

Diabetes

Definition: Diabetes is a chronic condition characterized by high blood glucose (sugar) resulting from the body's inability to use glucose for energy. In type 1 diabetes (5–10% of diabetes), the pancreas no longer makes insulin (which allows glucose to enter many cells); therefore, blood glucose cannot enter these cells to be used for energy. In type 2 diabetes (90–95% of diabetes), the pancreas does not make enough insulin or the body is unable to use insulin correctly. Other types of diabetes might account for 1–5% of diabetes. Prediabetes is a condition in which blood glucose levels are higher than normal but not high enough to be classified as diabetes. Gestational diabetes is a form of glucose intolerance diagnosed during pregnancy. This chapter uses self-reported diabetes from the Behavioral Risk Factor Surveillance System to measure diabetes and prediabetes. Gestational diabetes is not included unless otherwise indicated. See [Technical Notes](#) for additional detail.

Summary

Diabetes is the seventh leading cause of death in Washington, causing 1,652 deaths in 2012. As of 2012, an estimated 425,000 Washington residents had diagnosed diabetes, 172,000 had undiagnosed diabetes, and 1.8 million had prediabetes.

Self-reported data from the Behavioral Risk Factor Surveillance System^a showed that the age-adjusted percent of Washington adults who were ever told by a doctor they had diabetes was 8% in 2012. Older adults, American Indians and Alaska Natives, Native Hawaiian and other Pacific Islanders, blacks, Hispanics, Asians, and people in lower socioeconomic positions experience higher prevalence of diabetes than other groups.

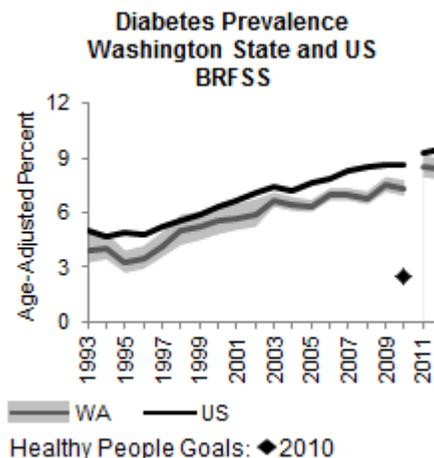
Reducing known risk factors (such as tobacco use, dietary patterns that lead to weight gain, physical inactivity, high blood cholesterol and high blood pressure) can prevent type 2 diabetes or delay its onset. Reducing these risk factors in people with diabetes also prevents or lessens the severity of diabetes complications.

Interventions to reduce the development of type 2 diabetes and to prevent diabetes-related complications and deaths range from community-wide activities to foster healthy eating, active living and tobacco-free environments, to early diagnosis of prediabetes and diabetes, to healthcare system changes to optimize care for those with diabetes. Approaches should focus on

reducing risk factors across individual, relationship, community and societal levels.¹

Time Trends

Self-reported data from the Behavioral Risk Factor Surveillance System (BRFSS)^a showed that the age-adjusted percent of Washington adults who were ever told by a doctor they had any type of diabetes increased steadily from 4% in 1993 to 7% in 2010. This is similar to national trends.² The age-adjusted percent of Washington adults who reported having diabetes was 9% in 2011 and 8% in 2012. The national age-adjusted percent was slightly higher at 9% in 2011 and 10% in 2012. Data for 2011 and 2012 are not comparable to data from earlier years due to changes in methods of collecting and analyzing BRFSS data. (See BRFSS Caveats in [Appendix B](#) and this chapter's [Technical Notes](#).) This break in trend is shown in the chart below.



^a Unless otherwise noted, the margins of error for BRFSS ≤ 1%

2010 and 2020 Goals

The national *Healthy People 2010* goal was to decrease the age-adjusted prevalence of diabetes to 2.5%. Neither Washington nor the United States met this goal. *Healthy People 2020* no longer includes a national goal for the prevalence of diabetes.

Another national *Healthy People 2010* goal was to decrease deaths in which diabetes was the main (underlying) cause or contributor to a national age-adjusted rate of 46.0 per 100,000 people. The goal for *Healthy People 2020* is an age-adjusted rate of 65.8 deaths per 100,000 people. With age-adjusted death rates of 75 and 71 per 100,000 people in 2010, neither Washington nor the United States met the 2010 goal. Given that diabetes-related death rates in Washington are increasing, it is also unlikely that Washington will meet the 2020 goal. (See [Other Measures of Burden](#).)

