



VOLUME 3:
The Burden of
Diabetes in Oregon
2013

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Authority

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Health Promotion & Chronic
Disease Prevention Section

Oregon Health Authority, Public Health Division:

Victoria Buelow, M.A., Oregon Diabetes Prevention and Control Program Research Analyst

Andrew Epstein, M.P.H., C.H.E.S., Oregon Diabetes Prevention and Control Program Coordinator

Steven Fiala, M.P.H., Oregon Heart Disease and Stroke Prevention Program Research Analyst

Terresa White, Oregon Heart Disease and Stroke Prevention Program Coordinator

Acknowledgements, Oregon Health Authority, Public Health Division:

Kirsten Aird, M.P.H., Chronic Disease Programs Manager, Health Promotion and Chronic Disease Prevention Section

Danna Drum, M. Div., Performance Manager, Office of the State Public Health Director

Karen Girard, M.P.A., Section Manager, Health Promotion and Chronic Disease Prevention Section

Bruce Gutelius, M.D., M.P.H., Deputy Director for Science, Center for Prevention and Health Promotion

Holly Heiberg, M.P.P., Health Promotion Strategist, Health Promotion and Chronic Disease Prevention Section

Lisa Lucas, Research Analyst, Health Promotion and Chronic Disease Prevention Section

Stacey Schubert, M.P.H., Surveillance Lead, Health Promotion and Chronic Disease Prevention Section

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Oregon Health Authority, Public Health Division

Health Promotion and Chronic Disease Prevention Section

800 N.E. Oregon Street, Suite 730

Portland, OR 97232

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This chapter summarizes data about diabetes in Oregon. It includes the most recent data available from a variety of sources. This chapter includes detailed data tables and graphs depicting diabetes prevalence, deaths and hospitalizations over time and across select demographics, chronic diseases and risk factors. The intent of this report is to highlight the burden of diabetes in Oregon and to assist stakeholders, policymakers and other interested parties in their efforts to reduce this burden. For more information on each dataset used in this chapter, see Appendix B.

What is diabetes?

- ▶ Diabetes is a chronic metabolic disease in which glucose (sugar) levels in the blood are above normal.
- ▶ High blood sugar occurs when the body does not produce enough insulin (Type 1 diabetes), or when the body resists and does not properly respond to insulin (Type 2 diabetes).
- ▶ Prediabetes occurs when blood glucose levels are higher than normal but not yet in the range of diabetes.
- ▶ Gestational diabetes is a form of diabetes that occurs during pregnancy.
- ▶ If not carefully managed, high blood sugar can cause blindness, skin infections, nerve damage and kidney damage.
- ▶ Diabetes also adversely affects the cardiovascular system, which can lead to high blood pressure and high cholesterol; both are primary risk factors for heart disease and stroke.





Who has diabetes?

- ▶ In Oregon, an estimated 9.3% of adults have diabetes (or 8.3% age-adjusted). This translates to approximately 278,000 adults with diabetes in Oregon.
- ▶ Oregon has a lower burden of diabetes compared to the United States overall; however, since 1990, diabetes in Oregon has increased 118%.
- ▶ In Oregon, diabetes is more common among men compared to women (8.9% vs. 7.9%).
- ▶ Older Oregonians are more likely to report diagnosed diabetes compared to younger Oregonians. More than one-fifth of Oregonians aged 65–74 years are diagnosed with diabetes, compared to less than 3% among those aged 18–44 years.
- ▶ Diabetes is more common among Oregonians with lower education levels. The prevalence of diabetes among those with less than a high school education is more than double that of Oregonians with a college degree (12% vs. 5%).

- ▶ The prevalence of diabetes among adults with an annual household income of less than \$20,000 is nearly three times that of those who have a household income of \$75,000 or more (14% vs. 5%).
- ▶ The percentage of adults with diabetes who are covered by the Oregon Health Plan is more than double that of adults with other types of insurance (17% vs. 8%).
- ▶ Many racial and ethnic groups in Oregon are disproportionately affected by diabetes: 23% of non-Latino African Americans, 15% of Latinos, and 14% of non-Latino American Indian/Alaska Natives have been diagnosed with diabetes compared to 7% of non-Latino whites and Asians.
- ▶ Of adults with coronary heart disease in Oregon, 48% also have diabetes.

Risk factors for diabetes

- ▶ **Obesity:** More than one-quarter of adults in Oregon are obese. Among adults with diabetes, 48% are obese.
- ▶ **High blood pressure and high cholesterol:** 28% of adults in Oregon have high blood pressure and 32% have high cholesterol. Among adults with diabetes, the prevalence doubles at 68% and 64%, respectively.
- ▶ **Lack of physical activity:** One-third of adults with diabetes in Oregon are physically inactive, compared to 20% of adults overall.
- ▶ **Cigarette smoking:** 26% percent of adults with diabetes in Oregon are current smokers, compared to 20% of adults overall.

- ▶ **Prediabetes:** It is estimated that nearly one million Oregon adults have prediabetes.
- ▶ **Gestational diabetes:** 8% of all births in Oregon in 2011 were to mothers who were diagnosed with gestational diabetes.

Diabetes mortality

- ▶ Diabetes was the seventh leading cause of death in Oregon in 2011. Since 1990, the diabetes death rate in Oregon has increased 44%.
- ▶ In the last decade, the diabetes death rate in Oregon has consistently been higher compared to the United States overall.
- ▶ In Oregon, diabetes is listed as the primary cause of death on 1,114 death certificates (3.4% of all deaths) and as a secondary (contributing) cause of death on 2,732 death certificates (11.7% of all deaths). In total, diabetes is listed as a cause of death on more than 15% of all deaths.
- ▶ The diabetes death rate is 50% higher for men than for women.
- ▶ The diabetes death rate is higher among non-Latino African Americans, non-Latino American Indian/Alaska Natives and Latinos compared to non-Latino whites.
- ▶ Among deaths where diabetes was listed as the primary cause, 61% had heart disease, heart attack or stroke listed as a contributing cause of death.

Diabetes hospitalizations

- ▶ In 2011, 4,274 hospitalizations in Oregon were primarily attributed to diabetes.
- ▶ Between 1997 and 2011, the diabetes hospitalization rate increased 19%.
- ▶ Among hospitalizations primarily attributed to complications of diabetes, 40% were due to ketoacidosis (low insulin combined with high blood sugar levels), 15% were due to neurological issues, and 6% were due to peripheral circulatory issues.
- ▶ For nearly a quarter (24.9%) of diabetes hospitalizations, heart disease, heart attack or stroke was listed as a secondary diagnosis.

Cost of diabetes

- ▶ According to the American Diabetes Association, excess medical expenditures associated with diabetes totals nearly \$2.2 billion each year; that is an average of \$7,800 per person with diabetes. In addition, costs associated with reduced productivity from diabetes are estimated at \$840 million. The estimated total cost of diabetes in Oregon is nearly \$3 billion per year.
- ▶ In 2011, the average cost of a hospitalization primarily due to diabetes was \$21,367, with the total cost of all diabetes hospitalizations in Oregon reaching more than \$91 million.

Prevention and management of diabetes

- ▶ Those who have prediabetes or gestational diabetes are more likely to develop diabetes in the future. A healthy diet and regular physical activity may prevent or delay the onset of prediabetes and Type 2 diabetes.
- ▶ 63% of adults aged 45 years and above in Oregon reported having a blood sugar test within the past three years.
- ▶ Adults with diabetes in Oregon have met Healthy People 2020 goals for annual foot and eye exams, two or more A1C checks within the past year, and for receiving formal diabetes education. However, the number of adults with diabetes who self-monitor their blood glucose at least once daily is below the target goal.

Ways to reduce the burden of diabetes in Oregon

The Oregon Public Health Division is committed to preventing diabetes and reducing the risk of diabetes complications through a wide range of evidence-based practices. The Health Promotion and Chronic Disease Prevention Section of the Oregon Public Health Division is working with local and state partners to:

- ▶ Increase availability of healthy foods and beverages in child care facilities, schools, worksites and neighborhoods;
- ▶ Increase places where people can move more safely;
- ▶ Increase the number of environments that are tobacco-free;



- ▶ Increase referrals to self-management and prevention programs such as the National Diabetes Prevention Program so that people with diabetes or prediabetes can live well and take care of themselves;
- ▶ Improve delivery and use of quality health care services including promotion of the ABCS — **A**1C checks, **B**lood pressure control, **C**holesterol control, and **S**moking cessation.

This comprehensive, community-wide approach makes it easier for all Oregonians to eat better, move more, and live tobacco-free wherever they live, work, play and learn.



Diabetes in Oregon

Approximately
278,000
adults

in Oregon have diabetes, and an estimated 1 million have prediabetes.



According to the American Diabetes Association, diabetes costs Oregonians nearly \$3 billion each year due to health care costs and reduced productivity.

People with diabetes are 2 to 4 times more likely to have heart disease or a stroke.

Certain risk factors can worsen diabetes and diabetes-related complications, and contribute to the development of other chronic diseases like heart disease and stroke.

Among Oregon adults with diabetes:

-  **1 in 2** is obese.
-  **1 in 4** smokes cigarettes.
-  **2 in 3** have high blood pressure.
-  **2 in 3** have high cholesterol.
-  **1 in 3** is physically inactive.

DIABETES affects some communities more than others.

Compared to adults with a college degree, adults with less than a high school education are:

2x more likely to have diabetes.

Compared to non-Latino whites, African American, American Indian, Alaska Native and Latino people are:

2 to 3x more likely to have diabetes.



What is diabetes?

Diabetes is a chronic metabolic disease in which glucose (sugar) levels in the blood are above normal. High blood sugar occurs when the body does not produce enough insulin (Type 1 diabetes), or when the body resists and does not properly respond to insulin (Type 2 diabetes).

Prediabetes occurs when blood glucose levels are higher than normal but not yet in the range of diabetes, and gestational diabetes is a form of diabetes that occurs during pregnancy. Those who have prediabetes or gestational diabetes are at a higher risk of developing Type 2 diabetes, but the progression to diabetes may be prevented or delayed with regular physical activity and a healthy diet. Once diagnosed, diabetes is usually a lifelong disease with treatment consisting of a combination of medication, diet modifications and physical activity to manage blood sugar and reduce potentially harmful complications.

If not carefully managed, diabetes can cause blindness, skin infections, nerve damage and kidney damage. Today, diabetes is the leading cause of adult blindness and non-traumatic lower-leg amputations.¹ Diabetes contributes to high blood pressure and high cholesterol, both of which are primary risk factors for heart disease and stroke.

Several health conditions and behaviors can increase the risk for developing diabetes or prediabetes. Age, family history, race and ethnicity are contributors to the development of diabetes that cannot be modified or controlled. However, many other risk factors for diabetes and complications of diabetes are modifiable, including overweight and obesity, high blood pressure, abnormal cholesterol, low fruit and vegetable consumption, lack of physical activity and cigarette smoking.^{1,2}

For this report, diabetes prevalence was determined by the percentage of adults who responded “Yes” when asked if they have ever been told by a doctor, nurse or other health professional that they have diabetes. This does not distinguish between Type 1 or Type 2 diabetes, and does not include those who currently have prediabetes, gestational diabetes or borderline diabetes.



Risk factors for diabetes and prediabetes

Non-modifiable:

- ▶ Age;
- ▶ Family history;
- ▶ Race and ethnicity;
- ▶ Gestational diabetes during previous pregnancy;
- ▶ Having given birth to a baby weighing more than 9 pounds.

Modifiable:

- ▶ Overweight and obesity;
- ▶ Lack of physical activity;
- ▶ Cigarette smoking;
- ▶ High blood pressure;
- ▶ Abnormal cholesterol.

Diabetes is a public health priority

During the past 20 years, the prevalence of diabetes among adults in Oregon has more than doubled, increasing from 4% in 1990 to more than 8% in 2011. There are approximately 278,000 adults with diagnosed diabetes in Oregon, and it is estimated that 35% of adults have pre-diabetes.¹ Diabetes is the seventh leading cause of death in Oregon, accounting for 3% of all deaths. In 2011, there were 4,274 hospitalizations due to diabetes with an average cost of \$21,000 per hospitalization. According to the American

Diabetes Association, excess medical expenditures associated with diabetes total nearly \$2.2 billion each year; that is an average of \$7,800 per person with diabetes. In addition, costs associated with reduced productivity from diabetes are estimated at \$840 million. The estimated total cost of diabetes in Oregon is nearly \$3 billion per year.³

Due to the significant morbidity and mortality associated with this disease, the 2007 Oregon Legislature passed House Bill 3486, which declared an emergency related to diabetes and obesity and led to the development in 2009 of a strategic plan to slow the rate of diabetes caused by obesity and other environmental factors.⁴

Oregon Diabetes Program priorities

- ▶ Creating healthy communities that support people in eating better, moving more and living tobacco-free where they live, work, play and learn.
- ▶ Helping prevent diabetes in those at risk for the disease by increasing access to lifestyle change programs, and helping people with diabetes live better by increasing access to chronic disease self-management programs.
- ▶ Improving delivery and use of quality clinical services to prevent diabetes, detect it early and manage risk factors.
- ▶ Eliminating health disparities among population groups.
- ▶ Providing facts and figures about diabetes in Oregon.

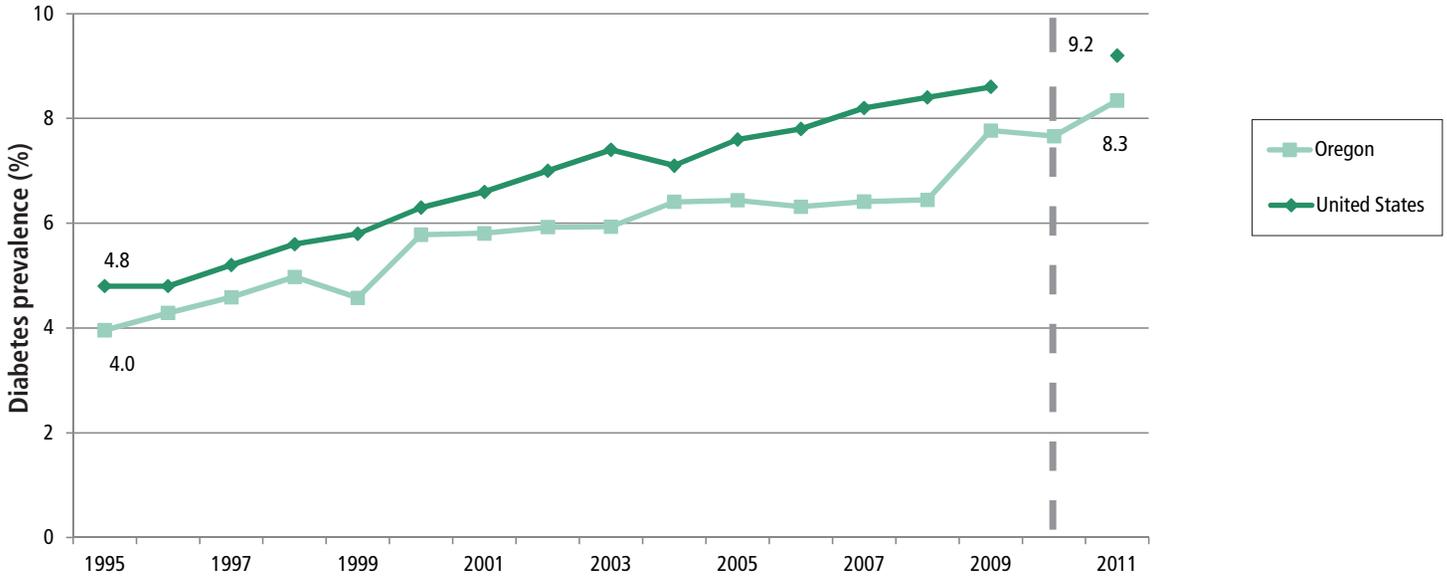


3.1 Who has diabetes?

To understand the burden of diabetes in Oregon, the prevalence of the disease needs to be known. Prevalence is the percentage of people with diabetes in a particular population, at a given time. It is important to report the prevalence of diabetes among sub-populations of Oregonians

(e.g., racial and ethnic minorities) to identify groups of Oregonians who are disproportionately affected by diabetes compared to the general population in Oregon. This section will describe the burden of diabetes among Oregon adults over time and by select demographics including gender, age, education, income, health insurance status, race and ethnicity, chronic disease risk factors, and chronic conditions.

FIGURE 3.1.1 ADULTS WITH DIAGNOSED DIABETES, BY YEAR, OREGON AND THE UNITED STATES, 1995–2011



Data source: Oregon Behavioral Risk Factor Surveillance System; National data from the National Behavioral Risk Factor Surveillance System.
Note: National data were not included for 2010 because the method for weighting the data was different from the method used in Oregon. The national estimate excludes territories. The vertical dashed line denotes a different adjustment method and inclusion of cellular phones in the sample. Starting in 2010, estimates are not comparable to earlier years. Estimates are age-adjusted.



