THE BURDEN OF DIABETES IN OREGON

SURVEILLANCE REPORT

March 2008

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Executive Summary

Diabetes is an increasing problem in Oregon, with a prevalence 35% higher than 10 years ago. Diabetes disproportionately affects the elderly, certain racial and ethnic communities, and the poor. In 2006:

- One in fifteen adult Oregonians have been diagnosed with diabetes, a prevalence higher than the national average
- Over 15% of Oregonians age 65 years or older have diabetes
- Diabetes is more prevalent among Asian/Pacific Islanders, American Indians and Alaska Natives, African Americans, and Hispanics
- Economically disadvantaged Oregonians are 1.5 times as likely to have diabetes

Diabetes leads to significant health problems and premature death.

- In 2005, diabetes was the sixth leading cause of death in Oregon; over 30% of those deaths occurred in people younger than 75 years old
- During 2006, diabetes hospitalization costs in Oregon were over $1.1 billion, and total estimated medical costs for diabetes were over $2 billion
- Oregonians with diabetes have increased rates of coronary heart disease, heart attacks, and strokes
- Oregonians with diabetes are twice as likely to report depression as those without diabetes, and more than four times as likely to report that their general health status is fair or poor instead of good or excellent

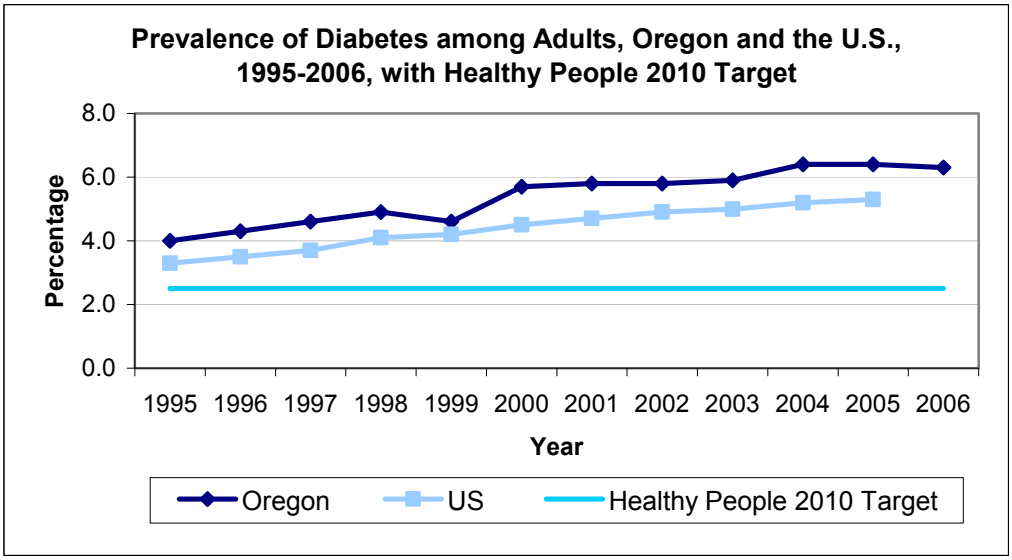
Oregonians without diabetes have significant risk of developing the disease.

- Over 65,000 Oregonians are estimated to have undiagnosed diabetes
- Obesity is the primary modifiable risk factor for diabetes – 58% of adult Oregonians without diabetes are overweight or obese
- Among adult Oregonians without known diabetes, 33% have multiple risk factors for developing it
- Adequate screening and risk counseling may be lacking; 16% of Oregonians have no health insurance

Prevalence

In Oregon, as with the rest of the country, diabetes is a major health problem♦. The percentage of adult Oregonians with diagnosed diabetes rose from 4.6% in 1997 to 6.3% in 2006, an increase of over 35% in the last ten years.[1] An estimated 184,000 adult Oregonians have been diagnosed with diabetes.[2] Because symptoms can develop gradually and complications can take years to develop, another 65,000 Oregonians likely have the disease and do not know it.[3]

The increase in prevalence seen among adults in our state is mirrored by national data, but Oregon prevalence is higher than the national average. Diabetes rates in Oregon[4] and the US as a whole[5] are well above the Healthy People 2010 target of 2.5%.[6]

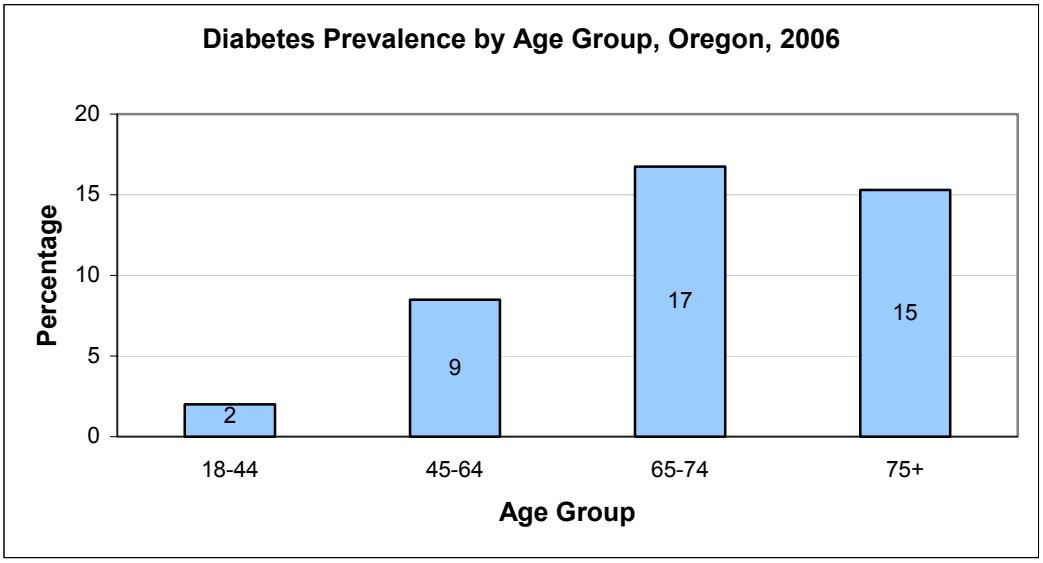


Rates are age-adjusted to the U.S 2000 Standard Population
Sources: Oregon Public Health Division, US Department of Health and Human Services, Centers for Disease Control & Prevention

♦ Throughout this report, data presented includes both Type 1 and Type 2 diabetes.