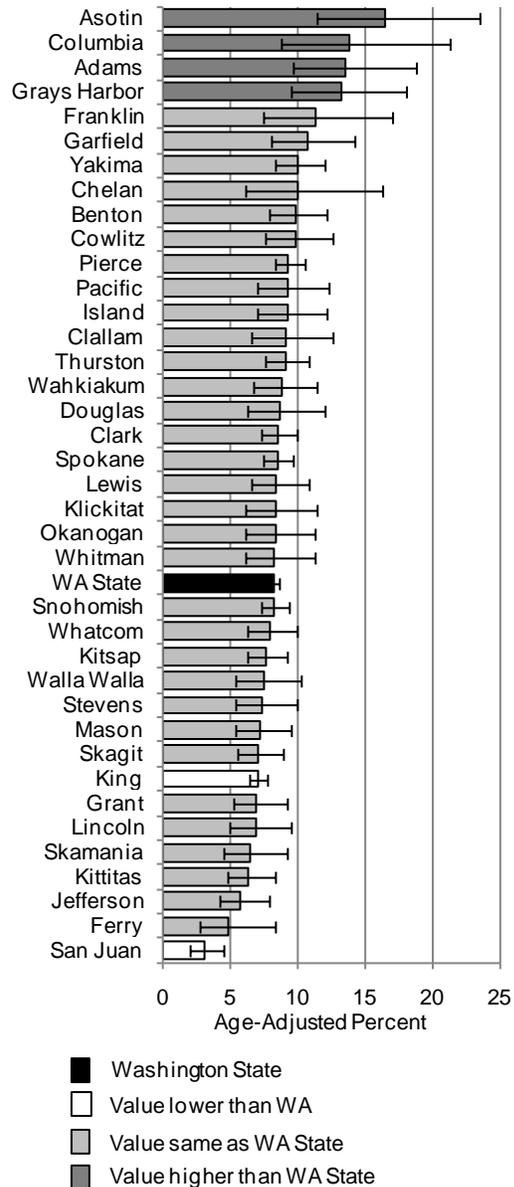
Geographic Variation

On the Washington BRFSS^a for 2010–2012^b combined, 8% (age-adjusted) of adults reported having diabetes. This ranged from 3% in San Juan County to 17% ($\pm 6\%$) in Asotin County. Asotin, Columbia, Adams, and Grays Harbor counties had higher age-adjusted percentages of adults reporting diabetes than the state average; King and San Juan counties had lower percentages. There were too few BRFSS respondents in Pend Oreille County to report a reliable percent.

Older BRFSS data from 2001–2010 showed Adams, Asotin and Grays Harbor as having higher age-adjusted percentages of adults reporting diabetes compared to the state average. According to the 2012 American Community Survey, these counties also had lower percentages of college graduates, higher percentages of adults living below the federal poverty level, and fewer adults ages 18–64 with health insurance.

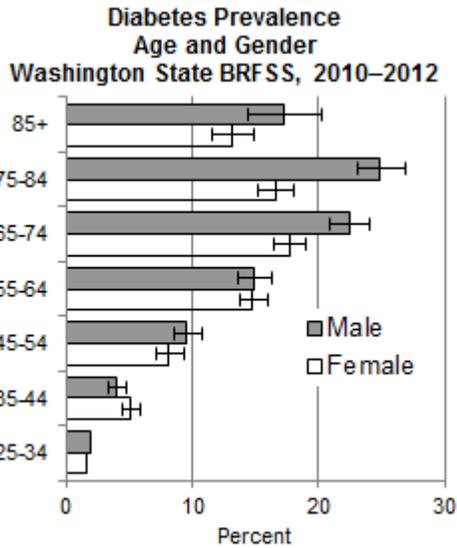
^b Analyses combining 2010–2012 BRFSS data use a 2010 dataset developed for this purpose. (See Appendix B BRFSS Technical Notes.)

