--	154
Siletz Tribal Head Start	Lincoln	20	30	50
Total		698	82	780

Source: Oregon Department of Education, Early Learning Division, Oregon Head Start Prekindergarten Programs 2013-2014 Directory

Despite strong research showing the positive impact of high-quality early education, many families in the region who are in need of child care may not be served. While data are not available for informal child care options, in 2012, for every 100 children there were 13 available child care slots in Linn County, 24 available child care slots in Benton County, and 18 available child care slots in Lincoln County. In Oregon, there were 17 available child care slots per 100 children. The goal for the state is 25 slots per 100 children; all counties in the region failed to meet the goal. In addition to availability, price may be a barrier for many families. The average annual cost of toddler care in childcare centers in Linn, Benton, and Lincoln Counties are shown in Figure 4.5 on the following page. In both Linn and Lincoln Counties, the average cost of toddler care is lower than the average cost in Oregon. However, child care expenses may overwhelm the budgets of families in these two counties and in Benton County, where the average cost of child care exceeds that of Oregon. Across the region, the cost of child care may amount to 34 to 65 percent of the annual income of a parent earning the minimum wage (Figure 4.5b).^{164,165,166}

Figure 4.5a: County-level median annual cost of childcare for a toddler, 2012

Figure 4.5b: Median annual cost of childcare (2012) as a percentage of median annual income, (2011-2013)



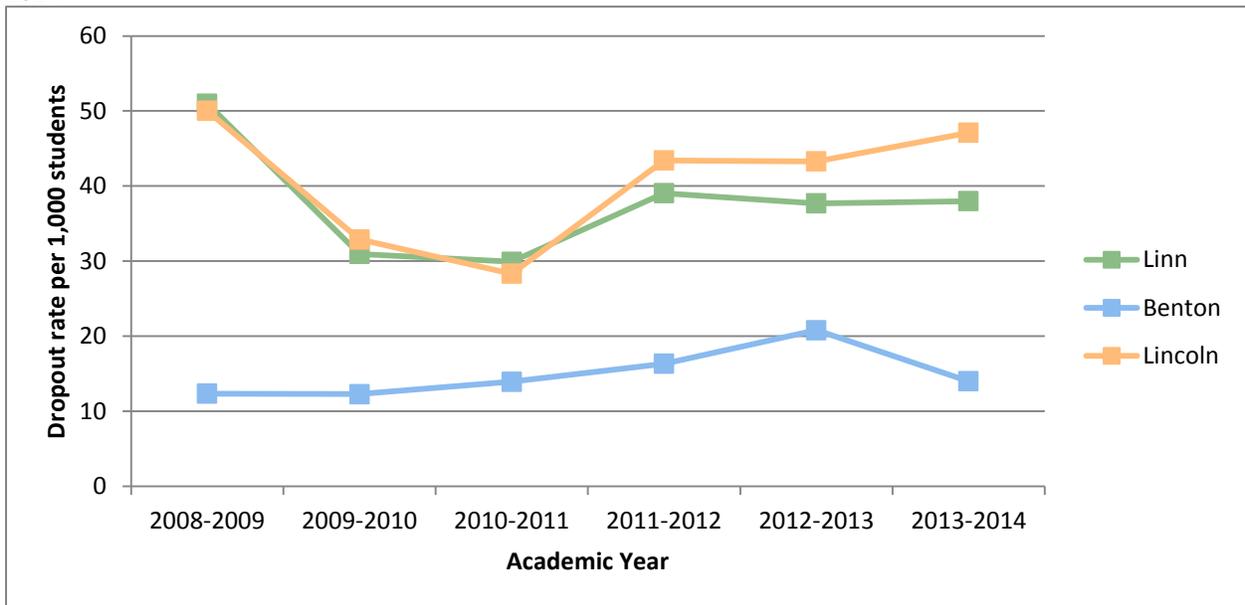
Sources: Oregon State University, Child Care and Education in Oregon and Its Counties, 2012
 U.S. Census Bureau American Community Survey, 2011-2013, Table B19031

High School Education

High school graduation is a strong predictor of future employment and earnings. Conversely, dropping out of school is associated with lower income, multiple social and health problems,^{167,168} and health risks.¹⁶⁹ For example, 32 percent of Oregonians who do not have a high school degree smoke, compared with 24 percent of high school graduates, 18 percent with some post-secondary education, and seven percent of college graduates (age-adjusted).¹⁷⁰

In the 2013-2014 school year, Linn County experienced a high school dropout rate of 38 students per 1,000 9th-12th graders, Benton County experienced a dropout rate of 14 students per 1,000 9th-12th graders, and Lincoln County experienced a dropout rate of 47 students per 1,000 9th-12th graders. In general, Linn and Lincoln Counties' dropout rates were comparable with the state dropout rate between 2008 and 2014. Benton County's lower dropout rate pulled the overall regional rate slightly lower. The counties' dropout rates are shown in Figure 4.6.¹⁷¹

Figure 4.6: High school dropout rate out of 1,000 students; Linn, Benton, Lincoln Counties, Region, Oregon; 2008-2014

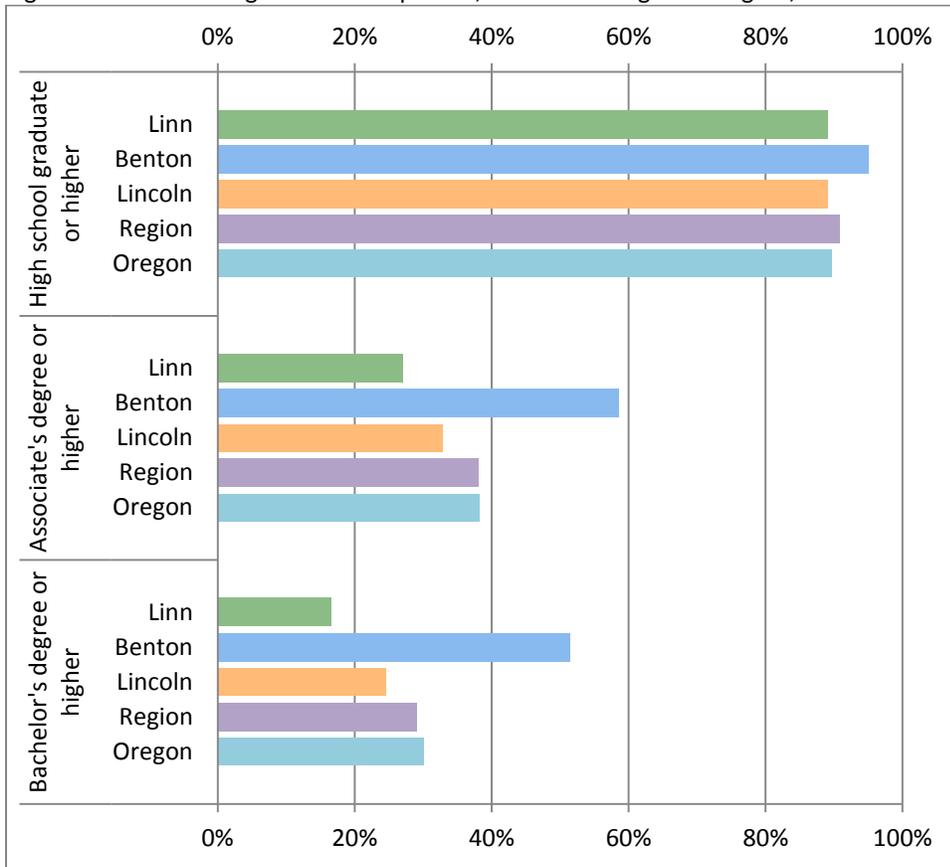


Source: Oregon Department of Education, Oregon High School Dropout Rates, 2008-2014

Within the region, the high school dropout rate for minority youth populations is generally higher compared to the total regional dropout rate of 3.3 percent. This is particularly true for Native American students (5.5 percent), Pacific Islander students (5.3 percent), and Hispanic students (4.4 percent).¹⁷²

In 2011, Oregon set a goal of 40-40-20, meaning that by 2025, 40 percent of Oregonians would have a bachelor’s degree or higher, an additional 40 percent would have an associate’s degree, and the remaining 20 percent would have graduated high school. This translates to 100% of Oregonians having a high school degree or higher, and 80% having an associate’s degree or higher. In 2013, 91% of regional residents had completed high school or GED equivalent, of whom 38% had an associate’s degree or some college, and 29% had a bachelor’s degree or higher. These rates were comparable to the state.¹⁷³ However, there was significant variation between counties, as the following figure demonstrates (Figure 4.7).

Figure 4.7: Rates of high school completion, associate’s degree or higher, and bachelor’s degree or higher, 2015



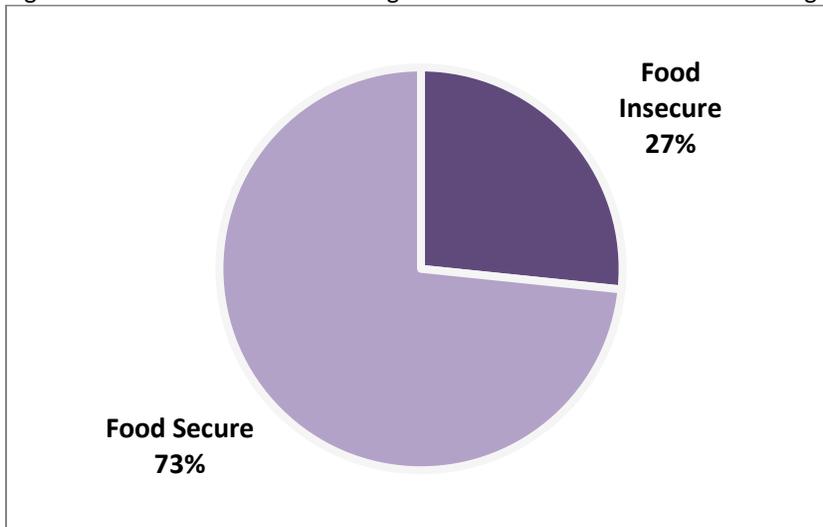
Source: County Health Rankings 2015

Food Security

Food security is defined as having enough to eat, and being able to purchase or obtain healthy food in socially acceptable ways.¹⁷⁴ Adequate nutrition is particularly important for children, as it affects their cognitive and behavioral development. Children from food insecure, low-income households are more likely to experience irritability, fatigue, and difficulty concentrating on tasks, especially in school, compared to other children.¹⁷⁵

Feeding America, a national nonprofit that monitors food security, estimates that 27 percent of children in the region are living in food insecure households as shown in Figure 4.8.

Figure 4.8: Percent of children living in food insecure households in the region, 2013



Source: Feeding America

Based on Oregon Department of Education data, 46 percent of regional K-12 students were eligible for free/reduced lunch during the 2013-2014 school year. The percentage of students eligible for free/reduced lunch by school varies significantly from school-to-school within and between the counties, from 10 percent to 89 percent of students attending schools with at least 100 students (Table 4.6).¹⁷⁶ Students whose family incomes are below 130 percent of the federal poverty level (\$31,525 annually for a family of four) are eligible for free lunches, and students whose family incomes lie between 130 and 185 percent of the federal poverty level (between \$31,525 and \$44,863 annually for a family of four) are eligible for reduced-price lunches.^{177,178}

Table 4.6: Percentage of children eligible for free and reduced-price lunch, 2014-2015.

County	Eligible for free lunch	Eligible for reduced-price lunch	Percent of total students eligible for free or reduced lunch
Linn County	8,570	1,283	44.1%
Benton County	2,905	474	38.2%
Lincoln County	3,041	413	66.0%
Region	14,516	2,170	45.7%
Oregon	--	--	50.8%

Source: Oregon Department of Education, Report: Students Eligible for Free/Reduced Lunch, 2013-2014

An analysis of factors* determining food insecurity suggests that in 2013, 16 percent of the regional population, or nearly 40,000 individuals, were residing in households that were food

* Factors include indicators of food insecurity such as poverty, unemployment, median income; food budget shortfalls; a cost of food index; and national average meal costs.

insecure. Among those who were food insecure, 23 percent earned incomes above 185 percent of the federal poverty level, making them ineligible to receive government assistance programs (Table 4.7). The childhood food insecurity rate was much higher, at 27 percent of the children in the region. Of the children living in food insecure households in the region, it is estimated that 33 percent of these children are likely ineligible for federal nutrition programs as they live in households with incomes above 185 percent of the federal poverty level.^{179,180,181}

Table 4.7: Food insecurity in the region, 2013

	Number of food insecure individuals	Percent of population that is food insecure	Percent of food insecure people who are ineligible for benefits *
Linn County	19,020	16%	21%
Benton County	13,840	16%	28%
Lincoln County	7,070	15%	21%
Region	13,310	16%	23%
Oregon	--	16%	25%

* Percent ineligible figure is produced by modeling and is an estimate

Source: Feeding America

Supplemental Nutrition Assistance Program Participation

The Federal Supplemental Nutrition Assistance Program (SNAP) is the largest domestic food and nutrition assistance program for low-income Americans. U.S. households must meet certain eligibility criteria, such as income, to receive benefits. In 2013, it is estimated that 19 percent of all households (18,499 households) in the tri-county region received SNAP benefits, compared to 20 percent in Oregon. Of these households, 48 percent (8,871 households) had an income in the past 12 months below the federal poverty level. Of the remaining 81 percent of households (35,805 households) that did not receive SNAP benefits, 11 percent (9,016 households) were below the poverty level.¹⁸² Furthermore, 8,723 (47 percent of the benefit-receiving households) households that received Food Stamps/SNAP benefits during this time supported children under the age of 18.¹⁸³ The regional rate is slightly higher than Oregon's (46.9 percent). See Table 4.8 on the following page for county level data.

Table 4.8: Supplemental Nutrition Assistance Program recipients, 2011-2013

	Number of households receiving SNAP benefits	Percent of households receiving SNAP benefits	Percent of households receiving SNAP benefits that have children under 18
Linn County	9,670	22 %	53 %
Benton County	4,540	14 %	43 %
Lincoln County	4,290	21 %	39 %
Region	18,500	19 %	47 %
Oregon		20 %	47 %

Source: U.S. Census Bureau American Community Survey, 2011-2013 Table B22002

Women, Infants and Children (WIC)

WIC is a public health nutrition program that is vital to the health of women, infants, and children across Oregon. The WIC program provides health and nutrition services to pregnant and breastfeeding women and children ages 0 to 5 that have a household income less than 185 percent of poverty guidelines.¹⁸⁴ Overall in 2014, a total of 4,356 families were served by WIC in the region; 71 percent of these were infants and children under five, and 29 percent were pregnant, breastfeeding, and post-partum women. Approximately 48% of pregnant women in the region were served by WIC. Furthermore, 63 percent, 67 percent, and 71 percent of families served by WIC in Linn, Benton, and Lincoln Counties, respectively, were working families.^{185,186,187}

Emergency Food Support

Linn Benton Food Share, the regional food bank system, distributes emergency food boxes to 23 food pantries (emergency food box agencies) located in both Linn and Benton Counties. In addition to the pantries, Linn Benton Food Share also provides assistance through programs, such as emergency meal sites (soup kitchens), supplemental programs, and gleaners and wood share.¹⁸⁸ Food Share of Lincoln County provides similar services to residents in Lincoln County.

Below are the most salient demographic characteristics of the population that is served by the Linn Benton Food Share:

- 36 percent of those receiving emergency food are children;
- 7 percent of those receiving emergency food are 65 years and older;
- 55 percent of households have children;
- 46 percent of households had at least one member working;
- 30 percent of households have one or more member working a full-time job;
- 58 percent of households report delaying medical care;
- 68 percent of households report delaying dental care;

- 47 percent of households delay filling medical prescriptions due to cost;
- 56 percent report medical/hospital debts.¹⁸⁹

Linn Benton Food Share distributed over 52,000 food boxes from July 2013 through July 2014. One food box typically contains enough groceries for a four day supply.¹⁹⁰ In addition, the Food Share served over 272,000 meals in soup kitchens and shelters. Between food boxes and emergency meals, Linn Benton Food Share provided enough meals to feed nearly 2,500 people three meals a day for the whole year.¹⁹¹

The Food Share of Lincoln County does not report demographic characteristics of the population they serve. Between July 2014 and July 2015, the Lincoln County Food Share distributed enough food to feed approximately 400 people three meals a day for a year.¹⁹²

Housing and Home Ownership

Housing is an important part of the built environment and another key factor contributing to good health. Older housing in particular can present multiple threats to health, including the presence of mold, asbestos, lead-based paint, and lead solder in plumbing and in the soil.

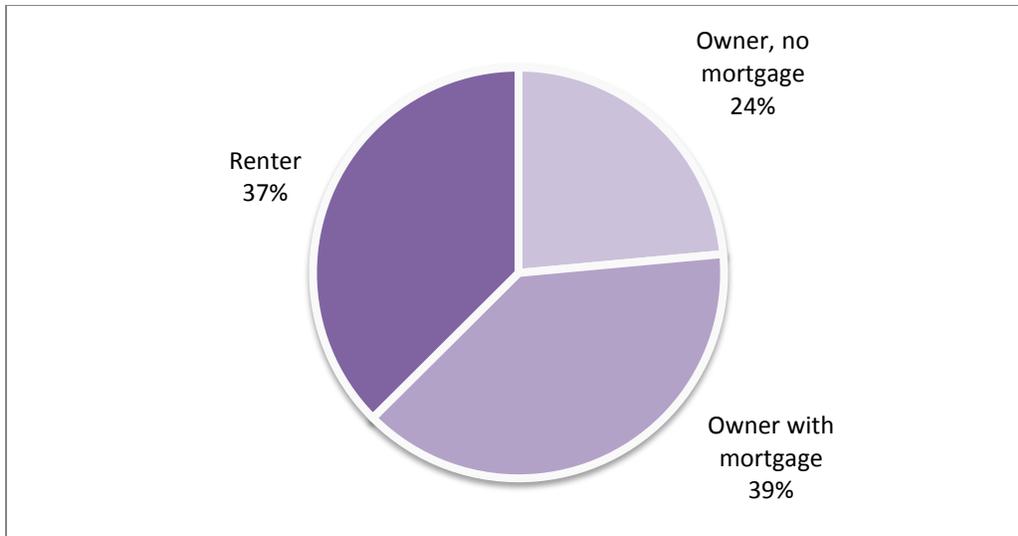
Poor quality and inadequate housing contribute to health problems such as infectious and chronic diseases, injuries, and poor childhood development. Indoor allergens and damp housing conditions play an important role in respiratory conditions including asthma, which currently affects over 20 million Americans, and is the most common chronic disease among children. Approximately 40 percent of diagnosed asthma among children is believed to be attributable to residential exposures.

Residential exposure to environmental tobacco smoke, pollutants from heating and cooking with gas, volatile organic compounds and asbestos have been linked with respiratory illness and some types of cancer. People who have difficulty paying rent, mortgage or utility bills are less likely to have an established source of medical care, more likely to postpone treatment, and more likely to use the emergency room for treatment. Families who lack affordable housing are more likely to move frequently. Residential instability is associated with emotional, behavioral and academic problems among children, and with increased risk of teen pregnancy, early drug use, and depression during adolescence.

Housing Affordability

Affordable, quality housing provides shelter that is safe and healthy for all people. Housing that costs more than 30 percent of household income is considered to be “unaffordable.”¹⁹³ Figure 4.9 below shows the distribution of regional residents who rent and own their homes.

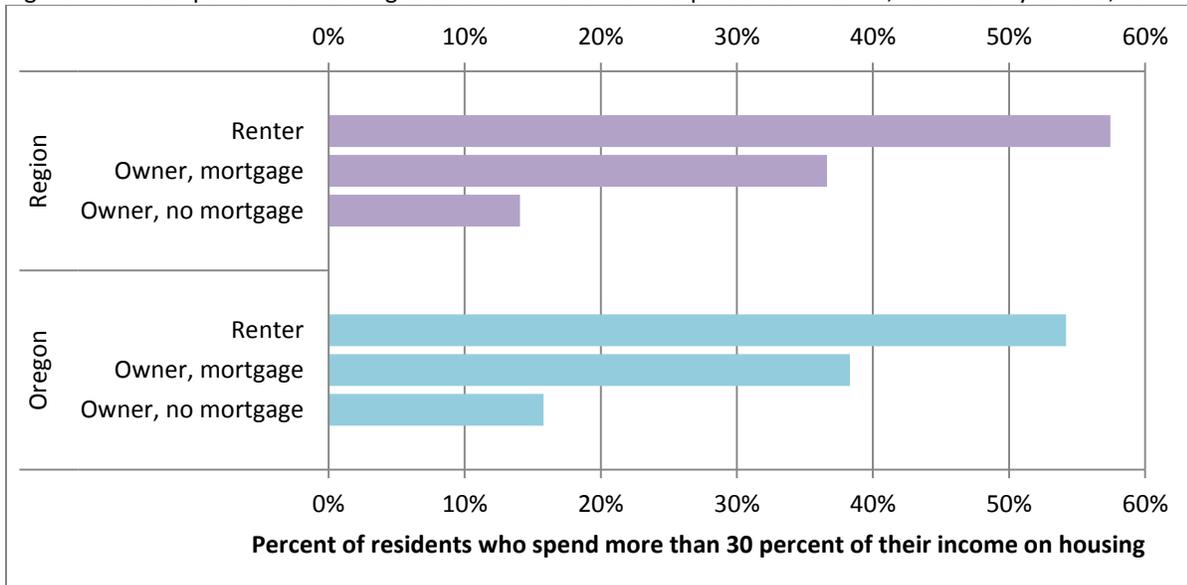
Figure 4.9: Household ownership in the region, 2011-2013



Source: U.S. Census Bureau, American Community Survey, 2011-2013, Table S2502

Figure 4.10 shows the similarities in housing affordability between Oregon and the region. Similar to Oregon, 57 percent of renters in the region spend 30 percent or more of household income on housing rent. Of home owners with mortgages, 37 percent spend 30 percent or more of household income on housing, compared to 38 percent in Oregon. Of home owners without mortgages, 14 percent spend 30 percent or more of household income on housing, compared to 16 percent in Oregon.¹⁹⁴

Figure 4.10: Occupants with housing cost burden more than 30 percent of income, stratified by tenure, 2011-2013

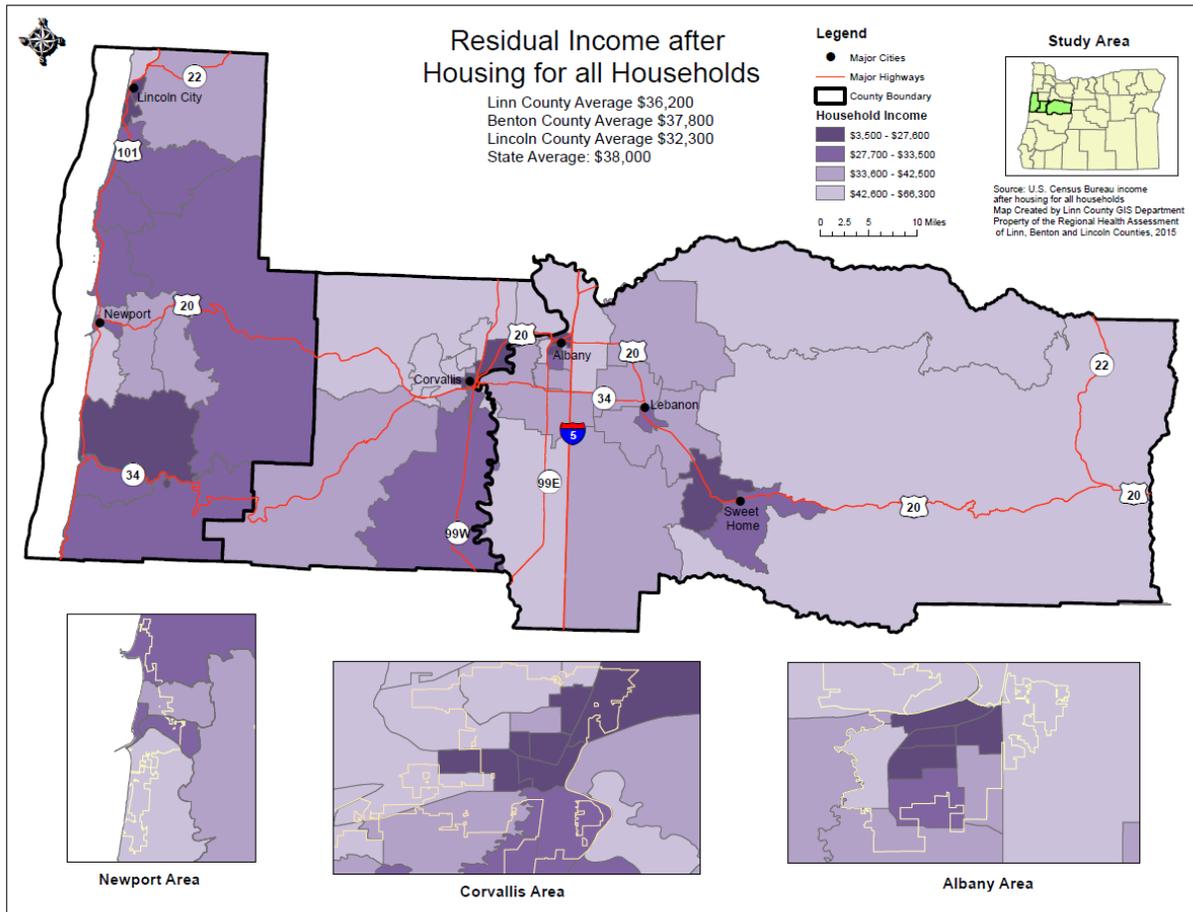


Source: U.S. Census Bureau, 2011-2013 American Community Survey, Table DP04

An additional measure of housing affordability is the residual income a household has after paying housing costs. One striking disparity is the difference in residual income between urban and rural areas. Map 4.2 on the following page shows that urban areas (delineated by census

tracts) tend to have much lower residual incomes than rural areas in the region.¹⁹⁵ This is partially a consequence of lower housing costs in rural areas, and partly a consequence of lower median incomes in some urban areas.

Map 4.2: Residual household income after housing costs for the region, 2011-2013



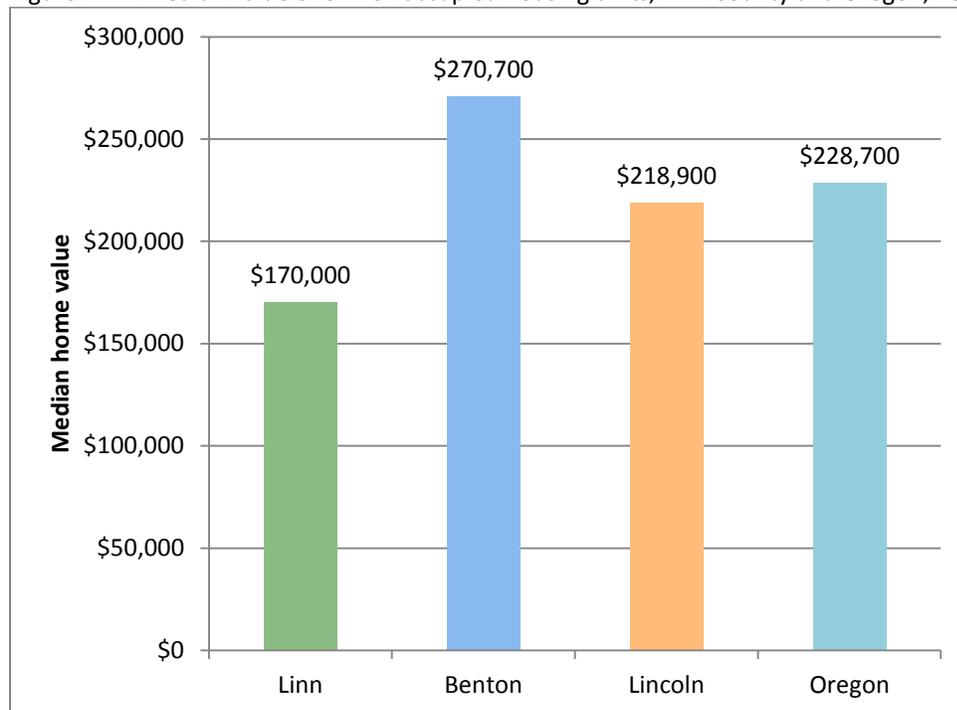
Source: U.S. Census Bureau, 2011-2013 American Community Survey, Table DP04

Home values

Higher home values can support health, as more valuable homes tend to have design or construction features that support health, such as adequate insulation and weather-proofing. Homes are also a major source of wealth, which helps people afford health care and other health promoting activities. However, high median home prices can also signal inequality or housing insecurity in a community. Unaffordable housing has strong negative effects on health for many of the same reasons that stable housing promotes health.

The median home values of the region vary widely, from \$170,000 in Linn County to \$270,700 in Benton County. Lincoln County's median home value of \$218,900 is close to the state median of \$228,700 (Figure 4.11).¹⁹⁶

Figure 4.11: Median value of owner-occupied housing units, Linn County and Oregon, 2011-2013



Source: U.S. Census, American Community Survey, 2011-2013

Homelessness

The Oregon's Ending Homelessness Advisory Council defines homelessness as being without a decent, safe, stable, and permanent place to live that is fit for human habitation.¹⁹⁷

Understanding homeless populations is a daunting challenge for public health. Homeless people are just as much a part of society as housed individuals, but they face additional obstacles in accessing social services or health care. Even counting the number of homeless individuals is a difficult task, because a homeless individual may move around a lot during the year or be unwilling to interact with social services. Each January, Oregon Housing and Community Services requires communities to conduct a point-in-time count of homeless populations. This snapshot of the homeless population is limited in scope and depth. Canvassers visit shelters, transitional housing, and known homeless encampments. Individuals staying with other people out of economic necessity are not counted, nor are homeless people who are in areas not covered by the canvassing. Furthermore, the one-night count misses any individual who is homeless at other points during the year. Notwithstanding these limitations, the point-in-time estimates have the benefit of being a consistent approach across years and geographies, and therefore may give some insight into the homeless community in each county.

In 2011, the county point-in-time surveys counted 283 homeless individuals across the region (Table 4.8). All of these individuals were in shelters or transitional housing. There were no street counts conducted in the region in 2011. Sixty percent of the homeless population across the region was male; although this proportion was found to be reversed in Lincoln County. The

regional average length of time spent homeless was 30 months for men and 13 months for women. However, in Benton County, men on average spent 43 months homeless, while women spent 18 months.

The most recent data on homeless populations is from 2015 (Table 4.8). In 2015, there were 408 homeless individuals identified in the January point-in-time survey, an increase of 44 percent in four years. However, in 2015 the unsheltered counts comprised the majority of the records, which may indicate a larger canvassing effort rather than solely an increase in the homeless population.

In both 2011 and 2015, approximately one quarter of the recorded individuals were members of families, both adults and children. However, in 2011, the majority of records in Lincoln County were of family members (Table 4.9).

Table 4.9: One-night count homeless population figures

	2011				2015			
	Linn	Benton	Lincoln	Region	Linn	Benton	Lincoln	Region
Total homeless count	135	107	41	283	246	131	47	424
Sheltered count	125	107	41	273	197	94	25	316
Unsheltered count	10	0	0	10	49	37	22	108
Male	84	71	16 *	171 *	123	88	23	234
Female	51	36	24 *	111 *	108	43	23	174
Individuals	109	81	23	75	186	110	29	325
Family members	26	26	18	208	60	21	18	99
Average months spent homeless (male / female)	22 / 13	43 / 18	20 / 7	30 / 13	No data	No data	No data	No data

Source: OHCS and Community Services Consortium

* Counts do not sum to total

Another source for recording the number of homeless individuals is the set of statistics gathered by federally qualified health centers (FQHCs)*. Among the data that FQHCs are required to collect is housing status, which they report each year to the federal government.

* FQHCs have a legal mandate or expressly adopted mission to serve all patients, regardless of ability to pay or legal status.

According to the Bureau of Primary Health Care, a patient’s status should be recorded as homeless if the patient was residing in a shelter, transitional housing, on the street, if the patient was doubled up or temporarily living with others, had been homeless within the last 12 months, or resided in a housing program targeted to homeless populations. Compared with the one-night counts, FQHCs may identify homeless individuals who were not staying in shelters or in canvassed encampments or who were homeless at other times throughout the year. However, only those individuals who were able to seek out medical care at an FQHC and chose to do so were identified. Nevertheless, the records provided by the FQHCs indicate a much broader level of homelessness than the one-night counts. In 2014, the Benton-Linn FQHC served approximately 835 homeless patients, and the Lincoln FQHC served approximately 564 homeless patients,* for a regional count of approximately 1,400 individuals who were homeless during at least one visit to the FQHC. This number is over three times as large as the 2015 one-night count, and represents a 50 percent increase from the number of homeless FQHC patients in 2012.¹⁹⁸

While these two data sources can broaden the understanding of the homeless population in the region, a major challenge is reconciling their different purposes and methodologies. If a crosswalk of data could be created, it could have the potential to greatly clarify the picture of homelessness in the three counties.

Student homelessness is a recurring problem in Oregon as well. Across the state, an increasing number of Oregon’s K-12 public school students are homeless at some point during the school year. Homelessness among students has more than doubled since the 2003-2004 academic school year. Regionally, Lincoln County has the highest percentage of children in K-12th grade who are homeless (10 percent), compared to 4 percent in Linn County and 3 percent in Benton County (Table 4.10).

Table 4.10: Homeless students grades K-12 in Linn, Benton, and Lincoln Counties, 2013-2014

County	Number of Homeless Students Grades K-12	Percent of Homeless to Total Enrollment
Linn	859	4 %
Benton	228	3 %
Lincoln	519	10 %
Region	1,199	4 %
Oregon	--	3 %

Source: Oregon Department of Education, 2013-2014

* 835 and 564 are the numbers of unique patients, not the numbers of patient visits.

Conclusion

Socioeconomic factors, income and wealth, form the base of Frieden's Health Impact pyramid (p. 7)¹⁹⁹ and are powerful determinants of health. Furthermore, socioeconomic factors that are affected by income and wealth, such as education, food security, and housing, in turn have powerful effects on a person's health. Social determinants of health interact with individual characteristics such as age, and environmental factors such as air quality and proximity to healthy or unhealthy built environments. People with a strong set of social resources are more resilient to challenges to their health, and are better able to navigate the health care system. In the next chapter on access to medical care, many of the disparities seen in social determinants of health recur when people try to access health care services.

Chapter 5

Access to Medical Care

Access to medical care is important to physical, mental, and social health. The Institute of Medicine (IOM) defines access to health care as "the timely use of personal health services to achieve the best health outcomes," with a special focus on the importance of equity of health care usage and health outcomes among and across different groups of people.²⁰⁰ The ability to access healthcare can impact other areas of life, including employment, education, family life, nutrition, and emotional outlook, which play major roles in one's overall health status. Scarcity of health services, rising health care costs, lack of insurance coverage, and other limiting factors create barriers that prevent individuals and families from accessing quality health care. Persistent or cumulative barriers to health care lead to worsening health conditions, preventable hospital visits, limited use of preventive care, and other negative health outcomes.²⁰¹

According to the Agency for Healthcare Research and Quality (AHRQ) 2013 National Healthcare Disparities Report (NHDR), there are three steps to attaining adequate access to health care:

- Gaining entry into the health care system,
- Getting access to sites of care where patients can receive needed services, and
- Finding providers who meet the needs of individual patients and with whom patients can develop a relationship based on mutual communication and trust.²⁰²

Healthy People 2020 cites both the IOM and AHRQ documents on access to health care, and divides access into four major components:

- *Insurance Coverage and Affordability* – Health insurance coverage is highly emphasized by current policy in the United States as a means to affordable health care services.
- *Service Availability* – Having a usual and ongoing source of care, especially a primary care provider, leads to better health outcomes. Existence of preventive services and emergency medical services are also key.
- *Workforce* – Health care centers must be staffed with appropriate employees in order for people to access health care. Healthy People 2020 focuses on tracking the number of primary care providers.
- *Timeliness of Care* – Timeliness is defined as receiving care quickly after a need is recognized. This can be measured both in appointment and office wait times as well as the time lag between identifying a needed service (such as a test or course of treatment) and receiving it.²⁰³

It is important to examine medical care access and capacity in the larger context of overall factors that contribute to health. "Health care is necessary but not sufficient for improved

health; in fact, health care accounts for only about 10–20 percent of health outcomes, according to some experts.”²⁰⁴ Social determinants of health, the upstream factors listed in Chapter 4, are responsible for a much larger percentage of health outcomes than medical care alone. People need a healthy and accessible environment to achieve good health. This includes the broader community context, as well as the characteristics of the local health care system itself. Both a strong health system and good population health are needed, and can be mutually reinforcing to achieve optimal health in a community.

Many of the forces that shape the opportunity for better health in the Linn, Benton, and Lincoln tri-county region – education, employment, and transportation, for instance – can also affect access to medical care. Frieden’s Health Impact Pyramid (illustrated in the Introduction on p. 7) provides a helpful model for recognizing some of those larger forces.²⁰⁵ Upstream factors play a large role in any individual’s ability to make healthy choices and decisions, and this holds true for accessing medical care. For example, the ratio of providers to patients in a region may be considered excellent, but a prospective patient may work during clinic hours, find transportation difficult to navigate, or be unable to find childcare options during the time of the visit. While having access to good doctors and health care facilities are visible indicators of access to medical care, there are numerous other factors that influence opportunities for health. This chapter will highlight recent data on the four major components discussed above.

