

Coronary Heart Disease

Definition: Decreased blood flow through the coronary arteries, usually caused by atherosclerosis. This results in decreased oxygen supply to the heart muscle and can cause reduced heart muscle function and destruction of heart muscle cells (myocardial infarction or "heart attack"). ICD-9 codes 410-414, 429.2. ICD-10 codes I20-I25.

Summary

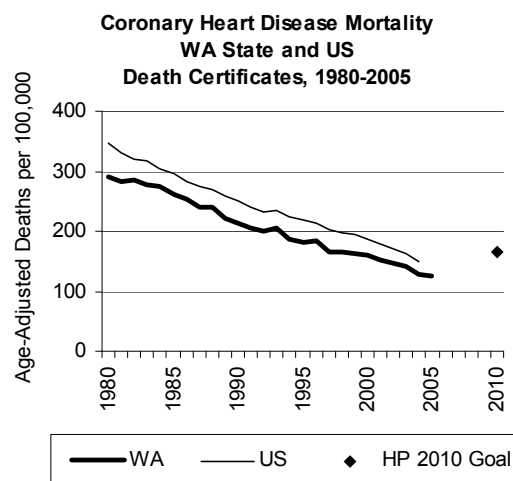
Coronary heart disease caused 7,734 deaths in Washington State in 2005 ([age-adjusted death rate: 125 per 100,000](#)). Coronary heart disease is the second leading cause of death in Washington. Non-Hispanic American Indians and Alaska Natives and blacks have the highest coronary heart disease death rates (186 and 163 per 100,000, respectively). Many of these deaths could be prevented or delayed by modifying known risk factors, such as high blood cholesterol, high blood pressure, tobacco use, physical inactivity, obesity, and diabetes. Intervention approaches should focus on reducing or treating risk factors, increasing knowledge of signs and symptoms, and improving both emergency response and quality of care.

Time Trends

Coronary heart disease mortality rates have steadily declined in both Washington and the United States. In Washington, the age-adjusted mortality rate fell from 291 ([±6](#)) deaths per 100,000 in 1980 to 125 deaths (± 3) per 100,000 in 2005. The age-adjusted coronary heart disease mortality rate in the United States also declined, from 345 deaths in 1980 to 151 deaths per 100,000 in 2004.

Year 2010 Goals

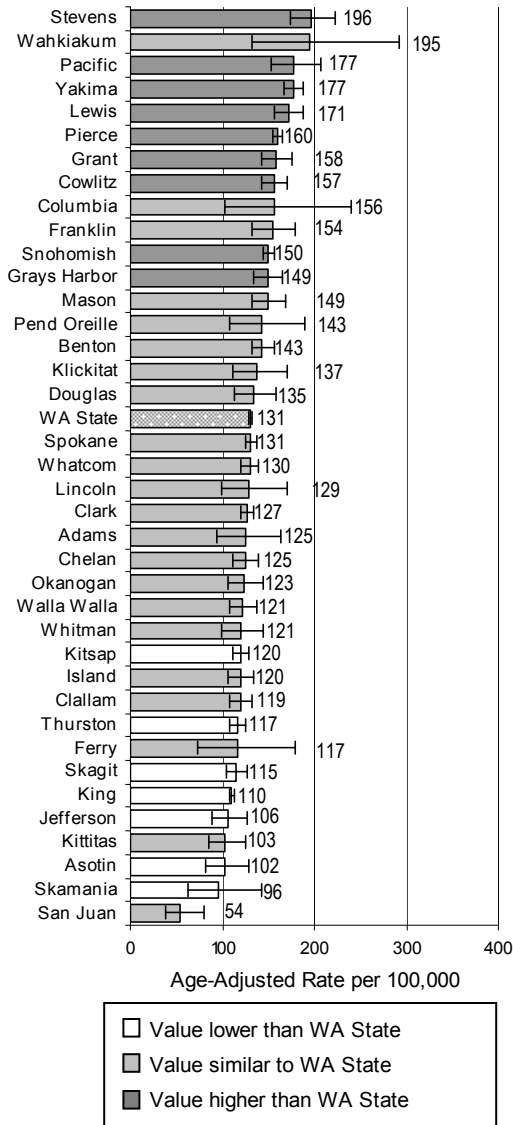
The national *Healthy People 2010, Midcourse Review* goal is to decrease coronary heart disease mortality to no more than 162 deaths per 100,000 population. Both Washington and the United States have met this goal.