**Diabetes Prevalence
Washington Counties
BRFSS, 2010–2012**



Age and Gender

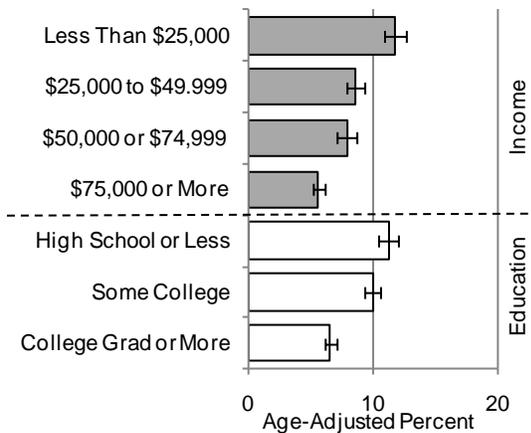
Washington BRFSS^{a,b} data for 2010–2012 combined showed the percent of adults reporting diabetes increased with age, up to 85 years old. About 6% of adults under age 65 reported having diabetes. A higher percent of men (23% $\pm 2\%$) than women (17% $\pm 1\%$) reported having diabetes from ages 65 to 84 years. This is similar to national patterns.³



Economic Factors and Education

People of lower socioeconomic position are more likely to develop diabetes.⁴ Income and education are two common indicators used to measure socioeconomic position. During 2010–2012 the Washington BRFSS showed the age-adjusted percent of adults who reported diabetes increased with decreasing income and decreasing levels of education. These relationships are similar to those found in other studies.^{5,6,7} Differences in health behaviors, effects of stress, and access to care may account for the relationship between socioeconomic position and diabetes.^{8,9}

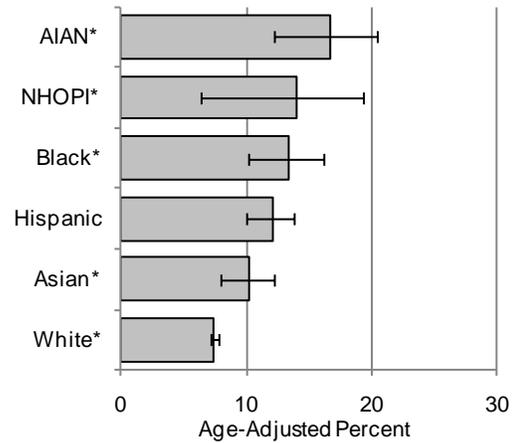
**Diabetes Prevalence
Annual Household Income
and Education
Washington State BRFSS, 2010–2012**



Race and Hispanic Origin

During 2010–2012^a white adults reported lower age-adjusted percent of diabetes (7%) than all other groups. Wide margins of error make it difficult to compare percentages between other groups. The high age-adjusted prevalence among American Indians and Alaska Natives (17% ±4%), followed by black (13% ±3%), Hispanic (12% ±2%) and Asian adults (10% ±2%) is consistent with national data.³ National data are not available for Native Hawaiian and other Pacific Islanders. Poverty and lack of access to healthcare may be barriers to preventive care for some racial and ethnic minorities.¹⁰

**Diabetes Prevalence
Race and Hispanic Origin
Washington State BRFSS, 2010–2012**



* Non-Hispanic, single race only
AIAN: American Indian/Alaska Native
NHOPI: Native Hawaiian/Other Pacific Islander

Other Measures of Impact and Burden

Hospitalizations. In 2011, 90,020 hospitalizations (14% of all hospitalizations) of Washington residents hospitalized in Washington or Oregon included a diagnosis of diabetes. The age-adjusted rate of hospitalizations with any-listed diagnosis of diabetes nearly doubled, from 720 hospitalizations per 100,000 people in 1990 to 1,255 hospitalizations per 100,000 people in 2011. Over the last two decades, rates in Washington were lower than national rates.¹¹ Washington’s lower rates might reflect Washington’s slightly lower rate of diabetes as well as a lower rate of potentially avoidable hospitalizations for people with diabetes.

In 2009–2011 combined, females ages 5–44 years were more likely to be hospitalized with diabetes than males. Men ages 45 and older were more likely than women in that age group to be hospitalized with

diabetes. While hospitalization rates increase with age, in 2011, 49% of hospitalizations with any-listed diagnosis of diabetes were among Washington residents less than 65 years.