Demographic Differences in Access to Medical Care

Some populations face increased barriers to accessing care and receive poorer quality care when they get it. In its 2011 reports on health care quality and disparities, the Agency for Healthcare Research and Quality (AHRQ) finds that, at a national level, low income individuals and people of color experience more barriers to care and receive poorer quality care. Moreover, other research shows that individuals with limited English proficiency are less likely than those who are English proficient to seek care even when insured. Research also finds differing patient experiences and levels of satisfaction by race, gender, education levels, and language.²⁰⁶

Health Insurance Coverage

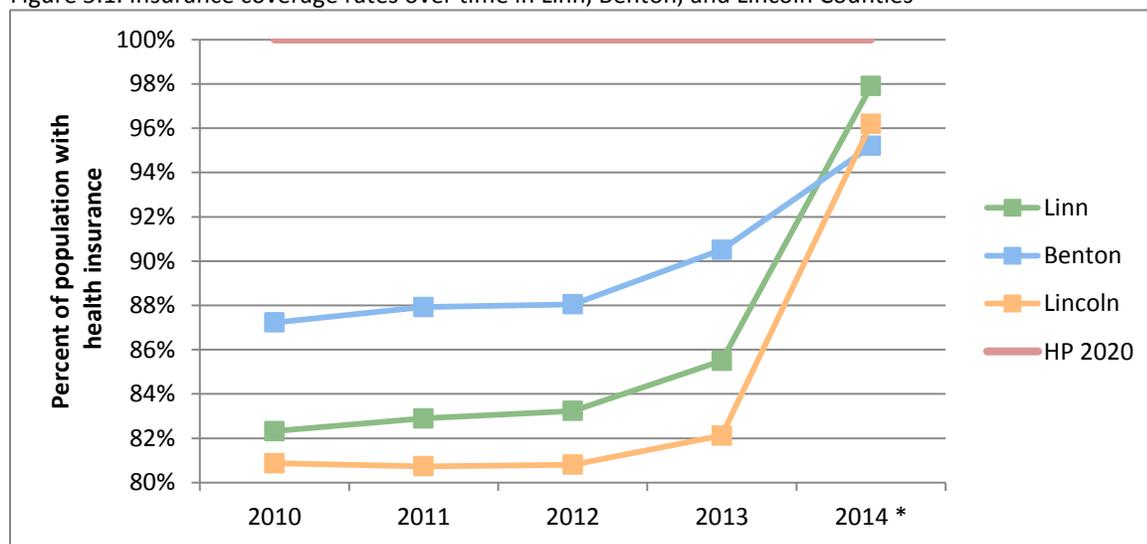
Lack of adequate health insurance coverage is often a major barrier to medical care. People who are uninsured or underinsured receive less medical care than their insured counterparts.²⁰⁷ Inadequate coverage creates a financial barrier between a patient and needed medical care services. People without health insurance are less likely to know about or seek out preventive services, and are more likely to have new and worsening health problems, and shorter lifespans.²⁰⁸ In general, even when uninsured or underinsured persons receive medical care,

care is often postponed (due, in part, to concerns about cost). These individuals suffer significantly worse health outcomes than those who have adequate medical coverage.²⁰⁹

Recent changes in policy on both the national and state level have altered the landscape of health care and health insurance access in the past five years. The Affordable Care Act (ACA), enacted on a federal level in 2010, made it illegal to deny coverage due to pre-existing medical conditions, mandated health coverage for most individuals, expanded Medicaid funding and coverage, and subsidized health insurance through exchanges for lower income individuals,* among other provisions. Most of these provisions went into effect by 2014.²¹⁰ As part of the ACA, Oregon accepted federal funding to expand Oregon Health Plan (OHP) membership, setting targets for enrollment and expanding the variety of services (e.g. dental services). Statewide, membership in OHP increased 75 percent over four years, from 469,000 members in January 2010 to 821,000 members in January 2014. Regional enrollment increased from 29,000 members to 53,000 members over the same time period.^{211,212} In addition to OHP expansion, 80 percent of the consumers registered to the new health care exchange received tax credits and/or cost-sharing subsidies as of April 2014.²¹³

Insurance coverage rates in the region, and across the nation, have risen recently, largely due to the ACA and other healthcare transformation policies. The regional insurance coverage rate in 2012 was 76 percent, rising to 97 percent in 2014.²¹⁴ As of 2014, 98 percent of Linn County, 95 percent of Benton County, 96 percent of Lincoln County residents have insurance (Figure 5.1).²¹⁵

Figure 5.1. Insurance coverage rates over time in Linn, Benton, and Lincoln Counties



Source: U.S. Census Bureau, American Community Survey, 2009-2013

* 2014 coverage rates are from Oregon Health Authority, 2015

* Health insurance exchanges are online, state or federally run marketplaces where an individual can compare plans from different insurance companies and purchase individual health insurance. Individuals with a qualifying level of income can receive federal subsidies to help pay premiums on health insurance plans.

Because of the rapidly shifting health care and health insurance landscape, local data points that accurately capture these changes are still forthcoming. With that in mind, data from before the ACA expansion showed major disparities among the population based on age, race, and income. Examining these disparities across the region can help provide a baseline for future comparisons with disparities which exist after ACA expansion once the data is available.

Uninsured Rates

Uninsured rates differed greatly between age groups before ACA. The uninsured rate among children across the region was lower than the rate for working-age adults (Table 5.1).²¹⁶ Overall, in both age groups, regional uninsured rates were similar to the rest of Oregon. Across the region, less than one percent of individuals 65 and older lack health insurance. The age group with the highest uninsured rates in the region was 25 to 34 year olds, at 28.7 percent.

Table 5.1: Uninsured rates in the region and Oregon, 2011-2013

	Region	Oregon
Under 18 years old	7.8 %	7.8 %
18 to 64 years old	20.3 %	22.1 %
65 years old and older	0.6 %	0.5 %

Source: U.S. Census Bureau, ACS 2011-2013, Table S2702

Insurance coverage rates were also pronounced across racial and ethnic categories, employment status, and citizenship status. From 2009 to 2013 in the region, over 27 percent of Latino individuals and over 30 percent of American Indian and Alaska Natives were uninsured, compared to 12 percent of Asians and 13 percent of the White population. Black or African American, two or more races, and other races had uninsured rates between 16 and 18 percent. Additionally, 42 percent of the unemployed are uninsured, compared to 17 percent of those currently employed. The foreign born and non-citizens have very high uninsured rates, at 31 percent and 42 percent, respectively.²¹⁷ Insurance coverage data is not available for undocumented immigrants. However, undocumented immigrants, including undocumented children, are excluded from both Medicaid and the health insurance exchange.²¹⁸

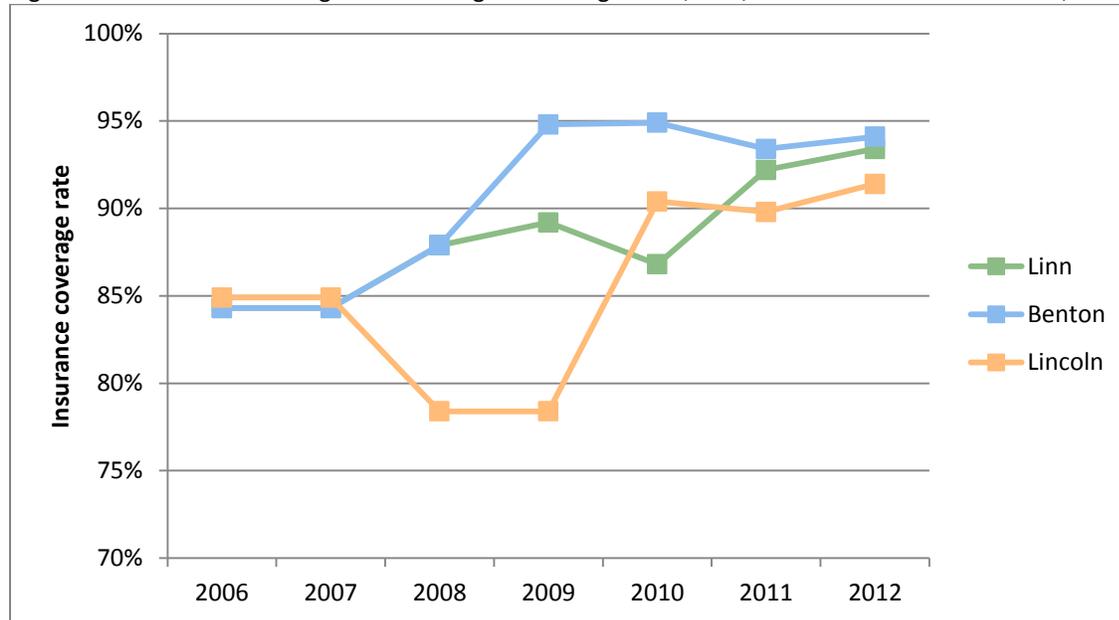
Among the employed, those working less than full time year-round were uninsured at a higher rate (25 percent) compared to those working full time year-round (13 percent). Residents earning less than 200 percent of the federal poverty level are more likely to be without insurance coverage than those with higher incomes, 24 percent versus 9 percent.²¹⁹

The implementation of the Affordable Care Act has had a major impact on insurance coverage rates in the region as Figure 5.1 demonstrates. However, even given the growth in insurance coverage rates over the past 5 years, insurance gaps and inequalities remain, especially for people of color, individuals living in rural areas, and low income workers.²²⁰ As data for recent years become available, it will be important to measure these disparities.

Health Insurance Among Children

Examining insurance coverage rates among children up to age 18 (Figure 5.2) shows a gradual increase in all three counties from 2006 to 2012. As of 2012, all three counties had an insurance coverage rate of 90 to 95 percent for children under the age of 18. While data are not yet available to demonstrate the effects of the ACA on insurance coverage rates among children, the upward trend preceding the ACA expansion provides an important baseline.

Figure 5.2: Insurance coverage rates among children age 0 -18, Linn, Benton and Lincoln Counties, 2006-2012

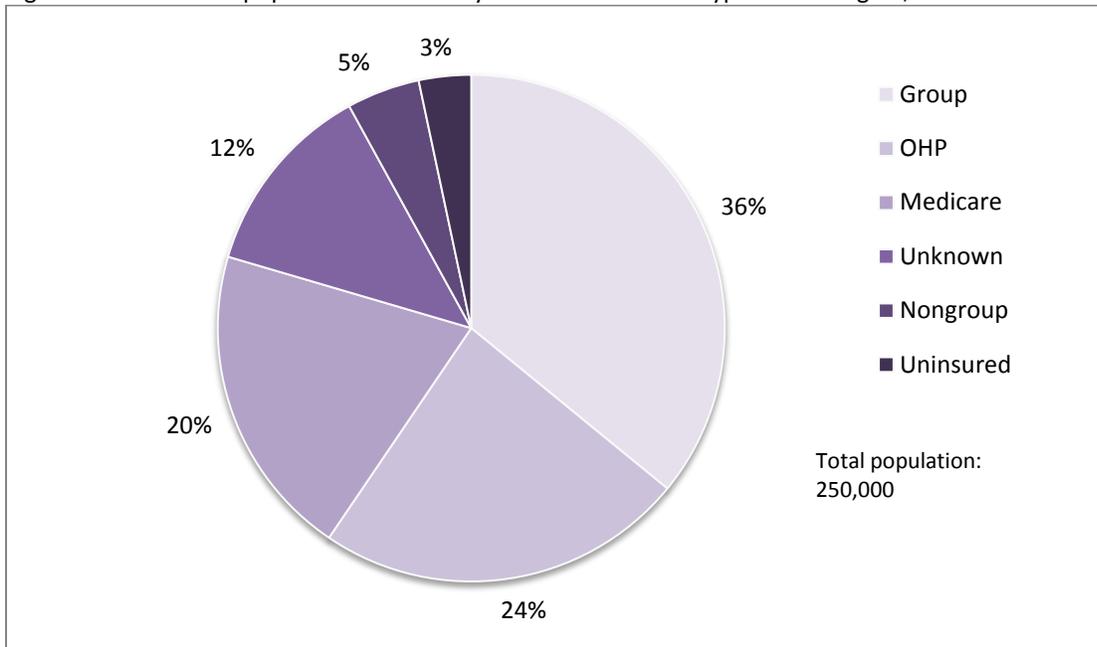


Source: Kids Count Data Center

Insurance Types and Sources

People secure insurance from many different sources, including employer-based insurance, private insurance and public insurance. Figure 5.3 illustrates the distribution of the type of health insurance coverage among tri-county residents as of February 2015; with employer-based health insurance constituting the majority of coverage. As listed in the following figure, group health insurance includes employer-based plans and self-insurance groups. The Oregon Health Plan provides health care coverage to low-income Oregonians. Medicare is the federal health insurance program for people who are 65 or older, certain younger people with disabilities, and people with end stage renal disease.²²¹ Non-group includes private insurance plans purchased on the health insurance market place or directly from insurance companies. Residual insurance includes COBRA and similar plans.

Figure 5.3: Percent of population covered by different insurance types in the region, 2015

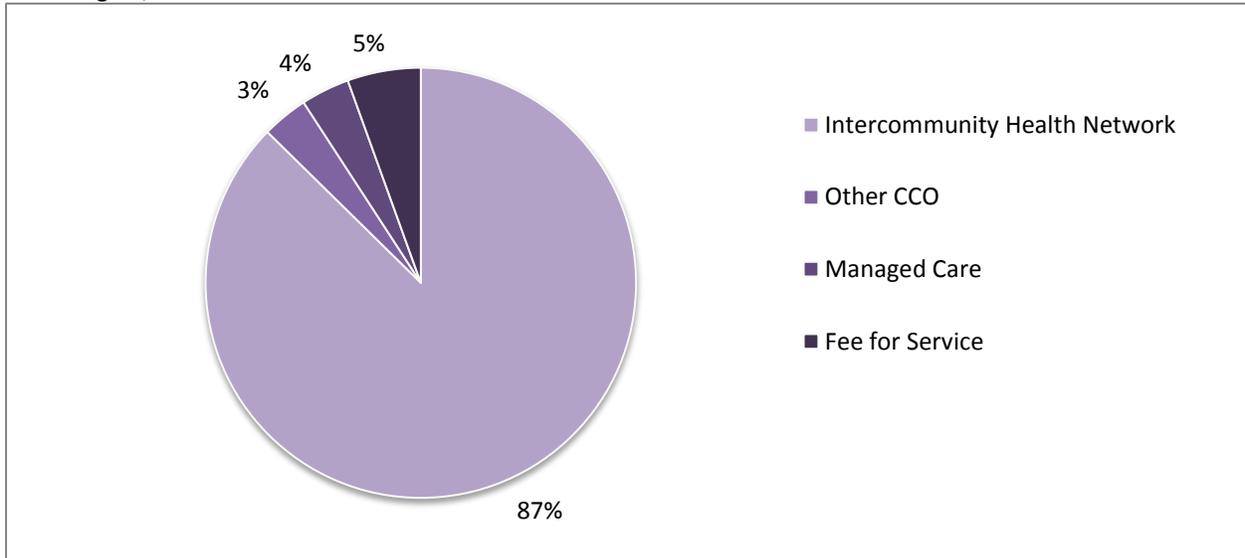


Source: OHA Office of Health Analytics, February 2015

Oregon Health Plan

The Oregon Health Plan (OHP) provides health care coverage to low-income Oregonians through programs overseen by Oregon Health Authority. Service to OHP members in the region is largely provided through the local coordinated care organization (CCO), Intercommunity Health Network-CCO (IHN-CCO). Eighty-six percent of OHP members in the region are enrolled with IHN-CCO. The other 14 percent of the region's OHP membership are enrolled in another CCO, Managed Care, or Fee for Service (Figure 5.4).²²²

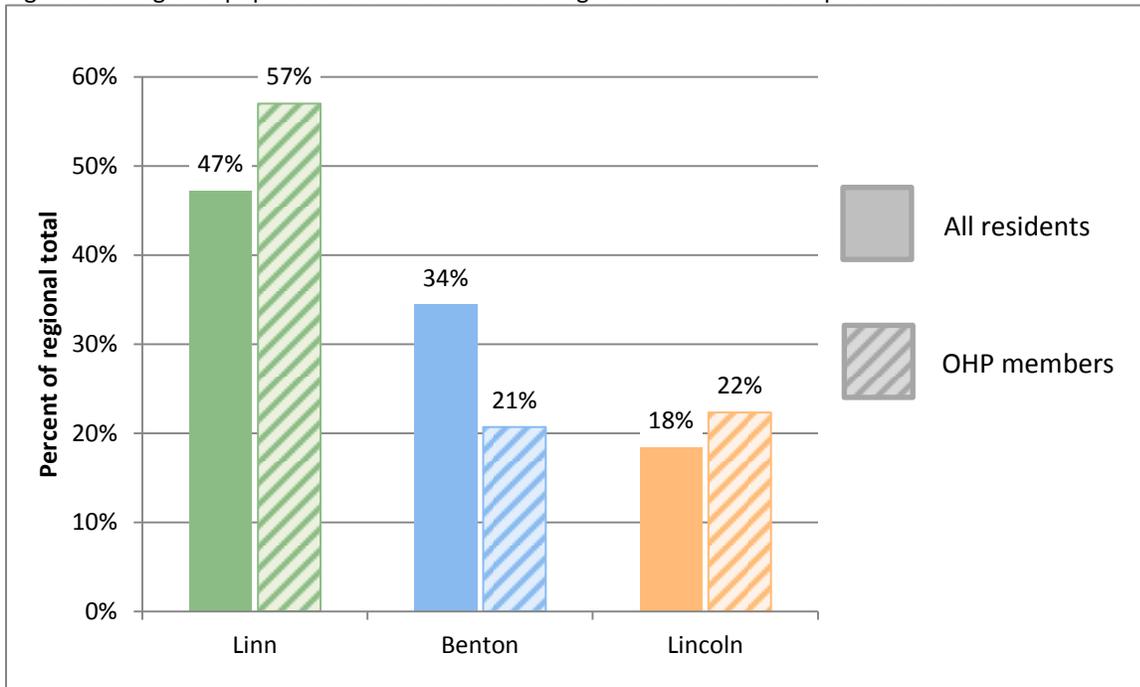
Figure 5.4: Percent of OHP members enrolled in Coordinated Care Organizations, Managed Care or Fee for Service in the region, 2015



Source: OHA Office of Health Analytics, February 2015 OHP Enrollment

In examining the number of OHP members in each county, it can help to make a comparison to the percentage of the regional population each county represents. Figure 5.5 below shows the distribution of OHP members across the counties. Linn County has a greater proportion of OHP members among its population as compared to its percentage of the regional population. Lincoln County has just a slightly higher proportion of regional OHP members than its regional population, while Benton County has a significantly lower percentage of the region's OHP members as compared to its percentage of the regional population.²²³

Figure 5.5: Regional population distribution versus regional OHP membership distribution.

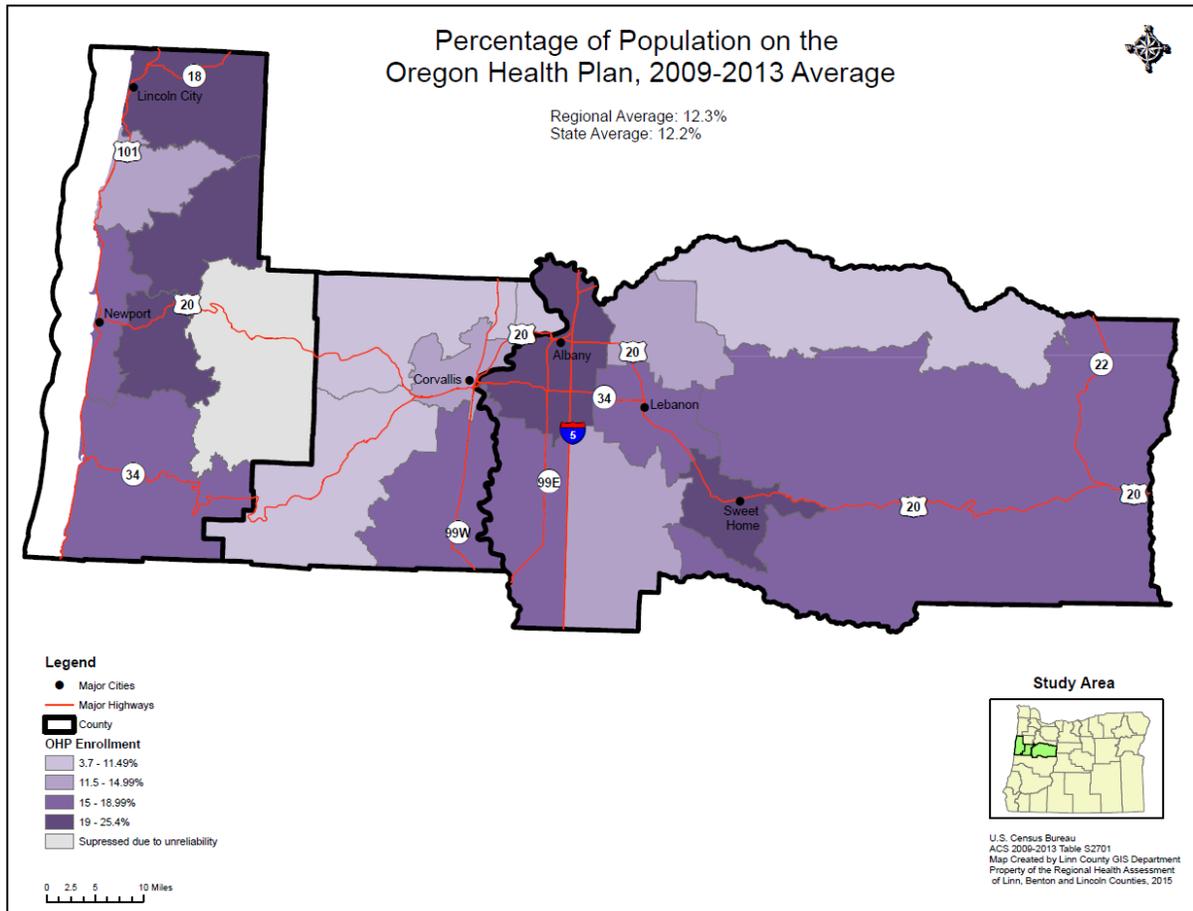


Source: OHA Office of Health Analytics, April 2014 OHP Enrollment; U.S. Census Bureau ACS 2011-2013
Note: Population percentages do not sum to 100% due to rounding

The OHP population increased greatly from 2010 to 2015. In 2010, approximately 31,600 regional residents were OHP members. In 2015, there were 61,500 members, an increase of 95 percent.^{224,225}

As Map 5.1, shows, OHP enrollment rates vary within and across counties. The geographic areas shown are U.S. Census city subdivisions rather than Census tracts. Some of the data may be unreliable due to low numbers. Lincoln City, Albany, and Sweet Home all have high OHP enrollment rates, as does eastern Lincoln County. Most of Benton County has enrollment rates below 15 percent, with the exception of south Benton County.

Map 5.1: Percent of residents enrolled in the Oregon Health Plan, 2009-2013



Source: U.S. Census Bureau, American Community Survey, 2009-2013, Table S2701
Eddyville subdivision data is suppressed due to unreliability

Cost of Medical Care

Insurance coverage is only part of the cost of medical care. Additional costs are referred to as cost-sharing and include costs such as copayments, coinsurance, and deductibles. Health reform legislation has reduced financial burdens for many people with a lower income or significant health care needs. Nevertheless, one in three Americans say they have put off getting medical treatment that they or their family members need because of cost.²²⁶

According to the County Health Rankings, during the 2006-2012 period, 17 percent of adults in Linn County, 10 percent of adults in Benton County, and 19 percent of adults in Lincoln County reported they did not see a doctor in the past 12 months because of cost.²²⁷

Cost of Health Care Services

Oregon has one of the highest hospital adjusted expenses per inpatient day when compared with all 50 states. The average cost per inpatient day in Oregon is \$3,106, while the average cost across the United States is \$2,090.²²⁸ Data that is specific at the county or tri-county level is not publically available.

Cost of Insurance Premiums

When insurance is purchased through an employer, the cost of the premium may be shared by both the employee and the employer. Premium costs are set by the insurer, but the employer decides how much of the cost to pass on to their employee. Individuals who do not purchase insurance through an employer can purchase insurance through the Marketplace Exchange or directly through a private insurance company. The ACA also provides subsidies to reduce premiums, thus making options more affordable for consumers when bought in the marketplace. Regardless of where insurance is purchased, costs have steadily climbed over time. These costs are outstripping increases in workers' wages. Within the U.S. between 2002 and 2012, the average annual premium for family coverage through an employer nearly doubled from \$8,003 to \$15,745.²²⁹ Oregon insurance premiums are slightly below the U.S. average for insurance premiums. In 2013, the average cost of employer-based insurance premiums in the U.S. was \$16,029 annually; the average cost in Oregon was slightly lower at \$15,856.²³⁰

Table 5.2 provides a snapshot of insurance premium costs for Oregon. It includes average monthly health care insurance premium costs paid by employee and employer, as well as the monthly cost for an individual purchasing non-employer provided insurance through the health insurance exchange. Individuals purchasing private, non-employer based coverage in Oregon are paying considerably more than individuals who purchase insurance through an employer.²³¹

Table 5.2: Cost of insurance coverage in Oregon, 2014

Source of Insurance	Type of Coverage	Individual/Employee Contribution to Annual Premium	Employer Contribution to Annual Premium	Total Annual Premium Cost
Employer-Purchased Insurance	Individual	\$ 804	\$ 4,645	\$ 5,449
Marketplace-Purchased Insurance	Individual	\$ 2,640		\$ 2,640
Employer-Purchased Insurance	Family	\$ 4,327	\$11,529	\$15,856
Marketplace-Purchased Insurance	Family	not available		not available

Source: Kaiser Family Foundation: State Health Facts 2014

Looking at the average cost for insurance premiums does have limitations due to the number of variables that influence costs for insurance premium (e.g., age, gender, health risk factors, zip code). However, it can give a general picture of the financial burden to both employers and employees for their health insurance coverage.

Medical Care Hardship Due to Cost

Uninsured Americans are still the most likely to report having put off medical treatment because of cost. However, even among those who have insurance, cost can be a barrier to care. Data from national studies report that families with private, non-employer sponsored insurance and with low income earnings face barriers to accessing services.²³²

National studies have found the following challenges to meeting premiums and deductibles for low and middle income families with insurance. Households with lowest incomes (100 percent to 249 percent FPL)²³³ lack resources to meet health insurance cost sharing demands.²³⁴ The majority of these families (68-80 percent) surveyed by the Kaiser Family Foundation in 2013 reported that they could not afford to cover the cost of their insurance deductible.²³⁵ Similarly, among families earning 250-400 percent of the federal poverty level, between one third and one half reported that they were unable to afford the out-of-pocket deductible limits.²³⁶

Findings from the national studies reported above suggest that households in the region with insurance coverage may also experience significant barriers to health care services due to cost of care.

Access Capacity

Primary care, mental health, and oral health are foundational to a comprehensive offering of medical care for a population. Examining the table below can help to provide insight on the number of providers in each of these categories. It is important to remember however, that Benton County is a regional hub for medical care. This means that while the number of patients to providers may be lower than the other counties, these same providers serve many patients from outside of the county.

While primary care provided by physicians is an important measure of the quality of the health care system, as the Robert Wood Johnson Foundation writes,

*Physicians are not the only providers of primary health care. Other professionals can serve as usual sources of routine, preventive care including nurse practitioners (NP), physician assistants (PA), and clinical nurse specialists. The Health Services Research Administration estimates that the primary care NP and PA workforces are projected to grow far more rapidly than the physician supply in the next ten years, and could help alleviate shortages as demand increases.*²³⁷

Other primary care providers are especially vital in rural areas that may not have the population density to support a full time physician. Many rural communities in the region have clinics staffed by nurse practitioners and other primary care providers.

Table 5.3 below shows the number of residents per provider for primary care physicians and other types of providers. The numbers assume that the residents would be equally distributed across providers within a given provider type. Therefore, a smaller number of residents to providers indicates more capacity.

Table 5.3: Number of residents per provider for Linn, Benton, and Lincoln Counties, with regional and state averages, 2012

Provider type	Number of residents per provider				
	Linn	Benton	Lincoln	Region	Oregon
Primary Care Physicians	1557	786	1775	1184	1105
Primary Care Providers (physicians and others) *	1151	483	784	734	664
Behavioral Health	907	172	400	336	299
Oral Health	1854	1604	1799	1736	1363

Source: County Health Rankings, 2012

* Other primary care providers include nurse practitioners, physician assistants, and clinical nurse specialists

Having a usual primary care provider (PCP) is associated with improved health outcomes, increased health equity, and lower healthcare costs. Effective PCPs work to maintain sustainable relationships with patients, connect them with additional health resources in the community, and coordinate their care. Patients with ongoing access to PCPs and other healthcare services have better relationships with their providers and are more likely to receive appropriate care than patients without a regular healthcare provider.²³⁸

A 2012 study concluded that a primary care team (PCP and non-PCP staff) could reasonably care for a panel size between 1,387 and 1,947 patients.²³⁹ The region has a ratio of 1,184 patients for each primary care physician. Using these ratios as benchmarks, the tri-county region has a good ratio of patients per PCP.

Although the region overall has a good ratio of patients to primary care providers, there is significant variation between the counties. Benton County has close to half as many patients per providers as Linn, and less than half as many as Lincoln County.

Behavioral/mental health services include an array of resources including assessments, individual and group therapy, case management, and other supportive therapies for people with a mental illness and/or addictions. A continuum of behavioral health services is available in Linn, Benton, and Lincoln Counties. Included in these services are acute care inpatient facilities for adult psychiatric patients, specialty mental health services for adult and child mental health and substance use disorders, residential services, and therapeutic services for clients with mild or moderate behavioral health needs. However, many residents have difficulty accessing these services due to limitations in geography, income, cultural competency or time.

The Benton, Lincoln, Linn Regional Oral Health Coalition has recently completed a needs assessment which provides a more comprehensive look and analysis of oral health needs in the region.²⁴⁰ Regionally there are about 1,730 residents for each oral health provider. This ratio is worse than the ratio in Oregon, which has about 1,360 residents per provider. Additionally, there is less variation between counties compared to primary care providers. The oral health provider ratios range from 1,600 to 1,850 residents per provider across the counties.

Medical Services and Workforce

Medical needs of people who live, learn, work and play in Linn, Benton, and Lincoln Counties are met through a variety of medical services, and residents of the three-county region travel between counties for the care they need. Private group and individual practices offer primary care, dental, mental health, services for the developmentally disabled, specialty care, and alternative medicine services. Corvallis functions as a center for regional healthcare and enjoys unusually sophisticated health services for a community of its size. The range of services include a 188-bed regional medical center including a 'Level II' trauma center, inpatient mental health care, cancer center, heart institute, outpatient surgery center, and hospice services.²⁴¹

Safety net providers serve a large proportion of low-income, uninsured and rural populations through community health centers, rural health centers, school-based health centers, public health, and other community service organizations. Traditionally, safety net clinics focus on primary care and may also provide mental health, oral health and pharmacy services.

Safety Net Services & Community Benefits

The health care “safety net” refers to the component of the health care system serving low-income and uninsured people. Safety net services are complemented by community funding, programs, and activities.²⁴²

Federally Qualified Health Centers* (FQHCs) and Free Clinics or “charity” clinics are the most common types of safety net clinics. FQHCs in the region provide primary care, mental/behavioral health, and oral health services. Lincoln County has two FQHCs, one in Newport and one located in Lincoln City. Additionally, there are four school-based health centers acting as FQHCs, with locations in Newport, Lincoln City, Toledo, and Waldport.²⁴³ Benton County has three federally qualified health centers: one in Corvallis, a school-based health center in south Corvallis, and a school-based health center in Monroe. In addition, an independent rural health clinic has operated for many years in Alsea; the clinic joined the Benton County FQHC network in 2015. Two Linn County FQHCs operate in Linn County, one in Lebanon and one in Sweet Home. Across the region, FQHCs served just over 14,000 patients in 2014.²⁴⁴ Several auxiliary safety net providers also serve the region’s vulnerable populations. Persons served by these programs include homeless, women and children through maternal-child and WIC services, and HIV-positive people.

Map 5.2 on page 95 shows the location of safety net clinics in the region, as well as the five hospitals serving the tri-county region and ambulance coverage areas.

Cultural and Linguistic Competency

One measure of workforce competency is quantifying the level of cultural and linguistic ability among providers. The Center for Linguistic and Cultural Competency in Health Care (CLCCHC) has created National Standards for Culturally and Linguistically Appropriate Services (CLAS) in Health and Health Care in order to “...advance health equity, improve quality, and help eliminate health care disparities by providing a blueprint for individuals and health and health care organizations to implement culturally and linguistically appropriate services.”²⁴⁵ These standards are used by many health and medical care organizations as a tool in order to improve cultural competency.²⁴⁶ Cultural competency alone cannot address disparities in health, but is seen as a way to increase access for all patients and promote health equity.²⁴⁷

* FQHCs have a legal mandate or expressly adopted mission to serve all patients, regardless of ability to pay or legal status.

Cultural competency, while often framed in terms of language barriers, includes more than having a provider who is able to speak the same language as the patient. By using the National CLAS Standards as a framework, it is clear that communication must include respect, engagement, and overall health literacy as well. This includes the ability to effectively communicate with and understand diverse patients, including those from at-risk populations such as LGBTQ, developmentally diverse, elderly, and those with chronic mental health issues.

Low-income Latinos, and migrant and seasonal farm workers living in the tri-county region face multiple barriers to accessing culturally and linguistically appropriate health care and other related prevention, treatment, and disease self-management services. Many are employed in agriculture sectors that provide few or no employment benefits, or live in geographically isolated rural areas with limited access to public transportation. Cultural, linguistic, and literacy barriers further reduce access to needed information. Oregon's Latino population is expected to grow by an anticipated 184 percent by 2025, increasing the need for health services by this population.²⁴⁸

Health Care Professional Shortage Areas

Knowing the number of providers and types of services are very important for gauging the capacity and presence of a health care system. However, an understanding of the geographical distribution of these services helps paint a more accurate picture.

While the region enjoys a good ratio of health care providers to overall population, geographic distribution of providers can make it difficult for those with limited transportation to access services. Because rural areas of the region have either no or very few medical care providers, portions of the region are designated as geographic Health Care Professional Shortage areas (HPSA). Designation as an HPSA means that there is an increased risk of poor access to health professionals.²⁴⁹ Linn, Benton, and Lincoln Counties all qualify in part as an HPSA for primary care, dental health, and mental health.

In addition to the geographic designation, the region also has population-based HPSAs for migrant seasonal farmworkers and low income individuals. Migrant seasonal farmworkers and their families are a particularly vulnerable subgroup of the Latino/Hispanic population.

Farmworkers have different and more complex health problems than those of the general population. Many of the Latino/Hispanic migrant seasonal farmworkers are documented but have undocumented family members with them. Many are employed in agriculture sectors that provide few or no employment benefits. While most are low income, many immigrants and migrant seasonal farm workers do not qualify for Medicaid due to their residency status or they are unable to access Medicaid due to language, transportation and cultural barriers.²⁵⁰

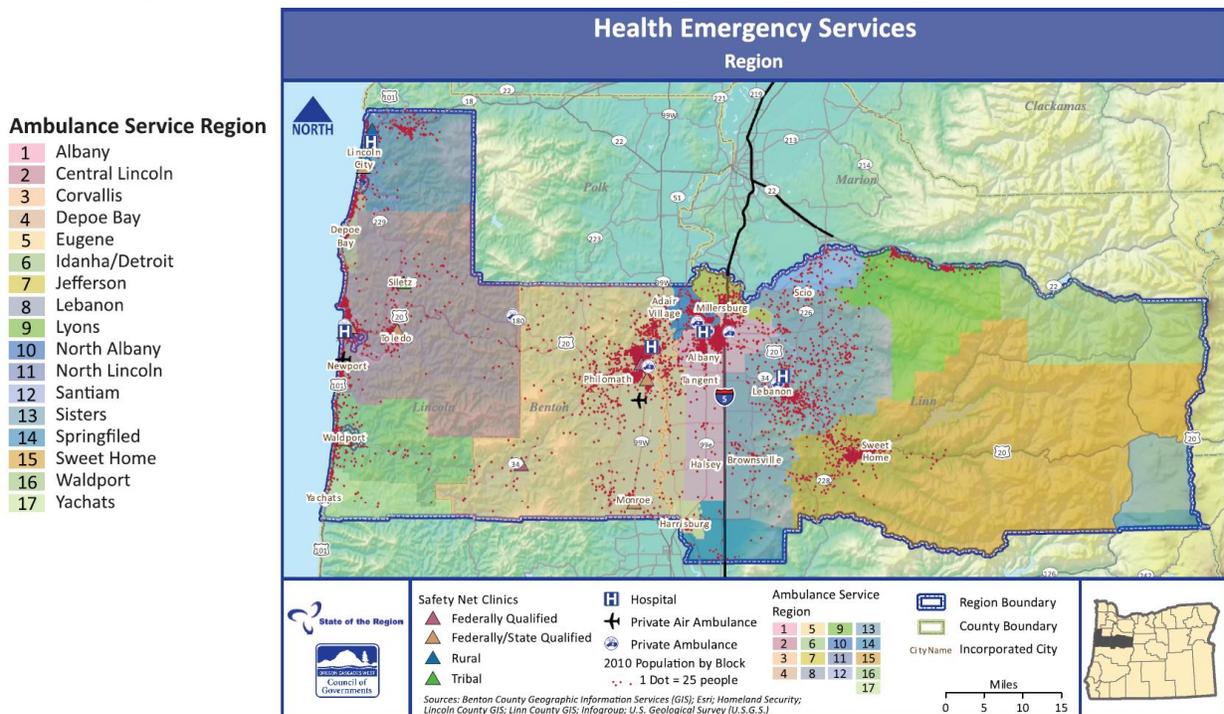
Emergency Responders

Emergency Management Services (EMS) responses serve an important role in the community. According to the Oregon Office of Rural Health, the mean travel time to the nearest hospital for rural service areas is 24 minutes. Estimated travel time is calculated from the largest town/city in each of the rural service areas to the nearest town/city with a hospital. This is the protocol unless the city already has a hospital, in which case driving time is defaulted to 10 minutes.²⁵¹ Seven areas in the region have a mean travel time to the nearest hospital which is greater than 24 minutes, with the longest mean travel time in eastern Linn County at approximately one hour.²⁵²

Geographic distribution of services

Map 5.2, shared from the Oregon Cascade West Council of Governments, shows ambulance service regions in the three counties. Seventeen ambulance services cover the region. Many rural areas are served by emergency responders that may be based very far from the populations they serve or very far from hospitals. Additionally, the hospitals and clinics are clustered near the coast and in the Corvallis-Albany area. However, Alsea and Monroe have clinics in rural Benton County, and Sweet Home will be opening a clinic in 2015. This map does not show additional clinics beyond the hospitals and official safety net clinics, such as private family practices.

Map 5.2: Geographic distribution of health care services, 2015



Source: Oregon Cascades West Council of Governments, State of the Region report, 2015

Timeliness

Once a health need is recognized, a health care system must be able to respond to this need in a timely manner. Measures of timeliness include the length of time it takes to get a medical appointment, wait time in doctors' offices and emergency departments, and the interval between identifying a need for specific tests and treatments and actually receiving services.

According to Healthy People 2020, in 2011, 4.5 percent of the U.S. population reported delays in receiving necessary care. For families below 200 percent of the poverty line, the proportion increased to nearly 7 percent.²⁵³ Linn, Benton, and Lincoln County patients enrolled in Medicaid reported that they received appointments and care when needed over 82 percent of the time in 2011 and 86 percent of the time in 2013.²⁵⁴ When looking at Oregon CCOs as a whole, timeliness for children increased from 76.1 percent to 87.6 percent between 2011 and 2013; the percentage of adults reporting timely care increased only 0.5 percentage points, from 79.4 percent to 80.1 percent.

There is evidence that type of insurance can affect the timeliness of care for an individual. A 2014 study, in which researchers called primary care providers to set up mock appointments, found significant disparities in the ability to successfully set up an appointment by insurance type.²⁵⁵ Callers representing themselves as privately insured in Oregon were able to secure a timely appointment 75 percent of the time, while those calling as Medicaid beneficiaries were only able to do so 37 percent of the time. It is possible that this disparity was magnified at the time of the study (calls were made in 2012 and 2013), as the health care transformation plan in Oregon created a new pool of Medicaid patients looking for services without expanding workforce capacity. However, this appears to be a similar trend across the nation.²⁵⁶ When the privately insured were turned down, the reason was largely because the doctor was not taking new patients. Conversely, 69 percent of Medicaid callers across multiple states were explicitly told their type of insurance was not accepted. Uninsured patients in Oregon were able to book an appointment 71 percent of the time; however that was with an up-front cash payment that averaged \$176. Only 20 percent of uninsured appointments cost less than \$75.²⁵⁷ In addition to causing economic hardships, expensive medical services can also cause delays in receiving medical care, as individuals have to seek alternative, less expensive sources of care, or wait until they have enough money to pay for care.