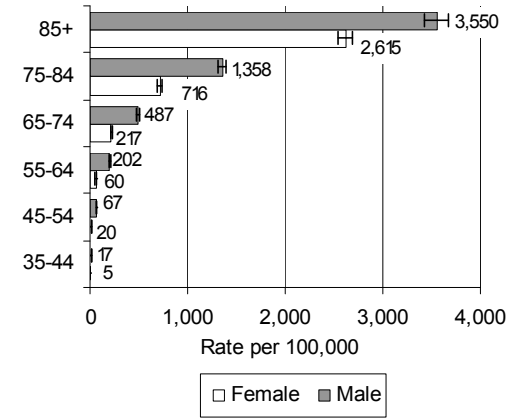
Geographic Variation

Washington's age-adjusted coronary heart disease death rate in 2003–2005 was 131 deaths per 100,000. Rates ranged from 54 per 100,000 in San Juan County to 196 per 100,000 in Stevens County. Nine counties had rates that were higher than the state rate: Grays Harbor, Snohomish, Cowlitz, Grant, Pierce, Lewis, Yakima, Pacific, and Stevens counties. Eight counties—San Juan, Asotin, Kittitas, Jefferson, King, Skagit, Thurston, and Kitsap—had rates lower than the state rate. [Fewer than 20](#) people died of heart disease in Garfield County over the three-year period, and the following chart does not include Garfield.

**Coronary Heart Disease Mortality
County Data
WA State Death Certificates, 2003-2005**



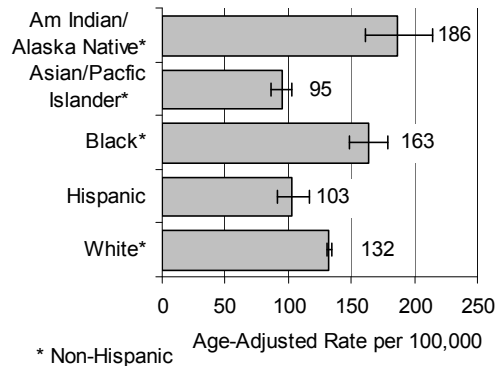
**Coronary Heart Disease Mortality
Age and Gender
WA State Death Certificates, 2003-2005**



Race and Hispanic Origin

In Washington in 2003–2005, blacks and American Indians and Alaska Natives had the highest age-adjusted coronary heart disease mortality rates. Except for American Indians and Alaska Natives, each racial or Hispanic origin group in Washington had lower coronary heart disease mortality rates than its national counterpart. American Indians and Alaska Natives in Washington had a higher coronary heart disease death rate than their U.S. counterparts in this period.³

**Coronary Heart Disease Mortality
Race and Hispanic Origin
WA State Death Certificates, 2003-2005**



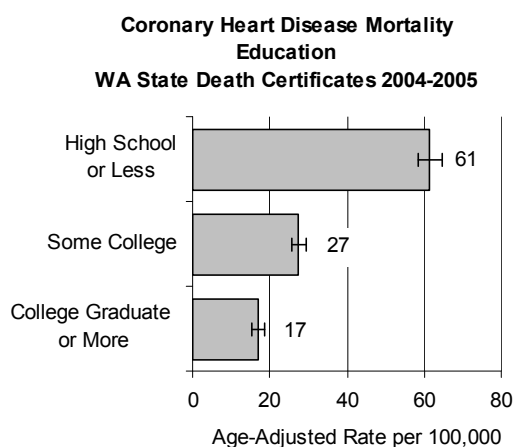
Age and Gender

Coronary heart disease deaths increased with age. In each age group, men had higher coronary heart disease death rates than women. Studies indicate that differences in rates by age and gender remain after accounting for race, Hispanic origin, income, and education.^{1,2}

Income and Education

Among Washington adults in 2004–2005, age-adjusted coronary heart disease mortality rates decreased as educational attainment increased. Some studies have found a weaker association between education and coronary heart disease for women than for men.²

