

At the Heart of the Matter: 2011 Report on Heart Disease and Stroke in Colorado

Executive Summary: Heart disease and stroke in Colorado

From the turn of the century through 2008, fewer Coloradans died of cardiovascular disease. Although fewer were dying of heart disease and stroke, more Coloradans were developing the risk factors that lead to cardiovascular disease. High blood pressure is pervasive, obesity rates have doubled and too few Coloradans get the nutritious food and physical activity needed to keep their hearts healthy.

Heart disease is the second and stroke is the fifth leading cause of death in Colorado. Together, they cost Colorado taxpayers more than \$128 million each year in Medicaid charges and hundreds of millions more in treatment for high blood pressure and other risk factors. Nationwide, cardiovascular disease cost more than a half trillion dollars in 2010.

The cost to Colorado's quality of life is not measured solely in dollars, but is more dearly felt in the loss of physical and emotional health and years of potential life lost. Coloradans with cardiovascular disease have more days of depression, illness and physical inactivity and fewer years of life than those without heart problems. Heart disease alone in Colorado accounted for more than 75,000 years of potential life lost in 2008, with the average sufferer dying 13 years before his or her life expectancy.

Place matters; where you live influences your health. Coloradans who live in poverty, are members of certain races or ethnic groups or make their homes in the state's more rural areas may have a higher prevalence of cardiovascular disease and multiple risk factors for heart disease and stroke. Research shows that social, economic and environmental factors have a significant impact on health outcomes.

Despite rising risk factors, we can continue to make progress in our efforts to reduce cardiovascular disease in Colorado by focusing on education, screening and environmental conditions. According to research, approximately 90 percent of cardiovascular disease risk is lifestyle-related, and thus preventable.¹

Public health communication can raise awareness of the risk factors that lead to cardiovascular disease, promote healthy behaviors aimed at preventing heart disease and stroke, and educate Coloradans on the signs, symptoms and appropriate response to a heart attack or stroke. Screening for high blood pressure, high cholesterol and diabetes is an important step to identify persons whose risk factors might be undiagnosed and who might benefit from lifestyle modification or pharmacologic therapy. To decrease morbidity and deaths from heart disease and stroke, public health programs should identify persons with multiple risk factors and focus interventions on those populations disproportionately affected.

Modifiable risk factors, unlike other risk factors such as age and family history, can be eliminated or reduced by making lifestyle and behavioral changes. Research shows that daily consumption of fruits or vegetables and moderate or strenuous physical exercise are protective against the development of cardiovascular disease. Preventing cardiovascular disease by reducing obesity, high blood pressure, high cholesterol, smoking and diabetes could prevent other chronic diseases as well.

This report provides a wealth of information on cardiovascular disease in Colorado. Please review this report, share its resources with other health advocates and work with us to improve the health of all Coloradans.

Heart disease and stroke deaths, 2008

- Heart disease was the second leading cause of death, and stroke was the fifth leading cause of death.
- Combined, heart disease and stroke accounted for about 25 percent of all deaths.
- The age-adjusted death rate for heart disease decreased from 197 per 100,000 in 1999 to 151 per 100,000 in 2008; rates among White non-Hispanics and Blacks decreased from 1999–2008, but rates among other races/ethnicities remained stable.
- The age-adjusted death rates for heart disease did not differ among Blacks, White Hispanics and White non-Hispanics, but were higher than the rates among Asians or Pacific Islanders and Native Americans or Alaska Natives.
- The age-adjusted death rate for stroke decreased from 57 per 100,000 in 1999 to 39 per 100,000 in 2008; rates among White non-Hispanics decreased from 1999–2008, but rates among other races/ethnicities remained stable.
- Heart disease and stroke combined was the second leading cause of years of potential life lost, which is a measure of premature death.

Hospital discharge rates for heart disease and stroke, 2008

- Almost 40,000 hospital discharges were attributed to heart disease and stroke, including almost 173,000 total inpatient days.
- The age-adjusted hospital discharge rate per 100,000 residents for heart disease significantly decreased from 984 in 1999 to 739 in 2008.
- The age-adjusted hospital discharge rate per 100,000 residents for stroke significantly decreased from 190 in 1999 to 161 in 2008.
- The counties with the highest discharge rates for both heart disease and stroke tended to be rural or frontier (non-urban) counties.

Costs of heart disease and stroke, 2007

- Annual costs to Medicaid for heart disease and stroke in Colorado were estimated at \$40.9 million and \$87.1 million, respectively.
- Estimated annual costs per Medicaid beneficiary for heart disease and stroke were \$1,400 and \$8,100, respectively.

Heart disease and stroke prevalence and quality of life, 2008

- The adult prevalence of heart attack was 3 percent, the adult prevalence of angina or coronary heart disease was 3 percent, and the adult prevalence of stroke was 2 percent.
- Among adults aged 65 years or older, the prevalence of heart attack, angina or coronary heart disease, and stroke were 12 percent, 11 percent and 6 percent, respectively.
- The prevalence of heart attack, angina or coronary heart disease, and stroke were significantly lower among adults with an annual household income of \$50,000 or more.
- Adults who reported having had a heart attack, angina or coronary heart disease, or stroke had a higher prevalence of fair or poor health status compared with adults who did not report these conditions (41–48 percent compared with 12–13 percent, respectively).
- Adults who reported having had a heart attack, angina or coronary heart disease, or stroke also reported poorer quality of life measures, including 14 or more physically or mentally unhealthy days in the past month and activity limitation, compared with adults who did not report these conditions.

Risk factors for heart disease and stroke, 2007 and 2008

- Among adult Coloradans, the most prevalent risk factor associated with heart disease and stroke was a diet low in fruits and vegetables (74 percent), followed by overweight or obesity (55 percent), low level of physical activity (45 percent), high cholesterol (34 percent), high blood pressure (21 percent), current smoking (18 percent) and diabetes (6 percent).
- Since 1999, the prevalence of high cholesterol increased from 26 percent to 34 percent by 2007, diabetes prevalence increased from 4 percent to 6 percent by 2008, and overweight or obesity increased from 48 percent to 55 percent by 2008.

- The prevalence of adult smoking decreased from 23 percent in 1999 to 18 percent in 2008, but was significantly higher for persons living at or below 250 percent of the federal poverty level (28 percent) compared with persons living above 250 percent of poverty (14 percent).
- More than half of Coloradans aged 65 years or older reported having high blood pressure and/or high blood cholesterol.
- The prevalence of high blood pressure was higher among Black non-Hispanics (33 percent) compared with White non-Hispanics and Hispanics (22 and 28 percent, respectively).
- Among adults who reported high blood pressure, 73 percent were taking medicine for high blood pressure.
- Black non-Hispanics and Hispanics had a higher prevalence of current smoking, overweight or obesity, and low physical activity level compared with White non-Hispanics.
- Hispanics had a higher prevalence of diabetes (8 percent) compared with White non-Hispanics (5 percent).
- Obesity was most prevalent in the southeastern and northeastern parts of the state.

Multiple risk factors, 2007

- The prevalence of three or more modifiable risk factors for heart disease and stroke was 44 percent. This prevalence increased with age, but nearly one in four persons aged 18–24 years reported multiple risk factors.
- Black non-Hispanics had a higher prevalence of multiple risk factors (59 percent) compared with White non-Hispanics or Hispanics (43 and 47 percent, respectively).
- Persons living at or below 250 percent of the federal poverty level had a higher prevalence of multiple risk factors (49 percent) compared with persons living above 250 percent of poverty (42 percent).
- Among adults who reported having diabetes, 64.8 percent reported high blood pressure and 62.6 percent reported high cholesterol, compared with 18.8 percent and 31.4 percent, respectively, of adults who did not report having diabetes.
- Similarly, adults who were overweight or obese or who had a low level of physical activity had a higher prevalence of high blood pressure and high cholesterol compared with adults who were not overweight or obese; and adults who reported a diet low in fruits and vegetables had a higher prevalence of high cholesterol compared with adults who ate the recommended amount of fruits and vegetables.
- Adults with high blood pressure had higher prevalence of overweight (41 percent) or obese (33 percent) compared with adults who did not have high blood pressure (35 and 16 percent, respectively).
- Adults with high cholesterol had higher prevalence of overweight (42 percent) or obese (26 percent) compared with adults who did not have high cholesterol (35 and 18 percent, respectively).

Knowledge of heart attack and stroke signs and symptoms, 2004

- 38 percent of adult Coloradans knew all five heart attack signs and symptoms.
- 46 percent of adult Coloradans knew all five stroke signs and symptoms.
- 24 percent of adult Coloradans knew the signs and symptoms of heart attack and stroke and also reported their first response would be to call 9-1-1.

The following summary tables and figure present heart disease and stroke death and hospital discharge data and the prevalence of heart disease and stroke and some of the major risk factors.

Table ES.1. Heart disease and stroke deaths and hospital discharges at-a-glance – Colorado residents, 2008

	Deaths*				Hospital Discharges†			
	Heart Disease		Stroke		Heart Disease		Stroke	
	Number of deaths	Age-adjusted rate [§] (95% CI)	Number of deaths	Age-adjusted rate [§] (95% CI)	Number of discharges	Age-adjusted rate [§] (95% CI)	Number of discharges	Age-adjusted rate [§] (95% CI)
Overall	6,132	151.4 (147.6-155.2)	1,531	38.9 (37.0-40.9)	32,603	739.1 (731.1-747.1)	6,902	160.8 (157.0-164.6)
Sex								
Male	3,193	197.9 (190.7-205.1)	623	41.8 (38.4-45.3)	18,427	939.0 (925.0-953.0)	3,289	179.2 (172.7-185.6)
Female	2,939	119.8 (115.5-124.1)	908	37.2 (34.8-39.7)	14,176	580.6 (571.1-590.1)	3,613	148.3 (143.5-153.2)
Race/ethnicity								
White non-Hispanic	5,260	151.9 (147.8-155.9)	1,272	37.7 (35.6-39.8)	N/A	N/A	N/A	N/A
White Hispanic	548	162.2 (147.2-177.2)	161	48.2 (39.9-56.5)	N/A	N/A	N/A	N/A
Black	223	171.8 (148.3-195.3)	55	44.3 (32.0-56.5)	N/A	N/A	N/A	N/A
Asian or Pacific Islander	62	72.1 (53.4-90.8)	34	40.6 (26.5-54.7)	N/A	N/A	N/A	N/A
Native American or Alaska Native	26	56.7 (33.2-80.2)	9	26.3 [¶] (8.6-44.0)	N/A	N/A	N/A	N/A
Age (years)								
<25	29	1.6 (1.0-2.2)	7	0.4 [¶] (0.1-0.7)	346	19.4 (17.3-21.4)	63	3.5 (2.7-4.4)
25-34	37	5.6 (3.8-7.3)	7	1.1 [¶] (0.3-1.8)	577	86.6 (79.5-93.7)	112	16.8 (13.7-19.9)
35-44	116	15.6 (12.7-18.4)	31	4.2 (2.7-5.6)	1,359	182.3 (172.6-192.0)	291	39.0 (34.6-43.5)
45-54	427	55.9 (50.6-61.2)	64	8.4 (6.3-10.4)	4,041	528.8 (512.5-545.1)	701	91.7 (84.9-98.5)
55-64	688	123.5 (114.3-132.7)	114	20.5 (16.7-24.2)	6,352	1,140.2 (1,112.3-1,168.0)	1,116	200.3 (188.6-212.1)
65-74	854	315.8 (294.7-337.0)	201	74.3 (64.1-84.6)	7,319	2,706.9 (2,645.7-2,768.1)	1,520	562.2 (534.0-590.3)
75+	3,981	1,781.9 (1,727.0-1,836.0)	1,107	495.5 (466.4-524.6)	12,609	5,643.8 (5,548.1-5,739.5)	3,099	1,387.1 (1,338.6-1,435.6)

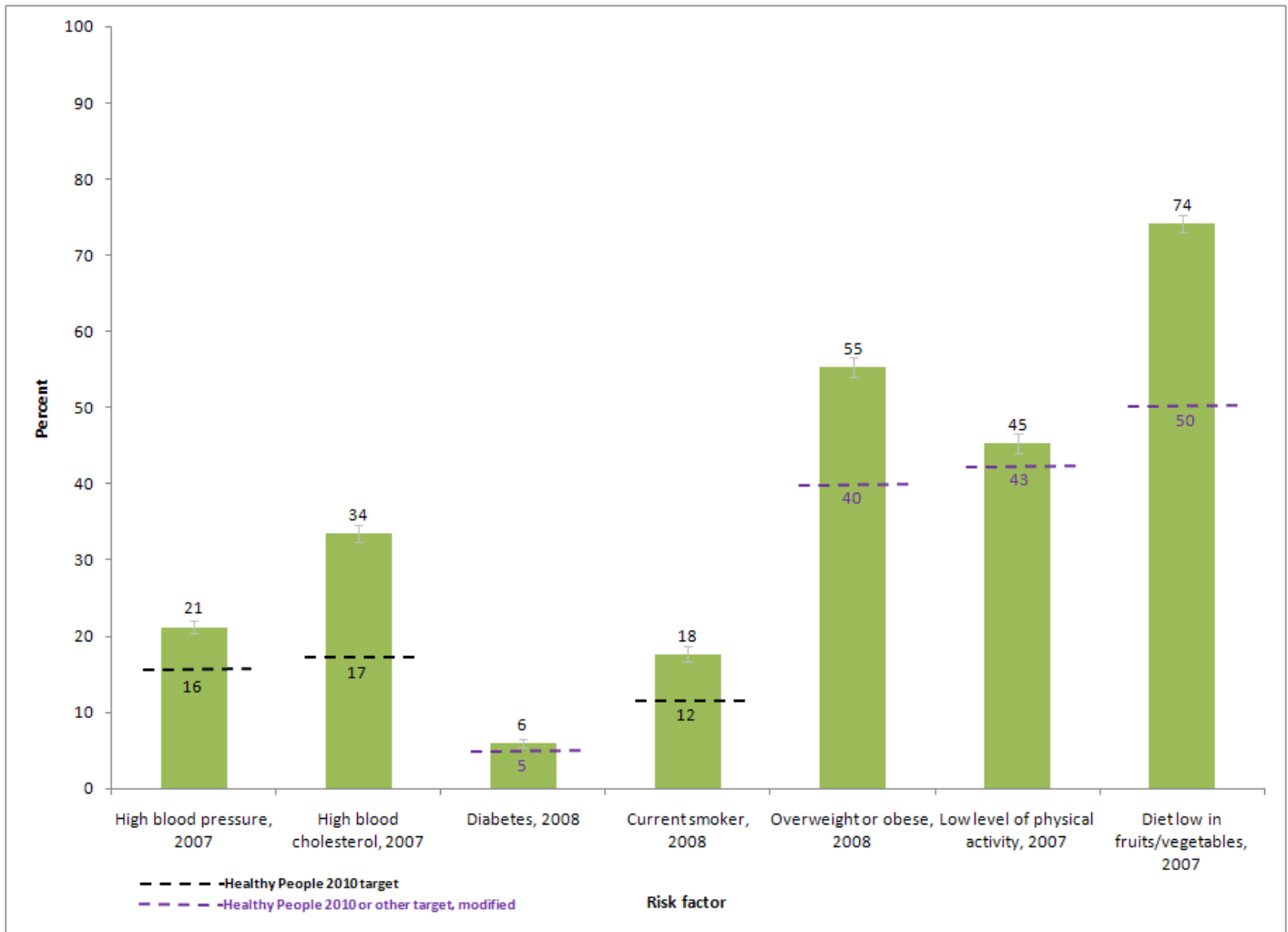
* Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment; Data include diseases of the heart (ICD-10 codes: I00-I09, I11, I13, I20-I51) and cerebrovascular diseases (ICD-10 codes: 160-169) as the primary (underlying) cause of death.

† Data source: Hospital Discharge Data, Colorado Hospital Association; data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment; Data include Colorado residents only and are not deduplicated; therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with diseases of the heart (ICD-9 codes: 390-398,402,404,410-429) and cerebrovascular diseases (ICD-9 codes: 430-434,436-438) as the primary diagnosis.

§ Rates are age-adjusted except for in age categories, where age-specific rates are reported instead. Age-adjusted rates are adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

¶ Rate is based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns.

Figure ES.1. Prevalence of heart disease and stroke risk factors — Colorado, 2007 or 2008



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one's lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet the minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

Table ES.2. Heart disease and stroke prevalence and risk factors at-a-glance — Colorado, 2007 or 2008

	Heart attack	Angina or coronary heart disease	Stroke	High blood pressure	High cholesterol	Cholesterol checked in last five years
	2008	2008	2008	2007	2007	2007
	Percent	Percent	Percent	Percent	Percent	Percent
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Overall	2.9 (2.6-3.2)	2.7 (2.5-3.0)	1.9 (1.6-2.1)	21.2 (20.4-22.0)	33.5 (32.3-34.7)	73.8 (72.6-75.0)
Sex						
Female	2.0 (1.7-2.3)	2.0 (1.7-2.3)	1.9 (1.6-2.2)	20.0 (19.0-21.0)	31.4 (30.0-32.8)	76.5 (74.9-78.1)
Male	3.9 (3.3-4.4)	3.5 (3.0-4.0)	1.9 (1.5-2.3)	22.5 (21.1-23.9)	35.7 (33.9-37.5)	71.1 (69.1-73.1)
Age (years)						
18-24	0.2 [†] (0.0-0.7)	N/A	0.5 [†] (0.0-1.3)	4.1 [†] (1.9-6.3)	10.7 [†] (6.0-15.4)	34.7 (29.4-40.0)
25-34	0.5 [†] (0.0-1.1)	0.4 [†] (0.0-0.8)	0.5 [†] (0.0-1.0)	7.0 (5.4-8.6)	15.1 (12.4-17.8)	59.6 (56.5-62.7)
35-44	0.7 [†] (0.3-1.1)	0.5 [†] (0.1-0.9)	0.8 [†] (0.4-1.2)	12.9 (11.3-14.5)	26.8 (24.4-29.2)	74.0 (71.8-76.2)
45-54	1.8 [†] (1.2-2.4)	1.8 [†] (1.2-2.5)	1.7 [†] (1.1-2.3)	22.6 (21.1-24.7)	35.6 (33.4-37.8)	85.3 (83.7-86.9)
55-64	4.5 (3.6-5.5)	5.1 (4.1-6.1)	2.5 (1.8-3.2)	37.6 (35.4-39.8)	47.5 (45.1-49.9)	92.0 (90.8-93.2)
65+	11.9 (10.5-13.3)	10.8 (9.5-12.0)	6.3 (5.3-7.3)	52.1 (49.9-54.3)	50.8 (48.6-53.0)	93.7 (92.5-94.9)
Race/ethnicity						
White non-Hispanic	3.0 (2.6-3.3)	3.1 (2.7-3.4)	1.7 (1.5-2.0)	21.8 (20.8-22.8)	34.2 (33.0-35.4)	78.1 (76.9-79.3)
Hispanic (all races)	2.5 [†] (1.7-3.4)	1.9 [†] (1.2-2.6)	1.9 [†] (1.2-2.7)	18.1 (15.9-20.3)	29.2 (25.9-32.5)	58.1 (54.6-61.6)
Black non-Hispanic	3.8 [†] (1.0-6.5)	2.1 [†] (0.6-3.5)	3.5 [†] (1.1-5.9)	32.5 (25.8-39.2)	41.5 (33.5-49.5)	76.8 (69.5-84.1)
Other	3.5 [†] (1.2-5.8)	1.7 [†] (0.3-3.0)	3.5 [†] (1.3-5.7)	18.0 (13.3-22.7)	31.7 (25.2-38.2)	71.0 (63.9-78.1)
Annual household income						
<\$15,000	7.4 (5.3-9.5)	5.0 (3.6-6.5)	4.8 (3.4-6.3)	28.1 (24.0-32.2)	40.4 (35.1-45.7)	58.5 (53.0-64.0)
\$15,000-24,999	4.5 (3.4-5.6)	4.0 (3.1-5.0)	3.6 (2.4-4.7)	26.0 (23.1-28.9)	36.3 (32.4-40.2)	59.4 (55.3-63.5)
\$25,000-34,999	3.8 (2.7-5.0)	3.7 (2.5-4.9)	2.3 [†] (1.2-3.4)	21.7 (19.0-24.4)	37.7 (33.6-41.8)	67.2 (63.1-71.3)
\$35,000-49,999	3.3 (2.3-4.2)	3.4 (2.4-4.4)	2.5 [†] (1.5-3.6)	22.2 (19.8-24.6)	34.0 (31.1-36.9)	74.5 (71.4-77.6)
\$50,000+	1.7 (1.4-2.1)	1.9 (1.5-2.2)	0.9 (0.6-1.2)	18.4 (17.2-19.6)	31.5 (30.1-32.9)	81.7 (80.3-83.1)

* Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

[†] Percent is based on less than 50 responses and should be interpreted with caution due to statistical reliability concerns

N/A = Not available

Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked and have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes

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These data represent the burden of heart disease and stroke among Coloradans. We hope these statistics will be helpful in your work. For additional information, please make a request to CDPHE-PSDRequests@state.co.us.

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Introduction

The Center for Healthy Living and Chronic Disease Prevention at the Colorado Department of Public Health and Environment (CDPHE) provides the data in this report to inform public health and health care professionals, advocacy and community organizations, policy makers and the general public on the significant impact of heart disease and stroke in Colorado. Cardiovascular disease is a leading cause of death and an important cause of hospitalization, high health care costs and reduced quality of life.

The purpose of this report is to provide a picture of the cardiovascular health of Coloradans as a guide for planning future activities focused on reducing the burden of heart disease and stroke. This report specifically provides 1) a description of heart disease and stroke in terms of death, hospitalization, prevalence, and quality of life, 2) a detailed discussion of the leading risk factors of cardiovascular disease; and 3) the costs associated with cardiovascular disease in Colorado. Comparison data are included for Colorado and the United States (where available), trends over time, and health disparities.

This summary of some of the major findings in this report presents a picture of the burden of heart disease and stroke in Colorado in terms of death, morbidity, costs, quality of life, and risk factors for future illness. Unequal distributions of various aspects of this burden (disparities) are also presented.

We hope you find this document useful and relevant to your work.

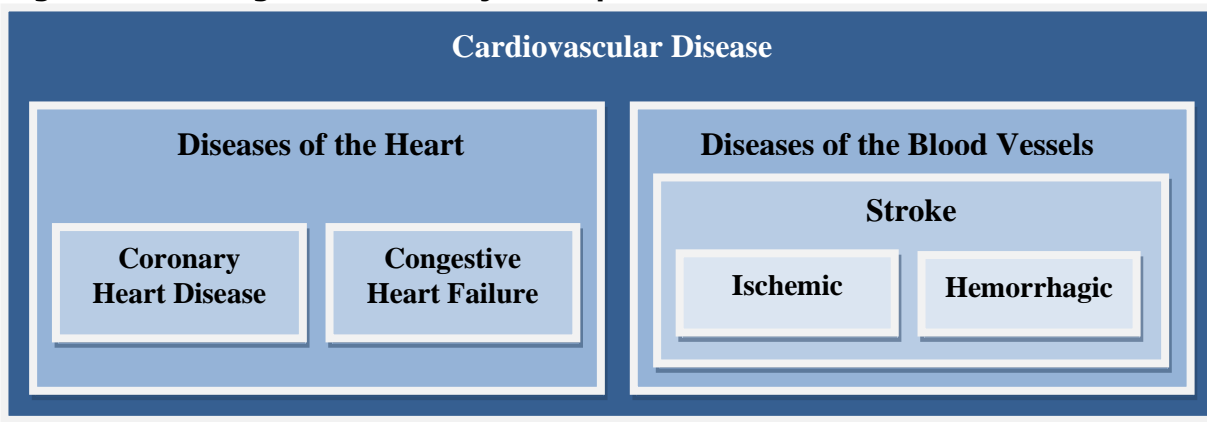
1. Cardiovascular disease overview

Defining Cardiovascular Disease

Cardiovascular Disease is a term that describes disorders of the heart and/or blood vessels of the body. There are two major disease groups associated with cardiovascular disease: Diseases of the heart and diseases of the blood vessels.

- Diseases of the heart (referred to as heart disease in this report) include two major categories: Coronary heart disease and heart failure.
 - Coronary heart disease includes angina (intense chest pain) and heart attack (myocardial infarction).
 - Heart failure, or congestive heart failure, is a critical condition in which the heart can no longer pump blood to the rest of the body.
- Diseases of the blood vessels are also referred to as stroke. There are two classifications of stroke: Ischemic (obstruction within a blood vessel supplying blood to the brain) and hemorrhagic (weakened blood vessel ruptures).

Figure 1.1. A diagram of the major components of cardiovascular disease



Cardiovascular disease is often related to a host of other conditions. This report presents data on the following risk factors:

- **High Cholesterol (Hypercholesterolemia):** Cholesterol is deposited in blood vessel walls, a condition known as atherosclerosis. These deposits can form plaque that obstructs blood flow. Cholesterol plaques may also rupture, forming blood clots. High total cholesterol, low-density lipoprotein (LDL) cholesterol and triglyceride levels, and low levels of high-density lipoprotein (HDL) cholesterol increase risk of coronary heart disease and stroke.²

- **High Blood Pressure (Hypertension):** Sustained higher blood pressure results in pathological changes in the blood vessels. This leads to cardiovascular disease and damages organs such as the eye and kidney. This is the most important risk factor for stroke.³

- **Diabetes:** This disease of abnormal glucose metabolism can cause damage to blood vessels and is a major risk for the development of cardiovascular disease. Diabetes can cause other serious health complications, including blindness, kidney failure and lower-extremity amputations. Diabetes is the sixth leading cause of death in the United States⁴ and the eighth leading cause of death in Colorado.

- **Cigarette Smoking (Tobacco):** Smoking contributes to atherosclerosis through several mechanisms: Decreased oxygen levels in the blood; nicotine-induced constriction of blood vessels, thereby causing an increase in heart rate and blood pressure; and changes to the blood-clotting mechanisms. Cigarette smokers are 2–4 times more likely to develop coronary heart disease than nonsmokers. Risk is especially high in people who start at an early age and those who are heavy smokers. Breathing secondhand smoke is an additional health hazard.⁵

- **Overweight or Obesity:** This condition can lead to the development of high blood pressure, high cholesterol and diabetes, all of which increase the risk for cardiovascular disease. Overweight and obesity contribute to a number of other chronic diseases or conditions as well, including cancer and respiratory problems.⁶

- **Physical Inactivity:** The combination of physical activity and good diet can reduce obesity and overweight, control blood pressure and cholesterol, reduce depression and improve rates of smoking cessation. Regular physical activity protects against heart disease and stroke by lowering LDL or “bad” cholesterol and raising HDL or “good” cholesterol levels.⁷

- **Diet Low in Fruits and Vegetables:** This is defined as a diet in which less than five fruits and vegetables are consumed each day. A diet low in sodium, cholesterol, saturated and total fat, and high in fruits and vegetables, potassium, fiber, and low-fat dairy products is protective against heart disease.⁸

These seven risk factors are modifiable, in that persons can potentially change their behaviors or lifestyle to affect these risks. An additional modifiable risk factor is excessive alcohol consumption. Non-modifiable risk factors for heart disease and stroke include advancing age, family history, genetic determinants and gender.

There is new evidence to support the connection between gum disease and heart disease and stroke. Gum disease is a bacterial infection of the gums and supporting jaw bone that if left untreated can result in tooth loss. Studies show that people with severe gum disease have a 22 percent increased risk for coronary heart disease,⁹ are twice as likely to develop coronary artery disease,¹⁰ and have up to three times greater risk for stroke.¹¹ The commonality between cardiovascular disease and gum disease lies in our body’s inflammatory response to periodontal pathogens. The periodontal pathogens trigger the body to release pro-inflammatory cells and tissue-destructive mediators. Periodontal bacteria can also induce platelet formation, which may play a role in blood clots. Research is also showing that the more teeth lost from gum disease or decay, the more people report having heart disease.¹² The number of teeth a person has lost is also a predictor for cardiovascular death.¹³ While there is not yet an understanding of, or evidence about, whether gum disease causes heart disease and stroke, it is important to control gum disease to reduce the risk of these diseases.

Impact of preventing and treating major cardiovascular disease

Over the past decade, death and hospital discharge rates from cardiovascular disease have declined in the United States and Colorado. The decline in these rates can be attributed to many factors, such as increased awareness of lifestyle and conditions associated with increased risk; and advancements to prevent, identify and treat disease. Routine screening for high cholesterol, high blood pressure, and diseases such as type 2 diabetes enables medical professionals to treat and reduce the overall risk for cardiovascular disease development. New pharmacotherapy and expanded uses for existing drugs to control conditions such as high blood pressure, high total cholesterol and diabetes have significantly contributed to cardiovascular disease prevention.

Medical technological advancements for treating people with cardiovascular disease have also contributed to the decline of death and hospital discharge for cardiovascular disease over the past decade. For example, ischemic stroke victims who make it to the hospital within three hours of the first symptoms can reduce brain damage and potential disability with administration of thrombolytic drugs that work to break up blood clots and return blood flow. Improving awareness of stroke symptoms and emergency services in remote areas can significantly impact the outcome for stroke victims. Similarly, opening blocked arteries to the heart with either medication or insertion of a stent can significantly reduce death and disability for people experiencing an acute myocardial infarction or heart attack.^{14, 15}

2. Leading causes of death in 2008

Cause-of-death ranking is a useful tool to show the relative burden of cause-specific deaths. The data in Figures 2.1-2.3 help to put some perspective on how heart disease and stroke compare to other major causes of death based on numbers of deaths, percent of deaths and age-adjusted death rates. The rank order of any particular cause of death will depend on the list of causes from which selection was made. Rankings denote the most frequently occurring causes of death among those eligible to be ranked (e.g., lung cancer was not ranked but rather included within a category of all cancers).

Total number of deaths for Colorado's 15 leading causes of death

Cardiovascular disease, which includes heart disease and stroke, claimed the lives of 7,663 Coloradans in 2008. In the United States in 2006 (the most recent year with available data), more than 831,000 Americans died of cardiovascular disease.¹⁵

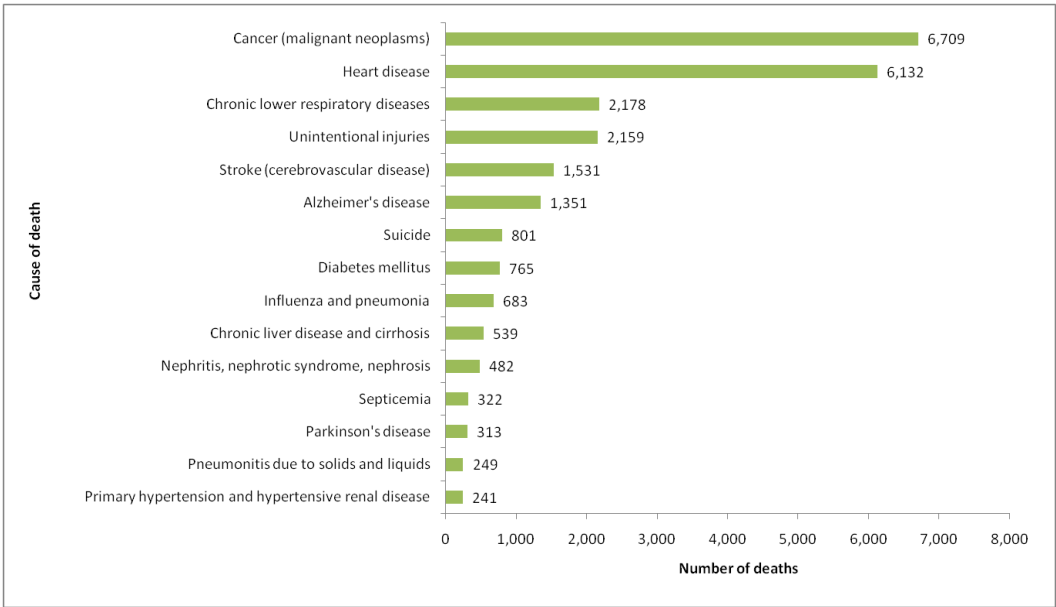
In 2008, chronic diseases accounted for four of the top five leading causes of death in Colorado (Figure 2.1). The top five causes of death have not changed since 2002.¹⁶

In 2008:

- Heart disease decreased from the first leading cause of death in 2002 to the second leading cause of death.
- Stroke decreased from the third leading cause of death in 2002 to the fifth leading cause of death.

Cause-of-death rankings do not illustrate cause-specific death risk or absolute burden as depicted by death rates; rankings can change independent of cause-specific death rate (e.g., a ranking could improve while the death rate remains stable).¹⁷

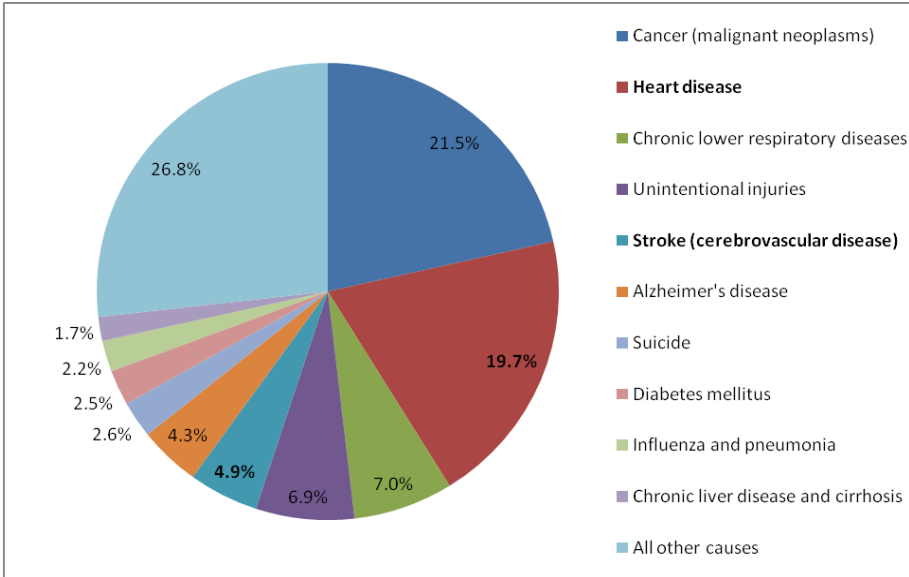
Figure 2.1. Total number of deaths for the fifteen leading causes of death — Colorado, 2008



Data source: Vital Statistics, Health Statistics Section, CDPHE
 Deaths by cause include the primary (underlying) cause of death only, not the contributing causes; numbers of deaths are mutually exclusive categories.

- In 2008:
- Heart disease accounted for 20 percent of deaths.
 - Stroke accounted for 5 percent of deaths (Figure 2.2).

Figure 2.2. Percent of total deaths for the leading causes of death – Colorado, 2008



Data source: Vital Statistics, Health Statistics Section, CDPHE
 Cause of death includes the primary (underlying) cause of death only, not the contributing causes.

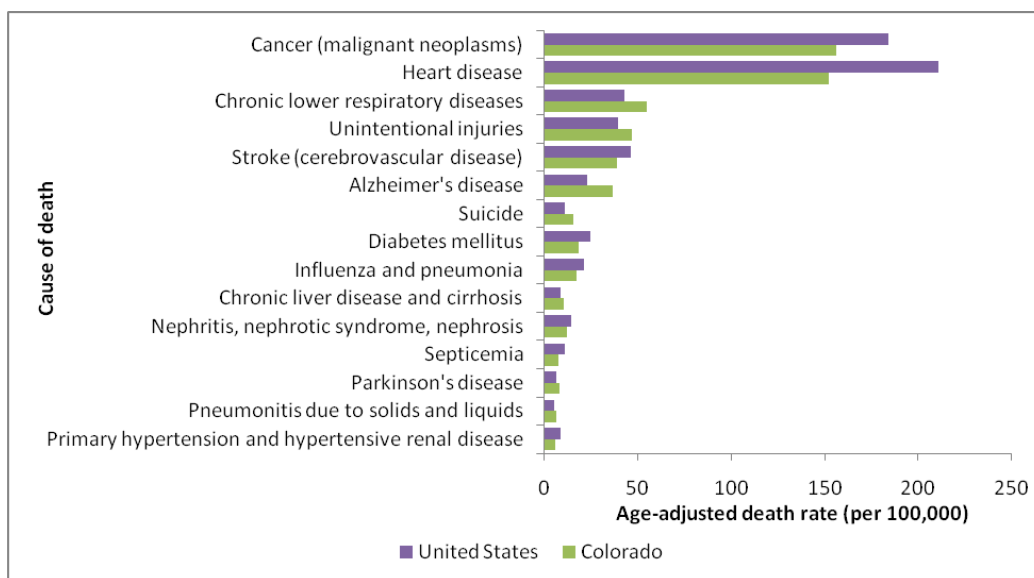
Age-adjusted death rates for Colorado’s 15 leading causes of death

- In 2008, Colorado had lower age-adjusted death rates for eight of the top 15 leading causes of death as compared with the United States in 2005 (Figure 2.3). The age-adjusted death rates for

heart disease and stroke were lower in Colorado compared with the United States. Age-adjusted death rate due to heart disease: 152 per 100,000 (Colorado) compared with 211 per 100,000 (United States).

