

Diabetes

Definition: Diabetes is a chronic condition characterized by high blood sugar resulting from the body's inability to use blood glucose for energy. In type 1 diabetes, the pancreas no longer makes insulin, and therefore blood glucose cannot enter the cells to be used for energy. In type 2 diabetes, either the pancreas does not make enough insulin or the body is unable to use insulin correctly. From 5% to 10% of people with diabetes have type 1 diabetes mellitus. Ninety to ninety-five percent of people with diabetes have type 2 diabetes mellitus. Other types of diabetes might account for 1%-5% of diabetes cases. 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 in some women during pregnancy. Gestational diabetes was not included in the analysis. ICD-9 codes 250. ICD-10 codes E10-E14.

Summary

More than 300,000 people in Washington State have diagnosed diabetes, nearly 127,000 people have undiagnosed diabetes, and nearly a million people have prediabetes.

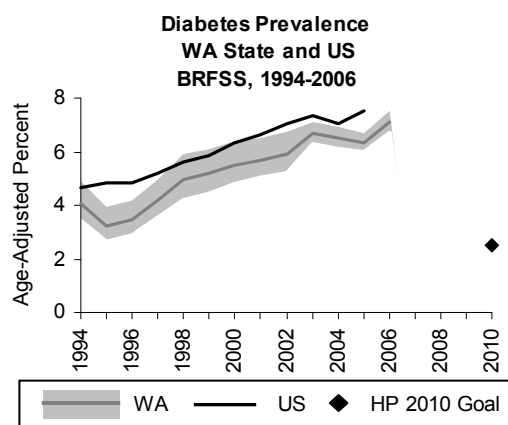
From 1994 to 2006, the [age-adjusted](#) percent of Washington adults with diabetes steadily increased from 4% ($\pm 1\%$) to 7% ($\pm <1\%$). In 2005, diabetes prevalence among non-Hispanic American Indians and Alaskan Natives and non-Hispanic blacks was 12% ($\pm 2\%$) and 14% ($\pm 2\%$), respectively. The prevalence of diabetes among Washington adults increased as levels of income and education decreased. National studies suggest that an individual's socioeconomic position—measured by occupation, education, and income—explains much but not all the disparity in diabetes prevalence.

Reducing known risk factors (such as obesity, tobacco use, physical inactivity, high blood cholesterol, and high blood pressure) can prevent diabetes or delay its onset. Reducing these risk factors in people with diabetes also prevents or lessens the severity of diabetes complications.

Intervention approaches should focus on reducing risk factors; increasing screening for diabetes and prediabetes; providing culturally appropriate community-based interventions for those with diabetes and prediabetes; reimbursing providers for improvement in diabetes-related care; improving the quality of care; and strengthening the diabetes public health system.