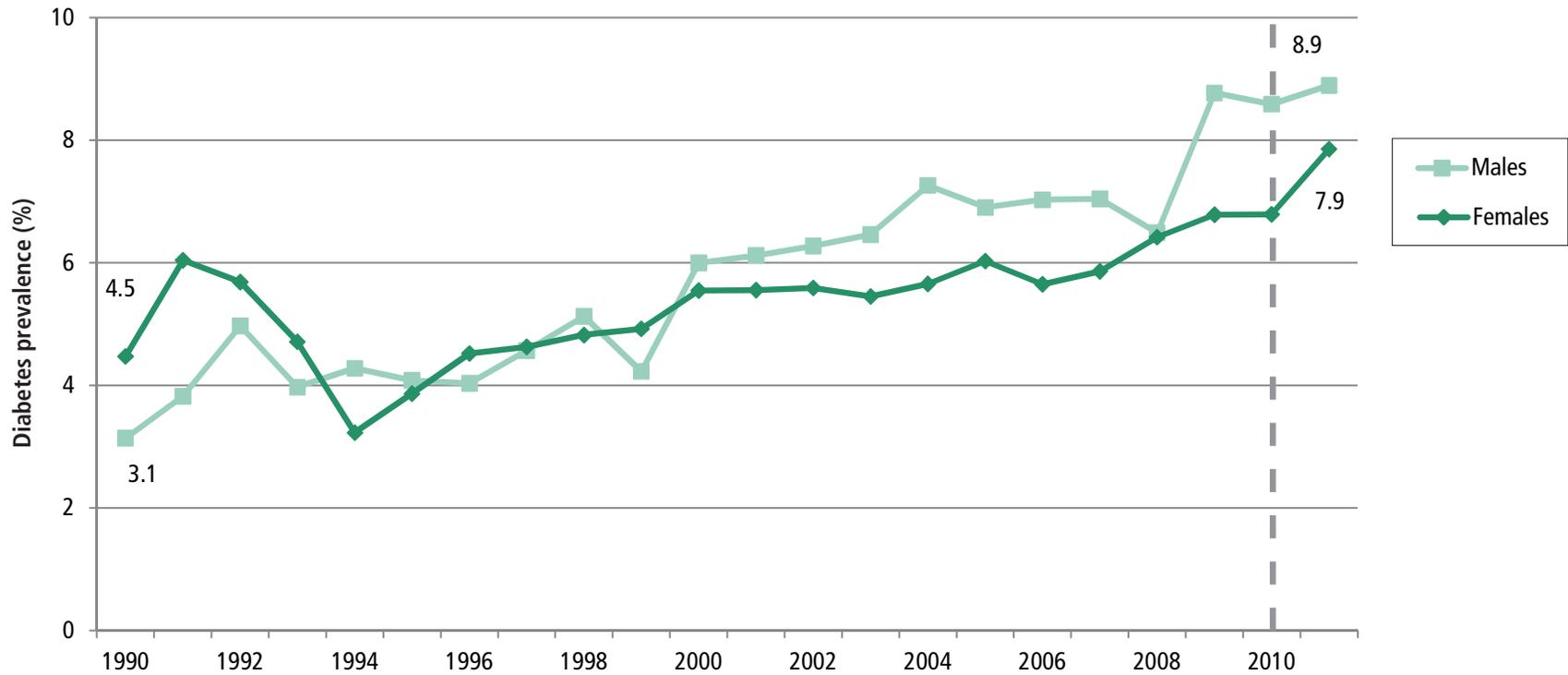
TABLE 3.1.1 ADULTS WITH DIAGNOSED DIABETES, BY YEAR, OREGON AND THE UNITED STATES, 1995–2011

YEAR	OREGON	UNITED STATES
1995	4.0	4.8
1996	4.3	4.8
1997	4.6	5.2
1998	5.0	5.6
1999	4.6	5.8
2000	5.8	6.3
2001	5.8	6.6
2002	5.9	7.0
2003	5.9	7.4
2004	6.4	7.1
2005	6.4	7.6
2006	6.3	7.8
2007	6.4	8.2
2008	6.4	8.4
2009	7.8	8.6
2010	7.7	n/a
2011	8.3	9.2

Note: National data were not included for 2010 because the method for weighting the data was different from the method used in Oregon. The national estimate excludes territories. Starting in 2010, estimates are not comparable to earlier years. Estimates are age-adjusted.

- ▶ During the past two decades, the age-adjusted diabetes prevalence among Oregon adults more than doubled, increasing from 4.0% in 1995 to 8.3% in 2011 (Table 3.1.1 and Figure 3.1.1).
- ▶ Oregon’s diabetes prevalence is lower compared to the United States.
- ▶ Approximately 278,000 Oregon adults had diabetes in 2011.

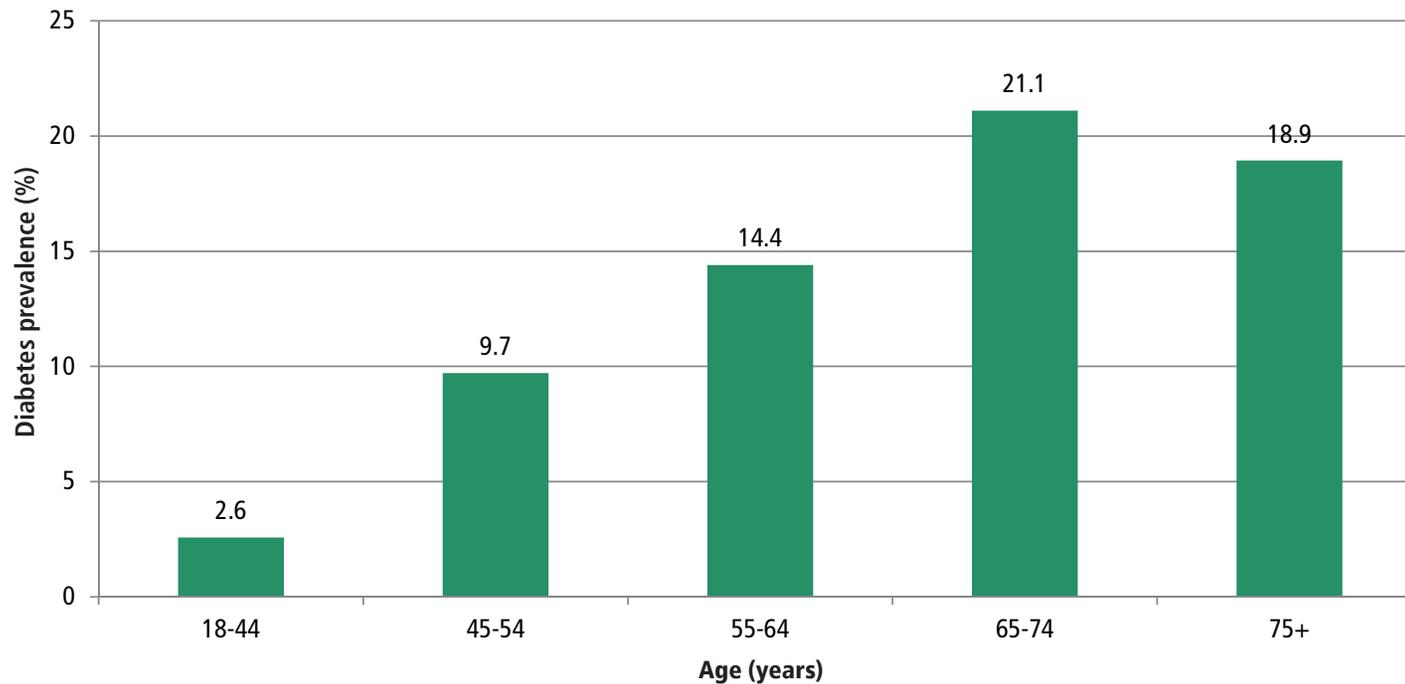
FIGURE 3.1.2 ADULTS WITH DIAGNOSED DIABETES, BY SEX AND YEAR, OREGON, 1990–2011



Data source: Oregon Behavioral Risk Factor Surveillance System: National data from the National Behavioral Risk Factor Surveillance System. Estimates are age-adjusted.

- ▶ Since 2000, the prevalence of diabetes has been higher for males compared to females (Figure 3.1.2).
- ▶ In 2011, the percentage of adult males with diagnosed diabetes was 8.9%, compared to 7.9% among females.

FIGURE 3.1.3 ADULTS WITH DIAGNOSED DIABETES, BY AGE GROUP, OREGON, 2011

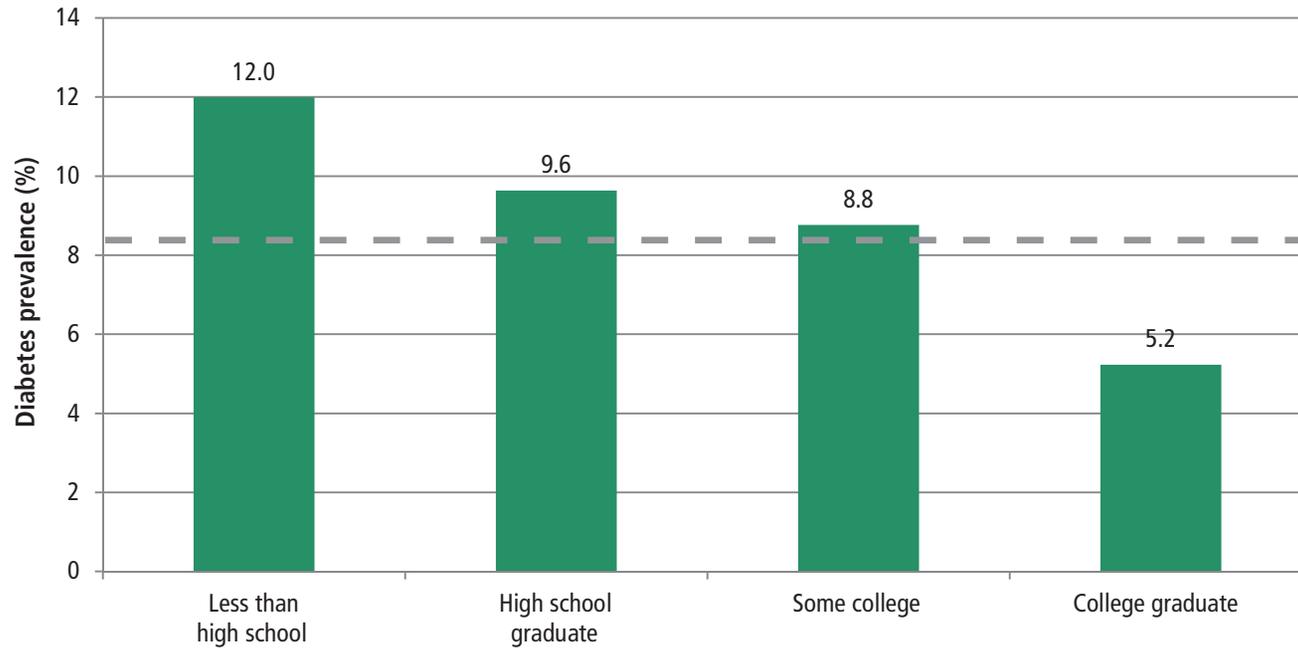


Data source: Oregon Behavioral Risk Factor Surveillance System

Note: Estimates are not age-adjusted.

- ▶ Diabetes was more prevalent among people in older age groups. Older Oregonians were much more likely to report diagnosed diabetes compared to younger Oregonians (Figure 3.1.3).
- ▶ Approximately one-fifth of Oregon adults aged 65 years and over reported having diagnosed diabetes, compared to less than 3% of adults aged 18–44 years (Figure 3.1.3).

FIGURE 3.1.4 ADULTS WITH DIAGNOSED DIABETES, BY EDUCATION, OREGON, 2011

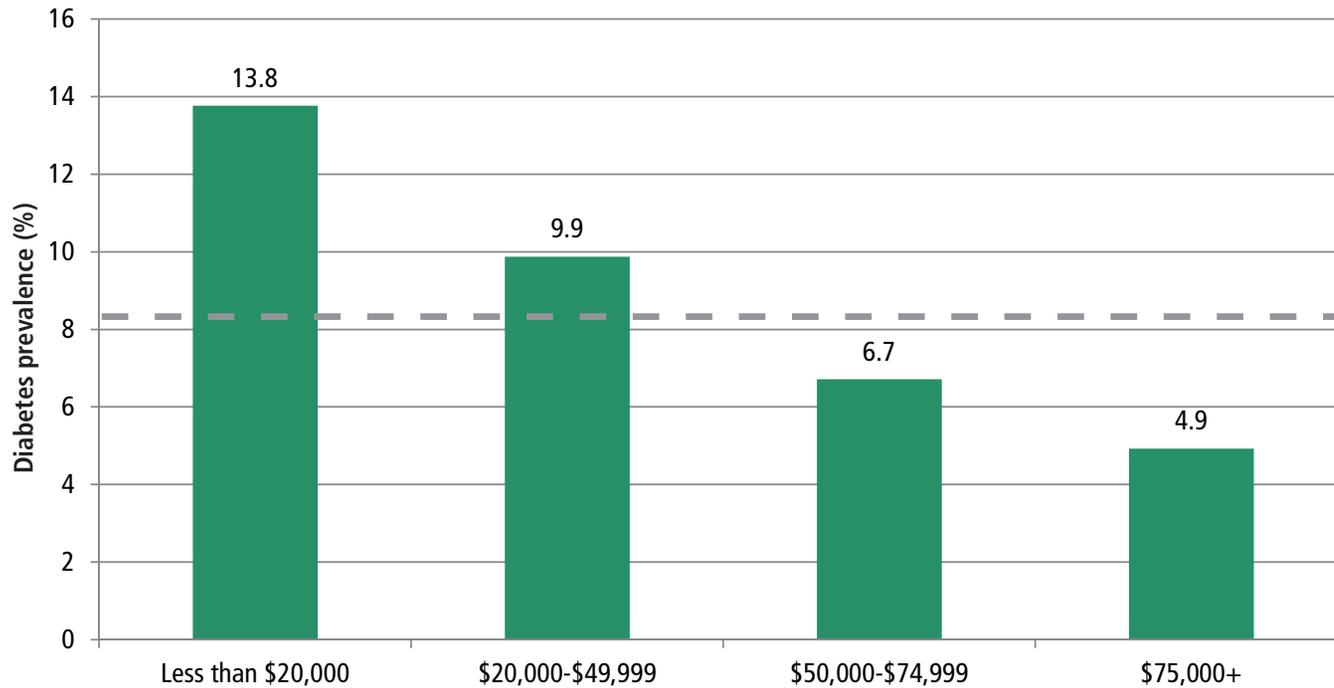


Data source: Oregon Behavioral Risk Factor Surveillance System

Note: The horizontal line represents the percentage of Oregon's general population with diabetes (8.3%). Estimates are age-adjusted.

- ▶ Diabetes was more common among Oregonians with lower education levels (Figure 3.1.4).
- ▶ The prevalence of diabetes among adults with less than high school education was more than double that of Oregonians with a college degree (Figure 3.1.4).

FIGURE 3.1.5 ADULTS WITH DIAGNOSED DIABETES, BY ANNUAL HOUSEHOLD INCOME, OREGON, 2011

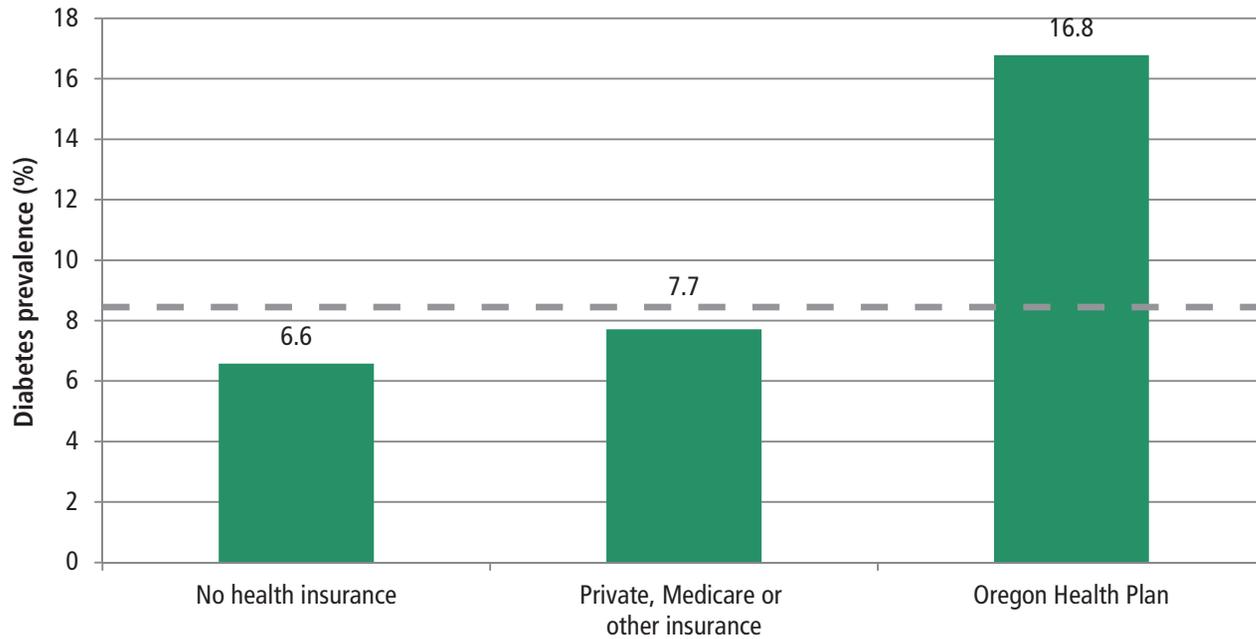


Data source: Oregon Behavioral Risk Factor Surveillance System

Note: The horizontal line represents the percentage of Oregon's general population with diabetes (8.3%). Estimates are age-adjusted.