Preventable Hospitalizations

Preventable hospital stays are another way to measure timely health care. Measurement focuses on hospital admissions for conditions that might otherwise have been controlled in an outpatient setting. Effective management of chronic conditions (e.g. asthma, heart disease and diabetes) on an outpatient basis can help avoid hospitalizations. Likewise, timely outpatient care for conditions such as pneumonia or cellulitis can often prevent deterioration and hospitalization.²⁵⁸ Local data is available for Medicare enrollees and preventable hospital stays as of 2012.²⁵⁹ The three counties show marked differences in rates per 1,000 Medicare

enrollees per year. Benton County has the lowest rate in the state at 28 preventable hospital stays per 1,000 Medicare enrollees. Lincoln County has a rate of 40 admissions per 1,000 Medicare enrollees, slightly higher than Oregon’s average of 38 admissions per 1,000 Medicare enrollees. Linn County has a rate of 49 admissions per 1,000.²⁶⁰

Emergency Services

Emergency services are an important indicator of timely access to medical care, as they represent the most time-sensitive and critical medical conditions. The five hospitals in the region had a combined total of just over 80,000 emergency room visits (not unique patients) in 2014. The following table (Table 5.4) provides further statistics for 2013-2014 for hospitals in the region regarding timely care in the emergency department.

Table 5.4: Emergency room visits and related statistics for 5 regional hospitals, 2013

Measurement	Hospital					Oregon Average
	Good Samaritan Regional Medical Center (Corvallis)	Samaritan Albany General Hospital (Albany)	Samaritan Lebanon Community Hospital (Lebanon)	Samaritan Pacific Communities Hospital (Newport)	Samaritan North Lincoln Hospital (Lincoln City)	
Emergency room visits	23,600	24,700	17,570	13,345	10,032	--
Emergency room visits per 1,000 county residents	273	209	148	289	217	--
Average time patients spend in the emergency department, before they were admitted to the hospital as an inpatient	3 hours, 40 minutes	2 hours, 28 minutes	4 hours, 10 minutes	3 hours, 15 minutes	2 hours, 54 minutes	4 hours, 3 minutes
Average time patients spend in the emergency department, after the doctor decided to admit them as an inpatient before leaving the emergency department for their inpatient	1 hour, 10 minutes	45 minutes	1 hour, 6 minutes	54 minutes	55 minutes	1 hour, 41 minutes

room						
Average time patients spend in the emergency department before being sent home	2 hours, 22 minutes	1 hour, 28 minutes	Not available	Not available	Not available	2 hours, 44 minutes
Average time patients spend in the emergency department before they were seen by a healthcare professional	40 minutes	24 minutes	Not available	Not available	Not available	36 minutes

Sources: U.S. Census Bureau American Community Survey, 2011-2013; U.S. News Health, American Hospital Association; Hospital Compare, Medicare.gov

Conclusion

Examining the ways in which various populations interact with the health care system is important to help us recognize the barriers that many residents face when obtaining medical care. As highlighted throughout this chapter, the data-driven exploration of healthcare access is still developing, as are the frameworks that act as a guide. In addition, the impact of the Affordable Care Act on access to health care is still forthcoming and major changes in access are expected after the expansion of health insurance and restructuring of the health care delivery system. Beyond the lack of data surrounding the ACAs impact on access to health care, major gaps exist in our understanding of the disparities experienced by different populations in accessing health care. We still have little knowledge on a local scale of how factors such as race and ethnicity, education level, disability status, and gender identity influence an individual's ability to access medical care. Finally, closing gaps in quantifying the workforce would provide a better understanding of the co-development of the health care system with those it serves. The data presented in this chapter can support an initial understanding and baseline of access to medical care in the region, while calling attention to challenges faced by many in our community when accessing medical care.

Chapter 6

Morbidity and Mortality

Understanding the leading causes of illness and death is the first step on the path to both preventing loss of life and improving the quality of life within any community. Traditional measures used to evaluate the health of populations are morbidity (incidence of disease) and mortality (deaths). Examining various cancers, heart disease, and other major causes can highlight notable improvement as well as areas in which the region is in need of improvement. The more detailed data available about disparities within particular populations and illnesses, the better communities can address these issues effectively in the region. Many of the conditions that cause illness and death within the region have well-established causes, a number of them rooted in behaviors or risk factors that can be prevented.

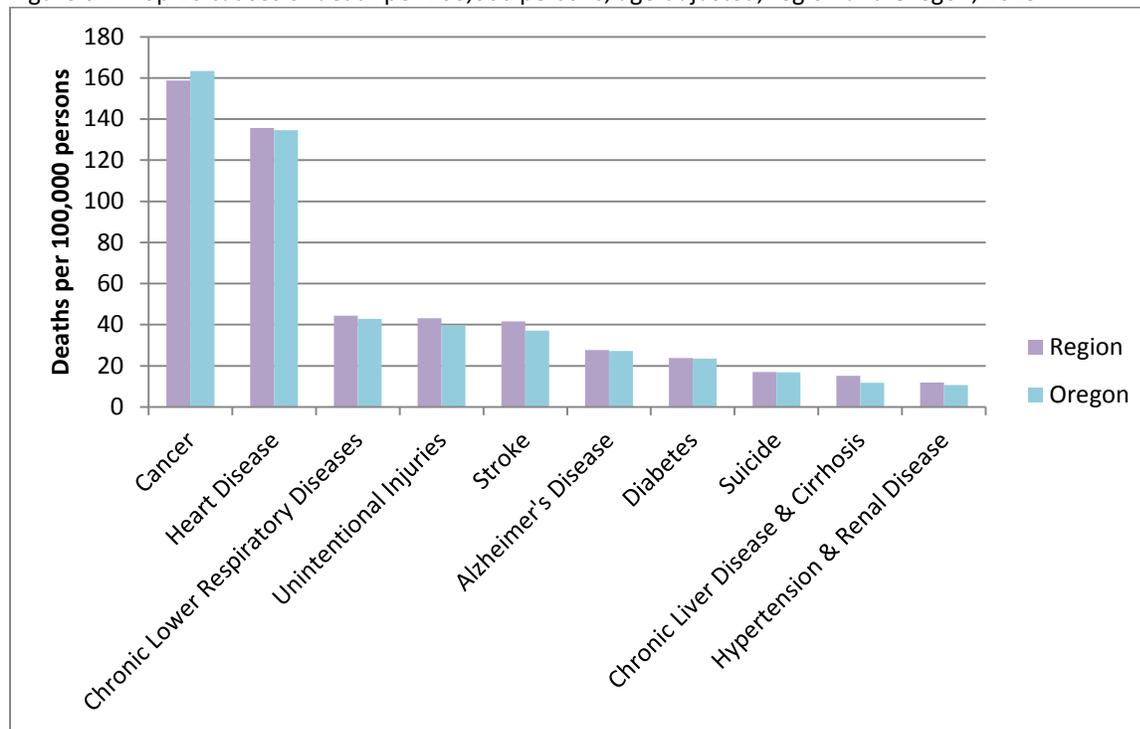
Throughout this chapter, some data is unavailable at the regional level. In these cases, county data are compared directly to that of the state. Many statistics are aggregated over a set of years in order to report reliable data. When incidence or prevalence rates are reported across many years, the statistic is per person per year. For example, the all-cancer incidence rate in Oregon across 2008-2012 was 448 cases per 100,000 people; this means that in each of the five years between 2008 and 2012, 448 cases were diagnosed for every 100,000 people in the population.

Leading Causes of Death in the Region

In 2013, the age-adjusted death rate in the tri-county region was 702 deaths per 100,000 people, compared to 717 deaths per 100,000 people in Oregon. The leading causes of death (for all ages combined) in the region are cancer, heart disease, chronic lower respiratory disease, unintentional injuries, and cerebrovascular disease (stroke). Compared with Oregon, the region has a similar number of deaths per 100,000 residents for each of its top ten causes of death (Figure 6.1).

Preventable risk factors such as tobacco use, diet, activity and alcohol use contribute substantially to these deaths. For example, in 2013, it is estimated that 26 percent, 18 percent, and 30 percent of Linn, Benton, and Lincoln County deaths, respectively, were tobacco-related deaths. These proportions are comparable to 22 percent of tobacco-related deaths in Oregon during the same time period.²⁶¹

Figure 6.1: Top 10 causes of death per 100,000 persons, age-adjusted, region and Oregon, 2013



Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2013

Chronic Diseases and Conditions

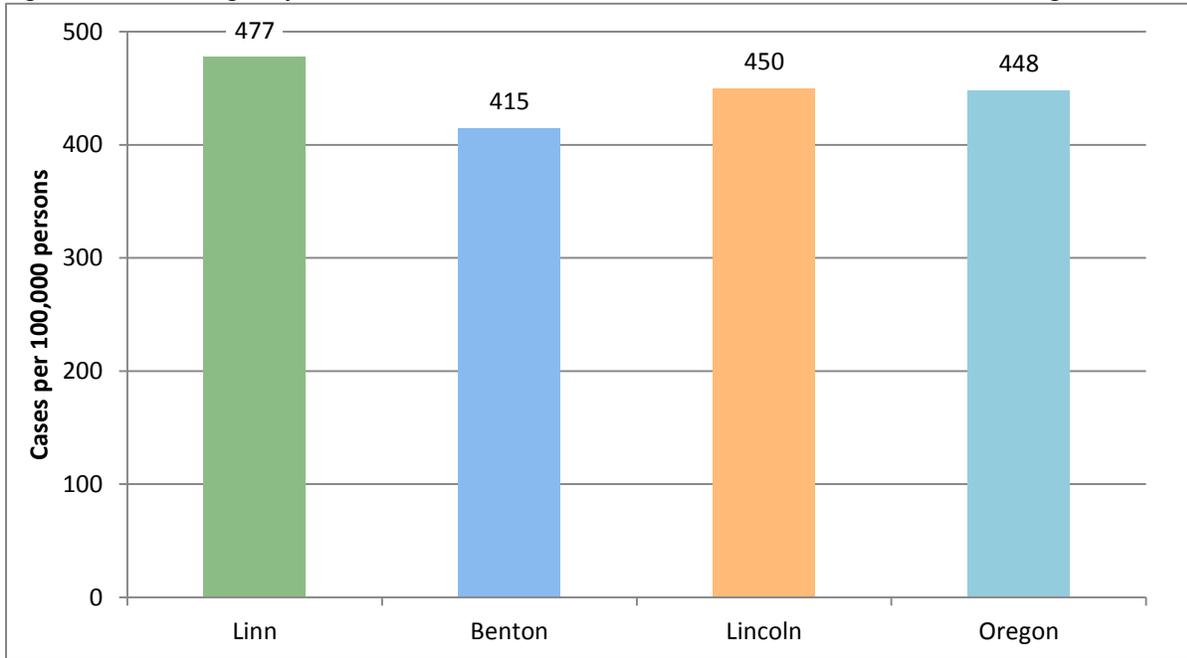
Chronic diseases, such as heart disease, stroke, cancer and diabetes are among the most prevalent, costly, and preventable of all health problems. Healthy lifestyles, such as avoiding tobacco, being physically active, and eating well, greatly reduce a person’s risk for developing chronic illnesses. Research shows that access to resources that support healthy lifestyles, such as nutritious food, recreational opportunities, and high quality and affordable prevention measures (including screening and appropriate follow-up) saves lives, reduces disability, and lowers medical costs.²⁶²

Cancer

Cancer is the leading cause of death in the region and in Oregon.²⁶³ Five types of cancer are discussed in the section: lung, colorectal, breast, prostate, and pancreatic. Lung cancer is the most common cause of cancer death for Oregonians, followed by colorectal cancer and breast cancer.²⁶⁴ Pancreatic cancer has a very high mortality rate, in part due to the likelihood of a late diagnosis after the cancer has already progressed. Prostate cancer is a common cancer among men.

The region's annual rate of newly diagnosed cancer cases is similar to the rate in Oregon, with the three counties ranging between 415 and 477 diagnoses per 100,000 individuals each year (Figure 6.2).

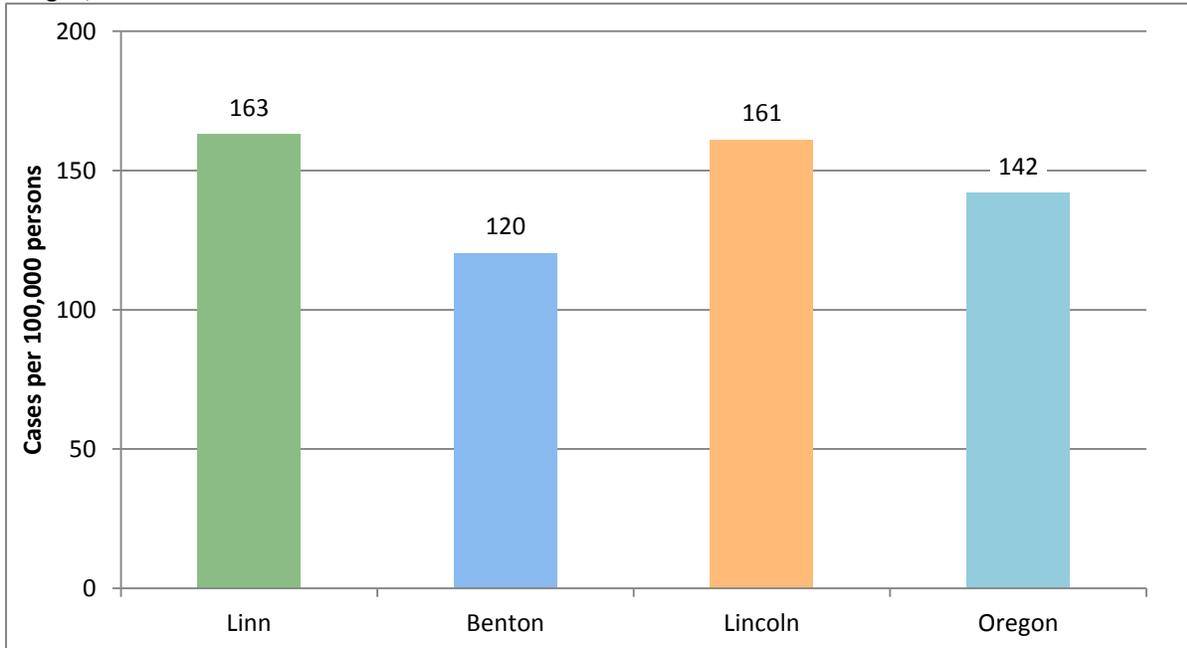
Figure 6.2: Annual age-adjusted incidence for all cancers, Linn, Benton, Lincoln Counties and Oregon, 2008-2012



Source: National Cancer Institute: State Cancer Profiles, 2014

However, different types of cancer impact the counties differently, and will be presented in detail. As shown in Figure 6.3, age-adjusted incidence of tobacco-related cancer in the three counties varies greatly. Benton County's age-adjusted incidence of tobacco related cancer is significantly lower than Oregon's incidence, while Linn and Lincoln Counties' incidences are significantly higher.²⁶⁵ Data for all cancer and tobacco related cancer incidence are from different years and are therefore not directly comparable.

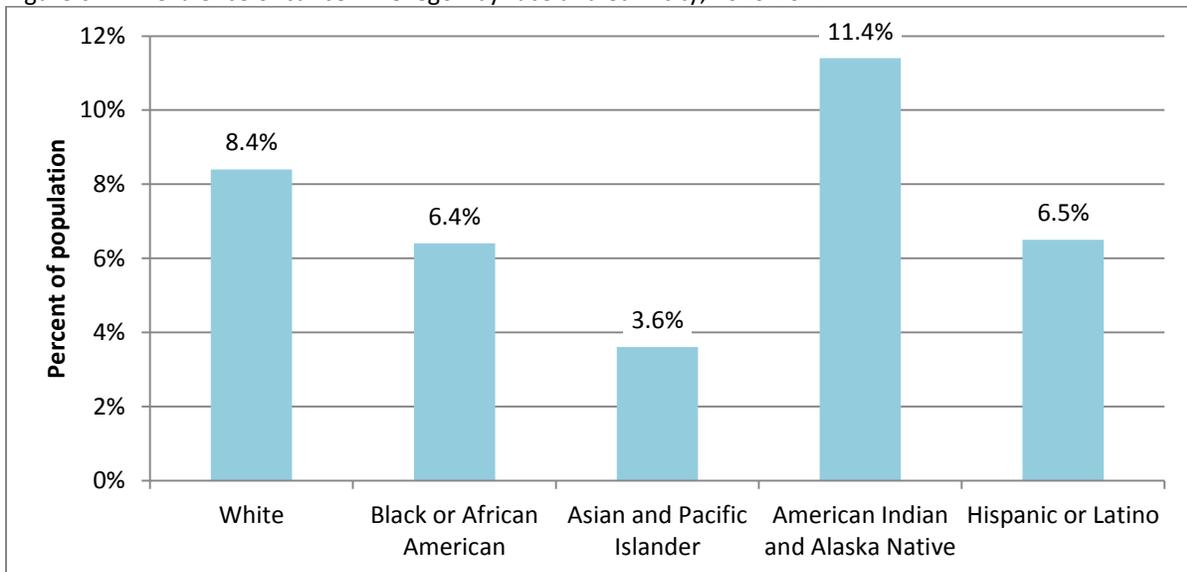
Figure 6.3: Age-adjusted tobacco related cancer incidence (per 100,000) in Linn, Benton, and Lincoln Counties and Oregon, 2006-2010



Source: Oregon Tobacco Facts and Laws, 2013

Cancer rates also vary between different racial and ethnic groups. In Oregon, prevalence of cancer (the proportion of the population living with cancer) varies from a low of 3.6 percent among Asians and Pacific Islanders, to a high of 11.4 percent among American Indians and Alaska Natives. Figure 6.4 below displays data for cancer prevalence in Oregon by race and ethnicity.

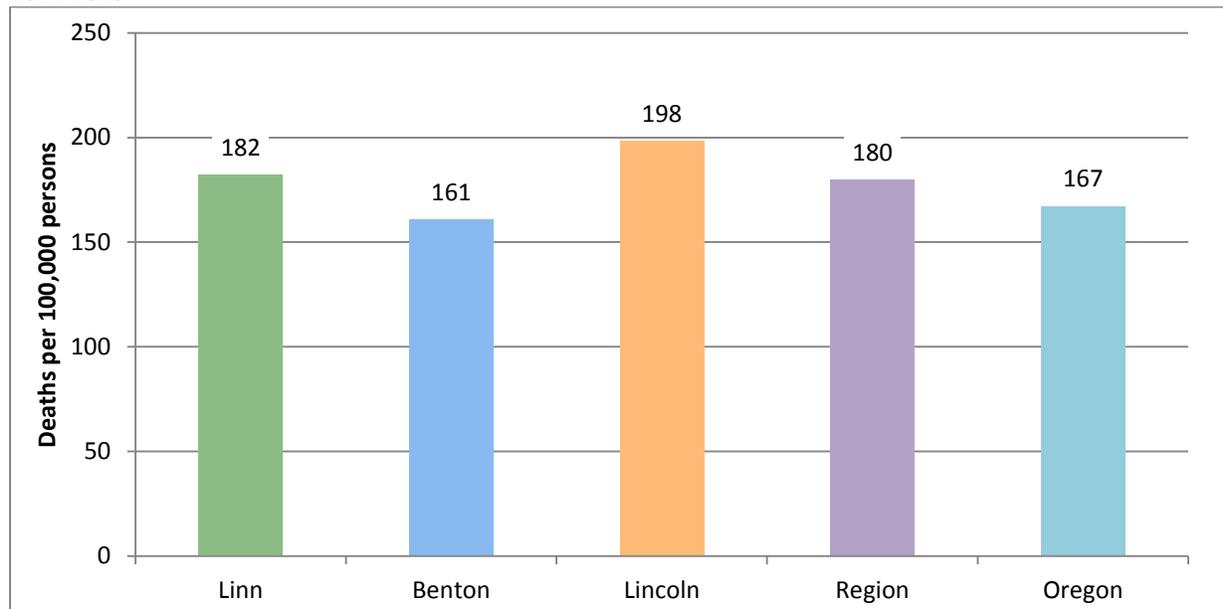
Figure 6.4: Prevalence of cancer in Oregon by race and ethnicity, 2010-2011



Source: Oregon Health Authority, 2010-2011

Between 2011 and 2013, the regional mortality rate from all cancers was 180 deaths per 100,000 people per year. Mortality rates were similar between the counties and close to the state rate of 167 deaths per 100,000 people, as shown in figure 6.5, below.

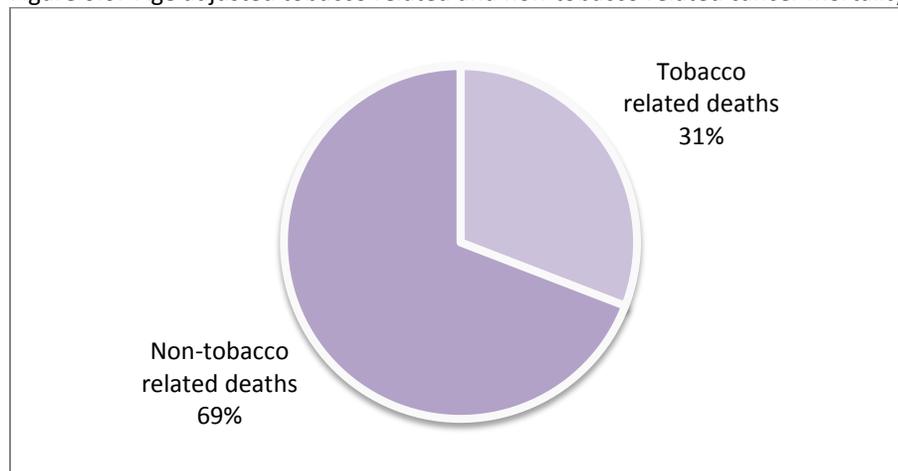
Figure 6.5: Age adjusted cancer mortality from all causes, Linn, Benton, and Lincoln Counties, region, and Oregon. 2011-2013



Source: Oregon Public Health Assessment Tool, 2011-2013

Tobacco contributed to 31 percent of regional cancer deaths in 2011-2013, as shown in figure 6.6, below. This percentage is similar to the state's percentage (30 percent). At the county level, 32 percent of cancer deaths in Linn County were related to tobacco, 24 percent of cancer deaths in Benton County were related to tobacco, and 36 percent of cancer deaths in Lincoln County were related to tobacco.

Figure 6.6: Age adjusted tobacco related and non-tobacco related cancer mortality in the region, 2011-2013



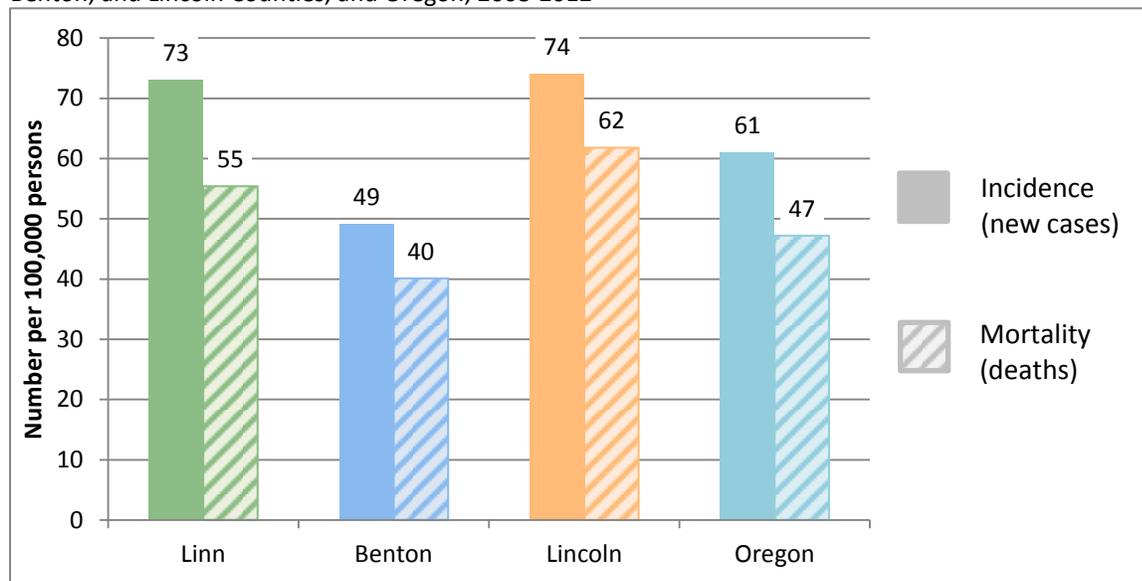
Source: Oregon Public Health Assessment Tool, 2011-2013

Lung and Bronchial Cancer

Because lung and bronchial cancers are closely related, this section will combine them both as lung cancer. Lung cancer incidence in men is steadily declining as a result of decreasing smoking rates, but the incidence in women remains relatively flat.²⁶⁶ Lung cancer is the deadliest cancer in Oregon, accounting for 27 percent of cancer deaths in the state in 2013; a number which includes tobacco and non-tobacco caused lung cancers.²⁶⁷ The rate of lung cancer has remained fairly constant in Oregon and the United States over time.

Across the region, the decline in smoking from 2004 to 2011, reflects major implication for cancer rates, since smoking is the leading cause of lung cancers.²⁶⁸ The lung and bronchial cancer incidence rate in Linn County was 73 per 100,000 persons per year from 2008-2012, similar to Lincoln County's 74 per 100,000 (Figure 6.7). The state incidence rate was 61 per 100,000, higher than the Benton County rate of 49 per 100,000.²⁶⁹ Mortality rates are also disparate across the region and compared to the state. Lincoln County has the highest mortality rate due to lung cancer at 62 per 100,000, with Linn County following at 55 per 100,000. Oregon has a mortality rate of 47 per 100,000, while Benton County has a rate of 40 per 100,000 (Figure 6.7). Only Benton County achieves the Healthy People 2020 goal of 45.5 deaths per 100,000 people.²⁷⁰

Figure 6.7: Age-adjusted incidence and death rate of lung and bronchial cancer per 100,000 persons in Linn, Benton, and Lincoln Counties, and Oregon, 2008-2012



Source: National Cancer Institute, State Cancer Profiles, 2015

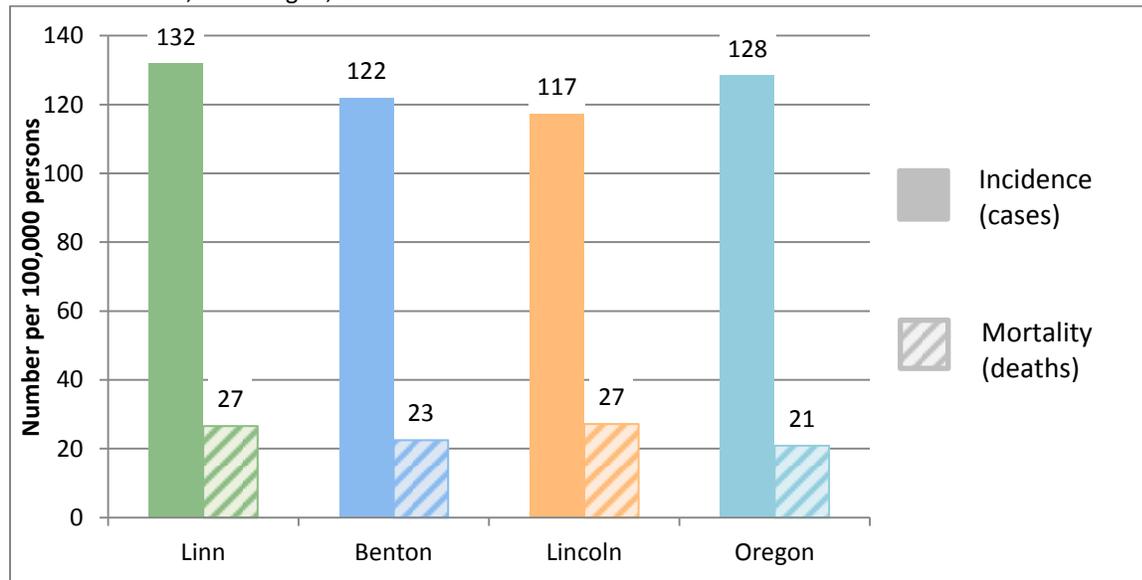
Breast Cancer

Oregon has the 7th highest incidence rate for breast cancer in the United States.²⁷¹ Although significant improvements have occurred in early detection and treatment, breast cancer is still

the leading cause of death for women in Oregon. Only a small fraction of breast cancer cases can be linked to genetics.²⁷²

Across the three counties in the region, the 2008-2012 age-adjusted incidence of breast cancer among women was 117, 122, and 132 diagnoses per 100,000 women in Lincoln, Benton, and Linn Counties, respectively, compared to 128 diagnoses per 100,000 women in Oregon. In 2008-2012, the female breast cancer mortality rates in all three counties were higher than the Oregon mortality rate, as shown in Figure 6.8.²⁷³ All three counties and Oregon had mortality rates above the Healthy People 2020 target of 20.7 deaths per 100,000 females.²⁷⁴

Figure 6.8: Age-adjusted breast cancer incidence and mortality rates per 100,000 women in Linn, Benton, and Lincoln Counties, and Oregon, 2008-2012



Source: National Cancer Institute, State Cancer Profiles, 2015

State trends in breast cancer can be summarized as follows:

- Women are at highest risk for breast cancer.
- Women age 40 and older are at greatest risk for being diagnosed with breast cancer.
- A small percentage of women under the age of 40 develop breast cancer.
- About 85 percent of all women diagnosed with breast cancer do not have a family history of breast cancer.
- Only about 10-15 percent of breast cancers occur as a result of inherited genetic traits.
- Breast cancer in men is rare, but it does occur and should be recognized as an important area for screening and treatment.
- Race is not considered a factor for increased risk of breast cancer. However, rates of death from the disease differ among ethnic groups. In Oregon, breast cancer is the leading cause of cancer associated deaths among Latino and Asian Pacific Islander women.²⁷⁵

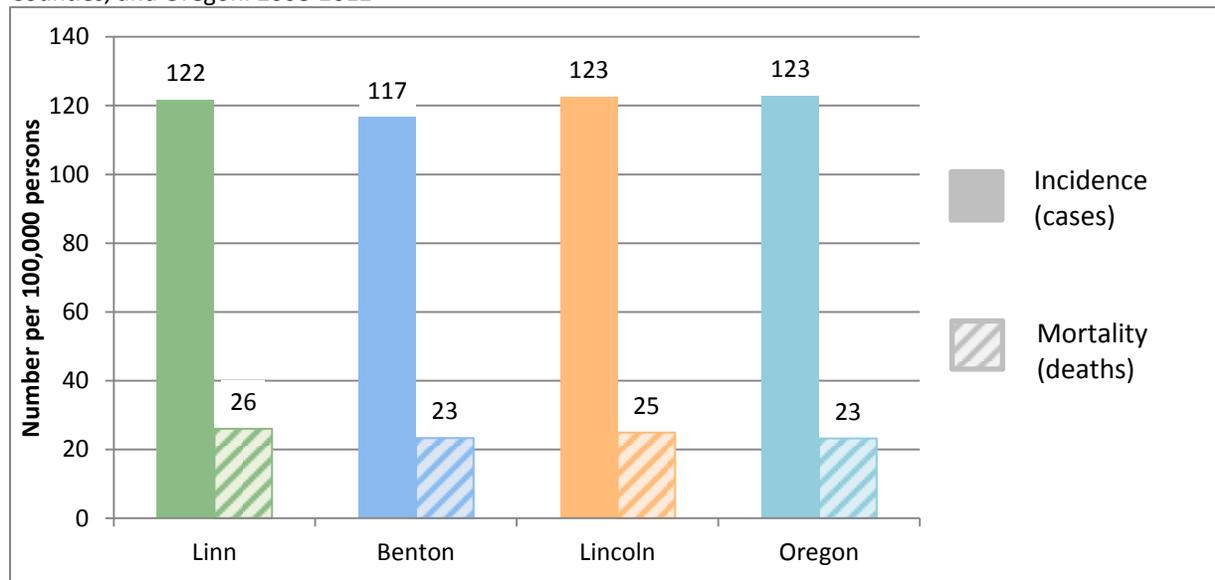
- Some women may be at risk for a later stage diagnosis due to lack of access or referral to cancer screening services. Women with disabilities and African American women are more likely to be diagnosed at later stages for breast, cervical, and colorectal cancer.²⁷⁶

Prostate Cancer

Prostate cancer is most common among men over the age of 40. When diagnosed early in the progression of the disease, it is very treatable through surgery or radiation treatments.

The 2008-2012 incidence of prostate cancer in Linn and Benton Counties, 122 per 100,000 and 117 per 100,000 respectively, was slightly lower than that of Oregon’s incidence rate of 123 per 100,000 men (Figure 6.9). However, Lincoln County’s incidence of prostate cancer was consistent with Oregon’s rate at 123 per 100,000 men. The mortality rate for Linn County, however, was the third highest in the state at 26 per 100,000 men, compared to the state mortality rate of 23 per 100,000 men.²⁷⁷ Lincoln County was also higher than the state, at 25 per 100,000. Benton County matched the state at 23 per 100,000. None of these rates meet the Healthy People 2020 objective to reduce the mortality rate due to prostate cancer 22 deaths per 100,000 men.²⁷⁸

Figure 6.9: Age-adjusted incidence and death rate of prostate cancer per 100,000 men in Linn, Benton, Lincoln Counties, and Oregon. 2008-2012



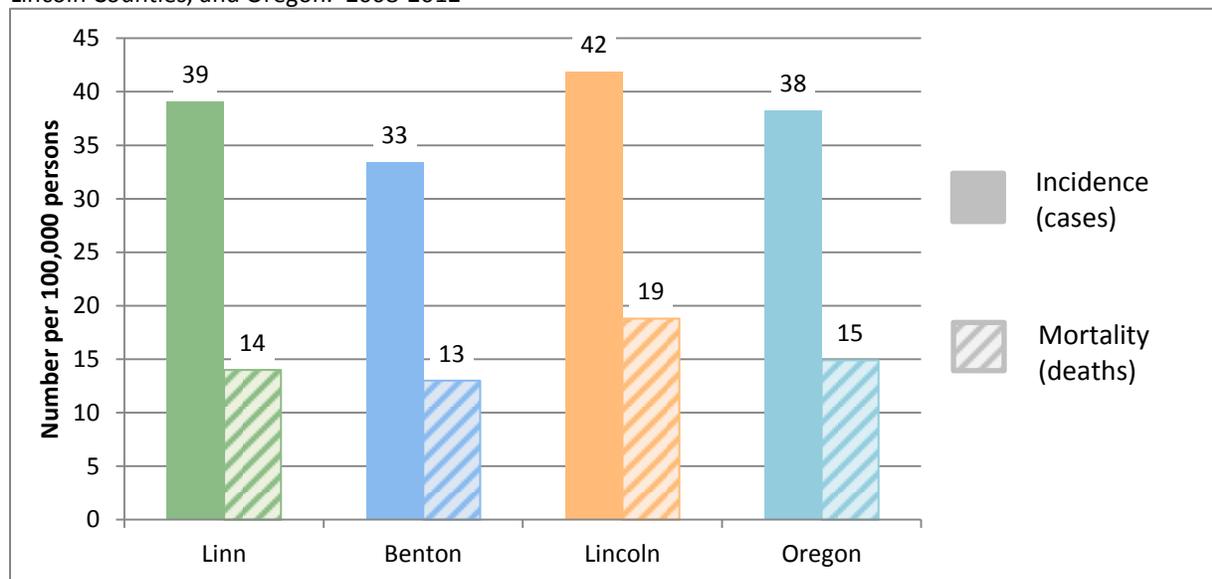
Source: National Cancer Institute, State Cancer Profiles, 2014

Colorectal Cancer

Colorectal cancer is another common cancer afflicting residents in the region. The age-adjusted incidence of colorectal cancer in the region is similar to the state incidence, as Figure 6.10 demonstrates. Regional mortality rates are also similar to the state rate. Linn and Benton

County have achieved the Healthy People 2020 target to reduce the mortality rate due to colorectal cancer to 14.5 deaths per 100,000 people.²⁷⁹

Figure 6.10: Age-adjusted incidence and death rate of colorectal cancer per 100,000 persons in Linn, Benton, and Lincoln Counties, and Oregon. 2008-2012



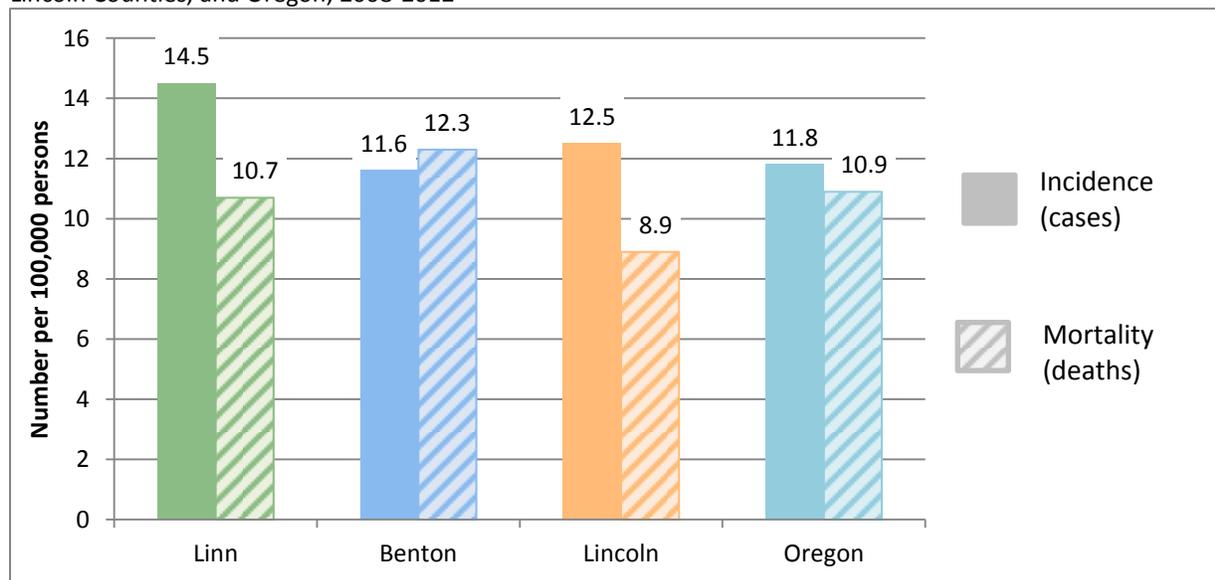
Source: National Cancer Institute, State Cancer Profiles, 2014

Pancreatic Cancer

Pancreatic cancer is a disease in which cancer cells form in the tissue of the pancreas. Risk factors for pancreatic cancer include smoking, long-standing diabetes, chronic pancreatitis, and certain conditions such as hereditary pancreatitis.²⁸⁰

In 2008-2012, the annual incidence rate for pancreatic cancer in Linn County was 14.5 per 100,000 persons, the second highest incidence rate of pancreatic cancer in Oregon.²⁸¹ Lincoln and Benton Counties had 12.5 and 11.6 per cases 100,000 persons respectively, similar to the state incidence rate of 11.8 per 100,000 persons during that time period. In contrast with the other cancers discussed in this section, pancreatic cancer mortality rates are close to incidence rates, with rates of 12.3 per 100,000 in Benton County, 10.7 per 100,000 in Linn County, 8.9 per 100,000 in Lincoln County, and 10.9 per 100,000 in Oregon. Pancreatic cancer is difficult to diagnose before it has advanced, so survival rates tend to be lower than for other common cancers. One consequence of similarities in incidence and mortality rates is the potential for mortality rates in a given year or set of years to exceed incidence rates, as is the case for Benton County, shown in Figure 6.11. This is because the cancer may be diagnosed in a year prior to the year of death.