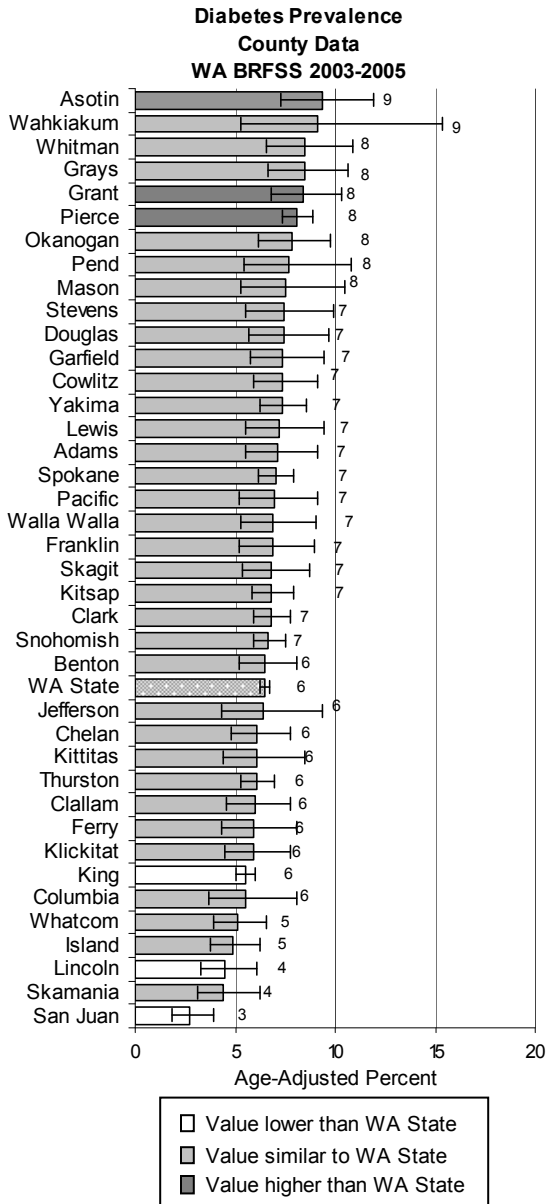
Time Trends

In 2005, 300,000 Washington residents of all ages were estimated to have diagnosed diabetes. Nearly 127,000 people had undiagnosed diabetes, and 987,000 people had prediabetes. Thus diabetes affected more than 1.4 million Washington residents. Diabetes prevalence has increased in Washington and nationwide. Data from [the Behavioral Risk Factor Surveillance System](#) (BRFSS) showed that among adults responding to the survey, the age-adjusted percent with diabetes increased steadily from 4% ($\pm 1\%$) in 1994 to 7% ($\pm <1\%$) in 2006. Nationwide, diabetes prevalence in adults also increased from 5% in 1994 to 8% in 2005.



Year 2010 Goals

The national *Healthy People 2010, Midcourse Review* goal is to decrease the prevalence of diabetes to no more than 2.5%. Given the current trend of increasing diabetes prevalence, neither Washington nor the nation will likely meet this goal.



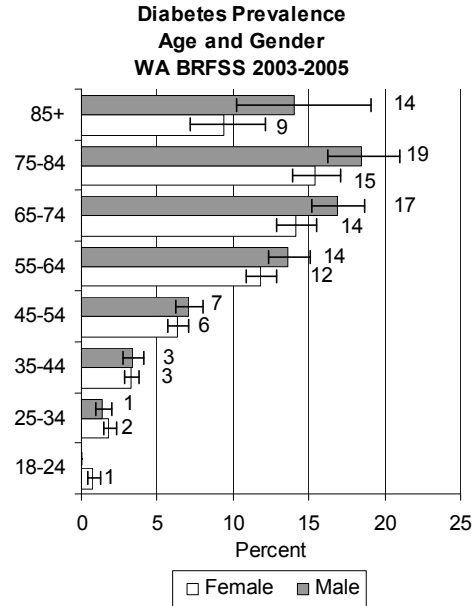
Geographic Variation

During 2003–2005, Washington’s age-adjusted rate of diabetes was 7% ($\pm 1\%$). Diabetes rates ranged from 3% ($\pm 1\%$) in San Juan County to 9% ($\pm 2\%$) in Asotin County. Asotin, Grant, and Pierce counties had diabetes prevalence higher than the state rate (7% $\pm 1\%$). King, Lincoln, and San Juan counties had rates lower than the state rate.

Age and Gender

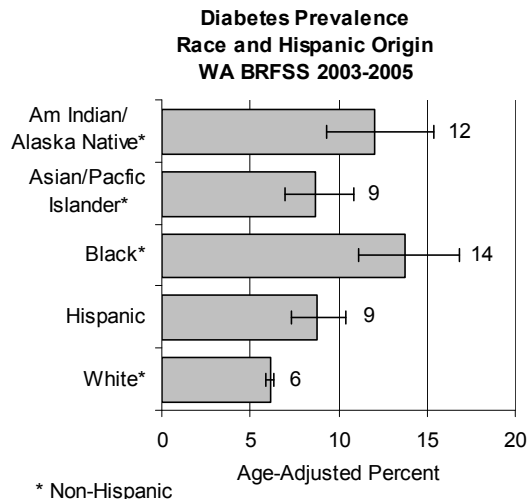
Consistent with national data, Washington BRFSS data for 2003–2005 showed that

diabetes among adults becomes more common as people age, up to age 85. Overall, diabetes prevalence was higher among men (7% $\pm 1\%$) than women (6% $\pm 1\%$). The diabetes prevalence for men remained significantly higher than women for ages 55 to 84. The patterns of diabetes prevalence by age and gender remained after taking race, Hispanic origin, income, and education into account.