- Age-adjusted death rate due to stroke: 39 per 100,000 (Colorado) compared with 47 per 100,000 (United States).

Figure 2.3. Age-adjusted death rates for Colorado’s fifteen leading causes of death — Colorado, 2008, and United States, 2005



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment. Cause of death includes the primary (underlying) cause of death only, not the contributing causes. Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

Years of potential life lost (YPLL) for Colorado’s leading causes of YPLL

“Years of potential life lost before life expectancy” (YPLL) is defined as the number of years of potential life lost by each death occurring before a predetermined age-, race-, and sex-specific life expectancy. For example, the life expectancy in 2008 for a 60-year-old White non-Hispanic female in Colorado was 85 years. If this person died of heart disease at age 60 years, her YPLL due to heart disease would be 25 years. In other words, she would have lived an estimated 25 more years if she had not died prematurely.

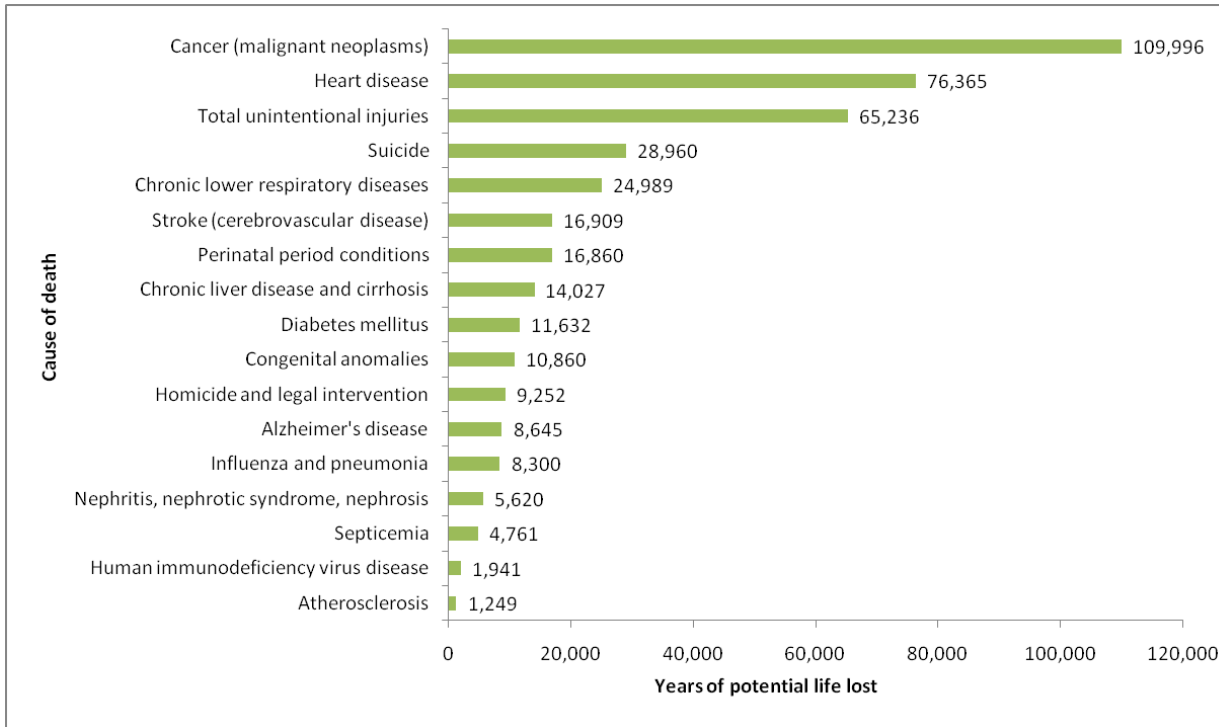
YPLL is one measure of the impact of premature or preventable deaths and one method to identify and rank the leading causes of premature death for establishing public health priorities.¹⁹ With this type of measure, deaths occurring at younger ages are weighted more heavily than those occurring in older populations. It should be noted that YPLL underestimates the importance of diseases that are contributing, but not underlying causes of death.

In 2008, cancer was the first leading cause of YPLL, and heart disease and stroke combined was the second leading cause of YPLL (Figure 2.4). More information on YPLL due to heart disease and stroke by sex and race/ethnicity is available in Section 4 of this report.

In 2008:

- Heart disease accounted for more than 76,000 years of potential life lost. The average YPLL per person who died of heart disease was 13 years (76,365 YPLL / 6,132 deaths).
- Stroke accounted for nearly 17,000 years of potential life lost. The average years of potential life lost per person who died of stroke was 11 years (16,909 YPLL / 1,531 deaths).

Figure 2.4. Leading causes of years of potential life lost before life expectancy – Colorado, 2008



Data source: Vital Statistics, Health Statistics Section, CDPHE

Cause of death includes the primary (underlying) cause of death only, not the contributing causes.

In 2006, more than 151,000 Americans who died of cardiovascular disease were younger than 65 years, and nearly 33 percent of cardiovascular disease deaths occurred prior to age 75 years, which was before the average life expectancy of 77.7 years.¹⁸

Heart disease and stroke are not only an important cause of deaths among the aged, they are also a significant contributor to premature death.

3. Heart disease and stroke deaths

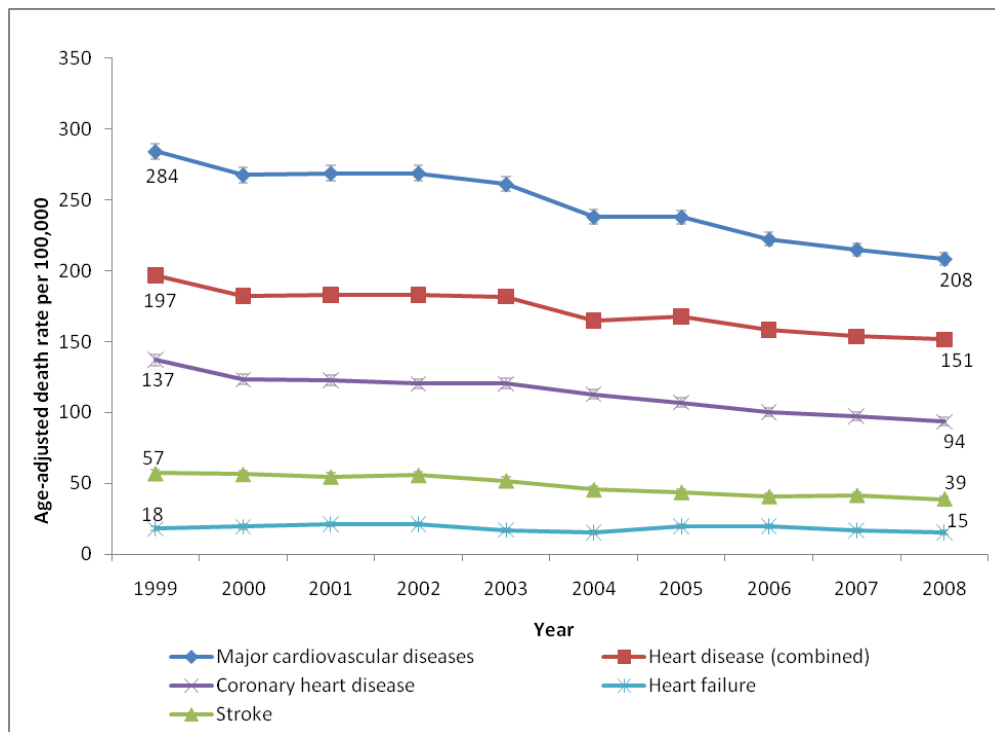
The rates presented in this section are age-adjusted rates. Age-adjustment is used to compare two different populations or one population over time that might be different with regard to age distribution.

Trends in death rates due to heart disease in Colorado

Between 1999 and 2008:

- The age-adjusted death rate for major cardiovascular disease decreased from 284 per 100,000 to 208 per 100,000.
- The age-adjusted death rate for heart disease decreased from 197 per 100,000 to 151 per 100,000.
- The age-adjusted death rate for coronary heart disease decreased from 137 per 100,000 to 94 per 100,000.
- The age-adjusted death rate for stroke decreased from 57 per 100,000 to 39 per 100,000.
- The age-adjusted death rate for heart failure decreased from 18 per 100,000 to 15 per 100,000 (Figure 3.1).

Figure 3.1. Age-adjusted death rates for major cardiovascular diseases, heart disease, coronary heart disease, heart failure, and stroke — Colorado, 1999–2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Cause of death (ICD-10 codes): major cardiovascular diseases (I00-I78); diseases of the heart (I00-I09, I11, I13, I20-I51); coronary heart disease (I20-I25); heart failure (I50); cerebrovascular diseases (I60-I69)
 Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

Death rates for cardiovascular disease and its major components, including heart disease and stroke, have declined. The leading contributor to cardiovascular disease death was heart disease. Heart disease includes congestive heart failure, coronary heart disease, and other diseases, such as hypertensive heart

disease. Although coronary heart disease contributed most to the burden of heart disease in terms of deaths, Colorado’s death rates have declined.

Heart disease and stroke deaths by race/ethnicity, sex, and age

Complex interactions between heredity, health conditions, lifestyle and social determinants of health (see Figure 13.1) increase the risk of death due to heart disease and stroke. For example, persons of older age, Black race, low socioeconomic status, and persons with chronic conditions such as diabetes, are at increased risk for death from heart disease and stroke.¹⁹ Identifying and understanding differences in death rates due to heart disease and stroke by age, sex and race/ethnicity is important for targeting these populations or societal influences among these populations with prevention strategies.

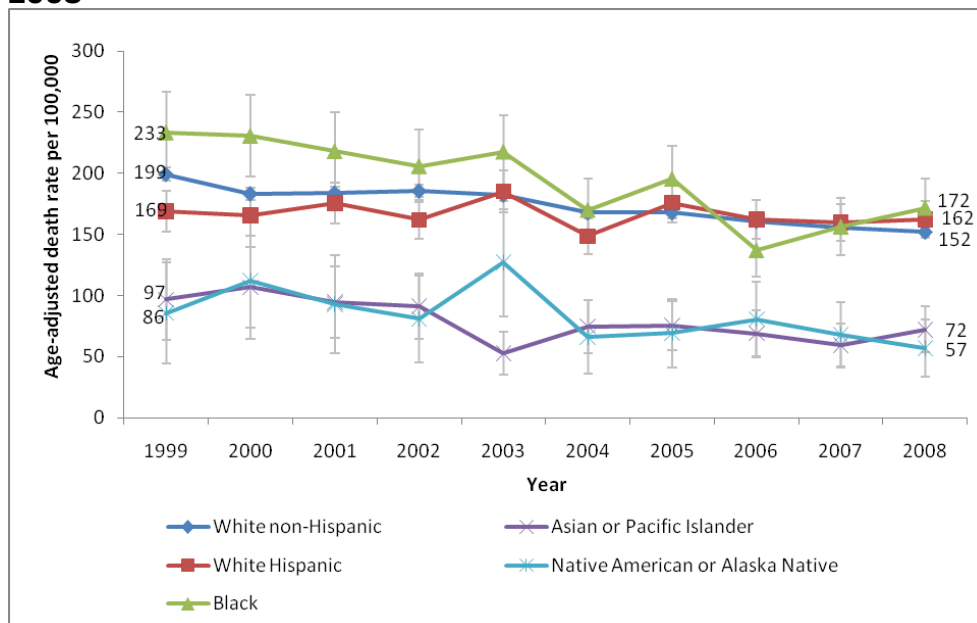
Trends in death rates due to heart disease by race/ethnicity in Colorado

Among all Coloradans, the age-adjusted death rate (per 100,000 persons) due to heart disease declined from 197 in 1999 to 151 in 2008. Although declining trends were observed for all race/ethnic populations, the decrease in death rates due to heart disease was only significant for White non-Hispanics and Blacks (Figure 3.2). Differences in death rates due to heart disease continue to exist between racial/ethnic populations.

In 2008:

- White non-Hispanics, White Hispanics, and Blacks had higher death rates due to heart disease than Asians or Pacific Islanders and Native American or Alaska Natives.
 - The differences between White non-Hispanics, White Hispanics and Blacks were not significant.
 - The differences between Asians or Pacific Islanders and Native American or Alaska Natives were not significant.

Figure 3.2. Age-adjusted death rates due to heart disease by race/ethnicity – Colorado, 1999–2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Cause of death (ICD-10 codes): diseases of the heart (I00-I09, I11, I13, I20-I51)
 Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

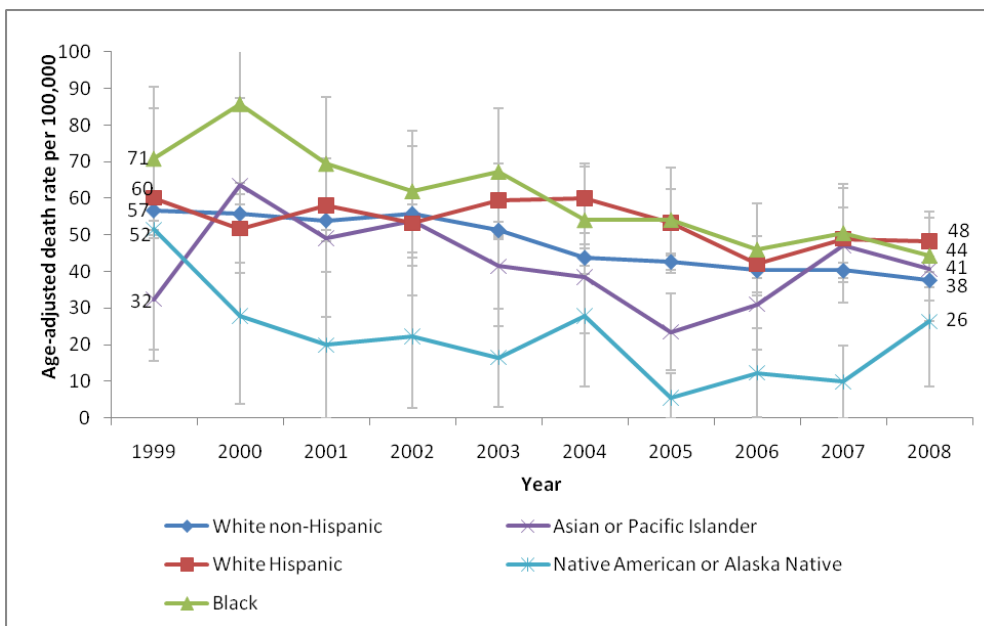
Trends in death rates due to stroke by race/ethnicity in Colorado

Among all populations in Colorado, the age-adjusted death rates (per 100,000 persons) due to stroke declined from 57 in 1999 to 39 in 2008. Since 1999, a decrease in death rates due to stroke was only significant for the White non-Hispanic population (Figure 3.3). Unlike heart disease, there were fewer differences in death rates due to stroke between the race/ethnic populations.

In 2008:

- White Hispanics had higher age-adjusted death rates due to stroke than White non-Hispanics (48 compared with 38 per 100,000, respectively).
- The difference in rates for all other groups was not statistically significant.

Figure 3.3. Age-adjusted death rates due to stroke by race/ethnicity – Colorado, 1999–2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause of death (ICD-10 codes): Cerebrovascular diseases (I60-I69)

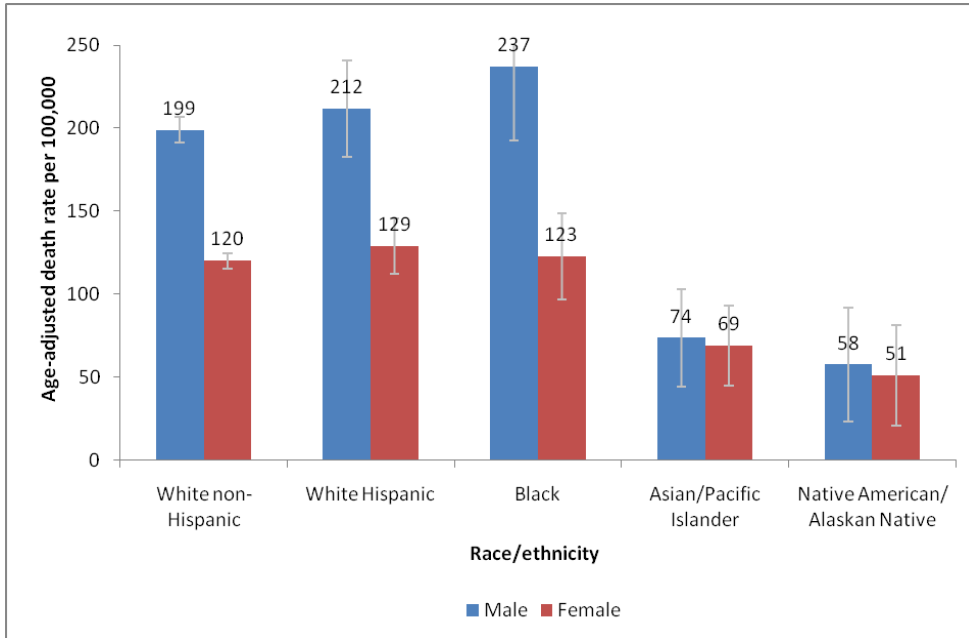
Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdph.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

Death rates due to heart disease by race/ethnicity and sex in Colorado

Between 1999 and 2008, the age-adjusted death rates from heart disease have decreased for males from 242 per 100,000 to 198 per 100,000 and for females from 160 per 100,000 to 120 per 100,000.

Among all race/ethnic populations, death rates due to heart disease were higher among males as compared to females in 2008 (Figure 3.4). The death rates due to heart disease were higher for males than females among White non-Hispanics, White Hispanics, and Blacks. The death rates among White non-Hispanic, White Hispanic, and Black males did not differ.

Figure 3.4. Age-adjusted death rates due to heart disease by race/ethnicity and sex — Colorado, 2008



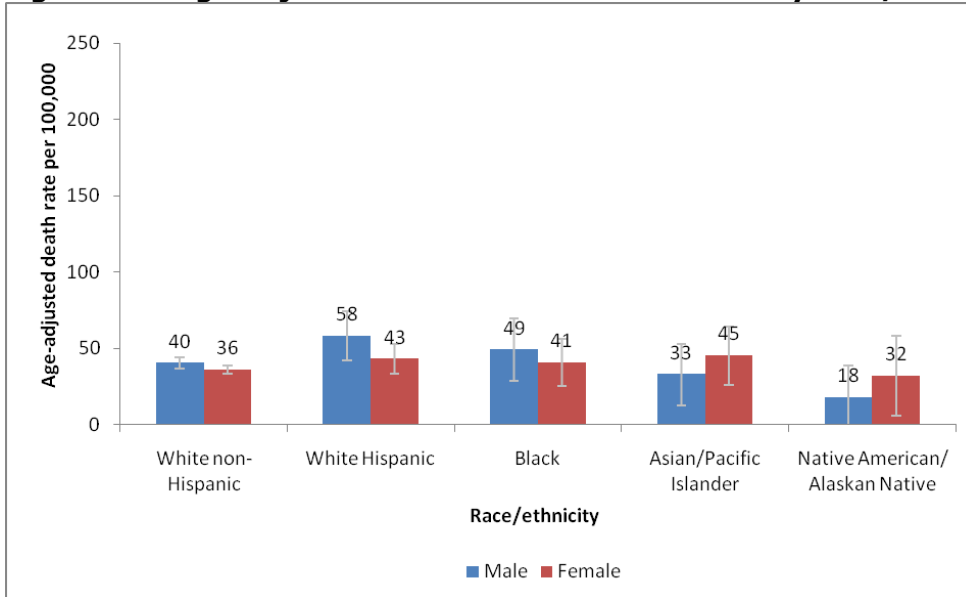
Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Cause of death (ICD-10 codes): diseases of the heart (I00-I09, I11, I13, I20-I51)
 Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

Death rates due to stroke by race/ethnicity and sex in Colorado

Unlike heart disease, the age-adjusted death rates due to stroke for males and females were similar. Between 1999 and 2008, death rates due to stroke have declined from 59 per 100,000 to 42 per 100,000 for males and from 56 per 100,000 to 37 per 100,000 for females.

Death rates due to stroke did not differ by race/ethnicity and sex (Figure 3.5). Death rates due to stroke were higher among White non-Hispanic, White Hispanic, and Black males. Conversely, death rates due to stroke were higher among female Asian or Pacific Islander and Native American or Alaska Native populations.

Figure 3.5. Age-adjusted death rates due to stroke by race/ethnicity and sex — Colorado, 2008



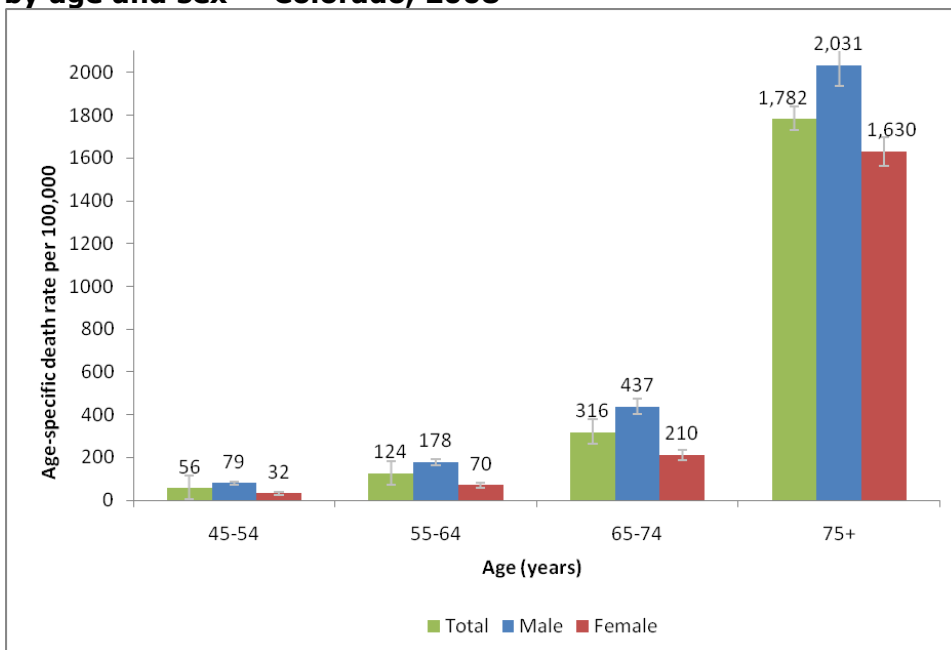
Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause of death (ICD-10 codes): cerebrovascular diseases (I60-I69)

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdph.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

Death rates due to heart disease by age and sex in Colorado

The 2008 death rates due to heart disease increased similarly by age for both males and females (Figure 3.6). Death rates more than doubled for both males and females between ages 45–54 years and 55–64 years and again between ages 55–64 years and 65–74 years. For each age group older than 44 years, the death rates for males were significantly higher than rates for females. The highest rates were among the age group 75 years and older.

Figure 3.6. Age-specific death rates due to heart disease among adults age 45 years and older by age and sex — Colorado, 2008



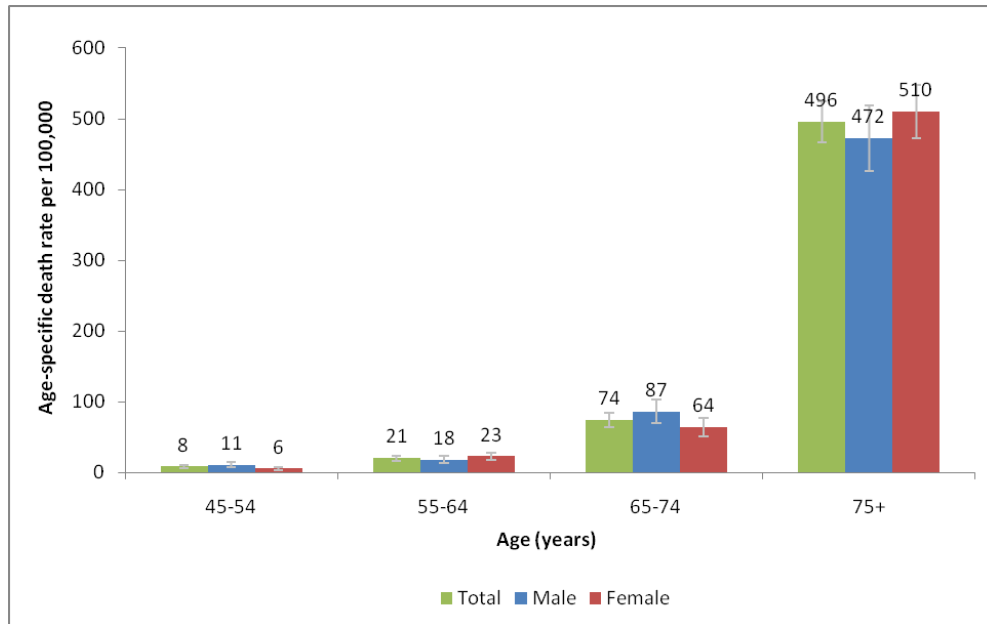
Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause of death (ICD-10 codes): diseases of the heart (I00-I09, I11, I13, I20-I51)

Rates are per 100,000 Colorado residents.

Death rates due to stroke by age and sex in Colorado

The 2008 death rates due to stroke increased similarly by age for both males and females (Figure 3.7). Unlike deaths from heart disease, death rates for males and females were not significantly different within any age group.

Figure 3.7. Age-specific death rates due to stroke among adults aged 45 years and older by age and sex — Colorado, 2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause of death (ICD-10 codes): cerebrovascular diseases (I60-I69)
Rates are per 100,000 Colorado residents.

In summary, since 1999, death rates due to heart disease decreased by age, sex, and race/ethnicity in Colorado. Blacks, White Hispanics and White non-Hispanics had the highest death rates due to heart disease and males had higher death rates compared with females. Since 1999, deaths due to stroke also declined for White non-Hispanics but remained stable for all other race/ethnicity populations. Death rates due to heart disease and stroke were highest for those 75 years of age and older. Among males age 35 years or older, death rates due to heart disease were significantly higher compared with females, but this gender difference was not observed for deaths due to stroke.

Death rates due to heart disease by county in Colorado

Differences in death rates stem from complex interactions between heredity, health conditions, lifestyle and social determinants of health. These factors may be influenced by where a person lives. For example, lifestyle factors such as smoking can be influenced by culture, policy and the economic health of a region. In other words, place matters; where you live influences your health.²⁰ Some areas of Colorado were at increased risk for death and hospitalization due to heart disease.

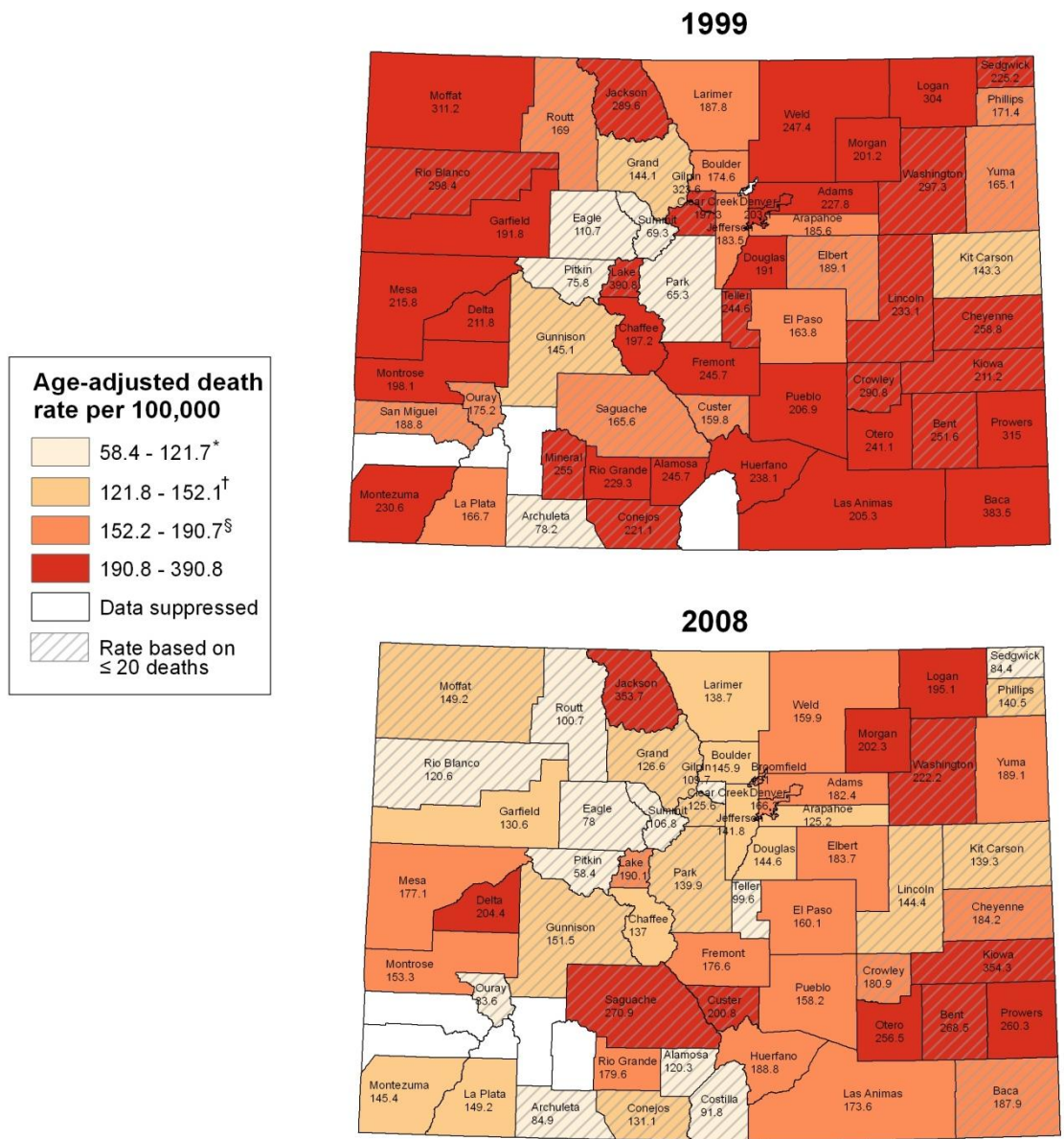
Between 1999 and 2008, the age-adjusted death rates improved in most Colorado counties (Figure 3.8). In 1999, the age-adjusted death rate was above the 2007 preliminary U.S. rate of 190.7 per 100,000 for 37 counties. Only 11 counties were above this rate in 2008. However, six of the 11 counties had rates based on 20 or fewer deaths and these rates should be interpreted with caution due to statistical reliability

concerns. For counties with small populations, death rates can vary substantially from year to year based on a small change in the number of deaths.

In 2008:

- The ten counties with the highest number of deaths in 2008 (Adams, Arapahoe, Boulder, Denver, El Paso, Jefferson, Larimer, Mesa, Pueblo, Weld) accounted for 78 percent of heart disease deaths in Colorado.
- Twelve counties had an age-adjusted death rate of 121.7 or less per 100,000, which was 20 percent below the 2008 Colorado rate of 152.1 per 100,000.

Figure 3.8. Age-adjusted heart disease death rates by county – Colorado, 1999 and 2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Map prepared by: Epidemiology, Planning and Evaluation Branch, Colorado Department of Public Health and Environment
 Cause of death (ICD-10 codes): diseases of the heart (I00-I09, I11, I13, I20-I51)

Data suppressed if less than three events in the county due to confidentiality or reliability concerns.

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

* The category cut-point of 121.7 represents the state equivalent to the Healthy People 2010 national goal, or 20 percent below Colorado's 2008 rate.

† The category cut-point of 152.1 represents the Colorado 2008 rate.

[§] The category cut-point of 190.7 represents the U.S. 2007 preliminary rate.

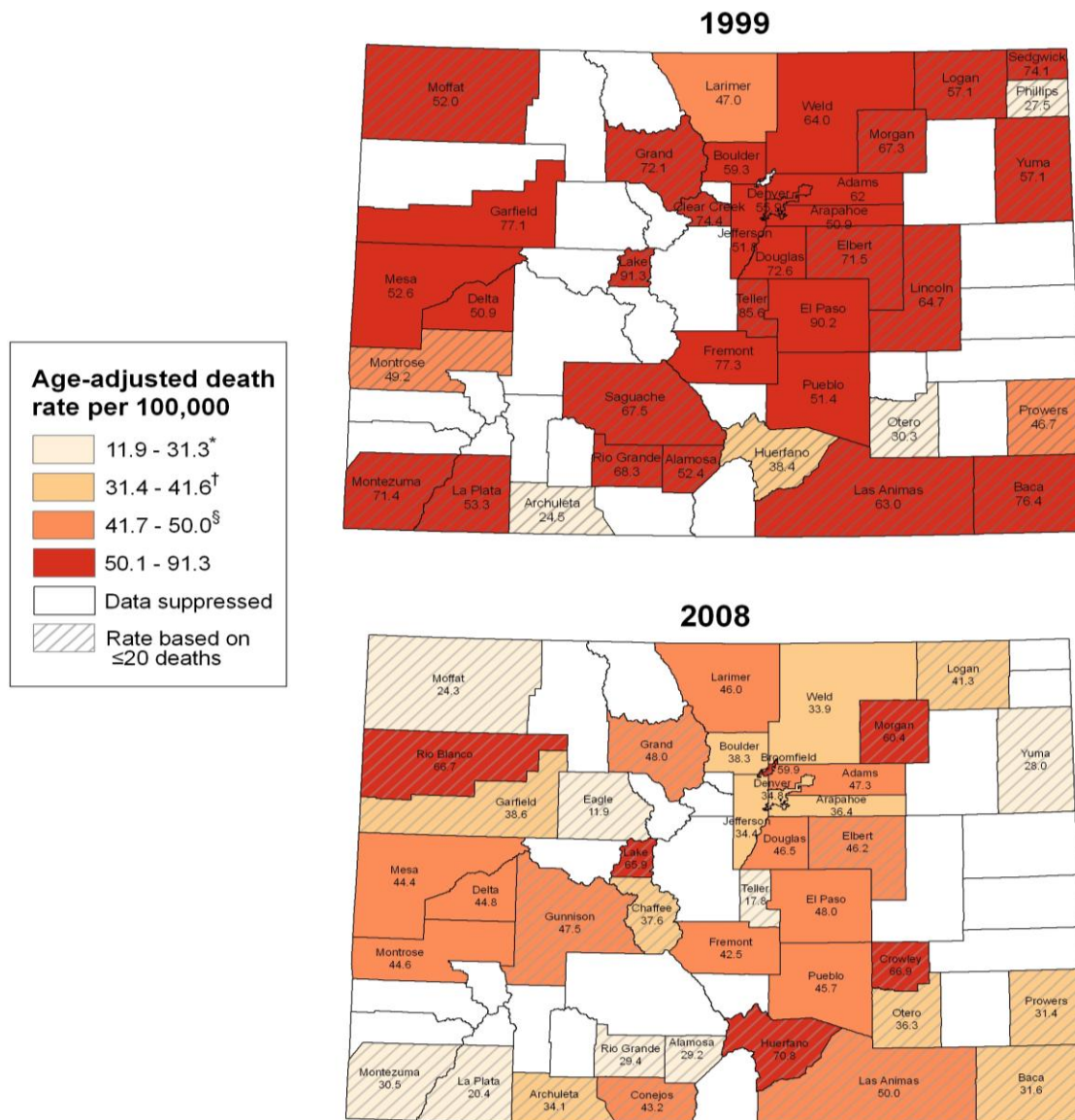
Death rates due to stroke by county in Colorado

Age-adjusted death rates improved in most counties. In 1999, the death rate was above 50 per 100,000 for 31 counties (Figure 3.9). Only six counties were above this rate in 2008. The rates in several counties were based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns. This includes all six counties with the highest rates in 2008. For counties with small populations, death rates can vary substantially from year to year based on a small change in the number of deaths.

In 2008:

- The six counties with the highest number of deaths due to stroke (Adams, Arapahoe, Denver, El Paso, Jefferson, and Larimer) accounted for 60 percent of stroke deaths in Colorado.
- Eight counties had an age-adjusted death rate of 31.3 or less per 100,000, which was 20 percent below the 2008 Colorado rate of 39.1 per 100,000.

Figure 3.9. Age-adjusted stroke death rates by county – Colorado, 1999 and 2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Map prepared by: Epidemiology, Planning and Evaluation Branch, Colorado Department of Public Health and Environment
 Cause of death (ICD-10 codes): cerebrovascular diseases (I60-I69)

Data suppressed if less than three events in the county due to confidentiality or reliability concerns.

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

* The category cut-point of 31.3 represents the state equivalent to the Healthy People 2010 national goal, or 20 percent below Colorado's 2008 rate.

† The category cut-point of 41.6 represents the U.S. 2007 preliminary rate.

‡ The category cut-point of 50.0 represents an arbitrary cut-point.

Many Colorado counties have small populations and few deaths in a given year. Interpretation of year-to-year changes and comparison with other counties are hampered by a tendency for rates to fluctuate widely. In this section, rates based on very small numbers have been noted.

Other factors and the social determinants of health – uneven distribution of resources, community design, housing, employment, access to health care, access to healthy foods and environmental pollutants – contribute to health outcomes and should be considered in interpreting data and in planning programs.