Complications. Complications from diabetes are widespread in Washington. In 2011, among hospitalizations having any-listed diagnosis of diabetes, 7,977 (9%) listed diabetes as the primary diagnosis, while 17,820 (20%) had heart disease or stroke listed as the primary diagnosis. Diabetes also contributed to 1,290 (65%) of all hospitalizations with non-traumatic lower extremity amputations). During 2010, 799 (46%) of all new cases of end-stage renal disease in Washington were among people with diabetes.¹² Diabetes is the leading cause of new cases of blindness among adults ages 20–74 years.³

Washington BRFSS^a data for 2012 show that adults with diabetes are about twice as likely to report being limited in activities because of physical, mental or emotional problems (46% ±3%) compared to adults without diabetes (22%). Adults with diabetes were about four times more likely to report use of special equipment, such as a cane, a wheelchair, a special bed, or a special telephone for health problems (26% ±3%) compared to adults without diabetes (6%).

Deaths. Diabetes is the seventh leading cause of death in Washington. In 2012, 1,652 people in Washington died from diabetes, and diabetes contributed to an additional 3,910 deaths. In 2012, 21% of diabetes deaths occurred among people less than 65 years of age. In Washington, the rate of deaths in which diabetes was either a primary or contributing factor increased between 1999–2011 from 72 to 79 deaths per 100,000 people. Nationally the age-adjusted rate has moved in the opposite direction, decreasing between 1999–2010 from 77¹³ to 71¹⁴ deaths per 100,000 people. It is not clear why Washington's diabetes death rates are higher than those seen nationally given Washington's lower prevalence of diabetes. Differences in reporting on the death certificate might play a role.

Data for 2009–2011 showed patterns of diabetes death rates with respect to age, gender, race, Hispanic origin, economic factors, and education were similar to those for diabetes prevalence.

Risk and Protective Factors

Progress has been made in the past 25 years to understand the pathways to development of type 2 diabetes and complications from all forms of diabetes.¹⁵ The following factors are now recognized as important in increasing risk, or protecting against development, of diabetes and its complications.

Overweight and obesity. The risk of type 2 diabetes increases with increases in body mass index.¹⁶ Washington BRFSS^a data for 2012 show that adults who report heights and weights indicating overweight or obesity are three times more likely to report having diabetes (12%) compared to adults who are not considered overweight or obese (4%). Washington BRFSS data also show that 84% (±3%) of adults with diabetes are overweight or obese. Excess weight complicates the management of diabetes and increases the risk of cardiovascular complications and cardiovascular death in people with diabetes.¹⁷

Physical inactivity. Physical inactivity impairs the control of blood sugar levels resulting in increased risk of prediabetes and diabetes.¹⁸ Regular physical activity has been shown to delay or prevent type 2 diabetes in individuals at greater risk.^{19,20,21} Among people with diabetes, regular physical activity improves blood glucose control, reduces cardiovascular risk factors, contributes to weight loss, and improves well-being.²² Washington BRFSS data for 2012 show only 57% (±3%) of adults who report having diabetes meet national guidelines for moderate or vigorous physical activity.²³ Muscle-strengthening increases the body's ability to control glucose for those with and without diabetes. Washington BRFSS data for 2011 show only 22% (±3%) of adults with diabetes meet the national guidelines for muscle-strengthening.²³

Hypertension and high cholesterol. Hypertension and high blood cholesterol are risk factors for the development of type 2 diabetes.^{24,25} Washington BRFSS^a data for 2011 showed that adults who reported ever being told by a health professional they had high blood pressure were four times more likely to report having diabetes (17% ±2%) compared to adults who did not report high blood pressure (4%). Similarly, among people who had been tested for blood cholesterol, adults who reported ever being told by a health professional they had high cholesterol were about three times more likely to report having diabetes (16% ±3%) compared to adults who did not report high cholesterol (6%). Clinical trials have shown that blood pressure and lipid control reduce diabetes complications by up to 50%.³

Prediabetes. Prediabetes is a condition in which individuals have fasting or post-meal blood glucose, or hemoglobin A1C levels higher than normal but not high enough to be classified as diabetes. People with prediabetes have a much greater chance of developing diabetes than those with normal A1C levels.²⁴ The higher the A1C, the greater the chance of progression to diabetes. Studies have shown hemoglobin A1C levels from 5.5% to 6.5% were associated with new cases of diabetes ranging from 9% to 50% incidence over five years.²⁶ Additionally, those with prediabetes are at increased risk of cardiovascular disease; whether or not they later develop type 2 diabetes.²⁷

Pregnancy. Women who have gestational diabetes have a 35 to 60% chance of developing diabetes in the next 10 to 20 years.³ Women who have delivered a baby weighing more than nine pounds are also at risk for developing diabetes, both immediately following delivery and in subsequent years.^{24,25} In 2011, 11,931 pregnancies (14% of all births in Washington) were to women with gestational diabetes or who delivered a baby weighing more than nine pounds.