Race and Hispanic Origin

Among BRFSS respondents of all races and Hispanic origin, non-Hispanic whites had the lowest prevalence of diabetes. Blacks had similar prevalence to American Indians and Alaska Natives.

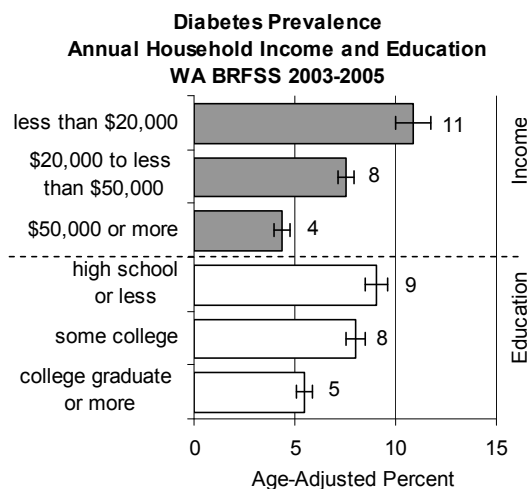


Both blacks and American Indians and Alaska Natives had higher prevalence than Hispanics and

Asian/Pacific Islanders. After controlling for gender, income, education, and age only blacks and American Indians and Alaska Natives had significantly higher prevalence than non-Hispanic whites. The pattern of diabetes prevalence by race and Hispanic origin in Washington is similar to that of the nation.^{1,2} These patterns probably reflect a combination of differences in genetics, cultural factors, access to health care and to social and economic opportunities, and experiences of racial discrimination.²

Income and Education

Data from the Washington BRFSS for 2003–2005 showed that diabetes prevalence increased with decreasing income. Similarly, diabetes prevalence increased with decreasing levels of education. The patterns for income remained after accounting for education, gender, race, age, and Hispanic origin. The patterns for education remained after accounting for income, gender, race, age, and Hispanic origin. These relationships are similar to those found in other studies.³



Other Measures of Impact and Burden

Diabetes self care. Certain personal health care behaviors are critically important to successful disease management for people with diabetes, including daily monitoring of blood glucose and adjusting medications accordingly, following healthy diet and physical activity plans, controlling weight, and not smoking. Among people with diabetes, lower income and

educational attainment have been associated with lower rates of blood glucose self-monitoring, lower levels of physical activity, and higher rates of smoking.⁴

In 2003–2005, about 68% ($\pm 3\%$) of Washington adults with diabetes said they monitored their blood glucose on a daily basis, greater than the national average of 61% ($\pm 2\%$). Compared to people without diabetes, those with diabetes were more likely to be obese (52% $\pm 3\%$ versus 20% $\pm 1\%$), less likely to get enough physical activity (53% $\pm 5\%$ versus 64% $\pm 1\%$), and more likely to smoke cigarettes (22% $\pm 3\%$ versus 19% $\pm 1\%$).

Hospitalizations. In 2004, 76,732 Washington hospitalizations included a diagnosis of diabetes at discharge. These admissions amounted to \$1.5 billion in charges. Among Washington residents, diabetes hospitalization rates nearly doubled from 1988 to 2004, from 687 per 100,000 to 1,232 per 100,000.

In 2002–2004, diabetes hospitalization rates increased with age. The hospitalization rate doubled for each subsequent decade between ages 25 and 64. Between ages 5 and 44, females were more likely than males to be hospitalized for diabetes. At ages 45 and older, diabetes hospitalization rates for men were higher than those for women.

Deaths. Diabetes is the seventh leading cause of death in Washington. In 2005, 1,549 people in Washington died from diabetes, and diabetes contributed to an additional 3,317 deaths. The rate of deaths in which diabetes was either a primary or contributing factor increased from 58 per 100,000 in 1988 to 80 per 100,000 in 2005, mirroring the increase in diabetes prevalence.

In 2003–2005, the lowest diabetes death rate was for non-Hispanic whites (75 ± 1 deaths per 100,000). The death rates for blacks, American Indians and Alaska Natives, people of Hispanic origin, and Asians and Pacific Islanders were 176 (± 16), 142 (± 24), 118 (± 14), and 85 (± 8) deaths per 100,000, respectively.