4. Years of potential life lost due to heart disease and stroke

In assessing the burden of a particular disease, death rates and hospital discharge rates are often presented to assess the impact of cardiovascular disease on a population, but years of potential life lost (YPLL) is another important measure, as it measures the impact of premature or preventable death. YPLL is useful for evaluating the impact of programs on improving health outcomes and increasing the life expectancy of the population.

YPLL is defined as the number of years of potential life lost by each death occurring before a predetermined age-, race-, and sex-specific life expectancy. For example, the life expectancy in 2008 for a 60-year-old White non-Hispanic female in Colorado was 85 years. If this person died of heart disease at age 60 years, her YPLL due to heart disease would be 25 years. In other words, she likely would have lived an estimated 25 more years if she had not died prematurely of heart disease.

In 2008, cancer was the leading cause of YPLL in Colorado, with 109,996 YPLL. Heart disease and stroke combined to account for 93,274 YPLL.

Years of potential life lost before life expectancy (YPLL) due to heart disease in Colorado

In 2008:

- Heart disease accounted for 76,365 YPLL.
- On average, a person who died of heart disease in 2008 died 13 years before his or her life expectancy (average YPLL = 76,365 YPLL total / 6,132 deaths = 13).
- The total YPLL and average YPLL per decedent (per person who died of heart disease) was higher among males (42,939 and 13 years, respectively) compared with females (31,291 and 11 years, respectively).
- Although White non-Hispanics account for most of the YPLL due to heart disease (White non-Hispanics comprise approximately 73 percent of Colorado's population), White non-Hispanics had a lower average YPLL per decedent compared with other races/ethnicities (12 vs. 15-31 years, respectively).
 - Native Americans and Alaska Natives had higher average YPLL per decedent values for heart disease compared with other races/ethnicities. However, this finding should be interpreted with caution as few persons of this population died from heart disease (n=26) and small numbers provide unreliable estimates.
- The rate of YPLL per 10,000 population due to heart disease was:
 - Higher among males compared with females overall (170 vs. 126, respectively) and
 - Higher among Blacks compared with other races/ethnicities (178 vs. 80-169, respectively) (Table 4.1).

Table 4.1. Deaths and years of potential life lost (YPLL) before life expectancy due to heart disease by sex and race/ethnicity – Colorado, 2008

	Number of Deaths	YPLL	Average YPLL per decedent	YPLL per 10,000 population
Total	6,132	76,365	13	153
Female	2,939	31,291	11	126
Male	3,193	42,939	13	170
White non-Hispanic	5,260	61,898	12	169
White Hispanic	548	8,376	15	93
Black	223	3,987	18	178
Asian or Pacific Islander	62	1,208	20	80
Native American or Alaska Native	26	817	31	102

Years of potential life lost before life expectancy (YPLL) due to stroke in Colorado

In 2008:

- Stroke accounted for nearly 17,000 YPLL.
- On average, a person who died of stroke in 2008 died 11 years before his or her life expectancy (average YPLL = 16,909 YPLL total / 1,531 deaths = 11).
- The average YPLL per decedent (per person who died of stroke) was higher among males compared with females (12 vs. 11 years, respectively).
- Although White non-Hispanics account for most of the YPLL due to stroke (White non-Hispanics comprise approximately 73 percent of Colorado’s population), White non-Hispanics had a lower average YPLL per decedent compared with other races/ethnicities (10 vs. 15-25 years, respectively).
 - Native Americans and Alaska Natives had higher average YPLL values for stroke compared with other races/ethnicities. However, this finding should be interpreted with caution as few persons of this population died from stroke (n = 9) and small numbers provide unreliable estimates (Table 4.2).
- The rate of YPLL per 10,000 population due to stroke was:
 - Higher among females compared with males overall (39 vs. 28, respectively) and
 - Higher among Blacks compared with other races/ethnicities (41 vs. 27-36, respectively)

Table 4.2. Deaths and years of potential life lost (YPLL) before life expectancy due to stroke by sex and race/ethnicity – Colorado, 2008

	Number of Deaths	YPLL	Average YPLL per decedent	YPLL per 10,000 population
Total	1,531	16,909	11	34
Female	908	9,610	11	39
Male	623	7,156	12	28
White non-Hispanic	1,272	12,939	10	35
White Hispanic	161	2,405	15	27
Black	55	905	17	41
Asian or Pacific Islander	34	546	16	36
Native American or Alaska Native	9	223	25	28

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause of death (ICD-10 codes): cerebrovascular diseases (I60-I69)

Although Colorado males experienced higher average YPLL values than females for both heart disease and stroke, females had more stroke deaths and a higher rate of YPLL per 10,000 population due to stroke. Among various races/ethnicities, Blacks had higher rates and White Hispanics had lower rates of YPLL per 10,000 population compared with White non-Hispanics for both heart disease and stroke.

This information is valuable in determining priorities for prevention activities. For example, the findings reported here emphasize the need for early prevention activities such as identifying, treating and controlling high blood pressure, especially among Blacks. YPLL and YPLL rates can also assist in the establishment of research and resource priorities, the surveillance of temporal trends in premature death, the evaluation of the effectiveness of program interventions and targeting health education efforts to sections of the general population most in need of public health interventions.¹⁸

5. Heart disease and stroke hospital discharges

Cardiovascular disease is a class of diseases that includes heart disease and stroke. Coronary heart disease and congestive heart failure are included within the category of heart disease. Most persons who experience a major cardiovascular disease event become hospitalized, and more than one hospital stay might be associated with the event. The total number of discharges for cardiovascular disease, therefore, does not represent the number of unique persons with such discharges.

Number of hospital discharges for major cardiovascular diseases in Colorado

Among Coloradans in 2008, major cardiovascular disease accounted for 43,672 hospital discharges and 194,269 total inpatient days for an overall average hospital length of stay of 4.4 days (194,269 inpatient days / 43,672 hospital discharges). Heart disease and stroke comprised 90 percent of all hospital discharges for major cardiovascular disease in Colorado in 2008 (39,505 hospital discharges from heart disease and stroke / 43,672 hospital discharges for all major cardiovascular disease) (Table 5.1).

In 2008:

- 32,603 Colorado hospital discharges were for heart disease; the average length of stay was 4.2 days.
 - In 2007, the average length of stay was 3.9 days in the United States.
- 6,902 Colorado hospital discharges were for stroke; the average length of stay was 5.1 days.
 - In 2007, the average length of stay was 5.4 days in the United States.

Table 5.1. Number of hospital discharges for major cardiovascular diseases and associated length of stay — Colorado, 2008

	Number of discharges	Total inpatient days	Average length of stay (days)
Major cardiovascular diseases	43,672	194,269	4.4
Heart disease	32,603	137,393	4.2
Coronary heart disease	11,969	44,314	3.7
Congestive heart failure	6,927	34,284	4.9
Stroke	6,902	35,306	5.1

Data source: Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

Diagnosis (ICD-9 codes): major cardiovascular disease (390-434,436-448); diseases of the heart (390-398,402,404,410-429); coronary heart disease (410-414,429.2); congestive heart failure (428); cerebrovascular diseases (430-434,436-438)

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with select major cardiovascular diseases as the primary diagnosis.

Trends in age-adjusted hospital discharge rates from heart disease in Colorado

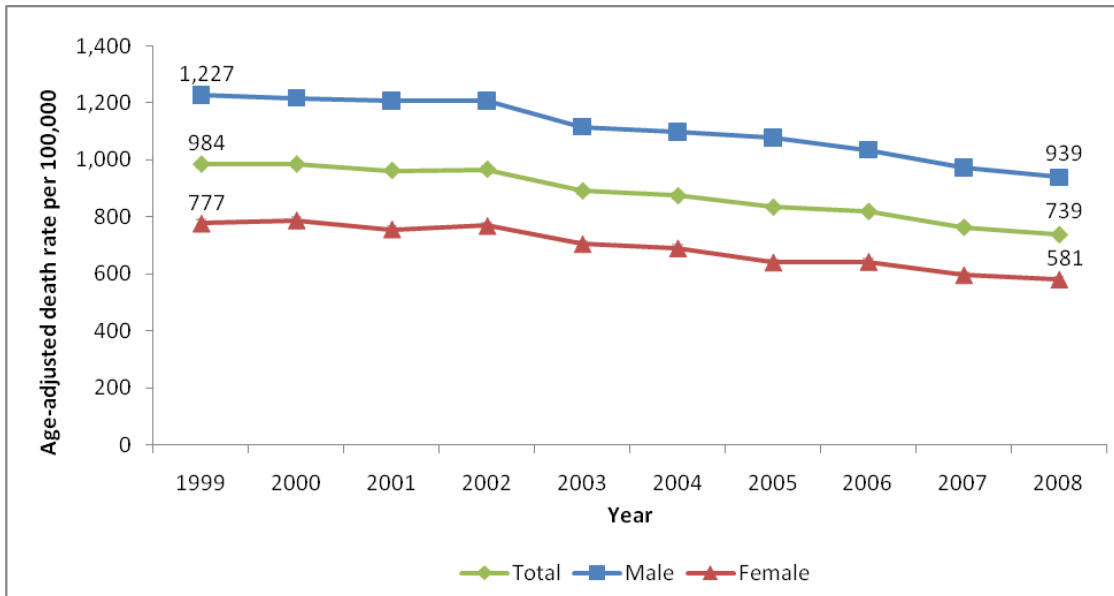
The rates presented in the following sections are age-adjusted rates. Age-adjustment is used to compare two different populations or one population over time that might be different with regard to age distribution.

In Colorado and nationwide, age-adjusted hospital discharge rates for heart disease have been decreasing during the past decade.²¹ In Colorado, there was a significant decrease in the age-adjusted hospital discharge rate (per 100,000 residents) for heart disease, from 984 in 1999 to 739 in 2008 (Figure 5.1). The decrease in the age-adjusted hospital discharge rate due to heart disease from 1999 to 2008 was significant for both males and females.

In 2008:

- The total age-adjusted hospital discharge rate for heart disease in Colorado was 739 per 100,000 Colorado residents.
- Males had higher hospital discharge rates for heart disease than females (939 vs. 581 per 100,000 Colorado residents, respectively).

Figure 5.1. Age-adjusted hospital discharge rates for heart disease per 100,000 residents by sex — Colorado, 1999–2008



Data source: Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

Diagnosis (ICD-9 codes): diseases of the heart (390-398,402,404,410-429)

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with select major cardiovascular diseases as the primary diagnosis.

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdph.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

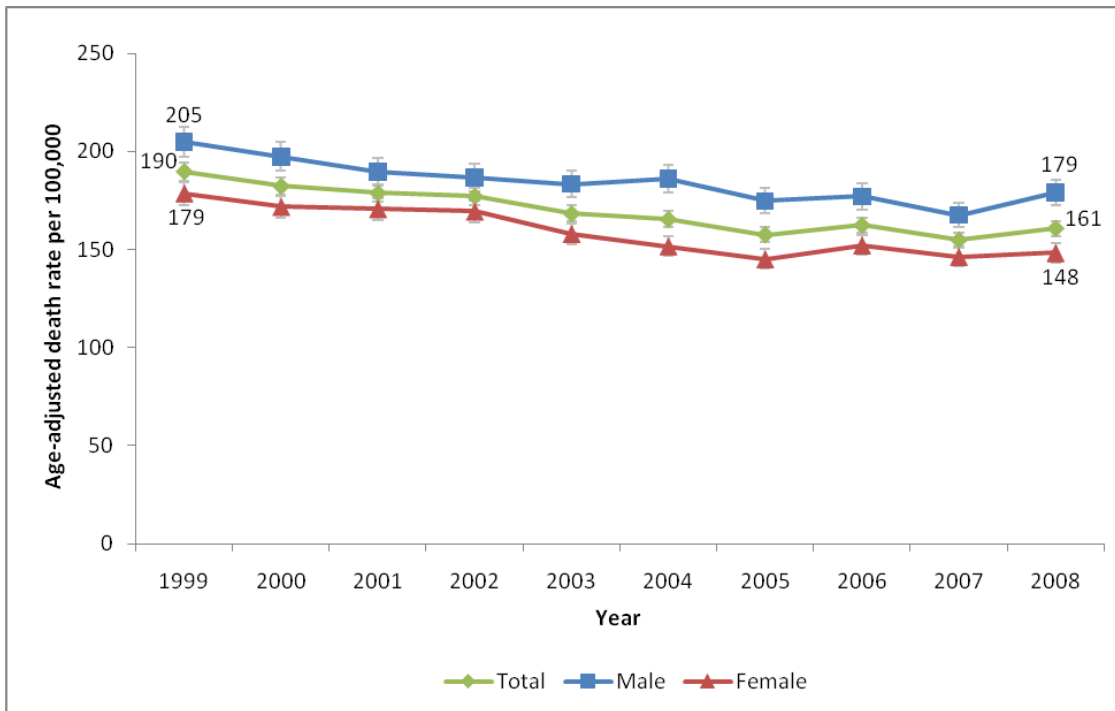
Trends in age-adjusted hospital discharge rates from stroke in Colorado

In Colorado, age-adjusted hospital discharge rate (per 100,000 residents) for stroke decreased from 190 in 1999 to 161 in 2008 (Figure 5.2). The decrease in the hospital discharge rate due to stroke from 1999 to 2008 was significant for both males and females.

In 2008:

- The total age-adjusted hospital discharge rate for stroke was 161 per 100,000 Colorado residents.
- Males had higher hospital discharge rates for stroke than females (179 vs. 148 per 100,000, respectively).

Figure 5.2. Age-adjusted hospital discharge rates for stroke by sex – Colorado, 1999–2008



Data source: Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

Diagnosis (ICD-9 codes): cerebrovascular diseases (430-434,436-438)

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with select major cardiovascular diseases as the primary diagnosis.

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

In summary, approximately 40,000 hospital discharges were attributed to heart disease and stroke in Colorado in 2008. The total number of hospital discharges for heart disease was considerably higher than discharges from stroke. However, stroke has been a leading cause of disability and recovery can take months or years.²² Both death and hospital discharge rates due to heart disease and stroke have been declining during the past decade in Colorado.

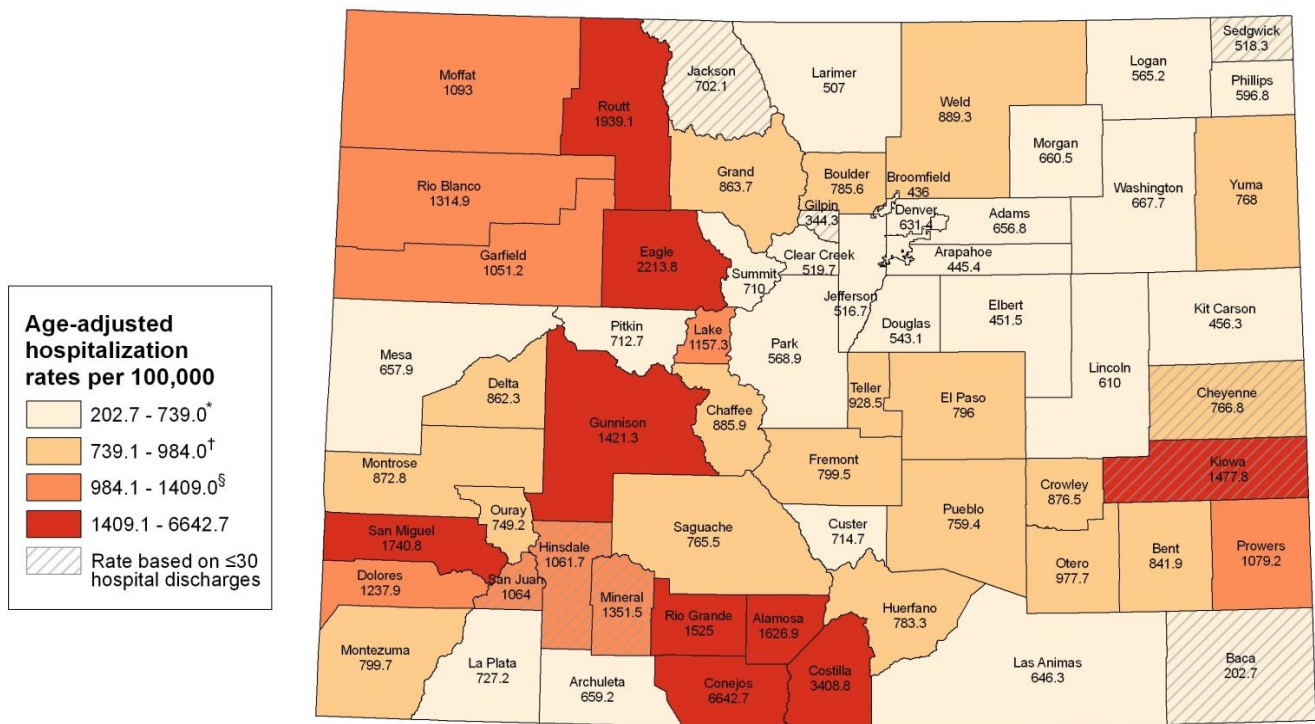
Hospital discharge rates for heart disease by county in Colorado

Hospital discharge data for heart disease by county was not available for 1999. In 2008, the Colorado age-adjusted hospital discharge rate was above the 2008 U.S. rate of 1,409 per 100,000 for nine counties (Figure 5.3). Only one of the nine counties, Kiowa, was also among the leading counties in heart disease death rates in 2008 (rate was based on nine deaths). An additional nine counties had rates above the 1999 Colorado rate of 984 per 100,000. The rates in counties based on 30 or fewer hospital discharges should be interpreted with caution due to statistical reliability concerns. For counties with small populations, hospital discharge rates can vary substantially from year to year based on a small change in the number of discharges.

In 2008:

- The 10 counties with the highest number of hospital discharges in 2008 (Adams, Arapahoe, Boulder, Denver, El Paso, Jefferson, Larimer, Mesa, Pueblo, Weld) accounted for 65 percent of hospital discharges in Colorado.
- Conejos and Costilla Counties had the highest hospital discharge rates for heart disease.

Figure 5.3. Age-adjusted hospital discharge rates for heart disease by county – Colorado, 2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Map prepared by: Epidemiology, Planning and Evaluation Branch, Colorado Department of Public Health and Environment
 Diagnosis (ICD-9 codes): diseases of the heart (390-398,402,404,410-429)
 Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.
 * The category cut-point of 739.0 represents the Colorado 2008 rate.
 † The category cut-point of 984.0 represents the Colorado 1999 rate.
 ‡ The category cut-point of 1,409.0 represents the U.S. 2008 rate.

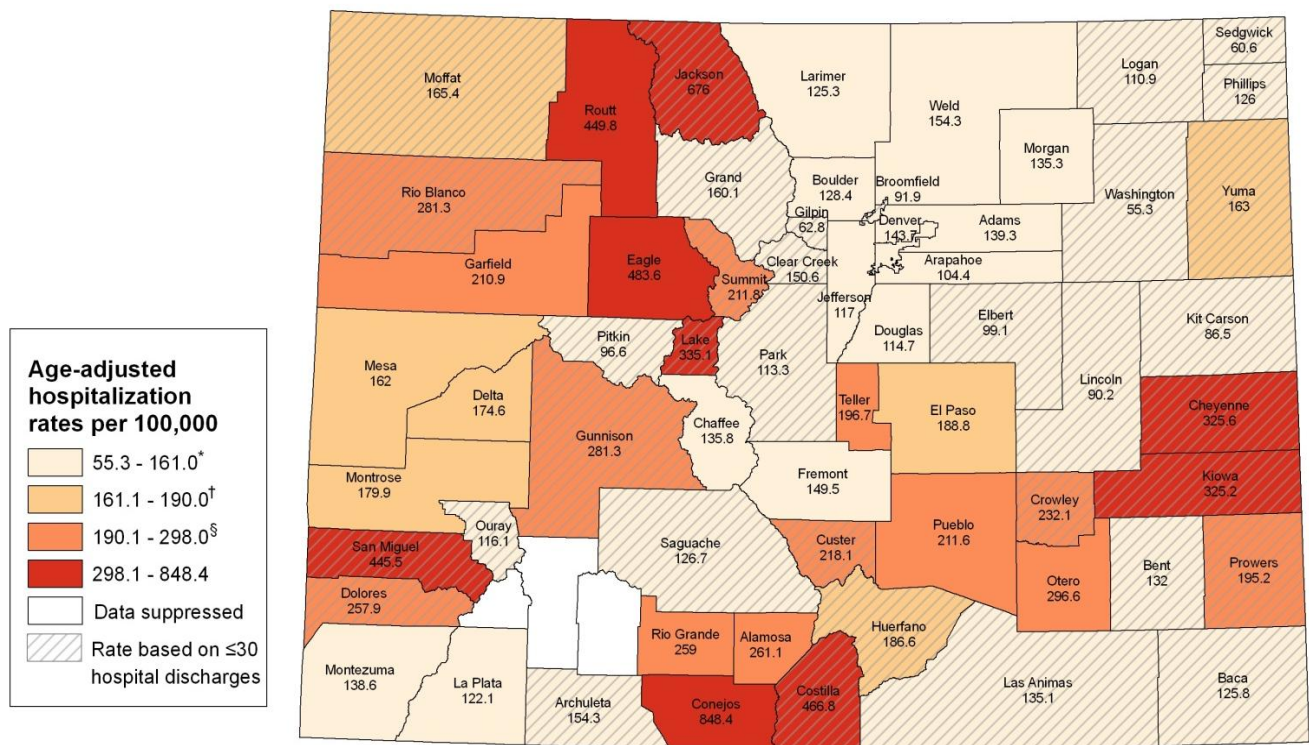
Hospital discharge rates for stroke by county in Colorado

Hospital discharge data for stroke by county was not available for 1999. In 2008, the Colorado age-adjusted hospital discharge rate due to stroke was above the 2008 U.S. rate of 298 per 100,000 for nine counties (Figure 5.4). Conejos and Jackson Counties had the highest rates. An additional 13 counties had rates above the 1999 Colorado rate of 190 per 100,000. The rates in 34 counties were based on 30 or less hospital discharges and should be interpreted with caution due to statistical reliability concerns. This includes six of the nine counties with the highest rates. For counties with small populations, hospital discharge rates can vary substantially from year to year based on a small change in the number of discharges.

In 2008:

- The 10 counties with the highest number of hospital discharges in 2008 (Adams, Arapahoe, Boulder, Denver, El Paso, Jefferson, Larimer, Mesa, Pueblo, Weld) accounted for 68 percent of hospital discharges in Colorado.

Figure 5.4. Age-adjusted hospital discharge rates for stroke by county – Colorado, 2008



Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
 Map prepared by: Epidemiology, Planning and Evaluation Branch, Colorado Department of Public Health and Environment
 Diagnosis (ICD-9 codes): cerebrovascular diseases (430-434, 436-438) for Colorado rate; (430-438) used for U.S. rate
 Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Rates are per 100,000 Colorado residents.

* The category cut-point of 161.0 represents the Colorado 2008 rate.

† The category cut-point of 190.0 represents the Colorado 1999 rate.

‡ The category cut-point of 298.0 represents the U.S. 2008 rate.

A large number of hospital discharges for cardiovascular disease occurred in 2008. However, the age-adjusted rates of hospital discharge for cardiovascular disease (and heart disease and stroke, separately) have decreased significantly from 1999 to 2008. Significant differences in hospital discharge rates for heart disease and stroke were observed in Colorado by county. The counties with the highest discharge rates for both heart disease and stroke tended to be rural or frontier (non-urban) counties. Potential explanations for these differences include lifestyle factors, such as smoking prevalence, and the availability of medical resources. Identifying geographical differences is important for prevention programming, particularly because stroke is a leading cause of disability and death if not treated within a specified time.

Many Colorado counties have small populations and few hospital discharges for a given diagnosis in a given year. Interpretation of year-to-year changes and comparison with other counties are hampered by a tendency for rates to fluctuate widely. In this section, rates based on very small numbers have been noted.

6. Costs of heart disease and stroke

Costs for treating chronic diseases are on the rise and straining the Medicaid and Medicare budgets of many states. Between 2000 and 2006, the average total charge per heart disease hospitalization that was billed to Medicare increased steadily.²¹

Chronic disease costs for Colorado Medicaid beneficiaries

The Chronic Disease Cost Calculator is a tool that estimates state Medicaid expenditures for six chronic diseases based on the prevalence of each disease in the Medicaid population and on treatment costs. Prevalence (defined as the percentage of the Medicaid population reporting treatment for or problems with the disease in the previous year) of each chronic disease was based on the 2001-2005 Medical Expenditures Panel Survey, as were the cost estimates (inflated to 2007 dollars). Enrollment data from 2004 indicates that Colorado had an estimated 503,400 Medicaid beneficiaries.

Among the Colorado Medicaid population, the prevalence of heart disease was 5.7 percent. Estimated annual cost per beneficiary for heart disease, inflated to 2007 dollars, was about \$1,400. Total costs to Medicaid for heart disease in Colorado were estimated at \$40.9 million.

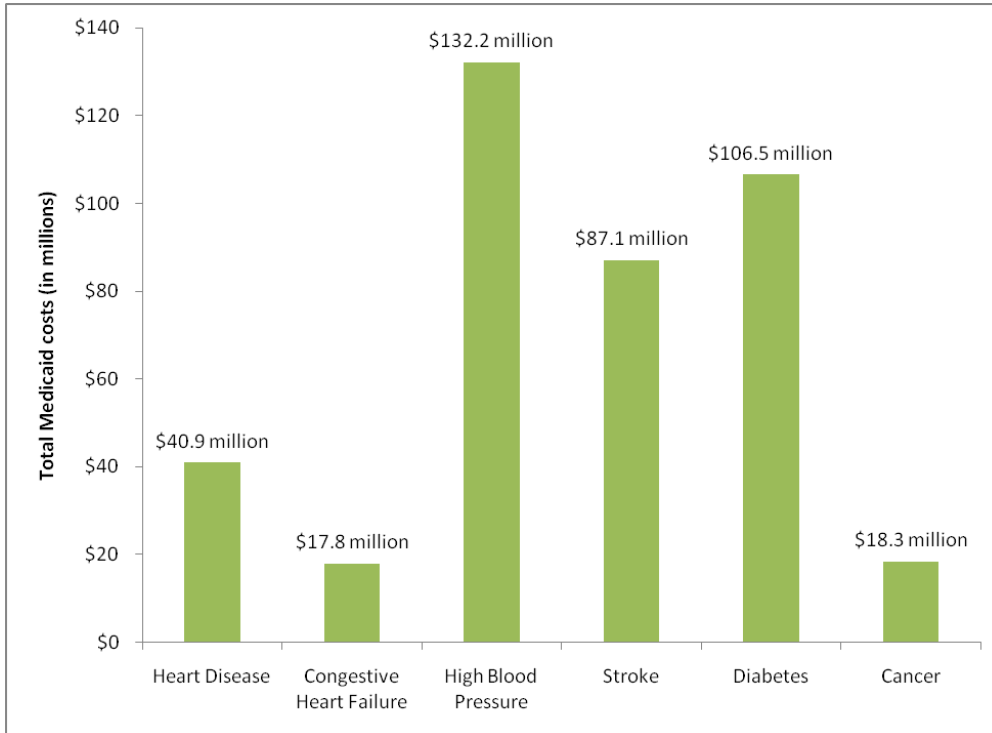
The prevalence of congestive heart failure among Medicaid beneficiaries in Colorado was 0.9 percent. Estimated annual cost per beneficiary for congestive heart failure, inflated to 2007 dollars, was about \$3,900. Total costs to Medicaid for congestive heart failure in Colorado were estimated at \$17.8 million.

The prevalence of high blood pressure was 10.2 percent among Colorado Medicaid beneficiaries. Estimated annual cost per beneficiary for high blood pressure, inflated to 2007 dollars, was close to \$2,600. Of importance, the costs for high blood pressure include costs for complications such as heart disease, congestive heart failure and stroke. Total costs to Medicaid for high blood pressure in Colorado were estimated at \$132.2 million.

Stroke prevalence among Medicaid beneficiaries in the state was 2.1 percent. Although the prevalence of stroke was low, the estimated annual cost per beneficiary for stroke, inflated to 2007 dollars, was almost \$8,100. Total costs to Medicaid for stroke in Colorado approximated \$87.1 million.

Diabetes prevalence among Medicaid beneficiaries in the state was 5.8 percent and the estimated annual cost per beneficiary for diabetes, inflated to 2007 dollars, was about \$3,600. Total costs to Medicaid for diabetes in Colorado approximated \$106.5 million (Figure 6.1).

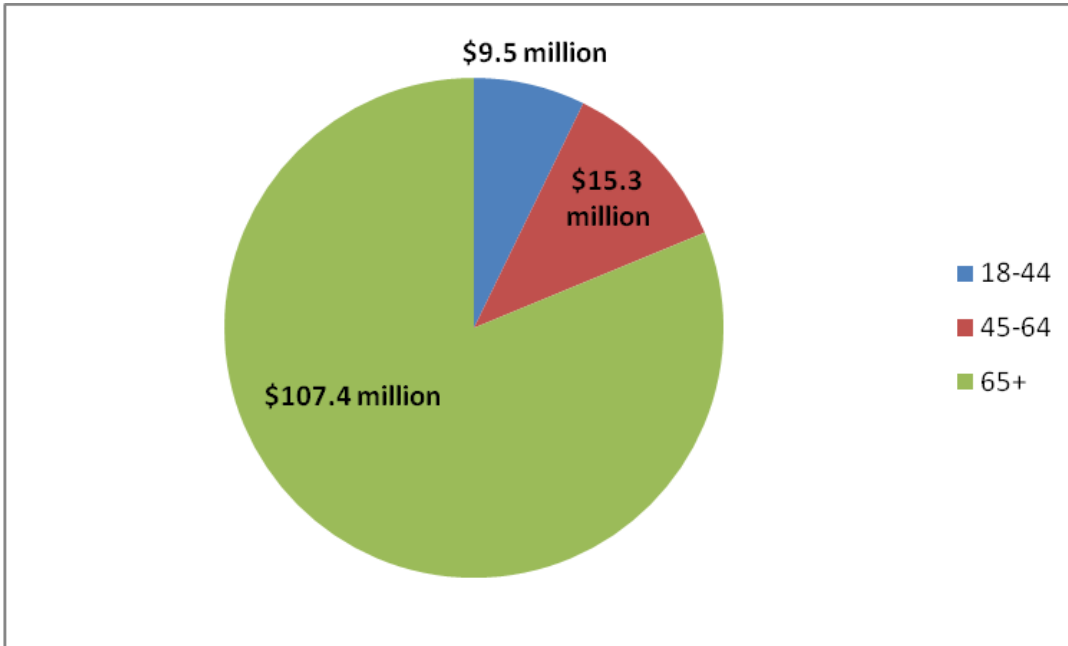
Figure 6.1. Estimated annual total Medicaid costs for select chronic diseases among beneficiaries - Colorado, 2007



Data source: Chronic Disease Cost Calculator, Centers for Disease Control and Prevention, Accessed December 14th, 2010 from <http://www.cdc.gov/chronicdisease/resources/calculator/index.htm>

The prevalence of high blood pressure was lowest in the 18-44 age group at 7.2 percent and highest in the 65 years and older age group at 60.7 percent. Costs to Medicaid for high blood pressure were highest among Medicaid beneficiaries age 65 and older, totaling about \$107.4 million (Figure 6.2). The costs for high blood pressure among Medicaid beneficiaries age 65 and older were more than 11 times higher than the costs among beneficiaries ages 18-44 years.

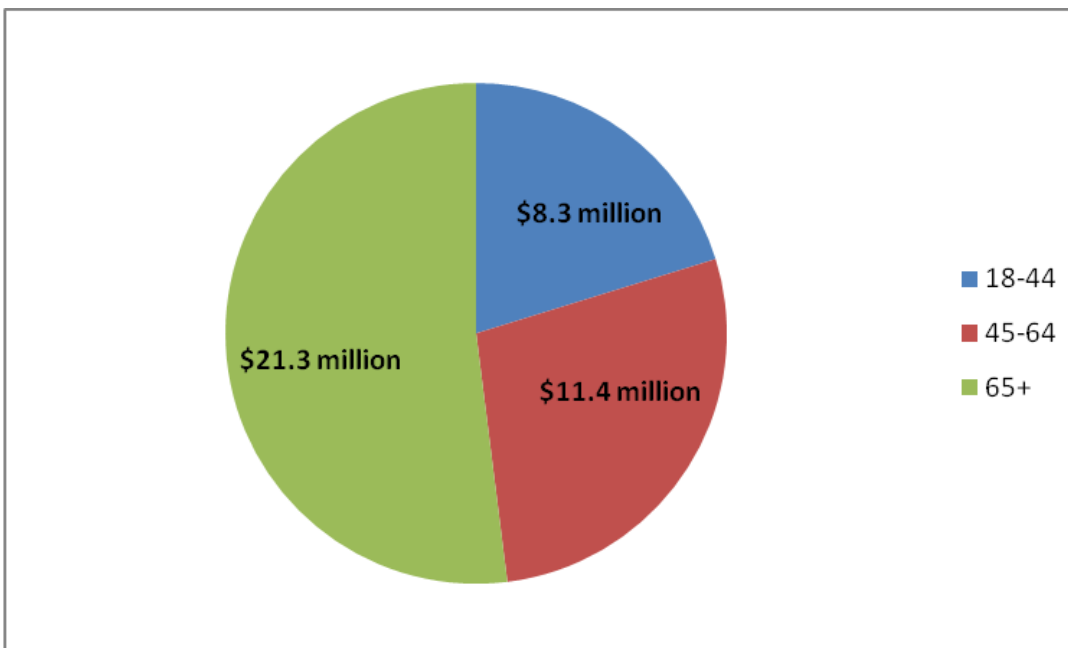
Figure 6.2. Estimated annual Medicaid costs for beneficiaries with high blood pressure by age group - Colorado, 2007



Data source: Chronic Disease Cost Calculator, Centers for Disease Control and Prevention, Accessed December 14th, 2010 from <http://www.cdc.gov/chronicdisease/resources/calculator/index.htm>

The prevalence of heart disease was lowest in the 18-44 age group at 3.6 percent and highest in the 65 years and older age group at 36.9 percent. Costs to Medicaid for heart disease were highest among Medicaid beneficiaries age 65 and older, totaling almost \$21.3 million (Figure 6.3).

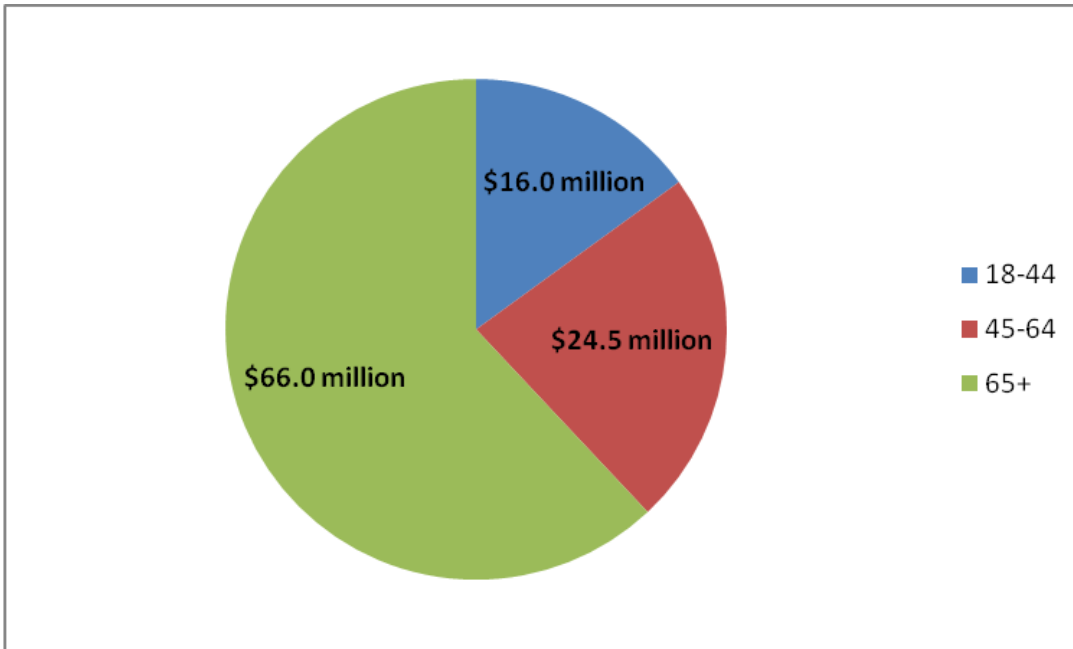
Figure 6.3. Estimated annual Medicaid costs for beneficiaries with heart disease by age group - Colorado, 2007



Data source: Chronic Disease Cost Calculator, Centers for Disease Control and Prevention, Accessed December 14th, 2010 from <http://www.cdc.gov/chronicdisease/resources/calculator/index.htm>

The prevalence of diabetes was lowest in the 18-44 age group at 5.0 percent and highest in the 65 years and older age group at 29.9 percent. Costs to Medicaid for diabetes were highest among Medicaid beneficiaries age 65 and older, totaling almost \$66.0 million (Figure 6.4).