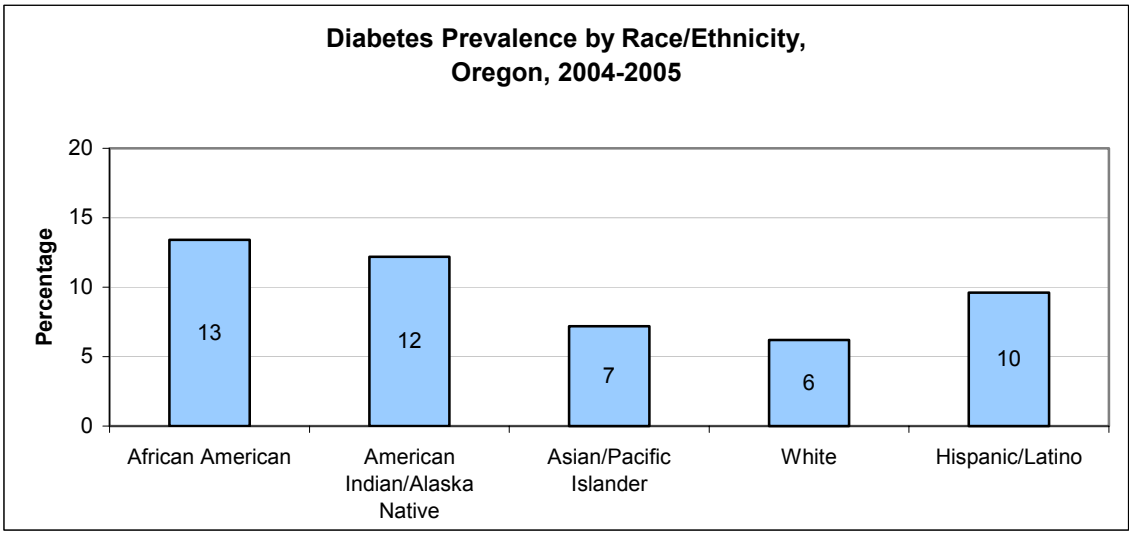
Prevalence by Age, Race/Ethnicity, and Household Income

Diabetes prevalence increases with age; adults under 45 have the lowest rates of diabetes (2%), while 16% of adults age 65 years and older have been diagnosed with the disease. The prevalence of diabetes is slightly higher among males (7.1%) than females (6.2%).[7]



Source: Oregon Public Health Division, 2006 BRFSS

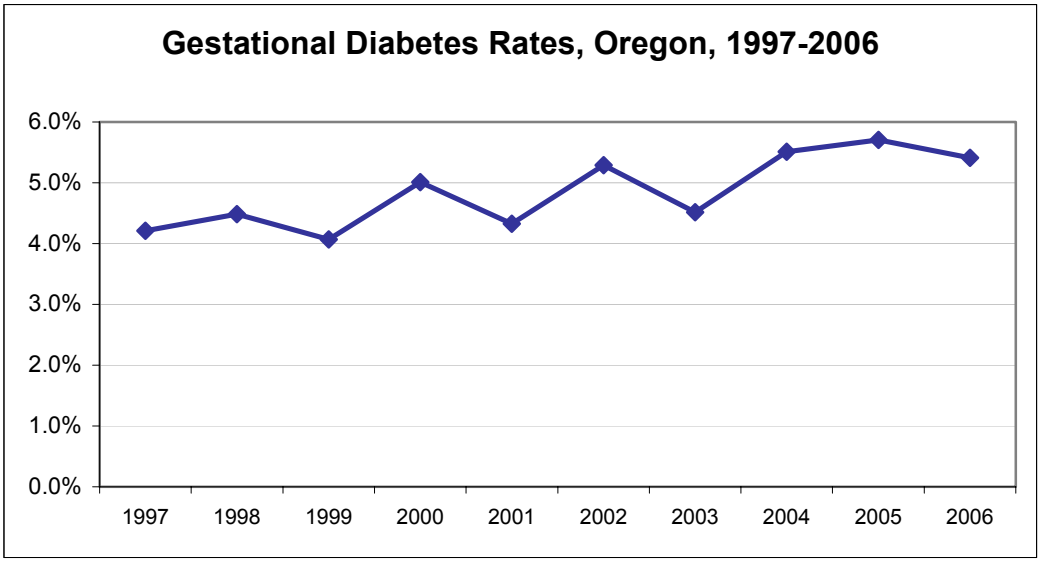
There are differences in the prevalence of diabetes in Oregon related to race and ethnicity. Oregon's Hispanic, African American, and American Indian/Alaska Native communities have significantly higher rates of diabetes than do non-Hispanic Whites.[8] Economic disparities also translate into different rates of diabetes. Economically disadvantaged Oregonians, those with household incomes at or below Federal Poverty Guidelines or who have not graduated from high school, have a significantly higher rate of diabetes (9.7%) than those with higher household incomes (5.7%).[9]



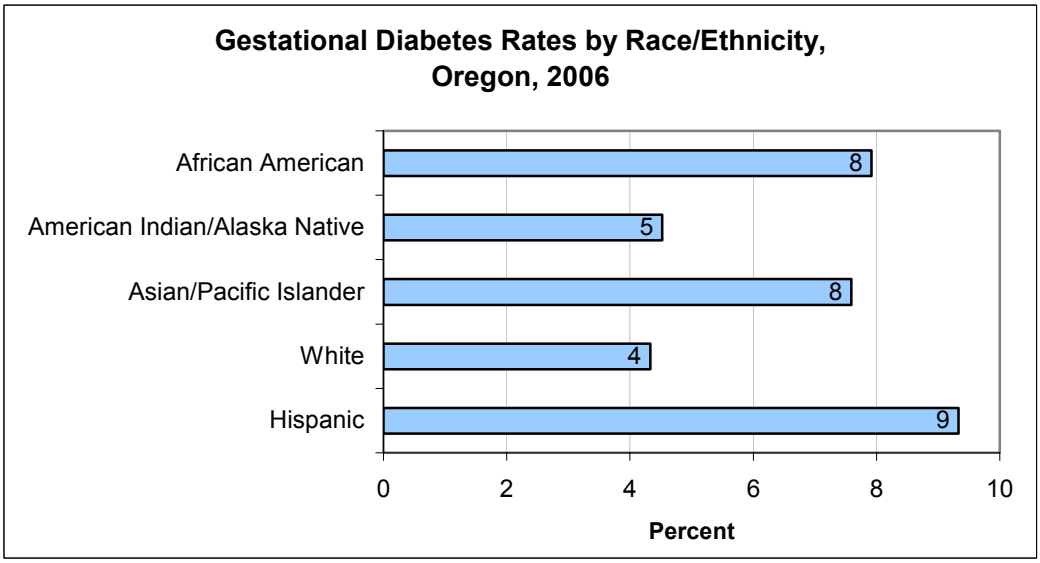
Rates are age-adjusted to the U.S. 2000 Standard Population
Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Source: Oregon Public Health Division, BRFSS Race oversample 2004-2005

Gestational Diabetes

Gestational diabetes can have a negative impact on both mother and infant. Babies born to mothers with gestational diabetes are more likely to have macrosomia – abnormally high birth weight – and are at increased risk to develop diabetes in adulthood. Women who develop gestational diabetes have a 20 to 50 percent chance of developing Type 2 diabetes in the next 5 to 10 years.[10] According to data from birth certificates, the rate of gestational diabetes in Oregon has increased from 4.2% in 1997 to 5.4% in 2006.[11] Gestational diabetes is more common among groups with a higher prevalence of diabetes overall.