Previous analysis suggested that the rate of coronary heart disease mortality increased as the percent of people living in poverty increased.⁴ Disparities in hypertension, high blood cholesterol, past cardiovascular events, behavior after a heart attack, psychosocial stressors, and access to care may account for the relationship between socioeconomic position and coronary heart disease mortality.²



Other Measures of Impact and Burden

Hospitalizations. In 2004, 77,959 Washington hospitalizations included a diagnosis of coronary heart disease at discharge. Total charges for these admissions were about \$2 billion. For 26,084 of these hospitalizations, coronary heart disease was the principal diagnosis. These admissions cost \$1 billion in hospitalization charges.

Hospitalizations that included coronary heart disease among the listed diagnoses increased rapidly in Washington beginning in 1993 (1,166 per 100,000 population) and peaked in 2001 (1,374 per 100,000 population). This was an increase of about 18% over a period of less than ten years. The rate for 2004 (1,279 per 100,000) was about 10% higher than rates in the early 1990s.

The hospitalization rates for coronary heart disease in 2002–2004 increased until age 85 years and were higher for men than women. The gender difference in coronary heart disease hospitalization rates is greatest among those ages 45 to 54. Men in that age group were 2.5 times more likely than women to be hospitalized for coronary heart disease. The difference gradually decreased for each subsequent age

group until ages 85 and older, when the risk for men was about 60% higher than for women. At ages 85 and older, men had a coronary heart disease hospitalization rate of 15,827 per 100,000 compared to 9,618 per 100,000 for women.

Prevalence of coronary heart disease. Self-reported data from the 2005 Washington State [Behavioral Risk Factor Surveillance System](#) (BRFSS) survey suggested 5% ($\pm 1\%$) of Washington adults have had coronary heart disease or angina or had a heart attack. More men than women reported these diseases (7% $\pm 1\%$ and 4% $\pm 1\%$, respectively). Disease rates increased with age. Rates were 1% ($\pm 1\%$) among people ages 18–34; 2% ($\pm 1\%$) among people ages 35–49; 7% ($\pm 1\%$) among people ages 50–64; and 19% ($\pm 1\%$) among people ages 65 and older. American Indians and Alaska Natives were more likely to report heart disease (11% $\pm 4\%$) than whites (5% $\pm 1\%$)

Risk and Protective Factors

Atherosclerosis, the build-up of a fatty cholesterol plaque within the arterial walls, is the typical process that leads to coronary heart disease. Atherosclerosis usually develops when one or more risk factors are present. Each of the risk factors discussed below independently increases the chance of developing coronary heart disease. Studies suggest people with fewer risk factors have a greater life expectancy than those who have more risk factors.⁵

High cholesterol. While cholesterol is an important component of a healthy body, too much cholesterol can increase the risk of developing coronary heart disease.⁶ High cholesterol can be a result of family history, or it can be caused by lifestyle, such as a diet high in saturated and trans fats.⁶

Self-report data from the 2005 Washington BRFSS indicated that 76% ($\pm 1\%$) of Washington adults have had their cholesterol checked at least once in their lives, and 63% ($\pm 1\%$) were screened within the past year. About 33% ($\pm 1\%$) of Washington adults had high cholesterol; this was an increase over the 2001 rate of 26% ($\pm 2\%$). More men than women reported high cholesterol (34% $\pm 1\%$ and 31% $\pm 1\%$, respectively). High cholesterol was more common among older adults; rates ranged from 16% ($\pm 2\%$) among people ages 18–34 to 53% ($\pm 2\%$) among people ages 65 and older.