Figure 6.4. Estimated annual Medicaid costs for beneficiaries with diabetes by age group - Colorado, 2007



Data source: Chronic Disease Cost Calculator, Centers for Disease Control and Prevention, Accessed December 14th, 2010 from <http://www.cdc.gov/chronicdisease/resources/calculator/index.htm>

The costs to Medicaid for two major risk factors for heart disease and stroke, high blood pressure and diabetes, are high. Costs for heart disease, congestive heart failure and stroke also bear a great financial burden on Medicaid. Compared to younger age groups, total costs for high blood pressure, heart disease and diabetes were highest among Colorado Medicaid beneficiaries age 65 and older.

Costs of Cardiovascular Disease in the United States

Total estimated costs of major cardiovascular disease in the United States for 2010 were \$503.2 billion. This estimate includes direct costs (costs of physicians and other professionals, hospital and nursing home services, medications, home health care and other medical durables) and indirect costs (lost productivity). Heart diseases were estimated to cost \$316.4 billion and stroke was estimated to cost \$73.7 billion in the United States in 2010.

The costs of risk factors for cardiovascular disease were also quite high. The estimated cost for high blood pressure in the United States in 2010 was \$76.6 billion. The cost of smoking is estimated at \$193 billion per year. In 2008, spending on overweight and obesity was estimated at \$147 billion. In 2007, the cost of diabetes was estimated at \$174 billion.¹⁵

7. Heart disease and stroke prevalence and quality of life indicators

Prevalence of heart attack, angina or coronary heart disease, and stroke in the United States and Colorado

Heart attack, angina or coronary heart disease, and stroke are three major cardiovascular outcomes. These outcomes also put a person at increased risk for future stroke. The prevalence estimates presented in this section are defined as the percent of adult Coloradans who report that they have been told by a health care professional that they had a heart attack, have angina or coronary heart disease, or had a stroke.

In 2008, the prevalence estimates for these three outcomes were lower in Colorado compared to the United States (Table 7.1).

In 2008:

- Almost 3 percent of adult Coloradans reported having been told by a health care professional that they previously had a heart attack (2.9 percent).
 - Males, persons aged 65 years and older, persons with low household incomes and persons with low education levels had a higher prevalence of previous heart attack.
 - No differences were observed for races/ethnicities.
- About 3 percent of adult Coloradans reported having been told by a health care professional that they had angina or coronary heart disease (2.7 percent).
 - Males, persons aged 65 years and older, and persons with lower household incomes had a higher prevalence of having been diagnosed with angina or coronary heart disease.
 - White non-Hispanics had a higher prevalence than Hispanics.
 - No differences were observed for different groups based on education level.
- Nearly 2 percent of adult Coloradans reported having been told by a health care professional that they previously had a stroke (1.9 percent).
 - Persons aged 65 years and older and persons with lower household incomes had a higher prevalence of previous stroke.
 - No difference was observed between males and females or persons of different races/ethnicities.

Table 7.1. Self-reported prevalence of heart attack, angina or coronary heart disease, and stroke by sex, age, race/ethnicity, income, and education — United States and Colorado, 2008

	Heart attack		Angina or coronary heart disease		Stroke	
	U.S. Median percent*	Colorado Percent (95% CI)	U.S. Median percent*	Colorado Percent (95% CI)	U.S. Median percent*	Colorado Percent (95% CI)
Total	4.2	2.9 (2.6-3.2)	4.3	2.7 (2.5-3.0)	2.6	1.9 (1.6-2.1)
Female	3.0	2.0 (1.7-2.3)	3.4	2.0 (1.7-2.3)	2.7	1.9 (1.6-2.2)
Male	5.5	3.9 (3.3-4.4)	5.3	3.5 (3.0-4.0)	2.5	1.9 (1.5-2.3)
Age (years)						
18-24	0.5	0.2 [†] (0.0-0.7)	0.6	N/A	0.4	0.5 [†] (0.0-1.3)
25-34	0.6	0.5 [†] (0.0-1.1)	0.4	0.4 [†] (0.0-0.8)	0.6	0.5 [†] (0.0-1.0)
35-44	1.1	0.7 [†] (0.3-1.1)	1.1	0.5 [†] (0.1-0.9)	0.9	0.8 [†] (0.4-1.2)
45-54	2.9	1.8 [†] (1.2-2.4)	2.9	1.8 [†] (1.2-2.5)	1.9	1.7 [†] (1.1-2.3)
55-64	6.3	4.5 (3.6-5.5)	7.1	5.1 (4.1-6.1)	3.4	2.5 (1.8-3.2)
65+	13.9	11.9 (10.5-13.3)	13.8	10.8 (9.5-12.0)	8.4	6.3 (5.3-7.3)
Race/ethnicity						
White non-Hispanic	4.4	3.0 (2.6-3.3)	4.6	3.1 (2.7-3.4)	2.6	1.7 (1.5-2.0)
Black non-Hispanic	3.9	3.8 [†] (1.0-6.5)	3.4	2.1 [†] (0.6-3.5)	4.0	3.5 [†] (1.1-5.9)
Hispanic	3.0	2.5 [†] (1.7-3.4)	3.4	1.9 [†] (1.2-2.6)	1.8	1.9 [†] (1.2-2.7)
Other	4.0	3.5 [†] (1.2-5.8)	3.3	1.7 [†] (0.3-3.0)	2.2	3.5 [†] (1.3-5.7)
Annual household income						
<\$15,000	8.8	7.4 (5.3-9.5)	7.8	5.0 (3.6-6.5)	7.0	4.8 (3.4-6.3)
\$15,000-24,999	7.0	4.5 (3.4-5.6)	6.8	4.0 (3.1-5.0)	4.6	3.6 (2.4-4.7)
\$25,000-34,999	5.5	3.8 (2.7-5.0)	5.5	3.7 (2.5-4.9)	3.2	2.3 [†] (1.2-3.4)
\$35,000-49,999	4.1	3.3 (2.3-4.2)	4.3	3.4 (2.4-4.4)	2.2	2.5 [†] (1.5-3.6)
\$50,000+	2.3	1.7 (1.4-2.1)	2.7	1.9 (1.5-2.2)	1.1	0.9 (0.6-1.2)
Education						
Less than high school	8.6	4.3 (3.0-5.6)	6.7	1.9 [†] (1.1-2.7)	5.3	3.0 [†] (1.7-4.2)
High school or GED	5.0	3.6 (3.0-4.3)	4.8	3.2 (2.6-3.9)	3.3	2.2 (1.7-2.8)
Some post-high school	3.8	2.8 (2.1-3.4)	4.3	3.0 (2.4-3.6)	2.5	2.0 (1.5-2.5)
College graduate	2.8	2.3 (1.9-2.7)	3.3	2.5 (2.1-2.9)	1.5	1.3 (1.0-1.7)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment (Colorado); <http://apps.nccd.cdc.gov/BRFSS/index.asp> (U.S.)

N/A = Not available if the unweighted sample size for the denominator (number of respondents in the sub-sample, e.g., respondents aged 18-24 years) was <50 or the confidence interval half width was >10 for any cell.

* Median percent (prevalence) of all 50 states and District of Columbia (n=51)

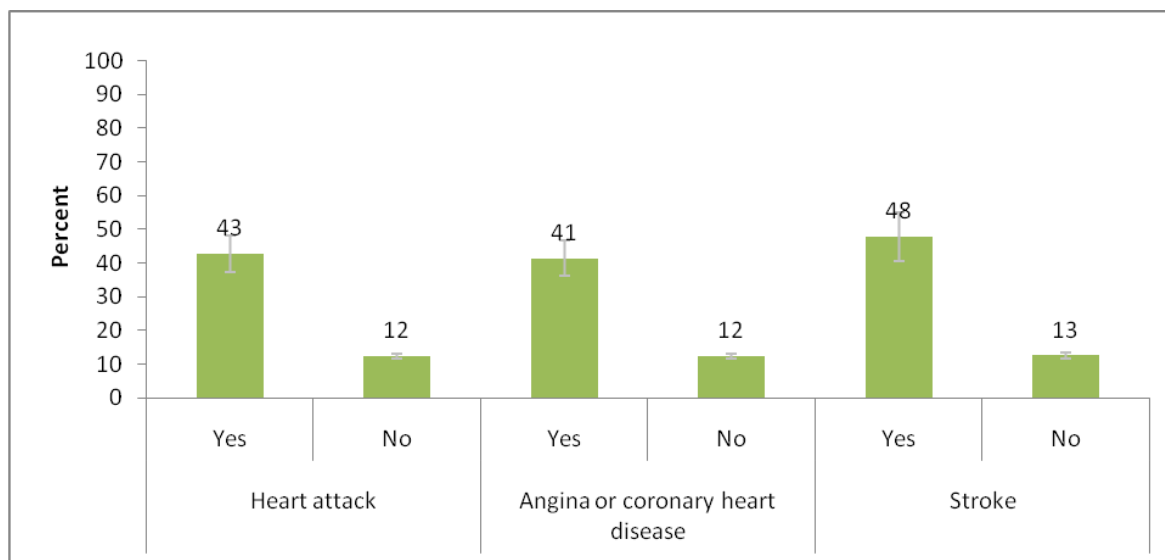
† Percent is based on less than 50 respondents (numerator) and should be interpreted with caution due to statistical reliability concerns.

Self-reported health status in Colorado

The total prevalence of fair or poor self-reported health status in Colorado was 13 percent in 2008 compared with a median prevalence of 14 percent in the United States.

In 2008, persons who reported having been told by a health care professional that they had a heart attack, persons who reported being told they have angina or coronary heart disease and persons who reported having been told they had a stroke had a higher prevalence of fair or poor general health status (Figure 7.1).

Figure 7.1. Percent of adults with or without cardiovascular disease histories who reported fair or poor general health status* – Colorado, 2008



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

*Survey respondents were asked, "Would you say that in general your health is— excellent, very good, good, fair, or poor?"

Quality of life measures in Colorado

In 2008:

Persons who reported having been told by a health care professional that they had a heart attack, persons who reported being told they have angina or coronary heart disease, and persons who reported having been told they had a stroke had a higher prevalence than persons without these conditions of:

- 14 or more physically unhealthy days per month
- 14 or more mentally unhealthy days per month
- 14 or more days with activity limitation per month
- Any activity limitation
- A health problem that required special equipment (Table 7.2)

Table 7.2. Quality of life measures by previous diagnosis of heart attack, angina or coronary heart disease, and stroke (percent, 95% confidence interval) – Colorado, 2008

	Heart attack		Angina or coronary heart disease		Stroke	
	Yes	No	Yes	No	Yes	No
General health fair or poor	42.7 (37.2-48.2)	12.3 (11.5-13.2)	41.4 (36.1-46.7)	12.4 (11.5-13.2)	47.8 (40.7-54.9)	12.6 (11.7-13.4)
14+ physically unhealthy days/month	47.4 (39.7-55.2)	27.0 (25.1-28.9)	52.1 (45.1-59.1)	26.8 (25.0-28.7)	54.1 (44.2-64.0)	27.0 (25.2-28.8)
14+ mentally unhealthy days/month	45.3 (34.6-55.9)	24.9 (22.9-26.8)	42.9 (33.2-52.5)	24.9 (23.0-26.9)	52.6 (40.9-64.4)	24.6 (22.7-26.5)
14+ days with activity limitation/month	47.9 (38.1-57.7)	28.5 (26.0-31.1)	51.1 (42.1-60.1)	28.4 (25.9-31.0)	57.8 (46.8-68.9)	28.3 (25.8-30.8)
Activity limitation (yes)	44.3 (38.9-49.6)	18.2 (17.3-19.1)	51.0 (45.7-56.3)	18.0 (17.1-18.9)	48.6 (41.6-55.7)	18.4 (17.5-19.3)
Health problem that requires special equipment (yes)	25.0 (20.3-29.8)	5.2 (4.8-5.7)	23.7 (19.4-28.0)	5.3 (4.8-5.7)	32.8 (26.2-39.3)	5.3 (4.8-5.8)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

According to a recent “Health Watch” published by the Colorado Department of Public Health and Environment,²³ the prevalence of heart attack, angina or coronary heart disease, or stroke (combined prevalence) was higher in 2008 among persons who reported current depression (11 percent vs. 5 percent for persons without current depression) or ever having been diagnosed with anxiety (9 percent vs. 5 percent for persons without anxiety). In addition, current depression was also found to be associated with risk factors for heart disease and stroke, including a higher prevalence of obesity, smoking and physical inactivity.

These data indicate an association between heart disease and stroke and quality of life and general health measures, but this does not confirm a causal association. The temporality of the association was also unknown. It was unknown, for example, whether a person’s poor mental health began before or after a heart attack or stroke.

Among Coloradans, persons of older age (65 years and older) and lower household income reported higher prevalence estimates for heart attack, angina or coronary heart disease, and stroke. By understanding which populations are disproportionately affected by heart disease and stroke, prevention programming can be targeted to help reduce the burden of disease. It is important to also consider quality of life issues in program planning.

8. Risk factors for heart disease and stroke

Risk factors can be modifiable (amenable to change) or non-modifiable. Non-modifiable risk factors for heart disease and stroke include advancing age, family history of heart disease or stroke, genetic determinants, and gender. Other factors that increase a person's risk of stroke include previous/current heart disease (e.g., atrial fibrillation, coronary artery disease, or other artery disease), sickle cell disease, and previous heart attack, stroke, or transient ischemic attack. Key modifiable risk factors for heart disease and stroke include tobacco use, high cholesterol, high blood pressure, diabetes, and overweight or obesity. Behaviors that contribute to the development of these risk factors include physical inactivity, poor diet (i.e., diet high in cholesterol, saturated fat, trans fat, sodium, and calories and diet low in fruits and vegetables), and excessive alcohol consumption. Improving these modifiable risk factors and behaviors can reduce a person's risk of heart disease and stroke.

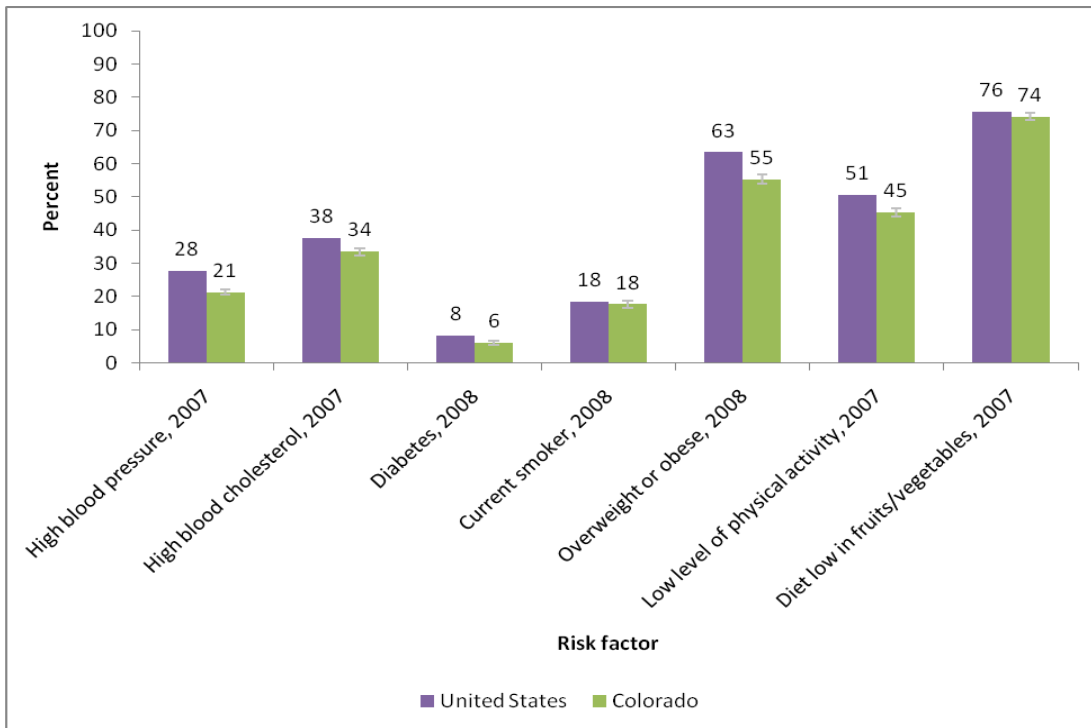
This report is specific to cardiovascular disease, but these modifiable risk factors are leading risk factors for other chronic diseases, including but not limited to, diabetes, cancer, asthma, pulmonary disease, and kidney disease. Therefore, improving these modifiable risk factors can also reduce the risk of these other diseases. Screening for high blood pressure, high cholesterol, and diabetes is an important step to identify persons whose risk factors might be undiagnosed and who might benefit from pharmacologic therapy. These interventions, coupled with other lifestyle changes, such as increasing physical activity, improving diet, and stopping smoking, can be even more effective in lowering the risk of cardiovascular disease.²⁴ Research shows that daily consumption of fruits or vegetables and moderate or strenuous physical exercise are protective against the development of cardiovascular disease.

Prevalence of risk factors of heart disease and stroke in the United States and Colorado

In 2007 or 2008:

- Compared to U.S. residents, Coloradans reported a lower prevalence of high blood pressure, high cholesterol, diabetes, overweight and obesity, low level of physical activity, and a diet low in fruits and vegetables. The prevalence of current smoking among adult Coloradans was not significantly different than the median prevalence in the United States.
- Among adult Coloradans, the most prevalent risk factor associated with heart disease and stroke was a diet low in fruits and vegetables (74 percent), followed by overweight or obesity (55 percent), and low level of physical activity (45 percent). Other key risk factors were prevalent among at least 18 percent of the population: high cholesterol (34 percent), high blood pressure (21 percent) and current smoking (18 percent). Diabetes was reported by 6 percent of the population (Figure 8.1).

Figure 8.1. Prevalence of heart disease and stroke risk factors — United States and Colorado, 2007 or 2008



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

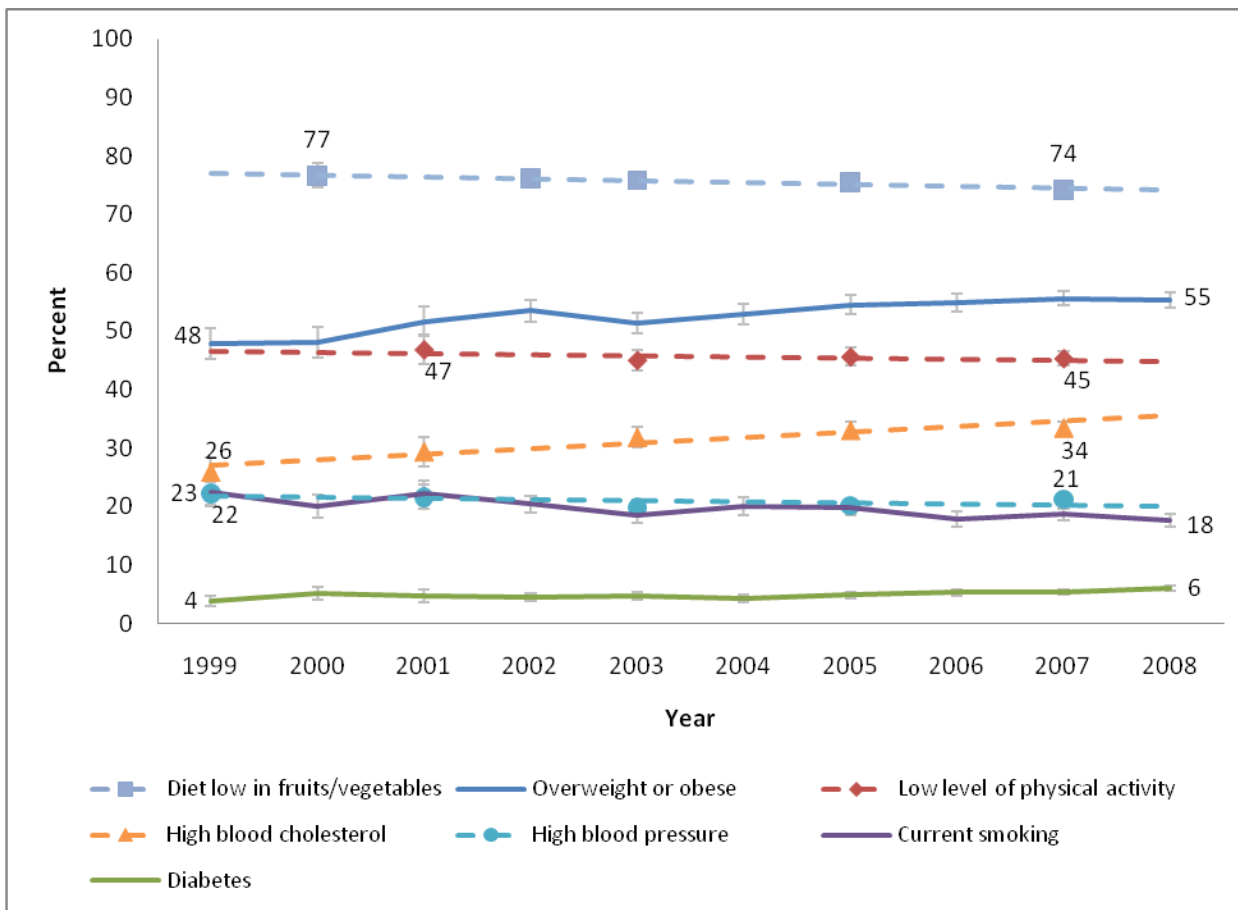
Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one's lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet the minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

Trends in prevalence of risk factors for heart disease and stroke in Colorado

During the period 1999–2008 (Figure 8.2):

- High cholesterol increased from 26 percent to 34 percent.
- Diabetes prevalence increased from 4 percent to 6 percent.
- Overweight or obesity prevalence increased from 48 percent to 55 percent.
- Current smoking prevalence decreased from 23 percent to 18 percent.
- No significant changes in the prevalence of high blood pressure, meeting recommended physical activity levels, or having a diet low in fruit and vegetables have occurred since 1999–2001.

Figure 8.2. Prevalence of heart disease and stroke risk factors — Colorado, 1999–2008



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one’s lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

In the interpretation of trends in risk factor prevalence, it is important to consider that increased prevalence might be due to an actual increase in the risk factor within the population or an increase in detection and awareness of certain risk factors, such as high blood pressure, high cholesterol and diabetes.

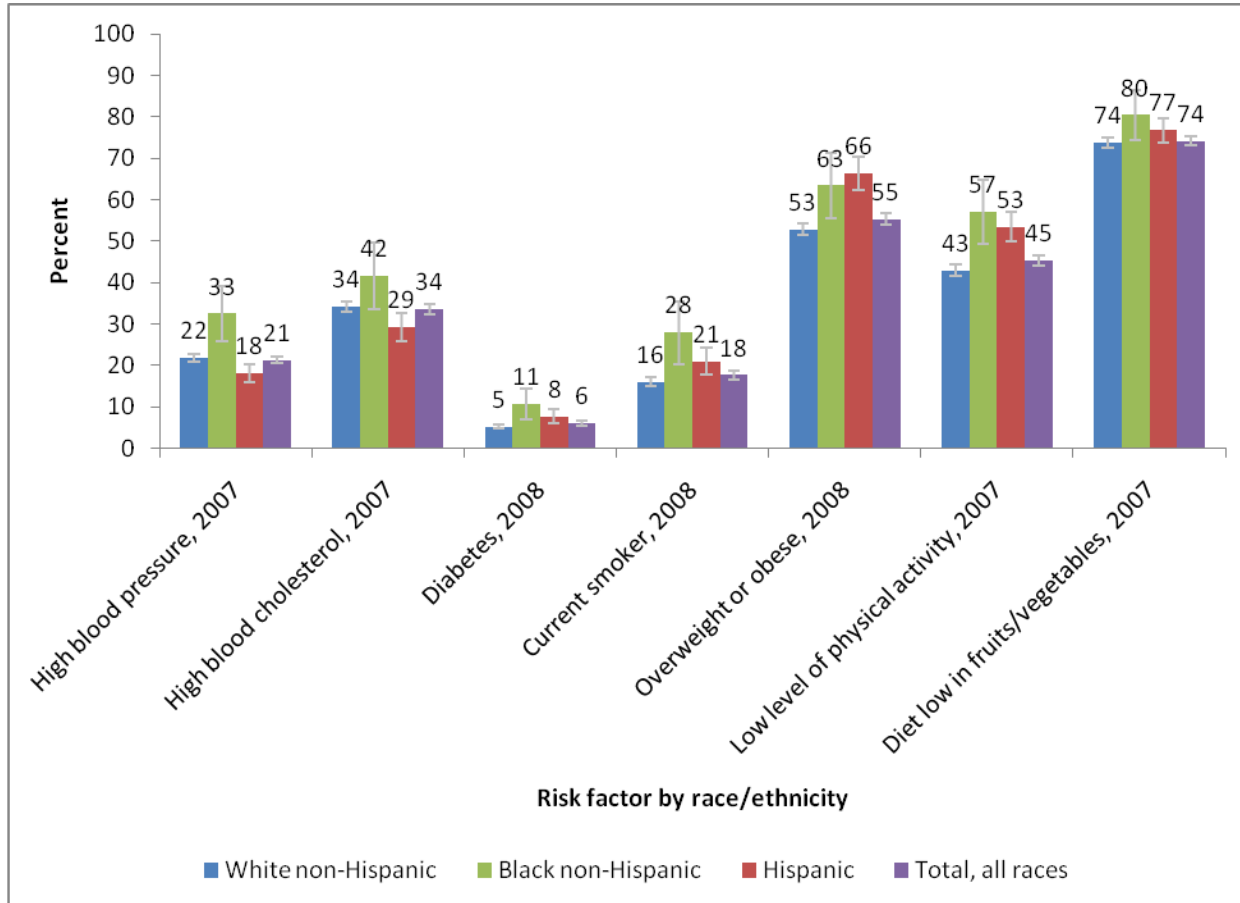
Prevalence of risk factors for heart disease and stroke by race/ethnicity in Colorado

During the period 1999–2008 (Figure 8.3):

- Black non-Hispanics had a higher prevalence of high blood pressure (33 percent) compared with Hispanics (18 percent) and White non-Hispanics (22 percent).
- Black non-Hispanics and White non-Hispanics had a higher prevalence of high cholesterol (42 percent and 34 percent, respectively) compared with Hispanics (29 percent).
- Hispanics had a higher prevalence of diabetes (8 percent) compared with White non-Hispanics (5 percent).
- Black non-Hispanics and Hispanics had a higher prevalence of current smoking (28 percent and 21 percent, respectively) compared with White non-Hispanics (16 percent).

- Black non-Hispanics and Hispanics had a higher prevalence of overweight or obesity (63 percent and 66 percent, respectively) compared with White non-Hispanics (53 percent).
- Black non-Hispanics and Hispanics had higher prevalence of low physical activity level (57 percent and 53 percent, respectively) compared with White non-Hispanics (43 percent).
- White non-Hispanics, Black non-Hispanics and Hispanics did not differ with regard to prevalence of a diet low in fruits and vegetables.

Figure 8.3. Prevalence of heart disease and stroke risk factors by race/ethnicity – Colorado, 2007 and 2008



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one’s lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet the minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

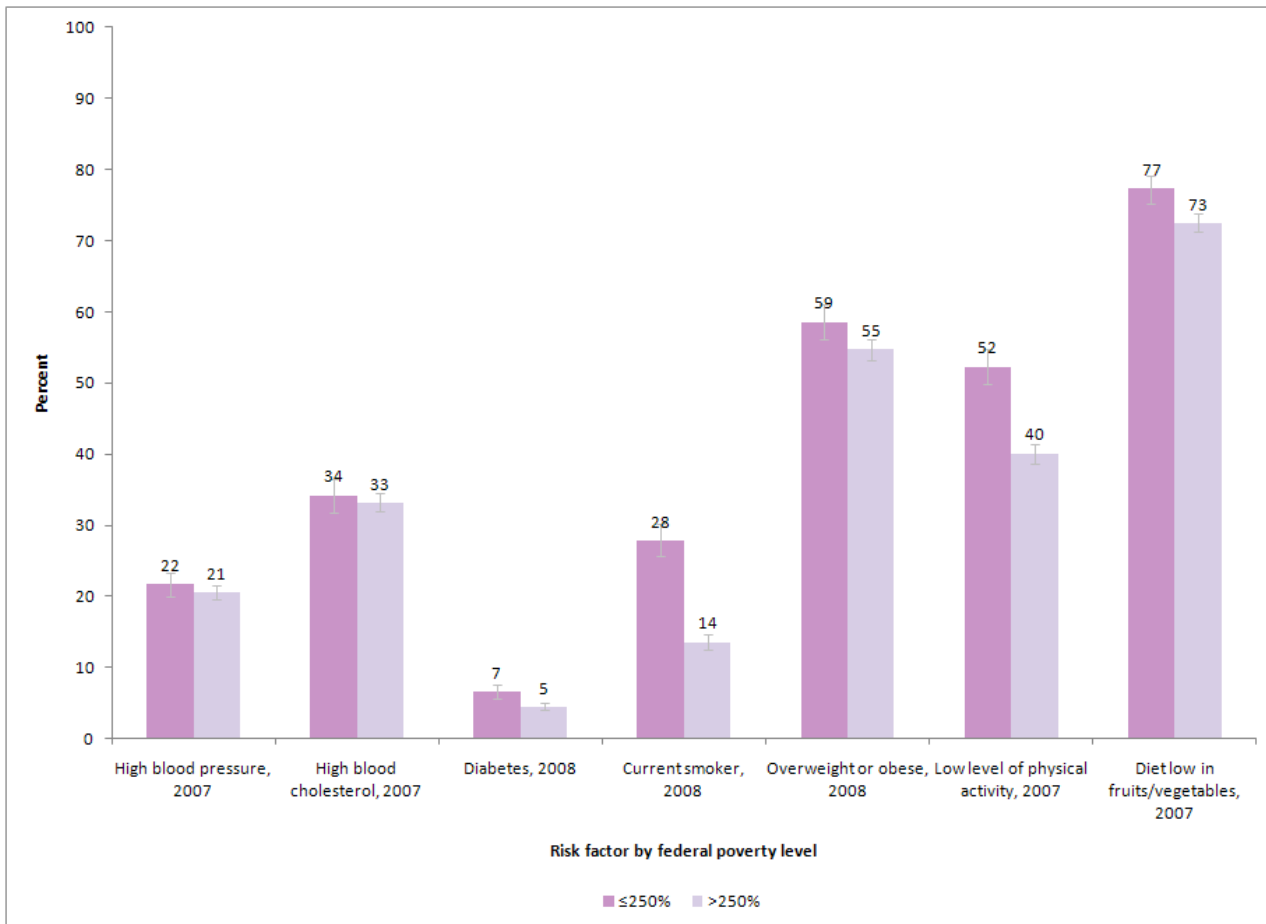
Prevalence of risk factors for heart disease and stroke by poverty level in Colorado

Poverty is a social determinant of health that is often related to behaviors and lifestyles that are risk factors for heart disease and stroke. In this report, persons living in poverty are those with incomes at or below 250 percent of the federal poverty level.

In 2007 or 2008 (Figure 8.4):

- Persons living in poverty had a higher prevalence of diabetes, current smoking, low physical activity levels and diets low in fruits and vegetables compared with persons not living in poverty.
 - The prevalence of current smoking among persons living in poverty was twice as high as those not in poverty.
- The prevalence of high blood pressure, high cholesterol, overweight or obesity did not differ by poverty level.

Figure 8.4. Prevalence of heart disease and stroke risk factors by poverty index – Colorado, 2007 and 2008



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one’s lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

There are a few limitations to these risk factor data. The estimates provided are based on self-report and are limited by a person’s recall and reflect social desirability issues (e.g., underreporting of actual weight). Second, data on the degree of individual cardiovascular risk factors and risk factor control through lifestyle, behavioral or pharmacologic means was not available. Third, persons who had not seen a health care professional or had not been screened for high cholesterol, diabetes or high blood pressure might have undiagnosed illness. Lastly, these data represent only certain modifiable risk factors, and other established risk factors (e.g., family history of premature coronary heart disease) were not included.

This section addresses seven modifiable risk factors for heart disease and stroke. Persons with multiple risk factors (e.g., an obese person with diabetes who is physically inactive) have an exponential increase in their risk of disease, such as acute myocardial infarction.¹The issue of multiple risk factors is addressed in Section 11 of this report.

In summary:

- Although the prevalence estimates for most of the risk factors included here were somewhat lower in Colorado compared with the United States, a significant proportion of Coloradans were at increased risk of heart disease and stroke because of modifiable risk factors.
- With the exception of current smoking prevalence, the prevalence of these risk factors has been stable or moving in the wrong direction (increased prevalence).
- In general, Black non-Hispanics, Hispanics, and persons living at or below 250 percent of poverty had higher prevalence of several risk factors compared with White non-Hispanics.
- Adults in all groups based on race/ethnicity and poverty level had a high prevalence of a diet low in fruits and vegetables (approximately 75 percent).
- Over half of adult Coloradans, regardless of race/ethnicity or poverty level, were overweight or obese.

Reducing modifiable risk factors can reduce but not eliminate your risks of heart disease and stroke. Many modifiable risk factors for heart disease and stroke can be addressed through prevention, early recognition (screening) and treatment. Policy and environmental changes (e.g., workplace smoking cessation programs and health-care provider adherence to primary care guidelines) also are essential in influencing persons to live heart-healthy and stroke-free lives.²⁵

9. High blood pressure

High blood pressure is an important risk factor for both heart disease and stroke. Lifestyle behaviors that lead to high blood pressure include smoking, drinking too much alcohol and eating a diet high in salt. In the United States, the prevalence of high blood pressure is associated with older age, Black race and persons with low annual household incomes.²⁹

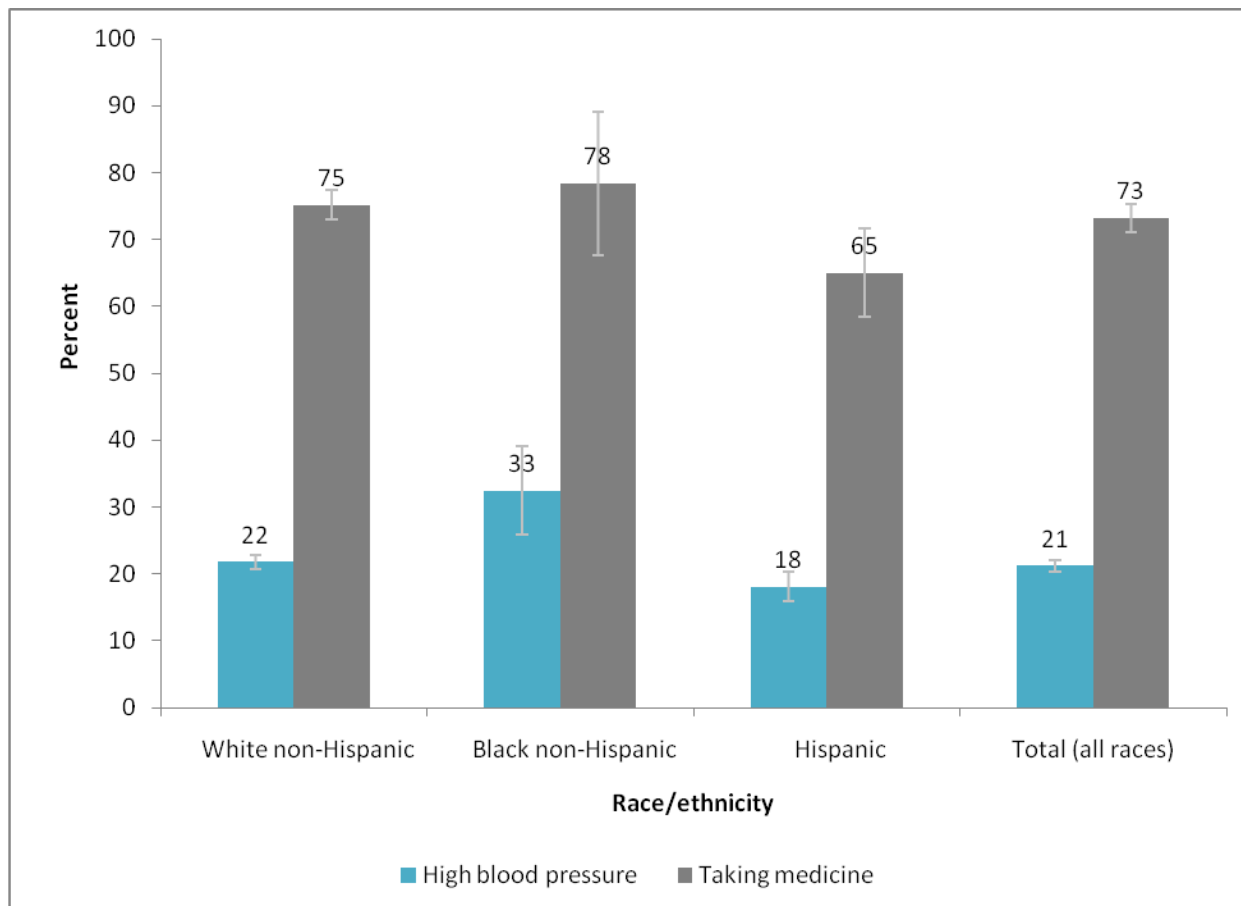
Prevalence of high blood pressure and taking medicine for high blood pressure by race/ethnicity in the United States and Colorado

In 2007, the prevalence of high blood pressure in Colorado was 21 percent compared with a prevalence of 28 percent in the United States.