Risk and Protective Factors

There are no known strategies for preventing type 1 diabetes, in which the body is unable to produce insulin. Type 2 diabetes, in which the body produces insulin but is unable to utilize it properly, can be delayed or prevented.^{5,6,7} For example, one study found that weight loss and increased physical activity resulted in a 58% reduction in development

of diabetes, and medication resulted in a 31% reduction, over three years.⁸

Overweight and obesity. There is a well-documented relationship between a body mass index (BMI) greater than 23 kg/m² and the development of diabetes.⁹ According to cross-sectional data reported in the 2003 BRFSS, Washington adults who were obese (BMI \geq 30 kg/m²) were up to seven times more likely to have diabetes compared to adults in the non-obese category (BMI <30 kg/m²). Obesity complicates the management of type 2 diabetes and increases the risk of cardiovascular complications and cardiovascular mortality in people with type 2 diabetes.¹⁰

Physical inactivity. A large-scale national study found that physical inactivity and obesity were strongly and independently associated with diabetes and diabetes-related complications.¹¹

Smoking. Cigarette smoking is an independent risk factor for type 2 diabetes.¹² It contributes to significant morbidity and mortality particularly in patients with diabetes.¹³

Hypertension and high cholesterol. Hypertension and high blood cholesterol are risk factors for the development of type 2 diabetes.¹⁴ In Washington, blood pressure greater than 130/80 was more prevalent among people with diabetes than among those without the disease (66% \pm 3% compared to 21% \pm 1%, 2003 BRFSS data). High cholesterol was also more common among people with diabetes than those without the disease (57% \pm 3% compared to 31% \pm 1%, 2003 BRFSS data).²

Prediabetes. In one prospective study of a white population, 64.5% of the participants who had prediabetes at baseline progressed to diabetes during the six-year follow-up.¹⁵ Of those with normal glucose levels at baseline, 4.5% had diabetes at the follow-up examination. Another study showed that people at risk for diabetes could be identified before their blood glucose values became diagnostic for diabetes, and those patients who lost weight and increased their physical activity could prevent or delay the development of diabetes.¹⁶

Pregnancy. Women who have delivered a baby weighing more than nine pounds or have been diagnosed with gestational diabetes are at risk for developing type 2 diabetes after the birth of the baby, both immediately following delivery

and in subsequent years.^{17,18} Women with histories of gestational diabetes are more likely to have modifiable risk factors, such as obesity and lack of regular physical activity, than women without a history of gestational diabetes.¹⁹ Preconception care with the goal of achieving normal blood glucose concentrations prior to pregnancy appears to reduce the risk of congenital malformations among babies born to mothers who have diabetes.²⁰

Family history. A family history of diabetes is associated with an increased risk of developing type 2 diabetes.²¹

Intervention Strategies

Interventions to reduce the incidence of diabetes and to prevent diabetes-related complications and deaths include the following:

Screen routinely for diabetes and prediabetes in the health care setting. This strategy is based on current American Diabetes Association guidelines.²² Screening high-risk individuals in primary care settings identifies people with prediabetes as well as those with undiagnosed diabetes. People found to have prediabetes should receive care to prevent diabetes. Washington is one of five states selected by the U.S. Centers for Disease Control and Prevention to conduct diabetes prevention initiatives that are based on established research. This research 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%.²³

Connect health systems to culturally appropriate community-based interventions for people with diabetes to self-manage their condition. These interventions should also target weight reduction and increasing physical activity to prevent and control type 2 diabetes. The use of lay leaders and outreach workers to teach self-management strategies in community and workplace settings has been effective in changing behavior.²⁴ One example is the Chronic Disease Self Management Program²⁵ in Washington, supported by the Department of Health, the Washington Health Foundation, and numerous local health organizations. A randomized controlled trial showed that this program improved health status, health behavior, and self-efficacy and reduced emergency room visits.²⁶

Improve quality of care and outcomes for people with diabetes and prediabetes by implementing the Chronic Care Model. Washington is one of several states adopting the Chronic Care Model²⁷ as

a basis for improving the effectiveness of primary care practices with patients and communities. The Washington State Collaborative is a 13-month evidence-based approach to improving outcomes for people with chronic illness by providing clinical practice teams with proven tools to assist them in making changes to improve care. Practice teams participating in one or more of the collaboratives increased the number of foot and retinal examinations and LDL cholesterol testing conducted.²⁸ More than 120 health organizations have participated in one or more of the five Washington State Collaboratives offered to date.