Rates are age-adjusted to the U.S. 2000 Standard Population
Source: Oregon Public Health Division, Vital Statistics - Birth Records, 2006



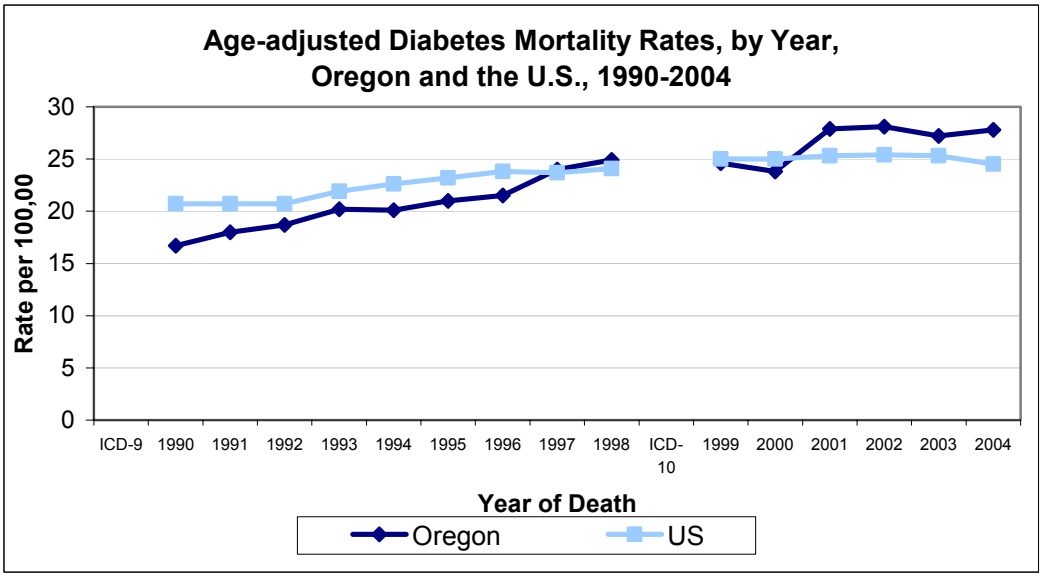
Rates are age-adjusted to the U.S. 2000 Standard Population
Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Source: Oregon Public Health Division, Vital Statistics - Birth Records, 2006

Diabetes Mortality

Diabetes is the sixth leading cause of death among both men and women in Oregon.[12] Diabetes deaths tend to come from related complications rather than from diabetes itself, so examination of diabetes as the "underlying cause of death" will underestimate the impact of this disease. Diabetes was the underlying, or primary, cause of death for 1,072 Oregonians in 2005, but was listed as a contributing cause of death for an additional 2,256 Oregonians.

Trends in Mortality

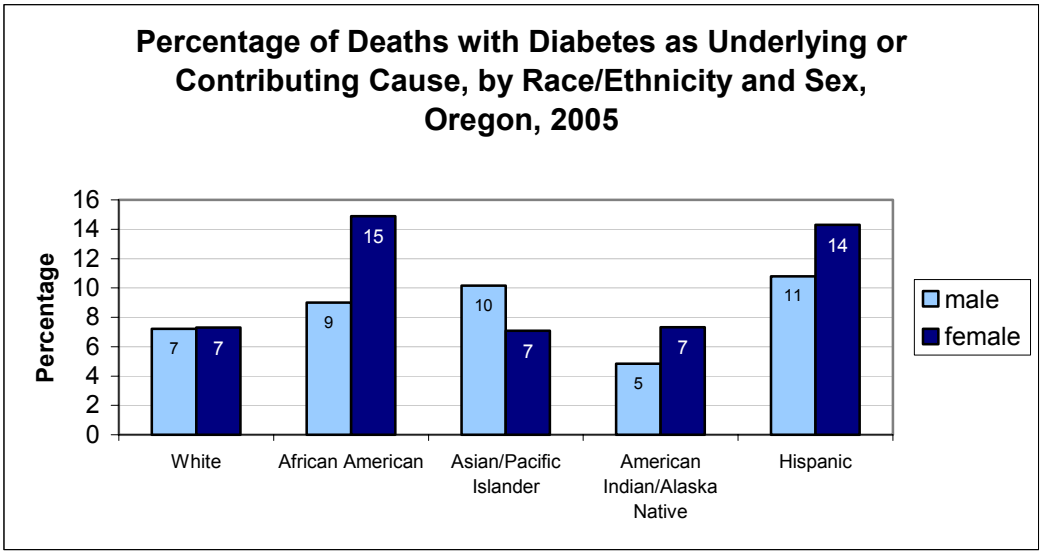
Diabetes mortality rates are increasing in both the US and Oregon, although the increase has been more rapid in Oregon than in the US as a whole.



Rates are age-adjusted to the U.S. 2000 Standard Population
Note: Coding on death certificates changed from ICD-9 to ICD-10 in 1999, indicated by the break in the graph
Source: Centers for Disease Control and Prevention, CDC WONDER On-line Database

Diabetes Mortality by Sex, Race, and Ethnicity

Diabetes death rates vary by sex and race/ethnicity. African American and Hispanic Oregonians have significantly higher diabetes death rates than non-Hispanic whites. African American and Hispanic women have the highest rates of mortality due to diabetes.



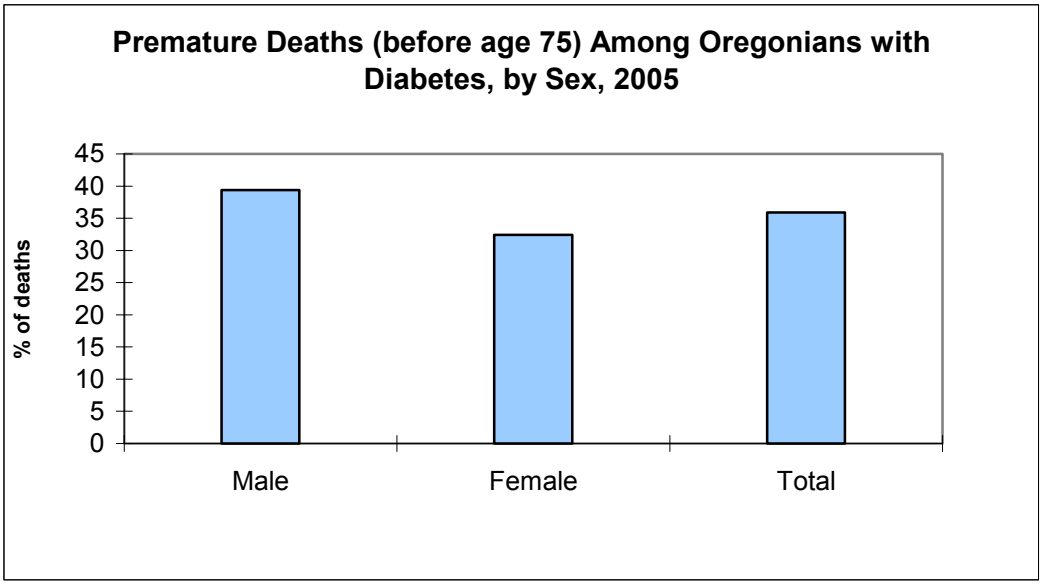
Rates are age-adjusted to the U.S. 2000 Standard Population
Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Source: Oregon Public Health Division, Vital Statistics - Death Records, 2005

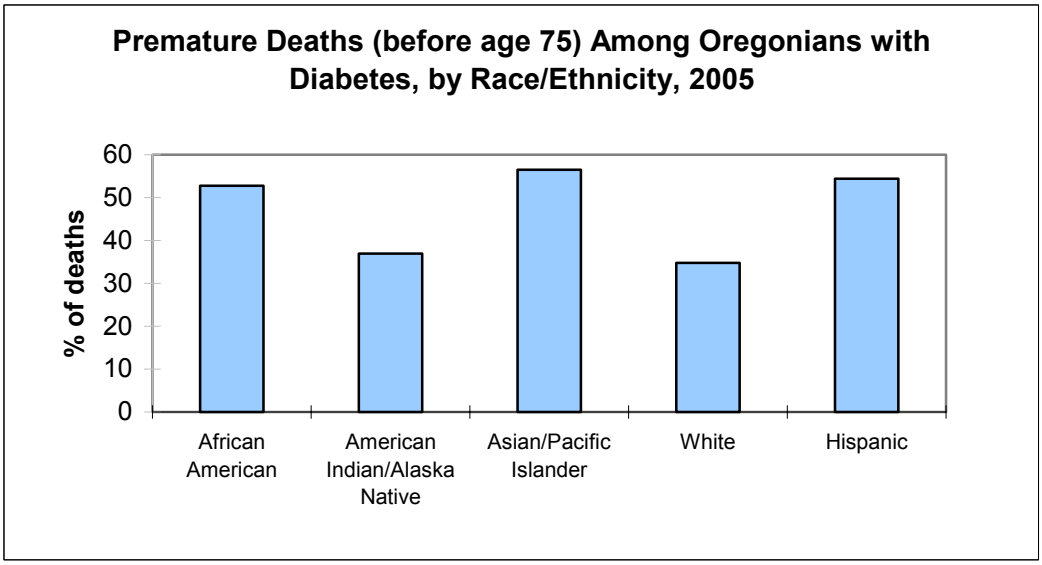
Premature Mortality by Sex, Race, and Ethnicity