Among Colorado and U.S. adults, the prevalence of high blood pressure was highest among Black non-Hispanics (33 percent and 37 percent, respectively) compared with other races/ethnicities. Compared to the U.S. population, the 2007 prevalence of high blood pressure was lower among Colorado residents for all race/ethnic groups except Hispanics.

In Colorado, 73 percent of adults with high blood pressure reported taking medicine for their condition. The proportion of adults taking medicine for high blood pressure was lower among Hispanics (65 percent) compared with White non-Hispanics (75 percent) (Figure 9.1).

Figure 9.1. Prevalence of high blood pressure* and taking medicine for high blood pressure† by race/ethnicity —Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Adults who have been told they have high blood pressure by their doctor, nurse, or other health professional

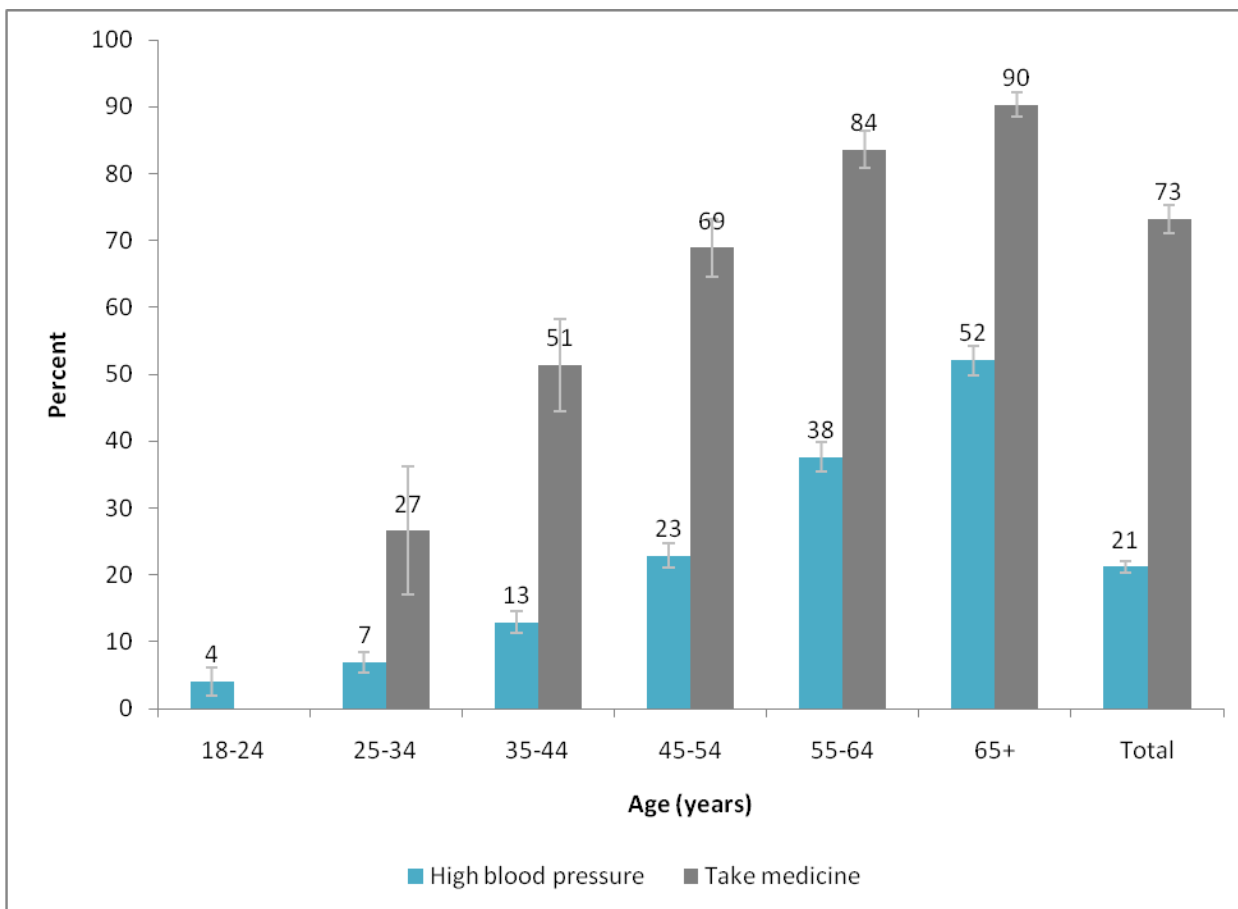
† Among adults who have been told they have high blood pressure by their doctor, nurse, or other health professional, those who are taking medicine for high blood pressure

Prevalence of high blood pressure and taking medicine for high blood pressure by age in the United States and Colorado

Among both Colorado and U.S. adults, the prevalence of high blood pressure increased with age and was highest among persons aged 65 years and older. Compared to U.S. adults, the prevalence of high blood pressure among Colorado adults was lower for all age groups. In Colorado, the 2007 prevalence of high blood pressure was higher among persons aged 65 years and older (52 percent) and persons aged 55–64 years (38 percent) compared with younger age groups (Figure 9.2).

In Colorado, adults aged 65 years and older had the highest prevalence of taking medicine for their high blood pressure (90 percent). The next highest prevalence of taking medicine for high blood pressure was among adults aged 55–64 years (84 percent) (Figure 9.2).

Figure 9.2. Prevalence of high blood pressure* and taking medicine for high blood pressure† by age – Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Adults who have been told they have high blood pressure by their doctor, nurse, or other health professional

† Among adults who have been told they have high blood pressure by their doctor, nurse, or other health professional, those who are taking medicine for high blood pressure

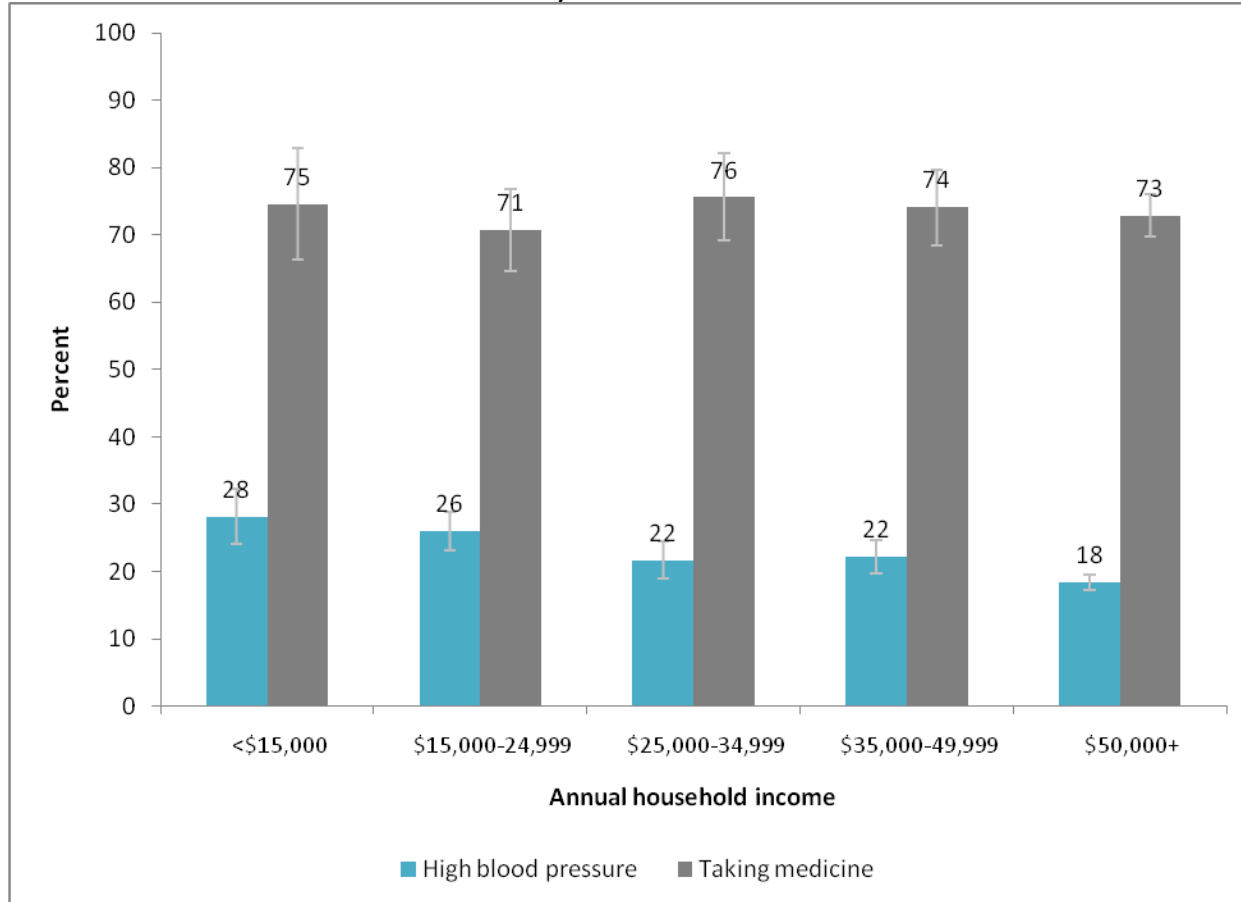
Data on taking high blood pressure medication among respondents aged 18–24 years was not available because the unweighted sample size for the denominator was <50 or the confidence interval half width was >10.

Prevalence of high blood pressure and taking medicine for high blood pressure by annual household income in the United States and Colorado

Among both Colorado and U.S. adults, the prevalence of high blood pressure decreased with increasing annual household income. For both Colorado and U.S. adults, the prevalence of high blood pressure was highest among adults making less than \$15,000 per year. Compared to U.S. adults, the prevalence of high blood pressure among Colorado adults was lower across all annual household income categories.

Approximately three of every four Colorado adults with high blood pressure in all annual household income categories reported taking medicine for their condition (Figure 9.3).

Figure 9.3. Prevalence of high blood pressure* and taking medicine for high blood pressure† by annual household income –Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Adults who have been told they have high blood pressure by their doctor, nurse, or other health professional

† Among adults who have been told they have high blood pressure by their doctor, nurse, or other health professional, those who are taking medicine for high blood pressure

Actions to control high blood pressure in Colorado

Controlling high blood pressure is important for reducing adverse cardiovascular events. In 2007, more than half of Colorado adults reported doing the following to help lower and control high blood pressure: cutting down on salt (71.9 percent), exercising (71.2 percent), changing eating habits (57.8 percent) and reducing alcohol use (50.1 percent). When asked about advice from health care professionals, Colorado adults reported being told to do the following: take medication (82.9 percent), exercise (75.1 percent), cut down on salt (58.6 percent), change eating habits (46.4 percent) and reduce alcohol use (32.1 percent) (Table 9.1).

Table 9.1. Actions to control high blood pressure – Colorado, 2007

	Percent (95% CI)
Are you now doing any of the following to help lower or control your high blood pressure?	
Changing your eating habits	57.8 (53.7-62.0)
Cutting down on salt*	71.9 (67.7-76.0)
Reducing alcohol use [†]	50.1 (45.0-55.2)
Exercising	71.2 (67.4-75.0)
Has a doctor or other health professional ever advised you to do any of the following to help lower or control your high blood pressure?	
Change your eating habits	46.4 (42.2-50.5)
Cut down on salt*	58.6 (54.4-62.8)
Reduce alcohol use [†]	32.1 (27.4-36.7)
Exercise	75.1 (71.7-78.5)
Take medication	82.9 (79.3-86.5)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Excludes respondents who reported that they did not use salt.

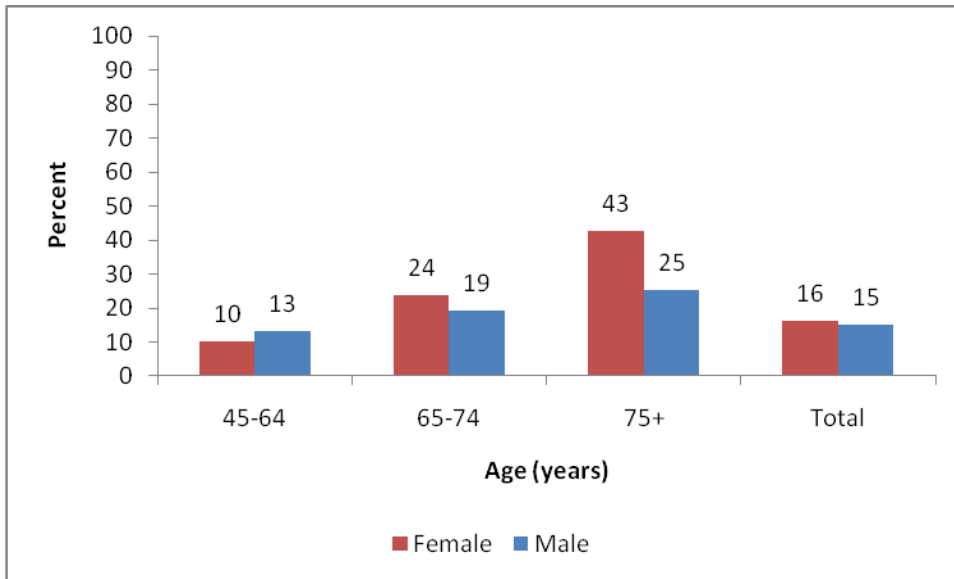
[†] Excludes respondents who reported that they did not drink alcohol.

Undiagnosed high blood pressure

The prevalence estimates for high blood pressure in Colorado that are provided in this report are likely underestimates because they are derived from self-reported data. In other words, adults were surveyed and asked if a health care provider ever diagnosed them with high blood pressure. A person is considered to have undiagnosed high blood pressure if at the time of examination, the systolic pressure is 140 or higher, and/or the diastolic pressure is 90 or higher and the person had never been told by a health professional that they had high blood pressure. Anyone who has high blood pressure but has not visited a health care provider, has not been tested for high blood pressure or does not remember being diagnosed is not included in the prevalence estimate. Identifying persons with high blood pressure is critically important for reducing the risk of stroke and heart disease.

The prevalence of undiagnosed high blood pressure in Colorado is unknown. In the United States in 2005–2006, 16 percent of female adults and 15 percent of male adults (aged 45 years and older) had undiagnosed high blood pressure. The prevalence of undiagnosed high blood pressure increased with age. The highest prevalence was among adults aged 75 years and older; within this age group 43 percent of females and 25 percent of males had undiagnosed high blood pressure (Figure 9.4).

Figure 9.4. Prevalence of undiagnosed high blood pressure* among adults aged 45 years and older by age and sex — United States, 2005–2006



Adapted from: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey; confidence limits unavailable

* At the time of examination had a systolic pressure (during heartbeats) of 140 or higher, and/or a diastolic pressure (between heartbeats) of 90 or higher AND had never been told by a health professional that they had high blood pressure.

These U.S. data on undiagnosed high blood pressure indicate that many older adults could benefit from being screened and treated for high blood pressure. A 12–13 point reduction in systolic blood pressure can reduce heart disease risk by 21 percent, stroke risk by 37 percent, and risk for death from heart disease or stroke by 25 percent.²⁷ The cause of 90–95 percent of high blood pressure is unknown; however, it is easily detected and usually controllable. It is recommended that people be screened for high blood pressure at least every two years.³²⁸

There are a few limitations to these data: 1) The Colorado high blood pressure data presented are based on self report, so they are subject to recall bias, which could affect total population and sub-population prevalence estimates; 2) High blood pressure is defined as illness diagnosed by a health care professional, so a respondent would have to have gone to a health care professional, been screened for high blood pressure, been told that he/she had high blood pressure, and recalled the diagnosis; 3) No Colorado data were available on control of high blood pressure, and taking medication is only a proxy measure because taking medicine does not necessarily mean that blood pressure is controlled; and 4) No Colorado-specific clinical data were available to determine systolic and diastolic blood pressure levels — in persons older than 50 years, systolic blood pressure greater than 140 mmHg is a much more important cardiovascular disease risk factor than diastolic blood pressure.²⁷

High blood pressure is a leading cause of heart attack, stroke, kidney failure and congestive heart failure; yet it has no signs and symptoms. About one in five adult Coloradans (21 percent) were aware that they had high blood pressure in 2007. More than half of Coloradans aged 65 years and older were aware that they had high blood pressure. Prevention, early recognition (screening) and treatment of high blood pressure is important in order to reduce the risks of several preventable health outcomes.

10. High cholesterol

High cholesterol is a key risk factor that can lead to coronary heart disease, heart attack and stroke. However, high cholesterol itself does not have symptoms, so many people are unaware of having a high cholesterol level. Identification of high cholesterol through screening is the first step in treating and controlling the condition. High cholesterol can potentially be prevented by eating a heart-healthy diet, being physically active and avoiding tobacco smoke.

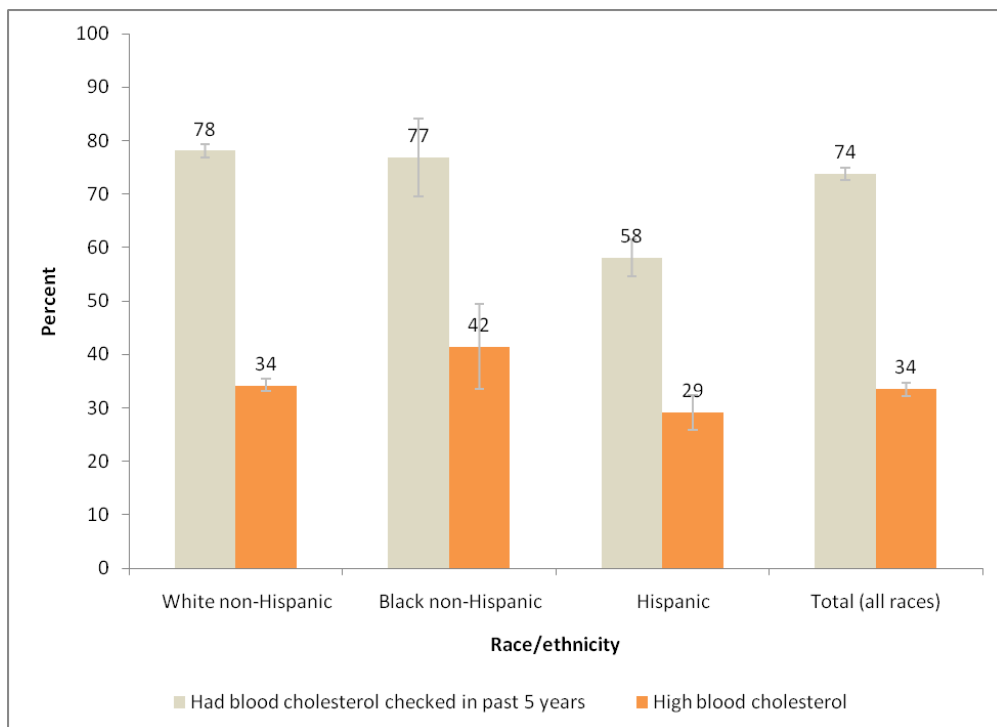
In 2007, almost eight in 10 adults in Colorado reported ever having their blood cholesterol checked (78 percent). Of those who ever had their blood cholesterol checked, more than one-third (34 percent) reported being told that it was high by their doctor, nurse or other health care professional. Males had a higher prevalence of high blood pressure awareness (36 percent) compared with females (31 percent), but females had a higher prevalence of having their cholesterol checked in the past five years (77 percent) compared with males (71 percent).

Prevalence of having cholesterol checked within the past five years and high cholesterol awareness by race/ethnicity in the United States and Colorado

In 2007:

- The prevalence of having cholesterol checked within the past five years was similar in Colorado compared with the United States overall and by race/ethnicity.
- The prevalence of high cholesterol awareness among adults who have ever had cholesterol checked was lower in Colorado compared to the United States overall and among White non-Hispanics. Among Black non-Hispanics and Hispanics, the difference was not significantly different.
- In Colorado, the prevalence of having cholesterol checked within the past five years was higher among White non-Hispanics (78 percent) and Black non-Hispanics (77 percent) compared with Hispanics (58 percent) (Figure 10.1).
- In Colorado, the prevalence of high cholesterol awareness among adults who ever had their blood cholesterol checked was higher among White non-Hispanics (34 percent) and Black non-Hispanics (42 percent) compared with Hispanics (29 percent) (Figure 10.1).

Figure 10.1. Prevalence of high cholesterol* and having had cholesterol checked within the past five years by race/ethnicity – United States and Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

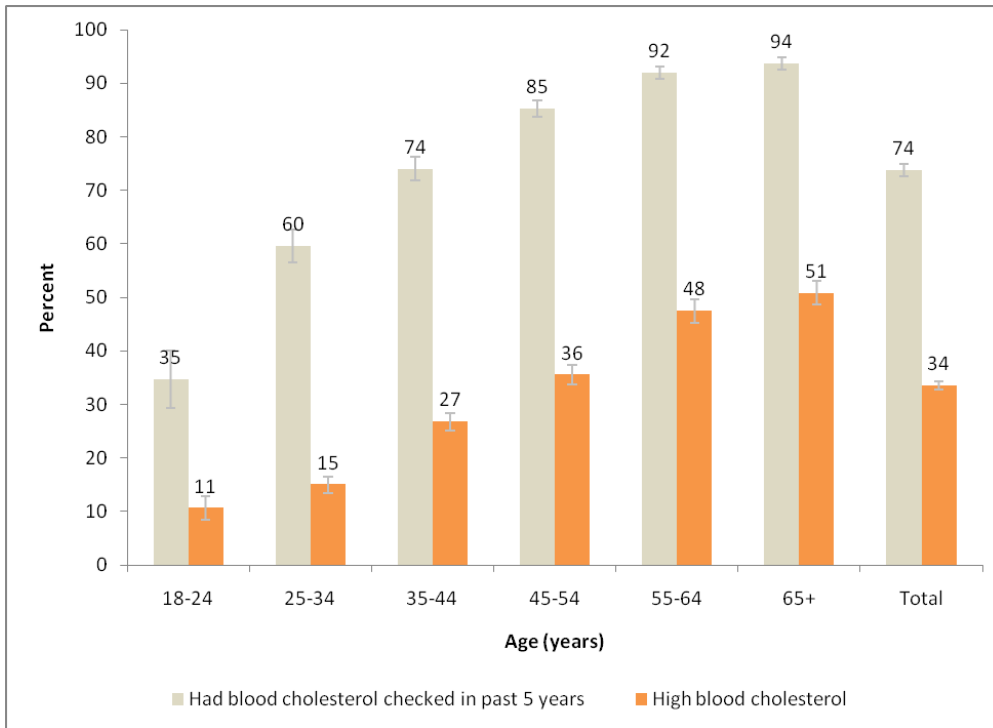
* Adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional

Prevalence of having cholesterol checked within the past five years and high cholesterol awareness by age in Colorado

In 2007, the prevalence of high cholesterol awareness among Colorado adults who ever had their blood cholesterol checked was 34 percent, and prevalence increased with age. The highest prevalence of high cholesterol was among Coloradans aged 65 years or older (51 percent) and Coloradans aged 55–64 years (48 percent).

Similarly, the prevalence of having cholesterol checked within the past five years among Colorado adults was 74 percent, and prevalence increased with age. The highest prevalence of having cholesterol checked within the past five years was among Coloradans aged 65 years or older (94 percent) and Coloradans aged 55–64 years (92 percent) (Figure 10.2).

Figure 10.2. Prevalence of high cholesterol* and having had cholesterol checked within the past five years by age – Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

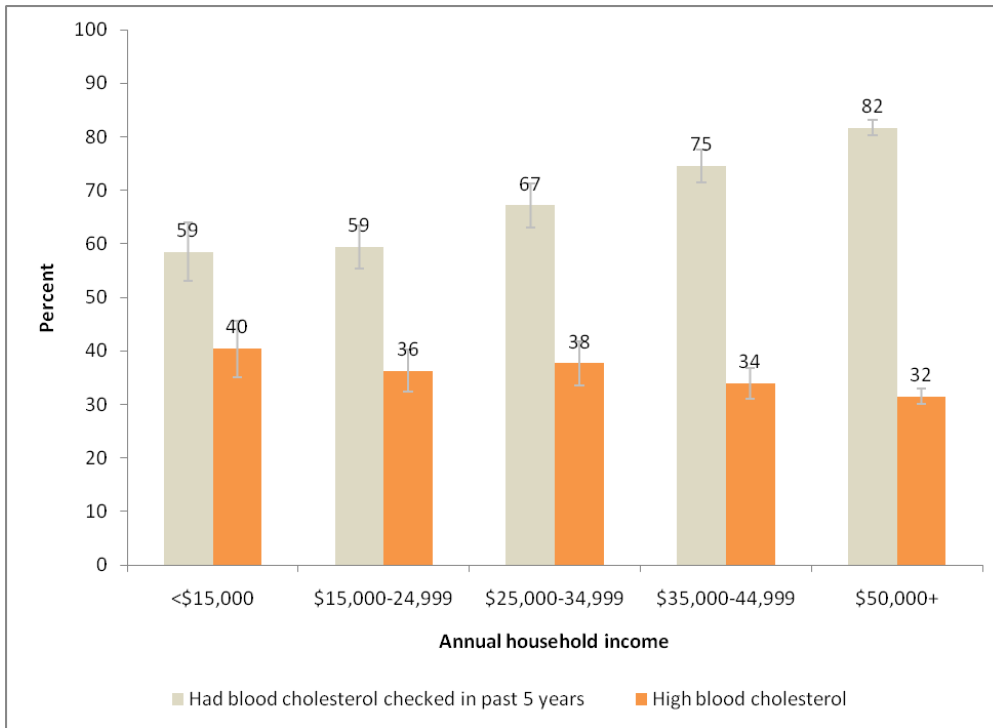
* Adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional

Prevalence of having cholesterol checked within the past five years and high cholesterol awareness by annual household income in Colorado

In 2007, the prevalence of having had cholesterol checked within the past five years was associated with annual household income. Approximately 59 percent of adults with an annual household income of less than \$15,000 per year had their cholesterol checked within the past five years; significantly lower than among adults with an annual household income of \$50,000 or more (82 percent).

In 2007, the prevalence of high cholesterol awareness was also associated with annual household income. Adults with an annual household income of less than \$15,000 had the highest prevalence of high cholesterol (40 percent), which was significantly higher than the prevalence among adults with annual household incomes of \$50,000 or more (32 percent) (Figure 10.3).

Figure 10.3. Prevalence of high cholesterol* and having had cholesterol checked within the past five years by annual household income — Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional

The prevalence of having had cholesterol checked in the past five years was lowest among Hispanics, adults aged less than 55 years, and adults with an annual household income of less than \$35,000. The prevalence of high cholesterol awareness was highest among White non-Hispanics, Black non-Hispanics, adults aged 55–64 years and 65 years or older, and persons with an annual household income of less than \$15,000. Males had a higher prevalence of high cholesterol awareness than females, but females had a higher prevalence of having their cholesterol checked in the past five years.

Lifestyle modifications such as exercise, nutritional changes and quitting smoking have a profound impact on cholesterol and, in conjunction with medication, often ameliorate the damaging effects that high cholesterol has on blood vessels.²⁹ These data can help to plan initiatives that target populations at need for increased screening and treatment of high cholesterol.

11. Multiple risk factors for heart disease and stroke

A substantial proportion of the population has multiple risk factors for heart disease and stroke.²⁵ Persons with multiple risk factors (e.g., an obese person with diabetes who is physically inactive) have an exponential increase in their risk of disease. For example, findings from the InterHeart study showed that persons with current smoking, high blood pressure and diabetes combined had 13 times the risk of acute myocardial infarction.¹ Alternately, persons with multiple protective health behaviors significantly reduced their risk of myocardial infarction. The InterHeart study found that daily consumption of fruit and vegetables and regular physical activity was associated with a 40 percent reduction in risk of myocardial infarction; daily consumption of fruit and vegetables, regular physical activity and avoiding smoking was associated with a 79 percent reduction in risk of myocardial infarction.

Prevalence of three or more modifiable risk factors for heart disease and stroke by age, race/ethnicity, and poverty status — Colorado, 2007

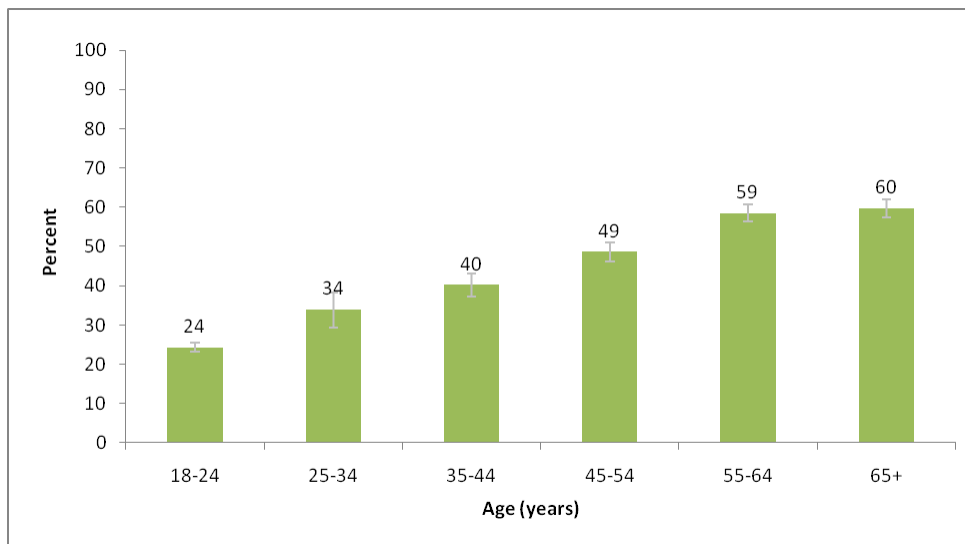
Seven modifiable risk factors were considered: high blood pressure, high cholesterol, diabetes, current smoking, overweight or obesity, not meeting physical activity recommendations and a diet low in fruits and vegetables.

In 2007, 44 percent of adult Coloradans reported three or more modifiable risk factors for heart disease and stroke. Only 8 percent of adult Coloradans did not have any of these seven modifiable risk factors for heart disease and stroke.

In 2007:

- The prevalence of multiple risk factors increased with age from 24 percent among persons aged 18-24 years to 60 percent among persons aged 65 years or older (Figure 11.1).
- Although older persons had a higher prevalence of multiple risk factors, nearly one in four persons aged 18-24 years had multiple risk factors.

Figure 11.1. Prevalence of three or more modifiable risk factors* for heart disease and stroke by age — Colorado, 2007

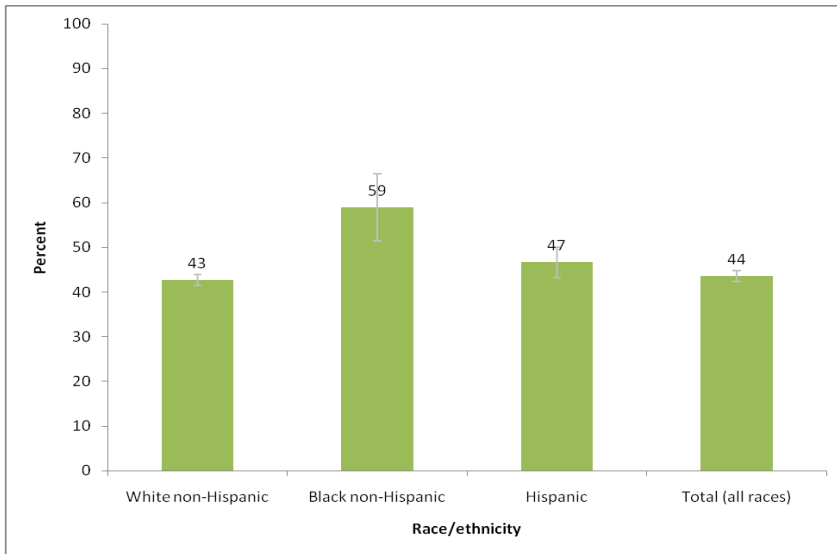


Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Modifiable risk factors: high blood pressure, high cholesterol, diabetes, current smoker, overweight or obese, did not meet physical activity recommendations, and diet low in fruit/vegetables

Among the different race/ethnic categories assessed, Black non-Hispanics had a higher prevalence of multiple risk factors (59 percent) compared with White non-Hispanics (43 percent) or Hispanics (47 percent) (Figure 11.2).

Figure 11.2. Prevalence of three or more modifiable risk factors* for heart disease and stroke by race/ethnicity – Colorado, 2007

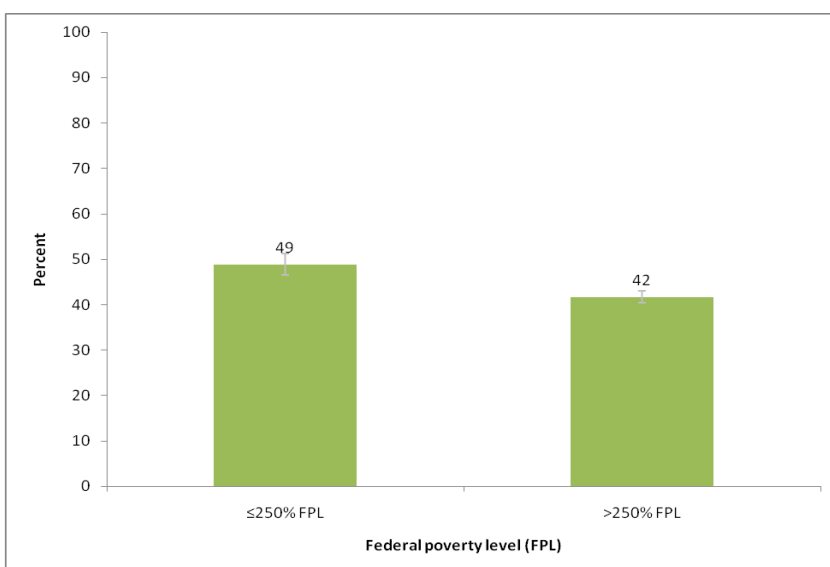


Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Modifiable risk factors: high blood pressure, high cholesterol, diabetes, current smoker, overweight or obese, did not meet physical activity recommendations, and diet low in fruit/vegetables

Persons living at or below 250 percent of the federal poverty level (FPL) had a higher prevalence of multiple risk factors (49 percent) compared with persons living above 250 percent of the FPL (42 percent) (Figure 11.3).

Figure 11.3. Prevalence of three or more modifiable risk factors* for heart disease and stroke by federal poverty level – Colorado, 2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Modifiable risk factors: high blood pressure, high cholesterol, diabetes, current smoker, overweight or obese, did not meet physical activity recommendations, and diet low in fruit/vegetables

These data have limitations in that high blood pressure, high cholesterol and diabetes represent self-reported, professionally diagnosed illness. Undiagnosed illness is not represented, and the prevalence of multiple risk factors could be underestimated for certain groups defined by age, race/ethnicity or poverty level. In spite of this limitation, the data suggest that Black non-Hispanics, older age groups, and persons living at 250 percent or less of the federal poverty level had a higher prevalence of three or more modifiable risk factors.

Prevalence of high blood pressure and high cholesterol by risk factors for heart disease and stroke — Colorado, 2007

High blood pressure and high cholesterol data were presented in detail in Sections 9 and 10. Because the risk of heart disease and stroke and related outcomes increases substantially among persons with more than one risk factor, the prevalence estimates for high blood pressure and high cholesterol concurrent with other risk factors are presented here.

In 2007, the prevalence of high blood pressure in Colorado was 21 percent compared with 28 percent in the United States; the prevalence of high cholesterol in Colorado was 34 percent compared with 38 percent in the United States.

In 2007:

- 56.0 percent of adults who reported high blood pressure also reported high cholesterol.
- 42.3 percent of adults who reported high cholesterol also reported high blood pressure.
- Among adults who reported having diabetes, 64.8 percent reported high blood pressure and 62.6 percent reported high cholesterol. This was compared with 18.8 percent and 31.4 percent (respectively) of adults who did not report having diabetes.
- Similarly, adults who were overweight or obese or had a low level of physical activity had higher prevalence of high blood pressure and high cholesterol than adults who were not overweight or who were more active.
- Persons who reported a diet low in fruits and vegetables had a higher prevalence of high cholesterol than their counterparts (35.2 percent vs. 29.3 percent, respectively).
- The prevalence of high blood pressure and high cholesterol did not differ between current smokers and persons who were not current smokers (Table 11.1).