Fewer than half of those who qualify for lipid-modifying treatment are receiving it.⁷ Only about a third of those treated achieve their low-density

lipoprotein (LDL) goal. Fewer than 20% of coronary heart disease patients are at their LDL goal.⁷

High blood pressure. People with high blood pressure have a two- to four-times greater risk of developing coronary heart disease than those who do not have high blood pressure.⁸

Tobacco use. Cigarette smokers are two to three times more likely to die from coronary heart disease than are nonsmokers.⁹ In addition, nonsmokers who are exposed to secondhand smoke at home or at work increase their risk of developing heart disease by 25%–30%.¹⁰

Physical inactivity. People who are physically inactive are twice as likely to develop coronary heart disease than those who are physically active. The lack of sufficient physical activity at moderate or vigorous intensity is as important a risk factor for developing coronary heart disease as high blood cholesterol, high blood pressure, or cigarette smoking.¹¹

Obesity. Overweight and obesity are associated with an increased relative risk of developing coronary heart disease. Obesity is responsible for an estimated 16% of coronary heart disease deaths in men and 17% of coronary heart disease deaths in women.¹²

Diabetes. Heart disease and stroke account for nearly 65% of deaths among people with diabetes. Adults with diabetes have coronary heart disease death rates that are about two to four times higher than those for adults without diabetes.¹³ Diabetes prevalence increased in Washington from 4% ($\pm 1\%$) in 1994 to 7% ($\pm <1\%$) in 2006.

Other factors. There are many risk and protective factors for coronary heart disease not listed above. Specifically, a diet poor in fruits and vegetables has been shown to be a significant risk factor for heart attack.¹⁴ Psychosocial stress is also a significant risk factor for heart attack.¹⁵ Moderate alcohol consumption has been shown to be a protective factor for the development of coronary heart disease.¹⁴

Knowledge of signs of heart attack. Survival rates following a heart attack improve dramatically when medical attention is given quickly. Knowing the signs and symptoms of a heart attack is the key to summoning emergency

responders when appropriate. When asked in the 2005 BRFSS whether listed signs and symptoms were indications of a heart attack in progress, about 95% ($\pm 1\%$) of Washington adults correctly identified chest pain; 86% ($\pm 1\%$) correctly identified pain in the arm or shoulder; 86% ($\pm 1\%$) identified shortness of breath; 63% ($\pm 2\%$) identified lightheadedness, fainting, or weakness; and 48% ($\pm 1\%$) identified pain in the jaw, neck, or back as signs and symptoms of heart attack. About 33% ($\pm 1\%$) incorrectly said that sudden loss of vision was a sign of heart attack. Only 13% ($\pm 1\%$) of survey respondents correctly identified all five signs and symptoms of a heart attack from the list of six signs and symptoms.

When Washington adults were asked what they would do first if they witnessed someone having a heart attack, 90% ($\pm 1\%$) correctly said they would call 911. About 4% ($\pm 1\%$) said they would drive the person to the hospital.

Intervention Strategies

The Washington State Heart Disease and Stroke Prevention Program adopted a framework from the U.S. Centers for Disease Control and Prevention to prevent and manage heart disease and stroke. The framework addresses needed policy and environmental changes to improve conditions that are favorable to health and identifies interventions that are targeted to the people living with long-term effects of heart disease or stroke.^{16,17}

Control risk factors. Controlling cholesterol and blood pressure levels can delay or prevent coronary heart disease. For example, for every 1% decrease in LDL-cholesterol level there is an estimated 1% reduction in the risk of coronary heart disease.⁷ A 12- to 13-point reduction in systolic blood pressure may reduce total cardiovascular disease deaths by 25%.¹⁸

Increase awareness of the importance of prompt treatment. Public awareness campaigns have traditionally been designed to increase knowledge of the signs and symptoms of a heart attack and to call 911. Evidence suggests, however, that knowing the signs and symptoms alone will not reduce delay in seeking treatment.¹⁹ The longest delay is between the onset of symptoms and the decision to seek medical help. Reperfusion therapy to restore blood flow and oxygen to the heart reduces both morbidity and mortality when administered soon after the onset of symptoms.¹⁹ Current recommendations suggest providing reperfusion therapy within 90 minutes of symptom onset to provide maximum

benefit.²⁰ Because treatment options are time-sensitive, reducing treatment delays is important. Awareness messages should emphasize the urgency and benefits of receiving prompt transport to hospitals where reperfusion therapy is readily available.

Improve emergency response. There is no national standard in the United States²¹ to train and certify emergency medical system personnel, nor is there a system to coordinate emergency medical services with hospital emergency departments. The Washington State Department of Health convened an emergency cardiac and stroke committee in 2000 that recommended establishing a comprehensive and coordinated system of care that includes standards for prehospital and hospital care and verification of hospital capabilities.²² Such interventions to address the fragmented emergency system could improve the effectiveness of care provided to people with acute heart attacks or strokes.