Premature mortality is defined here as years of potential life lost before age 75, a concept that emphasizes deaths that occur at younger ages. For example, by this measure, a person who dies at 52 years of age would have lost 23 years of life, while a person who dies at age 69 would have lost 6 years of life.

Premature mortality among those with diabetes is significantly higher in males than females ($p<.05$), as is the average number of years lost (13.4 years for men vs. 11.1 for women, $p<.05$).

White, non-Hispanic Oregonians with diabetes have a lower risk for premature death than other racial and ethnic populations. African Americans with diabetes have 2.7 times the risk of white, non-Hispanics, Asian/Pacific Islanders have twice the risk, American Indians have 4 times the risk, and Hispanics have 5 times the risk of premature death (all $p<.05$). The percentage of deaths among Oregonians with diabetes that are premature are shown in the following figures. The mean years of potential life lost by sex and race/ethnicity are in the following table.





Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Source: Oregon Public Health Division, Vital Statistics - Death Records, 2005

Mean number of lost years to premature death from diabetes

Overall	12.36
Men	13.35
Women	11.13
African Americans	14.82
American Indians/Alaska Natives	16.24
Asian/Pacific Islanders	11.68
Whites	6.97
Hispanics	24.87

Source: Oregon Public Health Division, Vital Statistics - Death Records, 2005

Economic Costs

Diabetes is a chronic, progressive disease that results in high costs for individuals and society due to complications, lost productivity, and the expense of hospitalizations.

In Oregon, diabetes is one of the most frequent hospital discharge diagnoses. In 2006, nearly 56,000 hospitalizations – over 13% of all hospitalizations – had diabetes as one of the listed diagnoses.[13♦]

In 2006, 25% of diabetes-related hospitalizations resulted in charges of $25,000 or more. The total cost for hospitalizations with diabetes as a principal diagnosis was nearly $71 million, while the total cost for hospitalizations with diabetes listed as a contributing diagnosis was over $1.1 billion. This represents a conservative estimate, since several large hospital systems in Oregon do not report cost data. Further, these figures do not include outpatient medical expenses or indirect costs such as lost productivity due to disability and premature death.

The American Diabetes Association (ADA) conducted a thorough analysis of diabetes costs in the United States in 2002, which were estimated at $132 billion.[14] Using those estimates, without adjustment for inflation or increases in per capita medical expenditures, over $2 billion was likely spent on diabetes care in Oregon in 2006. This number includes $1.2 billion in direct medical costs and $800 million from indirect costs due to lost workdays, restricted activity days, premature mortality and permanent disability. This $2 billion figure likely underestimates actual financial impact in several ways. As mentioned above, it does not adjust for the overall increase in per capita health care spending in the last five years.[15] Further, the ADA study did not include dental care, optometry care, or the use of registered dietitians – services likely to be utilized at higher rates by those with diabetes. Lastly, the estimate does not include the estimated 65,000 Oregonians who likely have diabetes but have not yet been diagnosed.

♦ The data represent the number of hospitalizations in a given year, not individual patients with diabetes. That is, a patient with diabetes could account for more than one hospitalization in a year.

Major Complications

Influenza and Pneumonia

People with diabetes are more susceptible to contagious illnesses and once they get them, tend to have disease that is more severe. In particular, people with diabetes are more likely to suffer or die from influenza or infections caused by the organism, *Strep. pneumoniae*, also called "pneumococcus". In Oregon, 4% of all diabetes-related hospitalizations had influenza or pneumonia listed as the primary diagnosis and 7% had influenza or pneumonia as a contributing diagnosis.

Coronary Heart Disease and Stroke

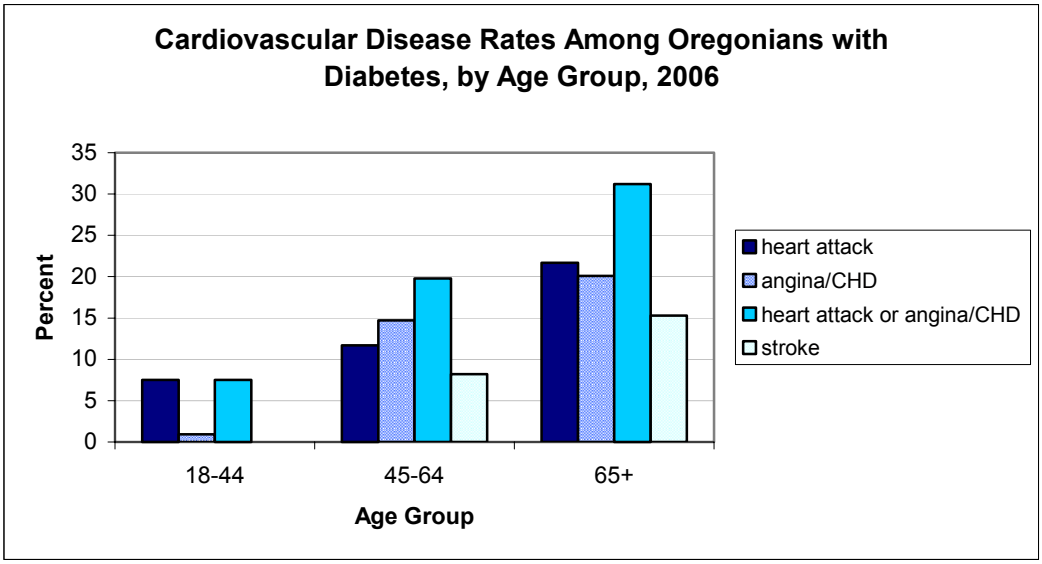
Coronary heart disease (CHD) results when the flow of blood and oxygen to the heart muscle is either decreased, which can lead to chest pain or "angina", or cut off, which can lead to a heart attack and death of part of the heart muscle. Individuals with diabetes are at increased risk for developing these conditions. In 2006, 17% of Oregonians with diabetes reported having had either a heart attack or angina/CHD, compared with just 4% of those without diabetes.

In 2006, 9% of all diabetes-related hospitalizations had a diagnosis of coronary heart disease listed as the primary diagnosis and 28% of diabetes-related hospitalizations had coronary heart disease listed as a contributing diagnosis.

Stroke is marked by the death of brain tissue, often due to loss of blood supply. Like CHD, stroke is a common co-morbidity of diabetes. In 2006, 5% of Oregonians with diabetes reported having had a stroke, compared with just 2% of those without diabetes.

Among diabetes-related hospitalizations in 2006, 4% listed stroke as the primary diagnosis and 8% listed stroke as a contributing diagnosis.