Figure 6.11: Age-adjusted incidence and death rate of pancreatic cancer per 100,000 persons in Linn, Benton, and Lincoln Counties, and Oregon, 2008-2012



Source: National Cancer Institute, State Cancer Profiles, 2014

Cancer Screening

Research shows that screening for cancer is effective in reducing serious consequences of the disease, which is generally more treatable when detected early. Breast and cervical cancer screening rates in the region are fairly consistent with state-level screening rates (Table 6.1). Additional data are needed to identify rates of screening among race/ethnic populations, age group and income level, as risk factors differ among different populations.

Table 6.1: Age-adjusted percent of cancer screening in Linn, Benton, and Lincoln Counties and Oregon, 2010-2013

Cancer Screening Practice	Linn County	Benton County	Lincoln County	Oregon
Mammogram within past 2 years (women 50-74 years old)	74.9%	78.4%	77.1%	75.3%
Pap test within past 3 years (women 21-65 years old)	82.0%	86.4%	78.6%	81.7%
Current on colorectal cancer screening (50-75 years old)*	63.4%	66.2%	68.8%	61.1%

Source: Oregon Health Authority, Health screenings among Oregon adults, 2010-2013

*Current on colorectal cancer screening includes the following: having a fecal occult blood test (FOBT) in the past year; a colonoscopy within the past 10 years; or, a sigmoidoscopy within the past 5 years as well as an FOBT within the past 3 years.

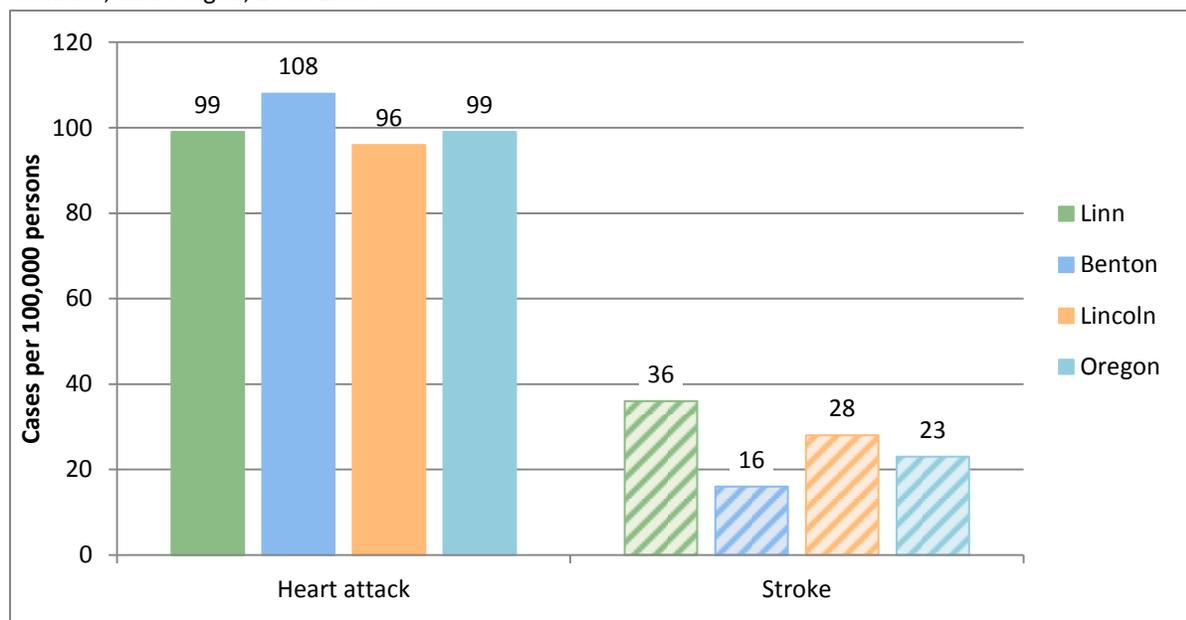
Heart Disease and Stroke

After cancer, heart disease is the largest contributor to the mortality rate in the region and in Oregon. When combined with stroke and adjusted for age, diseases of the circulatory system are the leading causes of death in the region and Oregon.

Cardiovascular Disease and Stroke

Incident rates of heart attacks are similar across the region and Oregon, although Benton County has a somewhat higher incidence rate than Linn and Lincoln Counties once adjusted for age. In contrast, Benton County has a much lower incidence rate of stroke than Linn and Lincoln Counties, as demonstrated in Figure 6.12.

Figure 6.12: Age-adjusted incidence of heart attack and stroke per 100,000 persons in Linn, Benton, and Lincoln Counties, and Oregon, 2006-2009



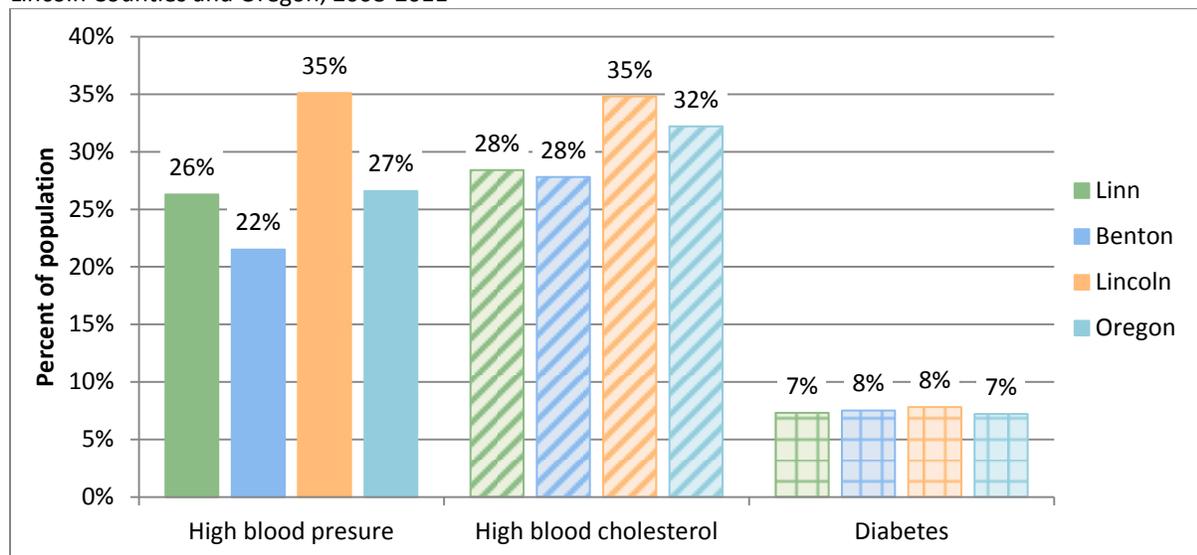
Source: Oregon Health Authority, *Heart Disease and Stroke in Oregon – Update 2010*

Numerous health conditions and behaviors contribute to the potential for heart disease and stroke. These include:

- High blood pressure,
- High blood cholesterol,
- Diabetes,
- Obesity,
- Lack of exercise, and
- Smoking.²⁸²

Figures 6.13 and 6.14 illustrate that regionally these contributing factors tend to be similar in prevalence to the state, with Benton County generally experiencing a lower prevalence and Lincoln County experiencing a higher prevalence. Linn County has a lower prevalence than the state for some factors and a higher prevalence for others.

Figure 6.13 Age-adjusted percent of residents with lifestyle behaviors of heart disease and stroke in Linn, Benton, Lincoln Counties and Oregon, 2008-2011



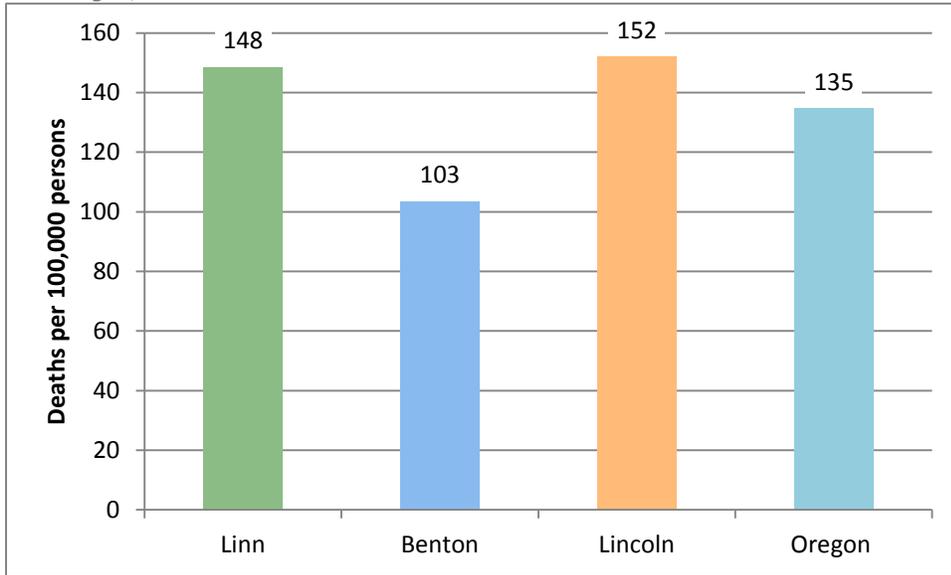
Source: Oregon Health Authority, *Heart Disease and Stroke in Oregon – Update 2010*

Many of the effects of heart disease can be reversed with healthy eating, exercise, avoidance of tobacco, and stress reduction. In addition to high blood pressure, high cholesterol, and diabetes being critical health factors of heart disease and stroke, social and economic factors are also important. For example, in the U.S., low-income adults are 50 percent more likely to suffer heart disease than top wage earners, even when other risk factors such as cholesterol or smoking, are taken into account.²⁸³

Heart Disease Mortality

After cancer, cardiovascular disease is the second leading cause of death in the region.²⁸⁴ Across Oregon, the death rate for heart disease is higher in rural areas than urban areas.²⁸⁵ Mortality rates are very different across the region (Figure 6.14); in 2013 Linn County (148 per 100,000 persons) and Lincoln County (152 per 100,000 persons) had higher cardiovascular disease mortality rates than Oregon (135 per 100,000 persons), while Benton County had a lower rate (103 per 100,000 persons).²⁸⁶

Figure 6.14: Age-adjusted heart disease mortality rate per 100,000 individuals in Linn, Benton, and Lincoln Counties and Oregon, 2013



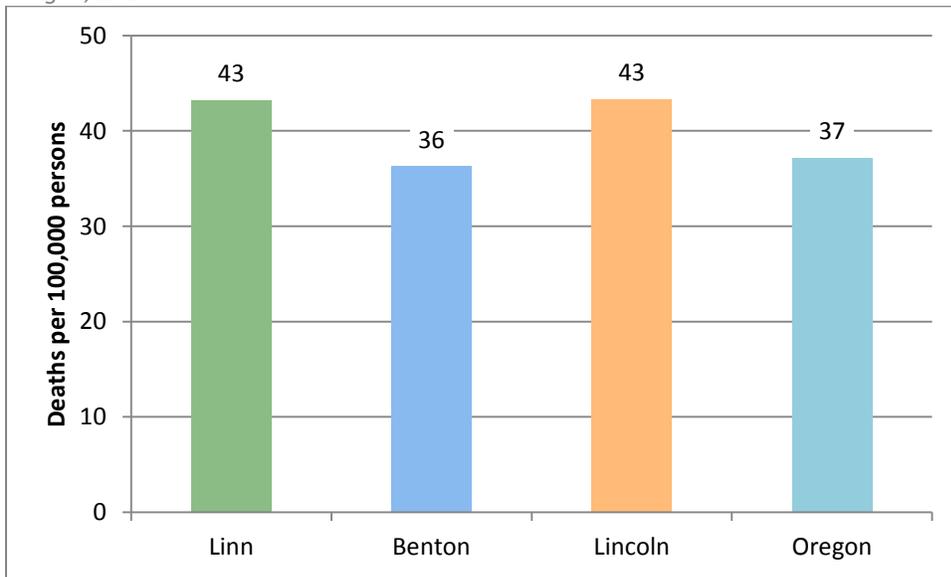
Source: Oregon Health Authority: Oregon Public Health Assessment Tool, 2013

Stroke Mortality

In general, stroke mortality rates in the region and in Oregon have not achieved the Healthy People 2020 target of a reduction to 34.8 deaths per 100,000 persons (Figure 6.15).²⁸⁷

However, Benton County's mortality rate is the lowest in the region at 36 deaths per 100,000 people, as opposed to Oregon's rate of 37 deaths per 100,000 people, and Linn and Lincoln Counties' rates of 43 deaths per 100,000 people.

Figure 6.15: Age-adjusted stroke mortality rate per 100,000 individuals in Linn, Benton, and Lincoln Counties and Oregon, 2013



Source: Oregon Health Authority: Oregon Public Health Assessment Tool, 2013

Diabetes

Diabetes in Adults

There are two types of diabetes identified by the medical community. Type 1 diabetes is a hormonal condition in which the body does not produce enough insulin to regulate the conversion of sugar and starches into energy. Type 1 diabetes is caused by genetic and unknown factors and is usually diagnosed in children. Fewer than five percent of diabetics are diagnosed with Type 1 diabetes.

In Type 2 diabetes, the body develops resistance to insulin, so that dietary sugar absorbed into the bloodstream is not converted into glycogen at a healthy rate. There are both genetic risk factors and behavioral risk factors for developing Type 2 diabetes. Because diabetes can cause serious health complications, it is important to prevent Type 2 diabetes through healthy life choices and also catch diabetes early through health screenings.²⁸⁸

Hereafter, Type 2 diabetes will be referred to as diabetes.

Risk factors for diabetes include the following:

- Being overweight or obese,
- having a parent or sibling with diabetes,
- having high blood pressure,
- having high cholesterol,
- being physically inactive,²⁸⁹ and
- smoking.²⁹⁰

Prevalence of diabetes among adults in the region was 7.7 percent from 2008-2011.²⁹¹ This estimate may be conservative, however, as many people are unaware of their status. Diabetes often develops gradually as symptoms and complications can take years to manifest.

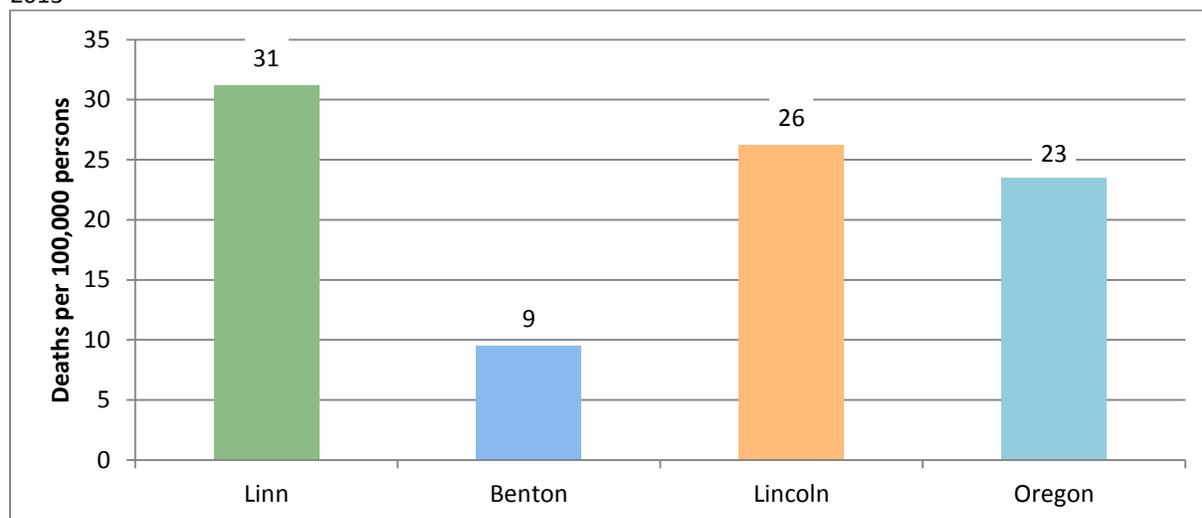
The growing burden of diabetes affects everyone in Oregon, but rates vary by age, race/ethnicity, and household income:

- Diabetes prevalence increases with age. Oregonians under 45 have the lowest rates of diabetes (2.6 percent), while 21.1 percent of adults aged 65 to 74 years of age and 18.9 percent of adults 75 years and older have been diagnosed with diabetes.
- Oregon's Hispanic/Latino, African American, and American Indian/Alaska Native communities have significantly higher rates of diabetes than do non-Latino Whites and Asian/Pacific Islanders.
- In 2011, the prevalence of diabetes among adults with an annual household income of less than \$20,000 was nearly three times that of those with an annual household income of \$75,000 or more (13.8 percent versus 4.9 percent, respectively).²⁹²

Diabetes Mortality

Overall, 2013 age-adjusted annual diabetes mortality rates have been consistently higher in Lincoln County (26 per 100,000 residents) and Linn County (31 per 100,000) than they have been in Oregon (23 per 100,000). The Benton County mortality rate (9 per 100,000) is below the state rate. All of these rates, however, are lower than the national diabetes mortality rate and meet the Healthy People 2020 objective of no more than 66.6 deaths per 100,000 persons.²⁹³

Figure 6.16: Age-adjusted diabetes mortality rate per 100,000 in Linn, Benton, and Lincoln Counties and Oregon, 2013



Source: Oregon Health Authority: Oregon Public Health Assessment Tool, 2013

Early detection and prompt treatment can reduce the burden of diabetes and its complications. Table 6.2 below shows that of the three counties in the region, a higher percentage of Lincoln County residents have had their blood sugar and cholesterol tested compared to the rest of the region and Oregon. The rate of screening in Benton and Linn Counties are more similar to that of the state.

Table 6.2: Age-adjusted percent of adults with diabetes-related health screenings in Linn, Benton, and Lincoln Counties and Oregon, 2010-2013

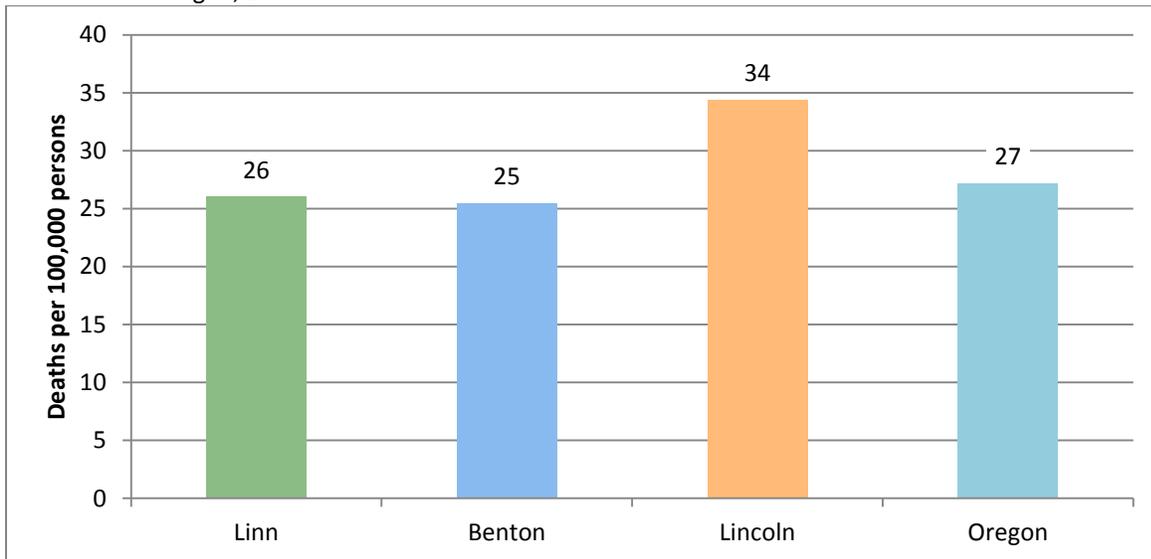
Health Screening Practice	Linn County	Benton County	Lincoln County	Oregon
Blood sugar test within the past 3 years (45 years or older)	63.5%	68.3%	75.0%	63.0%
Cholesterol checked within the past 5 years	70.8%	71.6%	76.3%	70.8%

Source: Oregon Health Authority, Health screenings among Oregon adults, 2010-2013

Alzheimer's Disease

Alzheimer's disease is the most common form of dementia, which is a general term for loss of memory and other intellectual abilities serious enough to interfere with daily life. Alzheimer's accounts for 60 to 80 percent of all cases of dementia. As the 6th most common cause of death in the region, Alzheimer's is also terminal. In 2013, Linn and Benton Counties' cause-specific mortality rates per 100,000 for Alzheimer's were similar to the mortality rate in Oregon (Figure 6.17). The Alzheimer's mortality rate in Lincoln County was much higher than in Linn or Benton Counties.

Figure 6.17: Age-adjusted Alzheimer's disease mortality rate per 100,000 individuals in Linn, Benton, and Lincoln Counties and Oregon, 2013



Source: Oregon Health Authority: Oregon Public Health Assessment Tool, 2013

It is anticipated that the number of Oregonians with Alzheimer's disease and related dementia will increase significantly in the next two decades, mostly due to an increase in the elderly population. Currently, about 76,000 Oregonians live with Alzheimer's disease and this number is expected to increase to 110,000 by 2025.²⁹⁴

Arthritis

Arthritis continues to be the most common cause of disability in the United States, affecting one in five Americans. Arthritis consists of over 100 different diseases and conditions that affect the joints, surrounding tissues and other connective tissues. The two most common types are osteoarthritis and rheumatoid arthritis.

The age-adjusted percentages of adults in Linn, Benton, and Lincoln Counties who report an arthritis diagnosis vary between 24 and 30 percent, compared to Oregon at 25 percent (Table 6.3).²⁹⁵

Table 6.3: Arthritis prevalence in Linn, Benton, and Lincoln Counties, and Oregon, 2011-2013

	Linn	Benton	Lincoln	Oregon
Arthritis prevalence	30 %	24 %	30 %	25 %

Source: Oregon Behavioral Risk Factor Surveillance System (BRFSS), 2011-2013

Older adults in Oregon are disproportionately affected by arthritis. Prevalence of arthritis is expected to increase dramatically as the population ages. Women are more likely to be affected than men because they live longer than men. The growth of the aging population in the region will add to the high prevalence of arthritis in the coming decades. Other risk factors include sedentary lifestyle, obesity/overweight, joint injury, and work-related joint trauma.²⁹⁶

Asthma

Over the past 20 years, asthma has become one of the most common chronic diseases in the United States. Oregon has one of the highest asthma rates in the nation.²⁹⁷ Asthma results in direct health care costs (e.g., hospitalizations and emergency department visits) and indirect costs (e.g., missed school and work days and days of restricted activity) that affect the quality of life for people with asthma and their families.

Common asthma triggers include:

- tobacco smoke and other smoke;
- animals with fur or feathers;
- dust mites and cockroaches;
- mold or mildew;
- pollen from trees, flowers, and plants;
- being physically active;
- air pollution;
- breathing cold air;
- strong smells and sprays; and
- illnesses, such as influenza and colds.²⁹⁸

Prevalence of Asthma in Adults

For the past 10 years, the percent of Oregonians with a current asthma diagnosis has been rising slowly. Oregon ranked among the top six states for the highest percentage of adults with current asthma diagnoses in 2011.²⁹⁹

Two important risk factors contribute to the likelihood of an asthma diagnosis, tobacco use and obesity. Consequently, Oregon counties with asthma levels higher than the state average also tend to be counties with high smoking rates.³⁰⁰ Likewise, counties with high levels of obesity also tend to have increased prevalence and incidence of asthma.

Lincoln County has the lowest age-adjusted adult asthma prevalence among the three counties, at 9.3 percent. Benton County, at 9.8 percent, is also below the Oregon prevalence of 10.4 percent. Linn County’s adult asthma prevalence is higher than Oregon’s at 12.3 percent.³⁰¹

Prevalence of Asthma in Teens

Asthma rates for teens are not currently available for Linn County, so regional data are not presented here. However, Lincoln County’s 2013 asthma rate among both 8th and 11th graders was higher than in Oregon and Benton County rates were similar to Oregon (Table 6.4).

Table 6.4: Asthma rates among high school students, 2013

	Linn	Benton	Lincoln	Oregon
8th grade	12.5%	10.6%	16.2%	12.6%
11th grade	14.3%	11.7%	14.6%	11.5%

Source: Oregon Healthy Teens Survey, 2013

Detailed information on the prevalence of asthma among other sub-populations in the region is not currently available. Even so, results from statewide surveillance suggest that prevalence varies by race/ethnicity, level of education, sexual orientation, and household income (Table 6.5).

Table 6.5: Age-adjusted prevalence of asthma in at-risk groups in Oregon, 2011

Population Characteristic	Prevalence
Total population	10.8 %
African American *	12.4 %
American Indian and Alaska Native *	17.6 %
No high school diploma	16.8 %
Homosexual/Bisexual †	11.8 % / 16.1 %
Household Income < \$15,000	17.5 %
No health insurance	11.6 %
Oregon Health Plan	20.3 %
Rural	12.4 %

Source: Oregon BRFSS, 2011

* Data from 2010-2011 combined

† Data from 2007-2011 combined

Infectious Diseases

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.³⁰² 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.

All physicians, health care providers, and laboratories in Oregon are required by law to actively report confirmed or suspect diagnoses of over 50 infectious diseases and conditions to their local health departments.³⁰³ These reports are directed through county health departments to the Oregon Public Health Division which collects and distributes data to inform health departments, physicians and the public. Reporting enables appropriate public health follow-up for patients, helps identify outbreaks, and provides a better understanding of disease transmission patterns. Some diseases are subject to restrictions on school attendance, day care attendance, patient care, and food handling. Communicable disease nurses in Linn, Benton, and Lincoln counties investigated 1,336 reports of reportable communicable diseases during 2013, a rate of over 25 investigations every week.³⁰⁴

Respiratory Illnesses

Respiratory illnesses such as the influenza virus, commonly referred to as the flu, spread from person to person when droplets from a cough or sneeze of an infected person move through the air and enter the mouth or nose of people nearby. Some of the microorganisms in these droplets can also live on surfaces for hours, such as desks or doorknobs, and can spread when people touch these surfaces and then touch their eyes, mouth, and nose.

The common cold* and influenza are the most common respiratory illnesses. However, local, state, and national statistics for these diseases are difficult to ascertain because doctors and laboratories are not required to report them to public health authorities. This is because most people experience only mild, short-term illness, and do not seek medical attention. The illnesses are difficult to differentiate, and most are treated symptomatically rather than curatively. The Oregon Health Authority reports influenza and pneumonia mortality jointly; these rates have been steadily declining in the region, and did not follow the same increase that the state experienced in 2013 (Figure 6.18).

* More than 200 viruses cause what is typically considered the common cold, including rhinovirus, coronavirus, respiratory syncytial virus, and the parainfluenza virus.

Figure 6.18: Age-adjusted influenza and pneumonia mortality rates in the region and Oregon, 2007-2013

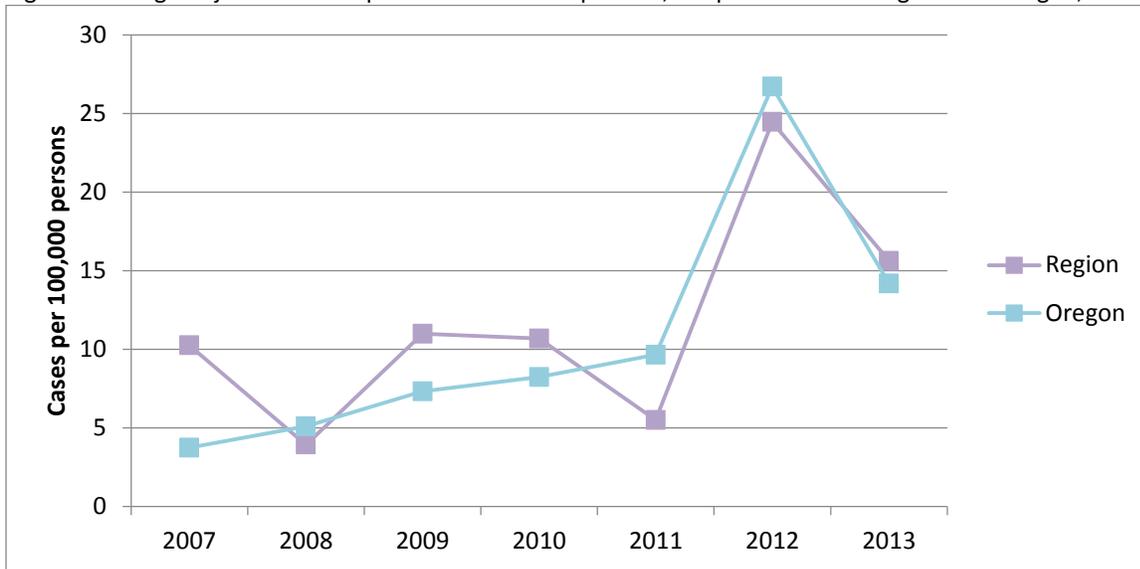


Source: Oregon Public Health Assessment Tool, 2007-2013

Less common, but more serious respiratory illnesses include pneumonia, pertussis (whooping cough), and tuberculosis. In general, infectious tuberculosis is extremely rare in the region. Between 2007 and 2013, an average of three to four cases were reported annually.³⁰⁵ Tuberculosis cases are actively managed and curative therapy is overseen by public health nurses.

Pertussis is a very contagious bacterial infection that causes a coughing illness which may last six to ten weeks or longer. It is an endemic disease with epidemic peaks occurring every two to seven years and has proven persistence despite widespread childhood immunization. There was a sharp rise of pertussis in the United States during 2012. Washington State was particularly impacted and declared a pertussis epidemic in April 2012, reporting almost 10 times more cases of pertussis than in 2011. Oregon reported more than twice as many pertussis cases in 2012 as in 2011. The number of cases of pertussis in the region fluctuates annually; an outbreak in 2012 pushed the incidence above the historical average of approximately 14 diagnoses per 100,000 people per year (Figure 6.19).

Figure 6.19: Age-adjusted rate of pertussis infections per 100,000 persons in the region and Oregon, 2007-2013

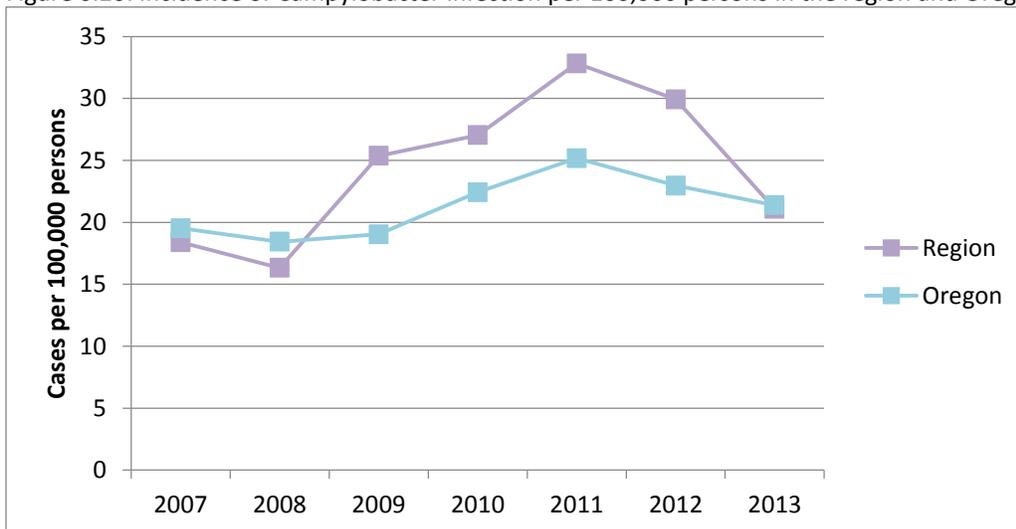


Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2007-2013

Foodborne Illnesses

The Centers for Disease Control and Prevention (CDC) estimate that each year, one in six Americans (48 million people) get sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases.³⁰⁶ The leading causes of foodborne illness in the United States are due to exposure to norovirus, Salmonella, Campylobacter, and *Clostridium perfringens*. Norovirus, Salmonella, and Campylobacter are also among the leading causes of death due to foodborne illness.³⁰⁷ Figure 6.20 below shows that the incidence of campylobacter in the region has historically ranged between 15 and 32 cases per 100,000 each year. In contrast, the incidence in Oregon has stayed below 25 cases per 100,000 people between 2007 and 2013.

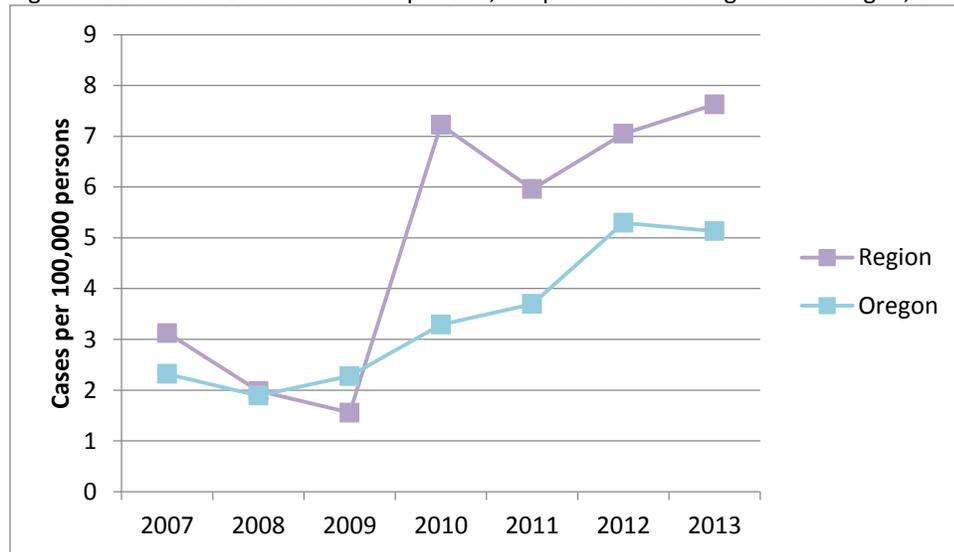
Figure 6.20: Incidence of Campylobacter infection per 100,000 persons in the region and Oregon, 2007-2013



Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2007-2013

Escherichia coli infections, most commonly O157:H7 (a specific strain of *E. coli*), is another significant causative organism. Around 5 to 10 percent of those who are diagnosed with the infection develop potentially life-threatening complications. The tri-county region's rate of *E. coli* per 100,000 persons has in recent years been consistently higher than Oregon's rate (Figure 6.21).³⁰⁸

Figure 6.21: Rate of *E. coli* infections per 100,000 persons in the region and Oregon, 2007-2013



Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2007-2013

Sexually Transmitted Infections (STIs)

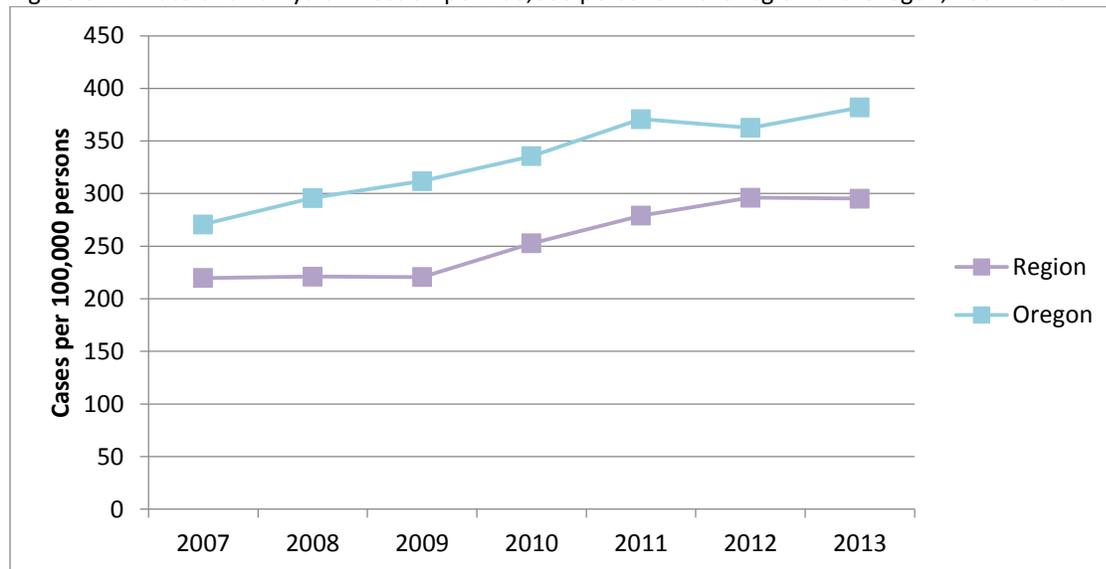
Sexually transmitted infections (STIs, also sometimes called sexually transmitted diseases, STDs) are infections that can be passed from one person to another through sexual contact. Untreated STIs can have consequences for individuals' health such as infertility and even death. Testing for STIs is a very effective mechanism for preventing the spread of STIs. Even incurable STIs, like HIV, are much less likely to spread if those affected by the infection receive proper treatment. However, untested individuals are unable to receive the treatment they need and are also much more likely to pass on the infection to others.

Chlamydia and gonorrhea are the most common STIs in the region. Approximately 80 to 90 percent of chlamydia infections and about 50 percent of gonorrhea infections are asymptomatic in women and may go undiagnosed. If left untreated, these infections may lead to pelvic inflammatory disease, which can cause tubal infertility, ectopic pregnancy and chronic pelvic pain.³⁰⁹

Chlamydia

Chlamydia is the most common reportable illness in Oregon, with infection rates steadily increasing over the past decade. In both Oregon and the region, reported rates of chlamydia are more than twice as high in women as in men; for every 10 men diagnosed with chlamydia, 25 women are diagnosed. Current guidelines recommend chlamydia screening in women who are not symptomatic, but do not recommend the same screening for men without symptoms. This likely causes the higher rate of reported chlamydia cases among women, rather than a difference in infection rates by gender.³¹⁰ Overall, the region has had a lower rate of chlamydia than the state, although rates are increasing at both geographic levels (Figure 6.22).

Figure 6.22: Rate of chlamydia infection per 100,000 persons in the region and Oregon, 2007-2013

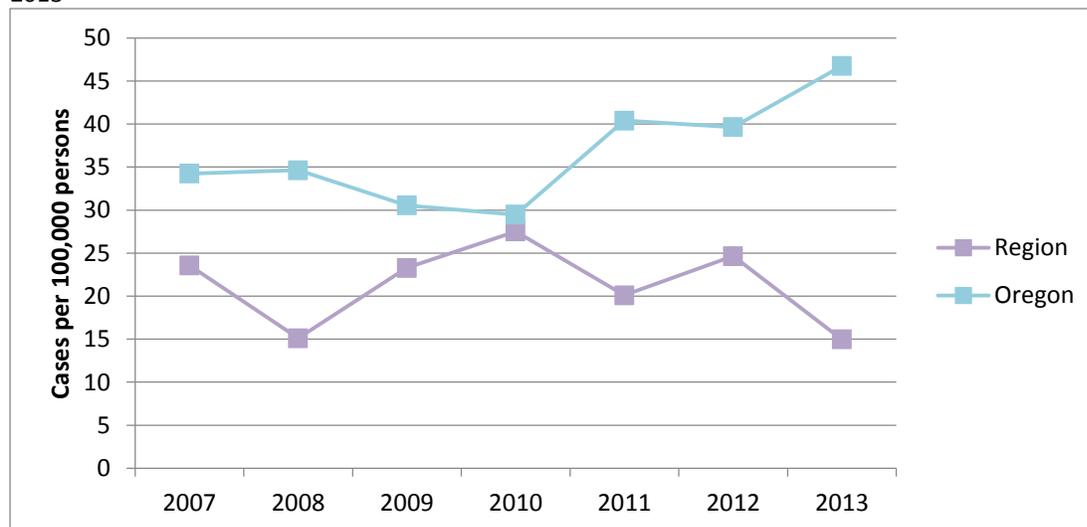


Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2007-2013

Gonorrhea

Another reportable sexually transmitted infection that is present in the region is gonorrhea. In general, women are more likely than men to become infected with gonorrhea after exposure. However, as with chlamydia, women are less likely than men to develop symptoms following infection.³¹¹ Gonorrhea infection rates in the region have consistently stayed below the state rate. Figure 6.23 shows the variation in gonorrhea incidence rates in the region and Oregon for the past five years.