Reimburse providers for improvement to diabetes-related processes of care. This strategy changes the system of payment from one based solely on fee-for-service to payment for high quality physician performance, with the expectation of improved health status for people with diabetes. Care must be taken in this approach, however, to insure that patients whose disease may be more difficult to manage are not excluded from clinical practices.²⁹ More than 50 Washington physicians are among the nearly 2,300 physicians nationwide who currently hold National Committee for Quality Assurance recognition for high quality care of patients with diabetes. With this certification, physicians can participate in evidence-based pay-for-quality programs.

Prevent and control diabetes-related health disparities. Social conditions are major determinants of individual health and risk behaviors as well as access to resources that protect good health. In Washington, individual risk behaviors and social inequities collide to result in poor diabetes-related health for many. In addition to increasing access to and cultural appropriateness of health care, experts recommend promoting policies that equalize life opportunities through investment in basic education, affordable housing, income security, and other anti-poverty measures.³⁰

Strengthen the diabetes public health system to improve coordination, communication, and collaboration between organizations. States with strong statewide diabetes coalitions have demonstrated a political presence that can bring about changes in legislation and policy. For example, the Minnesota Diabetes Steering Committee provided a communication network

and forum for key organizations to learn about cuts to diabetes coverage in a state-subsidized insurance plan for low-income workers. In conjunction with other efforts, this statewide coalition's involvement led to restored MinnesotaCare coverage for diabetes supplies and equipment and a doubling in the annual outpatient care cap to \$10,000.³¹ The Washington State Diabetes Network, formed in 2005, is a broad coalition of organizations and people working in public, private, tribal, community, and academic training settings to prevent and control diabetes.

See Related Chapters: [Physical Activity, Obesity and Overweight](#), [Social and Economic Determinants of Health](#)

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

Washington Hospitalization Data: Dataset compiled by the Washington State Department of Health, Center for Health Statistics from the Washington Comprehensive Hospitalization Abstract Reporting System, Oregon Hospital Discharge data, and Veterans Hospital Administration datasets, December 2006.

Washington State Behavioral Risk Factor Surveillance System (BRFSS) data: 1987–2006. The data for 2003–2006 were also weighted to reflect the county population estimates from the Washington State Office of Financial Management (OFM). Data release for 2003–2005: November 2006; data release for 2006: June 2007.

U.S. Behavioral Risk Factor Surveillance System data: 1994–2005, downloaded from http://www.cdc.gov/brfss/technical_infodata/surveydata.htm, August 2006.

Washington State Death Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1980–2005, released December 2006.

For More Information

Healthy People 2010 Chapter 5 on Diabetes available at <http://web.health.gov/healthypeople/Document/HTML/Volume1/05Diabetes.htm>.

Washington State Diabetes Collaborative <http://www.doh.wa.gov/cfh/wsc/default.htm>.

Collaborative methodology <http://improvingchroniccare.org> and <http://www.healthdisparities.net>.

Technical Notes

Number of people known to have diabetes in Washington State was calculated through estimation of adult diabetes prevalence from the Washington State Behavioral Risk Factor Surveillance System survey (combined 2003–2005 data) and youth diabetes prevalence from the National Health Interview Survey (NHIS—a national prevalence estimate applied to Washington).³² These prevalence figures were then applied to the 2004 Washington intercensal population estimates by age groups (0-17, 18-44, 45-64, 65-74, and 75+).

Estimates of undiagnosed diabetes were calculated based on a national prevalence estimate for undiagnosed diabetes, applied to the Washington State diabetes population. The national prevalence estimate for undiagnosed diabetes was used in the 2005 CDC National Diabetes Fact Sheet (for methods, see <http://www.centerforamericannurses.org/wellness/health/cd factsheet.pdf>).

Estimate of prediabetes was calculated by applying the 1988–1994 National Health and Nutrition Examination Survey (NHANES III) prevalence estimate of prediabetes among adults, ages 40–74 years (40.1%), as reported in the 2005 CDC National Diabetes Fact Sheet to the 2004 Washington State resident population estimates for this age group (2,401,964) obtained from OFM.

Endnotes

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