- ▶ Diabetes was more prevalent among Oregonians with lower annual household income levels (Figure 3.1.5).
- ▶ 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 (Figure 3.1.5).

FIGURE 3.1.6 ADULTS WITH DIAGNOSED DIABETES, BY CURRENT TYPE OF HEALTH INSURANCE, OREGON, 2011

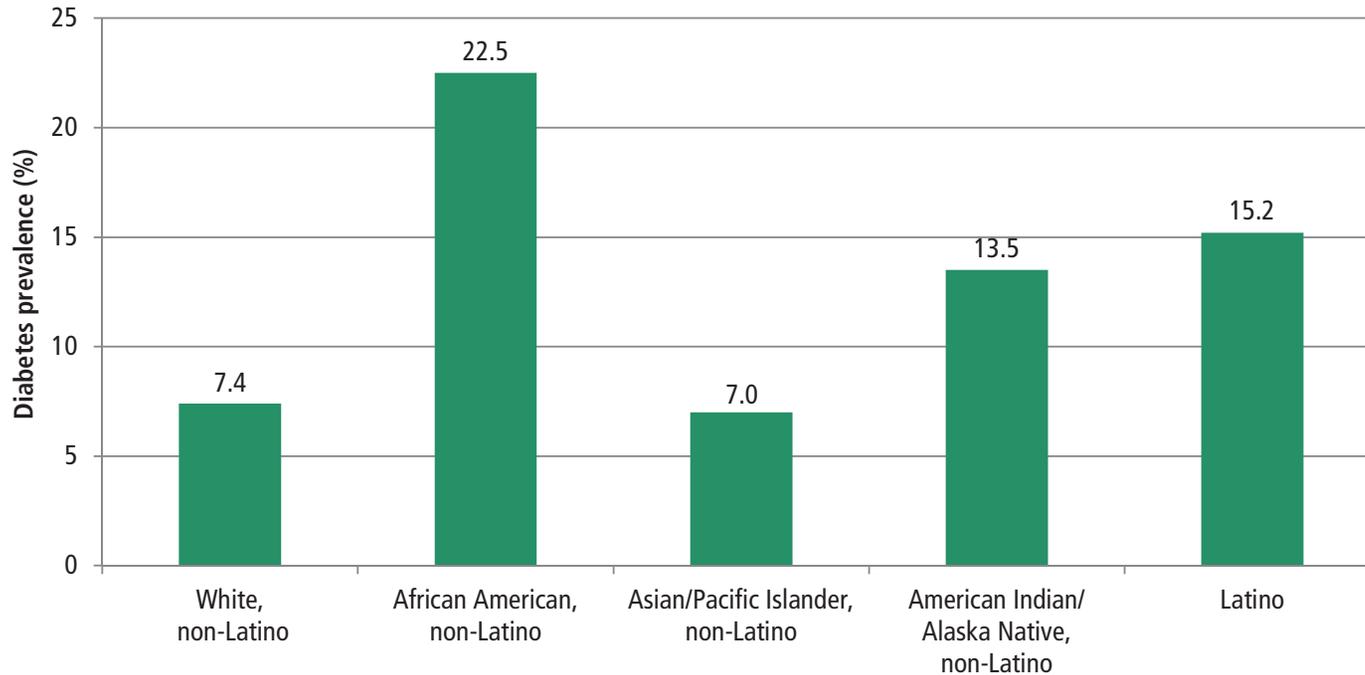


Data source: Oregon Behavioral Risk Factor Surveillance System

Note: The horizontal line represents the percentage of Oregon's general population with diabetes (8.3%). Estimates are age-adjusted.

- ▶ The prevalence of diabetes among adults currently insured by the Oregon Health Plan was more than double that of those who had other types of health insurance (Figure 3.1.6).
- ▶ Those with no health insurance may have a lower prevalence of diagnosed diabetes due to inadequate access to health care. Access to care and contact with a health care provider are required to receive a diabetes diagnosis.
- ▶ In addition, those with no health insurance are generally younger and healthier and therefore are less likely to have chronic health conditions.

FIGURE 3.1.7 ADULTS WITH DIAGNOSED DIABETES, BY RACE AND ETHNICITY, OREGON, 2010–2011

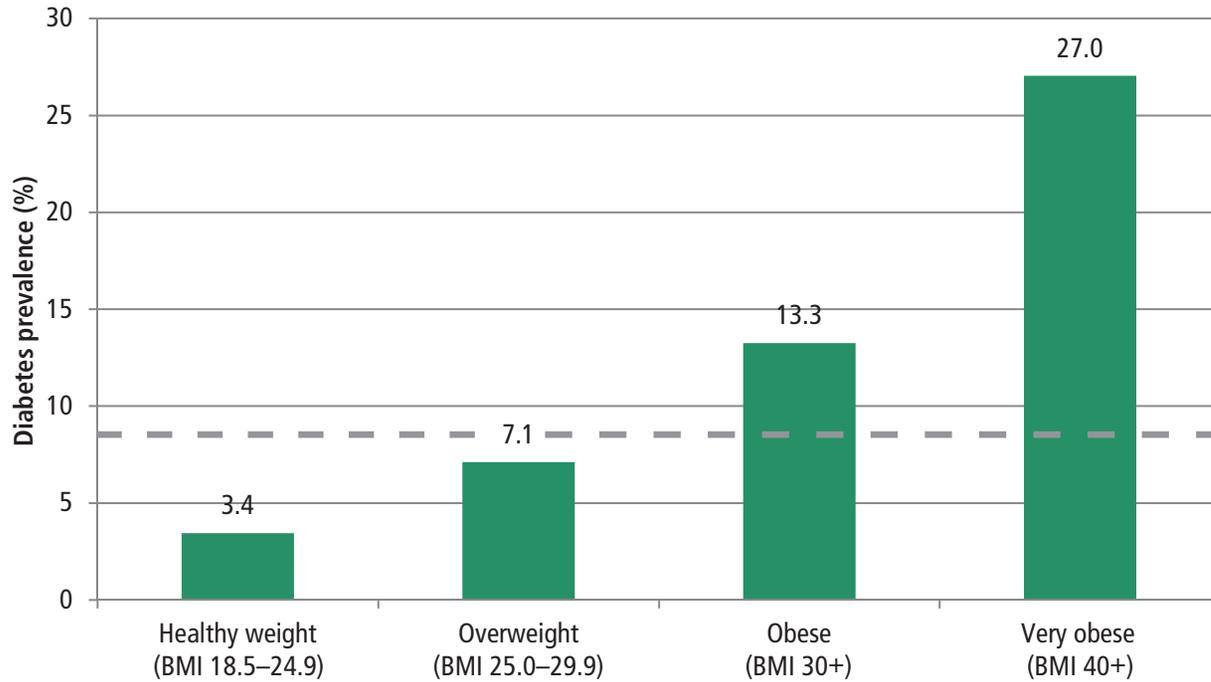


Data source: Oregon Behavioral Risk Factor Surveillance System Race Oversample, 2010–2011.

Note: Estimates are age-adjusted

- ▶ Many racial and ethnic minority groups in Oregon were disproportionately affected by diabetes (Figure 3.1.7).
- ▶ Among non-Latino African-Americans, nearly 23% were diagnosed with diabetes, compared with 15% of Latinos, 14% of American Indian/Alaska Natives, and 7% of whites and Asians (Figure 3.1.7).
- ▶ National data reflect similar disparities in diabetes prevalence by racial and ethnic groups.⁵

FIGURE 3.1.8 ADULTS WITH DIAGNOSED DIABETES, BY BODY MASS INDEX, OREGON, 2011



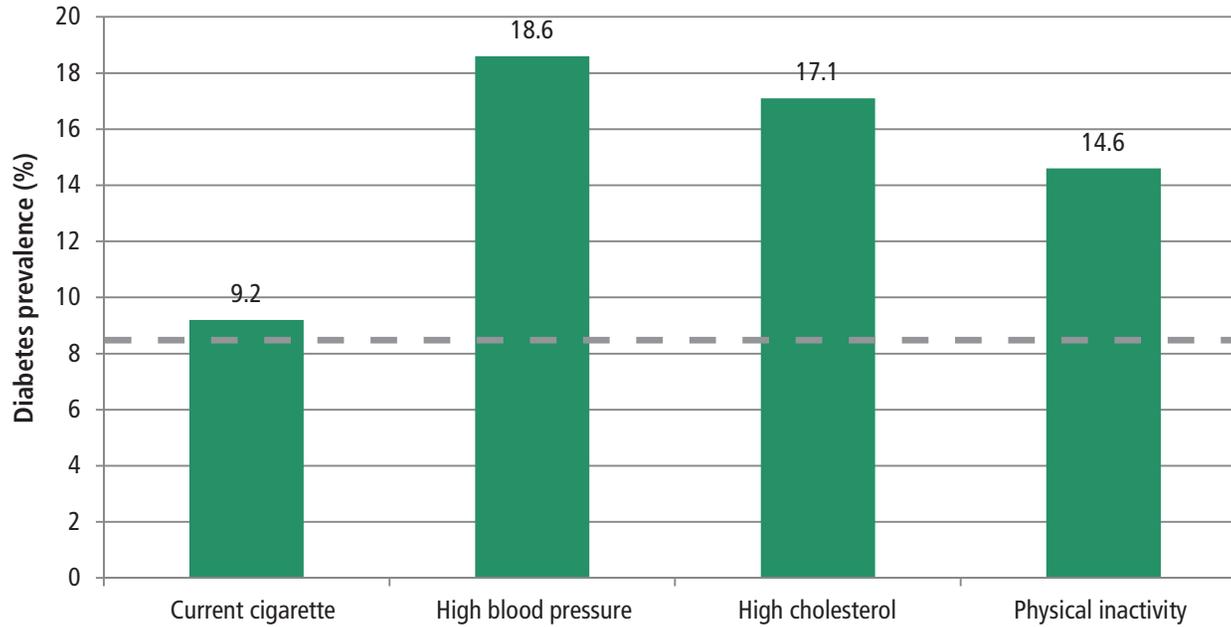
Data source: Oregon Behavioral Risk Factor Surveillance System

Note: The horizontal line represents the percentage of Oregon’s general population with diabetes (8.3%). Estimates are age-adjusted.

- ▶ The prevalence of diabetes increases with body weight, and approximately doubles with each increasing category of body mass index.*
- ▶ The prevalence of diagnosed diabetes among Oregon adults who are very obese (BMI of 40.0 and above) was extremely high at 27%.
- ▶ Adults who are obese were nearly four times more likely than adults of a healthy weight to report having diagnosed diabetes, and adults who are very obese were eight times more likely to report having diagnosed diabetes.

*To determine adult overweight and obesity ranges, self-reported weight and height are used to calculate body mass index (BMI) because, for most people, it correlates with the amount of body fat a person has, although it is not a direct measure of body fat. An adult who has a BMI between 25 and 29.9 is considered overweight, 30 to 39.9 is considered obese, and 40.0 and above is considered very obese.

FIGURE 3.1.9 ADULTS WITH DIAGNOSED DIABETES, BY SELECTED HEALTH RISK FACTORS, OREGON, 2011



Data source: Oregon Behavioral Risk Factor Surveillance System

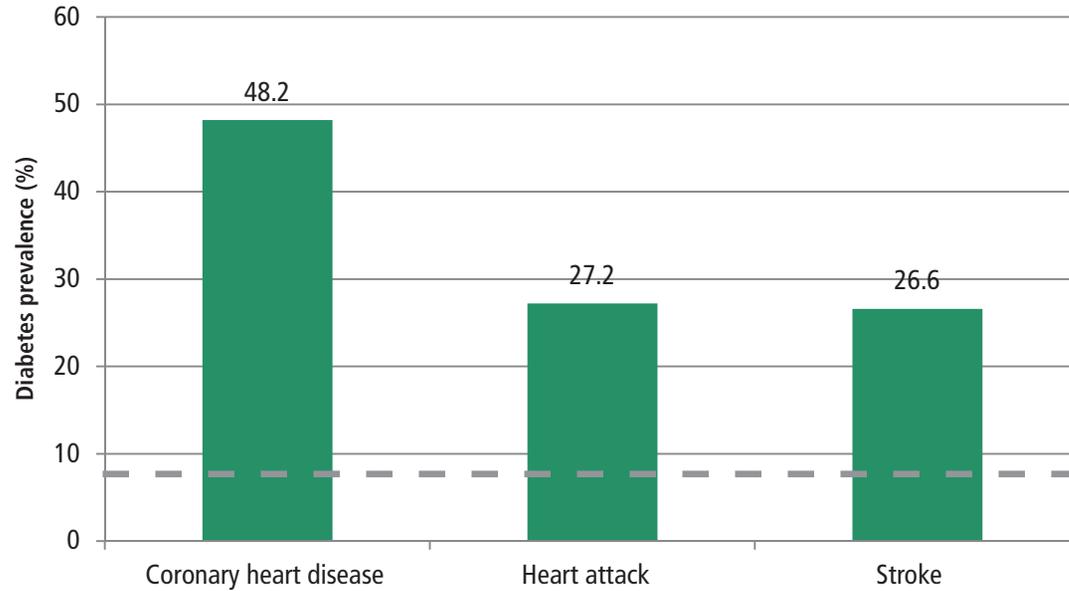
Note: The horizontal line represents the percentage of Oregon's general population with diabetes (8.3%). Estimates are age-adjusted.

- ▶ The diabetes prevalence among adults who are current smokers was higher compared to the general population (Figure 3.1.9).
- ▶ Adults with high blood pressure and high cholesterol were more than twice as likely to report having diagnosed diabetes compared to the general population (Figure 3.1.9).
- ▶ Of adults who reported a lack of physical activity* in the past month, 14.6% had been diagnosed with diabetes (Figure 3.1.9).

*For this report, lack of physical activity was determined by the percentage of adults who responded "No" when asked if they participated in any physical activity (other than what is done during one's regular job) or exercises, such as running, calisthenics, golf, gardening or walking during the past month.



FIGURE 3.1.10 ADULTS WITH DIAGNOSED DIABETES, BY CARDIOVASCULAR DISEASES, OREGON, 2011

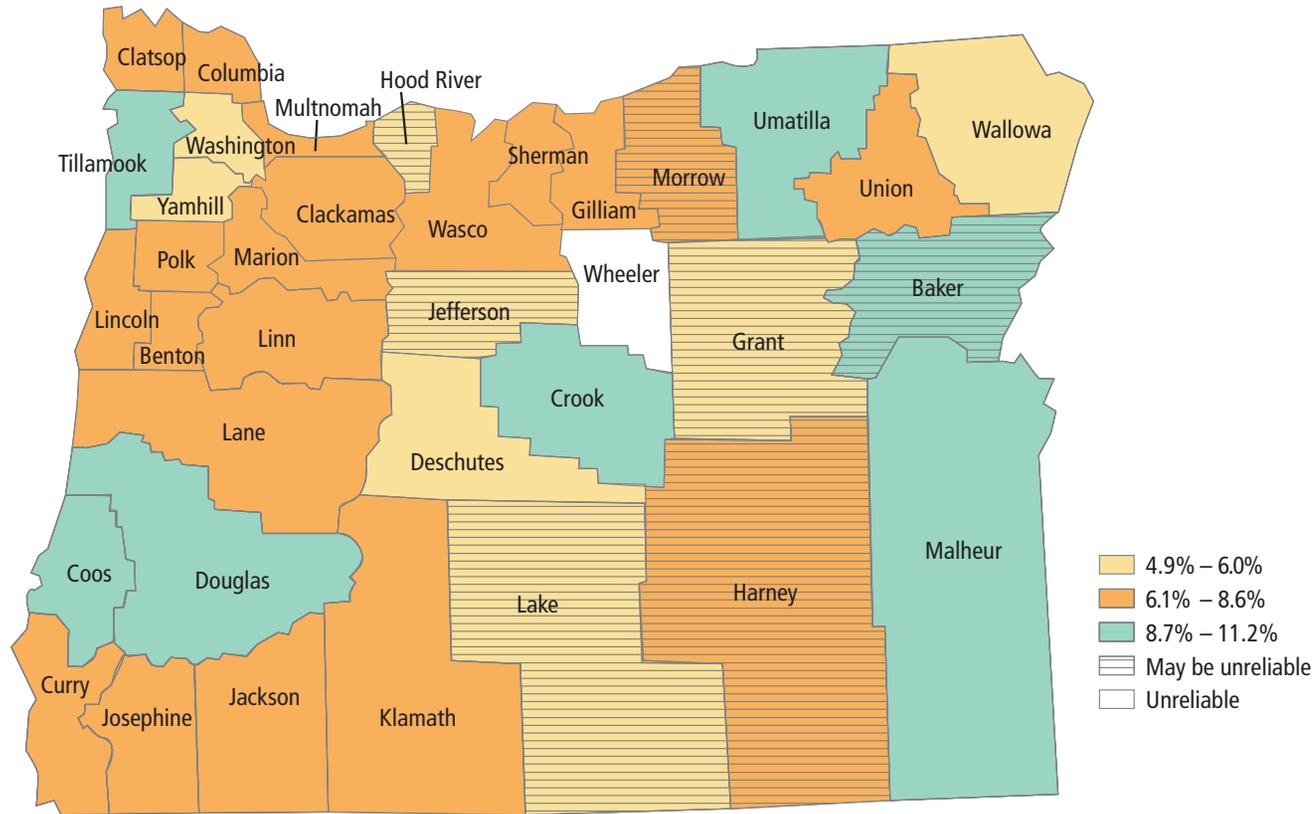


Data source: Oregon Behavioral Risk Factor Surveillance System

Note: The horizontal line represents the percentage of Oregon's general population with diabetes (8.3%). Estimates are age-adjusted.