Figure 6.23: Rate of gonorrhea infection per 100,000 persons in Linn, Benton, Lincoln Counties and Oregon, 2007-2013



Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2007-2013

The key risk factor for chlamydia infections is age. Regional residents between 15 and 24 years of age contract chlamydia at a rate 4.3 times higher than the infection rate among all ages. This trend holds for state infection rates as well. Gonorrhea infection rates are somewhat less influenced by age; 15-24 year olds in the region have infection rates 2.7 times as high as the infection rate among all ages (Table 6.7).

Table 6.7: Age-specific incidence rates of chlamydia and gonorrhea, diagnoses per 100,000 persons in the region and Oregon, 2013

Age	Chlamydia		Gonorrhea	
	Region	Oregon	Region	Oregon
All Ages	317	363	14	44
15-24	1,366	1,806	38	122
25-44	360	433	29	89
45-64	16	31	3.0	17
65+	0.0	1.6	0.0	0.5

Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2013

HIV/AIDS

HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome) remains an important public health problem in Oregon. From 1981 through 2010, 8,753 Oregonians were diagnosed with HIV infection. Of those, 40 percent (3,540) died. Fortunately, death rates have decreased dramatically since the development of effective antiretroviral therapies. HIV/AIDS is now managed as a serious but chronic disease. As a result, the number of Oregonians living with HIV infections has increased from 2,720 to 5,213 from 1997 to 2010. New HIV diagnoses in Oregon are most common among 35–39 year old males. Between 2009 and 2013, 48 individuals were diagnosed in the region. The 5-year incidence of HIV in the

region was 4 cases per 100,000 persons per year, about two-thirds of the state's incidence (6.5 cases per 100,000 persons per year) during that time period.³¹²

Viral Hepatitis

Although there is a very low incidence rate, viral Hepatitis, especially Hepatitis A, B, and C, are other infectious diseases affecting residents of the region. Transmission of Hepatitis A can occur person-to-person through an oral-fecal route; through exposure to contaminated water, ice, or shellfish harvested from sewage-contaminated water; or from fruits, vegetables, or other foods that are eaten uncooked and that were contaminated during harvesting or subsequent handling. Hepatitis B and C infection are transmitted by activities that involve contact with blood, blood products, and other bodily fluids, such as unprotected sexual contact, injection drug use, and transfusions with blood that has not been screened for viral hepatitis.³¹³

The three-county region recorded four Hepatitis A cases from 2007 to 2013. Between 2007 and 2013, there were 19 new recorded cases of acute Hepatitis B and seven recorded cases of acute Hepatitis C (past or present case, unspecified).³¹⁴ Current estimates suggest that 65 percent of people infected with Hepatitis B and 75 percent of people infected with Hepatitis C are unaware of their infections.³¹⁵ Overall, males experience higher rates of Hepatitis B and C infection than females.

Zoonotic Illnesses

Zoonotic illnesses are infectious diseases that can be spread from animals to humans. There are many zoonotic diseases, and their threat to human health is growing. This is due to increasing global movement of people and animals, and the effects of human populations expanding into previously undeveloped wildlife habitats.

Some zoonotic diseases are transmitted directly from animals to people, some result from contamination of the environment by animals, and others require a vector such as a tick or mosquito. Examples of zoonotic diseases include:

- Bacterial - *Salmonella*, *E. coli*, leptospirosis;
- Viral - Rabies, avian influenza;
- Fungal - Ringworm, sporotrichosis;
- Parasitic - Toxoplasmosis, larval migraines due to roundworms;
- Vector-borne - West Nile virus, spread by mosquitoes, and Lyme disease, spread by ticks.

Climate change may also lead to greater zoonotic disease threats. Zoonotic diseases can cause symptoms such as diarrhea, muscle aches, and fever. Some diseases cause only mild illness while others can be life threatening. One such disease is rabies, which is virtually always fatal if left untreated. Rabies is endemic in the Oregon bat population.

Injury and Violence

Violent Crime

Violent crimes are defined as offenses that involve face-to-face confrontation between the victim and the perpetrator, including homicide, forcible rape, robbery, and aggravated assault. High levels of violent crime compromise physical safety and psychological well-being. Crime rates can also deter residents from pursuing healthy behaviors such as exercising outdoors.³¹⁶ Additionally, exposure to crime and violence has been shown to increase stress, which may exacerbate hypertension and other stress-related disorders and contribute to obesity prevalence.³¹⁷ Exposure to chronic stress also contributes to the increased prevalence of certain illnesses such as upper respiratory illness and asthma in neighborhoods with high levels of violence.³¹⁸

Violent crime rates varied widely between counties. Benton County and Linn County had violent crime rates of 116 and 118 crimes per 100,000 people from 2010-2012. This was well below the Oregon rate of 249 crimes per 100,000 people. In contrast, Lincoln County reported 365 crimes per 100,000 people, which was the second highest rate in the state, after Multnomah County. This high rate was driven mostly by assault offenses; Lincoln County recorded 132 assaults in 2012 compared to 58 in Benton County and 73 in Linn County.³¹⁹ In 2013, the tri-county region recorded 55 violent deaths, including suicide, homicide, and undetermined causes. This was a rate of 22 violent deaths per 100,000 residents, equal to the rate in Oregon.³²⁰

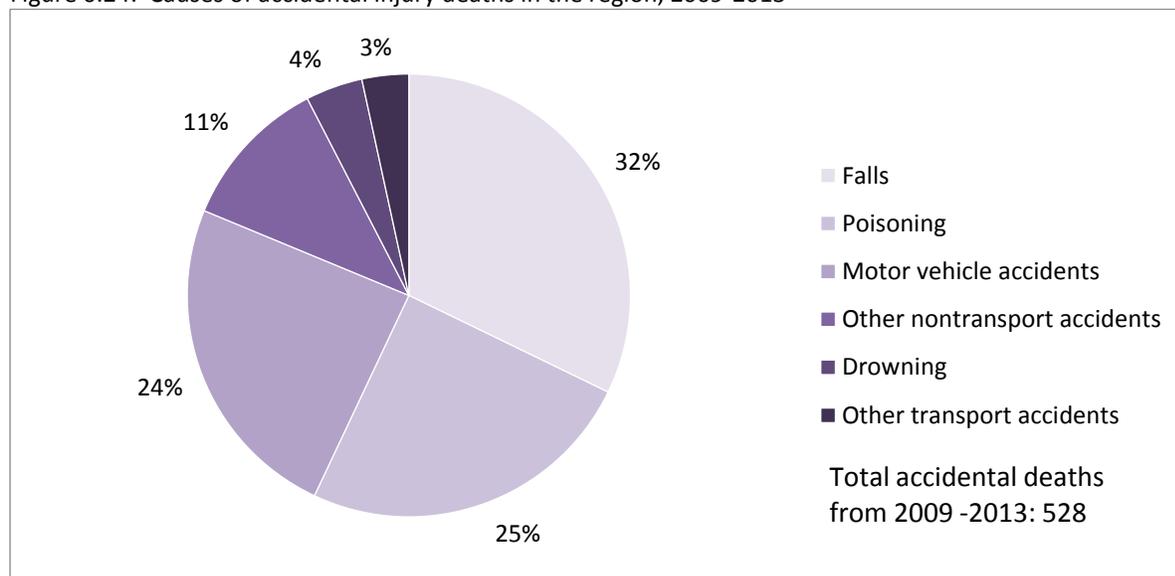
Unintentional Injury Mortality

Injuries are the number one cause of death among people under the age of 44 in Oregon and the fifth leading cause of death overall. Injury is also the number one cause of disability at all ages.³²¹ Most of the events resulting in injury, disability, or death are preventable. According to Healthy People 2020, injuries and violence have an impact on the well-being of people by contributing to premature death, disability, poor mental health, high medical costs, and high unproductivity.³²²

Nationally, the leading causes of death from injury are a result of motor vehicle traffic accidents, unintentional poisoning, and falls. Overall, these are the same leading causes of death resulting from unintentional injury in Oregon. However, falls is the number one cause, followed by poisoning and motor vehicle accidents. Risky behaviors, such as drinking and driving and the use of a hand-held cell phone while driving can be contributing factors to motor-vehicle traffic accidents. About three percent of Oregon adults report driving after having too much to drink on at least one occasion in the past month. About 15 percent of Oregon youth rode with a parent or other adult who had been drinking on at least one occasion in the past month.

Regional injury deaths follow the same pattern as the state (see Figure 6.24 below). Falls contributed to 32 percent of accidental deaths between 2009 and 2013, followed by poisoning and motor vehicle accidents. Together, these three causes comprise 81 percent of accidental deaths in the region.

Figure 6.24: Causes of accidental injury deaths in the region, 2009-2013



Source: Oregon Public Health Assessment Tool, 2009-2013

Injury mortality is higher among males than females in all age groups in Oregon. Injury mortality rates increase with age for both sexes, starting at age 5.³²³ The risks of different major types of injury fluctuate through a person’s life. These include, among other types, falls, unintentional poisonings, motor vehicle accidents, and self-harm.

Out of the 33,931 Oregon deaths in 2013, approximately 1,796 (5%) were due to unintentional injuries. Of those, 139 were in Linn, Benton, or Lincoln Counties.³²⁴ The top causes of unintentional injury deaths in the region in 2014 included poisoning (including overdoses of drugs and medications; 42 total deaths), falls (38 total deaths), and motor vehicle accidents (32 total deaths).³²⁵ These deaths are recorded by county of residence, not county of death. The Healthy People 2020 target for unintentional injury deaths is 36 per 100,000 persons, nearly 20 fewer deaths than the region’s death rate of 55 per 100,000 persons.³²⁶

Occupational Safety and Health

With the large majority of the population engaged in some form of employment for some portion of their lives, the workplace represents an important opportunity to improve health. Occupational Safety and Health is concerned with all aspects of health and safety in the workplace, and focuses mostly on primary prevention of hazards. On a global scale, the World Health Organization (WHO) is currently addressing a wide scope of determinants of workers’

health, which includes risks for disease and injury, social factors, and access to health services. In the United States, one of the primary organizations leading the way towards health and safety in the workplace is the Occupational Safety and Health Administration (OSHA) through the United States Department of Labor.

Despite established legislation, like the Occupational Safety and Health Act of 1970, requiring employers to provide workplaces “free from recognized hazards that are causing or likely to cause death or serious physical harm”³²⁷ to their workers, the toll of workplace fatalities, injuries and illness continues to exact a large toll on society. Impacts of these injuries, both social and financial, usually fall to workers and their families, as well as taxpayer-supported programs. Examining the data around particular industries can help illustrate the various workplaces and their relative rates of injury, illness, or fatality, ultimately painting a picture of the working conditions present in the community as a whole.

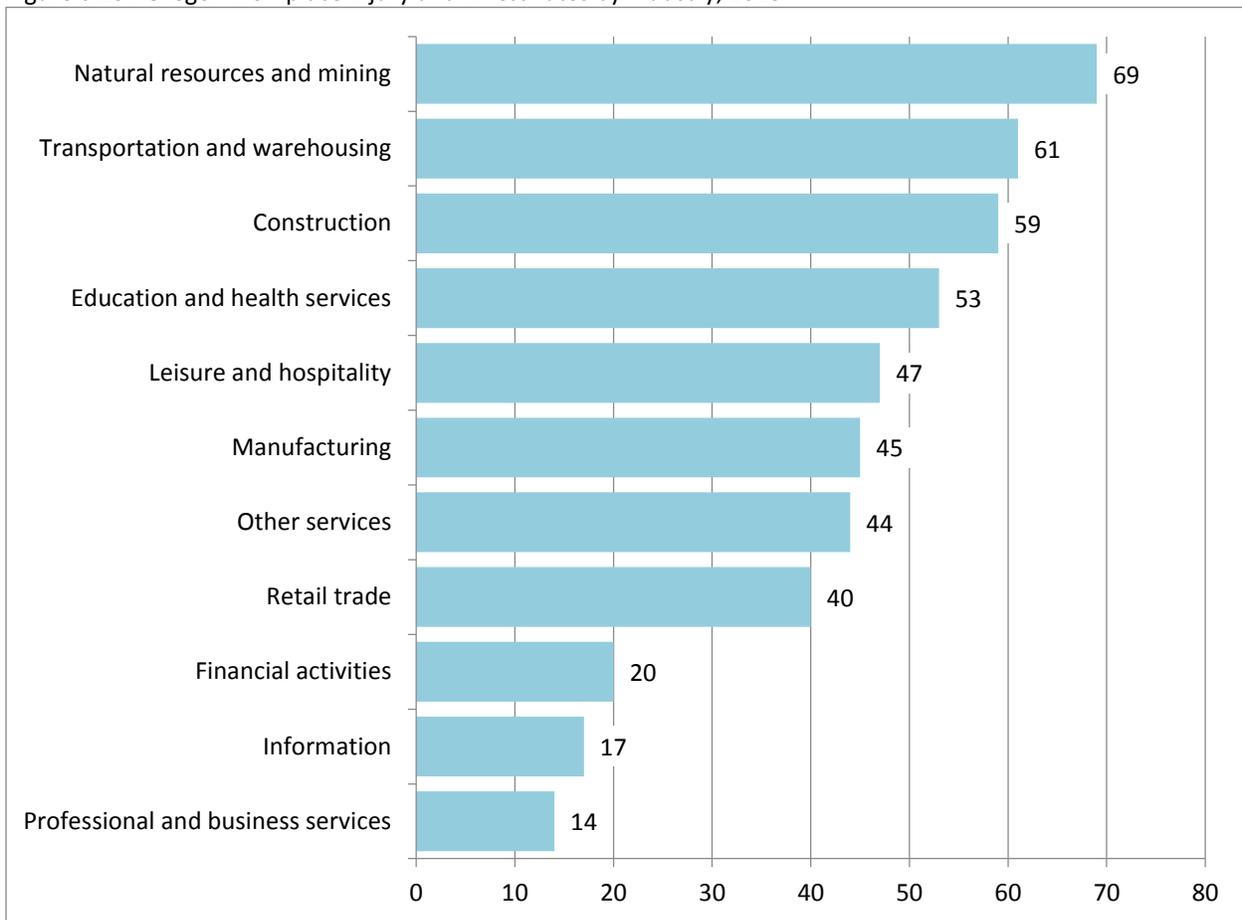
Injuries

County-specific data on workplace injuries are not available, but trends in state level data can be applied to major industries in the region to get a sense of the regional risk of workplace injury and illness. Statewide, the worker injury rate was approximately 41 injuries per 1,000 workers in 2013. Worker injury rates can be broken down first by industry, and then by category (a subset of industry).

The natural resources and mining industry has the highest incidence of non-fatal workplace injuries, with approximately 69 injuries per 1,000 workers in 2013. At a finer level of detail, certain specific workplace categories (not necessarily within the natural resources or mining industry) have high incidences of injury, including structural and motor vehicle manufacturing, fire protection, and wood preservation, which all had over 120 injuries per 1,000 workers. Surpassing all other workplace categories was local government nursing and residential care, with approximately 210 injuries per 1,000 workers in 2013. Industries with low workplace injury rates are concentrated in services such as educational and social services, business services, and private health care.

The variety of industries that constitute the bulk of the region’s economy means that the risks of workplace injury are also widely distributed. Linn County’s industry is concentrated in natural resources and manufacturing, and Benton County and Lincoln County have large natural resource industries as well. However, Benton and Linn Counties also have large educational and health care sectors, while Lincoln County has a large retail trade and tourism industry. As demonstrated in Figure 6.25, on the following page, 3at the state level these industries have lower workplace injury rates.

Figure 6.25: Oregon workplace injury and illness rates by industry, 2013



Source: Oregon Department of Consumer and Business Services, 2013

Workplace Fatalities

In 2013, forty-nine people died as a result of occupational injuries in Oregon, which was a rate of 2.8 deaths per 100,000 employed individuals.³²⁸ These fatalities were evenly distributed between production industries and service industries, although the deaths in service industries were mostly in transportation and administrative and waste services.

Mental Health Conditions

Mental health disorders are experienced by people of all ages, from early childhood through old age. Research suggests that only about 17 percent of U.S. adults are considered to be in a state of optimal mental health. An estimated 26 percent of Americans age 18 years and older are living with a mental health disorder in any given year and 46 percent will have a mental health disorder during their lifetime.³²⁹ These disorders include, among others, anxiety, depression, behavior disorders, persistent suicidal thoughts, schizophrenia, and Alzheimer's disease.³³⁰

County Health Rankings reports the number of poor mental health days each month, both as a proxy for mental health diagnoses and as an indicator of overall mental wellness. Residents of the tri-county region reported an average of 3.2 poor mental health days over the previous month. This measure is based on survey responses to the question: “Thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?”³³¹ Oregonians across the state reported an average of 3.3 poor mental health days. The Healthy People 2020 benchmark is 2.3, placing the region and the state in the worst 10 percent for this measure, with clear room for improvement. From 2008 to 2011, 60 to 64 percent of regional residents reported no poor mental health in the past 30 days. These rates are statistically equivalent to the statewide rate of 65 percent.³³² From 2010 to 2013, self-reported depression rates in the region varied from 23 percent in Benton County, 28 percent in Linn County, to 31 percent in Lincoln County. Both Benton and Linn County depression rates were close to the state rate of 25 percent.³³³

There is a strong link between chronic disease, injury and mental illness. Tobacco use among people diagnosed with mental health conditions is twice that of the general population. Other associations between mental illness and chronic disease include cardiovascular disease, diabetes, obesity, asthma, arthritis, epilepsy, and cancer. Injury rates for both intentional and unintentional injuries are 26 times higher among people with a history of mental health conditions than for the general population.³³⁴ National research indicates that people with serious mental illness die on average 25 years earlier than the general population. Sixty percent of those deaths are due to medical conditions such as cardiovascular disease, diabetes, respiratory diseases, and infectious illnesses; 40 percent are due to suicide and injury.³³⁵

Many mental health disorders can be treated effectively, and prevention of mental health disorders is a growing area of research and practice. Early diagnosis and treatment can decrease the disease burden of mental health disorders as well as associated chronic diseases. Assessing and addressing mental health remains important to ensure that all Americans lead longer, healthier lives.³³⁶

One group of particular concern regarding mental health is the incarcerated population. In Oregon, the provision of effective mental health service has been shown to lead to positive outcomes. These outcomes include a dramatic drop in arrests, reduction in the likelihood and duration of incarceration, and fostering of self-sufficiency and well-being as a result of improved social, emotional, and vocational functioning.³³⁷ Approximately 3,400 adults with mental illnesses were incarcerated in prisons in Oregon in 2010.³³⁸ This was a prevalence of approximately 24 individuals with mental illness for every 100 incarcerated individuals.³³⁹

Suicide

Suicide is a death resulting from the intentional use of force against oneself. As a public health concern, it relates to both injury and violence and mental health. However, while many unintentional injuries can be prevented by making one’s environment safer, suicide can also be effectively prevented by providing treatment to those with mental health disorders.

Therefore, suicide is discussed in the context of mental health. Suicide is an important public health problem in Oregon. It is also the leading cause of injury-related death in the state and is the 9th leading cause of death for Oregonians. There are more deaths in Oregon due to suicide than due to car crashes. As with violent death, suicide rates were much higher in Lincoln County in 2013 compared to the other counties in the region, with 30 deaths per 100,000 residents of Lincoln County. Linn County recorded 16 suicides per 100,000 residents and Benton County recorded 14 suicides per 100,000 residents. The statewide rate in 2013 was 18 per 100,000 persons.³⁴⁰ Additional detail is given in Chapter 7.

Conclusion

Understanding the leading causes of illness and death is a first step on the path to preventing both the loss of life and improving the quality of life within the region. While leading causes of death in the region closely mirror those of the state, examining various cancers, heart disease, and other major causes reveal areas of vast improvement, as well as areas in which the region is doing more poorly than the state average. Data on many sub-populations are noticeably absent throughout this chapter. While we know that factors such as access to health care, mental health status, and other demographics are closely linked to particular conditions at a state or national level, without more robust data we can only guess at local trends. The more detailed data we have about disparities within particular populations and illnesses, the more ability we have to address these issues effectively in the region. As discussed throughout the chapter, many of the conditions that cause illness and death within the region have well-established causes, with a number of them rooted in behaviors or risk factors that can be prevented. The following chapter takes a closer look at behaviors and risk factors that affect a person's health and well-being across the life course.

Chapter 7

Health Across the Life Course

A life course framework helps to illuminate the ways in which experiences during key stages of life contribute to health outcomes throughout an individual's lifetime.³⁴¹ This framework builds upon the previously discussed social determinants of health to illustrate that a person's environment and the systems in which they live can affect health outcomes differently during different stages of life. For example, there are ways in which maternal and infant disparities contribute to childhood and adolescent experiences which, in turn, contribute to adult and older adult health outcomes. This can have effects not only on an individual's life, but can also span generations, creating and contributing to persistent disparities within the community. By taking a look at the ways in which certain life stages and health factors interact, new opportunities to improve community health can be uncovered. This chapter addresses health behaviors such as engaging in physical activity, maintaining healthy eating habits, being tobacco-free, and using alcohol and prescription drugs appropriately. This larger view illuminates ways that people protect and promote health for others, including assuring a healthy start for children, preventing and managing chronic conditions, preventing disease and injury, and promoting good mental health.

This chapter is organized to follow the course of a person's life. Factors that influence the health of a mother have a lasting effect on the health of her children as infants, adolescents, and adults. The behavioral and lifestyle choices of children and adolescents affect their wellbeing throughout life, as do other health factors that arise during childhood, such as oral care and mental health. Adults continue to influence their health by adopting healthy behaviors or discontinuing unhealthy ones. They may now feel the effects of health conditions that began earlier in life but took time to develop, or reap the benefit of the healthy choices that they have made. Living a healthy life as one ages is very possible, and it is never too late to improve one's health. However, the elderly are also at risk for health issues that may not affect younger people, including falls, mental decline, or elder abuse.

Since many behaviors and health outcomes recur at different ages, this chapter will revisit topics throughout the life course. In addition, many of the health conditions that are mentioned here, such as diabetes and Alzheimer's disease, are discussed more thoroughly in the Morbidity and Mortality chapter (Chapter 6). Therefore, this chapter focuses on behaviors and practices that improve or worsen health.

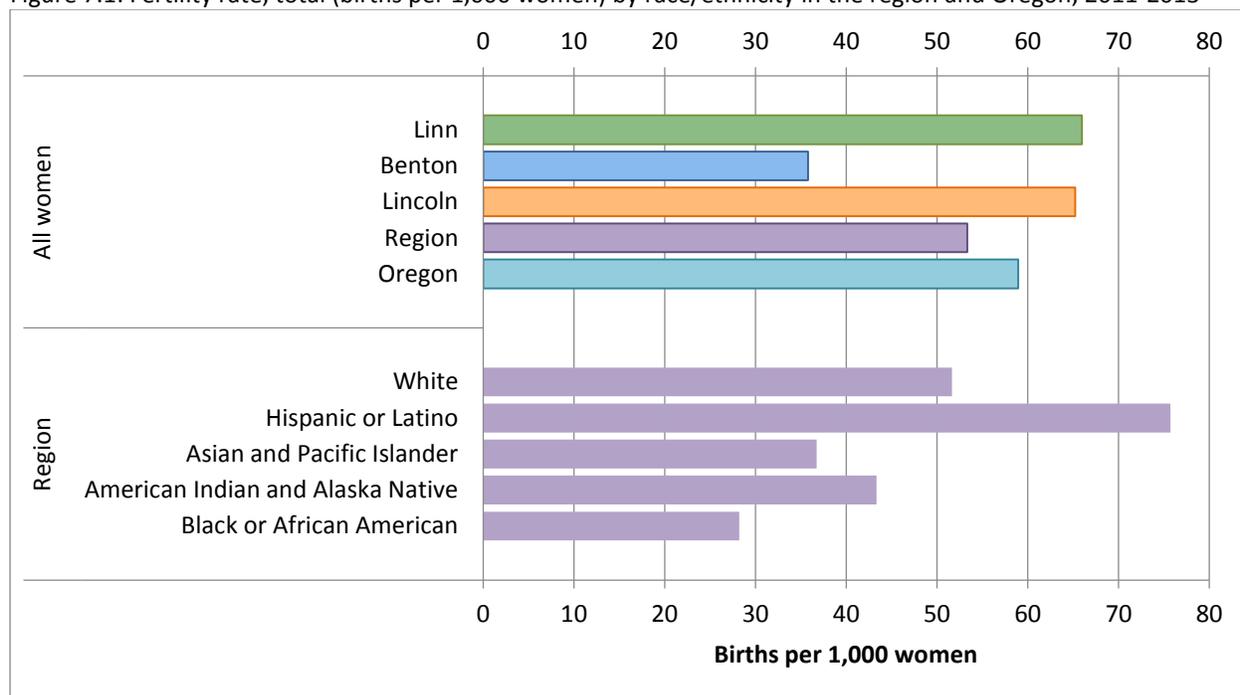
Maternal and Infant Health

Since healthy aging starts at the beginning of one’s life, public health professionals can assess the health of a community by starting with the health of mothers and infants during and immediately after pregnancy. This section takes a closer look at maternal and infant health outcomes and various factors that impact them. All fertility data is based on the county of residence, not the county where the infant was born.

Fertility Rate (Total Fertility Rate, TFR)

The total fertility rate (TFR) is the total number of births per 1,000 women in a given year. The TFR is based on the age-specific fertility rates of women in their “child-bearing years”, which is ages 15 to 44. Figure 7.1 below illustrates the variation of TFR among the three counties and among different racial/ethnic groups within the region. While the overall TFR for the region is lower than that of Oregon, both Linn and Lincoln Counties have a TFR that is higher than the state’s and nearly twice that of Benton County. Among racial/ethnic groups, women who identify as Hispanic or Latina have the highest TFR in the region, equating to about 1.5 times the TFR of women who identify as White.

Figure 7.1: Fertility rate, total (births per 1,000 women) by race/ethnicity in the region and Oregon, 2011-2013



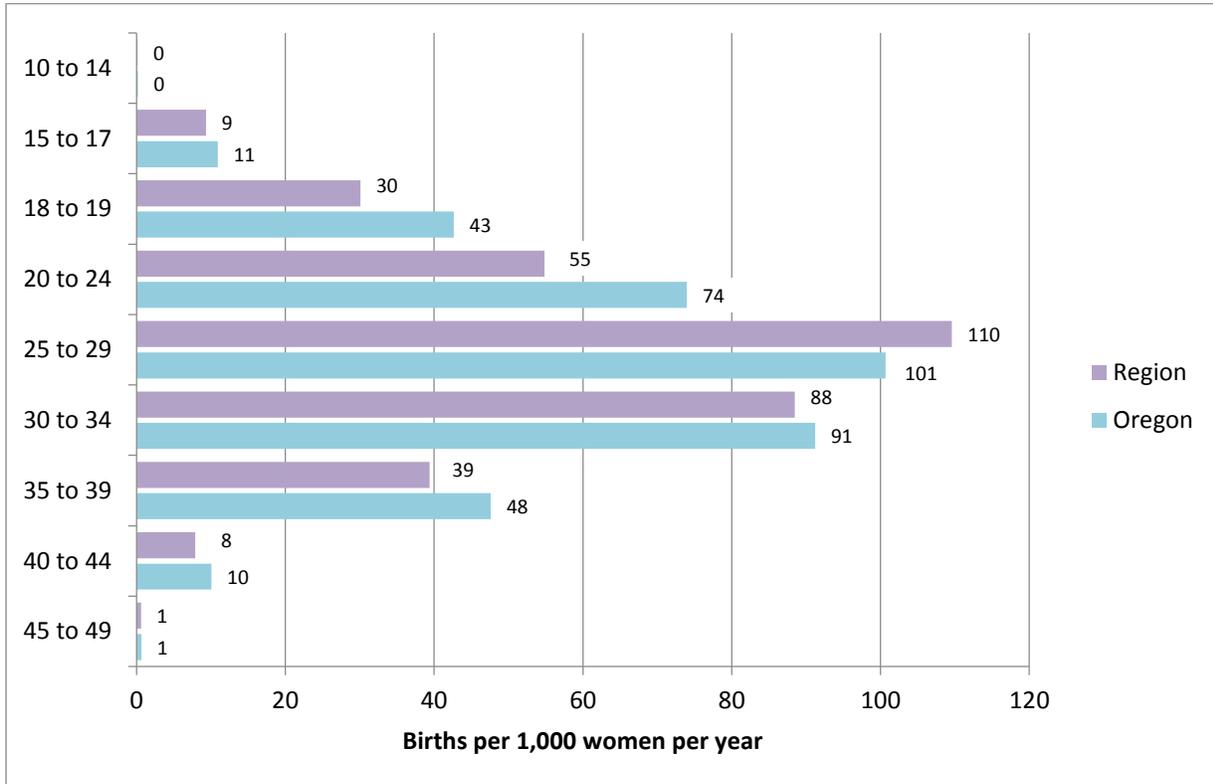
Source: Oregon Healthy Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

Note: Fertility rate data is based on county of residence, not county of birth

In general, compared to Oregon, women in the tri-county region tend to have fewer births per 1,000 women across all age groups, with the exception of women between the ages of 25 and

29 (Figure 7.2). The regional rate, however, conceals a notable difference among the counties; overall, women in Benton County tend to have children at a later age than women in Linn or Lincoln Counties.³⁴² The highest fertility rate in Benton County occurs for women between ages 30 to 34, while in Linn and Lincoln Counties the fertility rate is highest for women ages 20 to 29.³⁴³

Figure 7.2: Age-specific fertility rates (births per 1,000 women) by maternal age in the region and Oregon, 2011-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

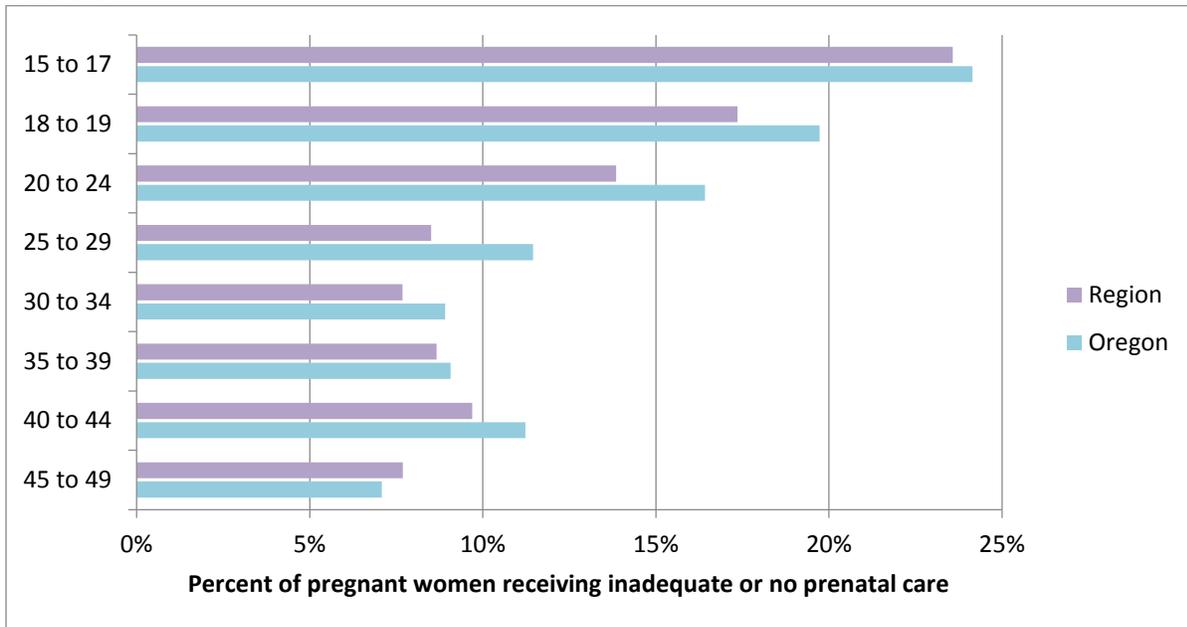
Prenatal Care and Healthy Pregnancy

Infants born to mothers who receive no prenatal care are three times more likely to have a low birth weight, and five times more likely to die of complications than those whose mothers received prenatal care.³⁴⁴ Prenatal care with/by a medical professional includes discussing a mother’s healthy choices and body changes; prenatal testing and counseling; identifying and treating medical complications like gestational hypertension, diabetes, and anemia; promoting optimal weight gain; testing for and treating sexually transmitted infections; oral health assessment and treatment; and maternal mental health, tobacco and substance abuse screening.

In the region from 2011 to 2013, a total of 89.7 percent of all mothers were able to access adequate prenatal care, only slightly higher than the 87.9 percent of Oregon mothers during the same time period. Across all age groups in the region, the percentage of mothers that

accessed adequate prenatal care was consistently higher when compared with Oregon. However, disparities exist among different age groups within the region. As shown in Figure 7.3, younger mothers are less likely to access adequate prenatal care than older mothers. Compared with women over the age of 25, women under the age of 25 are nearly twice (1.8 times) as likely to receive inadequate or no prenatal health care in the region.³⁴⁵

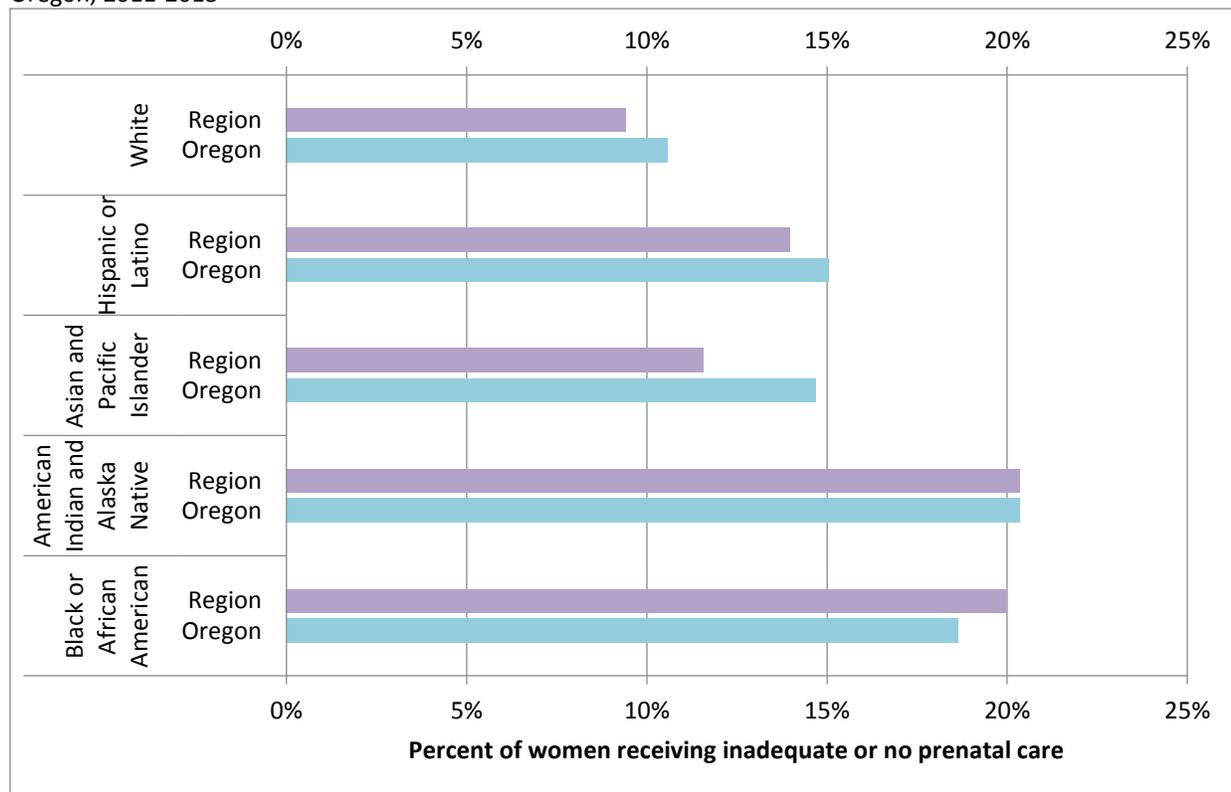
Figure 7.3: Percent of mothers accessing inadequate or no prenatal care in the region and Oregon by age group, 2011-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

There also exist disparities in prenatal care access among mothers of different race/ethnic groups in the region. Overall, mothers who identify as White, non-Hispanic tend to access adequate prenatal care more frequently when compared to all other racial/ethnic groups (Figure 7.4).³⁴⁶

Figure 7.4: Percent of mothers accessing inadequate or no prenatal care by race/ethnicity in the region and Oregon, 2011-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

Unhealthy Behavior During Pregnancy

Smoking During Pregnancy

Smoking during pregnancy is the single most preventable cause of illness and death among infants. Smoking during pregnancy increases the risk of stillbirth, low birth weight, sudden infant death syndrome (SIDS), and preterm birth. It also contributes to cognitive and behavioral problems and respiratory problems in both the mother and the child.³⁴⁷

Children exposed to tobacco before birth are more than twice as likely to become regular smokers themselves later in life, compared with children not exposed to tobacco in utero.³⁴⁸ Women who quit smoking before pregnancy or early in pregnancy also significantly reduce their risks for delays in conception (e.g. infertility) and other complications during birth.³⁴⁹

On average in 2011-2013, 15 percent of mothers smoked during pregnancy in the region (Table 7.1). This percentage is higher than both the state average of 11 percent and the Healthy People 2020 target of 1.4 percent.³⁵⁰ The maternal smoking rate in the region is also higher than Oregon across all age groups. However, there is a notable difference in smoking rates when comparing age groups, in which the rate of smoking among pregnant women under the age of 25 is over two times the rate of smoking among pregnant women over the age of 25.