Table 11.1. Prevalence of high blood pressure and high cholesterol by heart disease and stroke risk factors — Colorado, 2007

	High blood pressure	High cholesterol
	Percent	Percent
	(95% CI)	(95% CI)
High blood pressure		
Yes	N/A	56.0 (53.9-58.1)
No		25.9 (24.7-27.1)
High cholesterol		
Yes	42.3 (40.4-44.1)	N/A
No	16.7 (15.7-17.7)	
Diabetes	64.8	62.6

Yes	(60.7-68.8) 18.8	(58.4-66.8) 31.4
No	(17.9-19.6)	(30.3-32.5)
Current smoking		
Yes	18.7 (17.7-19.7)	34.8 (31.7-37.9)
No	21.7 (20.8-22.7)	33.3 (32.1-34.5)
Overweight or Obese		
Yes	27.9 (26.6-29.2)	39.4 (37.9-40.9)
No	12.7 (11.7-13.7)	25.5 (23.9-27.1)
Low level of physical activity		
Yes	24.6 (23.3-26.0)	38.8 (37.0-40.5)
No	17.6 (16.5-18.8)	29.4 (27.9-30.8)
Diet low in fruit/vegetables		
Yes	21.6 (20.6-22.6)	35.2 (33.9-36.6)
No	19.8 (18.3-21.4)	29.3 (27.3-31.2)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

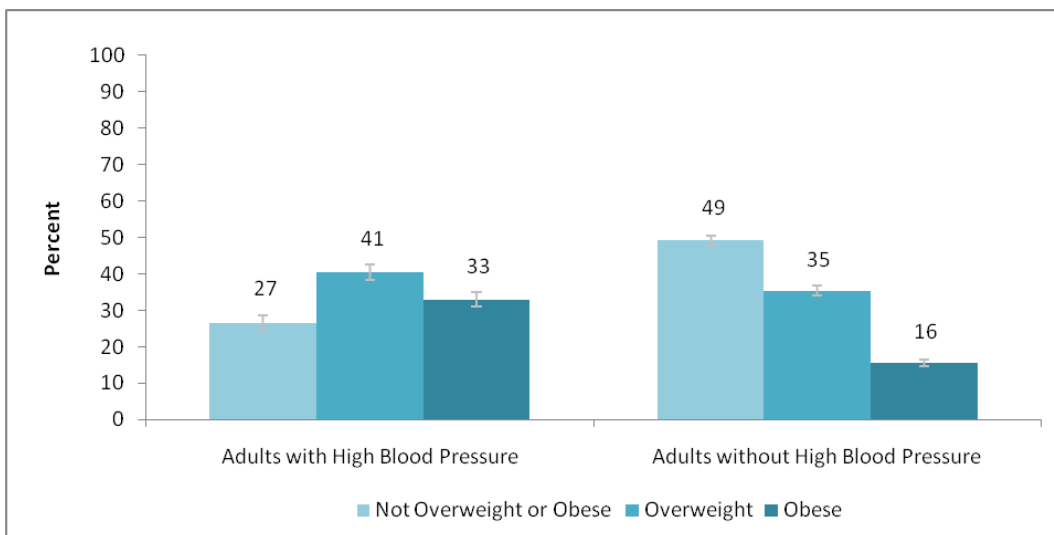
Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one's lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

Prevalence of adults who were not overweight or obese, overweight, and obese by high blood pressure awareness — Colorado, 2007

In this sub-section, instead of presenting the prevalence of high blood pressure and high cholesterol by other risk factors, the prevalence of overweight and obesity are presented by high blood pressure and cholesterol awareness.

Being overweight or obese increases the risks of high blood pressure, high cholesterol, angina, and coronary heart disease, among a number of other conditions and health-related outcomes.³⁰ Adults with high blood pressure in Colorado had a higher prevalence of overweight (41 percent) or obesity (33 percent) compared with adults who did not have high blood pressure (35 percent overweight and 16 percent obese) (Figure 11.4).

Figure 11.4. Prevalence of adults who were not overweight or obese, were overweight or obese by high blood pressure status -- Colorado, 2007

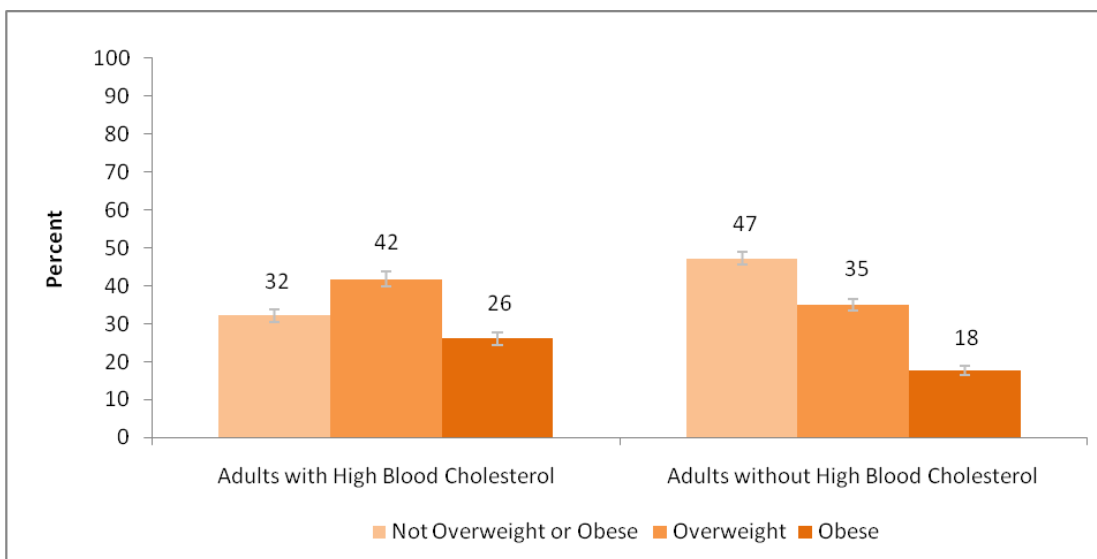


Data source: Behavioral Risk Factor Surveillance System

Prevalence of adults who were not overweight or obese, were overweight or were obese by high cholesterol awareness — Colorado, 2007

Adults with high cholesterol had a higher prevalence of overweight (42 percent) or obesity (26 percent) compared with adults who did not have high cholesterol (35 percent and 18 percent, respectively) (Figure 11.5).

Figure 11.5. Prevalence of adults who were not overweight or obese, were overweight or were obese, by high cholesterol status - Colorado, 2007

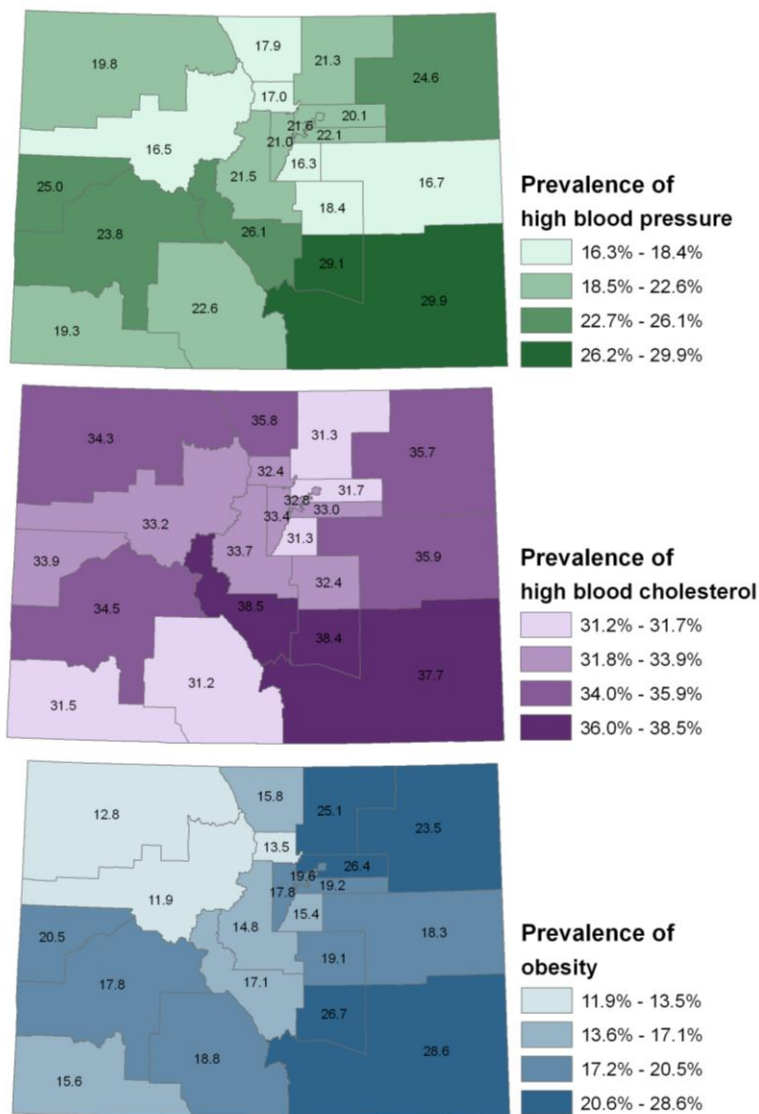


Data source: Behavioral Risk Factor Surveillance System

Prevalence of high blood pressure, high cholesterol and obesity by region — Colorado

Regional prevalence of adults who were told by their doctor, nurse or other health care provider that they had high blood pressure or high cholesterol was similar across the state, with the highest prevalence of both risk factors occurring in the southeast portion of the state. Obesity was most prevalent in the southeastern and northeastern parts of the state (Figure 11.6).

Figure 11.6. Prevalence of high blood pressure, high cholesterol and obesity among adults aged 20+ years by Colorado health statistics region — Colorado, 2005–2007



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Map prepared by: Epidemiology, Planning and Evaluation Branch, Colorado Department of Public Health and Environment

To decrease morbidity and deaths from heart disease and stroke, public health programs should improve identification of persons with multiple risk factors and focus interventions on those populations disproportionately affected. Modifiable risk factors, unlike other risk factors such as age and family history, can be eliminated or reduced by making lifestyle and behavioral changes.

12. Knowledge of heart attack and stroke signs and symptoms

Recognizing the signs and symptoms of heart attack and stroke and knowing when and how to seek medical care can mean the difference between life and death.³¹ Knowing the most common signs and symptoms of heart attack and stroke can help Coloradans quickly recognize heart attack and stroke and respond appropriately. Knowledge that a situation should be treated as a medical emergency and 9-1-1 should be called immediately for emergency medical treatment directly impacts heart attack and stroke outcomes.

Knowledge of heart attack signs and symptoms — Colorado, 2004

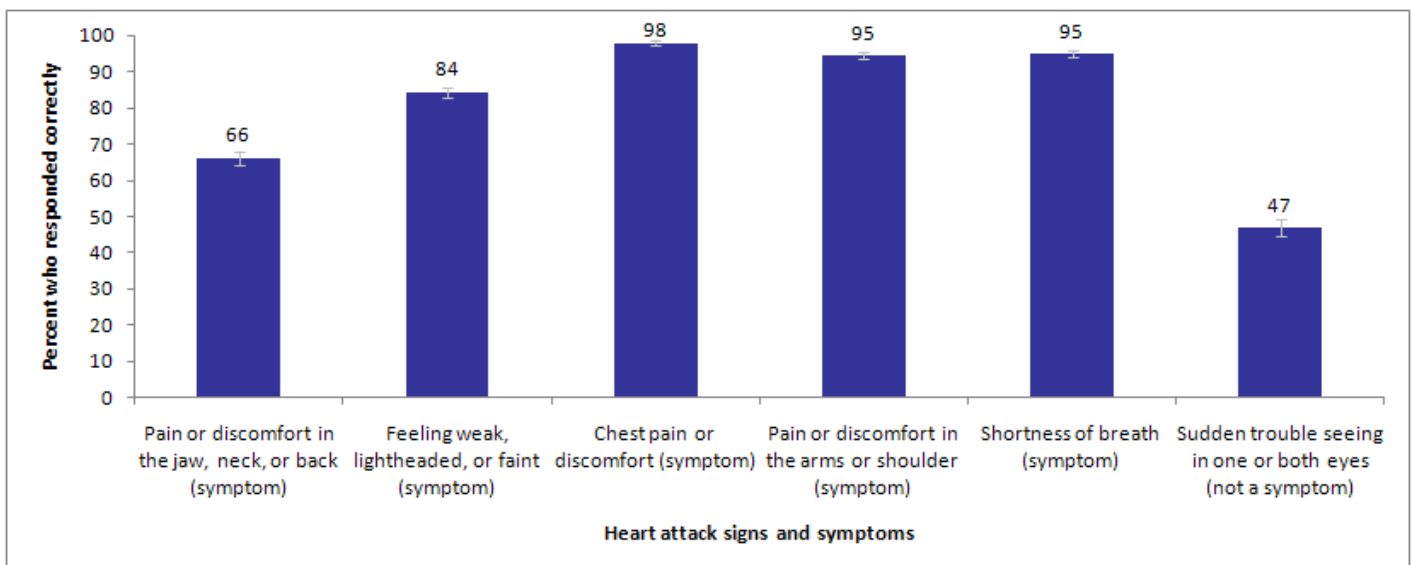
Victims of a heart attack most commonly exhibit these five major signs and symptoms:

- Pain or discomfort in the jaw, neck, or back
- Weakness, light-headedness or feeling faint
- Chest pain or discomfort
- Pain or discomfort in arms or shoulder
- Shortness of breath

More than 80 percent of Colorado respondents correctly recognized four of these five symptoms. However, only 66 percent of respondents knew that pain or discomfort in the jaw, neck or back was a heart attack symptom (Figure 12.1). Only 38 percent of respondents knew all five of the heart attack symptoms.

When asked if sudden trouble seeing in one or both eyes was a heart attack symptom, only 47 percent responded correctly that it is not a symptom of heart attack (It is, however, a symptom of stroke). Only 11 percent of respondents knew all five symptoms and that that sudden trouble seeing in one or both eyes was not a heart attack symptom.

Figure 12.1. Knowledge of heart attack signs and symptoms — Colorado, 2004



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Knowledge of stroke signs and symptoms — Colorado, 2004

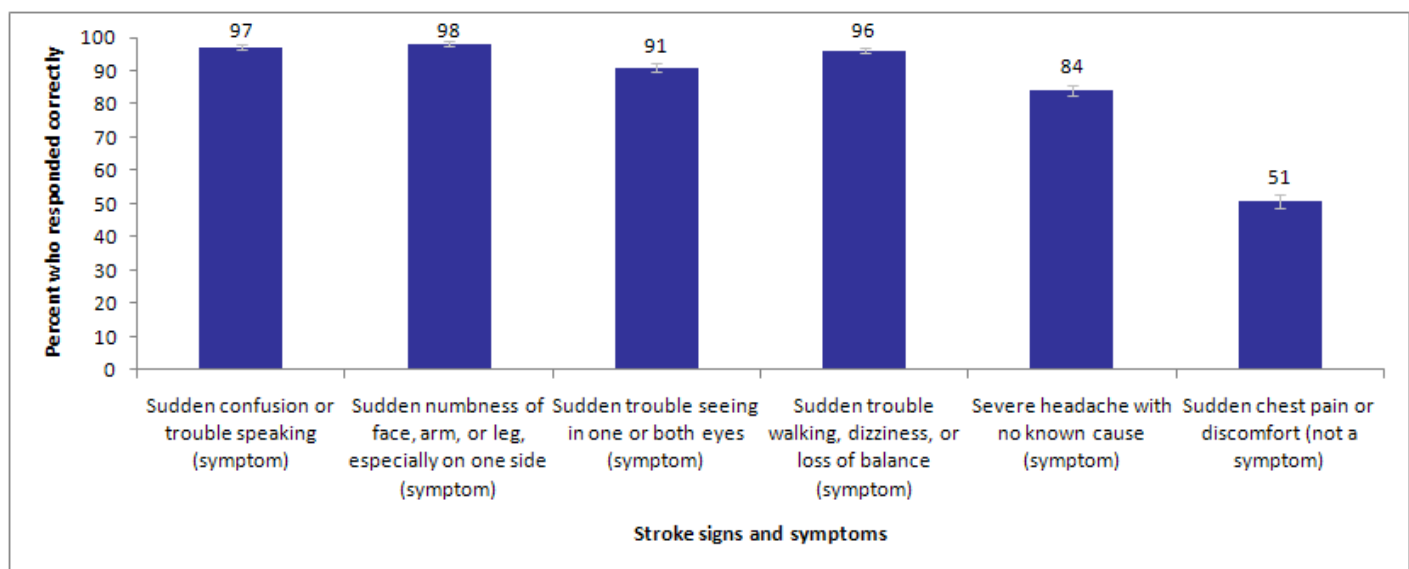
Victims of a stroke most commonly exhibit these five major signs and symptoms:

- Sudden numbness or weakness of the face, arm or leg, especially on one side
- Sudden confusion or trouble speaking
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, or loss of balance
- Sudden severe headache with no known cause

While each symptom of a stroke was correctly recognized by more than 80 percent of respondents (Figure 12.2), only 46 percent of respondents knew all five of the stroke symptoms.

More than half of Colorado respondents (51 percent) knew that sudden chest pain or discomfort was not a stroke symptom; however, only 20 percent knew all five stroke symptoms and that sudden chest pain or discomfort was not a stroke symptom.

Figure 12.2. Knowledge of stroke signs and symptoms — Colorado, 2004



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

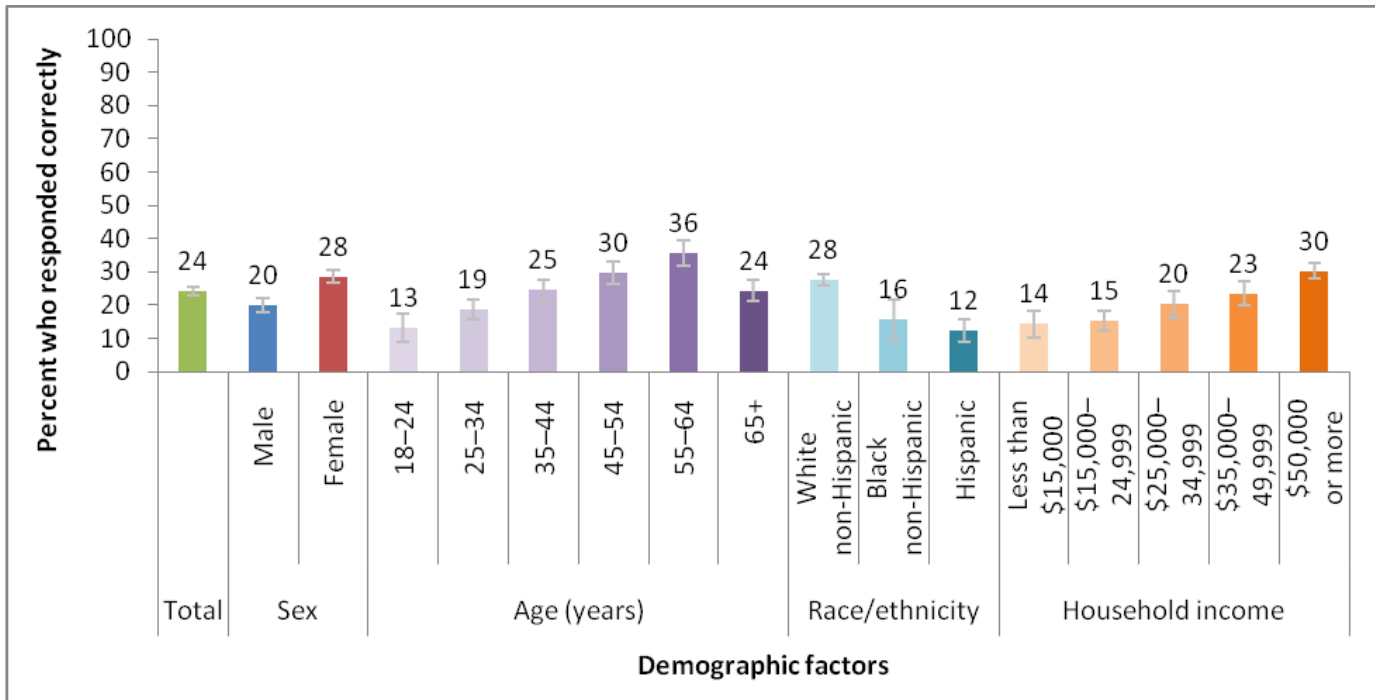
Knowledge of symptoms and first response by demographics

When asked what is the first thing they would do if someone was having a heart attack or stroke, 88 percent of respondents reported that they would call 9-1-1 and 5 percent reported they would take that person to the hospital. A total of 24 percent of respondents knew the signs and symptoms of heart attack and stroke and also said their first response would be to call 9-1-1 (Figure 12.3). Trends in correct responses were similar for both heart attack symptoms and stroke symptoms separately. In general, the following sub-populations had a higher prevalence of both knowing all of the heart attack and stroke symptoms and reporting they would call 9-1-1 if someone was having a heart attack or stroke:

- Females compared with males
- Adults aged 55-64 years compared with other adult age groups
- White non-Hispanic adults compared with Black non-Hispanic and Hispanic adults
- Adults with a household income of \$50,000 or more compared with lower income groups

Responses were also analyzed regionally, and no differences were found by geographic region within Colorado.

Figure 12.3. Knowledge of both heart attack and stroke signs and symptoms* and first response to call 911 if someone was having a heart attack or stroke by sex, age, race/ethnicity and household income – Colorado, 2004



Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Survey respondent answered correctly that pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath are heart attack symptoms and answered correctly that sudden confusion or trouble speaking; sudden numbness of face, arm, or leg, especially on one side; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, or loss of balance; and severe headache with no known cause are stroke symptoms.

An opportunity exists to educate the public in order to improve Coloradans’ knowledge of heart attack and stroke signs and symptoms and the appropriate response to seek medical care immediately.

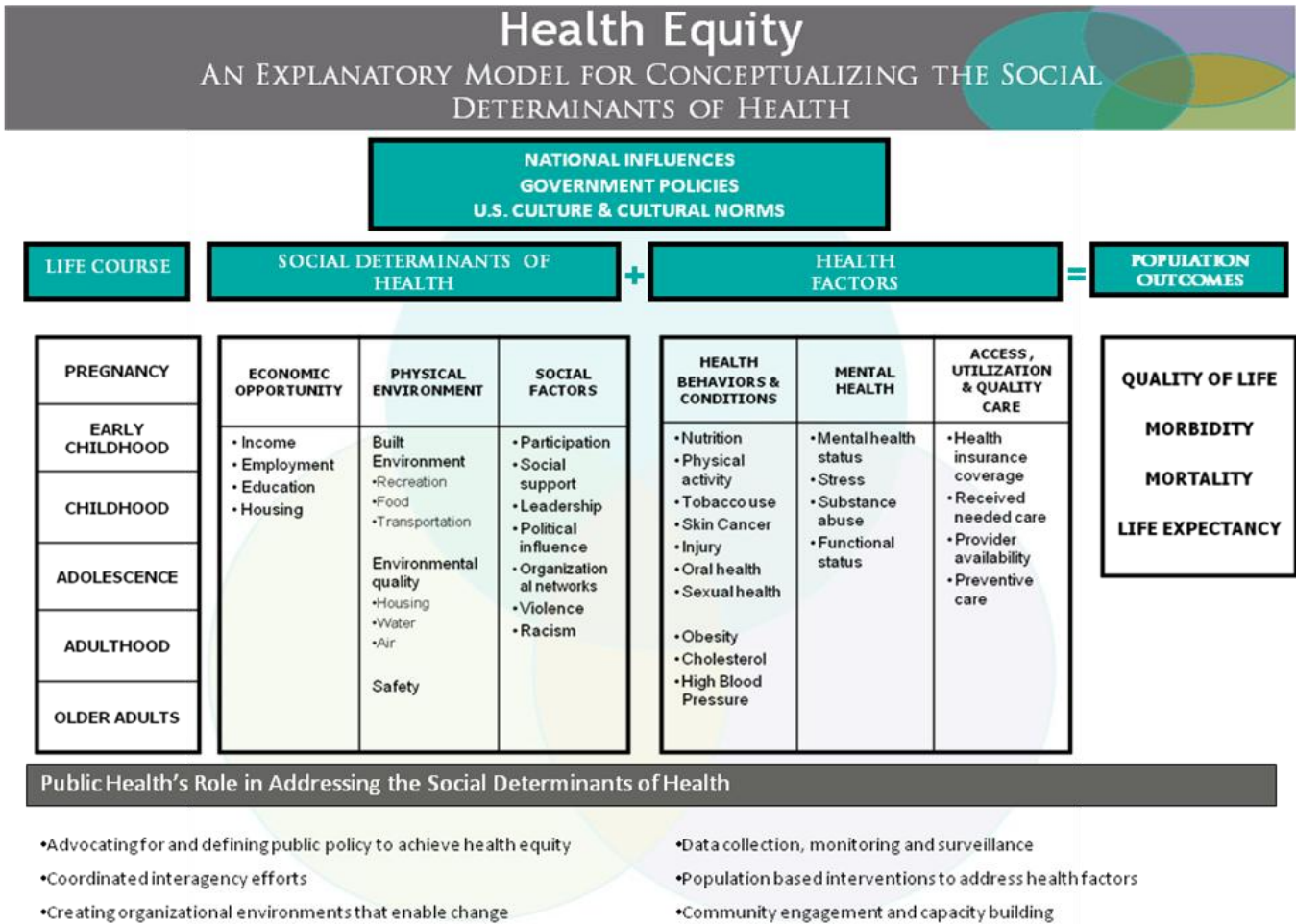
13. Health equity and heart disease

The findings reported here emphasize the need for early prevention activities such as identifying, treating and controlling high blood pressure, especially among Blacks. YPLL and YPLL rates can also assist in the establishment of research and resource priorities, the surveillance of temporal trends in premature death, the evaluation of the effectiveness of program interventions and targeting health education efforts to sections of the general population most in need of public health interventions.³²

Modifying or changing lifestyle behaviors is difficult and often associated with behaviors starting in childhood. In addition, lifestyle behaviors are inexorably linked to the “social determinants of health”, the macro-level forces that impact how people make choices. The social determinants of health are defined as “life enhancing resources whose distribution across populations effectively determines length and quality of life.”²⁰ See Figure 13.1 for a health equity model that conceptualizes the social determinants of health.

The public health system can affect population health outcomes by addressing the social determinants of health through a life course perspective. This role includes advocating for and defining public policy to achieve health equity; coordinating interagency efforts, creating supportive environments to enable change; data collection, monitoring, and surveillance; and working on population-based interventions to address individual factors, community engagement, and capacity building. By directing attention to how policies can positively change the social determinants and how they operate at every level of development and by continuing our work on individual factors, improvements can be made to Colorado’s health outcomes.

Figure 13.1 Health equity model for conceptualizing the social determinants of health



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Appendix 1: Data set descriptions, technical notes and definitions, acronyms list and links for more information

Data set descriptions

The following is a description of the data sources used in this report. The main data sources include state and national population-based surveys, state-level vital records and Colorado Hospital Association data.

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is sponsored by the Centers for Disease Control and Prevention and is the world's largest, ongoing telephone health survey system of adults 18 years of age and older. Beginning in 1984, the BRFSS purpose has been to collect data on health risk behaviors, preventive health practices and health outcomes primarily related to chronic disease and injury. Using random digit dialing, BRFSS surveyors collect data from each state and the District of Columbia, Puerto Rico, the United States Virgin Islands and Guam. BRFSS data are used to track changes in trends, develop and evaluate prevention programs, and prioritize resources. For more information on BRFSS, visit: <http://www.cdc.gov/brfss>.

There are a number of limitations to the BRFSS. Households without a land-line phone are unable to participate in the survey, and some individuals refuse to participate. Answers are self-reported and are subject to the limitations of self-reported data collection. The physical activity question asks about physical activity during leisure times and excludes physical activity performed as part of an individual's job. Questions specific to diabetes, high blood pressure and high cholesterol require a clinical diagnosis and might exclude individuals who have a condition but have not been diagnosed.

Colorado Death Certificate

Death data are compiled from information reported on the Certificate of Death. Data items are presented as reported. Information on the certificate concerning time, place and cause of death is typically supplied by medical personnel or coroners. Demographic information, such as age, race/ethnicity or occupation, is generally reported on the certificate by funeral directors from information supplied by the available next of kin. Training of physicians, coroners, other medical personnel and funeral directors is conducted on an ongoing basis to maintain and improve the quality of data supplied on death certificates.

Resident deaths are deaths of those individuals who reported being residents of Colorado, even if the death occurred to residents while outside of Colorado. Interstate agreements allow for the exchange of vital information about deaths of Colorado residents that occurred in other states. County-specific data are for deaths reported as occurring for residents of those counties. Because next of kin may not be aware of existing co-morbid conditions at the time of death, coroners without a medical history might be more likely to underreport such factors on the death certificate. For more information, visit <http://www.cdphe.state.co.us/hs/vs/>.

Colorado Hospital Discharge

The Colorado Hospital Association (CHA) compiles hospital discharge data from all acute care and many specialty hospitals in Colorado. This database includes demographic, diagnostic, procedural, payment and length of stay information on all inpatient admissions. Injury hospitalizations are identified using specific codes from the International Classification of Diseases, Version 10, Clinical Modification (ICD-10-CM). Although the Colorado Hospital Discharge dataset provides a look at hospitalized cases, approximately 20 percent of patient racial and ethnic data are missing, thus limiting data analysis and interpretation. For more information regarding the Colorado Hospital Discharge dataset, please visit the CHA website at <http://www.cha.com>.

National Health and Nutrition Examination Survey

The National Health and Nutrition Examination Survey (NHANES) is a program of studies sponsored by the Centers for Disease Control and Prevention. Beginning in the 1960s, the survey's purpose has been to assess the health and nutritional status of adults and children in the United States. NHANES is unique because it combines an interview with a physical examination. The survey examines a nationally representative sample of about 5,000 people each year. Study results are used to guide health sciences research. Results directly and indirectly impact programs, services and policy. For more information on NHANES, visit: www.cdc.gov/nchs/nhanes/about_nhanes.htm.

Technical notes and definitions

The following are technical notes specific to this report. The goal of these notes is to provide definitions of statistical, medical and technical terms and to provide some context and explanation as to why certain surveillance methods were chosen.

- All statistics are for the most recent year available at the time of drafting the report. Prevalence and hospital discharge data were computed for 2007 or 2008 unless otherwise indicated. Mortality data are final for 2008, unless otherwise indicated.
- Do not compare the prevalence estimates or rates provided in past versions of CDPHE's heart disease and stroke publications. It can lead to misinterpretation of time trends.

Population-based data and application of weights

This report used data from population-based surveys. A population-based survey is a survey that is representative of the population being studied; in this case, it is the population of Colorado. Although a survey sample is not strictly proportional to the population of the state, a weight is applied to account for sample and population differences. Using weighting, survey data are adjusted to reflect the population, and this enables public health officials to generalize conclusions to the entire population of Colorado.

Race/ethnicity data

Race/ethnicity data are self-reported on population-based surveys. In presenting BRFSS data, adult race and ethnic categories were classified as White non-Hispanic, Black non-Hispanic, Hispanic, Asian or Pacific Islander, Native American or Alaska Native, and other race/ethnicity.

Information on race is determined by responses to race checkboxes on the various certificates and reporting forms used for death and hospital discharge data. Ethnic backgrounds are determined by responses to Hispanic origin checkboxes. On death certificates, race/ethnicity must often be determined by funeral director observation rather than by interviewing the next of kin. This might result in the misreporting or underreporting of deaths to members of racial or ethnic minority groups. Race/ethnic categories for death rates and years of potential life lost were categorized as White non-Hispanic, White Hispanic, Black (Hispanic and non-Hispanic), Asian or Pacific Islander, and Native American or Alaska Native. Race/ethnicity data was not available for hospital discharge data.

It should be noted that in some cases, some race/ethnic categories are omitted from tables or figures. This omission is due to small numbers, which make estimates unreliable. Interpretation of statistics with small numbers is difficult because confidence intervals are large.

Age data

Age data are self-reported on population-based surveys. BRFSS data include only adults aged 18 years and older. Data on death rates and years of potential life lost (i.e., vital statistics data) include persons of all ages. "Adult" is defined as persons aged 18 years and older throughout this report, unless otherwise noted.

Demographic factors

Demographic factors are any characteristic describing social or vital statistics about a human population, such as size, growth, density and distribution.

Social determinants of health

The social determinants of health are the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies and politics.¹ Lifestyle and health behaviors are inexorably linked to the social determinants of health, the macro-level forces that impact how people make choices. Another definition of the social determinants of health describes the effects: "life-enhancing resources whose distribution across populations effectively determines length and quality of life."² See Figure 13.1 in this report for a health equity model that conceptualizes the social determinants of health.

Rates

A rate is defined as the frequency with which an event occurs in a defined population over a specified period of time. The rates presented in this report are defined as the number of persons with the condition of interest per 100,000 persons in the total population of interest (Colorado, United States, or a region of Colorado; total geographic population or sub-population based on demographic factors). Rates are important for comparing experiences between populations at different times, different places and among different types of people.³ For this report, age-specific and age-adjusted rates were used primarily, but crude rates were often reported as well. Calculation of all Colorado rates included only Colorado residents.

Crude rates

The relative frequency with which death occurs within some specified interval of time in a population. Crude death rates in this report are computed per 100,000 population. Dividing the number of deaths by the total population gives a crude death rate. It is restricted because it does not reflect a population's composition with respect to such characteristics as age, sex, race or ethnicity. Thus, rates calculated within specific subgroups, such as age-specific or sex-specific rates, are often more meaningful and informative. They allow well-defined subgroups of the total population to be examined.

Age-specific rates

¹ Social Determinants of Health: Key Concepts. World Health Organization; 2010. http://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/index.html Accessed December 14, 2010.

² LK Brennan Ramirez, E. B. (2008). Promoting Health Equity: A Resource to Help Communities Address Social Determinants of Health. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

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Age-specific rates are defined as the number of people within an age group who have a condition of interest per 100,000 people in that age group in the total population of interest (Colorado, United States, or a region of Colorado). Age-specific rates are not adjusted. Rather, these represent rates specific to the age group of interest.

Age-adjusted rates

Rates are often age-adjusted to eliminate the confounding effects of differences in the age composition among different populations or across time. Age-adjusted rates in this report are adjusted to the 2000 U.S. standard population using the direct method. In this method, the age-adjusted death rate is calculated by multiplying each age-specific rate by the standard population weight and summing the weighted age-specific death rates. Because each population or time period shares a common age distribution represented by the age-specific standard population weights, the effects of variation in the age distribution are eliminated. For example, an age-adjusted death rate is defined as the death rate that would occur if the observed age-specific death rates were present in a population with an age distribution equal to a standard population.

Unless otherwise noted, death rates and hospital discharge rates in this report are age-adjusted per 100,000 population and are based on underlying causes of death or primary diagnosis.

Cause of death

Cause of death includes all the diseases, conditions or injuries that either resulted in or contributed to death. All causes of death listed on a death certificate must be coded. When more than one death cause is listed on the death certificate, the underlying cause is determined by rules that take into account the sequence of conditions on the certificate and provisions of the ICD-10. To select the underlying cause of death, the Automated Classification of Medical Entities (ACME) system is used. All cause-of-death codes (ACME codes) serve as inputs to the computer software that employs WHO rules to select the underlying cause of death.

Underlying cause of death

Underlying mortality is defined by the World Health Organization as “the disease or injury which initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury.”

Contributing cause of death

Contributing mortality can be any other disease or condition which the decedent also had.

Any mention mortality/cause of death

In a given year, the total number of death certificates in which a disease or condition is listed as the underlying cause of death or as a contributing (secondary) cause of death.

Cause of death classification

The *International Classification of Diseases* (ICD) is a system developed collaboratively between the World Health Organization (WHO) and 10 international centers so that the medical terms reported by physicians, medical examiners and coroners on death certificates can be grouped together for statistical purposes. Revisions of the ICD are implemented periodically so that the classification reflects advances in medical science. Effective with deaths occurring in 1999, the United States replaced ICD-9, in use for deaths from 1979 to 1998, with ICD-10. Publications showing mortality data coded under ICD-10 will differ substantially from those under ICD-9 because of changes in coding rules, changes in category names and ICD numbers, and changes in the tabulation lists used to group mortality data. Mortality data users should

be aware of those changes. The National Center for Health Statistics has also posted information about the new coding at www.cdc.gov/nchs/about/major/dvs/icd10des.htm. However, it should be noted that it is industry standard for hospitals to use the older, ninth revision of ICD codes (ICD-9). This difference influences diseases of the blood vessels, because the transient ischemic attack (TIA) category of disease moved from diseases of the blood vessels in ICD-9 to diseases of the nervous system in ICD-10.

Causes of death (ICD-10 codes) used in this report:

- Major cardiovascular diseases (I00-I78)
- Diseases of the heart (I00-I09, I11, I13, I20-I51)
 - Includes acute rheumatic fever/chronic rheumatic heart diseases (I00–I09); hypertensive heart disease (I11) and hypertensive heart and renal disease (I13); coronary heart disease (I20–I25); pulmonary heart disease and diseases of pulmonary circulation (I26–I28); heart failure (I50); and other forms of heart disease (I29–I49, I50.1–I51).
- Coronary heart disease (I20-I25)
 - Includes acute myocardial infarction (I21–I22); other acute ischemic (coronary) heart disease (I24); angina pectoris (I20); atherosclerotic cardiovascular disease (I25.0); and all other forms of chronic ischemic heart disease (I25.1–I25.9).
- Heart failure (I50)
- Cerebrovascular diseases (I60-I69)
 - This category includes: subarachnoid hemorrhage (I60); intracerebral hemorrhage (I61); other nontraumatic intracranial hemorrhage (I62); cerebral infarction (I63); stroke, not specified as hemorrhage or infarction (I64); occlusion and stenosis of precerebral arteries not resulting in cerebral infarction (I65); occlusion and stenosis of cerebral arteries not resulting in cerebral infarction (I66); other cerebrovascular diseases (I67); cerebrovascular disorders in diseases classified elsewhere (I68), and sequelae of cerebrovascular disease (I69).