- ▶ Diabetes is more prevalent among adults who also have cardiovascular diseases (Figure 3.1.10).
- ▶ More than one-quarter of adults who had ever had a heart attack or stroke also had diagnosed diabetes, and almost one-half of adults who had coronary heart disease also had diagnosed diabetes.

FIGURE 3.1.11 ADULTS WITH DIAGNOSED DIABETES, BY COUNTY, OREGON, 2008–2011



Data source: Oregon Behavioral Risk Factor Surveillance System County Combined File

Note: Estimates are age-adjusted. The state diabetes prevalence for 2008–2011 was 7.2%.

- ▶ During 2008–2011, the prevalence of diagnosed diabetes among Oregon counties ranged from 5.3% to 11.2%.
- ▶ Washington County had a significantly lower percentage of adults with diagnosed diabetes (6.0%) compared to the rest of the state.
- ▶ Douglas County had a significantly higher percentage of adults with diagnosed diabetes (11.2%) compared to the rest of the state.
- ▶ See Appendix A for detailed county estimates.



Conclusions

During the past two decades, the percentage of Oregon adults with diagnosed diabetes has more than doubled. Men tend to have a higher prevalence of diagnosed diabetes compared to women. As expected, a higher proportion of older Oregonians reported having diagnosed diabetes compared to the younger adult population. However, many differences were seen across other demographic factors, both modifiable and non-modifiable. The prevalence of diagnosed diabetes was higher among Oregon adults with less education, a smaller annual household income, and among those enrolled in the Oregon Health Plan, which is Oregon's Medicaid program. In addition, non-Latino African Americans, non-Latino American Indians/Alaska Natives, and Latinos were more likely to report having diagnosed diabetes compared to non-Latino whites. Oregon adults with chronic disease risk factors and other chronic conditions were also more likely to report having diagnosed diabetes than the general population. Most notable, adults who are obese are nearly four times more likely than adults of a healthy weight to report having diagnosed diabetes, and adults who are very obese are eight times more likely to report having diagnosed diabetes.



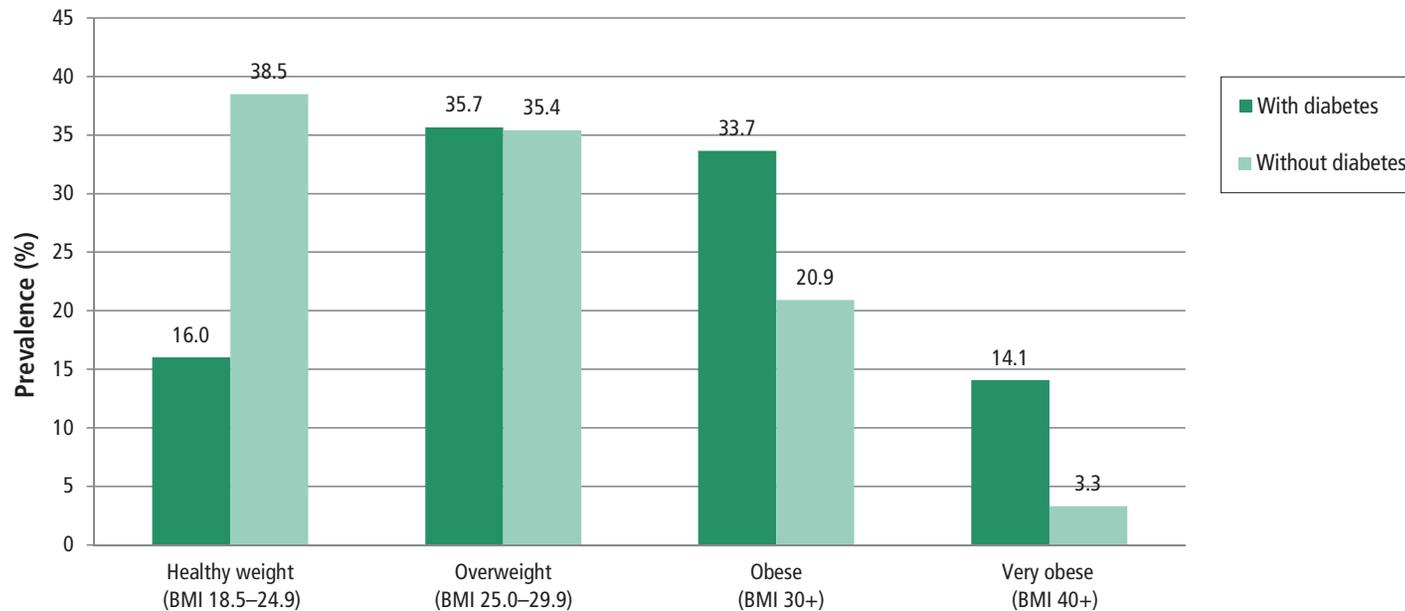
3.2 Risk factors among adults with diagnosed diabetes

Several health conditions and behaviors can increase the risk for developing diabetes. Age, family history, race and ethnicity contribute to developing diabetes, heart disease and stroke that cannot be modified or controlled. However, many other risk factors for diabetes are modifiable, including cigarette smoking, overweight and obesity, high blood pressure, high cholesterol, and lack of physical activity.^{1,2} These risk factors increase one's risk for developing diabetes and can contribute

to developing other chronic diseases, cause difficulties in self-management, and increase the risk of complications for those who have the disease. This section will describe the burden of risk factors and behaviors and other chronic conditions among Oregon adults who have been diagnosed with diabetes.

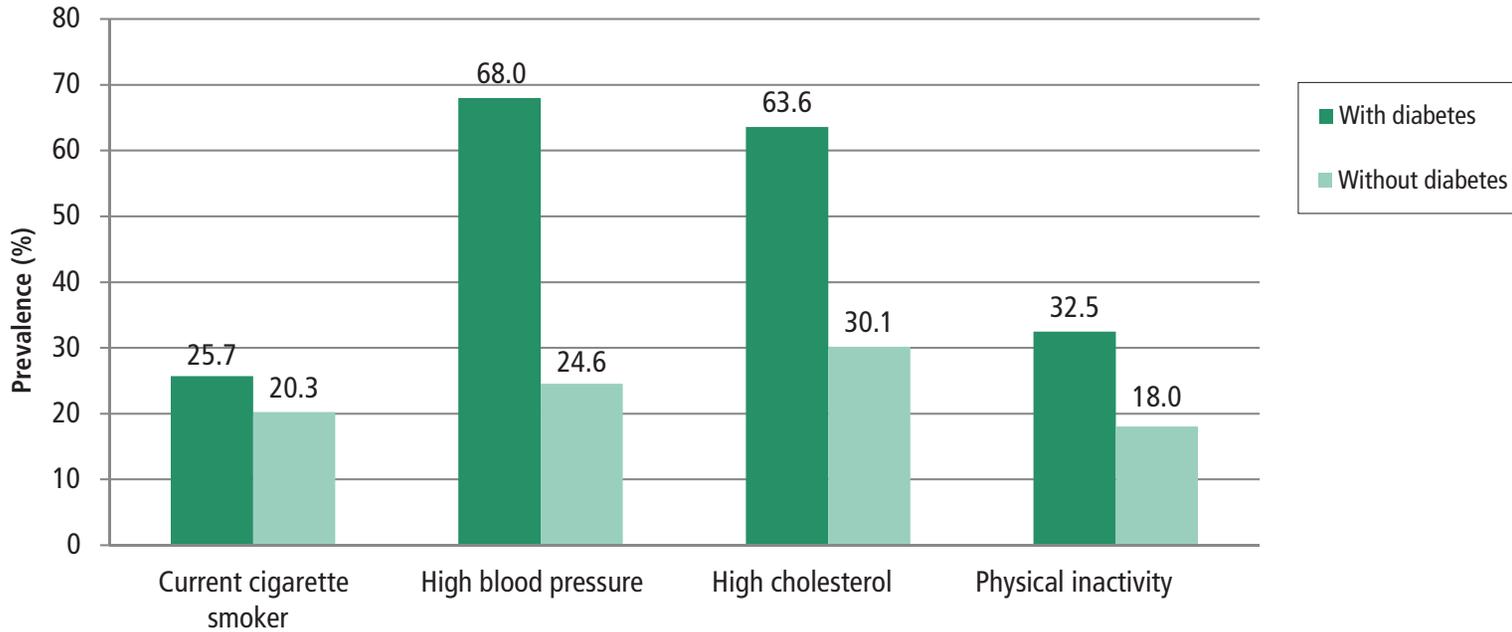
- ▶ Adults with diagnosed diabetes were less likely to be of a healthy weight and more likely to be obese compared to adults without diabetes (Figure 3.2.1).
- ▶ Adults with diagnosed diabetes were four times more likely to report being very obese (BMI of 40.0 and above) compared to adults without diabetes (Figure 3.2.1).

FIGURE 3.2.1 BODY WEIGHT STATUS AMONG ADULTS WITH AND WITHOUT DIAGNOSED DIABETES, OREGON, 2011



Data source: Oregon Behavioral Risk Factor Surveillance System
Note: Estimates are age-adjusted.

FIGURE 3.2.2 PREVALENCE OF RISK FACTORS AMONG ADULTS WITH DIAGNOSED DIABETES, OREGON, 2011

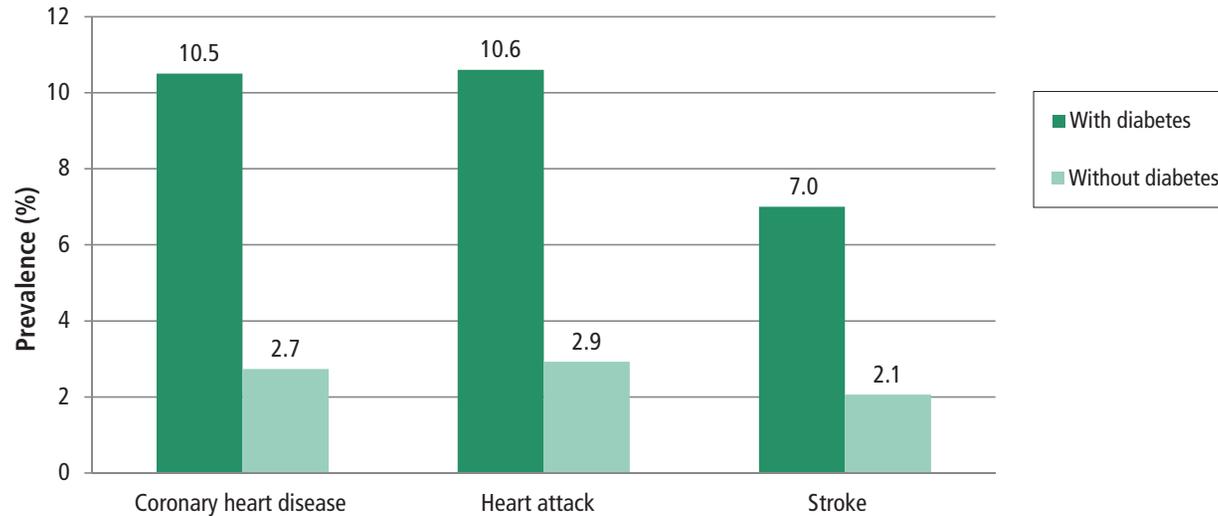


Data source: Oregon Behavioral Risk Factor Surveillance System

Note: Estimates are age-adjusted.

- ▶ The percentage of adults with diagnosed diabetes who also had high blood pressure or high cholesterol was more than double that of adults without diabetes (Figure 3.2.2).
- ▶ The cigarette smoking rate among adults with diagnosed diabetes was approximately 30% higher compared to adults without diabetes (Figure 3.2.2).
- ▶ Adults with diabetes were more likely to report doing no physical activity outside of work in the past month (Figure 3.2.2).

FIGURE 3.2.3 PREVALENCE OF HEART DISEASE, HEART ATTACK AND STROKE AMONG ADULTS WITH AND WITHOUT DIAGNOSED DIABETES, OREGON, 2011



Data source: Oregon Behavioral Risk Factor Surveillance System

Note: Estimates are age-adjusted.

- ▶ The prevalence of heart disease or heart attack among adults with diagnosed diabetes was almost four times higher than adults without diabetes, and the prevalence of stroke was nearly three-and-one-half times higher (Figure 3.2.3).

Conclusions

Overall, Oregon adults who have diagnosed diabetes also report chronic disease risk factors and other chronic conditions at a higher rate than those who do not have diagnosed diabetes. A higher proportion of adults with diagnosed diabetes were obese, smoked cigarettes, had high blood pressure, had high cholesterol and were not physically active compared to adults without diagnosed diabetes. Most notably, adults with diagnosed diabetes were 62% more likely to report being obese and almost three times as likely to report high blood pressure or high cholesterol compared to adults without diagnosed diabetes. High blood pressure and high cholesterol, along with cigarette smoking and lack of physical activity, are key contributors to the development of cardiovascular diseases and diabetes-related complications.



3.3 Diabetes self-management

Having diabetes means that blood glucose (blood sugar) levels are too high. If blood glucose stays too high for a long time, serious health problems may result. People with diabetes can lower their chances of having a heart attack, a stroke or other complications of diabetes by managing their diabetes ABCS – **A**1C (a measure of the average blood glucose level over the past three months), **B**lood pressure control, **C**holesterol control, and **S**moking cessation.^{6,7}

Health care providers can help people with diabetes understand what their ABC numbers should be and what they can do to reach their targets.* General recommendations for staying healthy with diabetes include:

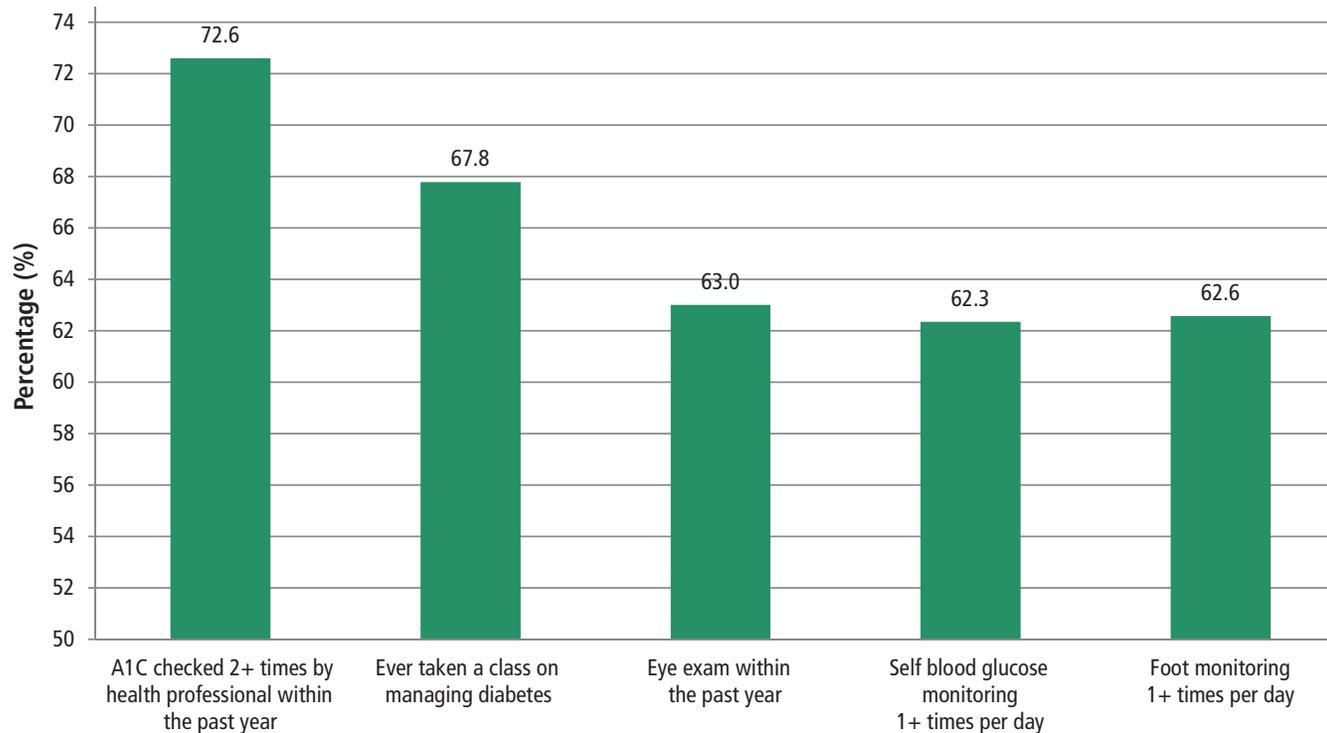
- ▶ Eat well.
- ▶ Be physically active.
- ▶ Maintain a healthy weight.
- ▶ Stop cigarette smoking.
- ▶ Keep track of blood sugar levels.
- ▶ Learn to cope with stress.
- ▶ Check feet every day for cuts, blisters, red spots and swelling.
- ▶ Take medicines for diabetes and other health problems as prescribed.

- ▶ Get routine health care including an annual flu shot and recommended tests (including A1C, blood pressure, cholesterol and a dilated eye exam).