Blood sugar that is not well controlled in a pregnant woman with gestational or preexisting diabetes may lead to problems for the woman and the baby including birth defects, maternal high blood pressure, baby being born too early, miscarriage or stillbirth, and an extra large baby resulting in a higher chance of needing a Caesarean section to deliver.²⁸ Studies show that if a woman with preexisting diabetes keeps her blood sugar well controlled before and during pregnancy, she can reduce the chance of having a baby with birth defects.²⁹ In 2011, 659 pregnancies (<1% of all births in Washington) were among mothers with preexisting diabetes.

Smoking. Studies suggest that cigarette smoking is associated with an increased risk of developing type 2 diabetes.^{30,31} Smoking as well as use of other tobacco products can interfere with how insulin works.³² Smokers with diabetes have higher risks for serious complications, including heart disease, kidney disease, foot infections, ulcers, possible amputation, eye diseases that can cause blindness, and damaged nerves to the arms and legs.³¹ In spite of the risks, Washington BRFSS data for 2012 show that around the same percentage of adults with diabetes currently smoke cigarettes (15% ±3%) as adults without diabetes (17% ±1%).

People with diabetes who quit using tobacco have better control of their blood sugar levels, improved insulin functioning, and faster recovery from surgery.^{31,32}

Additional risk factors. Other factors associated with increased risk of developing type 2 diabetes include having: a first-degree relative with diabetes, polycystic ovary syndrome (hormonal disorder among women of reproductive age), and a history of cardiovascular disease.²⁴

Intervention Strategies

Diabetes is increasingly common, includes a phase before symptoms appear, and simple tests are available to detect preclinical disease. Early detection and treatment result in longer life and fewer complications from diabetes.²⁴ Interventions to reduce the development of type 2 diabetes and to prevent diabetes-related complications and deaths range from community-wide activities to foster healthy eating, active living and tobacco-free environments, to early diagnosis of prediabetes and diabetes, to healthcare system changes to optimize care for those with diabetes. This section focuses on screening and healthcare system approaches. Interventions to foster healthy eating, physical activity and tobacco-free living are covered in the *Health of Washington State* [Tobacco Use](#), [Physical Activity](#), [Nutrition](#), and [Obesity and Overweight](#) chapters.

Screen routinely for diabetes and prediabetes in the healthcare setting. The American Diabetes Association (ADA) guidelines recommend that healthcare providers consider testing asymptomatic adults of any age to detect prediabetes and type 2 diabetes if they are overweight or obese and have one or more additional risk factor for diabetes. For adults without symptoms or risk factors, testing should begin at age 45.²⁴ (See [Technical Notes](#).) Washington BRFSS data for 2012 show that only 40% (±1%) of adults without diabetes who should be tested based on their risk factors report having a test for diabetes in the past three years.

Expand coverage for and access to the National Diabetes Prevention Program. According to multiple studies, lifestyle interventions to lose weight and increase physical activity may reduce or delay the development of diabetes in people with prediabetes.^{19,20,21} Washington is one of the top five states with both the capacity to provide the National Diabetes Prevention Program and insurance coverage for this program.³³ The National Diabetes Prevention Program is based on research that found that a minimum of 7% weight loss or weight

maintenance and a minimum of 150 minutes per week of physical activity similar in intensity to brisk walking decreased new cases of type 2 diabetes by 58%.¹⁹ YMCAs and Washington State University Extension are the two largest providers of the Diabetes Prevention Program in Washington and are able to reach the most populated areas of the state. The program is currently available as a benefit covered by health plans through the Public Employee Benefits Board and a small number of other employers. Not every geographical region or linguistic minority group has access to the program to date.