The likelihood of heart attack, angina/CHD, and stroke increases with age. Over 30% of Oregonians with diabetes aged 65 or older have had a heart attack or angina/CHD and 15% have had a stroke.



Source: Oregon Public Health Division, BRFSS 2006

Peripheral Vascular Disease and Peripheral Neuropathy

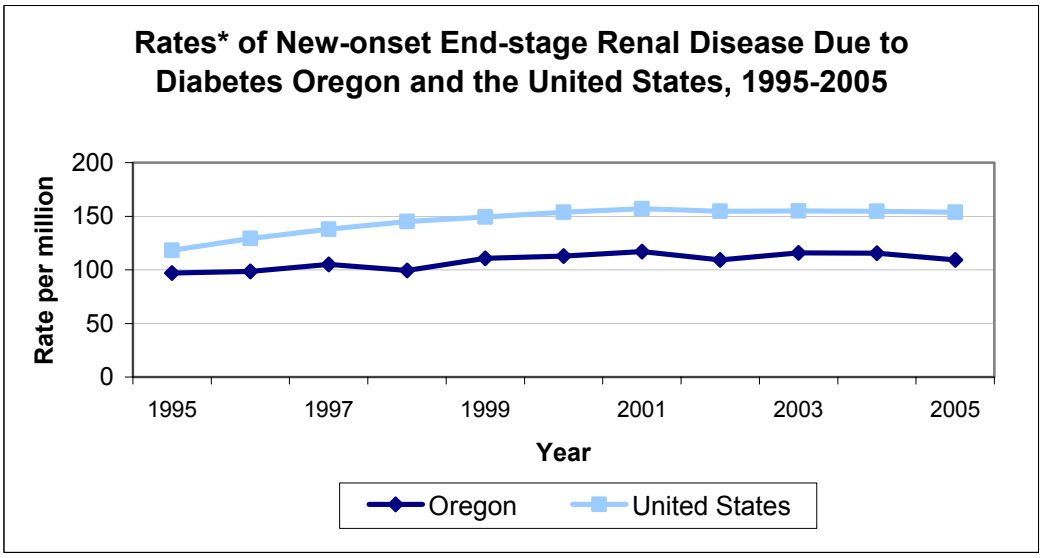
Peripheral vascular disease occurs when blood vessels in the legs are narrowed or blocked by fatty deposits, decreasing blood flow to the feet and legs. Peripheral neuropathy is damage to the nerves in the arms and legs, resulting in decreased sensation. Together, these two conditions can decrease a person's ability to feel cuts or sores on the feet, and can result in ulcers, inflammation, infection, and ultimately, amputation of lower extremities.

In 2006, 5% of all diabetes-related hospitalizations in Oregon had a primary diagnosis related to a lower extremity condition (including ulcer, inflammation, infection, peripheral arterial disease, or neuropathy). Over 21% of all diabetes-related hospitalizations had a lower extremity condition listed as a contributing diagnosis and 2% listed a non-traumatic lower extremity amputation procedure.

End-stage Renal Disease

End-stage renal disease is the permanent failure of the kidneys. In 2006, 363 out of 884 (41%) newly diagnosed chronic end-stage renal disease patients in Oregon had a primary

diagnosis of diabetes, 983 Oregonians with diabetes were on dialysis, and 286 deaths occurred among Oregon dialysis patients with diabetes[16].



Rates are adjusted by age (using the 2004 population), sex, and race.
Source: US Renal Data System[17]

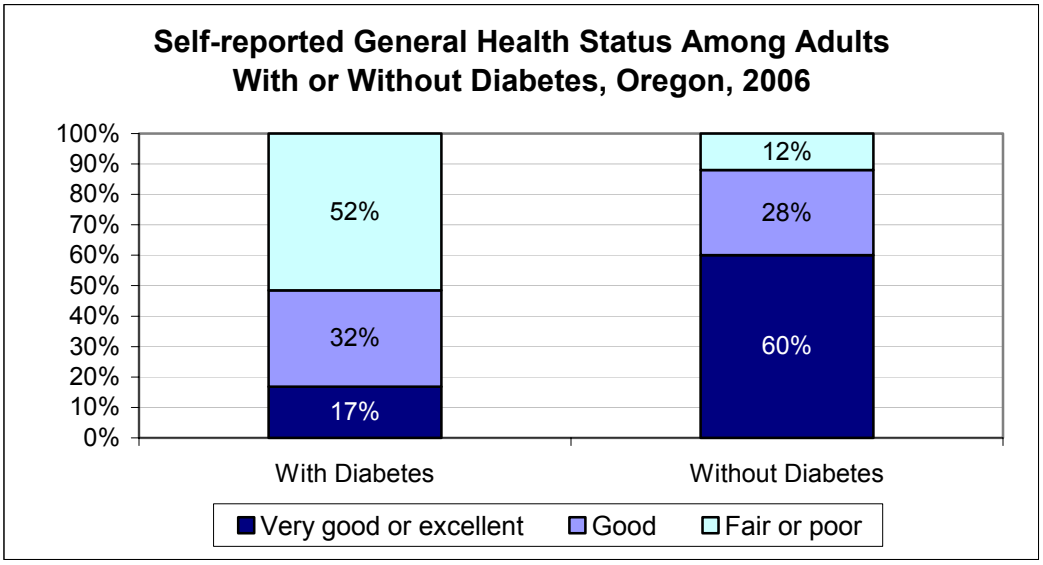
Ketoacidosis and Hyperosmolar Coma

Ketoacidosis and hyperosmolar coma are acute medical events related to uncontrolled diabetes. Ketoacidosis is a serious condition, primarily affecting people with Type 1 diabetes, in which the body has dangerously high levels of ketones, an acidic product from the breakdown of fats that builds up in the blood when insulin is not available to allow metabolism of glucose. Ketoacidosis, if left untreated, can lead to coma or death. In 2006, 3% of all diabetes-related hospitalizations in Oregon had ketoacidosis as a primary diagnosis and 4% had it as a contributing diagnosis.

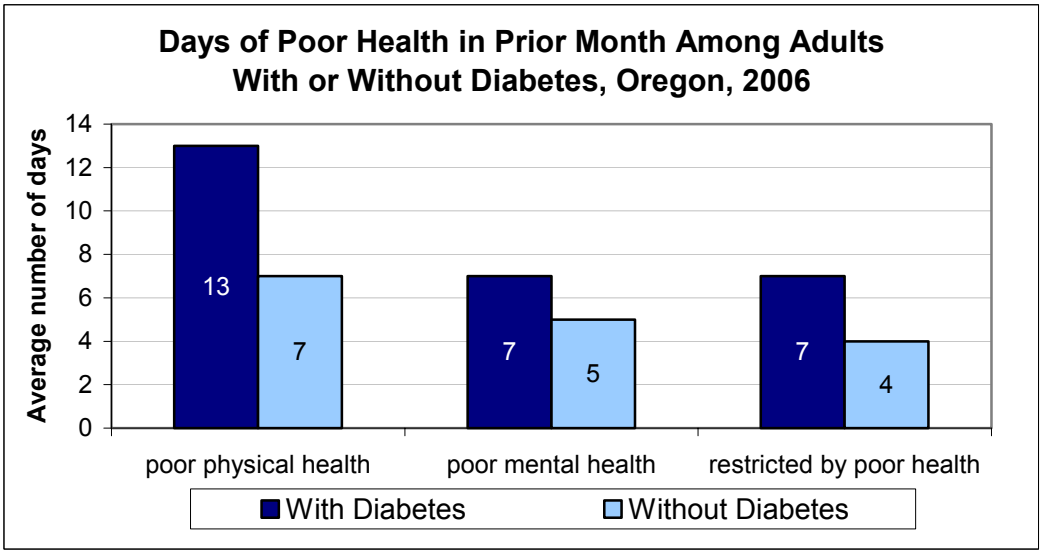
Some people with Type 2 diabetes may experience an acute condition called hyperosmolar non-ketotic coma. Hyperosmolarity is a condition in which the blood is concentrated with sodium, glucose, and other molecules and the body becomes severely dehydrated, eventually resulting in a coma. This is a rare event; only 0.5% of diabetes-related hospitalizations had hyperosmolar coma listed as a contributing diagnosis.