Diabetes self-management education (DSME) programs can help people with diabetes gain the knowledge and skills needed to modify their behaviors and successfully self-manage the disease and its related conditions. The American Diabetes Association (ADA) and the American Association of Diabetes Educators (AADE) accredit, or recognize, diabetes education programs that meet National Standards for Diabetes Self-Management Education. In Oregon, DSME is available through organizations whose programs have been ADA-recognized, AADE-accredited, or licensed to offer the Stanford Diabetes Self-Management Program. In addition, people with diabetes may benefit from the Oregon Tobacco Quit Line and other self-management programs offered in Oregon such as Living Well with Chronic Conditions and Tomando Control de su Salud.

*Additional diabetes self-management recommendations are available through the National Diabetes Education Program: <http://ndep.nih.gov/i-have-diabetes/index.aspx>.

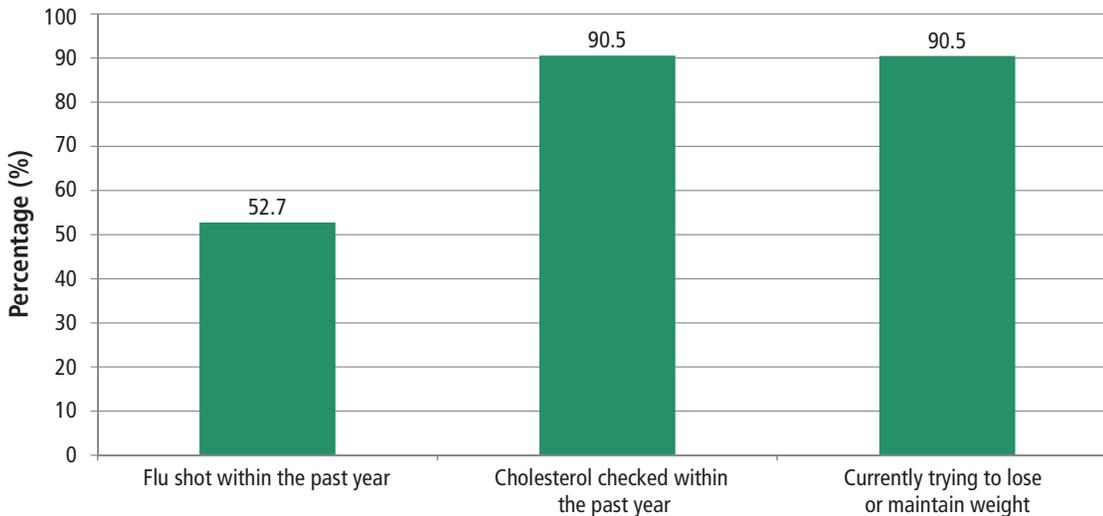
FIGURE 3.3.1 SELF-MANAGEMENT BEHAVIORS AMONG ADULTS WITH DIAGNOSED DIABETES, OREGON, 2011



Data source: Oregon Behavioral Risk Factor Surveillance System

- ▶ Self-management practices are crucial in keeping one's diabetes under control. Regular blood sugar monitoring, doctor visits, screenings for other diabetes-related complications, and educational classes are some examples of proper diabetes management (Figure 3.3.1).
- ▶ Of Oregon adults with diabetes (Type 1 or Type 2), 28.6% currently used insulin (not pictured).
- ▶ The majority checked their blood sugar and their feet for sores or irritations at least once per day.
- ▶ Nearly three-fourths of adults had their A1C levels checked by a health professional at least twice within the past year.
- ▶ Approximately two-thirds of adults with diabetes had an eye exam within the past year and had taken a class on managing their diabetes.

FIGURE 3.3.2 OTHER SELF-MANAGEMENT BEHAVIORS AMONG ADULTS WITH DIAGNOSED DIABETES, OREGON, 2011



Data source: Oregon Behavioral Risk Factor Surveillance System

- ▶ Adults with diabetes in Oregon have met Healthy People 2020 goals for annual foot and eye exams, two or more A1C checks within the past year, and for receiving formal diabetes education. However, the number of adults with diabetes who self-monitor their blood glucose at least once daily is below the target goal.
- ▶ Just over half of adults with diagnosed diabetes had an annual influenza (flu) shot within the past year (Figure 3.3.2).
- ▶ Most adults with diagnosed diabetes had their cholesterol checked within the past year.
- ▶ Most adults with diagnosed diabetes were currently trying to lose weight or maintain their current weight.

Conclusions

Encouragingly, many Oregon adults who have diagnosed diabetes are taking steps to manage their condition. A majority of adults with diagnosed diabetes meet recommendations for cholesterol screening and getting their A1C levels checked by a health professional. In addition, the majority of adults with diagnosed diabetes were trying to lose or maintain weight. However, there is room for improvement as approximately one-third of adults with diagnosed diabetes had never taken a class on how to manage their diabetes.

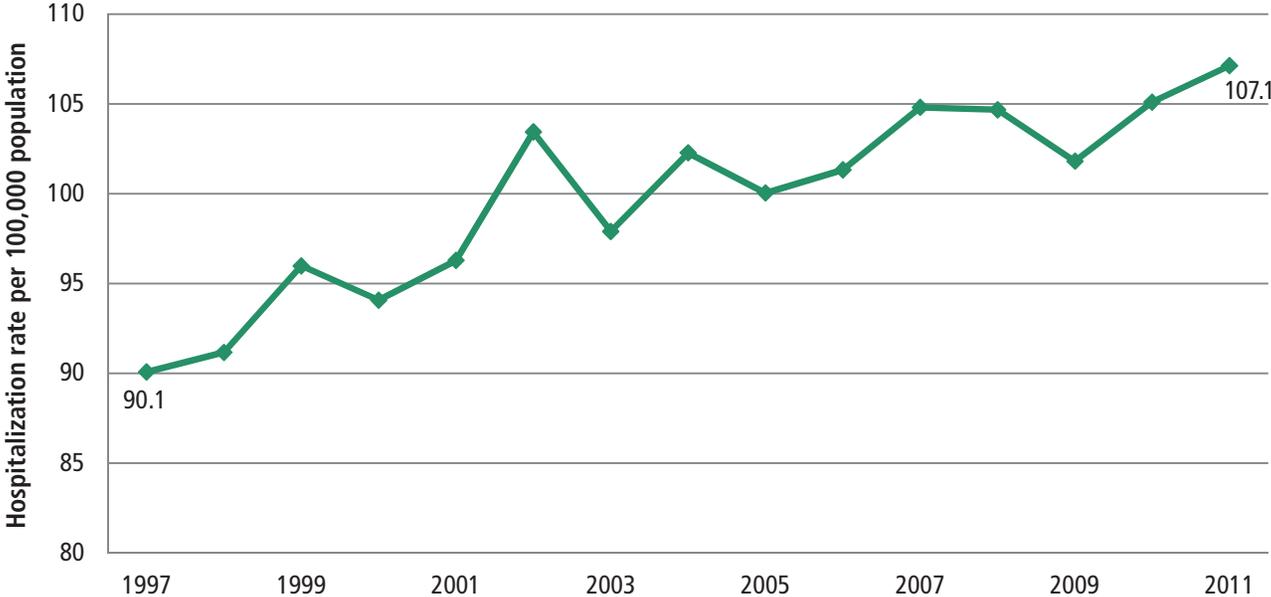


3.4 Diabetes hospitalizations

If diabetes is not properly managed or controlled, severe complications, such as infections, nerve damage and kidney damage, can develop and lead to hospitalization. In 2011, about one in six hospitalizations in Oregon were related to patients with diabetes. Research shows that patients with diabetes tend to have longer and more costly hospital stays,

and are more likely to be admitted through the emergency department compared to patients without diabetes.⁸ Among hospitalizations primarily caused by diabetes, approximately 40% were due to ketoacidosis (low insulin combined with high blood sugar levels), which is a serious condition that can result from uncontrolled or improperly managed diabetes. This section will describe diabetes-related hospitalizations in Oregon, complications involved and their associated costs.

FIGURE 3.4.1 DIABETES HOSPITALIZATION RATE, OREGON, 1997–2011



Data source: Oregon Hospital Discharge Dataset
Note: Estimates are age-adjusted.

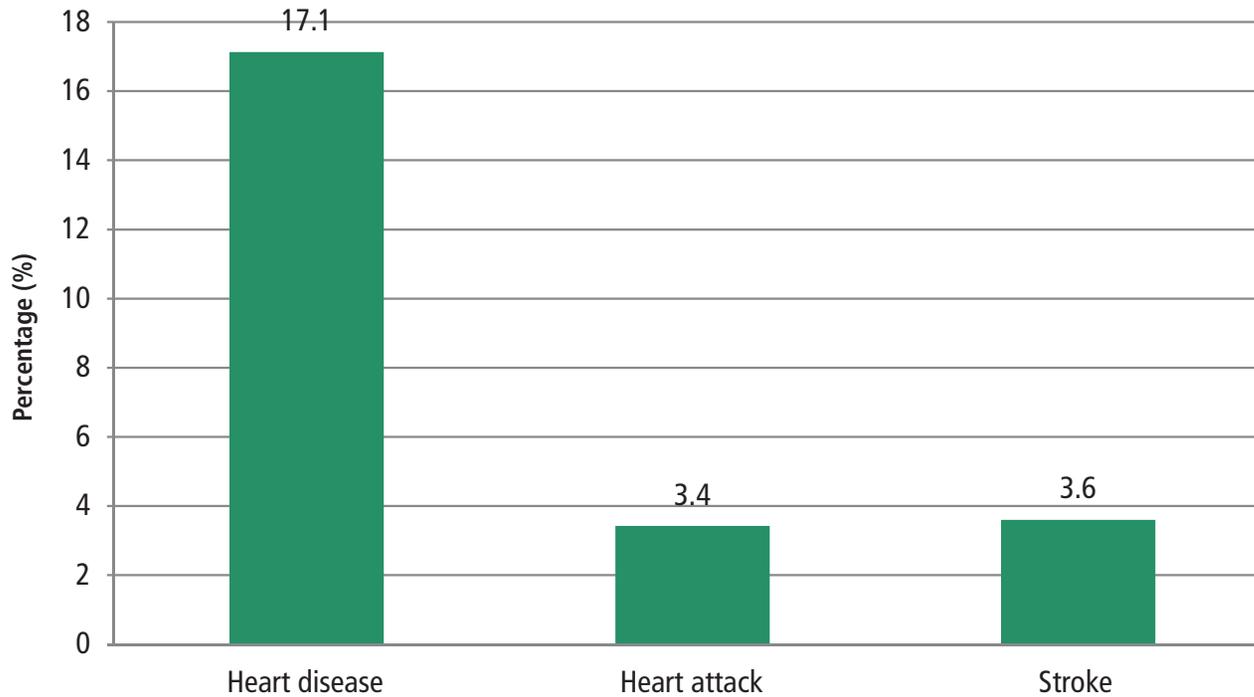
TABLE 3.4.1 DIABETES HOSPITALIZATION RATE, OREGON, 1997–2011

YEAR	DIABETES HOSPITALIZATION RATE
1997	90.1
1998	91.2
1999	96.0
2000	94.1
2001	96.3
2002	103.4
2003	97.9
2004	102.3
2005	100.0
2006	101.3
2007	104.8
2008	104.7
2009	101.8
2010	105.1
2011	107.1

Note: Estimates are age-adjusted.

- ▶ Between 1997 and 2011, the diabetes hospitalization rate increased 19% (Figure 3.4.1 and Table 3.4.1).
- ▶ In 2011, men had a higher rate of hospitalization primarily caused by diabetes compared to women.
- ▶ In 2011, diabetes was listed as the primary cause of hospitalization on 4,274 records, and as a contributing cause on 48,778 records. In total, diabetes was listed as any cause on 15.2% of all hospitalizations in 2011.
- ▶ The average cost of a hospitalization primarily caused by diabetes was more than \$21,000, with the total cost of all hospitalizations primarily caused by diabetes reaching more than \$91 million in 2011.

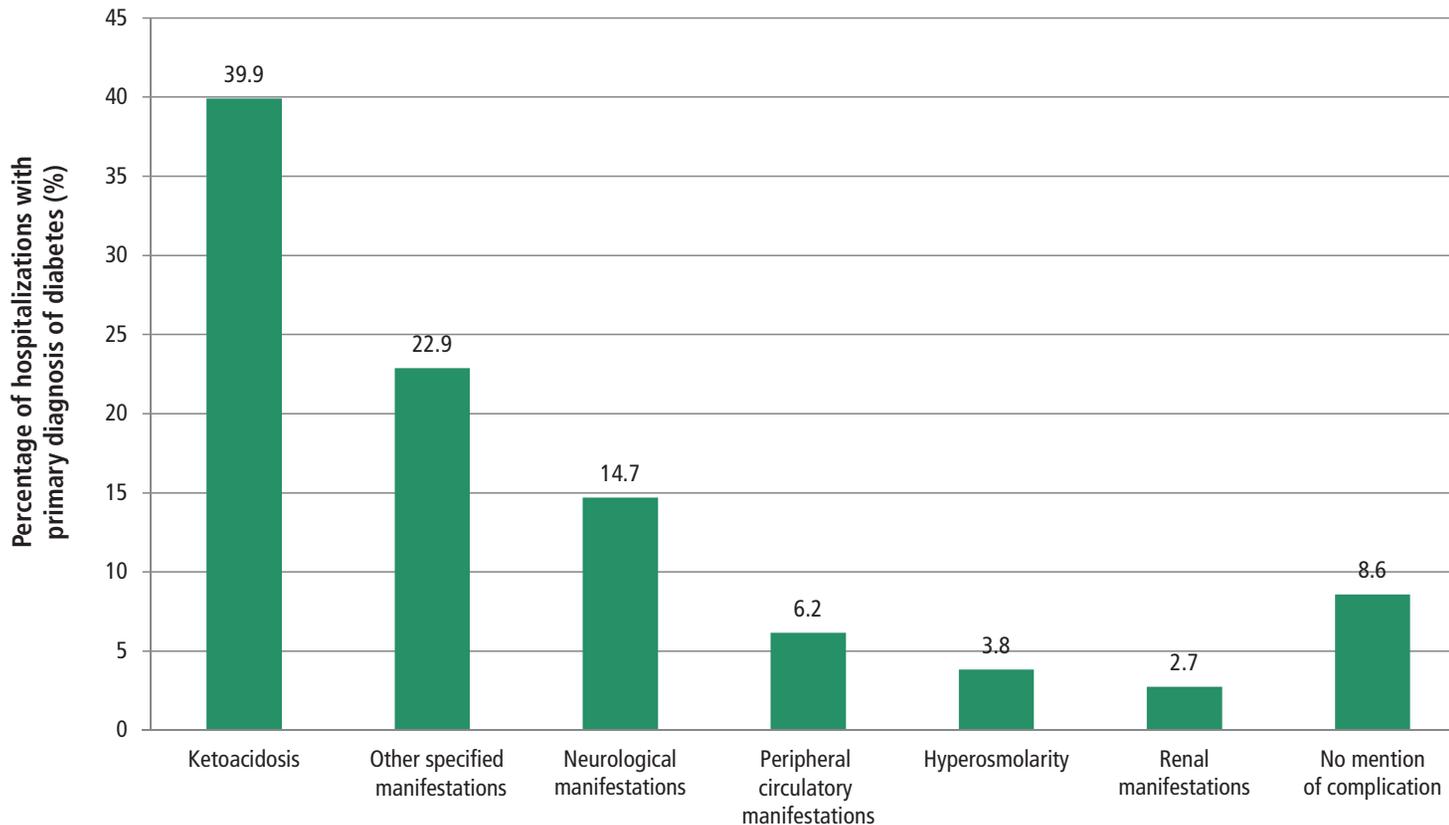
FIGURE 3.4.2 HOSPITALIZATIONS DUE TO CARDIOVASCULAR DISEASES AMONG PATIENTS WITH DIABETES, OREGON, 2011



Data source: Oregon Hospital Discharge Dataset

- ▶ Among hospitalizations with diabetes listed as a contributing cause, almost one-quarter had cardiovascular diseases listed as the primary cause of hospitalization (Figure 3.4.2).
- ▶ Similarly, among hospitalizations primarily caused by diabetes, nearly a quarter had heart disease, heart attack or stroke listed as a contributing cause of hospitalization (not pictured).

FIGURE 3.4.3 DIABETES-RELATED COMPLICATIONS AMONG HOSPITALIZATIONS PRIMARILY CAUSED BY DIABETES, OREGON, 2011



Data source: Oregon Hospital Discharge Dataset

Note: Complications reflect primary diabetes ICD-9 diagnosis codes (250.0–250.9)

▶ Ketoacidosis (low insulin combined with high blood sugar levels) was the most common related complication among hospitalizations that were primarily caused by diabetes (39.9% of all primary diabetes hospitalizations).

▶ Hyperosmolarity (dehydration due to high blood sugar levels), along with neurological, circulatory and renal manifestations were also common complications.