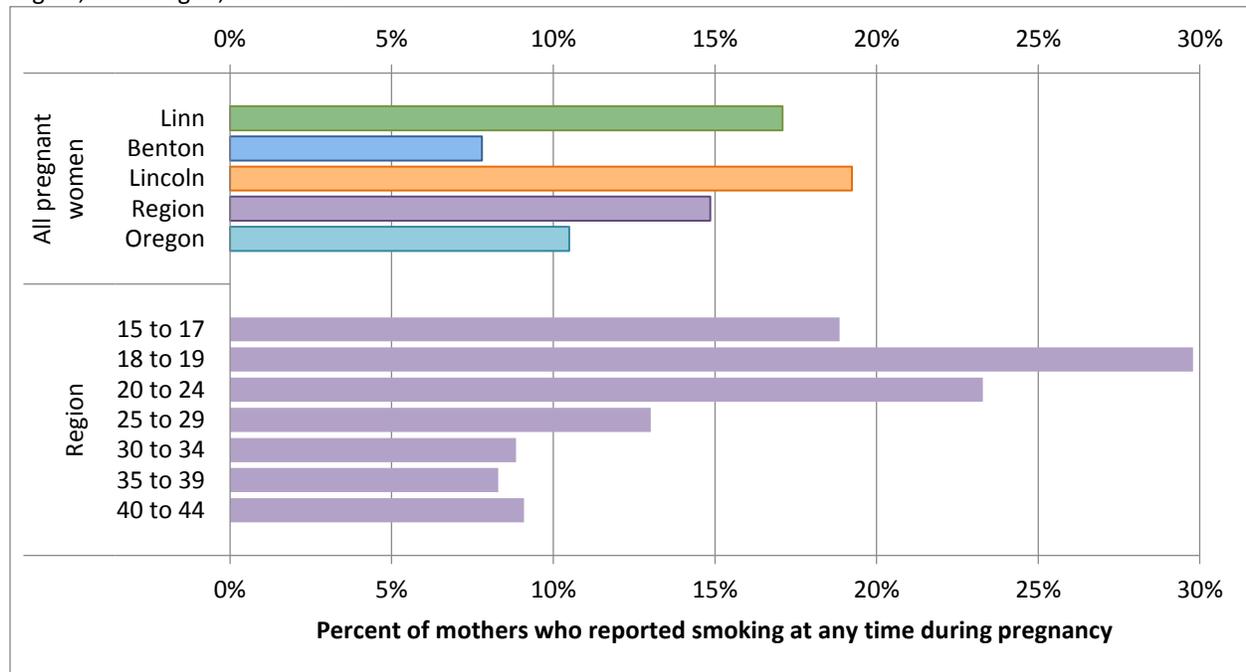
Table 7.1: Maternal smoking rates among pregnant women by age in the region and Oregon, 2011-2013

Population (by age)	Region	Oregon
15 to 17	19 %	13 %
18 to 19	30 %	18 %
20 to 24	23 %	18 %
25 to 29	13 %	10 %
30 to 34	9 %	6 %
35 to 39	8 %	5 %
40 to 44	9 %	4 %
Total	15 %	11 %

Source: Oregon Health Authority, Center for Vital Statistics, 2011-2013

Among the counties, individually, the percentage of mothers who smoked during pregnancy varies, ranging from 8 percent in Benton County to 17 percent in Linn County and 19 percent in Lincoln County (Figure 7.5).

Figure 7.5: Maternal smoking rates (percentages) among pregnant women in Linn, Benton, and Lincoln Counties, region, and Oregon, 2011-2013



Source: Oregon Health Authority, Center for Vital Statistics, 2011-2013

Smoking cessation counseling and programs offered during prenatal care can provide effective assistance to encourage pregnant women to quit smoking. There currently are no established smoking cessation programs specifically for mothers in the region, but efforts are being made to make them available at the county level, particularly in Lincoln County. The standard of care among health professionals providing prenatal care is to determine if the mother smokes and, if

so, to discuss the benefits of quitting smoking and offer resources to support the mother if she decides to quit.

Alcohol Use During Pregnancy

Drinking alcohol during pregnancy can cause miscarriage, stillbirth, and a range of lifelong disorders known as fetal alcohol spectrum disorders (FASDs). Children with FASDs can have a host of problems, including poor coordination, hyperactivity behavior, difficulty paying attention, poor memory, difficulty in school, learning disabilities, speech and language delays, poor reasoning and judgment skills, vision or hearing problems, and complications with the heart, kidney, or bones. There is no known safe amount of alcohol to drink during pregnancy and no known safe time to drink alcohol during pregnancy.³⁵¹

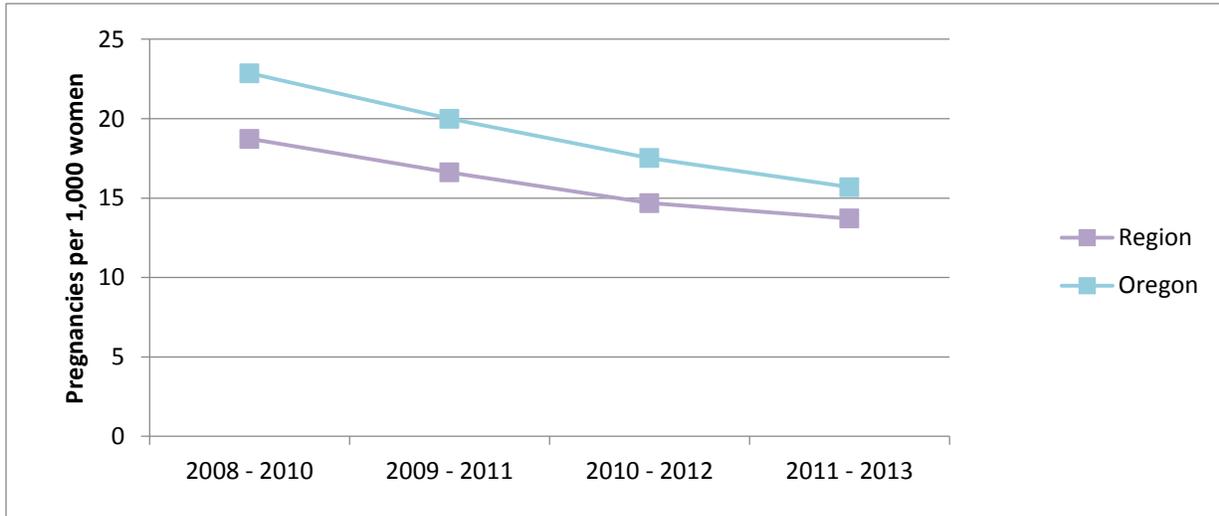
The Pregnancy Risk Assessment Monitoring System (PRAMS), a national surveillance system, provides information about women who have had a recent live birth. Oregon state-level data indicates that 92 percent of pregnant mothers abstained from alcohol during the last 3 months of their pregnancies. Less than one percent had more than one drink per week during the third trimester.³⁵² There are no regional data available at present.

Teen Parenting

Teen mothers are less likely to receive early prenatal care, and are more likely to experience blood-pressure complications and premature birth.³⁵³ Children of teenage mothers are also more likely to become teen parents themselves, be incarcerated during adolescence, drop out of school, experience more health problems, and are two times as likely to experience abuse and neglect. Negative effects of early childbearing on teenage fathers include an increased likelihood of partaking in delinquent behaviors, such as alcohol and drug abuse or dealing, and fewer years of completed school in comparison to their childless peers.³⁵⁴ On average in the United States, 50 percent of teen mothers receive a high school diploma by age 22, compared to 90 percent of women who had not given birth as a teenager.³⁵⁵

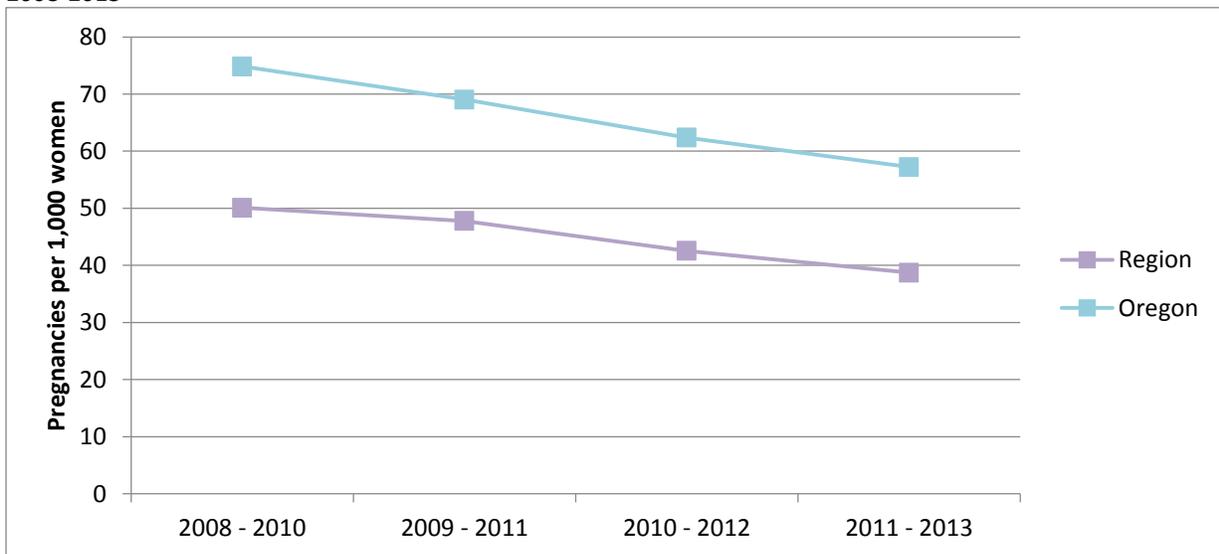
The most recent information available suggests that, overall, regional teen pregnancy rates (ages 15 to 17 and 18 to 19) have decreased between 2009 and 2013 (Figures 7.6 and 7.7). Given the small number of teen pregnancies each year, three year averages are shown. The three year average in 2008-2010 among 15-17 year-olds was 18.7 pregnancies per 1,000 women age 15-17. This number declined to 13.7 pregnancies per 1000 women age 15-17 in 2011-2013. This decline is similar among 18-19 year old women; the rate declined from 50.1 pregnancies per 1,000 women age 18-19 in 2008-2010 to 38.7 pregnancies per 1,000 women age 18-19 in 2011-2013. Regional teen pregnancy rates were below state teen pregnancy rates in all years.

Figure 7.6: Pregnancy rate per 1,000 women age 15-17 years in the region and Oregon, 3 year moving average, 2008-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2008-2013

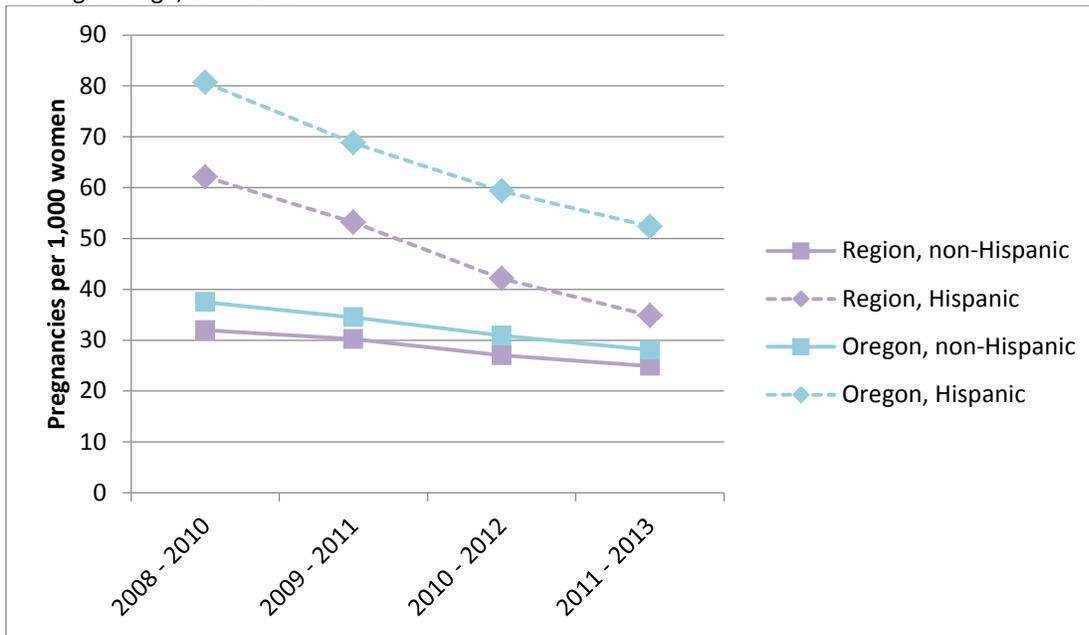
Figure 7.7: Pregnancy rate per 1,000 women age 18-19 years in the region and Oregon, 3 year moving average, 2008-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2008-2013

Disparities in teen pregnancy rates emerge when the overall regional figure is broken down. For example, despite the overall decline in rates, there are striking differences in teen birth rates for Hispanic and non-Hispanic populations at both the regional and state levels. Between 2011 and 2013, Hispanic teens aged 15 to 19 had a pregnancy rate in the region that was forty percent higher than that of non-Hispanic teens (Figure 7.8). The regional disparity was much less than the state disparity; state-wide the pregnancy rate of Hispanic teens was 86% greater than that of non-Hispanic teens. Notwithstanding the greater Hispanic teen pregnancy rates, both regionally and statewide, the pregnancy rate among Hispanic teens is declining faster than the pregnancy rate among non-Hispanic teens.

Figure 7.8: Pregnancy rate, Hispanic versus non-Hispanic, women age 15-19 years in the region and Oregon, 3 year moving average, 2008-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2008-2013

Infant Mortality

The annual infant mortality* occurrence in the region has been less than 4 per 1,000 births from 2011 to 2013. Infant mortality rates are lower in the region (3.98 per 1,000 births) than in Oregon (4.98 per 1,000 births).³⁵⁶ The region has surpassed the Healthy People target of 6.0 per 1,000 births.³⁵⁷ Principal causes of infant mortality over the 10 years between 2004 and 2013 included include congenital malformations, low birthweight and/or premature birth, sudden infant death syndrome, accidents, and complications from birth.³⁵⁸

Premature Birth and Low Birth Weight

Premature birth and low birth weight among infants are commonly used measures of maternal and infant health. Infants that are born too early and/or with a low birth weight are at higher risk of dying in the first year of life and of having developmental problems and worse health outcomes throughout life.^{359,360} Both conditions are preventable to varying degrees and have been found to be influenced by a variety of factors.

Premature Birth

* Infant mortality is defined as the death of a live-born infant before the age of 1.

Premature birth (also known as preterm birth) is a measure of births that occur before the projected full term of the pregnancy. Infants are considered premature when they are born before completing 37 weeks (about 8.5 months) of pregnancy.³⁶¹

Many maternal factors can influence premature birth. Established preventable risk factors for premature birth include:

- Chronic health conditions in the mother, such as high blood pressure, and diabetes;
- Certain infections during pregnancy; and
- Cigarette smoking, alcohol use, or illicit drug use during pregnancy.³⁶²

In both the region and Oregon, the percent of preterm births is 7.5 percent, which is well below the Healthy People 2020 target of 11.4 percent.³⁶³ However, disparities exist among women when stratified by race/ethnicity, as shown below in Table 7.2.

Table 7.2: Percent of births that are premature in the region and Oregon, 2011-2013

	Region	Oregon
White, non-Hispanic	7.3	7.3
Black/African American, non-Hispanic	24.4*	9.7*
American Indian/Alaska Native	5.1*	10.4*
Asian & Pacific Islander	6.6*	7.6*
Hispanic/Latino	8.8	7.4
All births	7.5	7.5

Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

* This number may be statistically unreliable due to small numbers and should be interpreted with caution

Low Birth Weight

Low birth weight results when an infant fails to grow sufficiently during pregnancy, and can both signal and cause health problems with the infant. Infants are considered to have low birth weight if they weigh less than 2,500 grams (about 5.5 pounds at birth).

Established risk factors for low birth weight include:

- Premature birth;
- limited weight gain of the mother during pregnancy;
- the mother being younger than 15 years or older than 35 years;
- exposure to air pollution or drinking water contaminated with lead;
- cigarette smoking, alcohol use, or illicit drug use during pregnancy; and
- socioeconomic factors, such as having a low income, low educational level, or a high level of stress.³⁶⁴

From 2011 to 2013, approximately 6.6 percent of all infants born in the region had a low birth weight, which meets the Healthy People 2020 target of 7.8 percent.³⁶⁵ While the region, overall, and Oregon meet the Healthy People 2020 objective for low birth weight infants, differences exist among the three counties and among racial/ethnic groups within the region. Table 7.3 and Figure 7.9 illustrate the variation between the individual counties and across different racial/ethnic groups within the region.

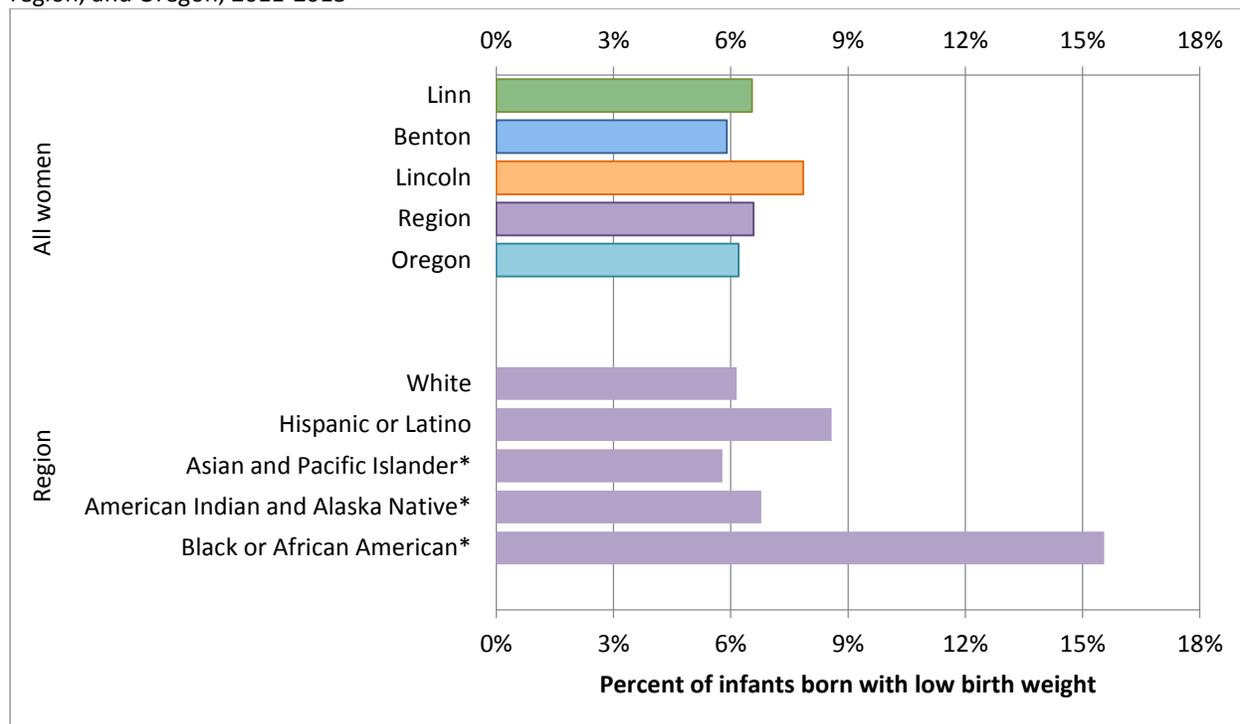
Table 7.3: Percent of infants born with low birth weight by race/ethnicity in the region and Oregon, 2011-2013

	Region	Oregon
White, NH	6.2%	5.9%
Black/African American, NH	15.6%*	9.5%*
American Indian/Native American, NH	6.8%*	8.1%*
Asian & Pacific Islander, NH	5.8%*	7.7%*
Hispanic/Latino	8.6%	6.2%
All infants	6.6%	6.2%

Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

* This statistic may be statistically unreliable due to small numbers and should be interpreted with caution

Figure 7.9: Percent of infants born with low birth weight by race/ethnicity in Linn, Benton, and Lincoln Counties, region, and Oregon, 2011-2013



Source: Oregon Health Authority, Center for Health Statistics, Birth Certificate Data, 2011-2013

* This statistic may be statistically unreliable due to small numbers and should be interpreted with caution

Note: Low birth weight data is based on county of residence of the mother, not county of birth

Breastfeeding

Breastfeeding is associated with numerous health benefits for infants, such as boosting immune system response, reducing the risk of Type 2 diabetes, and preventing obesity. Breastfeeding also promotes maternal-child bonding. The American Academy of Pediatrics recommends exclusively breastfeeding for the first six months after birth and further recommends continued breastfeeding for a year or more after birth.³⁶⁶

Barriers to Breastfeeding

Breastfeeding may not always come easily to new mothers, and other barriers to initiation of breastfeeding and continuation of breastfeeding might include:

- lack of support from the child’s father,
- lack of support from family and friends,
- hospital practices that interfere with breastfeeding,
- misperceptions about milk supply,
- no timely follow-up to questions or problems that arise after hospital discharge,
- lack of workplace support for breastfeeding,
- lack of acceptance by the community and society in general,
- widespread advertising and promotion of infant formula, and
- the common portrayal of bottle-feeding in the mass media.³⁶⁷

Breastfeeding in the Region

Data on breastfeeding are limited at both the state and county level. However, state programs, such as the Nutrition and Health Screening Program for Women, Infants, and Children (WIC), give some insight into the percentage of participating women who breastfeed. Table 7.4 displays the available county data on mothers who participate in the WIC program and the rate of breastfeeding.³⁶⁸

Table 7.4: Breastfeeding rates among WIC mothers in Linn, Benton, and Lincoln Counties, 2014

	Linn County	Benton County	Lincoln County
Percent of pregnant women served by WIC	51%	35%	71%
Percent of WIC mothers who started out breastfeeding (initiation)	91%	97%	90%
Percent of WIC mothers who breastfed exclusively for 6 months	51%	53%	21%

Source: Oregon Health Authority, 2014 WIC Facts

In addition to WIC, most health care providers encourage women to breastfeed their children, and there are many breastfeeding classes and support groups available in the region.

Perinatal Depression

Maternal Depression

Maternal depression, or Postpartum Depression, is a depressive disorder characterized by feelings of sadness or hopelessness, reduced interest or pleasure in activities, changes in weight/appetite, sleeping disruption or too much sleep, restlessness or irritability, or diminished ability to think or concentrate during pregnancy and/or soon after giving birth. Mothers with maternal depression are less likely to engage in healthy parenting behaviors. As a result, mother-infant bonding and attachment can be compromised. In extreme cases, mothers with maternal depression have harmed themselves or their babies.³⁶⁹

In Oregon, nearly 1 in 5 (18.8 percent) new mothers report symptoms of depression during and/or after pregnancy. This figure has been relatively constant since 2009.³⁷⁰ Regional data depicting maternal depression is currently limited, however, state level data can provide some insight into the experiences of mothers in the region.

The most recent detailed data on maternal depression and disparities among women in Oregon is from 2004 to 2008:

- Low income women are twice as likely to report depressive symptoms as high income women (36.2 percent versus 16.7 percent).
- Current smokers are 50 percent more likely to report depressive symptoms than non-smokers (33.5 percent versus 21.7 percent).
- Women who experienced partner stress are twice as likely to report depressive symptoms (42 percent versus 16.2 percent).
- Racial/ethnic minority mothers are more likely to report depressive symptoms than White mothers (Hispanic 31.1 percent versus White 20.8 percent).
- Teen mothers are more likely to report depressive symptoms than older mothers (36.3 percent of <20 year olds versus 16.9 percent of 35 years and older).³⁷¹

Maternal health is the foundation for life-long health. As a child grows, they experience new opportunities for health and encounters new risks that can hurt their health. The next section looks at health among children and adolescents.

Childhood and Adolescence

Childhood and adolescence are formative times in a person's life. The number and severity of adverse experiences during childhood affects an individuals' risk for alcoholism, depression,

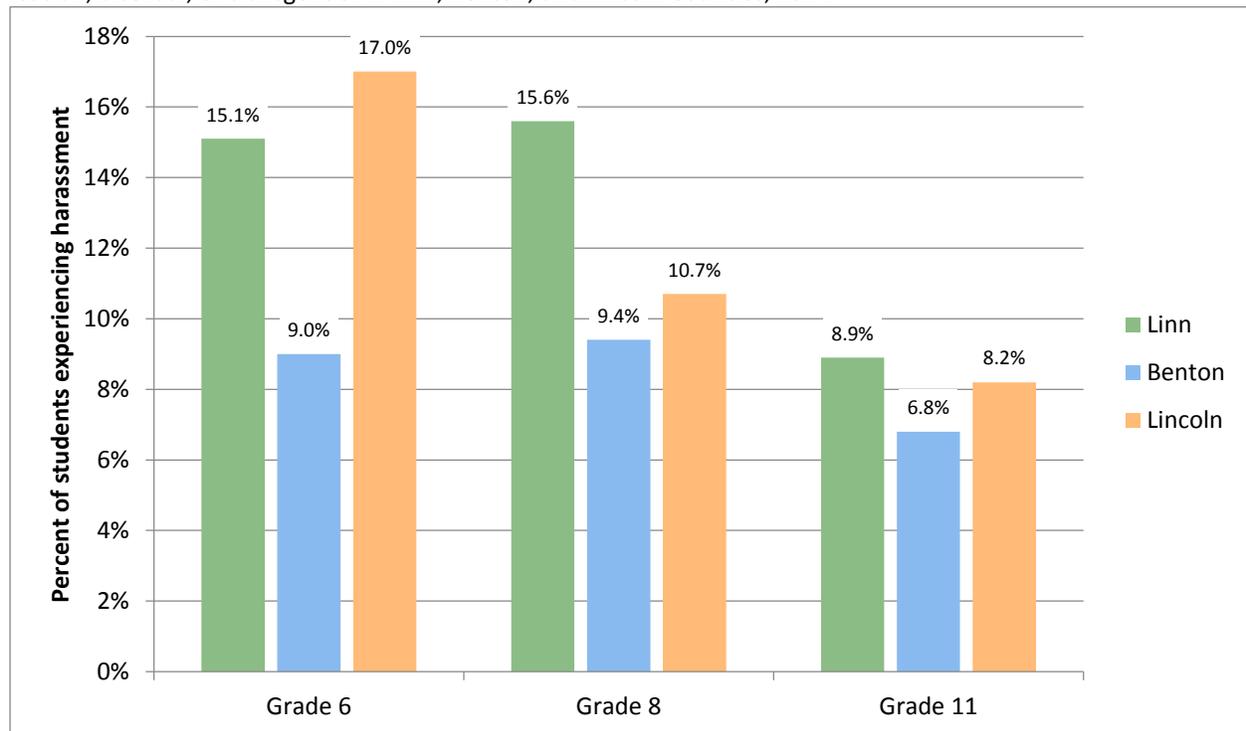
heart disease, liver disease, intimate partner violence, sexually transmitted infections, smoking, and suicide. Adverse events include emotional, physical, and sexual abuse and neglect, and various types of household dysfunctions such as violence against mothers, substance abuse, mental illness, parental separation or divorce, or an incarcerated household member.^{372,373}

Gender Identity and Sexual Orientation

Adolescence is a time of developing sexual awareness and gender expression, although many children are aware of their developing gender identity from a very early age. Because most state and national surveys do not ask questions related to sexual orientation or gender identity, it is difficult to estimate the health needs of lesbian, gay, bisexual, transgender, or queer children, youth, and adults in the region and Oregon.

Available data include survey responses on harassment among adolescents in our public schools. Across the region during the 2013-2014 school year, 6th and 8th graders reported having been harassed by a peer who thought they were gay, lesbian, bisexual, or transgender more frequently than 11th graders (Figure 7.10). Overall, harassment based on perceptions about sexual orientation declines with age.^{374,375, 376}

Figure 7.10: Percent of students who were harassed in the last 30 days by peers who derisively called them gay, lesbian, bisexual, or transgender in Linn, Benton, and Lincoln Counties, 2014

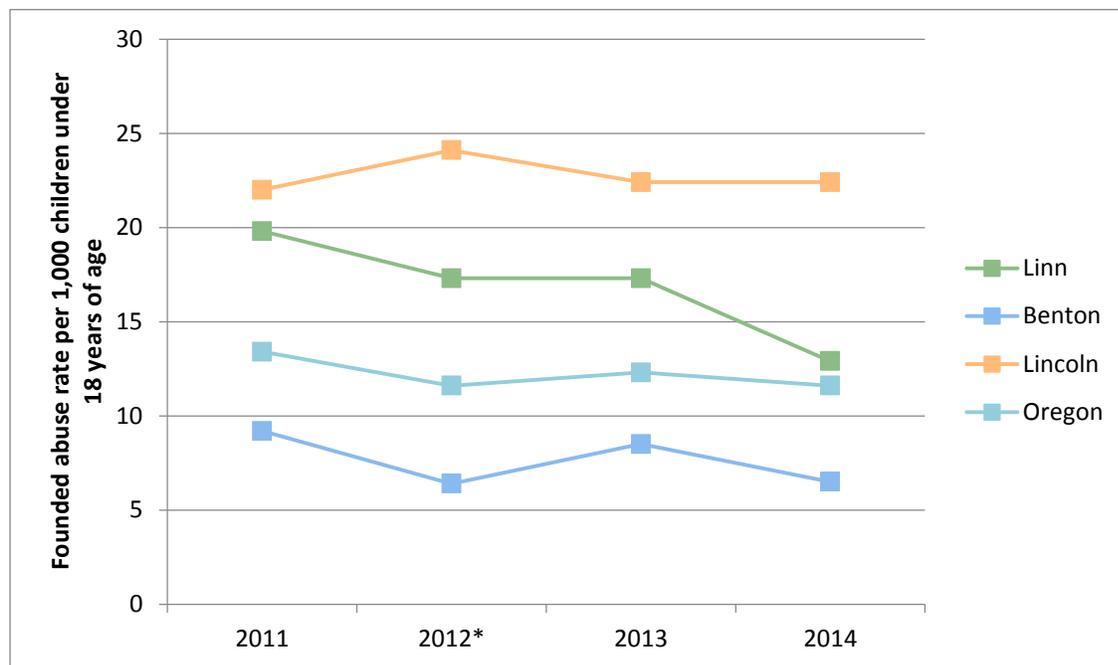


Source: Oregon Student Wellness Survey, 2014

Child Abuse

In 2014, there were a total of 1,817 reports of child abuse or neglect in the region, of which, 420 (23 percent) were founded (determined to be abuse). Of these cases, Benton County comprised 15 percent, Lincoln County comprised 28 percent, and Linn County comprised 57 percent. There were an additional 810 unfounded reports and 306 indeterminable reports.³⁷⁷ The types of abuse/neglect include mental injury, physical/medical neglect, physical abuse, sexual abuse, sexual exploitation, or threat of harm. Most often, the perpetrators of child abuse and neglect are family members (93.9 percent of reports); parents account for 78.2 percent of all perpetrators.³⁷⁸ Within the region, the rate of child abuse in Lincoln County has been fairly stable, but consistently higher than Linn and Benton Counties and Oregon (Figure 7.11). In recent years, the rate of child abuse in Linn County has decreased and is similar to the rate in Oregon. Child abuse rates in Benton County have remained lower than Oregon and have been fairly stable over the years.^{379,380,381,382}

Figure 7.11: Founded abuse rate per 1,000 for children under 18 years of age in Linn, Benton, and Lincoln Counties, and Oregon, 2010-2014



Source: Oregon Department of Human Services, Child Welfare Data Book 2011, 2012, 2013, 2014

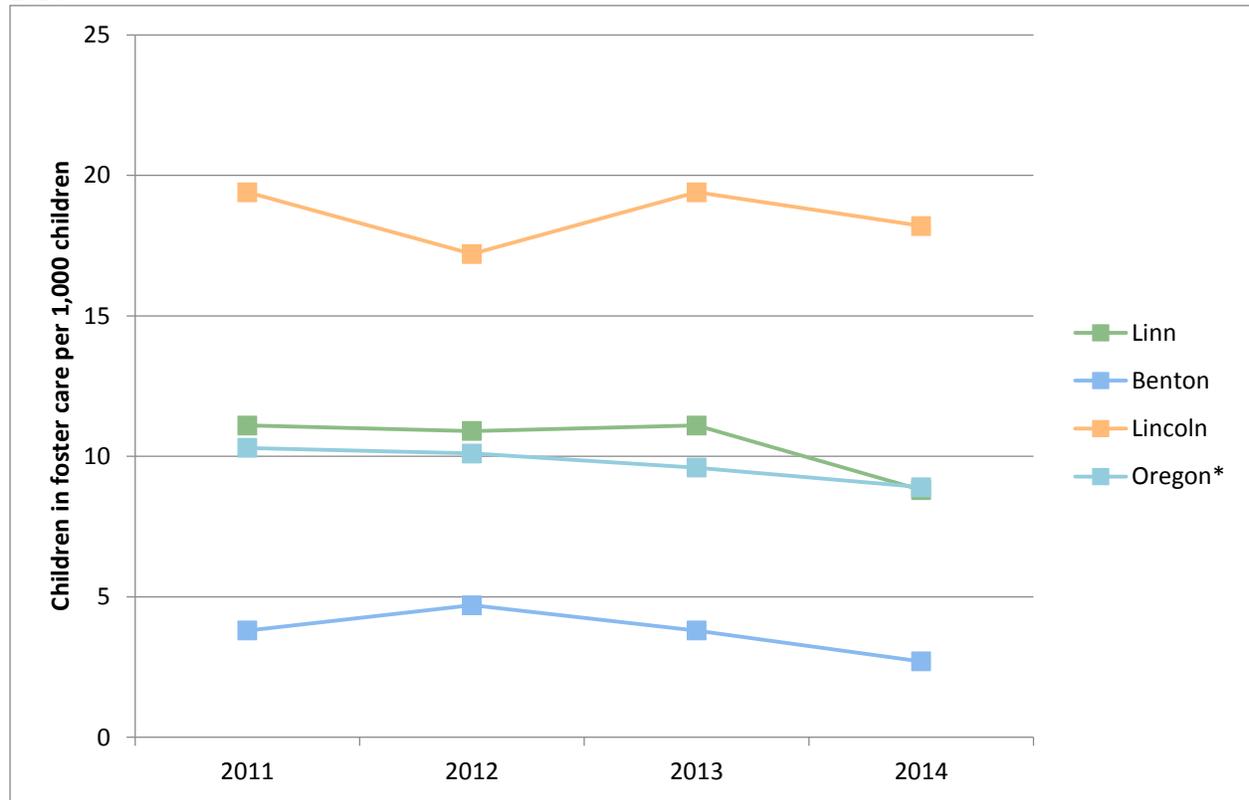
Rates include neglect, physical abuse, and sexual abuse

*2012 data is from the Portland State University Population Research Center. Starting in 2013, the population data is one year behind the year shown and is from Puzanzhera, C., Sladky, A. and Kang, W. (2014). "Easy Access to Juvenile Populations: 1990-2013."

Not all reported cases of child abuse result in a foster care placement. Children are placed in foster care for a variety of reasons. Some are placed in foster care because their families cannot provide them with basic safety and protection, while others have had negative experiences such as parental substance abuse, sexual or physical abuse, and abandonment. In

Oregon, many children are in foster care due to a history of abuse or neglect.³⁸³ Across all three counties, the rates of foster care (Figure 7.12) mirror the rates of child abuse (Figure 7.11).

Figure 7.12: Children in foster care, rate per 1,000 children in Linn, Benton, Lincoln Counties and Oregon, 2011-2014

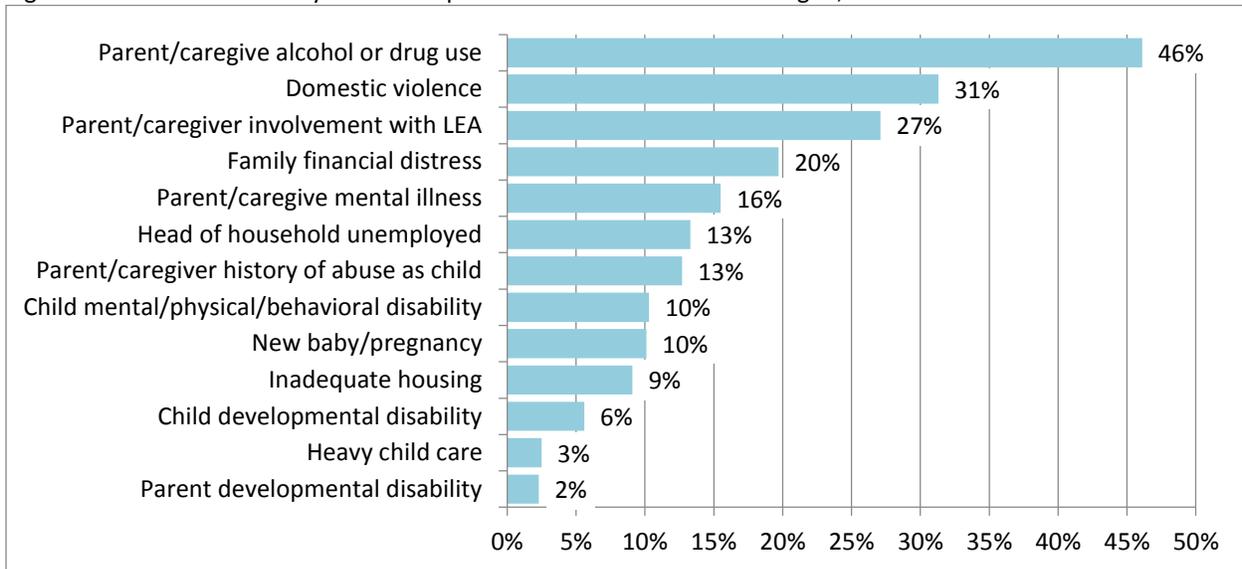


Source: Oregon Department of Human Services: Children, Adults and Families Division (2012). *Child Welfare Data Book*

*State totals do not include Title IV-E eligible children served by tribes.

Family stress is a major underlying factor associated with families of abused and neglected children. Major sources of family stress often include drug and/or alcohol abuse, domestic violence, parental involvement with law enforcement agencies (LEA), and financial distress within the family. Many families also have significant child care responsibilities, and some parents may even have a history of abuse as children. Often, families experience multiple sources of stress. Regional data on sources of family stress are unavailable, but state-level data in Figure 7.13 display sources of family stress as a percent of founded abuse among Oregon families.