Similarly effective lifestyle programs for people with diabetes need to be identified, tested and disseminated into practice. Intensive lifestyle intervention can produce sustained weight loss and improvements in fitness, glycemic control, and cardiovascular disease risk factors in overweight individuals with type 2 diabetes.³⁴

Connect health systems to culturally appropriate community-based interventions for people with diabetes to self-manage their condition. The use of lay leaders and outreach workers to teach self-management strategies in community and workplace settings has been effective in changing behavior.³⁵ For greatest impact and cost-effectiveness, these interventions use community and lay health workers who represent the communities they serve.^{36,37,38,39} When supervised by clinical experts, and in conjunction with diabetes education, these trusted health advisors can help people at high risk of developing type 2 diabetes and those with diabetes to self-manage their weight, physical activity, medications and other components of self-care. One example of a successful program is the Chronic Disease Self Management Program⁴⁰ in Washington, supported through partnerships between the Department of Health, Department of Social and Health Services, Area Agencies on Aging, and local and regional health organizations. As of January 2014, 47 organizations offer this program at 152 sites throughout the state. A randomized controlled trial showed that this program improved health status, health behavior, and self-efficacy and reduced emergency room visits among those with chronic diseases, including diabetes or prediabetes.⁴¹

To connect these evidence-based community programs to clinicians and community agencies,

the Department of Health, with funding from the Centers for Disease Control and Prevention, has invested in the Washington Information Network 2-1-1 to provide information by phone or the Internet (www.win211.org).

Improve access to effective care. ADA's Standards of Care recommend that goals and treatment be individualized based on factors including a patient's preferences, other health conditions, and costs.²⁴ Medical and health homes can be effective in increasing early detection of diabetes complications, as well as helping people reduce cholesterol, blood pressure and blood sugar levels. These delivery systems may also help patients manage depression and other mental health conditions that often co-occur with diabetes.⁴² The Washington Healthcare Improvement Network (WHIN) is a Department of Health initiative to work with healthcare organizations and providers to develop and support patient-centered health.

In 2014, 267 Washington physicians are among the more than 8,500 physicians nationwide who currently hold National Committee for Quality Assurance recognition for high quality care of patients with diabetes. There are also more than 1,150 Washington primary care providers with Patient-Centered Medical Home recognition from the National Committee for Quality Assurance (NCQA), one of several possible Patient-Centered Medical Home national recognition programs.⁴³

Treatment of obesity is especially important for people with or at high risk of developing type 2 diabetes. One treatment, bariatric surgery among people with diabetes, has been shown to be effective in reducing body weight and use of diabetes medications, and improving quality of life.⁴⁴ (See *Health of Washington State Obesity and Overweight* chapter.) Bias and discrimination against people with higher body weights in healthcare settings can result in people with obesity delaying preventive care.^{45,46} Educational interventions for healthcare providers to increase empathy, decrease stereotyping and increase confidence in communicating with patients with excess weight show promise in addressing weight-related stigma in healthcare.⁴⁷

Align health systems transformation with improvements to diabetes care. The Washington State Health Care Innovation Plan and the Washington State Plan for Healthy Communities both outline strategies for healthcare system improvements. Changes in healthcare team roles, referrals, payment and information-sharing systems are designed to lower costs, while improving quality

of care and health for people with and at high risk of developing diabetes.^{48,49}

See Related Chapters: [Coronary Heart Disease](#), [Stroke](#), [Tobacco Use](#), [Obesity and Overweight](#), [Physical Activity](#), [Nutrition](#), [Access to Primary Healthcare Services](#), and [Social and Economic Determinants of Health](#)

Data Sources (For additional detail, see [Appendix B](#)).

Washington State Behavioral Risk Factor Surveillance System (BRFSS) Data: 1987–2012. Olympia, Washington: Washington State Department of Health, under federal cooperative agreement numbers: U58/CCU002118 (1987–2003), U58/CCU022819 (2004–2008), U58 DP001996 (2009–2010), or U58/SO000047 (2011–2013); data prepared by Washington State Department of Health, (Office of Healthy Communities).

United States Behavioral Risk Factor Surveillance System: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC). Atlanta, Georgia, [1993–2012]; data prepared by (Office of Healthy Communities).

Washington Hospital Discharge Data, Comprehensive Hospitalization Abstract Reporting System (CHARS) 1987–2012, Washington State Department of Health, Center for Health Statistics, July 2013; data prepared by Washington State Department of Health, (Office name).