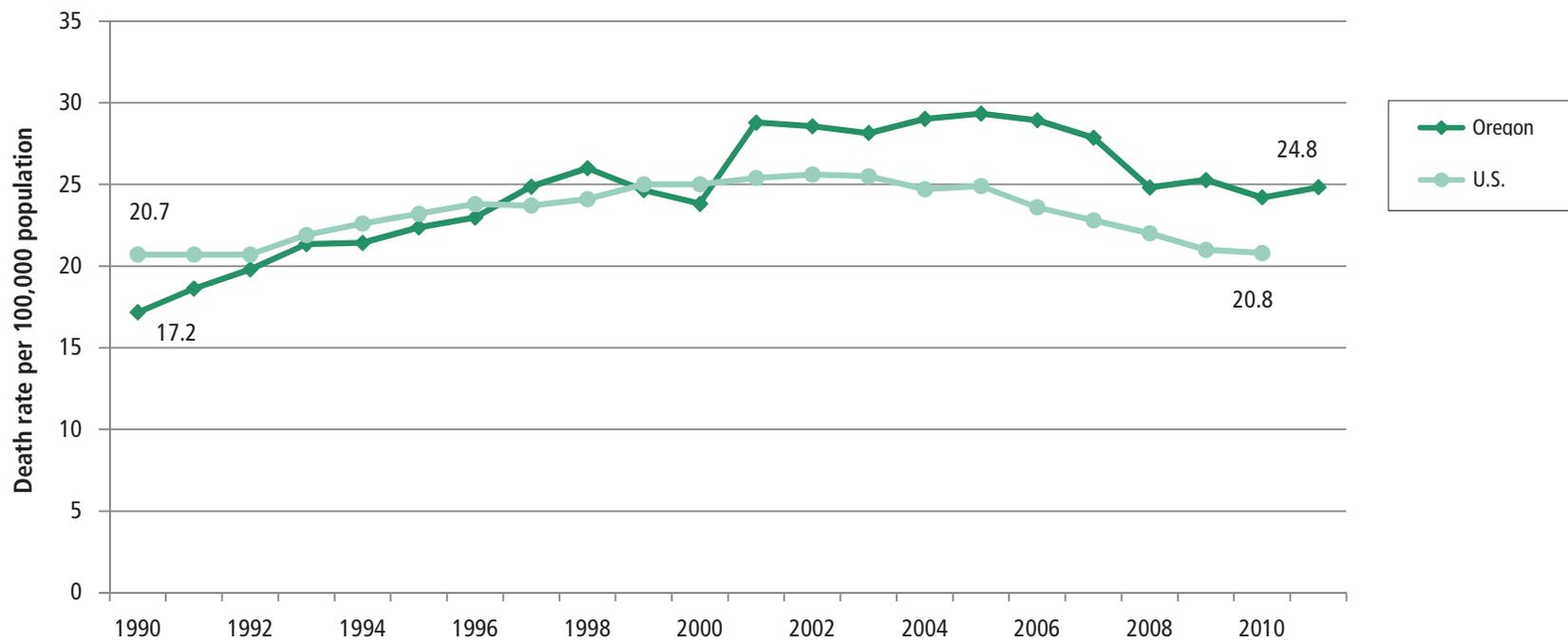
3.5 Diabetes mortality

Diabetes is the seventh leading cause of death in Oregon. However, since many diabetes deaths tend to be primarily attributed to diabetes-related complications (such as heart disease) rather than diabetes itself, examining diabetes as the primary cause of death underestimates the impact of the disease on mortality. Overall, the risk of death among people with diabetes is about double that of people without diabetes

(of a similar age).¹ This section will describe diabetes mortality in Oregon as a primary and contributing cause of death.

- ▶ Since 1990, the diabetes death rate in Oregon increased 44% (Figure 3.5.1 and Table 3.5.1).
- ▶ In the last decade, the diabetes death rate in Oregon has consistently been higher compared to the United States (Figure 3.5.1 and Table 3.5.1).

FIGURE 3.5.1 DIABETES DEATH RATES, OREGON AND THE UNITED STATES, 1990–2011



Data source: Oregon Vital Records and CDC WONDER online database (data not yet available for 2011).

Notes: Estimates are age-adjusted. Death rates reflect diabetes as the primary cause of death.

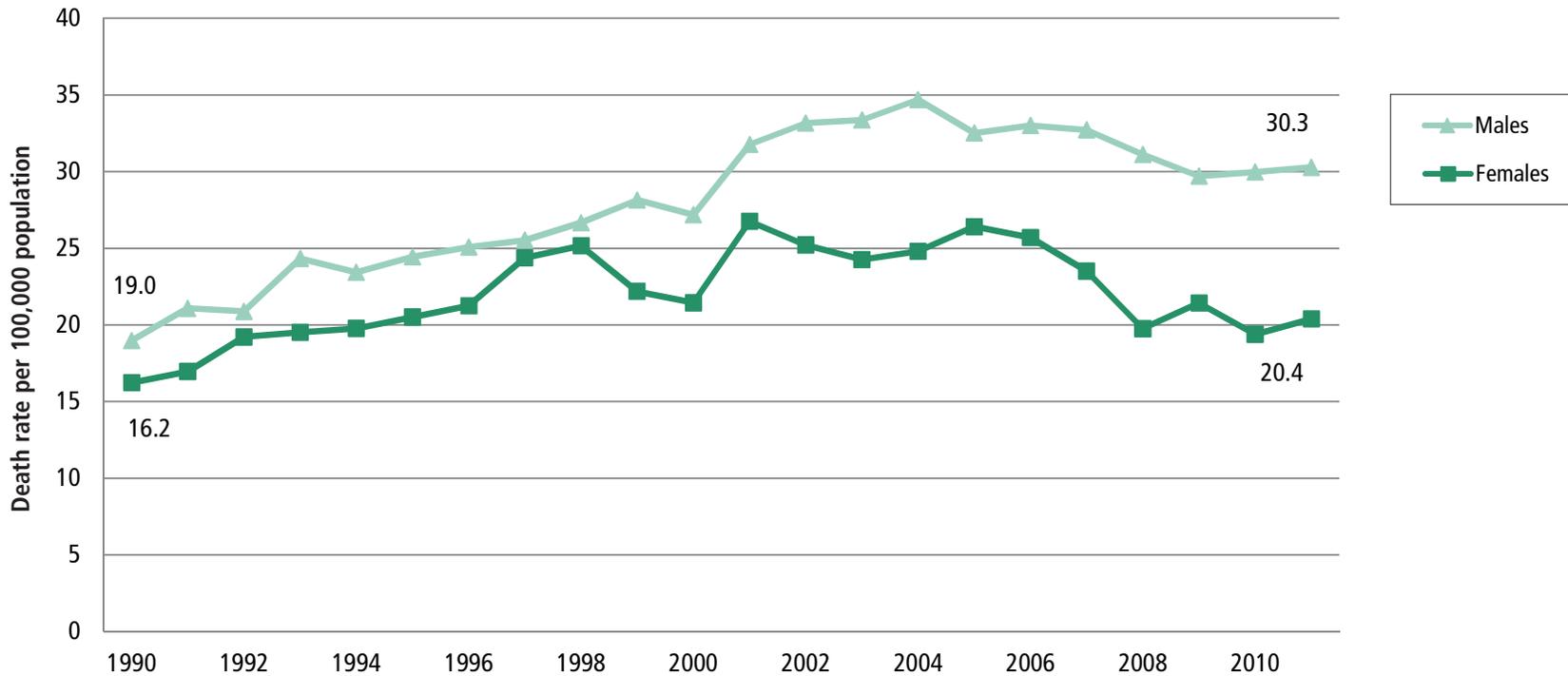
TABLE 3.5.1 DIABETES DEATH RATES, OREGON AND THE UNITED STATES, 1990–2011

YEAR	DIABETES DEATHS — OREGON	DIABETES DEATHS — UNITED STATES
1990	17.2	20.7
1991	18.6	20.7
1992	19.8	20.7
1993	21.4	21.9
1994	21.4	22.6
1995	22.4	23.2
1996	23.0	23.8
1997	24.9	23.7
1998	26.0	24.1
1999	24.7	25.0
2000	23.8	25.0
2001	28.8	25.4
2002	28.6	25.6
2003	28.1	25.5
2004	29.0	24.7
2005	29.3	24.9
2006	28.9	23.6
2007	27.9	22.8
2008	24.8	22.0
2009	25.3	21.0
2010	24.2	20.8
2011	24.8	N/A



► In 2011, the diabetes death rate in Oregon was 24.8 per 100,000 deaths.

FIGURE 3.5.2 DIABETES DEATH RATES, BY SEX AND YEAR, OREGON, 2011

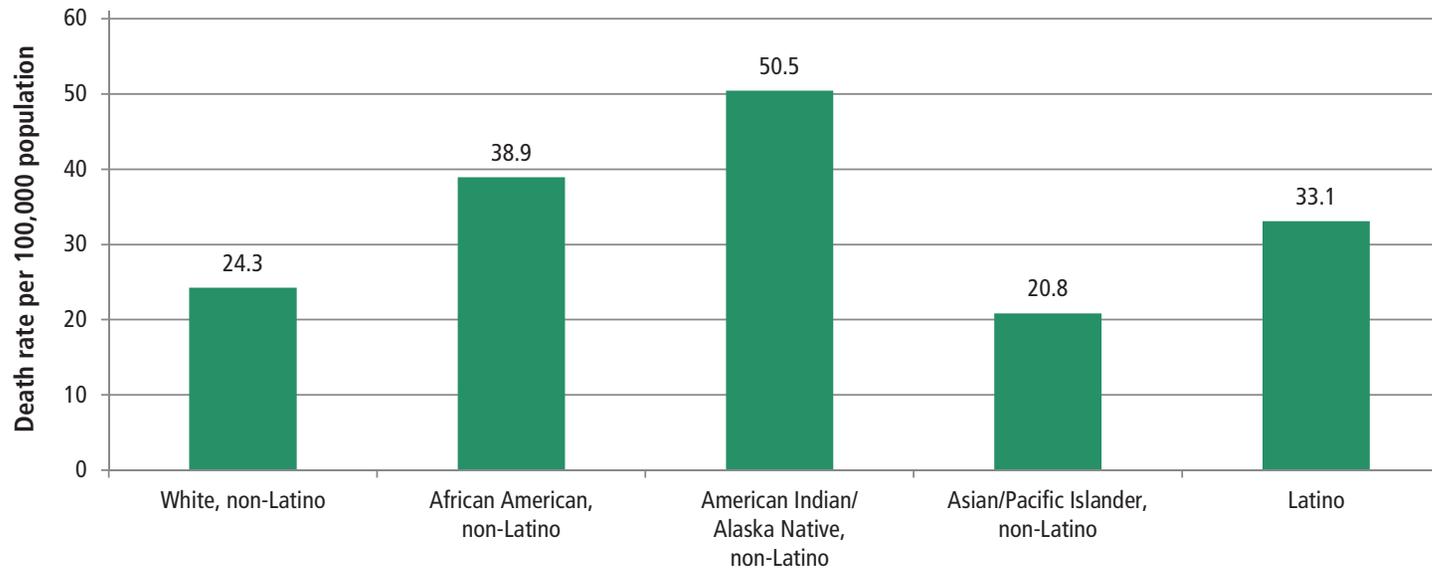


Data source: Oregon Vital Records

Notes: Estimates are age-adjusted. Death rates reflect diabetes as the primary cause of death.

- ▶ The diabetes death rate was 50% higher for men than for women in 2011 (Figure 3.5.2).
- ▶ Diabetes was the seventh leading cause of death in Oregon in 2011.
- ▶ A total of 1,114 deaths were primarily due to diabetes, accounting for 3.4% of all deaths among Oregon residents.
- ▶ Diabetes was additionally listed as a contributing cause of death on 2,732 death certificates. In total, diabetes was reported on 3,846 death certificates in Oregon in 2011, accounting for 12% of all deaths among Oregon residents.

FIGURE 3.5.3 DIABETES DEATH RATES, BY RACE, OREGON, 2011



Data source: Oregon Vital Records

Notes: Estimates are age-adjusted. Death rates reflect diabetes as the primary cause of death.

- ▶ In 2011, the diabetes death rate was higher among non-Latino African-Americans, non-Latino American Indians/Alaska Natives, and Latinos compared to non-Latino whites (Figure 3.5.3).

Conclusions

Diabetes was the primary cause of death for more than 3% of all deaths in Oregon in 2011, and was a contributing factor to an additional 8%. In total, diabetes was the primary or contributing cause of death for approximately 12% (3,486) of all deaths in Oregon in 2011. The diabetes

death rate is higher among men compared to women, and it is also higher among racial and ethnic minority groups compared to non-Latino whites. Of deaths where diabetes was the primary cause, more than 60% listed cardiovascular diseases as a contributing cause. Of deaths where cardiovascular diseases were the primary cause, 13% listed diabetes as a contributing cause.

3.6 Costs of diabetes

Diabetes creates a significant economic burden at the national, state and community level. The American Diabetes Association (ADA) estimates that annual expenditures related to diabetes have reached \$245 billion in the United States, including \$176 billion in direct medical costs and \$69 billion in indirect costs (absenteeism, reduced productivity, unemployment due to disability, etc.).² This is an increase of 41% over the previous estimate (\$174 billion) from 2007. The ADA also estimates that 23% of total health care costs in the United States can be attributed to diabetes.

In Oregon, nearly \$2.2 billion in excess medical expenditures are associated with diabetes each year, averaging \$7,800 per person with diabetes. In addition, costs associated with reduced productivity from diabetes are estimated at \$840 million. The total cost of diabetes in Oregon is estimated at nearly \$3 billion per year. Many of the medical expenditures related to diabetes can be attributed to hospitalizations due to complications. The average cost of a hospitalization primarily caused by diabetes was more than \$21,000 in 2011, with the total cost of all hospitalizations primarily caused by diabetes reaching more than \$91 million.

Diabetes continues to be a major contributor to increased health care costs. Without significant changes in public and private health system strategies, the costs associated with diabetes can be expected to at least double during the next 25 years.⁹



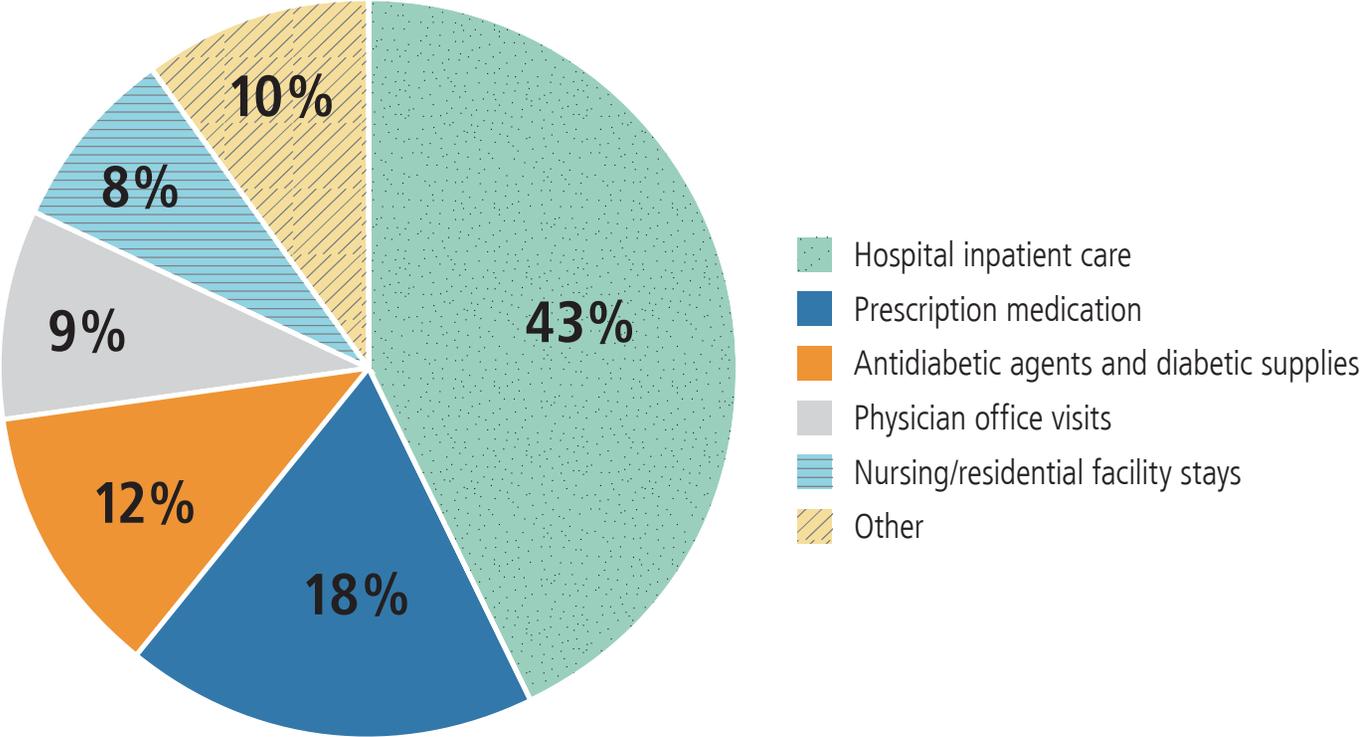
Reducing diabetes costs

Maintaining a healthy diet and getting regular physical activity may prevent or delay the onset of Type 2 diabetes and reduce the risk of complications for people with diabetes. Some of the behavioral and environmental factors associated with diabetes include cigarette smoking and exposure to secondhand smoke, overweight and obesity, high blood pressure, high cholesterol, and lack of physical activity. Many of these factors can be addressed by creating environments that support Oregonians in eating better, moving more and living tobacco-free.

Oregon also promotes and supports strategies to improve delivery and use of quality clinical services to prevent diabetes and diabetes-related complications. These strategies include conducting recommended screenings for blood pressure, cholesterol, and blood sugar; increasing clinical referrals to self-management education programs; and delivering health care in accordance with clinical practice guidelines.