Figure 7.13: Sources of family stress as a percent of founded abuse in Oregon, 2014



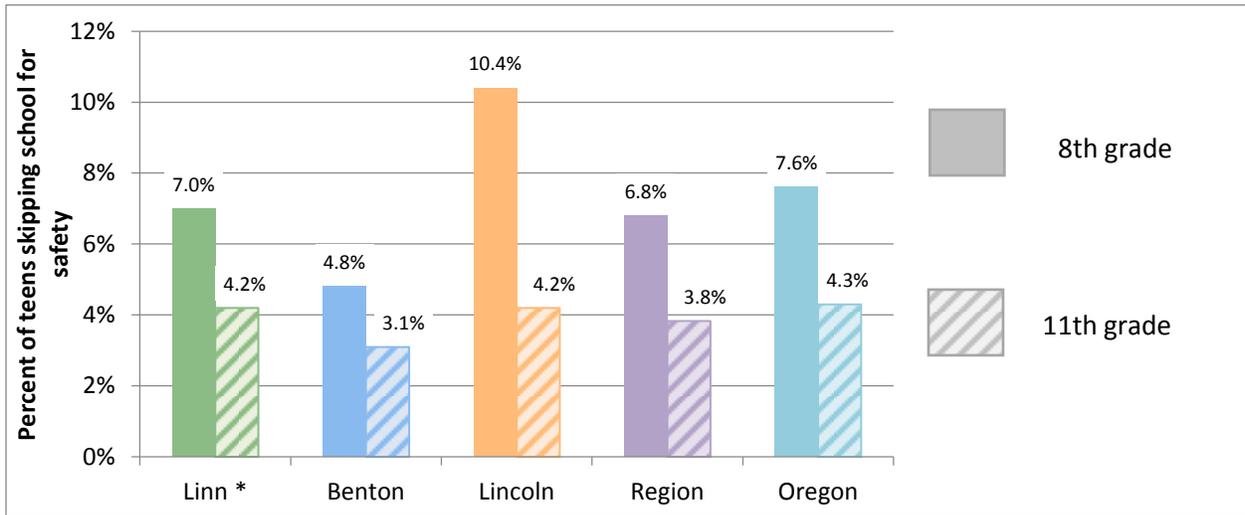
Source: Oregon Department of Human Services: Children, Adults and Families Division, 2014 Child Welfare Data Book, June 2015

Bullying/Peer Abuse

The same factors that influence where people live and the opportunity they have to be healthy (income, employment, education) are also linked to the occurrence of violence. Violence in schools can affect the learning environment and contribute to absenteeism. Students who are bullied, harassed, and feel unsafe or otherwise victimized, are more likely to miss classes, skip school, feel depressed, or exhibit problem behaviors. Research shows that comprehensive discipline, positive behavioral support, and anti-bullying programs in schools can reduce the incidence of harassment among primary and secondary school students.³⁸⁴

Figure 7.14 shows the percent of students in 2015 that did not go to school at least once in the past 30 days due to feeling unsafe at school or on their way to school. While the percentage of students who miss school due to feeling unsafe decreases with age in Oregon, there is no distinct trend among regional youth. Both 6th and 11th graders in the region reported missing fewer days of school than their peers statewide. However, as shown in the Figure 7.14, percentages vary from county to county, particularly among 6th graders.³⁸⁵

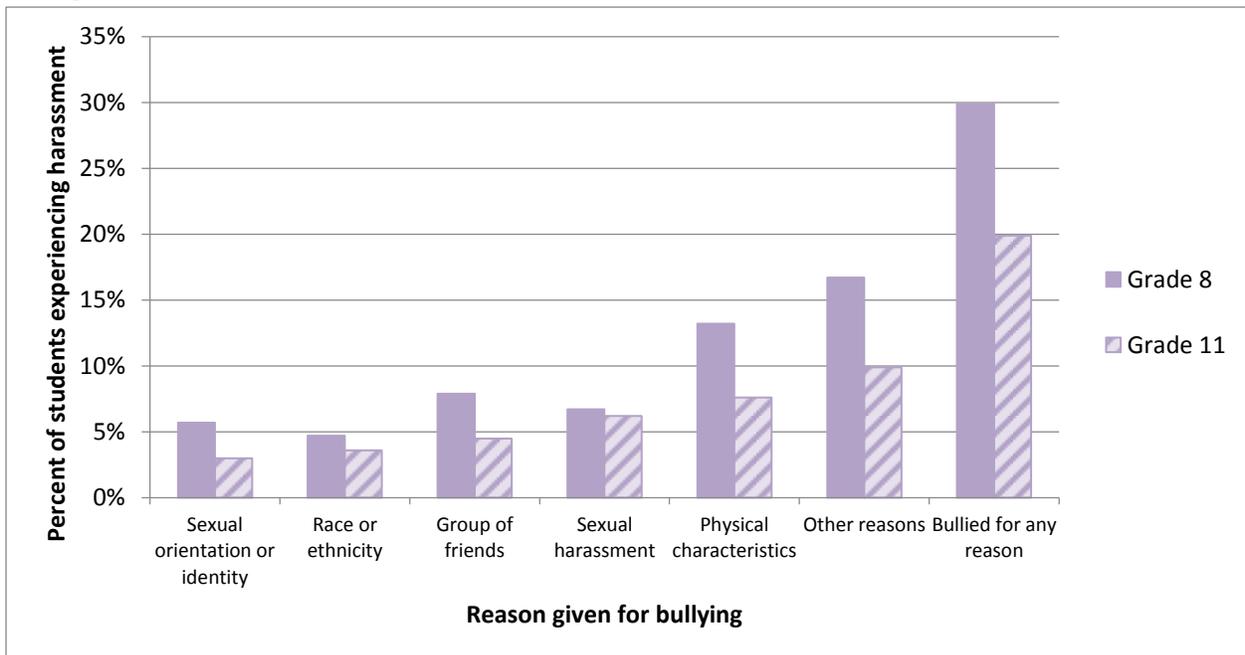
Figure 7.14: Percent of students, 8th and 11th grade, that did not go to school one or more times in the past 30 days due to feeling unsafe at school or on their way to or from school in Linn, Benton, and Lincoln Counties and Oregon, 2015



Source: Oregon Healthy Teens Survey, 2015

Figure 7.15 below shows that reasons for harassment at school differ among age groups at the regional level, and that the overall incidence of harassment among regional students is common. While the percent of students who report having been harassed at school in the past month tends to decrease with age, reasons for and severity of harassment vary among age groups. Aside from all or other reasons, harassment for physical characteristics is the most reported reason for harassment across all age groups.³⁸⁶

Figure 7.15: Percent of students in 8th and 11th grade, who experienced bullying in the past 30 days by reason in the region, 2015



Source: Oregon Healthy Teens Survey, 2015

Psychological Distress

Mental health includes our emotional, psychological, and social well-being, and is essential to the overall health and wellbeing of an individual. The World Health Organization defines it as “a state of well-being in which the individual realizes her or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.”³⁸⁷

Depression, Suicide, and Suicidal Ideation

Depression is the most common type of mental illness and it is estimated that it affects more than 26 percent of the U.S. adult population.³⁸⁸ Depression is characterized by a depressed or sad mood, diminished interest in activities which used to be pleasurable, weight loss or gain, fatigue, psychomotor agitation or retardation, inappropriate guilt, difficulties concentrating, and recurrent thoughts of death.³⁸⁹ Depression has many degrees of severity, including dysthymia (a chronic, persistent mild depression)³⁹⁰ to major depressive disorder (clinical depression).³⁹¹ Depression is also the most common underlying cause of suicide, and many individuals who take their own lives have a diagnosable mental or substance abuse disorder, and most have more than one disorder.³⁹² In Oregon, suicide rates are higher than the national average and about 70 percent of people who died by suicide from 2003 to 2012 also had depression. Among all age groups, the suicide rate in 2013 per 100,000 people was 19, 12, and 14 in Linn, Benton, and Lincoln Counties, respectively.³⁹³

Factors associated with an increased risk of suicide include:

- having a family history of suicide;
- having a family history of child maltreatment;
- having previously attempted suicide;
- having a history of mental disorders, particularly clinical depression;
- having a history of alcohol and substance abuse;
- living in an area where there is a local epidemic of suicide;
- isolation or feeling cut off from other people;
- encountering barriers to accessing mental health treatment;
- encountering loss (relational, social, work, or financial);
- having a physical illness;
- having easy access to lethal methods; and
- an unwillingness to seek help due to the stigma attached to mental health and substance abuse disorders or to suicidal thoughts.³⁹⁴

While protective factors against suicide have not been studied as extensively as risk factors, they are equally important. Factors that have been found to buffer individuals from suicidal thoughts or behavior include:

- Effective clinical care for mental, physical, and substance abuse disorders;

- Easy access to a variety of clinical interventions and support for help seeking;
- Family and community support (connectedness);
- Support from ongoing medical and mental health care relationships; and
- Skills in problem solving, conflict resolution, and nonviolent ways of handling disputes.³⁹⁵

Table 7.5 highlights the percentage of 8th and 11th grade students in the region that exhibited signs of depression, thought about suicide, or attempted suicide during 2015. The rate of attempted suicide is higher among 8th graders in the region than among 11th graders in the region.³⁹⁶

Table 7.5: Percent of 8th and 11th grade students that exhibited signs of depression, thoughts about suicide, or actually attempted suicide during the last 12 months, Linn, Benton, and Lincoln Counties, and Oregon, 2015

	Grade	Linn	Benton	Lincoln	Oregon
Felt so sad or hopeless almost every day for two weeks or more in a row that they stopped doing some usual activities	8th	29 %	26 %	36 %	27 %
	11th	30 %	28 %	28 %	29 %
Seriously considered attempting suicide	8th	18 %	18 %	19 %	16 %
	11th	13 %	14 %	16 %	16 %
Attempted suicide at least once	8th	9 %	7 %	15 %	8 %
	11th	5 %	5 %	5 %	6 %

Source: Oregon Healthy Teens Survey, 2015

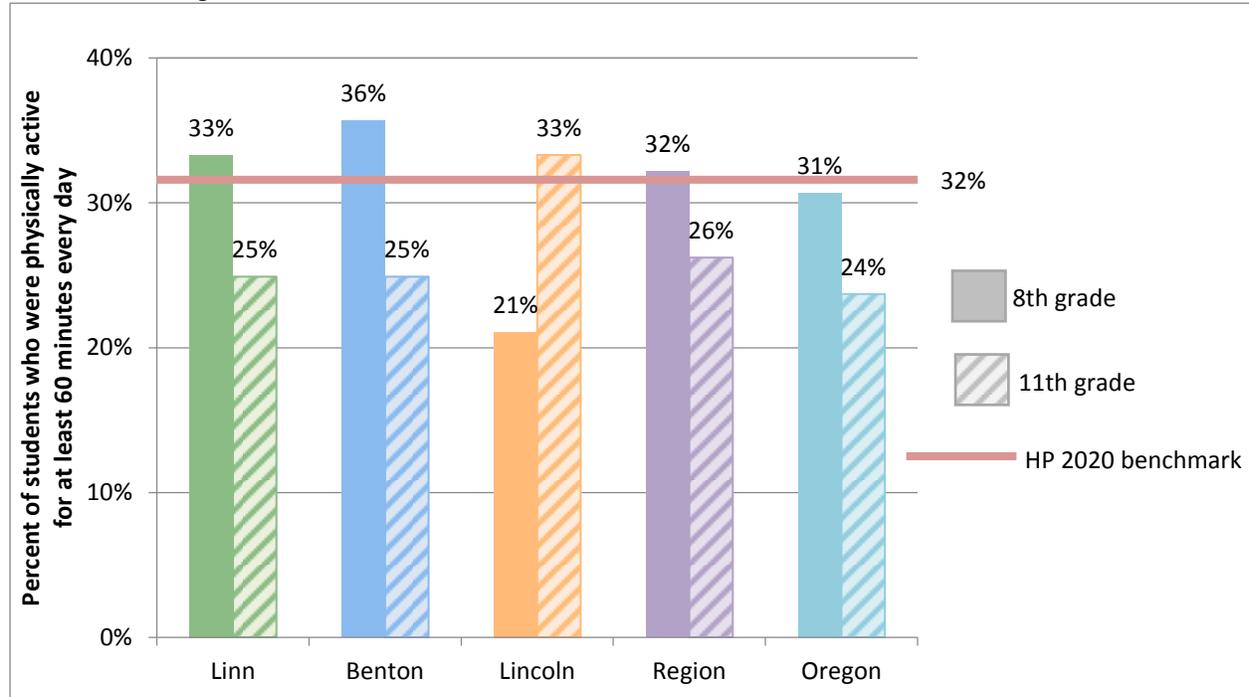
Physical Activity

Regular physical activity helps improve overall health and wellness, reduces risk for obesity, and lessens the likelihood of developing many chronic diseases including diabetes, cancer, and heart disease. National physical activity guidelines recommend that children engage in at least 60 minutes of physical activity each day, including aerobic, muscle strengthening, and bone strengthening activity.

The Healthy People 2020 objective for physical activity aims to increase the proportion of adolescents who meet current national physical activity guidelines to 32 percent.³⁹⁷ As shown in Figure 7.16, 8th graders in Linn and Benton Counties exceeded the Healthy People 2020 objective, while 8th graders in Lincoln County did not. Conversely, 11th graders in Lincoln County exceeded the Healthy People 2020 objective, while 11th graders in Linn and Benton

Counties did not. Overall, a larger percentage of youth in the region self-report exercising for the recommended amount of time compared to Oregon youth.³⁹⁸

Figure 7.16: Percent of youth meeting CDC recommendations for physical activity, by grade, Benton and Lincoln Counties and Oregon, 2015



Source: Oregon Healthy Teens Survey, 2015

Reducing the amount of time youth spend in front of a screen, such as viewing television, videos, or playing video games is a key strategy to promote physical activity. In 2011, the Academy of Pediatrics recommended limiting television and video time to a maximum of two hours per day for children over the age of two and no exposure to television and or videos (i.e., zero hours) for children younger than two years of age.³⁹⁹

Healthy People 2020 supports increasing the proportion of children and adolescents aged two years through 12th grade who view television, videos, or play video games for no more than two hours a day to the following percentages:

- 83.2 percent of children aged two to five years,
- 78.9 percent of children and adolescents aged 6 to 14 years, and
- 73.9 percent of adolescents in 9th through 12th grade.⁴⁰⁰

Although data are unavailable for the aforementioned age groups at the county and regional level, the data shown in the following table (Table 7.6) may serve as an indicator of screen time (television and computers) among the child and adolescent population across the region. Table 7.6 shows that the majority of youth in 8th and 11th grade in the region do not spend more than two hours per school day watching television. Among 8th graders, Benton County youth surpass the state average and Healthy People 2020 target. Among 11th graders, a larger percentage of

youth in all three counties spend less than two hours watching television than Oregon youth overall. All three counties surpass the Healthy People 2020 target for this measure for youth in 11th grade.⁴⁰¹

Table 7.6: Percent of youth who view television for no more than two hours per school day in Linn, Benton, and Lincoln Counties and Oregon, 2015

Grade	Linn County	Benton County	Lincoln County	Region	Oregon
8th Grade	75 %	83 %	73 %	77 %	76 %
11th Grade	77 %	82 %	80 %	79 %	80 %

Source: Oregon Healthy Teens Survey, 2015

Table 7.7 shows that about one-half to two-thirds of 8th and 11th graders in the region spend less than two hours per day on the computer or on their phone. These rates are comparable to the state average, but fall well short of the Healthy People 2020 target of 82.6 percent.⁴⁰²

Table 7.7: Percent of youth who play video/computer games or use a computer for something that is not school work for no more than two hours per school day (including time spent on social networks and on smartphones) in Linn, Benton, and Lincoln Counties and Oregon, 2015

Grade	Linn County	Benton County	Lincoln County	Region	Oregon
8th Grade	54 %	65 %	42 %	56 %	54 %
11th Grade	56 %	63 %	55 %	58 %	58 %

Source: Oregon Healthy Teens Survey, 2015

Nutrition

There is a well-established link between eating a healthy and balanced diet, and an increasing number of health benefits. A healthy and balanced diet involves eating a variety of foods which provide essential nutrients (like dietary fiber and potassium), in the right amount – with negative health consequences from consuming too little or too much food.⁴⁰³ In addition to promoting health and supporting a healthy weight, mounting evidence links a healthy diet to lowered risks of chronic disease, including several types of cancer, osteoporosis, and cardiovascular disease.⁴⁰⁴

The 2010 recommendations released by the U.S. Department of Health & Human Services and the U.S. Department of Agriculture highlights three major guidelines for Americans:

- balance calories with physical activity to manage weight;
- consume more of certain foods and nutrients such as fruits, vegetables, whole grains, fat-free and low-fat dairy products, and seafood; and
- consume fewer foods with sodium (salt), saturated fats, trans-fats, cholesterol, added sugars, and refined grains.⁴⁰⁵

While research continues to show that healthy eating is a key ingredient to good health, the food environment has been changing in dramatic ways, parallel to increases in obesity rates. Portions, prices, and media messaging encourage consumption of foods high in calories, sugars, and fat. These unhealthy foods are all readily available at fast food restaurants, vending machines, and convenience stores. Meanwhile, work, school, and leisure environments are allowing fewer opportunities to burn the extra calories consumed. These changes include cut-backs in physical education classes, office jobs which include hours of sitting, and television and computers representing a large portion of leisure activity.⁴⁰⁶ With so many aspects of daily life supporting improper nutrition, it becomes essential to look at both healthy behaviors and environmental factors to improve the nutrition and health of the entire community.

Proper nutrition among children and adolescents is essential in supporting healthy growth and development, academic performance, and well-being, while also preventing obesity and a number of chronic diseases.⁴⁰⁷ Including education about the importance of nutrition early in life helps children and adolescents to develop healthy habits that often continue into adulthood.

As shown in the table below (Table 7.8), more adolescents in Benton County self-report consuming at least five servings of fruits and vegetables per day when compared with the rest of the region and with Oregon. Overall, regional youth report consuming the recommended servings just as much or more than Oregon youth.⁴⁰⁸

Table 7.8: Percent of youth consuming at least 5 servings of fruits and vegetables per day in the region and Oregon, 2015

Grade	Linn County	Benton County	Lincoln County	Region	Oregon
8th Grade	24 %	29 %	23 %	26 %	23 %
11th Grade	19 %	26 %	22 %	22 %	20 %

Source: Oregon Healthy Teens Survey, 2015

Obesity

Being obese or overweight* is a complicated health condition. The risk of unhealthy weight is influenced by diet, exercise, and other behaviors, but it also depends strongly on genetic and environmental factors. Obesity is also correlated with socio-economic status and other social determinants of health. In addition to being a poor health outcome, obesity and overweight status can increase the risk of many diseases such as diabetes, heart disease, and possible cancer.

* Obesity is defined as having a body mass index (BMI) of 30 or more; Overweight is defined as having a BMI of above 25 and less than 30. Healthy weight is a BMI between 20 and 25.

The Oregon Healthy Teens Survey* found that more than a quarter of all eighth graders in the region are overweight or obese (Table 7.9). Rates vary across the region, with Benton and Linn County youths generally less likely to be overweight than Lincoln County or Oregon youths, with the exception of 11th graders in Linn County. The rate of obesity and being overweight does not change much between 8th and 11th grade.⁴⁰⁹

Table 7.9: Overweight and obesity prevalence in Linn, Benton and Lincoln Counties and Oregon, 2015

	Linn	Benton	Lincoln	Region	Oregon
8th grade overweight	15 %	14 %	20 %	16 %	15 %
8th grade obese	12 %	7 %	19 %	11 %	11 %
11th grade overweight	15 %	9 %	19 %	14 %	15 %
11th grade obese	17 %	7 %	10 %	12 %	13 %

Source: Oregon Healthy Teens Survey, 2015

Oral Health

Another childhood health issue that has ramifications for the rest of a person’s life is adequate dental care. Good oral health is essential to overall physical and mental health and encompasses more than just dental check-ups. Oral disease can lead to cavities and gum ailments, which can in turn contribute to other diseases or conditions. Conversely, certain chronic mental and physical health conditions can also contribute to declines in oral health. Gum disease is associated with endocarditis (an infection of the inner lining of the heart), cardiovascular disease, premature birth, and low birth weight.⁴¹⁰ Osteoporosis can lead to tooth loss, and individuals with diabetes and immune system disorders are more susceptible to gum and bone infections. Poor oral health can also affect self-esteem, reduce employment opportunities, and increase absenteeism.⁴¹¹

Among children in the U.S., dental cavities are the most common childhood disease.⁴¹² Cavities are almost completely preventable through optimal water fluoridation, application of dental sealants to children’s teeth, effective oral hygiene (brushing teeth and flossing), and regular preventive visits to the dentist.⁴¹³ Across the region, the proportion of 8th grade and 11th grade youth who have ever had a cavity is higher than the Healthy People 2020 target of no more than 48.3 percent (Table 7.10). The proportions do not change much in the three years between 8th grade and 11th grade – this indicates that most tooth decay occurs in children before the 8th grade.⁴¹⁴

* The Oregon Healthy Teens Survey distributes a questionnaire to 8th and 11th graders; therefore, adolescent data is richest for these age groups.

Table 7.10: Percent of youth who have ever had a cavity in Linn, Benton, and Lincoln Counties, the region, and Oregon, 2015

Grade	Linn County	Benton County	Lincoln County	Region	Oregon
8 th Grade	73 %	65 %	75 %	71 %	69 %
11 th Grade	73 %	70 %	77 %	73 %	75 %

Source: Oregon Healthy Teens Survey, 2015

Achieving and maintaining good oral health is a significant challenge for many people in the region, particularly those with lower incomes. This challenge may be exacerbated by the fact that not all cities, districts, or water supplies in the region are fluoridated (see Chapter 3 Environment).

One of the objectives of Healthy People 2020 is to increase the proportion of U.S. communities with fluoridated water to 75 percent.⁴¹⁵ Linn and Benton Counties surpass this percentage (at 82 and 96 percent respectively), while Lincoln County currently has a zero percent fluoridation rate.⁴¹⁶ Approximately 27 percent of Oregon residents have access to fluoridation through community water systems, the second lowest percentage in the country.⁴¹⁷

Alcohol, Tobacco, and Prescription and Illicit Drug Abuse

Alcohol and prescription medications are consumed appropriately and responsibly by most of the population. However, problems frequently occur when these substances are over-consumed, used inappropriately, combined with other substances, or consumed while engaging in risky activities such as driving or unsafe sexual activity. The costs to society of the misuse of alcohol, prescription medications, and other drugs are massive, and include injury and death due to overdose; effects on unborn children of drug users; impacts on family, crime and homelessness; spread of infectious disease including through sexual transmission and needle sharing; and financial costs associated with lost productivity, healthcare, and legal expenses for individuals and the wider community.⁴¹⁸

Research has shown that people are most likely to misuse drugs—including tobacco, alcohol, and illegal and prescription drugs—during adolescence and young adulthood. 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.⁴¹⁹

Some of the primary factors related to whether an adolescent tries drugs include the availability of drugs in the home, neighborhood, and community, as well as the home environment. Adolescents who experience violence, emotional or physical abuse, mental illness, or drug use in the home are at increased risk of using drugs. In addition, certain genetic factors and mental health conditions (including depression, anxiety, and poor impulse control)

increase the likelihood that an adolescent will use drugs.⁴²⁰ Table 7.11 depicts adolescent alcohol and drug use in the region.⁴²¹

Table 7.11: Percent of youth who reported taking part in illicit activities in the past 30 days in Linn, Benton, Lincoln Counties, region, and Oregon, 2015

	Grade	Linn	Benton	Lincoln	Region	Oregon
Consumed at least one alcoholic beverage	8th	14 %	7 %	17 %	12 %	12 %
	11th	29 %	30 %	24 %	29 %	30 %
Consumed at least 5 alcoholic beverages within a couple of hours	8th	8 %	3 %	6 %	6 %	5 %
	11th	18 %	15 %	15 %	16 %	17 %
Smoked cigarettes	8th	8 %	1 %	8 %	5 %	4 %
	11th	11 %	7 %	7 %	9 %	9 %
Used e-cigarettes	8th	14 %	5 %	10 %	10 %	9 %
	11th	21 %	12 %	10 %	16 %	17 %
Used marijuana	8th	12 %	4 %	22 %	11 %	9 %
	11th	22 %	21 %	23 %	21 %	19 %
Used prescription drugs without a doctor's orders	8th	7 %	3 %	15 %	7 %	4 %
	11th	8 %	10 %	15 %	10 %	7 %

Source: Oregon Healthy Teens Survey, 2015

Alcohol Use

The younger a person begins drinking regularly, the greater the chance that person will develop a clinically defined alcohol disorder. Youth who start drinking before age 15, compared to those who start at age 21, are far more likely to be injured while under the influence of alcohol, to be in a motor vehicle crash after drinking, or to become involved in a physical fight after drinking.⁴²² Overall, alcohol use among regional youth tends to increase with age, reflecting the state trend displayed in Table 7.11.

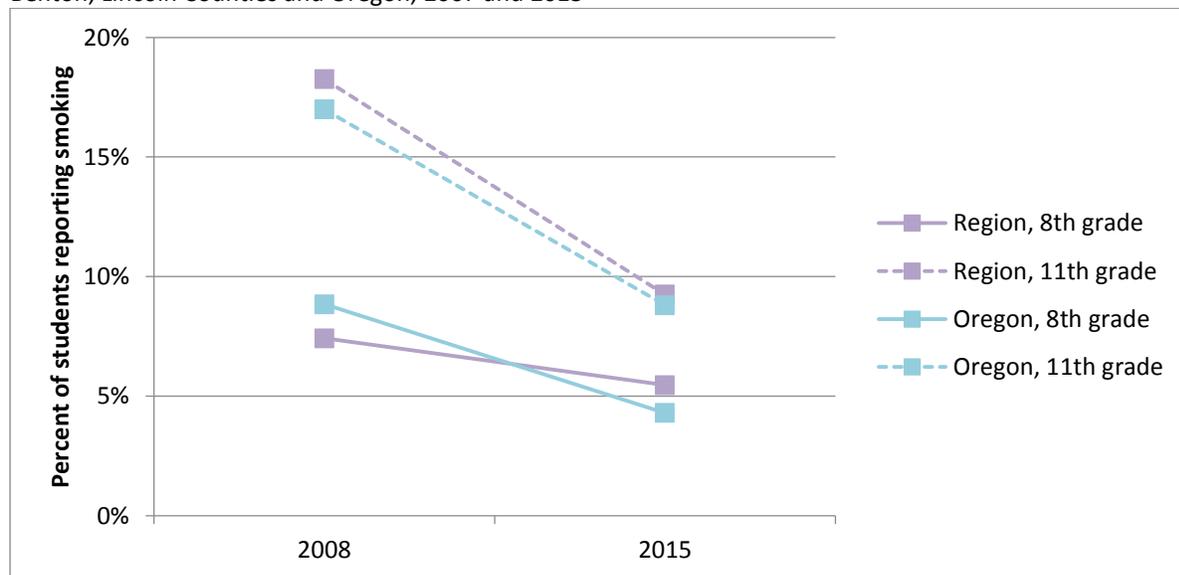
Binge Drinking

Binge drinking, in which a person consumes a significant amount of alcohol in a short period of time, is associated with the same serious health problems as other forms of alcohol abuse. Middle and high school youth in the region and Oregon report binge drinking at similar rates. Approximately 8 percent of Linn County 8th graders, 3 percent of Benton County 8th graders, and 6 percent of Lincoln County 8th graders reported binge drinking in 2015 (Table 7.11). These rates increase to 18 percent, 15 percent, and 15 percent, respectively, among 11th graders.⁴²³ In comparison, the Healthy People 2020 objective is to reduce the percent of 12th graders who binge drink to below 23 percent.⁴²⁴

Tobacco Use Among Adolescents

Tobacco products are designed to deliver nicotine, an addictive drug that changes the way the brain works, causing tobacco users to crave repeated doses. Youth are especially sensitive to nicotine and can become dependent more quickly than adults. Because of their dependency, nearly three out of four teen smokers continue using tobacco products into adulthood.⁴²⁵ Tobacco use is present among regional youth but has been decreasing over time. Figure 7.17 below illustrates this trend, in addition to showing that smoking among youth increases with age.^{426,427}

Figure 7.17: Percent of students that reported having smoked cigarettes at least once in the past 30 Days, Linn, Benton, Lincoln Counties and Oregon, 2007 and 2015



Source: Oregon Healthy Teens Survey, 2007 and 2015

2015 was the first year the Oregon Healthy Teens Survey asked students about electronic cigarette use. Among both 8th and 11th graders, and in all three counties, electronic cigarette use was significantly higher than smoking cigarettes. The regional rate of electronic cigarette

use among 8th graders was twice that of cigarette smoking (10 percent versus 5 percent), as was the regional rate among 11th graders (16 percent versus 9 percent).

Marijuana, Prescription Drug, and Illicit Drug Use

Recreational marijuana is still illegal for all individuals under 21 years of age. The effects of marijuana on children and adults have not been studied to the degree that other legal substances have been, including alcohol and cigarettes. Another major public health concern is the abuse of prescription drugs. When these drugs are misused or taken without a doctor's prescription they can be just as harmful as illegal street drugs. This section focuses on adolescents who choose to abuse prescription drugs as opposed to accidental poisonings. Discussed in this section, illicit drugs include cocaine, methamphetamine, and heroin.

Among youths in the region, marijuana use was generally more than twice as prevalent as cigarette smoking as shown in Table 7.11. Benton County rates were lower than the rest of the region and the state among 8th graders, but marijuana use increased across geographies from 8th grade to 11th grade. In the region, one out of every five 11th graders surveyed reported using marijuana in the past 30 days. Adolescents in the region abuse prescription drugs at rates higher than the state, particularly among 11th graders in Benton County and youth in Lincoln County.⁴²⁸ There are no reliable data on other illicit drug use among adolescents in the region.

Many healthy behaviors that children learn continue to support their health as adults, including good oral hygiene, exercise and nutritious diets, and abstaining from drugs or tobacco. The next section discusses the prevalence of these behaviors among adults in the region.

Adults

As individuals enter adulthood, they become independent in their decision making. With adulthood comes a new set of stressors and risks, such as the potential for partner violence or easier access to alcohol, tobacco, and drugs. At the same time, working adults have more independence and resources to engage in healthy behaviors such as consuming nutritious food and getting adequate exercise.

Many of the topics that were covered in the childhood health section are revisited here, and some additional areas are introduced. Much of the data reported in this section covers adults from age 18 onward, including the elderly. Where possible, data is reported for ages 18-64, and when the age group includes the elderly, this fact is noted.

Domestic Violence

Domestic violence, which includes many forms of abuse, affects children and adults. Physical abuse, sexual abuse or assault, intimidation, verbal abuse and emotional abuse, or threats of such harm are all forms of domestic violence. Domestic violence can include abuse from a

household member (including roommates or caregivers), intimate partners (including dating partners), or a family member (whether or not they live with the victim).⁴²⁹

The Center Against Rape and Domestic Violence (CARDV) is a non-profit organization serving Linn and Benton Counties that provides supportive services to victims of domestic violence, sexual assault, and dating abuse.⁴³⁰ My Sister's Place (MSP)⁴³¹ is a similar non-profit organization that serves residents of Lincoln County. Services include crisis intervention, emergency shelter, 24-hour crisis line, safety planning, advocacy, court information and support, agency and resource referrals, education, peer counseling, and outreach activities.

In 2013, CARDV responded to a total 7,178 calls on its 24-hour crisis line and provided emergency shelter to 125 adults and 91 children for a total of 3,240 bed nights. CARDV also provided legal system support to 594 adults and 11 teens from Benton and Linn Counties.⁴³²

In 2013, MSP responded to a total of 1,230 calls on its 24-hour crisis lines and sheltered 117 people with a total of 3,853 bed nights. MSP also provided court advocacy for a total of 786 Lincoln County residents.⁴³³

Domestic violence not only has an effect on the victim, but can also have an effect on children; domestic violence poses a threat to children's emotional, psychological, and physical well-being. Children who live with domestic violence are also at an increased risk to become direct victims of child abuse.⁴³⁴

Abuse of Vulnerable Adults

Vulnerable adults include the elderly and adults of all ages with physical or mental disabilities, whether living at home or being cared for in a health facility. Abuse and maltreatment of vulnerable adults can include physical, emotional, or sexual abuse, caregiver neglect, and financial exploitation. The information in this section includes adults and seniors.

In 2010, the Oregon Department of Human Services Adult Protective Services received more than 27,000 reports of potential abuse.⁴³⁵ Of those:

- 2,608 Oregon seniors and adults with physical disabilities experienced abuse or self-neglect,
- fewer than two percent of residents in licensed care facilities were found to have been abused,
- neglect is the most common type of abuse experienced by seniors in facilities, and
- 85 percent of founded abuse occurs among seniors and adults with physical disabilities in their own homes and 15 percent occurs in licensed care settings.⁴³⁶

Within the region, there were 38 allegations of abuse against adults with with intellectual and/or developmental disabilities, of which more than twenty were substantiated. There were also 84 allegations of abuse against older adults and people with physical disabilities in care

facilities, 55 of which were substantiated. Outside of facilities, 363 allegations of abuse were reported in the community, with 112 substantiated.⁴³⁷

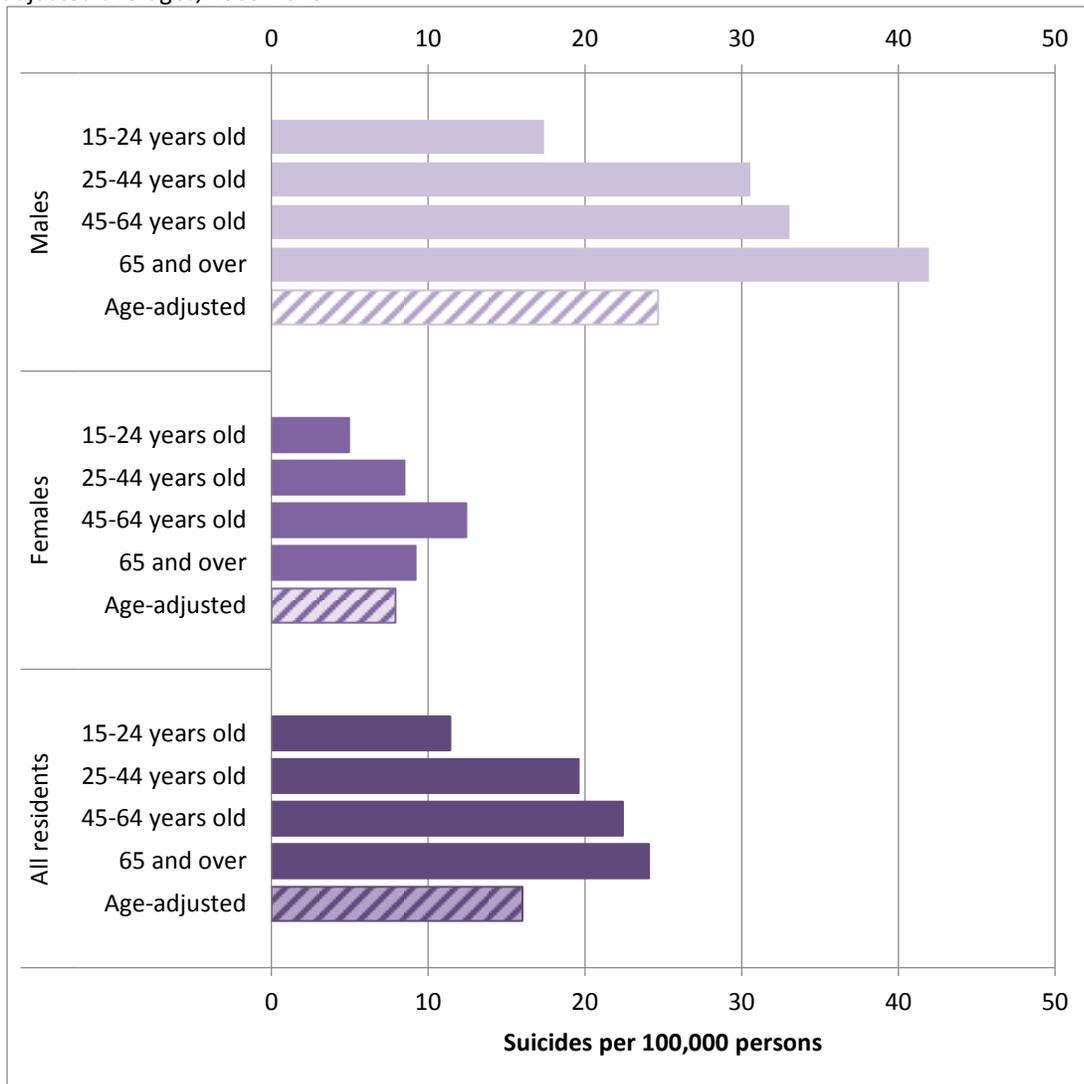
Mental and Emotional Health

Mental and emotional health begins in childhood and extends throughout a person's life. Many mental disorders manifest during the transition from adolescence to adulthood, including depression, schizophrenia, and bipolar disorder.

A major depressive episode (MDE) is defined as a period of at least two weeks when a person experienced a depressed mood or a loss of interest or pleasure in daily activities. In addition to this, four of the seven symptoms reflecting the criteria for major depressive disorder (as described in the 4th edition of the DSM-IV) must have been experienced by the individual.⁴³⁸ From 2008 to 2010, eight percent of Linn, Benton, and Lincoln County adults age 18 years and older reported having had a MDE in the past year.^{439,440} This is comparable to seven percent of Oregon adults aged 18 years and older having reported an MDE in the past year.⁴⁴¹

The most serious consequence of poor mental health is suicide. Overall, the suicide rate among Oregon adult males is 3.7 times the rate among adult females. This is a larger ratio than in the region, where the suicide rate among men is 3.1 times the rate among women.⁴⁴² The total suicide rate increases with age, but this is due primarily to the outsize effect of male suicide rates, which increase with age. Among males of all age groups in the region from 2009 to 2012, males over the age of 65 had the highest suicide rate at 42 per 100,000 men (Figure 7.18). After the age of 70, the rate of suicide among older adult men rises dramatically (up to 72 per 100,000 men for males 85 and older in the state of Oregon).⁴⁴³ Females had a much lower rate of suicide, averaging 8 per 100,000 women, and this rate does not increase with increasing age. The suicide rate among women peaks at 12 per 100,000 women between the ages of 45 and 64.⁴⁴⁴

Figure 7.18: Suicide rates per 100,000 men, per 100,000 women, and per 100,000 individuals, with regional age adjusted averages, 2009-2013

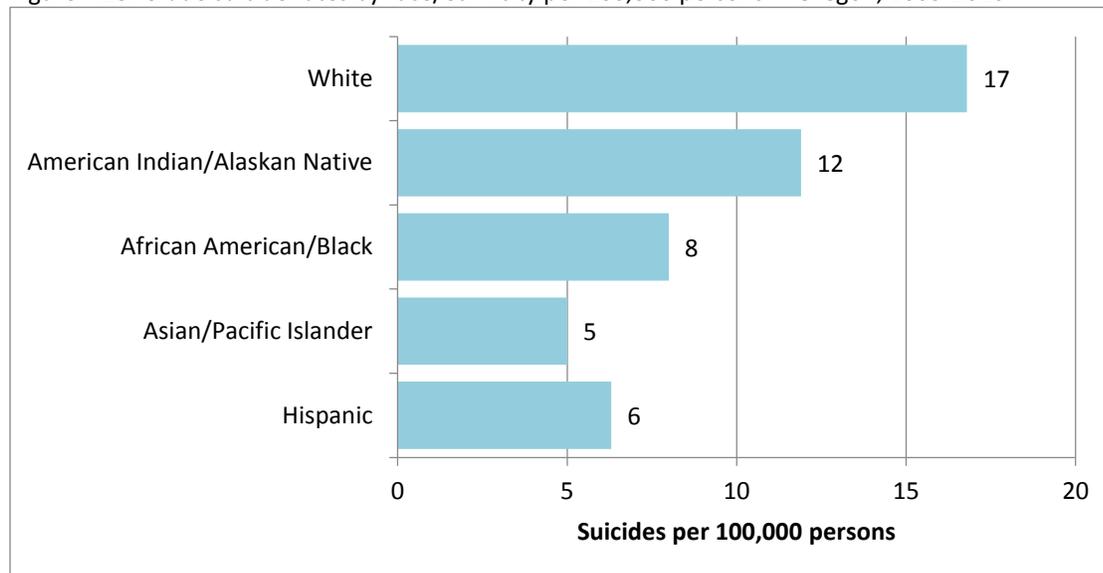


Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2009-2013

Race/Ethnicity

Suicide events among non-white individuals are rare in the region, therefore race/ethnicity data cannot be reported at the regional level for confidentiality and reliability reasons. However, state suicide rates in the following figure may be used to understand trends in suicide deaths by race and ethnicity among all age groups (Figure 7.19).