Oregon State Hospital Discharge Data 1987–1999. Office for Oregon Health Policy and Research; data prepared by Washington State Department of Health, (Office name).

Oregon State Hospital Discharge Data 2000–2012. Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality; data prepared by Washington State Department of Health, (Office name).

Washington State Death Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1980–2012, released September 2013; data prepared by Washington State Department of Health, Center for Health Statistics and Office of Healthy Communities.

Washington State Birth Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Births 2011.

Washington State population counts: 2000 and 2010 U.S. Census and 2001–2009 intercensal and 2011–2012 post-censal estimates, Washington State Office of Financial Management, Forecasting Division (OFM), released January 2014; 1990 U.S. Census and 1991–1999 OFM intercensal estimates, Vista Partnership and Krupski Consulting, released October 2007; 1980 U.S. Census and 1981–1989 OFM intercensal estimates.

Technical Notes

Definitions

- **Diabetes mortality:** The International Classification of Diseases (ICD) codes assigned to diabetes include: ICD-9 codes 250 and ICD-10 codes E10–E14. Diabetes is likely to be underreported as an underlying cause of death. Studies have found that about 35% to 40% of decedents with diabetes had it listed anywhere on the death certificate and about 10% to 15% had it listed as the underlying cause of death.^{50,51} Therefore, data in this chapter focus on diabetes as any-listed cause of death.
- **Number of people** in Washington with diagnosed and undiagnosed diabetes and prediabetes:
 - **Diagnosed diabetes:** Percent of adults with diabetes ages 20 years and older obtained from 2012 Washington BRFSS and percent of youth with diabetes ages less than 20 years obtained from 2011 National Diabetes Fact Sheet applied to Washington State population estimates in 2012 for these age groups.
 - **Undiagnosed diabetes:** Percent of adults with undiagnosed diabetes ages 20 years and older obtained from 2011 National Diabetes Fact Sheet applied to Washington State population estimates in 2012 for this age group. Percentages for youth are not available.
 - **Prediabetes:** Percent of adults with prediabetes ages 20 years and older obtained from 2011 National Diabetes fact sheet applied to Washington State population estimates in 2012 for this age group.

Discontinuity in BRFSS trend. The addition of cell phone data and the new raked weighting method in the 2011 BRFSS are expected to result in more accurate estimates of health behaviors. The estimates are expected to shift as a result of these improvements. Special analysis to assess the effect of change in BRFSS methodology in 2011 indicate that the age-adjusted percent of adults with diabetes increased slightly from 8% using older methods to 9% using newer methods. Health estimates from 2011 (and beyond) should not be compared directly to those from 2010 (and earlier). This limits our ability to observe annual trends that cross 2010 and 2011.

Hospitalization data. These data do not include hospitalizations for Washington residents from U.S. Department of Veterans Affairs Hospitals (VA), federal hospitals (e.g., Bremerton, Madigan, Oak Harbor), or out-of-state hospitals in Idaho serving Washington residents of border counties. If these hospitalizations were added, the count of hospitalizations with diabetes would be larger. Data from Oregon hospitals serving Washington residents of border counties are included.

Screening guidelines. An update on screening guidelines for type 2 diabetes in asymptomatic adults from the United States Preventive Services Task Force (USPSTF) is currently in progress.⁵² The final Recommendation Statement is not available as of May 2014. In lieu of the current USPSTF

recommendation, we rely on the American Diabetes Association's Standards of Medical Care – 2014. These standards are based on evidence of actions known or believed to be cost effective, and to have a positive impact on the health outcomes of people with diabetes.⁵³

For More Information

Washington State Diabetes Connection, web portal of the Washington State Diabetes Network:
<http://diabetes.doh.wa.gov/>.

Washington State Patient-Centered Health Home Program:
<http://www.doh.wa.gov/PublicHealthandHealthcareProviders/HealthcareProfessionalsandFacilities/PatientCareResources/DiabetesManagementResources/HealthHome.aspx>.

Healthy People 2020, Diabetes:
<http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=8>.

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Endnotes

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¹³ National Center for Health Statistics, Health Promotion Statistics Branch. *DATA2010: Healthy People 2010 Database. Objective: 05-05*. Atlanta, GA: Centers for Disease Control and Prevention; October, 14, 2011. <http://wonder.cdc.gov/data2010/focus.htm>. Accessed April 7, 2014.

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