FIGURE 3.6.1 DIRECT MEDICAL COSTS DUE TO DIABETES, UNITED STATES, 2012



Data source: American Diabetes Association

3.7 Prediabetes

Prediabetes is a condition in which blood sugar levels are higher than normal but not high enough to be considered diabetes. People with prediabetes have a higher risk of developing Type 2 diabetes, heart disease and stroke.

The Centers for Disease Control and Prevention (CDC) estimates that 35% of U.S. adults aged 20 years or older have prediabetes. Applying the national prediabetes estimated rate to the Oregon population yields an estimate of nearly one million adults in Oregon who have prediabetes, and most likely do not know they have it.

It is recommended that screening for Type 2 diabetes with a blood glucose test be considered for those who are at higher risk, including adults at any age who are overweight and have additional diabetes risk factors. Testing for adults without other diabetes risk factors is recommended starting at age 45 years. If test results are normal, testing is recommended every three years, with more frequent testing depending on risk status and if results indicate prediabetes. For children and adolescents under 18 years of age, testing to detect Type 2 diabetes and prediabetes should be considered for those who are overweight and have two or more additional risk factors for diabetes (family history, racial or ethnic minority, lack of physical activity, high blood pressure or high cholesterol).⁶

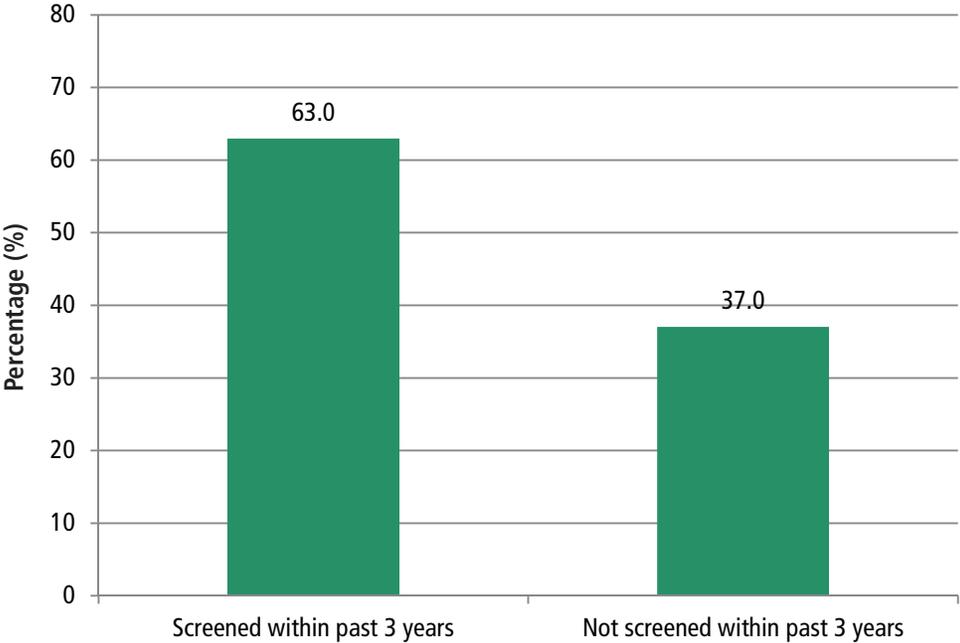
People with prediabetes who adopt a healthier lifestyle and lose weight by eating better and moving more can prevent or delay Type 2 diabetes. The National Diabetes Prevention Program is a one-year, community-based lifestyle change

program proven to prevent Type 2 diabetes in adults at risk for developing diabetes. Participants work with a lifestyle coach in a group setting that includes 16 core sessions (usually one per week) and eight post-core sessions (one per month). The Oregon Health Authority Public Health Division is working with partner organizations to expand the reach of the National Diabetes Prevention Program in Oregon.

- ▶ In Oregon, approximately two-thirds of adults aged 45 years or older reported having a blood sugar test within the past three years.
- ▶ Of those adults aged 45 years or above who reported having a blood sugar test in the last three years, 9% reported having been diagnosed with prediabetes.
- ▶ This is likely an underestimate of the prediabetes prevalence in Oregon, since 37% of adults reported they have not had a blood sugar test within the past three years. Many adults who have had a blood sugar test within the past three years could also be unknown.



FIGURE 3.7.1 ADULTS AGED 45 YEARS AND OLDER WHO HAVE HAD A BLOOD SUGAR TEST WITHIN THE PAST THREE YEARS, OREGON, 2011



Data source: Oregon Behavioral Risk Factor Surveillance System

Notes: Estimates are age-adjusted.

3.8 Gestational diabetes

Gestational diabetes is a type of diabetes that occurs during pregnancy. In most cases, gestational diabetes goes away after pregnancy. However, 5% to 10% of women with gestational diabetes are found to have diabetes immediately after pregnancy, and women who have had gestational diabetes have a 35% to 60% chance of developing diabetes in the next 10–20 years.¹

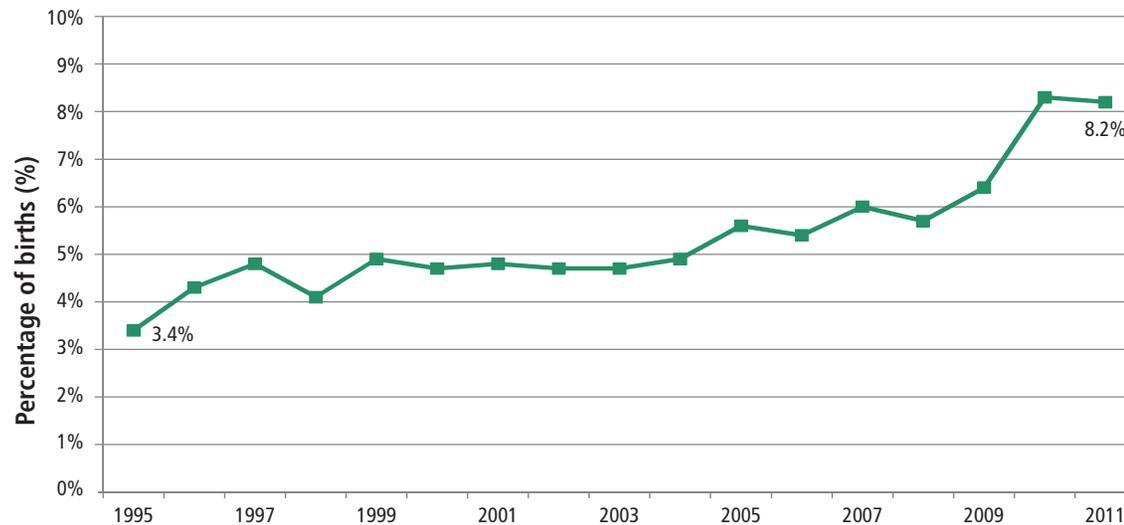
When blood sugar is frequently high during pregnancy, it can result in increased health risks for pregnant women, including preeclampsia, preterm birth and C-section.¹⁰ It can also cause

the baby of a woman with gestational diabetes to grow very large (nine pounds or more). Large babies increase the risk of complications during birth and of the baby being overweight or developing diabetes later in life.¹⁰ Eating well, staying active and keeping blood sugar under control can prevent complications from gestational diabetes as well as prevent or delay getting Type 2 diabetes following pregnancy.

This section will describe the burden of gestational diabetes among Oregon mothers over time and by race and ethnicity.

- ▶ The prevalence of gestational diabetes among Oregon mothers more than doubled from 1995 to 2011, increasing from 3.4% to 8.2% (Figure 3.8.1 and Table 3.8.1).

FIGURE 3.8.1 PERCENTAGE OF BIRTHS TO MOTHERS WITH GESTATIONAL DIABETES, OREGON, 1995–2011



Data source: Oregon Vital Records

Notes: Data refer to births to mothers aged 10–49 years. Estimates are age-adjusted.



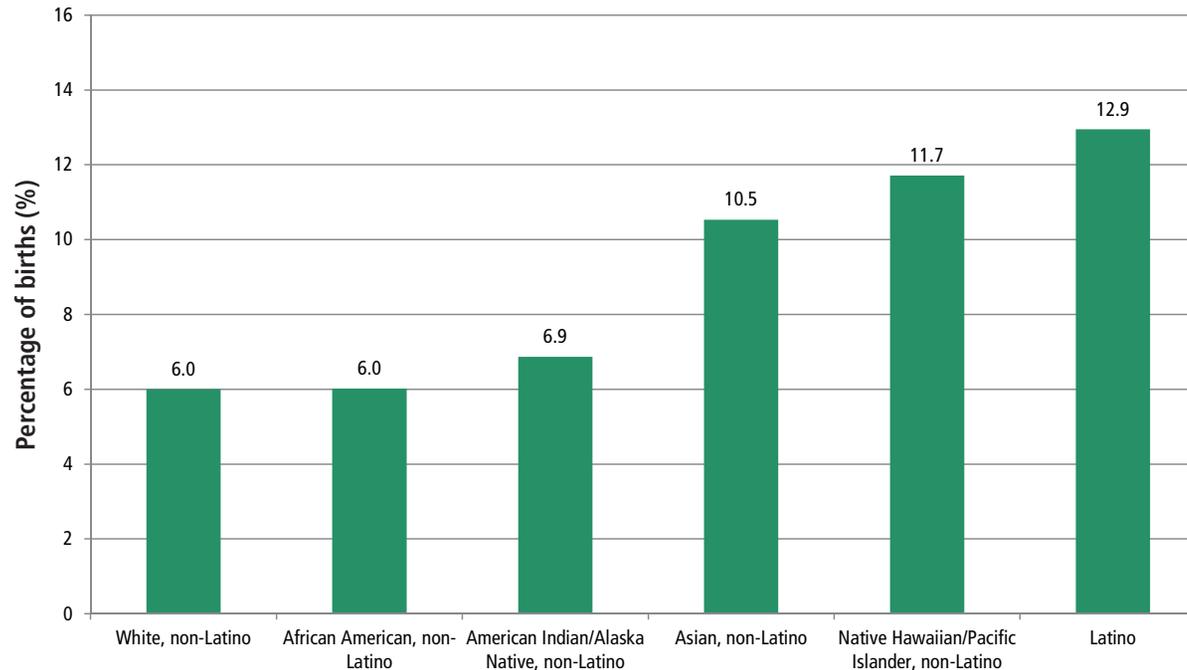
TABLE 3.8.1 PERCENTAGE OF BIRTHS TO MOTHERS WITH GESTATIONAL DIABETES, OREGON, 1995–2011

YEAR	PERCENT OF BIRTHS
1995	3.4%
1996	4.3%
1997	4.8%
1998	4.1%
1999	4.9%
2000	4.7%
2001	4.8%
2002	4.7%
2003	4.7%
2004	4.9%
2005	5.6%
2006	5.4%
2007	6.0%
2008	5.7%
2009	6.4%
2010	8.3%
2011	8.2%

Data source: Oregon Vital Records

Notes: Data refer to births to mothers aged 10–49. Estimates are age-adjusted.

FIGURE 3.8.2 PERCENTAGE OF BIRTHS TO MOTHERS WITH GESTATIONAL DIABETES, BY RACE AND ETHNICITY, OREGON, 2011



Data source: Oregon Vital Records

Notes: Data refer to births to mothers aged 10–49 years. Estimates are age-adjusted.

- ▶ Oregon mothers who were members of racial and ethnic minority groups were disproportionately affected by gestational diabetes (Figure 3.8.2).
- ▶ Nearly 13% of Latina mothers were diagnosed with gestational diabetes during their pregnancies, compared with 11.7% of non-Latina Native Hawaiians/Pacific Islanders, 10.5% of non-Latina Asians, 6.9% of non-Latina American Indians/Alaska Natives, and 6% of non-Latina whites, and non-Latina African-American women (Figure 3.8.2).

Conclusions

The prevalence of gestational diabetes among Oregon mothers more than doubled during the past 15 years, increasing more than 140% between 1995 and 2011. Mothers who are members of racial and ethnic minority groups are disproportionately affected by gestational diabetes, especially non-Latina Asians, non-Latina Native Hawaiians or Pacific Islanders, and Latina women.

WAYS TO REDUCE DIABETES IN OREGON



Maintaining a healthy diet and getting regular physical activity may prevent or delay the onset of Type 2 diabetes and reduce the risk of complications for people with diabetes. Some of the behavioral and environmental factors associated with diabetes include cigarette smoking and exposure to secondhand smoke, overweight and obesity, high blood pressure, high cholesterol, inadequate consumption of fruits and vegetables, and lack of physical activity. Many of these factors can be addressed through lifestyle changes and environments that support Oregonians in eating better, moving more and living tobacco-free. Effectively reducing these risk factors will help reduce the prevalence of diabetes in the future.

There are many resources available in Oregon to support individuals, families and employers in preventing and controlling diabetes. The National Diabetes Prevention Program is a one-year, community-based lifestyle change program that has been proven to prevent Type 2 diabetes in adults at risk for developing diabetes. For people with diabetes, Oregon's chronic disease self-management program (Living Well with Chronic Conditions and Tomando Control de su Salud) provide tools for living a healthy life with chronic health conditions such as diabetes. Diabetes self-management programs help people with diabetes gain the knowledge and skills needed to modify their behavior and successfully self-manage the disease and its related conditions. The Oregon Tobacco Quit Line provides free tobacco cessation coaching to help people live tobacco-free. Visit www.healthoregon.org/takecontrol for more information on programs to help people manage their condition and live healthier lives.

Oregon also promotes and supports strategies to improve delivery and use of quality clinical services to prevent diabetes and diabetes-related complications. These strategies include conducting recommended screenings for blood pressure, cholesterol, and blood sugar; increasing clinical referrals to self-management education programs; and delivering health care in accordance with clinical practice guidelines.

Visit the Oregon Diabetes and Prevention Control Program webpage for diabetes prevention resources and more information on strategies to reduce the burden of diabetes in Oregon: www.healthoregon.org/diabetes.

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APPENDIX A: COUNTY-LEVEL ESTIMATES



TABLE A.1. AGE-ADJUSTED AND UNADJUSTED PREVALENCE OF DIABETES, HEART ATTACK AND HEART DISEASE AMONG ADULTS, BY COUNTY, OREGON 2008–2011

	Diabetes		Heart attack		Heart disease	
	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted
OREGON	–	7.2%	–	9.9%	–	3.5%
County						
Baker	11.2%	10.0%†	6.1%†	7.5%	6.0%†	6.4%†
Benton	6.8%	7.5%	2.5%	10.8%	2.5%	2.5%*
Clackamas	8.1%	7.5%	2.9%	9.5%	2.9%	2.6%*
Clatsop	8.7%	7.5%	6.5%	5.9%*	4.9%	3.8%
Columbia	8.4%	7.5%	2.9%	11.3%	3.5%	3.0%
Coos	12.4%	10.9%	7.6%	18.1%*	8.5%	7.3%†
Crook	10.2%	9.1%	4.7%†	6.8%†	2.8%†	2.0%†
Curry	9.7%	6.8%	6.5%	8.8%	7.5%	4.9%
Deschutes	6.6%	5.8%	2.8%	9.2%	3.5%	2.9%
Douglas	12.8%	11.2%*	6.7%	14.2%*	4.4%	3.2%
Grant	8.3%†	5.8%†	3.5%†	12.1%†	4.7%†	2.6%†
Harney	9.0%†	7.7%†	–	15.1%†	–	–
Hood River	6.1%†	5.3%†	–	2.2%†	–	–
Jackson	8.6%	7.8%	3.8%	9.1%	3.8%	3.2%
Jefferson	6.1%†	5.3%†	5.3%†	9.2%†	2.6%†	2.0%†
Josephine	10.3%	7.6%	6.6%	10.6%	6.6%	4.7%
Klamath	8.0%	7.0%	6.4%	14.1%	4.0%	3.3%

TABLE A.1. AGE-ADJUSTED AND UNADJUSTED PREVALENCE OF DIABETES, HEART ATTACK AND HEART DISEASE AMONG ADULTS, BY COUNTY, OREGON 2008–2011, CONTINUED

	Diabetes		Heart attack		Heart disease	
	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted
OREGON	–	7.2%	–	9.9%	–	3.5%
County						
Lake	7.6%†	4.9%†	7.9%†	7.2%†	5.1%†	3.3%†
Lane	7.4%	6.9%	3.9%	11.7%*	3.6%	3.1%
Lincoln	10.4%	7.8%	4.1%	9.6%	3.9%	2.7%
Linn	8.6%	7.3%	4.3%	9.9%	5.4%	4.4%
Malheur	10.5%	10.3%	3.4%†	9.3%	4.1%†	4.0%†
Marion	7.8%	7.6%	3.8%	9.2%	4.4%	4.1%
Morrow	7.3%†	6.6%†	4.1%†	6.6%†	5.8%†	5.6%†
Multnomah	6.5%	6.6%	2.7%	8.9%	3.7%	3.7%
Polk	8.3%	7.5%	6.6%	10.6%	6.2%	5.8%
Tillamook	12.8%	11.2%	5.4%	6.4%*	5.3%	3.3%
Umatilla	9.6%	9.4%	4.0%	9.1%	2.3%	2.1%*
Union	9.1%†	8.6%†	3.8%†	13.5%	4.0%†	3.4%†
Wallowa	7.1%†	5.0%†	4.6%†	6.2%†	6.6%†	4.4%†
Washington	5.8%	6.0%*	2.5%	9.6%	2.9%	3.1%
Wheeler	–	–	–	–	–	–
Yamhill	6.1%	6.0%	4.2%†	9.3%	4.2%	4.0%
Gilliam/Sherman/ Wasco	8.1%	6.6%	6.3%	7.5%†	5.6%	4.9%†

* Statistically significant difference compared with all other counties (p -value ≤ 0.05)

† This number may be statistically unreliable and should be interpreted with caution.