Figure 7.19: Crude suicide rates by race/ethnicity per 100,000 persons in Oregon, 2003-2010



Source: Oregon Health Authority, *Suicides in Oregon: Trends and Risk Factors, 2012 Report*

Suicide Among Veterans

Veterans are twice as likely as nonveterans to die by suicide. Approximately 23 percent of suicides that occurred in Oregon between 2008 and 2013 were among veterans, but less than 9 percent of Oregonians were veterans during that time. Of those, 97 percent of veteran suicides were male. Overall, male veterans had a much higher suicide rate than non-veteran males (46 per 100,000 male veterans versus 28 per 100,000 male non-veterans).⁴⁴⁵ However, the ratio between female veterans and female non-veterans was even higher (21 per 100,000 female veterans versus 9 per 100,000 female non-veterans). Between 2008 and 2012, 44 veterans in the tri-county region died by suicide.⁴⁴⁶

Physical Activity

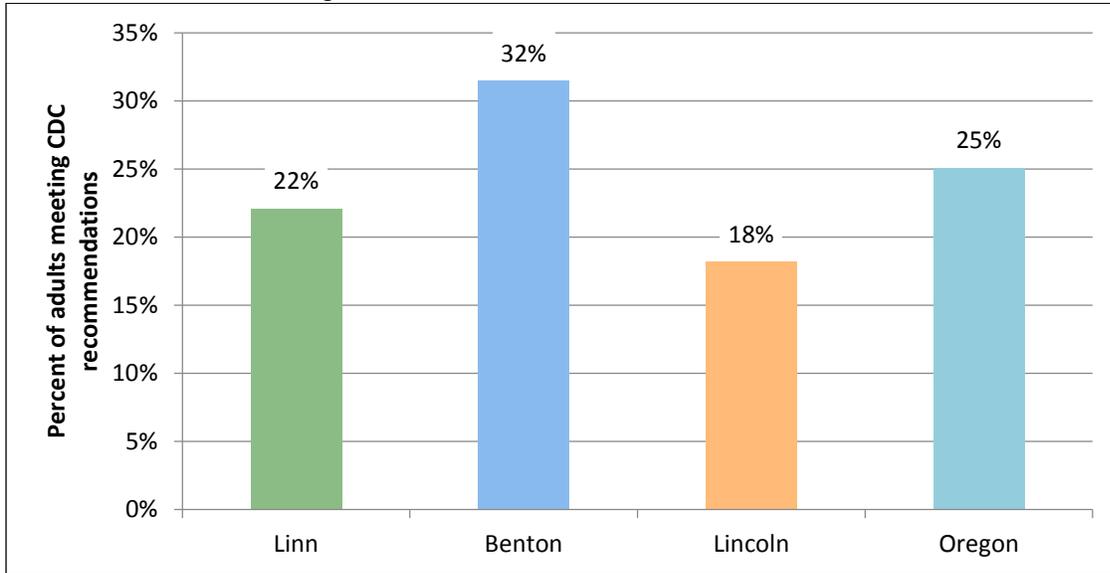
Physical activity is important for maintaining health as a person ages. Children in the region have moderate levels of physical activity, with the counties close to the CDC recommended guidelines of 60 minutes per day. Recommendations for adults include at least an hour and fifteen minutes of vigorous-intensity activity or two-and-a-half hours of moderate-intensity activity every week, in addition to muscle-strengthening activities on two or more days a week.⁴⁴⁷

Overall, 22 percent of adults in Linn County, 32 percent of adults in Benton County, and 18 percent of adults in Lincoln County met the CDC guidelines for physical activity* from 2010-2013, compared to 25 percent of adults in Oregon (Figure 7.20).⁴⁴⁸ There is still a significant amount of room for improvement for each county and for the state, as none of the

* The CDC recommends 30 minutes of moderate physical activity on five or more days per week.

geographical regions meet the Healthy People 2020 objective of having 48 percent of the population meeting the CDC guidelines for physical activity.⁴⁴⁹

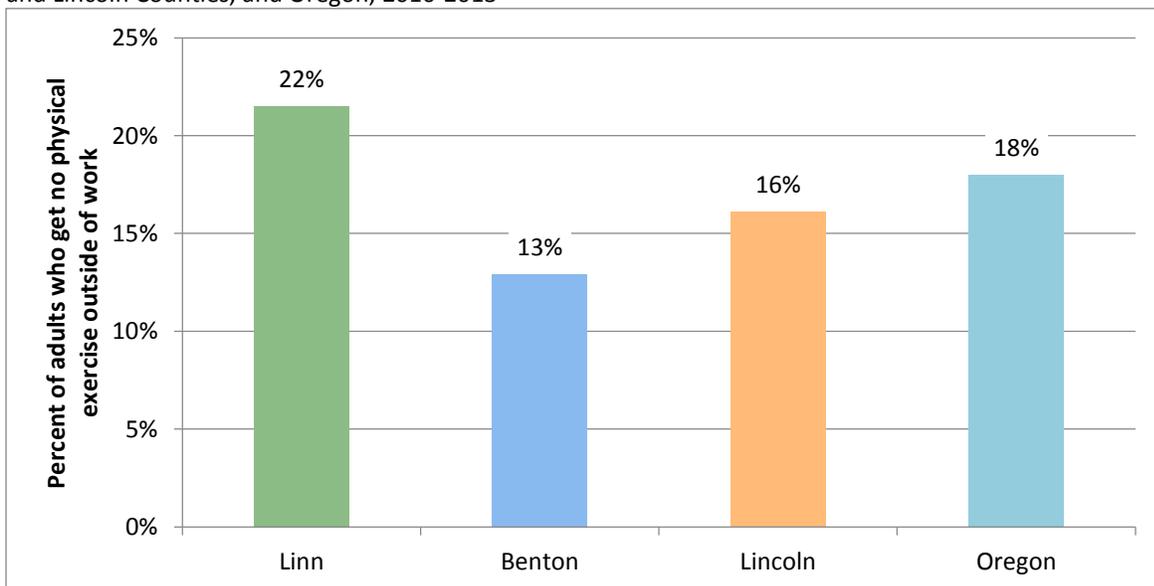
Figure 7.20: Age-adjusted percent of adults who meet CDC recommendations for physical activity in Linn, Benton, and Lincoln Counties and Oregon, 2010-2013



Source: Oregon Health Authority, Health risk and protective factors among Oregon adults, by county, 2010-2013

Of greater concern is the proportion of the population that gets little to no exercise. Within the region, the percent of adults who report no physical activity outside of work ranges from 13 percent in Benton County to 22 percent in Linn County, compared to the Oregon average of 18 percent (Figure 7.21).⁴⁵⁰

Figure 7.21: Percent of adults who report no physical activity outside of work within past month in Linn, Benton, and Lincoln Counties, and Oregon, 2010-2013

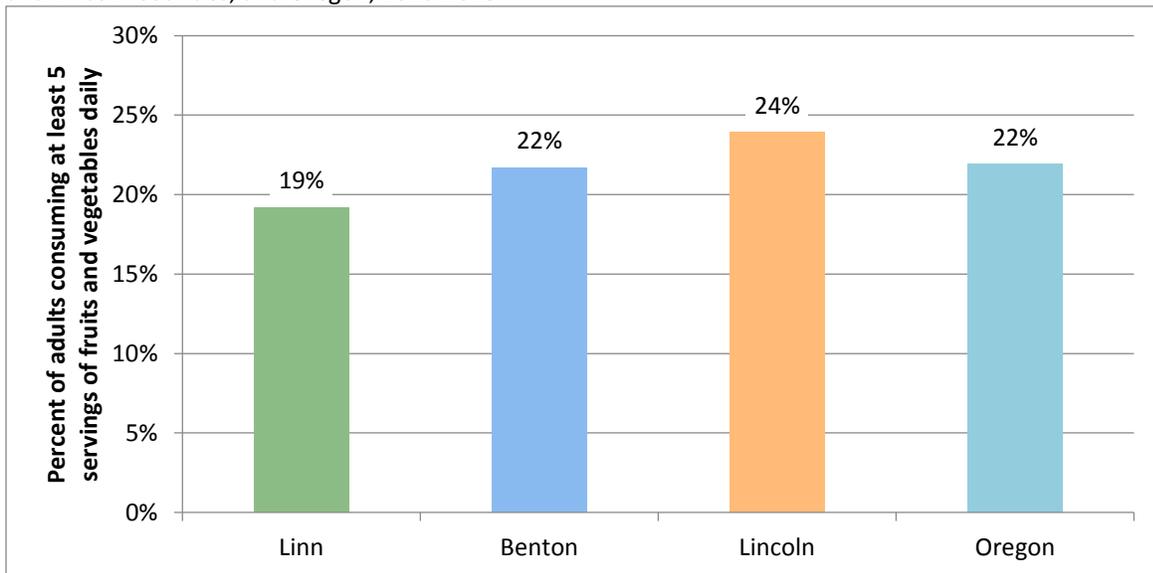


Source: Oregon Health Authority, Health risk and protective factors among Oregon adults, by county, 2010-2013

At the state level, participation in physical activity varies by race/ethnicity, household income, and by level of education. Adults with less than a high school education, those earning less than \$24,999, and Latinos are less likely to meet CDC physical activity recommendations than their peers.⁴⁵¹ As with children and youth, regional-level data that describe physical activity levels among adults by race/ethnicity or level of household income are not available.

Nutrition and eating habits are frequently set early in life. Good nutrition can delay the physical signs of aging and prevent or slow the development of many chronic diseases, including diabetes and cancer. Approximately one in five adults in the region and in Oregon consumes at least five servings of fruits and vegetables per day (Figure 7.22).⁴⁵² This is similar to the percentage of children in the region. Additional assessments of fruit and vegetable intake by race/ethnicity, age group, and income levels are needed for future planning and outreach among adults in the region.

Figure 7.22: Percent of adults who consumed at least 5 servings of fruits and vegetables per day in Linn, Benton, and Lincoln Counties, and Oregon, 2010-2013.



Source: Oregon Health Authority, *Health risk and protective factors among Oregon adults, by county, 2010-2013*

Obesity

As discussed in the childhood obesity section of this chapter, obesity is a complicated health issue, with many factors that affect the likelihood of obesity, and many downstream health issues that are influenced by body weight.

About 25 percent of children in the region are overweight or obese, while the prevalence of overweight or obesity among adults more than doubles. An estimated 26 percent of adults in the region are obese; an additional 36 percent are overweight (Table 7.12).⁴⁵³ Therefore, about 62 percent of regional adults are either overweight or obese. Since 1990, Oregon's adult

obesity rate has increased 121 percent. Obesity contributes to the death of about 1,400 Oregonians each year, making it second only to tobacco as a preventable cause of death.⁴⁵⁴

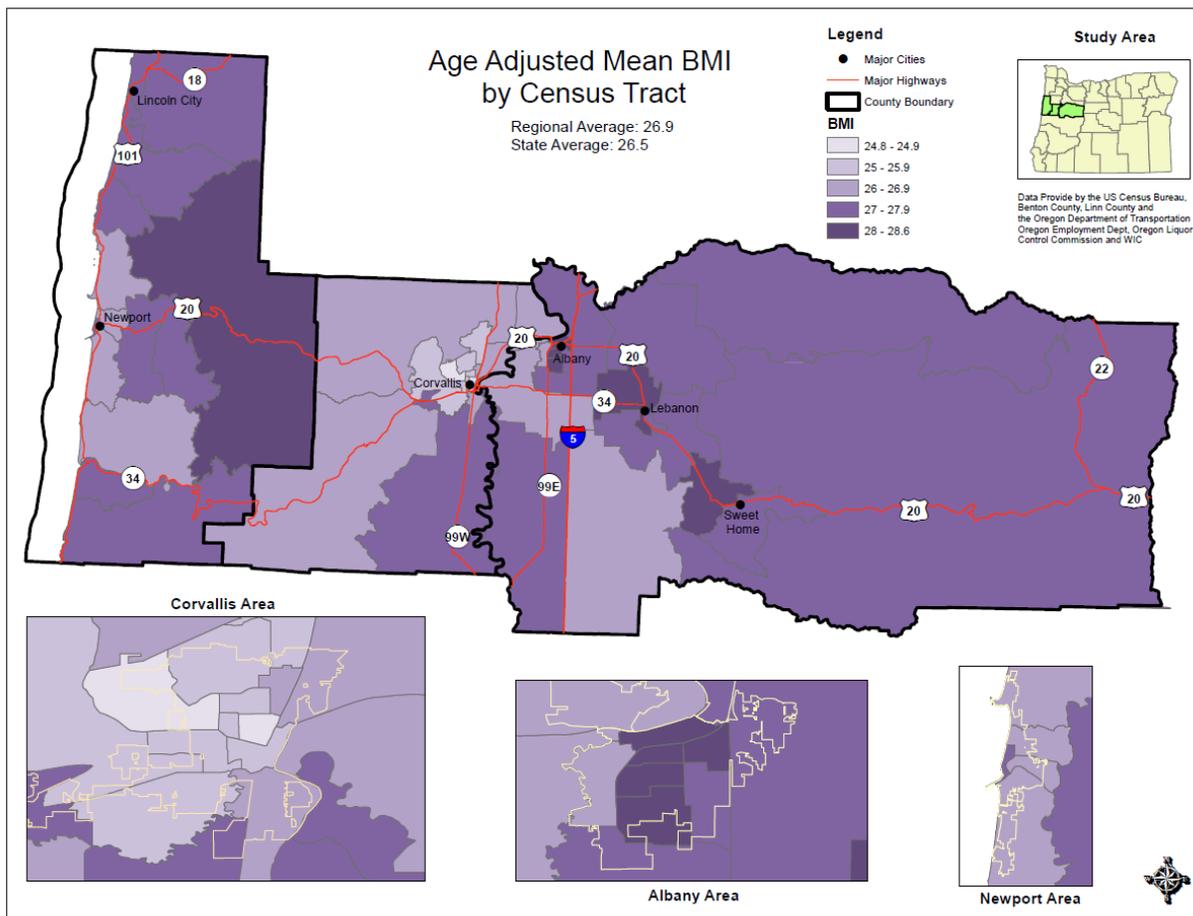
Table 7.12: Prevalence of overweight and obesity among adults in the region and Oregon, 2013

	Region	Oregon
Overweight	35.7%	35.5%
Obese	26.1%	24.8%

Source: Oregon State Health Profile, 2013

A person’s body mass index (BMI) is commonly used to assess weight. The average body mass of residents in the region differs across and within counties. Map 7.1 below highlights this variation between census tracts in the region.

Map 7.1: Age-adjusted average (mean) BMI in Linn, Benton, and Lincoln Counties, 2012



Source: Oregon Environmental Public Health Tracking Tool, 2012

The regional average BMI of 26.9 is considered overweight. This is similar to the state average of 26.5. In Lincoln and Benton Counties, the average BMI is generally higher in rural areas than

in urban areas, with two census tracts in Benton County having the lowest average BMI in the region. These are also the only tracts where the average BMI is in the healthy weight range. In contrast to Lincoln and Benton Counties, urban areas in Linn County tend to have higher average BMIs than rural areas.

Alcohol, Tobacco, and Drug use

Data shows that younger adults (particularly in their 20's) are at a higher risk for misuse of alcohol and other drugs. One particular area for concern is the misuse of prescription drugs. Misuse of these drugs is highest among young adults (aged 18 to 25).⁴⁵⁵ As the most commonly abused type of prescription drugs, painkillers provide a useful marker for prescription drug misuse trends. While data shows little change in the self-reported pain experienced by Americans, the amount of painkillers dispensed in the U.S. has quadrupled since 1999, as have the deaths resulting from prescription painkillers. While this epidemic represents an enormous burden to society, 2012 saw a national drop in both prescribing rates and prescription overdose deaths. This is the first decrease since the 1990's, offering promise for further progress in reversing the epidemic.⁴⁵⁶ Oregon (along with the majority of states) has implemented a Prescription Drug Monitoring Program (PDMP) in an attempt to track and improve prescribing practices around certain types of controlled substances, including painkillers.⁴⁵⁷

Of particular concern are the rates of misuse of prescription painkillers among Medicaid patients. Research shows higher rates of inappropriate provider prescribing practices and patient use as compared to privately insured patients. Potential inappropriate prescribing practices include overlapping prescriptions for painkillers, high daily doses, or long-acting painkillers, and have been shown in at least one study to be present in particularly high rates amongst Medicaid enrollees.⁴⁵⁸

Alcohol Use

Excessive drinking is a risk factor for many adverse health outcomes, such as hypertension, alcohol poisoning, unintended pregnancy, fetal alcohol syndrome, inter-personal violence, and motor vehicle crashes.⁴⁵⁹ It can also contribute to a number of health issues including heart disease and stroke, high blood pressure, cirrhosis, coma, and even death.⁴⁶⁰ The following data includes adults ages 18 and older.

Excessive drinking is defined differently for men and women, due to different metabolic rates and average body weights. Among men, excessive drinking is defined as two or more alcoholic drinks per day for a period of 30 days. In Linn County, five percent of men reported excessive drinking, compared to 14 percent in Lincoln County (Table 7.13). Benton County data is suppressed due to unreliability.

For women, excessive drinking is defined as one or more alcoholic drinks per day for a period of 30 days. In general, excessive drinking among women is lower in the region than among men,

especially in Lincoln County, where only six percent of women reported excessive drinking, compared to 14 percent of men (Table 7.13).

Table 7.13: Alcohol abuse among adults, 18 years and older in Linn, Benton, and Lincoln Counties, and Oregon, 2010-2013

	Gender	Linn	Benton	Lincoln	Oregon
Consumed at least two alcoholic beverages per day for the past 30 days	Male	5 %	**	14 %	6 %
Consumed at least one alcoholic beverage per day for the past 30 days	Female	4 %	6 %	6 %	7 %
Consumed at least 5 (male) or 4 (female) alcoholic beverages within a couple of hours in the past 30 days		22 %	17 %	16 %	18 %

Source: Oregon BRFSS 2010-2013

** Benton County data is suppressed due to statistical unreliability

Binge Drinking Among Adults

For adults over the age of 18, binge drinking is defined as consuming five or more drinks at one time for men and four or more drinks at one time for women.⁴⁶¹ Binge drinking is more common across the region and in the state than drinking every day. Binge drinking among adults in the region varies by county of residence. Twenty-two percent of Linn County adults, 17 percent of Benton County adults, and 16 percent of Lincoln County adults reported binge drinking within the past month in 2013 (Table 7.13).⁴⁶² All counties meet and surpass the Healthy People 2020 objective of reducing the percent of adults that reported having engaged in binge drinking within the past month to 24.4 percent.⁴⁶³

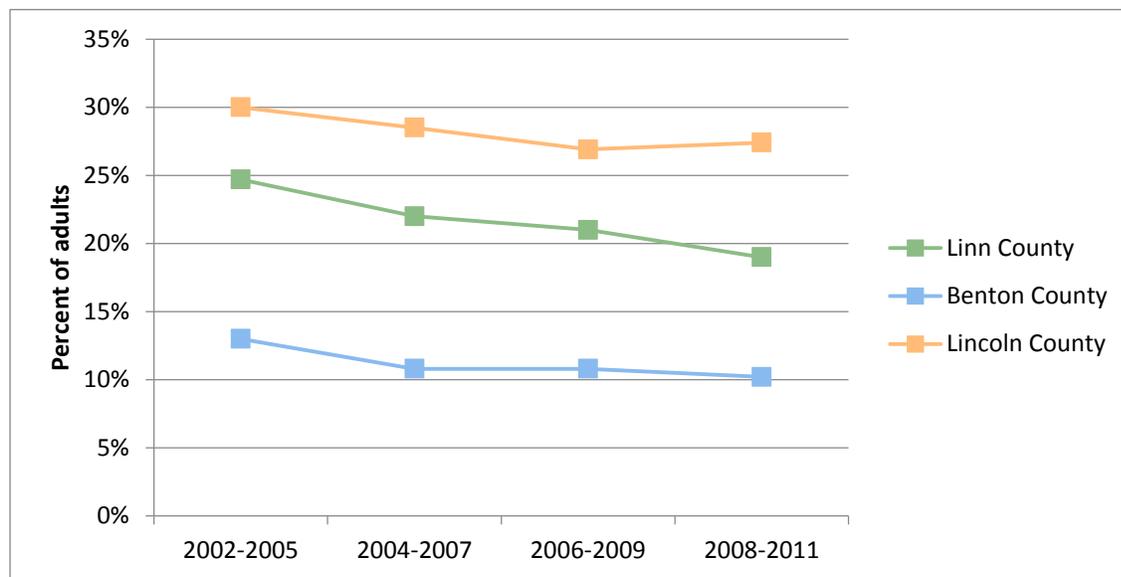
Tobacco Use and Exposure to Secondhand Smoke

Tobacco use is the single most preventable cause of disease, disability, and death in the United States. Tobacco use in any form can cause serious diseases and health problems, including cancers of the lung, bladder, kidney, pancreas, mouth, and throat; heart disease and stroke; lung diseases (i.e., emphysema, bronchitis, and chronic obstructive pulmonary disease); pregnancy complications; gum disease; and vision problems.⁴⁶⁴

Poor health behaviors have serious consequences. In particular, smoking patterns are predictive of increased rates of future disease and early death. Smokers die, on average, 10 years earlier than nonsmokers.⁴⁶⁵ Health impacts are more severe among those with lower socio-economic status as well. In the United States, low-income smokers are more likely to become ill and die sooner from tobacco-related diseases than smokers who have a higher income.⁴⁶⁶

Overall, the smoking rate among adults has been slowly decreasing in the region (Figure 7.23). Both Linn and Lincoln Counties have smoking rates that remained consistently above the state smoking rate, while Benton County has consistently maintained a smoking rate lower than that of the state.⁴⁶⁷ The current Healthy People 2020 objective is to reduce the percent of adults who currently smoke to 12 percent or below.⁴⁶⁸

Figure 7.23: Age-adjusted percent of adults who currently smoke cigarettes in Linn, Benton, and Lincoln Counties, 2002-2011



Source: Oregon BRFSS, Table II: Prevalence of Modifiable Risk Factors among Adults, 2002-2011

More recent data has been collected that includes up to 2013, but should not be compared to the data in Figure 7.23 above due to changes in survey methodology. The 2010-2013 data is presented in Table 7.14 below, and is likely more accurate due to a more representative survey sample. These data indicate that none of the counties are currently meeting the Healthy People 2020 smoking target of 12 percent or below.

Table 7.14: Age-adjusted percent of adults who currently smoke cigarettes in Linn, Benton, and Lincoln Counties and Oregon, 2010-2013

	Linn	Benton	Lincoln	Oregon
Smoking rates	21 %	14 %	33 %	19 %

Source: Oregon BRFSS, Table II: Prevalence of Modifiable Risk Factors among Adults, 2010-2013

Tobacco's toll on the health and economy of the region each year is significant. For example, in 2014:

- 37,300 adults regularly smoked cigarettes,
- 10,623 people suffered from a serious illness caused by tobacco use,
- 544 people died from tobacco use,

- \$108.3 million were spent on medical care for tobacco-related illnesses, and
- \$86.8 million in productivity were lost due to tobacco-related deaths.^{469,470,471}

Secondhand Smoke Exposure

Secondhand smoke is a mixture of the smoke exhaled by a person smoking, and the smoke from burning tobacco in a cigarette, pipe, or cigar. Secondhand smoke contains the same toxic chemicals and carcinogens as inhaled tobacco smoke, and even brief exposure has been found to put a nonsmoker’s health at risk. In adults, secondhand smoke exposure has been found to cause lung cancer and heart disease. Children exposed to secondhand smoke are more at risk for ear infections, asthma attacks, respiratory symptoms and infections, and at greater risk for sudden infant death syndrome (SIDS).⁴⁷² Measures to reduce the amount of secondhand smoke exposure to others include, but are not limited to, quitting smoking, forbidding smoking in the home, and forbidding smoking in a shared car. Table 7.15 illustrates that the majority of households in the region have rules against smoking in the home, while a smaller majority hold the same rules against smoking in family cars.

Table 7.15: Family tobacco/secondhand smoke practices (age-adjusted) in Linn, Benton, Lincoln Counties and Oregon, 2008-2011

	Linn County	Benton County	Lincoln County	Oregon
Have rules against smoking in the home	93 %	94 %	91 %	91 %
Have rules against smoking in family cars	85 %	86 %	70 %	82 %

Source: Oregon Health Authority, Table IV: Age-adjusted and unadjusted prevalence of tobacco use among adults, 2008-2011

Drug Use Among Adults

At the time the data used in this report was collected, recreational marijuana was illegal for all ages. Its inclusion in this section reflects the fact that marijuana could not be legally purchased or grown for recreational use and marijuana use was subject to at least some of the stigma that other illegal drugs faced. While marijuana use is now legal for individuals 21 years and older, the effects of marijuana on children and adults have not been studied to the degree that other legal substances have been, including alcohol and cigarettes. Another major public health concern is the abuse of prescription drugs. When these drugs are misused or taken without a doctor’s prescription they can be just as harmful as illegal street drugs. In this section, illicit drugs include cocaine, methamphetamine, and heroin.

Regional data is not available for marijuana use among adults. At the state level, marijuana use peaks among individuals ages 18-25, with 23 percent of respondents in this age group reporting the use of marijuana in the past 30 days (Table 7.16). Marijuana use among adults, over the

age of 25, drops to seven percent. This trend holds among adults who abuse prescription or illicit drugs. Fifteen percent of adults age 18 to 25 report using prescription drugs and ten percent report using illicit drugs. These rates drop to five and four percent, respectively, among adults over the age of 25.⁴⁷³

Table 7.16: Percent of residents who use the following controlled substances in Oregon, 2008-2010

	Age group	Oregon
Marijuana	12 to 17	9%
	18 to 25	23%
	26 or older	7%
Prescription drugs (without a doctor's orders)	12 to 17	9%
	18 to 25	15%
	26 or older	5%
Illicit drugs	12 to 17	6%
	18 to 25	10%
	26 or older	4%

Source: Oregon Health Authority, *Health risk and protective factors among Oregon adults, by county, 2010-2013*

As discussed at the beginning of this section, much of the behavior data presented above is for adults age 18 and older. This includes data on elderly adults. The next section highlights some areas of particular concern for older adults.

Older Adult Health

As people age, many of the behaviors they have adopted over their lives begin to pay dividends, whether it is exercising regularly, eating healthy food, or avoiding drugs and tobacco. Older adults also encounter a different set of challenges for staying healthy. This section revisits some of the ongoing behaviors and also highlights new factors that affect health.

Abuse Against Older Adults

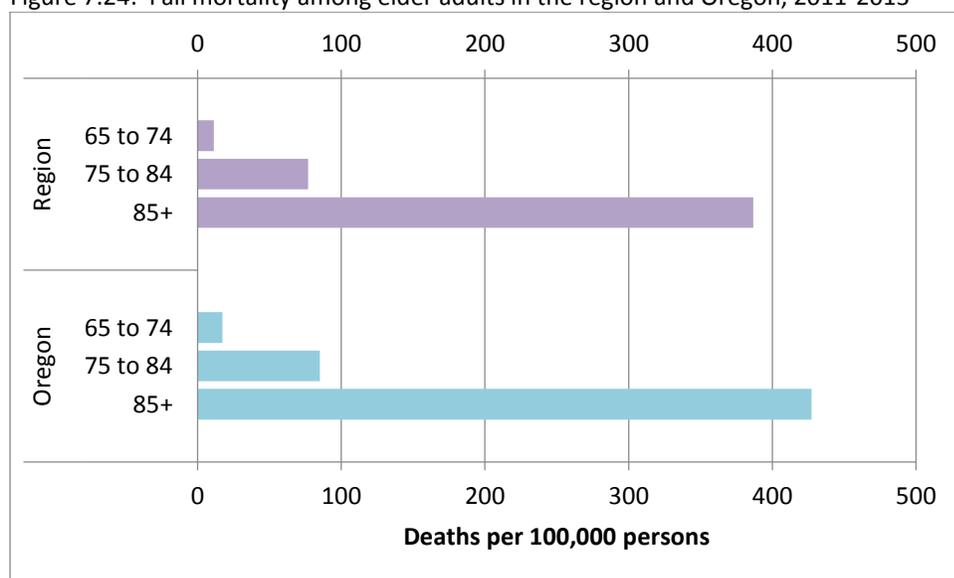
The elderly are among the most vulnerable populations for abuse because they must rely more on the support systems around them, such as in-home or residential care, nursing homes, or family members. Additionally, with increased age comes a greater likelihood of mental decline, which can make it more challenging to protect oneself from abuse. Specific data on abuse among older adults is combined with abuse against other vulnerable adults, and was presented in that section.

Preventing Falls

Falls are a major cause of injury and hospitalization, and the 10th leading cause of death among older Oregonians.⁴⁷⁴ Nearly one in three older adults experiences a fall each year, and 20-30 percent of those who fall suffer injuries. As commonly as they occur, injuries and deaths due to falls are not an inevitable consequence of aging; they can be prevented. Muscle weakness is a significant contributing factor in falls, so physical activity is widely viewed as among the most important interventions for preventing injuries related to falls among older adults.

Hospitalization rates for falls increase drastically as adults age; the rate of hospitalizations due to a fall for adults 75 years and older is more than six times the rate for adults 60-74 years. Older adults hospitalized for falls are nearly six times more likely to be discharged into long term care compared to older adults hospitalized for other conditions. In 2013, the cost for fall injury hospitalization among adults 65 years and older in Oregon totaled to more than \$219 million.⁴⁷⁵ Between 2011 and 2013, the mortality rate from falls in the region was 79 deaths per 100,000 residents age 65 and older. Figure 7.24, below, highlights the difference in mortality rates for different age groups among the elderly in the region and Oregon.

Figure 7.24: Fall mortality among elder adults in the region and Oregon, 2011-2013



Source: Oregon Health Authority, Oregon Public Health Assessment Tool, 2011-2013

Depression and Suicide

Specific regional data on emotional health among older adults is not currently available, but the elderly are at increased risk for depression. Older adults are also often misdiagnosed and undertreated. Estimates of major depression in older adults range from less than five percent among elderly who remain in their communities to over eleven percent in elderly who require in home or institutional care.⁴⁷⁶

Regional suicide rates are also higher among older adults, with 24 suicides per 100,000 adults age 65 and older between 2009 and 2013. This rate is 50 percent higher than the age adjusted rate for all regional residents. This increased rate conceals the difference between older men and women, however. The suicide rate among older men was 68 percent higher than among all men. The suicide rate among older women was 12 percent higher than among all women, and was lower than the suicide rate among women age 45-64. See Figure 7.18 in the Adults Mental and Emotional Health section for a visual representation of these data.

Physical Activity, Nutrition, and Weight Status

Recent data are not available at the county or regional level for physical activity among older adults. The CDC recommends that adults 65 years of age or older get two hours and 30 minutes of moderate-intensity exercise (e.g. brisk walking) each week and engage in muscle-strengthening activities at least two days a week.⁴⁷⁷ Statewide, older adults have only a small decrease in physical activity compared to younger adults, but there are differences between men and women. Men improve at meeting physical activity recommendations as they age, while women do not display a similar improvement. Table 7.17 below displays physical activity at the state level among older adults.

Nutrition among older adults plays an important role in immune function, as well as cognitive changes that take place as part of the aging process. Older adults can also be at increased risk for poor nutrition and dehydration, as taste sensitivity and thirst mechanisms often decline with age. Good nutrition has been shown to decrease inflammatory responses and improve immune function, as well as slow some types of cognitive (brain function) decline associated with aging.⁴⁷⁸ Data at the county- and regional-level are not available for older adults on consumption of fruits and vegetables and is a possible area for future surveillance, but statewide data is shown in Table 7.17.

Table 7.17: Adequate physical activity and nutrition among older adults in Oregon, 2013

		45 to 54	55 to 64	65 and older
Adequate physical activity	Men	58 %	65 %	71 %
	Women	63 %	66 %	64 %
5 fruits and vegetable servings	Men	14 %	16 %	13 %
	Women	29 %	28 %	25 %

Source: Oregon Health Authority, Oregon BRFSS, 2013

Statewide obesity and overweight rates are similar among the elderly population and among adults between 45 and 64 years of age (approximately 63 percent).⁴⁷⁹ Specific data is not available at the regional level.

Alcohol, Tobacco, and Drug Use

There are no regional data available on older adult alcohol, tobacco, or drug use. State data indicates that older adults are much less likely to engage in excessive or binge drinking. Table 7.18 compares rates among elderly adults to adults age 45 to 64.

Table 7.18: Excessive drinking and binge drinking among older adults in Oregon, 2013

		45 to 54	55 to 64	65 and older
Excessive drinking	Men	8 %	9 %	4 %
	Women	12 %	8 %	7 %
Binge drinking	Men	19 %	15 %	8 %
	Women	12 %	7 %	3 %

Source: Oregon Health Authority, Oregon BRFSS, 2013

Statewide, far fewer older adults are current smokers than are adults between the ages of 45 and 64. Consequently, there is a greater proportion of former smokers among the elderly than among younger adults. Table 7.19 displays these data.

Table 7.19: Current and former smoking status in Oregon, 2013

		45 to 54	55 to 64	65 and older
Current smoker	Men	23 %	17 %	7 %
	Women	21 %	15 %	9 %
Former smoker	Men	26 %	35 %	55 %
	Women	21 %	29 %	38 %

Source: Oregon Health Authority, Oregon BRFSS, 2013

There are no data on marijuana or illicit drug use among the elderly. Table 7.16, discussed earlier, indicates that marijuana and illicit drug use peaks among ages 18 to 25 and decreases for adults age 26 and older. Following similar trends in alcohol and smoking, it is likely that marijuana and illicit drug use continues to decline among older adults.

Conclusion

The life course framework helps us recognize two key components of community health: the health issues which are most important at particular stages of life and when they are best addressed. At the same time, we are able to identify particular disparities that are present throughout the life course, such as the far-reaching risks of poor health tied to low birth weight. In this context, differences in low birth weight that exist by race in our region, as well as differences in related behaviors, like smoking among pregnant women, become particularly important for health improvement efforts.

In examining the data we have available, it is apparent that the early years are an essential focus for prevention, with opportunities to provide a safe home, adequate food, and a home environment free of tobacco or drug use. Ensuring these early conditions can result in a number of health benefits later in life.

Shifting focus to adolescence and adulthood allows us to consider such factors as mental health, healthy eating, and physical activity. These are areas in which we have significant differences between counties, and in some cases have room for improvement to reach the statewide average or Healthy People 2020 benchmarks. In taking advantage of early opportunities to adopt healthy behaviors or prevent unhealthy ones, health benefits can be experienced throughout the life course.

With aging come additional health concerns. Not only are there different challenges and needs for older adults around physical activity, nutrition, and behavioral health, but issues such as elder abuse and fall prevention are of particular concern.

While regional data on many life course factors exist, there are other measures in which state data must be used, as local data is currently unavailable. As we gather more data on the health behaviors and practices discussed in this chapter, we will be able to make distinctions between such factors as race/ethnicity, age, and income status. Such data would enable us to focus prevention efforts at the age and sub-population level at which they are most needed in our region, resulting in countless health benefits throughout the life course.

Conclusion

Meeting Challenges with Strengths

As highlighted throughout the Regional Health Assessment report, there are many factors that influence and affect health outcomes, both positively and negatively, in Linn, Benton, and Lincoln Counties. The RHA provides an opportunity to identify the many health concerns, disparities and impacts that residents face in their daily lives.

A health assessment is truly important to help identify needs and opportunities for improvement. At the same time, it is important to highlight the various strengths and assets that are alive and well within our communities. These strengths and assets refer to the many types of human, social, and economic resources that our region can offer to address problems. Organizations, agencies, and partners within and across the three counties can collaborate to improve the health and quality of life for residents. Together we can build a road to better health for the region.

General Health Status

In 2015, Linn County was ranked 17 out of 34 counties for health outcomes, and 21 out of 34 for health factors. Benton County was ranked 3 out of 34 for health outcomes and 1 out of 34 for health factors. Lincoln County ranked 25 out of 34 for health outcomes and 30 out of 34 for health factors.⁴⁸⁰ It is clear in these numbers that the region has a lot of opportunity ahead to work on improving overall health status for the residents who live here. The County Health Rankings look at the different factors and conditions that affect the health and well-being of county residents, and are made up of four categories: health behavior, clinical care, social and economic factors, and physical environment.

Linn, Benton and Lincoln Counties have several rich community resources that can help meet the identified challenges and needs in the region. A few highlights of the many resources are summarized here.

Knowledge and Skills in Caring for and Promoting Health

The three-county region shares a long history of collaboration and partnership among various organizations and agencies to improve and promote health.

- Across the three counties, a unified Tobacco Prevention & Education Program aims to reduce tobacco-related illness and death. There also exist other population-based prevention and chronic disease programs that reduce the onset and incidence of many chronic conditions and help residents in the region take control of their health.

- The region is home to a variety of medical care, dental care, vision care, elder care, medical clinics, doctors, nurse practitioners, and alternative medicine which can be expanded upon to meet the needs of all residents.
- The region is home to a single Coordinated Care Organization (InterCommunity Health Network CCO) which unifies services and systems for Oregon Health Plan (Medicaid) patients within the region. This includes a broad partnership and a number of collective projects, committees, and initiatives.
- The three county health departments work in close collaboration with one another. Information and surveillance is shared, resources are pooled, and expertise is lent as needed between the counties.

Social Support Networks

- The three counties share a comprehensive network of social support and opportunity for the aging population.
- The region offers specialized support for people with mental illness, addictions, disabilities, and children with behavioral or emotional problems.
- The region shares a strong commitment to the health and wellbeing of children and youth. This commitment includes a focus on issues such as increasing family stability, kindergarten readiness, and equitable service coordination. Numerous organizations exist to address education, nutrition, and social support for children and families.

Without being able to call out every organization and project that supports the health of the region, what is shown above only highlights a few examples; each example is the result of efforts by countless community partners. A wealth of collective action and resources exists within and across the Linn, Benton, and Lincoln County region. Overcoming the many health challenges facing residents depends on this collective action and the vitally important part that each of our community partners play.

Acronyms used throughout the Regional Health Assessment document

ACA	Affordable Care Act
ACS	American Community Survey
AHRQ	Agency for healthcare Research and Quality
AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
BRFSS	Behavioral Risk Factor Surveillance System
CARDV	Center Against Rape and Domestic Violence
CCO	Coordinated Care Organization
CDC	Centers for Disease Control and Prevention
CHA	Community Health Assessments
CHIP	Community Health Improvement Plan
CLAS	Culturally and Linguistically Appropriate Services
CLCCHC	Cultural Competency in Health Care
DEQ	Department of Environmental Quality
DMAP	Division of Medical Assistance Programs
DSM	Diagnostic and Statistical Manual
ECD	Early Childhood Development
EDs	Emergency Departments
EHS	Early Head Start
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
FASDs	Fetal Alcohol Spectrum Disorders
FPL	Federal Poverty Level
FOBT	Fecal Occult Blood Test
FQHC	Federally Qualified Health Centers
GED	General Education Development
GFR	General Fertility Rate
HIV	Human Immuno-Deficiency Virus
HPSA	Health Professional Shortage Areas
IOM	Institute of Medicine
LBCC	Linn-Benton Community College
LEA	Law Enforcement Agencies
LGBTQ	Lesbian, Gay, Bi-sexual, Transgender, Queer
MDE	Major Depressive Episode
MSFW	Migrant Seasonal Farmworkers
MSP	My Sister's Place
NHDR	National Healthcare Disparities Report
NOAA	National Oceanic and Atmospheric Administration
OCCC	Oregon Coast Community College

ODF	Oregon Department of Forestry
OHP	Oregon Health Plan
OHS	Oregon Head Start
OSHA	Occupational Safety and Health Administration
OSU	Oregon State University
PCP	Primary Care Provider
PDMP	Prescription Drug Monitoring Program
PM _{2.5}	Particulate Matter
PPD	Postpartum Depression
PRAMS	Pregnancy Risk Assessment Monitoring System
RHA	Regional Health Assessment
SIDS	Sudden Infant Death Syndrome
SNAP	Supplemental Nutrition Assistance Program
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
TFR	Total Fertility Rate
USDA	US Department of Agriculture
WHO	World Health Organization
WIC	Women, infants, and children

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