Causes of hospitalization/hospital discharge codes (ICD-9 codes) used in this report:

- Diseases of the heart (390-398,402,404,410-429)
- Cerebrovascular diseases (430-434,436-438)

Life expectancy tables

Life expectancy is the average number of years a person will live on the basis of a given set of assumptions (i.e., age-specific rates of dying).

Two types of life tables exist: the generation (or cohort) life table and the current life table. The generation life table follows the mortality experience of an actual cohort of people (i.e., people born in 1920). The current life table considers a hypothetical cohort and assumes it to be subject to the age-specific death rates occurring at a given time, such as Colorado death rates in 1996. The current life tables in this report, therefore, do not tell users how long they are expected to live based on their present age. The current life tables express how long a group of people would live if the age-specific death rates existing in 1996 were to apply throughout their lives.

Complete life tables contain information for single years of life. Another type is the abridged life table, which contains values for five-year age groups. Caution must be used in comparing life expectancy statistics from different sources because of the variety of methods that can be used in calculating them.

Years of potential life lost before life expectancy

Years of potential life lost before life expectancy (YPLL) is defined as the number of years of potential life lost by each death occurring before a predetermined life expectancy specific to a person's age, race and sex. For example, the life expectancy in 2008 for a 60-year-old White non-Hispanic female in Colorado

was 85 years. If this person died of heart disease at age 60 years, her YPLL due to heart disease would be 25 years. In other words, she would have lived an estimated 25 more years if she had not died prematurely.

YPLL is one measure of the impact of premature or preventable deaths and one method to identify and rank the leading causes of premature death for establishing public health priorities. In this type of measure, deaths occurring at younger ages are weighted more heavily than those occurring in older populations. YPLL and YPLL rates can assist in the establishment of research and resource priorities, the surveillance of temporal trends in premature death, the planning and evaluation of program interventions, and the targeting of health education efforts to sections of the general population most in need of public health interventions. YPLL data does not, however, provide a complete description of mortality burden or trends, and YPLL underestimates the importance of diseases that contribute to, but are not recorded as, the underlying cause of death.⁴

Hospital discharge data

Colorado Hospital Association data on hospital discharges were used in this report. Data include Colorado residents only and are not screened for duplications. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data in this report include hospital discharges with either diseases of the heart or cerebrovascular diseases as the primary diagnosis.

CDC cost calculator

To determine the financial burden of chronic diseases such as heart disease, stroke, congestive heart failure, high blood pressure, diabetes and cancer at the state level, the Chronic Disease Cost Calculator was developed. This calculator allows users to generate the costs of specific chronic diseases to Medicaid using default or customized inputs for prevalence and treatments costs. The costs for Colorado Medicaid result from the use of the default inputs (refer to data source for technical information and methodology at <http://www.cdc.gov/chronicdisease/resources/calculator/index.htm>).

Morbidity

Prevalence rates and hospital discharge rates are both measures of morbidity, that is, measures of various effects of disease on a population.

Prevalence

Prevalence is defined as the proportion of individuals in a population who have a disease, condition or attribute of interest at a specified time. For example, the prevalence of obesity among adults in Colorado in 2008 was 19.1 percent. This value was calculated by taking the number of adults with a body mass index greater than or equal to 30 and dividing by the total number of adults in the population. Prevalence can also be defined as the number of events in a given population in a specified period.

Mean or average

The mean is a measure of central tendency defined as the sum of scores divided by the total number of cases involved.

⁴ CDC. Premature Mortality in the United States: Public Health Issues in the Use of Years of Potential Life Lost. MMWR 1986;35(2S):1s-11s.

Median

The median is the middle value of an ordered set of values (or the average of the middle two in a set with an even number of values).

Confidence intervals and statistical significance

Confidence intervals are used to describe the possible margin of error of an estimated prevalence or rate. This report provides 95 percent confidence intervals when they were available. A 95 percent confidence interval indicates that for 95 out of 100 similar samples, the “true” value of a prevalence or rate will be contained between the upper and lower limits of that confidence interval. Confidence intervals are directly affected by sample size. If the sample size is small, the confidence interval likely will be wide. Conversely, if the sample size is large, the confidence interval likely will be narrow.

Confidence intervals can be used as a conservative test of statistical significance. A statistically significant difference is noted when the confidence interval of one estimate is higher or lower than the confidence interval of another estimate. In other words, one estimate is significantly different than another if the two confidence intervals do not overlap.

Small frequencies

Many Colorado counties have small populations and few deaths or hospital discharges in a given year. Interpretation of death rates and hospital discharge rates in such areas might be difficult. In this report, rates based on very small numbers have been noted. Additionally, 95 percent confidence intervals have been presented; rates with large confidence intervals should be interpreted with caution. If two rates’ confidence intervals overlap, then the difference between the rates is not statistically significant (this is a conservative test for statistical significance).

Analyses of year-to-year changes or comparison with other places are hampered by a tendency for rates and percentages to fluctuate widely. Combining data for places with small numbers of events and small populations into regions is another way of improving the general usefulness of data.

Health statistics regions

The 21 health statistics regions included in this report are aggregations of counties developed by the Health Statistics Section of the Colorado Department of Public Health and Environment in partnership with state and local public health professionals. The regions were developed using statistical and demographic criteria. More information about these regions is available by emailing health.statistics@state.co.us.

Health conditions and risk factors

Several health conditions and risk factors included in this report are listed below along with the definition based on the BRFSS data used to calculate prevalence. Risk factors can be modifiable (amenable to change) or non-modifiable. The following eight heart disease and stroke risk factors are modifiable risk factors.

Overweight and obese

Body mass index (BMI) is calculated as weight in kilograms divided by height in meters squared (or as weight in pounds times 703 divided by height in inches squared). The four BMI categories for adults are underweight (less than 18.5), healthy weight (18.5–24.9), overweight (25.0–29.9), and obese (30.0 or greater). BMI estimates and categories used within this report are crude estimates of body fat based on a person’s height and weight. BMI is calculated from self-reported height and weight.

High blood pressure (hypertension)

Adults who have been told they have high blood pressure by their doctor, nurse, or other health professional

High cholesterol (hypercholesterolemia)

Adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse or other health professional

Diabetes

Adults who have had been told by their doctor, nurse or other health professional that they have diabetes

Current smoker

Adults who have smoked at least 100 cigarettes during one’s lifetime and still smoking by the date of the survey

Low level of physical activity

Adults who did not meet CDC recommendations of at least 30 minutes of moderate physical activity five or more days per week or 20 minutes vigorous physical activity 3 or more days per week.

Diet low in fruit/vegetables

Adults who did not meet recommended level of fruit and vegetable intake (reported eating fruits or vegetables less than five times per day).

Physical inactivity or physically inactive

A physically inactive person is often defined (using BRFSS data) as one who, at the time of survey, reported having had no leisure-time physical activity during the past 30 days.

Cardiovascular disease

Heart disease and cerebrovascular disease (stroke) together make up cardiovascular disease. These are diseases or disorders of the heart and/or blood vessels (arteries and veins). Cardiovascular disease is the number one cause of death in the United States.

Heart disease

Heart disease is broken down into two major categories: coronary heart disease and heart failure.

Coronary heart disease (referred to in this report as “heart disease”) includes angina, which is chest pain or discomfort that occurs when the heart is not getting enough blood. Coronary heart disease also includes heart attack, or myocardial infarction, where reduced blood supply causes damage to the heart muscle. **Heart failure**, also called congestive heart failure or chronic heart failure is a critical condition.

Heart failure does not necessarily mean that the heart has stopped, but that the heart can no longer pump enough blood to the rest of the body.

Cerebrovascular disease or stroke

The two types of stroke are ischemic and hemorrhagic. **Ischemic stroke** is caused by blockage of an artery stopping blood flow to the brain depriving brain tissues of oxygen and blood. **Hemorrhagic stroke** involves a rupture of a blood vessel resulting in a hemorrhage (profuse bleeding) into or around the brain. This report provides statistics on stroke but does not provide separate statistics for each type of stroke, because of the substantial proportion of deaths and hospital discharges coded as unspecified type. This missing information on stroke type makes it difficult to interpret the remaining data on ischemic and hemorrhagic stroke, so the data are not presented.

Healthy People 2010 and 2020

Healthy People 2010 was a set of health objectives for the nation to achieve during the first decade of the new century. It was used by many different people, states, communities, professional organizations and others to help them develop programs to improve health. Healthy People 2010 builds on initiatives pursued during the past two decades. The 1979 Surgeon General's Report, *Healthy People*, and *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* both established national health objectives and served as the basis for the development of state and community plans. The release of the 2020 objectives occurred in December 2010. Like its predecessors, Healthy People 2020 is built on the best scientific knowledge and designed to measure programs over time.

For Healthy People 2010, there are two overarching goals: increase quality and years of healthy life; and, eliminate health disparities. There are twenty-eight focus areas and 467 specific objectives and some objectives have sub objectives specific to a population. And, for each objective is a target to strive to reach. For more information, visit: <http://www.healthypeople.gov>. Healthy People 2010 targets for various objectives or indicators (e.g., current smoking prevalence and high blood pressure prevalence) were used to compare to current Colorado population estimates.

Acronyms List

BMI body mass index
BRFSS Behavioral Risk Factor Surveillance System
CDC Centers for Disease Control and Prevention
CDPHE Colorado Department of Public Health and Environment
CHLCDP Center for Healthy Living and Chronic Disease Prevention of PSD, CDPHE
CI confidence interval
EPE Epidemiology, Planning, and Evaluation Branch of PSD, CDPHE
HDL high-density lipoprotein
ICD International Classification of Diseases
LDL low-density lipoprotein
mm Hg millimeters of mercury
MMWR Morbidity and Mortality Weekly Report
NHANES National Health and Nutrition Examination Survey
PSD Prevention Services Division of CDPHE
TIA transient ischemic attack
YPLL years of potential life lost before life expectancy

Links for more information

Centers for Disease Control and Prevention, Division of Heart Disease and Stroke Prevention

<http://www.cdc.gov/dhdsp/>

Colorado Department of Public Health and Environment, Heart Disease and Stroke Prevention

<http://www.cdphe.state.co.us/pp/cvd/cvdhom.html>

American Heart Association

<http://www.americanheart.org>

National Institutes of Health, National Heart, Lung, and Blood Institute

<http://www.nhlbi.nih.gov>

National Stroke Association

<http://www.stroke.org>

National Institutes of Health, National Institute of Neurological Disorders and Stroke

<http://stroke.nih.gov/>

Appendix 2: Supplemental tables

Supplemental table 1. Number of deaths, crude death rates, and age-adjusted death rates for leading causes with selected components and selected categories — Colorado residents, 2008 and United States, 2005

Cause of Death	Colorado, 2008				United States, 2005			
	CO Rank	N	Crude Rate	Age-Adj. Rate	U.S. Rank	N	Crude Rate	Age-Adj. Rate
All causes		31,205	623.3	750.4		2,448,017	825.9	798.8
Malignant neoplasms	1	6,709	134.0	156.1	2	559,312	188.7	183.8
Malignant neoplasm of colon, rectum, and anus		637	12.7	14.9		53,252	18.0	17.5
Malignant neoplasm of pancreas		453	9.0	10.6		32,760	11.1	10.8
Malignant neoplasm of trachea, bronchus, and lung		1,598	31.9	37.6		159,292	53.7	52.6
Malignant neoplasm of breast		492	9.8	10.8		41,491	14.0	13.5
Malignant neoplasm of prostate		387	7.7	9.9		28,905	9.8	9.5
Non-Hodgkin's lymphoma		257	5.1	6.1		20,873	7.0	6.9
Leukemia		300	6.0	7.3		21,623	7.3	7.1
Heart disease	2	6,132	122.5	152.1	1	652,091	220	211.1
Acute rheumatic fever and chronic rheumatic heart disease		59	1.2	1.5		3,365	1.1	1.1
Hypertensive heart disease		272	5.4	6.4		29,282	9.9	9.4
Hypertensive heart and renal disease		26	0.5	0.7		3,172	1.1	1.0
Ischemic heart disease		3,809	76.1	94.0		445,687	150.4	144.4
Other heart disease		1,966	39.3	49.6		170,585	57.6	55.2
Chronic lower respiratory diseases	3	2,178	43.5	55.0	4	130,933	44.2	43.2
Unintentional injuries	4	2,159	43.1	46.8	5	117,809	39.7	39.7
Motor vehicle		579	11.6	11.8		45,343	15.3	15.2
Other unintentional injuries		1,580	31.6	34.9		72,466	24.4	23.9
Stroke	5	1,531	30.6	39.1	3	143,579	48.4	46.6
Alzheimer's disease	6	1,351	27.0	36.6	7	71,599	24.2	22.9
Suicide	7	801	16.0	15.8	11	32,637	11.0	10.9
Diabetes mellitus	8	765	15.3	18.3	6	75,119	25.3	24.6
Influenza and pneumonia	9	683	13.6	17.3	8	63,001	21.3	21.3
Chronic liver disease and cirrhosis	10	539	10.8	10.6	12	27,530	9.3	9.0
Nephritis, nephrotic syndrome, and nephrosis	11	482	9.6	12.2	9	43,901	14.8	14.3
Septicemia	12	322	6.4	7.8	10	34,136	11.5	11.2
Parkinson's disease	13	313	6.3	8.4	14	19,544	6.6	6.4
Pneumonitis due to solids and liquids	14	249	5.0	6.5		17,279	5.8	5.6
Essential (primary) hypertension and hypertensive renal disease	15	241	4.8	6.1	13	24,902	8.4	9.0
Perinatal period conditions		213	4.3	4.1		14,549	4.9	4.9
Homicide		191	3.8	3.7	15	18,124	6.1	6.1
Neoplasms in situ, benign, or of uncertain or unknown behavior		180	3.6	4.5		13,710	4.6	4.5
Congenital anomalies		179	3.6	3.6		10,410	3.5	3.5
Atherosclerosis		176	3.5	4.7		11,841	4.0	3.8
Aortic aneurysm and dissection		169	3.4	4.2		13,843	4.7	4.6
Events of undetermined intent		130	2.6	2.6		4,742	1.8	1.6
Human immunodeficiency virus disease		57	1.1	1.1		12,543	4.2	4.2
All other causes		5,455	--	--		334,883	--	--

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause-of-death rankings are based on the number of deaths for selected categories as defined by the National Center for Health Statistics.

All component parts are not ranked. U.S. data are from the National Center for Health Statistics and are final for 2005.

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment. Crude and age-adjusted death rates are per 100,000 persons.

Supplemental table 2. Seventeen leading causes of years of potential life lost (YPLL) before life expectancy – Colorado residents, 2008

YPLL ranking	Cause of death	Number of deaths	YPLL N	YPLL Percent*	Mean YPLL per decedent
1	Malignant neoplasms (cancer)	6,709	109,996	21.3	16.4
2	Heart disease	6,132	76,365	14.8	12.5
3	Unintentional injuries	2,159	65,236	12.7	30.2
4	Suicide	801	28,960	5.6	36.2
5	Chronic lower respiratory diseases	2,178	24,989	4.8	11.5
6	Stroke	1,531	16,909	3.3	11.0
7	Perinatal period conditions	213	16,860	3.3	79.2
8	Chronic liver disease and cirrhosis	539	14,027	2.7	26.0
9	Diabetes mellitus	765	11,632	2.3	15.2
10	Congenital anomalies	179	10,860	2.1	60.7
11	Homicide and legal intervention	191	9,252	1.8	48.4
12	Alzheimer's disease	1,351	8,645	1.7	6.4
13	Influenza and pneumonia	683	8,300	1.6	12.2
14	Nephritis, nephrotic syndrome, and nephrosis	482	5,620	1.1	11.7
15	Septicemia	322	4,761	0.9	14.8
16	Human immunodeficiency virus disease	57	1,941	0.4	34.0
17	Atherosclerosis	176	1,249	0.2	7.1
--	All other causes	6,737	100,087	19.4	14.9
	Total	31,205	515,689	100.0	16.5

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment

* This value presents YPLL as a percentage of YPLL across all causes of death.

Supplemental table 3. Age-adjusted death rates for major cardiovascular diseases by sex – Colorado residents, 1999–2008

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Major cardiovascular diseases	Total	284.1	267.6	268.8	268.8	261.0	238.0	237.8	222.1	214.8	208.2*
	Female	244.6	234.1	236.6	231.1	227.3	199.7	198.4	192.1	180.2	173.5*
	Male	332.0	311.5	308.6	319.6	304.7	290.9	293.2	263.1	264.8	258.3 [†]
Heart disease	Total	196.5	182.3	183.0	183.0	181.7	164.8	167.5	158.2	153.6	151.4 [†]
	Female	159.8	149.6	150.8	146.0	148.0	129.9	131.6	128.5	121.0	119.8 [†]
	Male	242.1	226.1	224.9	234.3	226.5	213.7	219.1	199.5	201.1	197.9 [†]
Coronary heart disease	Total	137.2	123.2	122.6	120.2	120.3	112.8	107.1	100.3	97.2	93.5 [†]
	Female	103.3	91.6	94.0	86.6	89.3	81.8	75.4	72.9	70.0	66.8 [†]
	Male	180.5	165.8	160.8	167.3	162.8	156.2	152.8	139.4	137.4	132.9 [†]
Congestive heart failure	Total	18.0	19.4	21.2	21.2	17.1	15.4	19.7	19.9	16.8	15.3*
	Female	17.8	19.3	19.6	21.2	16.9	14.0	19.1	18.5	16.1	14.6*
	Male	18.1	19.8	23.8	21.1	16.6	17.9	20.7	22.3	18.1	16.4*
Stroke	Total	57.2	56.5	54.7	55.8	52.0	45.5	43.6	40.7	41.5	38.9 [†]
	Female	55.7	58.2	56.0	57.0	51.5	44.2	41.1	41.8	41.4	37.2 [§]
	Male	58.7	53	51.2	53.4	52.5	46.9	47.1	38.6	41.3	41.8 [¶]

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment.

Cause of death (ICD-10 codes): major cardiovascular disease (I00-I78); diseases of the heart (I00-I09, I11, I13, I20-I51); coronary heart disease (I20-I25); congestive heart failure (I50); cerebrovascular diseases (I60-I69)

* Significant decrease since 2006 and prior

† Significant decrease since 2005 and prior

§ Significant decrease since 2003 and prior

¶ Significant decrease since 2004 and prior

Supplemental table 4. Age-adjusted cardiovascular disease death rates per 100,000 by race/ethnicity — Colorado, 1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Major cardiovascular diseases	Total (both sexes)	284.1	267.6	268.8	268.8	261.0	238.0	237.8	222.1	214.8	208.2
	White non-Hispanic	286.7	267.1	268.9	271.7	260.8	239.1	236.3	224.1	215.4	207.1
	White Hispanic	255.2	248.5	262.3	242.7	270.6	240.5	267.5	225.6	236.0	234.0
	Black	346.2	367.2	333.1	302.8	327.7	260.9	290.3	219.3	232.3	239.4
	Asian or Pacific Islander	149.5	196.8	168.4	159.6	110.6	126.7	113.9	115.8	121.2	122.6
	Native American or Alaska Native	137.1	166.2	129.6	117.6	146.4	102.9	81.3	104.0	86.9	92.1
	Total (female)	244.6	234.1	236.6	231.1	227.3	199.7	198.4	192.1	180.2	173.5
	White non-Hispanic	246.3	232.4	236.9	232.5	226.2	200.1	196.9	194.0	179.8	172.5
	White Hispanic	209.3	222.1	233.4	206.6	239.1	189.7	215.4	185.5	198.5	195.2
	Black	330.3	338.1	287.3	280.3	300.8	252.8	268.2	179.1	206.3	181.2
	Asian or Pacific Islander	143.0	181.0	129.1	151.5	83.1	105.0	101.0	110.9	111.7	126.1
	Native American or Alaska Native	96.0	157.1	83.9	85.8	110.5	81.2	66.4	89.6	49.5	92.4
	Total (male)	332.0	311.5	308.6	319.6	304.7	290.9	293.2	263.1	264.8	258.3
	White non-Hispanic	336.1	313.3	308.4	324.5	305.9	292.6	292.7	264.8	266.2	257.7
White Hispanic	311.9	276.8	294.2	292.7	310.1	317.4	343.4	292.8	294.5	292.1	
Black	341.1	398.1	378.2	320.1	340.7	261.1	299.3	269.0	274.6	314.0	
Asian or Pacific Islander	163.5	215.9	233.7	169.2	153.5	159.6	131.2	124.1	135.9	113.0	
Native American or Alaska Native	179.5	186.5	199.1	172.8	194.5	134.5	93.8	124.0	138.0	83.6	
Heart disease	Total (both sexes)	196.5	182.3	183.0	183.0	181.7	164.8	167.5	158.2	153.6	151.4
	White non-Hispanic	199.3	183.3	183.8	185.6	182.3	167.7	167.7	160.8	155.7	151.9
	White Hispanic	168.9	165.4	175.5	161.9	185.1	148.6	175.9	162.2	159.6	162.2
	Black	233.4	230.6	218.1	205.9	217.7	170.0	195.6	137.0	156.4	171.8
	Asian or Pacific Islander	96.7	106.7	94.5	91.1	52.8	74.8	75.1	69.0	59.5	72.1
	Native American or Alaska Native	85.6	112.1	93.1	80.9	126.9	65.9	69.1	80.7	67.7	56.7
	Total (female)	159.8	149.6	150.8	146.0	148.0	129.9	131.6	128.5	121.0	119.8
	White non-Hispanic	162.6	149.7	151.6	147.6	147.7	132.0	131.2	130.7	122.6	120.2
	White Hispanic	125.6	135.8	145.9	125.1	158.8	109.9	135.5	120.8	121.4	129.0
	Black	205.0	201.0	188.8	178.2	178.3	146.7	180.4	111.5	133.5	123.0
	Asian or Pacific Islander	78.7	103.7	59.6	80.2	27.8	59.3	60.1	73.6	52.7	69.0
	Native American or Alaska Native	55.6	116.2	48.0	45.0	93.0	42.9	52.4	64.4	32.5	51.2
	Total (male)	242.1	226.1	224.9	234.3	226.5	213.7	219.1	199.5	201.1	197.9
	White non-Hispanic	245.3	228.9	226.2	238.5	228.3	217.4	220.9	202.3	203.7	199.0
White Hispanic	222.6	201.8	210.4	213.0	216.8	204.3	231.9	228.9	218.9	211.8	
Black	251.0	262.5	240.7	236.0	267.7	201.9	202.8	170.8	195.6	237.2	
Asian or Pacific Islander	127.8	105.8	150.5	108.9	90.4	99.8	95.7	61.0	68.5	73.7	
Native American or Alaska Native	120.5	106.9	161.1	143.5	170.7	103.2	85.4	101.7	113.3	57.7	
Coronary heart disease	Total (both sexes)	137.2	123.2	122.6	120.2	120.3	112.8	107.1	100.3	97.2	93.5
	White non-Hispanic	139.0	123.6	123.1	122.2	120.9	114.8	107.1	102.4	98.2	93.6
	White Hispanic	125.1	117.9	120.2	109.6	125.2	106.3	113.3	106.5	106.8	105.3
	Black	162.0	149.2	149.7	129.7	131.5	120.0	126.4	73.5	99.8	106.9
	Asian or Pacific Islander	71.3	73.7	58.3	54.6	37.0	48.2	51.7	34.1	36.0	44.0

	Native American or Alaska Native	58.4	74.9	66.0	63.0	97.7	47.1	48.5	44.4	46.3	23.6
	Total (female)	103.3	91.6	94.0	86.6	89.3	81.8	75.4	72.9	70.0	66.8
	White non-Hispanic	104.8	91.4	94.2	88.1	88.7	83.4	74.2	74.2	70.7	67.0
	White Hispanic	88.2	87.2	93.3	71.0	106.1	69.8	79.1	73.4	74.1	77.7
	Black	132.6	121.5	129.0	105.8	97.8	98.5	118.1	46.7	77.2	64.2
	Asian or Pacific Islander	58.4	67.1	43.6	42.8	12.3	31.0	44.8	37.0	26.1	36.6
	Native American or Alaska Native	45.1	60.2	24.1	25.5	75.6	21.8	41.7	28.2	18.8	10.6
	Total (male)	180.5	165.8	160.8	167.3	162.8	156.2	152.8	139.4	137.4	132.9
	White non-Hispanic	182.9	167.4	162.2	169.8	165.3	158.4	155.0	142.0	138.4	133.2
	White Hispanic	170.2	155.8	151.4	163.3	146.8	158.3	161.3	161.1	158.7	144.5
	Black	187.7	187.0	162.0	154.7	178.6	154.5	128.8	111.3	137.8	167.3
	Asian or Pacific Islander	89.8	80.5	81.2	73.5	75.0	75.1	60.2	29.7	50.6	53.2
	Native American or Alaska Native	69.3	102.3	126.0	129.9	125.8	83.9	53.1	71.2	81.1	37.0
Congestive heart failure	Total (both sexes)	18.0	19.4	21.2	21.2	17.1	15.4	19.7	19.9	16.8	15.3
	White non-Hispanic	18.2	19.6	21.7	21.7	17.0	15.9	20.3	20.0	16.8	15.4
	White Hispanic	15.6	16.4	20.5	16.1	21.0	13.2	16.0	20.5	19.0	17.7
	Black	21.0	24.0	14.1	20.2	20.5	6.9	17.4	19.0	15.5	13.5
	Asian or Pacific Islander	*	12.2	*	13.2	*	4.6	7.0	11.8	10.8	8.6
	Native American or Alaska Native	*	*	9.7	*	*	11.5	*	10.7	*	*
	Total (female)	17.8	19.3	19.6	21.2	16.9	14.0	19.1	18.5	16.1	14.6
	White non-Hispanic	18.3	19.4	19.9	21.5	17.0	14.2	19.7	18.2	16.0	14.6
	White Hispanic	10.9	15.6	21.0	17.3	18.4	12.8	17.1	21.5	19.0	17.3
	Black	22.6	29.6	13.3	19.7	18.1	9.0	16.1	17.9	16.4	10.2
	Asian or Pacific Islander	*	15.7	*	18.6	*	*	*	14.6	12.5	13.7
	Native American or Alaska Native	*	*	*	*	*	21.1	*	15.4	*	*
	Total (male)	18.1	19.8	23.8	21.1	16.6	17.9	20.7	22.3	18.1	16.4
	White non-Hispanic	17.8	20.4	24.4	22.0	16.0	18.9	21.4	23.1	18.5	16.6
	White Hispanic	22.9	18.1	20.6	14.0	24.5	14.3	13.6	19.3	18.2	19.1
	Black	17.8	11.3	13.8	20.2	24.2	*	18.1	20.1	14.0	18.7
	Asian or Pacific Islander	*	*	*	*	*	*	14.4	*	*	*
	Native American or Alaska Native	*	*	*	*	*	*	*	*	*	*
Stroke	Total (both sexes)	57.2	56.5	54.7	55.8	52.0	45.5	43.6	40.7	41.5	38.9
	White non-Hispanic	56.6	55.7	53.9	55.7	51.2	43.8	42.7	40.3	40.3	37.7
	White Hispanic	60.1	51.7	58.1	53.2	59.5	60.0	53.3	42.0	48.9	48.2
	Black	70.8	85.7	69.4	61.9	67.2	54.0	54.1	46.0	50.5	44.3
	Asian or Pacific Islander	32.4	63.5	49.1	53.9	41.4	38.5	23.5	31.0	47.1	40.6
	Native American or Alaska Native	51.5	27.8	19.9	22.2	16.5	27.9	5.5	12.3	9.8	26.3
	Total (female)	55.7	58.2	56.0	57.0	51.5	44.2	41.1	41.8	41.4	37.2
	White non-Hispanic	54.9	57.1	55.6	56.9	50.8	42.7	40.7	41.6	39.8	36.2
	White Hispanic	56.4	55.3	61.6	56.0	56.3	55.5	43.9	44.2	51.5	43.1
	Black	75.0	93.7	60.0	62.1	72.7	62.8	50.9	37.1	54.2	40.5
	Asian or Pacific Islander	40.5	58.9	46.9	55.5	36.8	30.4	22.7	29.0	46.5	45.2
	Native American or Alaska Native	40.5	19.5	*	26.7	11.8	24.6	*	*	*	31.9
	Total (male)	58.7	53.0	51.2	53.4	52.5	46.9	47.1	38.6	41.3	41.8
	White non-Hispanic	58.3	52.8	50.2	53.5	51.5	45.1	45.5	37.9	40.8	40.4
	White Hispanic	65.1	45.1	49.9	48.8	64.6	68.2	70.6	40.5	45.7	58.4
	Black	64.2	69.7	82.5	54.7	51.4	36.4	59.2	55.5	43.0	49.1
	Asian or Pacific Islander	18.8	69.8	54.1	48.2	48.7	50.1	24.7	34.7	49.0	33.0
	Native American or Alaska Native	59.0	47.0	*	*	23.8	31.3	*	*	*	17.9

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment

Rates are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups. See technical notes at www.cdphe.state.co.us/hs for an explanation of age-adjustment.

Cause of death (ICD-10 codes): major cardiovascular disease (I00-I78); diseases of the heart (I00-I09, I11, I13, I20-I51); coronary heart disease (I20-I25); congestive heart failure (I50); cerebrovascular diseases (I60-I69)

* Data suppressed if less than three events in the category due to confidentiality or reliability concerns

Supplemental table 5. Numbers of deaths and age-adjusted death rates due to cardiovascular diseases by race/ethnicity and sex – Colorado, 2008

		Number of deaths		Age-adjusted death rate	
		Female	Male	Female	Male
Major cardiovascular diseases	Total	4,252	4,111	173.5	258.3
	White non-Hispanic	3,672	3,454	172.5	257.7
	White Hispanic	364	412	195.2	292.1
	Black	127	177	181.2	314.0
	Asian or Pacific Islander	62	43	126.1	113.0
	Native American or Alaska Native	20	18	92.4	83.6 [†]
	Heart disease	Total	2,939	3,193	119.8
White non-Hispanic		2,558	2,702	120.2	199.0
White Hispanic		241	307	129.0	211.8
Black		88	135	123.0	237.2
Asian or Pacific Islander		33	29	69.0	73.7
Native Alaska Native		12	14	51.2 [†]	57.7 [†]
Coronary heart disease		Total	1,635	2,174	66.8
	White non-Hispanic	1,425	1,836	67.0	133.2
	White Hispanic	142	212	77.7	144.5
	Black	46	93	64.2	167.3
	Asian or Pacific Islander	17	22	36.6 [†]	53.2
	Native American or Alaska Native	3	10	10.6 [†]	37.0 [†]
	Congestive heart failure	Total	362	218	14.6
White non-Hispanic		319	192	14.6	16.6
White Hispanic		29	17	17.3	19.1 [†]
Black		7	8	10.2 [†]	18.7 [†]
Asian or Pacific Islander		*	*	*	*
Native American or Alaska Native		*	*	*	*
Stroke		Total	908	623	37.2
	White non-Hispanic	767	505	36.2	40.4
	White Hispanic	85	76	43.1	58.4
	Black	27	28	40.5	49.1
	Asian or Pacific Islander	23	11	45.2	33.0 [†]
	Native American or Alaska Native	6	3	31.9 [†]	17.9 [†]

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment
Cause of death (ICD-10 codes): major cardiovascular disease (I00-I78); diseases of the heart (I00-I09, I11, I13, I20-I51); coronary heart disease (I20-I25); congestive heart failure (I50); cerebrovascular diseases (I60-I69)

Age-adjusted to the 2000 United States standard population. Rates are per 100,000 persons.

* Data suppressed if less than three events in the category due to confidentiality or reliability concerns

[†] Rate is based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 6. Numbers of deaths and death rates due to major cardiovascular diseases by age and sex – Colorado residents, 2008

		<25 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75+ years
Major cardiovascular diseases	Total - n	39	47	150	515	860	1,154	5,598
	Female - n	17	19	47	150	283	432	3,304
	Male - n	22	28	103	365	577	722	2,294
	Total - rate	2.2	7.1	20.1	67.4	154.4	426.8	2,505.7
	Female - rate	2.0 [†]	5.9 [†]	13.1	39.4	100.9	299.3	2,382.2
	Male - rate	2.4	8.1	26.7	95.3	208.5	572.8	2,707.7
Heart disease	Total - n	29	37	116	427	688	854	3,981
	Female - n	12	15	30	123	196	303	2,260
	Male - n	17	22	86	304	492	551	1,721
	Total - rate	1.6	5.6	15.6	55.9	123.5	315.8	1,781.9
	Female - rate	1.4 [†]	4.7 [†]	8.4	32.3	69.9	209.9	1,629.5
	Male - rate	1.9 [†]	6.3	22.3	79.4	177.8	437.1	2,031.4
Coronary heart disease	Total - n	6	8	56	271	478	586	2,404
	Female - n	3	*	13	65	112	184	1,256
	Male - n	3	*	43	206	366	402	1,148
	Total - rate	0.3 [†]	1.2 [†]	7.5	35.5	85.8	216.7	1,076.0
	Female - rate	0.3 [†]	*	3.6 [†]	17.1	40.0	127.5	905.6
	Male - rate	0.3 [†]	*	11.1	53.8	132.2	318.9	1,355.0
Congestive heart failure	Total - n	*	3	*	7	22	53	492
	Female - n	*	*	*	*	11	19	325
	Male - n	*	*	*	*	11	34	167
	Total - rate	*	0.5 [†]	*	0.9 [†]	3.9	19.6	220.2
	Female - rate	*	*	*	*	3.9 [†]	13.2 [†]	234.3
	Male - rate	*	*	*	*	4.0 [†]	27.0	197.1
Stroke	Total - n	7	7	31	64	114	201	1,107
	Female - n	4	3	17	21	64	92	707
	Male - n	3	4	14	43	50	109	400
	Total - rate	0.4 [†]	1.1 [†]	4.2	8.4	20.5	74.3	495.5
	Female - rate	0.5 [†]	0.9 [†]	4.7 [†]	5.5	22.8	63.7	509.8
	Male - rate	0.3 [†]	1.2 [†]	3.6 [†]	11.2	18.1	86.5	472.1

Data source: Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment

Cause of death (ICD-10 codes): major cardiovascular disease (I00-I78); diseases of the heart (I00-I09, I11, I13, I20-I51); coronary heart disease (I20-I25); congestive heart failure (I50); cerebrovascular diseases (I60-I69)

Rates are per 100,000 persons.

* Data suppressed if less than three events in the category due to confidentiality or reliability concerns

[†] Rate is based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 7. Adult hospital discharge rates for major cardiovascular diseases by sex – Colorado, 1999–2008

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Major cardiovascular diseases	Total	1,274.1	1,268.5	1,242.1	1,240.7	1,152.6	1,138.8	1,091.0	1,078.0	1,011.9	992.3
	Female	1,038.9	1,045.4	1,012.0	1,019.1	942.1	925.4	868.8	873.3	819.6	803.5
	Male	1,551.6	1,535.7	1,518.3	1,511.9	1,409.1	1,404.0	1,371.0	1,332.2	1,253.7	1,232.5
Heart disease	Total	984.3	984.4	962.1	966.3	891.1	874.3	834.6	819.6	764.6	739.1
	Female	776.8	787.9	756.5	768.7	704.9	690.2	640.4	643.0	596.4	580.6
	Male	1,226.7	1,217.2	1,206.6	1,207.4	1,115.9	1,098.8	1,077.6	1,035.4	973.9	939.0
Coronary heart disease	Total	491.3	489.8	458.9	447.4	392.2	370.9	338.1	321.7	287.5	260.3
	Female	322.4	324.2	295.7	288.4	249.9	233.5	206.1	202.3	177.7	162.4
	Male	685.9	682.3	648.4	634.1	558.7	534.8	495.5	463.7	418.4	378.8
Congestive heart failure	Total	202.9	188.5	189.1	194.4	189.0	193.8	183.4	183.7	168.5	166.6
	Female	185.3	174.9	172.0	175.6	167.4	172.0	154.6	158.6	142.9	138.7
	Male	225.8	207.3	212.3	223.4	219.9	223.1	226.0	218.8	204.1	206.3
Stroke	Total	189.8	182.3	178.8	177.1	168.3	165.4	157.6	162.4	154.9	160.8
	Female	178.7	171.8	170.7	169.4	158.1	151.7	145.1	152.2	146.4	148.3
	Male	204.8	197.4	189.7	186.6	183.4	186.1	174.7	177.0	167.5	179.2

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with select major cardiovascular diseases as the primary diagnosis.

Rates are age-adjusted to the 2000 United States standard population. Rates are per 100,000 persons.