– This number is suppressed because it is statistically unreliable.

Data source: Oregon BRFSS County Combined Dataset 2008–2011

Note: Age-adjusted estimates are adjusted to the 2000 Standard Population using three age groups (18–34, 35–54 and 55+).

TABLE A.2. AGE-ADJUSTED AND UNADJUSTED PREVALENCE OF STROKE, HIGH BLOOD PRESSURE AND HIGH CHOLESTEROL AMONG ADULTS, BY COUNTY, OREGON, 2008–2011

	Stroke		High blood pressure		High cholesterol	
	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted
OREGON	–	2.3%	–	26.6%	–	32.2%
County						
Baker	5.3%†	–	40.4%	32.8%	56.4%	51.7%
Benton	1.5%	1.6%*	20.9%	21.5%	29.1%	27.8%
Clackamas	2.5%	2.2%	28.9%	27.0%	37.1%	33.1%
Clatsop	4.2%	3.1%	35.6%	31.2%	41.3%	28.4%
Columbia	2.7%†	2.5%†	32.7%	29.4%	40.7%	29.8%
Coos	6.2%†	5.9%†	32.9%	26.1%	39.8%	35.2%
Crook	–	–	42.4%	38.3%	48.3%	42.9%
Curry	2.5%†	1.3%†	35.8%	22.7%	44.9%	29.3%
Deschutes	1.8%	1.5%*	24.6%	21.2%*	38.0%	37.8%
Douglas	4.3%	3.3%	36.8%	33.1%*	43.5%	38.4%
Grant	–	–	37.3%	22.8%	54.2%	68.3%*
Harney	–	–	21.3%†	14.4%*	39.1%	37.8%†
Hood River	–	–	23.2%	20.6%	16.2%	12.1%*
Jackson	2.7%	2.1%	32.0%	29.0%	41.6%	34.0%
Jefferson	1.8%†	1.4%†	21.9%	17.6%*	38.6%	24.0%
Josephine	3.2%	2.4%	35.5%	29.7%	38.2%	26%*
Klamath	3.4%	3.2%	33.7%	30.6%	44.0%	39.7%
Lake	–	–	32.2%†	22.1%	58.8%	51.0%
Lane	2.4%	2.1%	28.3%	26.8%	39.1%	33.7%

TABLE A.2. AGE-ADJUSTED AND UNADJUSTED PREVALENCE OF STROKE, HIGH BLOOD PRESSURE AND HIGH CHOLESTEROL AMONG ADULTS, BY COUNTY, OREGON, 2008–2011, CONTINUED

	Stroke		High blood pressure		High cholesterol	
	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted
OREGON	–	2.3%	–	26.6%	–	32.2%
County						
Lincoln	3.7%	2.8%†	39.6%	35.1%	45.4%	34.8%
Linn	3.9%	3.6%	28.8%	26.3%	33.8%	28.4%
Malheur	1.6%†	1.4%†	29.3%	26.0%	30.3%	21.7%*
Marion	3.0%	2.8%	27.9%	27.2%	33.6%	29.8%
Morrow	–	–	29.1%	22.9%	41.6%	27.5%
Multnomah	1.9%	2.0%*	26.1%	26.1%	35.1%	32.4%
Polk	1.5%	1.3%*	25.9%	24.4%	36.4%	30.5%
Tillamook	3.8%†	3.0%†	27.9%	20.4%	47.0%	44.9%
Umatilla	3.7%	3.4%	32.7%	32.1%	47.6%	42.6%*
Union	2.9%†	2.3%†	31.8%	28.8%	41.3%	40.0%
Wallowa	5.8%†	–	43.7%	28.7%	44.6%	35.2%
Washington	2.1%	2.1%	23.5%	24.2%*	32.2%	28.6%*
Wheeler	–	–	–	–	–	–
Yamhill	2.2%	2.0%	27.8%	26.9%	35.3%	32.7%
Gilliam/Sherman/ Wasco	2.4%†	1.6%†	37.8%	34.1%	35.6%	27.3%

* Statistically significant difference compared with all other counties (p-value < = 0.05)

† This number may be statistically unreliable and should be interpreted with caution.

– This number is suppressed because it is statistically unreliable.

Data source: Oregon BRFSS County Combined Dataset 2008–2011

Note: Age-adjusted estimates are adjusted to the 2000 Standard Population using three age groups (18–34, 35–54 and 55+).

TABLE A.3. AGE-ADJUSTED AND UNADJUSTED PREVALENCE OF OBESITY, CURRENT SMOKER AND LACK OF PHYSICAL ACTIVITY AMONG ADULTS, BY COUNTY, OREGON, 2008–2011

	Obese		Current cigarette smoker		Lack of physical activity	
	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted
OREGON	–	24.8%	–	16.3%	–	17.5%
County						
Baker	26.6%	26.6%	23.0%	26.4%*	27.7%	31.7%*
Benton	18.1%	18.7%*	10.3%	10.2%*	13.4%	13.9%
Clackamas	24.0%	23.9%	14.0%	14.3%*	15.7%	15.4%*
Clatsop	30.5%	31.4%	19.6%	20.3%	18.3%	17.5%
Columbia	24.7%	23.7%	18.2%	19.2%	19.2%	18.9%
Coos	30.0%	30.0%*	24.8%	28.3%*	21.7%	19.8%
Crook	25.5%	25.6%	16.7%	17.4%	19.4%	18.7%
Curry	30.1%	31.5%	24.5%	32.3%*	25.5%	25.1%
Deschutes	17.4%	17.2%*	13.1%	13.8%	18.1%	18.2%
Douglas	32.5%	33.6%*	23.8%	26.7%*	21.4%	20.9%
Grant	23.1%	21.8%	22.8%	26.2%	16.1%†	20.1%†
Harney	22.8%	22.7%	9.0%†	8.4%†	20.7%	18.5%
Hood River	19.5%	19.7%	9.2%	9.5%†	16.9%	16.9%
Jackson	21.0%	20.7%*	19.7%	21.2%*	15.2%	14.3%*
Jefferson	28.5%	28.7%	14.6%	15.4%	21.4%	20.7%
Josephine	21.7%	19.7%*	19.3%	21.3%*	22.1%	21.4%
Klamath	28.4%	29.4%	19.9%	20.6%	21.9%	21.6%
Lake	28.4%	27.1%	16.8%	19.2%†	21.0%	19.1%
Lane	26.4%	26.5%	17.6%	18.1%	16.8%	16.6%

TABLE A.3. AGE-ADJUSTED AND UNADJUSTED PREVALENCE OF OBESITY, CURRENT SMOKER AND LACK OF PHYSICAL ACTIVITY AMONG ADULTS, BY COUNTY, OREGON, 2008–2011, CONTINUED

	Obese		Current cigarette smoker		Lack of physical activity	
	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted	Unadjusted	Age-adjusted
OREGON	–	24.8%	–	16.3%	–	17.5%
County						
Lincoln	27.5%	26.6%	22.8%	27.4%*	21.3%	20.1%
Linn	30.5%	30.6%*	18.2%	19.0%	24.4%	24.6%*
Malheur	27.7%	27.9%	22.0%	22.9%	19.2%	18.3%
Marion	28.0%	28.0%*	14.2%	14.4%	18.1%	18.0%
Morrow	29.5%	29.7%	14.5%	14.7%	32.0%	31.3%*
Multnomah	22.4%	22.5%*	14.6%	14.5%*	14.9%	15.0%*
Polk	27.4%	27.2%	13.2%	14.2%	16.8%	16.4%
Tillamook	29.1%	27.9%	19.8%	23.0%	17.9%	15.3%
Umatilla	34.4%	34.8%*	20.6%	21.0%*	26.2%	26.2%*
Union	27.4%	28.1%	10.8%	11.6%	16.0%	16.3%
Wallowa	18.3%	18.1%	14.9%†	16.9%†	32.6%	35.1%†
Washington	21.9%	21.9%*	12.7%	12.6%*	16.7%	16.7%
Wheeler	22.6%†	–	12.1%†	–	–	–
Yamhill	34.8%	35.0%*	18.4%	18.5%	28.4%	28.2%*
Gilliam/Sherman/ Wasco	35.2%	35.3%*	13.7%	14.4%	19.6%	18.1%

* Statistically significant difference compared with all other counties (p-value <= 0.05)

† This number may be statistically unreliable and should be interpreted with caution.

– This number is suppressed because it is statistically unreliable.

Data source: Oregon BRFSS County Combined Dataset 2008–2011

Note: Age-adjusted estimates are adjusted to the 2000 Standard Population using three age groups (18–34, 35–54 and 55+).

APPENDIX B: DATA SOURCES

The data sources used in this report are listed below.
Data sources are described with brief limitations.

Behavioral Risk Factor Surveillance System (BRFSS)

Description: The BRFSS is a random-digit dialed telephone survey that is conducted year-round among Oregon adults aged 18 years or older. The BRFSS includes questions on health behavior risk factors such as diet, weight control, tobacco and alcohol use, physical activity, preventive health screenings, and use of health care services. The data are weighted to represent all adults aged 18 years and older. A core set of questions is asked annually, and other topics are surveyed on a rotating basis.

Every few years, Oregon conducts additional BRFSS surveys among under-represented races and ethnicities. The results of these surveys are combined with statewide BRFSS data to provide more stable estimates for chronic diseases and related risk factors among these groups of Oregonians. The most recent race/ethnicity oversamples were conducted in 2010–2011. In addition, BRFSS surveys from 2008–2011 were aggregated to produce more reliable county-level prevalence estimates.

Starting in 2010, Oregon began collecting data from those who use cell phones, causing the method for adjusting (weighting) the data to the demographics of the state to change. This new method is called “raking.” Because of these changes, data prior to 2010 are not directly comparable to the data from 2010 forward. In addition, the national BRFSS also made these changes but did not implement the changes until 2011.

Limitations: BRFSS estimates pertain only to the adult population aged 18 years or older living in households. Respondents are identified through telephone-based methods. The survey started collecting data for cell phones in 2009. Cell phone data were incorporated for analysis in Oregon in 2010. According to a recent publication from the National Center for Health Statistics, in 2011 more than 38% of households in Oregon were wireless-only. Finally, results obtained through BRFSS surveys also are limited in that they represent self-reported responses. Not all questions in the BRFSS have been validated.



Hospital Discharge Dataset

Description: The Hospital Discharge Dataset provides information on hospital discharges from all acute care hospitals in Oregon except two Veterans Administration hospitals. The dataset includes admit and discharge dates, diagnosis and procedural codes, financial charges, primary payer, and patient demographic information.

Limitations: Prior to 2008, the Hospital Discharge Dataset did not include identifying information that would allow us to ascertain when a single person had multiple hospitalizations; therefore, the calculated rate was the number of hospitalizations per the Oregon population rather than number of different people hospitalized per the Oregon population. In addition, prior to 2008, the dataset did not include information on race or ethnicity. Starting in 2008, the data necessary for investigating repeat hospitalizations for chronic diseases and hospitalizations by race/ethnicity were available and reported.

Oregon Health Panel Survey (OHPS)

Description: The Oregon Health Panel Survey was conducted in 2012 among non-institutionalized adults aged 18 years or older. Panel members were recruited using random digit dialing sampling based on landline telephone numbers and/or address-based sampling methodologies. A sample of panel members was then drawn at random for the survey. Topics on the survey include knowledge and attitudes toward colorectal screening, trans fats, sugary drinks, and other tobacco products. The data are weighted to represent all adults aged 18 years and older.

Limitations: OHPS estimates pertain only to the adult population aged 18 years or older living in households.

Oregon Healthy Teens (OHT) Survey

Description: Since 2000, the Youth Risk Behavior Survey (developed by the CDC) and the Oregon Public School Drug Use Survey were combined for Oregon into a single annual survey called Oregon Healthy Teens (OHT) Survey. The sample size varies from 1,600 to 32,000 per year, and the final data are weighted to more accurately represent Oregon eighth- and 11th-graders. The survey assesses health topics such as tobacco and alcohol use, HIV knowledge and attitudes, eating behaviors, nutrition and exercise.

Limitations: One limitation is that participation by school systems in the OHT is voluntary. However, participation rates have been high thus far. Another limitation is that the OHT questionnaire is not currently available in non-English versions except for a Spanish booklet that can be used as a reference when filling out the English version of the survey. A third limitation is that 3% of surveys were eliminated due to combinations of “dubious” answers and another 5% were eliminated because the student did not fill out grade or gender information.

Vital records data (full count data)

Birth Certificate Statistical File

The Birth Certificate Statistical File includes all births occurring in Oregon and births occurring out of state to Oregon

residents. This database includes parental demographic information, conditions of the newborn, congenital abnormalities, medical factors of pregnancy, method of delivery, and complications of labor and delivery. It also includes tobacco, alcohol or illicit drug use during pregnancy. Information about maternal diabetes and gestational diabetes is also included.

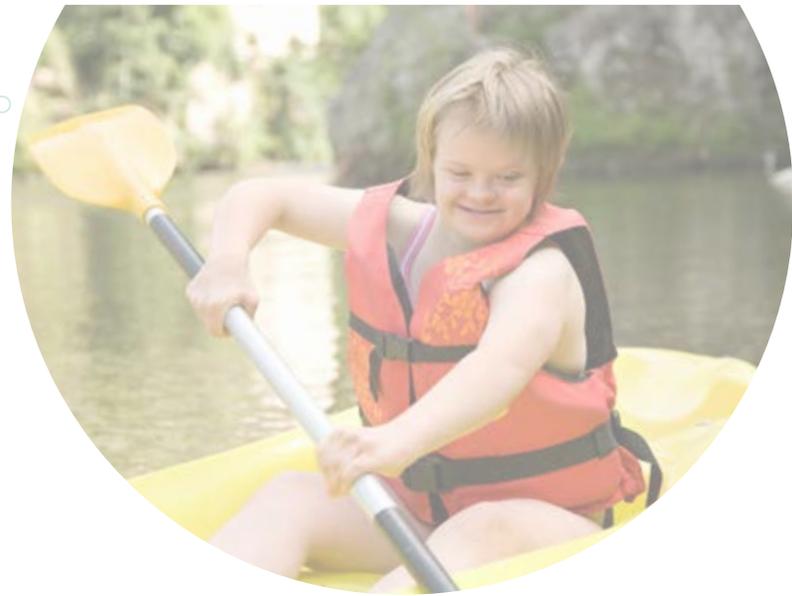
Death Certificate Statistical File

The Death Certificate Statistical File includes all deaths occurring in Oregon and deaths occurring out of state to Oregon residents. Data are obtained from death certificates that are collected from the state registrar. The data are used to examine trends in mortality and causes of death. This database includes cause of death, date and place of death, and decedent demographic information. The mortality data analyzed for this report consists of deaths among Oregon residents.

Limitations of birth and death files: The accuracy of the data depends on the accuracy with which the birth attendant, certifying physician or medical examiner describes the circumstances surrounding the birth or the underlying causes of death.

CDC Wonder database

The CDC Wonder database provides National Center for Health Statistics (NCHS) national statistical analysis and reporting of deaths from specific diseases.



APPENDIX C: RELIABILITY AND SUPPRESSION GUIDELINES



In this report, some numbers include a warning that they are potentially unreliable or they are unreliable and suppressed (not shown). In general, reliability refers to the stability of a number being reported.

The guidelines used to gauge reliability differ depending on the type of data used. Some data sources include all events under study (such as births, deaths or hospitalizations). These will be referred to as "full count." Other data sources are from surveys of randomly selected individuals, adjusted to represent the full population. These will be referred to as "survey." The text below briefly describes the methods used to determine if the information in this report includes a warning for reliability or is suppressed.



Full count

Determine the number of events (n).

- ▶ $n \geq 12$: Report the estimate.
- ▶ $n \geq 5$ and $n < 12$: Report the estimate and include a warning regarding reliability.
- ▶ $n < 5$: Do not report the estimate and state that it is suppressed.

Survey

Determine the total number of persons surveyed (x) for a particular question and calculate the standard error (SE) for the reported number. Use the SE to calculate a statistic called the relative standard error (RSE). RSE is a measure of the variability of an estimate compared with the estimate itself.

1. Determine if the estimate is being calculated on a full population (i.e., everyone) or a subpopulation (i.e., a smaller group of all people surveyed who share a common trait such as race, county or medical condition).
2. If the full population, determine if the denominator is ≥ 50 . If yes, proceed; if not, suppress.
3. If a subpopulation, determine if the denominator is ≥ 20 . If yes, proceed; if not, suppress.
4. Apply the following logic to each RSE:
 - RSE $< 30\%$: Report the estimate.
 - RSE $\geq 30\%$ and RSE $< 50\%$: Report the estimate and include a warning regarding reliability.
 - RSE $\geq 50\%$: Do not report the estimate and state that it is suppressed.







**Oregon Health Authority, Public Health Division
Health Promotion and Chronic Disease Prevention Section
800 N.E. Oregon St., Suite 730
Portland, OR 97232
971-673-0984**

<https://public.health.oregon.gov/DiseasesConditions/ChronicDisease/Pages/pubs.aspx>

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