Improve quality of care. The Washington State Collaborative began in 1999 as an approach to improve the quality of care for people with chronic disease, and it uses the Planned Care Model as one of three evidence-based methodologies to improve both process and outcome measures in the primary care setting.²³ The Planned Care Model represents an ideal system of health care for people with chronic disease; implementing it leads to improved quality of primary care for patients with chronic conditions.²⁴ The Washington State Collaborative has addressed primary care needs of people with and at risk for coronary heart disease, particularly those who already have diabetes.

Quality improvement must go beyond the primary care setting to include both inpatient and outpatient care. Hospital-based quality initiatives are now addressing heart disease and stroke. One such initiative, Get With the Guidelines, has significantly improved the care provided to patients admitted with coronary heart disease.²⁵

See Related Chapters: [Stroke](#), [Tobacco Use, Obesity and Overweight](#), [Physical Activity](#), [Diabetes](#), [Access to Primary Health Care Services](#), [Alcohol Abuse and Dependence](#), [Nutrition](#), and [Social and Economic Determinants of Health](#)

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

Washington State Behavioral Risk Factor Surveillance System (BRFSS) data: 1987–2006. 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. National BRFSS: 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.

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

For More Information

Washington State Public Health Action Plan for Heart Disease and Stroke Prevention and Management, 2005. Available at: http://www.doh.wa.gov/cfh/heart_stroke/state_plan.htm

Healthy People 2010, Heart Disease and Stroke. Available at: <http://www.healthypeople.gov/Document/HTML/Volume1/12Heart.htm>

Washington State Collaborative. Available at: <http://www.doh.wa.gov/cfh/WSC/default.htm>

Washington State Department of Health, Heart Disease and Stroke Prevention Program: (360) 236-3792.

Technical Notes

Mortality rates based on counts of less than 20 were not presented.

Endnotes

¹ Steenland, K., Henley, J., Calle, E., & Thun, M. (2004). Individual- and area-level socioeconomic status variables as predictors of mortality in a cohort of 179,383 persons. *American Journal of Epidemiology*, 159(11), 1047-1056.

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³ U.S. Centers for Disease Control and Prevention. (n.d.). *CDC Wonder Data 2010*. Retrieved December 11, 2006 from <http://wonder.cdc.gov/data2010>.

⁴ Washington State Department of Health. (2004, September). *Health of Washington State 2004 Supplement* [cited 2007/11/04]. Available from <http://www.doh.wa.gov/HWS/doc/HWS2004Supp.pdf>.

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¹¹ Wannamethee, S. G., & Shaper, A. G. (2001). Physical activity in the prevention of cardiovascular disease: an epidemiological perspective. *Sports Medicine*, 31, 101-114.

¹² Wilson, P. W. F., D'Agostine, R. B., Sullivan, L., Parise, H., & Kannel, W. B. (2002). Overweight and obesity as determinants of cardiovascular risk: the Framingham experience. *Archives of Internal Medicine*, 162, 1867-1872.

¹³ U.S. Centers for Disease Control and Prevention. (2005). *National diabetes fact sheet: general information and national estimates on diabetes in the United States, 2005*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

¹⁴ Yusuf, S., Hawken, S., Ounpuu, S., Dans, T., Avezum, A., Lanas, F., et al. (2004). Effect of potentially modifiable risk factors associated with myocardial infarctions in 52 countries (the INTERHEART study): case-control study. *The Lancet*, 364, 937, 952.

¹⁵ Rosengren, A., Hawken, S., Ounpuu, S., Silwa, K., Zubaid, M., Almahmeed, W. A., et al. (2004). Association of psychosocial risk factors with risk of acute myocardial infarction in 11,119 cases and 13,648 controls from 52 countries (the INTERHEART study): case-control study. *The Lancet*, 364, 953-962.

¹⁶ Washington State Department of Health. (2005). *Washington State Public Health Action Plan For Heart Disease and Stroke*

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¹⁷ U.S. Department of Health and Human Services. (2003). *A public health action plan to prevent heart disease and stroke*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

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