General Health Status

In Oregon, adults with diabetes are less likely to report that their health status is "very good" or "excellent" than adults without diabetes. The chart below shows the current self-assessed health status of adult Oregonians with and without diabetes.[18]



Rates are age-adjusted to the U.S. 2000 Standard Population
Source: Oregon Public Health Division, BRFSS 2006.



Rates are age-adjusted to the U.S. 2000 Standard Population
Source: Oregon Public Health Division, BRFSS 2006.

Diabetes and Depression

Depression continues to be a significant problem for Oregonians with diabetes. Including those in treatment, taking medication, or who report symptoms of major depressive disorder, 23% of Oregonians with diabetes report current depression, compared to only 12% of those without diabetes. One in ten Oregonians with diabetes had symptoms consistent with major depression in the past two weeks, compared with 4% in the general population.

Self-reported depression among adults with diabetes, Oregon, 2006

By indicator:	Percentage
Ever been treated for depression	36%
Ever diagnosed with depression by a health care provider	32%
Currently receiving treatment for depression	18%
Currently taking medication for depression	17%
Symptoms consistent with active major depression	10%
Sad most days of previous 2 years	25%
Suicidal thoughts in previous 2 weeks	7%

Source: Oregon Public Health Division, BRFSS 2006

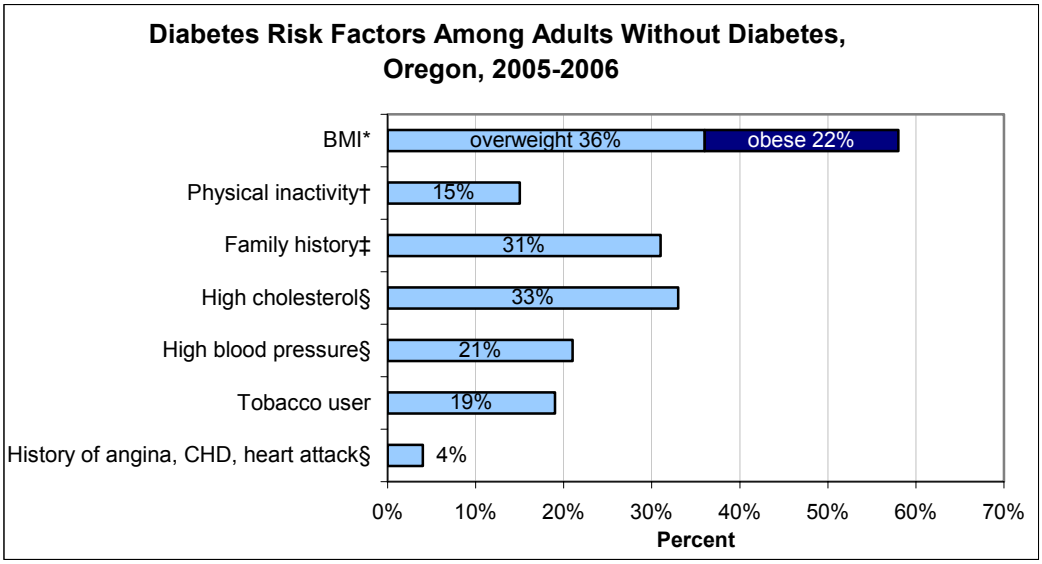
Depression among those with diabetes is of serious concern as it has been associated with reduced physical activity, poor diet, and low adherence to medications.[19] Oregonians with diabetes who were depressed reported less confidence in their ability to manage their conditions and carry out recommended self-care behaviors than did their non-depressed counterparts.[20]

Risk Factors for Diabetes

Certain conditions or characteristics can increase a person's risk of developing diabetes. Some of these risk factors, such as age or family history, one can't do much about. These non-modifiable risk factors include being over 45 years old, having a close relative (parent or sibling) with diabetes, having certain racial/ethnic backgrounds (African American, Asian/Pacific Islander, American Indian, Hispanic/Latino), and having had gestational diabetes or a baby weighing more than nine pounds at birth.

Other risk factors, such as overweight or obesity, high blood pressure, low HDL (or *good*) cholesterol, high triglyceride levels, and lack of physical activity, can be controlled. Obesity is the primary modifiable risk factor for diabetes – 86% of adult Oregonians with diabetes are obese or overweight (50% and 36%, respectively).[21] Although Type 2 diabetes can occur in youth, the nationally representative data that would be needed to monitor diabetes trends in youth by type are not available. Clinically-based reports and regional studies suggest that Type 2 diabetes, although still rare, is being diagnosed more frequently in children and adolescents, particularly in American Indians, African Americans, and Hispanic/Latino Americans;[22] furthermore, 1 in 6 overweight adolescents aged 12-19 may have pre-diabetes.[23]

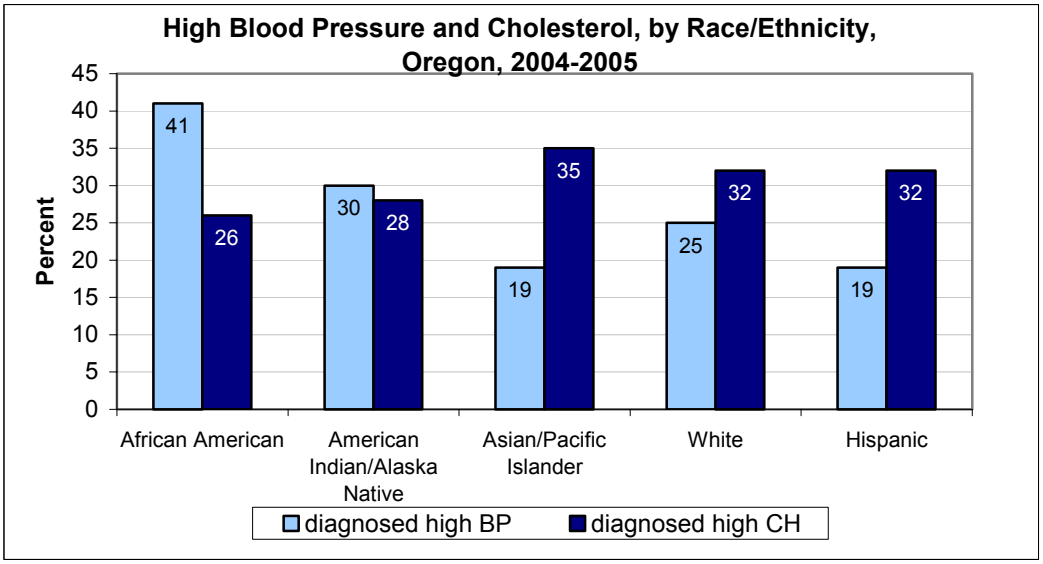
In 2006, almost three-quarters of adult Oregonians without diabetes (73%) reported having at least one of the following risk factors for developing diabetes—family history of diabetes, obesity, age 45 years or older, or physical inactivity. Approximately 33% had at least two of these risk factors, 9% had at least three, and 2% had all four.



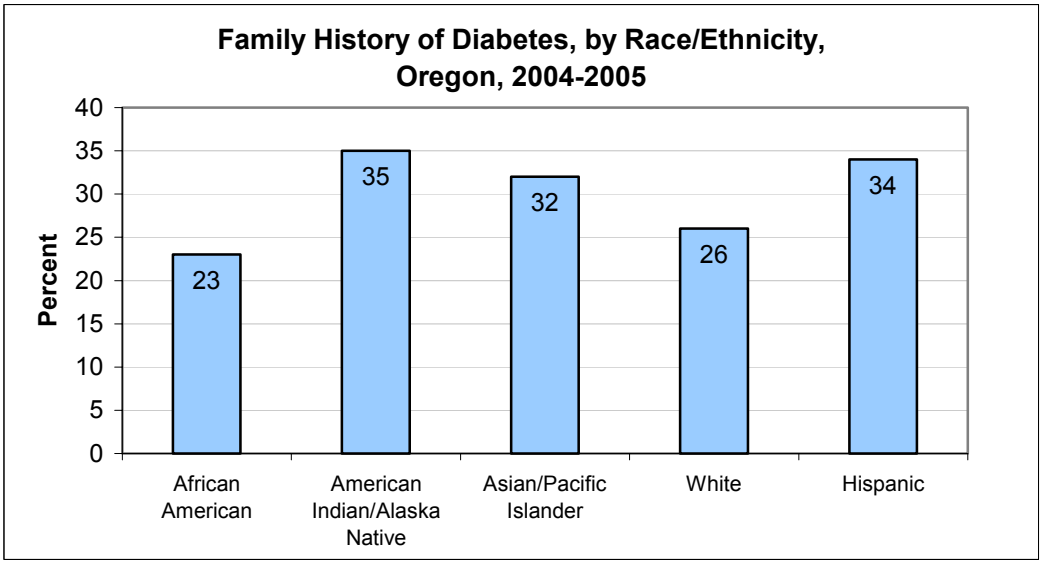
* Overweight=body mass index (BMI) 25.0-29.9 kg/m2, obese=BMI 30.0+ kg/m2.
† Inactivity=no physical activity during leisure time.
‡ Family history=have parent or sibling related by blood with diabetes, excluding diabetes only during pregnancy.
§ Diagnosed by doctor, nurse, or other health professional.
Sources: Oregon Public Health Division, 2005-2006 BRFSS

Risk Factors by Race/Ethnicity

In conducting the statewide Behavioral Risk Factor Surveillance survey in 2004 and 2005, additional African American, American Indian/Alaska Native, and Asian/Pacific Islander Oregonians were interviewed to learn more about risk factors for diabetes and its complications in these populations. It should be noted that although additional people were surveyed, total numbers of respondents from each of these groups remained small, and the following charts should be interpreted with caution.



Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Rates are age-adjusted to the 2000 U.S. Standard Population.
Source: Oregon Public Health Division, BRFSS Race oversample, 2004-2005



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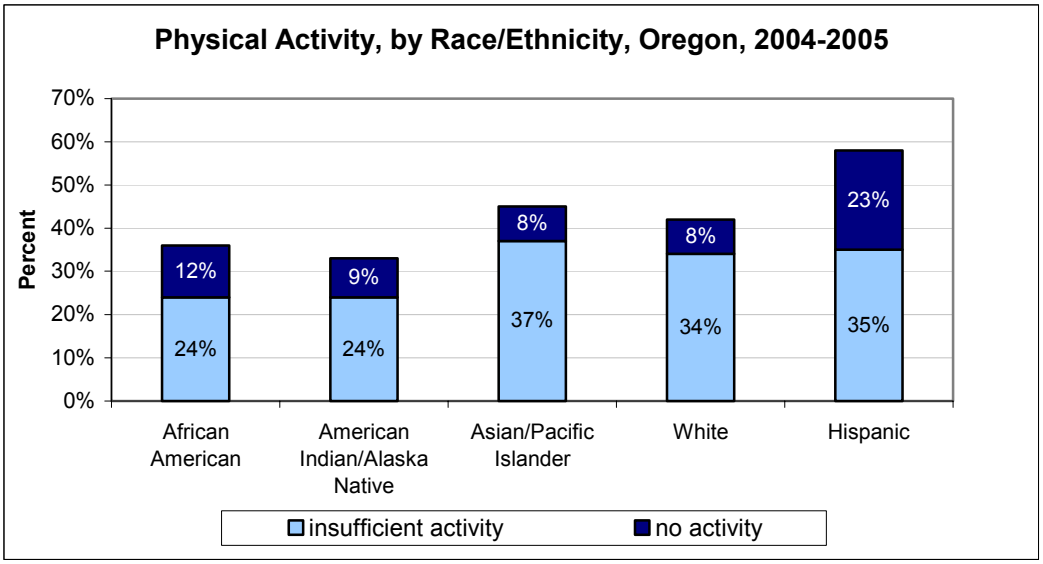
Source: Oregon Public Health Division, BRFSS Race oversample, 2004-2005



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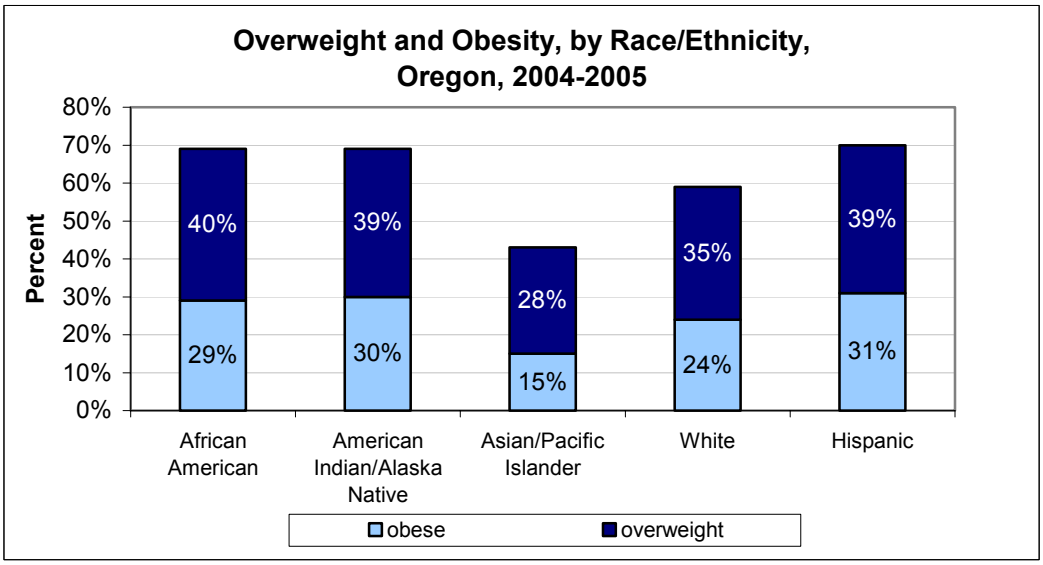
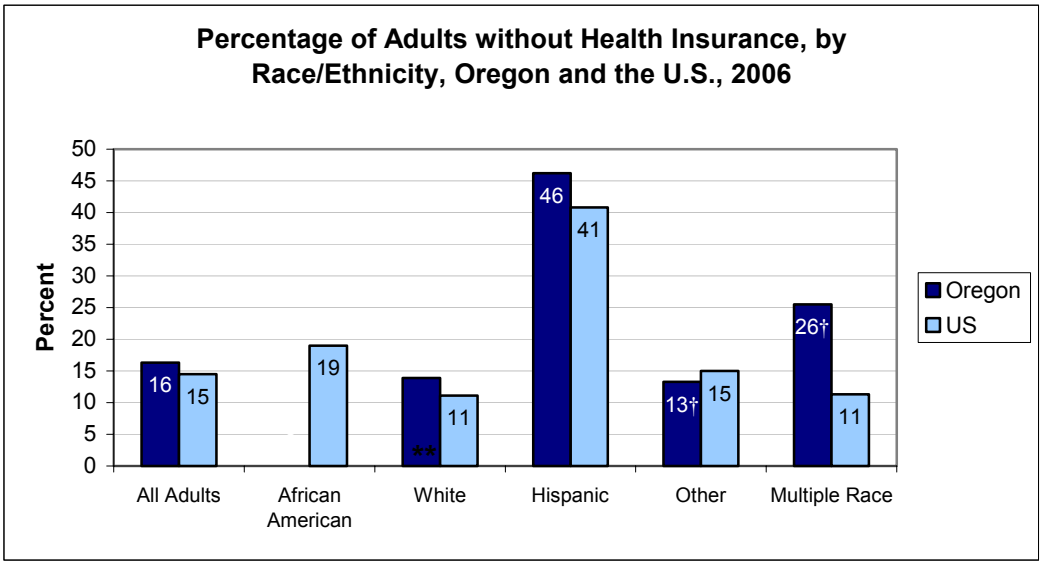


Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Rates are age-adjusted to the 2000 U.S. Standard Population.
Source: Oregon Public Health Division, BRFSS Race oversample, 2004-2005

Access to Health Care

Treatment and management of diabetes are linked to access to health care. Approximately 8% of Oregonians with diabetes are without any health care coverage, which may make it more difficult for them to get appropriate care and assistance with management of their condition. In fact, 14% of adults in Oregon with diabetes reported needing to see a doctor in the prior 12 months but being unable to go because they could not afford it, and 20% reported that they could not afford needed dental care.

National rates of individuals with undiagnosed diabetes and pre-diabetes indicate there may be over 65,000 adults in Oregon with undiagnosed diabetes and over 500,000 adults with pre-diabetes. Thus, access to health care for those who have not been diagnosed with diabetes will have a large impact on the burden of diabetes in future years. Hispanic Oregonians, a high-risk group for diabetes, are particularly unlikely to be insured.[24]



Rates are age-adjusted to the U.S. 2000 Standard Population
†Small count, interpret with caution, **= not available
Note: Data for the categories African American, American Indian/Alaska Native, Asian/Pacific Islander, and White do not include respondents of Hispanic ethnicity.
Source: Centers for Disease Control and Prevention, BRFSS 2006

Moving forward

In recognition of the seriousness of the problem of diabetes in the state, the 2007 Oregon legislature mandated that Oregon's Department of Human Services develop a strategic plan to reduce diabetes rates in Oregon. This process is underway, in collaboration with the ADA, health care professionals, educators, and other interested parties.

The Oregon Diabetes Program continues to work with the Oregon Diabetes Coalition (ODC) to improve the health and quality of life of Oregonians affected by diabetes. The ODC's goals and objectives are summarized in a state plan called *Oregon's Action Plan for Diabetes,*[25] originally published in 1999, and updated in 2005. A companion document to this burden report, called the *Oregon Progress Report on Diabetes* outlines the progress made over that last year in implement the *Action Plan*, and provides guidance as to next steps.

For further information on diabetes

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www.healthoregon.org/diabetes

Oregon Diabetes Coalition
contact: Carrie Washburn Beck (971) 673-0984
www.oregon.gov/DHS/ph/diabetes/coalition.shtml

American Diabetes Association
1-800-DIABETES (1-800-342-2383)
www.diabetes.org

Centers for Disease Control and Prevention: Division of Diabetes Translation
1-800-CDC-INFO (1-800-232-4636)
www.cdc.gov/diabetes

References

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Appendix A. Data Sources

Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing random-digit dialed telephone survey of adults concerning health conditions and health-related behaviors. The BRFSS was developed by the Centers for Disease Control and Prevention (CDC) and in conducted in all states in the U.S. Each year between 5,000 and 15,000 adult Oregonians are interviewed. The BRFSS includes questions on health behavior risk factors such as seat belt use, diet, weight control, tobacco and alcohol use, physical activity, preventive health screenings, and use of preventive and other 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. More information on BRFSS in Oregon is available from the Center for Health Statistics, http://www.dhs.state.or/dhs/ph/chs/brfs.

Data presented by race/ethnicity are from a special combined 2004 and 2005 file, which includes additional surveys among African Americans, American Indians/Alaska Natives, and Asians/Pacific Islanders. The additional surveys were done to ensure that there would be a minimum of 250 surveys for each racial/ethnic group. Data for each racial/ethnic group were weighted to represent the group's population by age and gender. Percentages presented have been age-adjusted, to lessen the effect of differences in the age distribution between the various groups.

National BRFSS data in customizable reports is available from the CDC website at http://www.cdc.gov/BRFSS.

CDC Wonder

Online database that provides data collected by the National Center for Health Statistics (NCHS) for statistical reporting and analysis of deaths from specific diseases, at http://wonder.cdc.gov.

Oregon Vital Statistics – Birth Certificates

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 anomalies, medical factors of pregnancy, method of delivery, complications of labor and delivery, and smoking, drinking, or illicit drug use during pregnancy. Information about maternal diabetes is based on two check boxes – one for gestational diabetes and one for pre-existing (chronic) diabetes. Additional information about Oregon's birth data can be found at http://www.oregon.gov/dhs/ph/chs/data/birth/birthdata.shtml.

Oregon Vital Statistics – Death Certificates

The Death Certificate Statistical File includes all deaths occurring in Oregon and deaths occurring out-of-state among Oregon residents. Data are obtained from death certificates that are collected by the State Registrar. The data are used to examine trends in mortality and causes of death. Variables in this database include cause of death, date and place of death, and decedent demographic information. The mortality data analyzed for this report consist of deaths in Oregon residents and exclude residents of other states or countries who died in Oregon. Additional information about Oregon's mortality data can be found at http://www.oregon.gov/DHS/ph/chs/data/death/death.shtml.

US Renal Data System

The United States Renal Data System (USRDS) is a national data system that collects, analyzes, and distributes information about end-stage renal disease in the United States. The USRDS is funded by the National Institute of Diabetes and Digestive and Kidney Diseases, in conjunction with the Centers for Medicare & Medicaid Services. Additional details about the national data system can be found on the USRDS website at http://www.usrds.org.

Northwest Renal Network

The Northwest Renal Network (NWRN) is a private, not-for-profit corporation funded by the Department of Health and Human Services' Centers for Medicare & Medicaid Services. The Network collects and analyzes data on patients (including Oregon patients) with end-stage renal disease, including patient history, tracking, and outcome data. Data are used to monitor the incidence of ESRD, prevalence of dialysis, and mortality rates among patients with a primary diagnosis of diabetes in Oregon. Additional information about the NWRN can be found at *http://www.nwrenalnetwork.org*.