Diagnosis (ICD-9 codes): major cardiovascular disease (390-434,436-448); diseases of the heart (390-398,402,404,410-429); coronary heart disease (410-414,429.2); congestive heart failure (428); cerebrovascular diseases (430-434,436-438)

Data source: Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

Supplemental table 8. Adult hospital discharges for major cardiovascular diseases by age and sex – Colorado, 2008

		<25 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75+ years
Major cardiovascular diseases	Total - n	572	818	1,895	5,280	8,290	9,775	17,042
	Female - n	263	387	734	1,915	2,837	3,975	9,516
	Male - n	309	431	1,161	3,365	5,453	5,800	7,526
	Total - rate	32.0	122.8	254.2	690.9	1,488.0	3,615.2	7,628.0
	Female - rate	30.4	121.1	204.4	502.5	1,012.0	2,754.2	6,861.2
	Male - rate	33.6	124.3	300.5	878.5	1,970.2	4,601.1	8,883.3
Heart disease	Total - n	346	577	1,359	4,041	6,352	7,319	12,609
	Female - n	163	270	478	1,323	2,056	2,908	6,978
	Male - n	183	307	881	2,718	4,296	4,411	5,631
	Total - rate	19.4	86.6	182.3	528.8	1,140.2	2,706.9	5,643.8
	Female - rate	18.8	84.5	133.1	347.1	733.4	2,014.9	5,031.2
	Male - rate	19.9	88.6	228.0	709.6	1,552.2	3,499.2	6,646.6
Coronary heart disease	Total - n	7	76	410	1,895	3,060	3,061	3,460
	Female - n	*	13	83	491	799	995	1,631
	Male - n	7	63	327	1,404	2,261	2,066	1,829
	Total - rate	0.4	11.4	55.0	248.0	549.3	1,132.1	1,548.7
	Female - rate	*	4.1 [†]	23.1	128.8	285.0	689.4	1,176.0
	Male - rate	0.8	18.2	84.6	366.5	816.9	1,639.0	2,158.9
Congestive heart failure	Total - n	42	87	176	519	967	1,307	3,829
	Female - n	21	37	52	172	366	553	2,173
	Male - n	21	50	124	347	601	754	1,656
	Total - rate	2.4	13.1	23.6	67.9	173.6	483.4	1,713.9
	Female - rate	2.4	11.6	14.5	45.1	130.6	383.2	1,566.8
	Male - rate	2.3	14.4	32.1	90.6	217.1	598.1	1,954.7
Stroke	Total - n	63	112	291	701	1,116	1,520	3,099
	Female - n	30	64	141	358	482	704	1,834
	Male - n	33	48	150	343	634	816	1,265
	Total - rate	3.5	16.8	39.0	91.7	200.3	562.2	1,387.1
	Female - rate	3.5	20.0	39.3	93.9	171.9	487.8	1,322.3
	Male - rate	3.6	13.8	38.8	89.5	229.1	647.3	1,493.1

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with select major cardiovascular diseases as the primary diagnosis.

Rates are age-adjusted to the 2000 United States standard population. Rates are per 100,000 persons.

Diagnosis (ICD-9 codes): major cardiovascular disease (390-434,436-448); diseases of the heart (390-398,402,404,410-429); coronary heart disease (410-414,429.2); congestive heart failure (428); cerebrovascular diseases (430-434,436-438)

Data source: Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

* Data suppressed if less than three events in the category due to confidentiality or reliability concerns

[†] Rate is based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 9. Number and rate of heart disease deaths and hospital discharges by county – Colorado, 1999 (deaths only) and 2008

County	Number of deaths		Death rate per 100,000 (crude rate)		Age-adjusted death rate per 100,000		Number of hospital discharges	Hospital discharge rate per 100,000 (crude rate)	Age-adjusted hospital discharge rate per 100,000
	1999	2008	1999	2008	1999	2008		2008	2008
Adams, CO	477	444	134.2	102.1	227.8	182.4	1,924	442.5	656.8
Alamosa, CO	29	17	195.6	106.9 [†]	245.7	120.3 [†]	241	1,515.3	1,626.9
Arapahoe, CO	614	559	127.6	99.5	185.6	125.2	2,173	386.6	445.4
Archuleta, CO	6	9	62.7 [†]	70.8 [†]	78.2 [†]	84.9 [†]	95	747.4	659.2
Baca, CO	28	16	619.2	385.2 [†]	383.5	187.9 [†]	14	337.0 [§]	202.7 [§]
Bent, CO	18	19	300.0 [†]	308.7 [†]	251.6 [†]	268.5 [†]	60	974.8	841.9
Boulder, CO	321	315	113.1	105.5	174.6	145.9	1,793	600.3	785.6
Broomfield, CO	*	39	*	71.2	*	181.0	164	299.3	436.0
Chaffee, CO	38	30	238.5	175.0	197.2	137.0	204	1,190.1	885.9
Cheyenne, CO	9	6	395.4 [†]	299.9 [†]	258.8 [†]	184.2 [†]	21	1,049.5 [§]	766.8 [§]
Clear Creek, CO	9	10	98.0 [†]	106.0 [†]	197.3 [†]	125.6 [†]	52	551.1	519.7
Conejos, CO	20	12	240.6	143.1 [†]	221.1	131.1 [†]	635	7,573.0	6,642.7
Costilla, CO	*	4	*	114.3 [†]	*	91.8 [†]	154	4,401.3	3,408.8
Crowley, CO	13	10	259.9 [†]	147.1 [†]	290.8 [†]	180.9 [†]	51	750.2	876.5
Custer, CO	6	7	178.7 [†]	169.6 [†]	159.8 [†]	200.8 [†]	36	872.1	714.7
Delta, CO	88	95	321.1	300.7	211.8	204.4	381	1,205.90	862.3
Denver, CO	1,032	833	189.2	137.4	203.1	166.2	3,174	523.4	631.4
Dolores, CO	*	*	*	*	*	*	32	1,593.6	1,237.9
Douglas, CO	92	133	56.7	46.8	191.0	144.6	708	249.3	543.1
Eagle, CO	9	13	22.6 [†]	24.1 [†]	110.7 [†]	78.0 [†]	461	852.9	2,213.8
Elbert, CO	18	26	94.3 [†]	111.6	189.1 [†]	183.7	89	382.1	451.5
El Paso, CO	560	687	110.1	115.0	163.8	160.1	3,931	658.2	796.0
Fremont, CO	130	108	288.0	224.9	245.7	176.6	483	1,005.6	799.5
Garfield, CO	57	48	133.5	84.1	191.8	130.6	432	757.2	1,051.2
Gilpin, CO	4	7	88.1 [†]	135.0 [†]	323.6 [†]	109.7 [†]	18	347.2 [§]	344.3 [§]
Grand, CO	12	11	100.0 [†]	75.2 [†]	144.1 [†]	126.6 [†]	96	656.7	863.7
Gunnison, CO	10	15	72.8 [†]	98.3 [†]	145.1 [†]	151.5 [†]	155	1,015.8	1,421.3
Hinsdale, CO	*	*	*	*	*	*	10	1,152.1 [§]	1,061.7 [§]
Huerfano, CO	26	22	332.1	272.6	238.1	188.8	93	1,152.4	783.3
Jackson, CO	4	6	253.2 [†]	416.4 [†]	289.6 [†]	353.7 [†]	13	902.2 [§]	702.1 [§]
Jefferson, CO	715	715	137.3	131.7	183.5	141.8	2,830	521.1	516.7
Kiowa, CO	5	9	307.5 [†]	622.8 [†]	211.2 [†]	354.3 [†]	28	1,937.7 [§]	1,477.8 [§]
Kit Carson, CO	14	16	177.2 [†]	190.9 [†]	143.3 [†]	139.3 [†]	46	548.7	456.3
Lake, CO	15	11	191.8 [†]	131.8 [†]	390.8 [†]	190.1 [†]	60	719.0	1,157.3
La Plata, CO	52	65	121.6	128.1	166.7	149.2	341	672.1	727.2
Larimer, CO	354	357	143.8	121.5	187.8	138.7	1,350	459.3	507.0
Las Animas, CO	47	40	310.5	240.5	205.3	173.6	138	829.6	646.3
Lincoln, CO	18	10	295.7 [†]	176.2 [†]	233.1 [†]	144.4 [†]	40	705.0	610.0
Logan, CO	72	51	354.8	235.0	304.0	195.1	144	663.4	565.2
Mesa, CO	287	289	250.5	200.1	215.8	177.1	1,063	735.9	657.9
Mineral, CO	3	*	371.7 [†]	*	255.0 [†]	*	15	1,521.3 [§]	1,351.5 [§]
Moffat, CO	32	16	245.7	113.0 [†]	311.2	149.2 [†]	130	917.9	1,093.0

Montezuma, CO	55	43	233.9	167.2	230.6	145.4	243	944.9	799.7
Montrose, CO	80	79	244.3	191.3	198.1	153.3	431	1,043.6	872.8
Morgan, CO	60	67	222.6	234.4	201.2	202.3	208	727.6	660.5
Otero, CO	63	67	308.7	351.7	241.1	256.5	248	1,301.8	977.7
Ouray, CO	5	3	137.9 [†]	63.8 [†]	175.2 [†]	83.6 [†]	40	851.1	749.2
Park, CO	9	16	64.7 [†]	93.8 [†]	65.3 [†]	139.9 [†]	93	544.9	568.9
Phillips, CO	16	12	354.1 [†]	261.3 [†]	171.4 [†]	140.5 [†]	40	871.1	596.8
Pitkin, CO	6	10	40.5 [†]	58.5 [†]	75.8 [†]	58.4 [†]	111	649.0	712.7
Prowers, CO	46	40	320.1	298.6	315.0	260.3	162	1,209.1	1,079.2
Pueblo, CO	332	279	237.6	177.3	206.9	158.2	1,342	852.7	759.4
Rio Blanco, CO	16	7	262.6 [†]	106.6 [†]	298.4 [†]	120.6 [†]	89	1,355.1	1,314.9
Rio Grande, CO	32	30	260.4	237.9	229.3	179.6	235	1,863.3	1,525.0
Routt, CO	15	17	78.0 [†]	71.6 [†]	169.0 [†]	100.7 [†]	302	1,272.1	1,939.1
Saguache, CO	8	14	138.6 [†]	197.9 [†]	165.6 [†]	270.9 [†]	53	749.2	765.5
San Juan, CO	*	*	*	*	*	*	5	888.1 [§]	1,064.0 [§]
San Miguel, CO	3	*	45.9 [†]	*	188.8 [†]	*	65	837.2	1,740.8
Sedgwick, CO	10	4	367.9 [†]	157.1 [†]	225.2 [†]	84.4 [†]	24	942.7 [§]	518.3 [§]
Summit, CO	5	10	22.2 [†]	34.3 [†]	69.3 [†]	106.8 [†]	102	350.0	710.0
Teller, CO	20	18	99.1	79.0 [†]	244.6	99.6 [†]	188	825.6	928.5
Washington, CO	19	15	378.3 [†]	317.0 [†]	297.3 [†]	222.2 [†]	45	951.0	667.7
Weld, CO	320	287	180.5	114.2	247.4	159.9	1,711	681.1	889.3
Yuma, CO	20	27	203.7	270.1	165.1	189.1	95	950.5	768.0
Colorado total	6,386	6,132	151.5	122.5	196.4	152.1	32,603	651.2	743.5

Data source (deaths): Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment

Rates are age-adjusted to the 2000 United States standard population. Rates are per 100,000 persons.

Cause of death (ICD-10 codes): I00-I09, I11, I13, I20-I51

Data source (hospitalizations): Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with heart diseases as the primary diagnosis (ICD-9 codes: 390-398,402,404,410-429).

* Data suppressed if less than three events in the category due to confidentiality or reliability concerns

[†] Rate is based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns.

[§] Rate is based on 30 or less hospital discharges and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 10. Number and rate of stroke deaths and hospital discharges by county — Colorado, 1999 (deaths only) and 2008

County	Number of deaths		Death rate per 100,000 (crude rate)		Age-adjusted death rate per 100,000		Number of hospital discharges	Hospital discharge rate per 100,000 (crude rate)	Age-adjusted hospital discharge rate per 100,000
	1999	2008	1999	2008	1999	2008		2008	2008
Adams, CO	125	110	35.2	25.3	62.0	47.3	402	92.5	139.3
Alamosa, CO	6	4	40.5 [†]	25.2 [†]	52.4 [†]	29.2 [†]	36	226.4	261.1
Arapahoe, CO	163	155	33.9	27.6	50.9	36.4	497	88.4	104.4
Archuleta, CO	3	4	31.3 [†]	31.5 [†]	24.5 [†]	34.1 [†]	18	141.6 [§]	154.3 [§]
Baca, CO	7	3	154.8 [†]	72.2 [†]	76.4 [†]	31.6 [†]	5	120.4 [§]	125.8 [§]
Bent, CO	*	*	*	*	*	*	9	146.2 [§]	132 [§]
Boulder, CO	106	75	37.3	25.1	59.3	38.3	285	95.4	128.4
Broomfield, CO	*	13	*	23.7 [†]	*	59.9 [†]	30	54.7	91.9
Chaffee, CO	*	9	*	52.5 [†]	*	37.6 [†]	32	186.7	135.8
Cheyenne, CO	*	*	*	*	*	*	7	349.8 [§]	325.6 [§]
Clear Creek, CO	3	*	32.7 [†]	*	74.4 [†]	*	13	137.8 [§]	150.6 [§]
Conejos, CO	*	4	*	47.7 [†]	*	43.2 [†]	84	1,001.8	848.4
Costilla, CO	*	*	*	*	*	*	22	628.8 [§]	466.8 [§]
Crowley, CO	*	3	*	44.1 [†]	*	66.9 [†]	12	176.5 [§]	232.1 [§]
Custer, CO	*	*	*	*	*	*	10	242.2 [§]	218.1 [§]
Delta, CO	22	22	80.3	69.6	50.9	44.8	77	243.7	174.6
Denver, CO	287	176	52.6	29.0	55.9	34.8	722	119.1	143.7
Dolores, CO	*	*	*	*	*	*	7	348.6 [§]	257.9 [§]
Douglas, CO	30	38	18.5	13.4	72.6	46.5	148	52.1	114.7
Eagle, CO	*	4	*	7.4 [†]	*	11.9 [†]	95	175.8	483.6
Elbert, CO	5	7	26.2 [†]	30.1 [†]	71.5 [†]	46.2 [†]	20	85.9 [§]	99.1 [§]
El Paso, CO	284	202	55.8	33.8	90.2	48.0	889	148.8	188.8
Fremont, CO	41	27	90.8	56.2	77.3	42.5	89	185.3	149.5
Garfield, CO	23	13	53.9	22.8 [†]	77.1	38.6 [†]	84	147.2	210.9
Gilpin, CO	*	*	*	*	*	*	4	77.1 [§]	62.8 [§]
Grand, CO	4	5	33.3 [†]	34.2 [†]	72.1 [†]	48.0 [†]	14	95.8 [§]	160.1 [§]
Gunnison, CO	*	4	*	26.2 [†]	*	47.5 [†]	29	190.1 [§]	281.3 [§]
Hinsdale, CO	*	*	*	*	*	*	*	*	*
Huerfano, CO	4	9	51.1 [†]	111.5 [†]	38.4 [†]	70.8 [†]	21	260.2 [§]	186.6 [§]
Jackson, CO	*	*	*	*	*	*	8	555.2 [§]	676.0 [§]
Jefferson, CO	197	168	37.8	30.9	51.8	34.4	633	116.6	117.0
Kiowa, CO	*	*	*	*	*	*	5	346.0 [§]	325.2 [§]
Kit Carson, CO	*	*	*	*	*	*	9	107.4 [§]	86.5 [§]
Lake, CO	3	3	38.4 [†]	35.9 [†]	91.3 [†]	65.9 [†]	18	215.7 [§]	335.1 [§]
La Plata, CO	16	8	37.4 [†]	15.8 [†]	53.3 [†]	20.4 [†]	55	108.4	122.1
Larimer, CO	88	115	35.7	39.1	47.0	46.0	329	111.9	125.3
Las Animas, CO	15	12	99.1 [†]	72.1 [†]	63.0 [†]	50.0 [†]	28	168.3 [§]	135.1 [§]
Lincoln, CO	5	*	82.1 [†]	*	64.7 [†]	*	6	105.7 [§]	90.2 [§]
Logan, CO	13	11	64.1 [†]	50.7 [†]	57.1 [†]	41.3 [†]	29	133.6 [§]	110.9 [§]
Mesa, CO	70	72	61.1	49.8	52.6	44.4	262	181.4	162.0
Mineral, CO	*	*	*	*	*	*	*	*	*
Moffat, CO	5	3	38.4 [†]	21.2 [†]	52.0 [†]	24.3 [†]	22	155.3 [§]	165.4 [§]

Montezuma, CO	17	9	72.3 [†]	35.0 [†]	71.4 [†]	30.5 [†]	42	163.3	138.6
Montrose, CO	20	22	61.1	53.3	49.2	44.6	90	217.9	179.9
Morgan, CO	20	19	74.2	66.5 [†]	67.3	60.4 [†]	41	143.4	135.3
Otero, CO	8	10	39.2 [†]	52.5 [†]	30.3 [†]	36.3 [†]	78	409.4	296.6
Ouray, CO	*	*	*	*	*	*	8	170.2 [§]	116.1 [§]
Park, CO	*	*	*	*	*	*	16	93.8 [§]	113.3 [§]
Phillips, CO	3	*	66.4 [†]	*	27.5 [†]	*	8	174.2 [§]	126.0 [§]
Pitkin, CO	*	*	*	*	*	*	14	81.9 [§]	96.6 [§]
Prowers, CO	7	5	48.7 [†]	37.3 [†]	46.7 [†]	31.4 [†]	29	216.5 [§]	195.2 [§]
Pueblo, CO	83	82	59.4	52.1	51.4	45.7	371	235.7	211.6
Rio Blanco, CO	*	4	*	60.9 [†]	*	66.7 [†]	19	289.3 [§]	281.3 [§]
Rio Grande, CO	10	5	81.4 [†]	39.6 [†]	68.3 [†]	29.4 [†]	42	333.0	259.0
Routt, CO	*	*	*	*	*	*	65	273.8	449.8
Saguache, CO	3	*	52.0 [†]	*	67.5 [†]	*	9	127.2 [§]	126.7 [§]
San Juan, CO	*	*	*	*	*	*	*	*	*
San Miguel, CO	*	*	*	*	*	*	13	167.4 [§]	445.5 [§]
Sedgwick, CO	4	*	147.2 [†]	*	74.1 [†]	*	3	117.8 [§]	60.6 [§]
Summit, CO	*	*	*	*	*	*	19	65.2 [§]	211.8 [§]
Teller, CO	7	4	34.7 [†]	17.6 [†]	85.6 [†]	17.8 [†]	38	166.9	196.7
Washington, CO	*	*	*	*	*	*	4	84.5 [§]	55.3 [§]
Weld, CO	81	61	45.7	24.3	64.0	33.9	287	114.2	154.3
Yuma, CO	8	4	81.5 [†]	40.0 [†]	57.1 [†]	28.0 [†]	21	210.1 [§]	163.0 [§]
Colorado total	1,821	1,531	43.2	30.6	57.2	39.1	6,902	137.9	161.8

Data source (deaths): Vital Statistics, Health Statistics Section, Colorado Department of Public Health and Environment

Cause of death (ICD-10 codes): I60-I69

Data source (hospitalizations): Hospital Discharge Data, Colorado Hospital Association

Data prepared by: Health Statistics Section, Colorado Department of Public Health and Environment

Rates are age-adjusted to the 2000 United States standard population. Rates are per 100,000 persons.

Data include Colorado residents only and are not deduplicated. Therefore, the number of discharges does not represent the number of unique persons who were hospitalized. Data include hospital discharges with cerebrovascular diseases as the primary diagnosis (ICD-9 codes: 430-434,436-438).

* Data suppressed if less than three events in the category due to confidentiality or reliability concerns

[†] Rate is based on 20 or less deaths and should be interpreted with caution due to statistical reliability concerns.

[§] Rate is based on 30 or less hospital discharges and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 11. Prevalence of heart disease and stroke risk factors — Colorado, 1999–2008

Colorado	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
High blood pressure	22.2 (20.1- 24.2)		21.6 (19.6- 23.7)		19.8 (18.5- 21.1)		20.1 (19.0- 21.2)		21.2 (20.4- 22.1)	
High cholesterol	25.9 (23.4- 28.4)		29.4 (26.9- 31.9)		31.9 (30.1- 33.6)		33.1 (31.7- 34.6)		33.5 (32.4- 34.6)	
Diabetes	3.8 (2.9-4.7)	5.1 (3.9-6.3)	4.6 (3.6-5.7)	4.4 (3.7-5.1)	4.7 (4.0-5.4)	4.3 (3.7-4.9)	4.8 (4.2-5.3)	5.3 (4.7-5.8)	5.3 (4.9-5.8)	6.0 (5.5-6.5)
Current smoker	22.5 (20.3- 24.6)	20.0 (18.0- 22.0)	22.3 (20.3- 24.3)	20.4 (18.9- 21.9)	18.6 (17.2- 20.0)	20.0 (18.5- 21.5)	19.8 (18.5- 21.1)	17.9 (16.6- 19.2)	18.7 (17.7- 19.7)	17.6 (16.6- 18.7)
Overweight or obese	47.9 (45.3- 50.4)	48.0 (45.4- 50.6)	51.7 (49.2- 54.2)	53.5 (51.6- 55.3)	51.4 (49.6- 53.2)	53.0 (51.2- 54.8)	54.5 (53.0- 56.1)	54.9 (53.4- 56.5)	55.6 (54.4- 56.8)	55.3 (54.1- 56.6)
Low level of physical activity			46.8 (44.3- 49.3)		45.0 (43.2- 46.8)		45.6 (44.1- 47.2)		45.3 (44.1- 46.6)	
Diet low in fruit/vegetables		76.6 (74.6- 78.7)		76.1 (74.6- 77.6)	75.8 (74.3- 77.3)		75.5 (74.3- 76.8)		74.2 (73.1- 75.2)	
United States	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	Median percent	Median percent	Median percent	Median percent	Median percent	Median percent	Median percent	Median percent	Median percent	Median percent
High blood pressure	23.9		25.6		24.8		25.5		27.8	
High cholesterol	30.1		30.2		33.2		35.6		37.6	
Diabetes	5.6	6.1	6.5	6.5	7.1	7.0	7.3	7.5	8.0	8.3
Current smoker*	22.8	23.2	23.2	23.2	22.0	20.9	20.6	20.1	19.8	18.4
Overweight or obese	56.1	56.9	58.9	58.8	60.0	60.2	61.4	61.8	63.0	63.4
Low level of physical activity [†]			53.9		52.6		50.9		50.5	
Diet low in fruit/vegetables [§]		76.8	76.2	77.4	77.4		76.8		75.6	

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Note: Pregnant women were excluded from the sample; data are not available for some years.

Definitions: high blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; high cholesterol: adults who have ever had their blood cholesterol checked who have been told it was high by their doctor, nurse, or other health professional; diabetes: adults who have had been told by their doctor, nurse, or other health professional that they have diabetes; current smoker: having smoked at least 100 cigarettes during one's lifetime and still smoking by the date of the survey; low level of physical activity: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; diet low in fruit/vegetables: did not meet the minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

Supplemental table 12. Prevalence of risk factors by race/ethnicity — Colorado, 2007 or 2008

	White non-Hispanic	Black non-Hispanic	Hispanic	Other	Total (all races)
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
High blood pressure, 2007	21.8 (20.8-22.8)	32.5 (25.8-39.2)	18.1 (15.9-20.3)	18.0 (13.3-22.7)	21.2 (20.4-22.0)
High cholesterol, 2007	34.2 (33.0-35.4)	41.5 (33.5-49.5)	29.2 (25.9-32.5)	31.7 (25.2-38.2)	33.5 (32.3-34.7)
Diabetes, 2008	5.2 (4.7-5.8)	10.7* (7.0-14.5)	7.7 (6.1-9.4)	8.4* (5.0-11.8)	6.0 (5.5-6.5)
Current smoker, 2008	16.0 (14.9-17.0)	27.9 (20.3-35.5)	21.0 (17.8-24.1)	21.2 (14.5-27.8)	17.6 (16.6-18.7)
Overweight or obese, 2008	52.8 (51.5-54.2)	63.4 (55.4-71.4)	66.3 (62.3-70.2)	46.4 (38.7-54.0)	55.3 (54.1-56.6)
Low level of physical activity, 2007	42.9 (41.6-44.2)	57.0 (49.1-64.8)	53.4 (49.8-56.9)	43.1 (36.0-50.2)	45.3 (44.1-46.6)
Diet low in fruit/vegetables, 2007	73.7 (72.6-74.8)	80.4 (74.5-86.2)	76.8 (73.9-79.7)	65.7 (58.8-72.5)	74.2 (73.1-75.2)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Note: Pregnant women were excluded from the sample.

Definitions: Current smoker: having smoked at least 100 cigarettes during one's lifetime and still smoking by the date of the survey; Did not meet physical activity recommendations: did not meet CDC recommendations, at least 30 minutes of moderate physical activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; Diet low in fruit/vegetables: did not meet the minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

* Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 13. Prevalence of risk factors by poverty index — Colorado, 2007 or 2008

	<250% of federal poverty level	250%+ of federal poverty level
	Percent (95% CI)	Percent (95% CI)
High blood pressure, 2007	21.7 (20.0-23.3)	20.6 (19.6-21.6)
High cholesterol, 2007	34.2 (31.8-36.5)	33.2 (31.9-34.5)
Diabetes, 2008	6.6 (5.7-7.6)	4.5 (4.0-5.0)
Current smoker, 2008	27.9 (25.7-30.1)	13.6 (12.6-14.6)
Overweight or obese, 2008	58.6 (56.2-61.1)	54.7 (53.2-56.2)
Did not meet physical activity recommendations, 2007	52.3 (49.8-54.7)	40.1 (38.7-41.5)
Diet low in fruit/vegetables, 2007	77.3 (75.3-79.2)	72.5 (71.3-73.8)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Note: 250% of current poverty level is an eligibility criterion for CDPHE's Women's Wellness Connection.

Note: Pregnant women were excluded from the sample.

Definitions: Current smoker: having smoked at least 100 cigarettes during one's lifetime and still smoking by the date of the survey; Did not meet physical activity recommendations: did not meet CDC recommendations, at least 30 minutes of moderate physical

activity 5+ days/wk or 20 minutes vigorous physical activity 3+ days/wk; Diet low in fruit/vegetables: did not meet the minimum recommended level of fruit and vegetable intake (fruits or vegetables less than five times per day)

Supplemental table 14. Number of modifiable risk factors* per person by age – Colorado, 2007

Number of risk factors	Total	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65+ years
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
0	7.7 (7.1-8.3)	11.2 [†] (7.8-14.5)	8.5 (6.9-10.1)	8.4 (7.2-9.6)	7.2 (6.2-8.3)	5.3 (4.4-6.3)	4.9 (4.0-5.8)
1	20.3 (19.3-21.3)	29.2 (24.5-33.9)	25.2 (22.6-27.7)	21.2 (19.3-23.0)	17.5 (15.9-19.1)	14.5 (13.0-16.1)	12.8 (11.5-14.1)
2	28.4 (27.3-29.5)	35.3 (30.2-40.5)	32.4 (29.6-35.2)	30.3 (28.1-32.4)	26.6 (24.7-28.5)	21.7 (19.9-23.5)	22.6 (20.9-24.3)
3	23.7 (22.7-24.7)	18.6 (14.5-22.7)	23.3 (20.8-25.8)	24.0 (21.9-26.0)	24.5 (22.7-26.4)	25.6 (23.6-27.7)	25.6 (23.8-27.4)
4	12.8 (12.1-13.5)	4.6 [†] (2.6-6.6)	9.4 (7.5-11.3)	11.1 (9.5-12.7)	15.3 (13.8-16.9)	18.3 (16.6-20.0)	19.4 (17.8-21.1)
5	5.6 (5.1-6.0)	1.0 [†] (0.1-1.9)	1.2 [†] (0.6-1.8)	4.4 (3.4-5.5)	7.1 (5.9-8.3)	10.7 (9.3-12.2)	11.0 (9.6-12.3)
6	1.4 (1.2-1.6)	0.1 [†] (0.0-0.4)	0.0 [†] (0.0-0.1)	0.7 [†] (0.3-1.1)	1.5 [†] (1.0-2.0)	3.4 (2.5-4.2)	3.5 (2.7-4.3)
7	0.1 (0.1-0.2)	N/A	N/A	N/A	0.1 [†] (0.0-0.3)	0.4 [†] (0.2-0.7)	0.2 [†] (0.0-0.4)
1-2	48.7 (47.5-49.9)	64.6 (59.5-69.6)	57.6 (54.6-60.6)	51.4 (49.0-53.8)	44.1 (42.0-46.3)	36.2 (34.1-38.3)	35.4 (33.5-37.4)
3+	43.6 (42.4-44.7)	24.3 (19.8-28.7)	33.9 (31.0-36.8)	40.2 (37.8-42.5)	48.6 (46.5-50.8)	58.5 (56.3-60.7)	59.7 (57.7-61.7)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Note: Pregnant women were excluded from the sample.

N/A = not available

*high blood pressure, high cholesterol, diabetes, current smoking, overweight or obese, not meeting physical activity recommendations, and diet low in fruit/vegetables

[†] Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 15. Number of modifiable risk factors* per person by race/ethnicity – Colorado, 2007

Number of risk factors	White non-Hispanic	Black non-Hispanic	Hispanic	Other	Total (all races)
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
0	8.4 (7.6-9.1)	1.5 [†] (0.1-2.9)	4.9 (3.5-6.3)	10.9 [†] (6.8-15.1)	7.7 (7.1-8.4)
1	21.1 (20.0-22.2)	14.1 [†] (8.5-19.7)	17.1 (14.5-19.7)	24.1 (18.2-29.9)	20.3 (19.3-21.3)
2	27.8 (26.7-29.0)	25.4 (18.6-32.3)	31.4 (28.1-34.7)	28.3 (21.7-34.8)	28.4 (27.3-29.5)
3	23.2 (22.2-24.3)	27.9 (21.1-34.6)	26.5 (23.6-29.5)	19.3 (14.1-24.4)	23.7 (22.7-24.7)
4	12.8 (12.1-13.6)	16.3 [†] (11.2-21.4)	12.3 (10.1-14.4)	10.4 [†] (6.1-14.7)	12.8 (12.1-13.5)
5	5.4	11.2 [†]	5.7	5.4 [†]	5.6

	(4.9-5.9)	(6.7-15.7)	(4.5-7.0)	(2.8-8.1)	(5.1-6.0)
6	1.2	3.6 [†]	1.9 [†]	1.6 [†]	1.4
	(1.0-1.4)	(1.3-6.0)	(1.2-2.6)	(0.3-3.0)	(1.2-1.6)
7	0.1 [†]	N/A	0.2 [†]	N/A	0.1 [†]
	(0.0-0.1)		(0.0-0.4)		(0.1-0.2)
1-2	48.9	39.5 [†]	48.5	52.3	48.7
	(47.7-50.2)	(31.9-47.1)	(45.1-51.9)	(45.5-59.2)	(47.5-49.9)
3+	42.7	59.0	46.7	36.7	43.6
	(41.5-43.9)	(51.4-66.5)	(43.3-50.0)	(30.2-43.2)	(42.4-44.7)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Note: Pregnant women were excluded from the sample.

*high blood pressure, high cholesterol, diabetes, current smoker, overweight or obese, did not meet physical activity recommendations, and diet low in fruit/vegetables

[†] Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 16. Number of modifiable risk factors* per person by federal poverty level – Colorado, 2007 or 2008

Number of risk factors	<250% of federal poverty level	250%+ of federal poverty level
	Percent (95% CI)	Percent (95% CI)
0	5.3 (4.2-6.4)	8.5 (7.7-9.4)
1	17.9 (16.0-19.8)	21.7 (20.5-22.9)
2	27.9 (25.7-30.1)	28.0 (26.7-29.3)
3	25.8 (23.8-27.8)	22.9 (21.7-24.1)
4	14.5 (13.0-16.0)	12.2 (11.4-13.1)
5	6.6 (5.6-7.5)	5.4 (4.8-5.9)
6	1.9 (1.4-2.3)	1.2 (0.9-1.4)
7	0.2 [†] (0.0-0.3)	0.1 [†] (0.0-0.1)
1-2	45.8 (43.4-48.1)	49.7 (48.3-51.1)
3+	48.9 (46.6-51.2)	41.7 (40.4-43.1)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Note: 250% of current poverty level is an eligibility criterion for CDPHE's Women's Wellness Connection.

Note: Pregnant women were excluded from the sample.

* High blood pressure, high cholesterol, diabetes, current smoker, overweight or obese, did not meet physical activity recommendations, and diet low in fruit/vegetables

[†] Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 17. Adult prevalence of high blood pressure, high cholesterol, and having had cholesterol checked in the last five years by demographic factors – United States and Colorado, 2007

	High blood pressure		High cholesterol		Cholesterol checked in last five years	
	United States Median percent	Colorado Percent (95% CI)	United States Median percent	Colorado Percent (95% CI)	United States Median percent	Colorado Percent (95% CI)
TOTAL	27.8	21.2 (20.4-22.0)	37.6	33.5 (32.3-34.7)	74.8	73.8 (72.6-75.0)
Sex						
Female	26.4	20.0 (19.0-21.0)	35.7	31.4 (30.0-32.8)	77.6	76.5 (74.9-78.1)
Male	28.1	22.5 (21.1-23.9)	39.0	35.7 (33.9-37.5)	72.4	71.1 (69.1-73.1)
Age (years)						
18-24	6.0	4.1* (1.9-6.3)	9.8	10.7* (6.0-15.4)	35.6	34.7 (29.4-40.0)
25-34	9.4	7.0 (5.4-8.6)	18.3	15.1 (12.4-17.8)	58.7	59.6 (56.5-62.7)
35-44	16.0	12.9 (11.3-14.5)	27.8	26.8 (24.4-29.2)	75.2	74.0 (71.8-76.2)
45-54	28.6	22.6 (21.1-24.7)	38.6	35.6 (33.4-37.8)	84.6	85.3 (83.7-86.9)
55-64	44.3	37.6 (35.4-39.8)	51.3	47.5 (45.1-49.9)	91.7	92.0 (90.8-93.2)
65+	57.9	52.1 (49.9-54.3)	53.7	50.8 (48.6-53.0)	93.7	93.7 (92.5-94.9)
Race/ethnicity						
White non-Hispanic	27.9	21.8 (20.8-22.8)	39.0	34.2 (33.0-35.4)	78.1	78.1 (76.9-79.3)
Black non-Hispanic	36.9	32.5 (25.8-39.2)	33.4	41.5 (33.5-49.5)	76.3	76.8 (69.5-84.1)
Hispanic	17.1	18.1 (15.9-20.3)	31.7	29.2 (25.9-32.5)	55.0	58.1 (54.6-61.6)
Other	20.6	18.0 (13.3-22.7)	31.6	31.7 (25.2-38.2)	76.1	71.0 (63.9-78.1)
Annual household income						
<\$15,000	38.7	28.1 (24.0-32.2)	47.8	40.4 (35.1-45.7)	66.2	58.5 (53.0-64.0)
\$15,000-24,999	35.4	26.0 (23.1-28.9)	42.7	36.3 (32.4-40.2)	68.4	59.4 (55.3-63.5)
\$25,000-34,999	31.4	21.7 (19.0-24.4)	39.5	37.7 (33.6-41.8)	71.6	67.2 (63.1-71.3)
\$35,000-49,999	27.8	22.2 (19.8-24.6)	37.2	34.0 (31.1-36.9)	76.4	74.5 (71.4-77.6)
\$50,000+	21.8	18.4 (17.2-19.6)	34.1	31.5 (30.1-32.9)	81.8	81.7 (80.3-83.1)
Education						
Less than high school	35.4	19.2 (16.1-22.3)	44.8	32.2 (27.1-37.3)	63.4	48.9 (44.0-53.8)
High school or GED	31.8	25.1 (23.1-27.1)	40.2	36.6 (34.2-39.0)	71.2	67.6 (64.9-70.3)
Some post-high school	27.6	21.7 (20.1-23.3)	36.4	34.2 (32.0-36.4)	74.9	74.6 (72.2-77.0)
College graduate	23.2	18.9 (17.7-20.1)	34.5	31.7 (30.1-33.3)	83.8	83.8 (82.4-85.2)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment (Colorado); <http://apps.nccd.cdc.gov/BRFSS/index.asp> (U.S.)
Median percent (prevalence) of all 50 states and District of Columbia (n=51).

Definitions: High blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; High cholesterol: adults who have ever had their blood cholesterol checked and have been told it was high by their doctor, nurse, or other health professional

* Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 18. Adult prevalence of high blood pressure, high cholesterol, and having had blood cholesterol checked in the last five years by poverty status and health care coverage and usage — Colorado, 2007

	High blood pressure	High cholesterol	Blood cholesterol checked in last five years
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Poverty index			
Less than 250%	21.7 (20.0-23.3)	34.2 (31.8-36.5)	61.2 (58.7-63.6)
250% or greater	20.6 (19.6-21.6)	33.2 (31.9-34.5)	82.3 (81.0-83.6)
Any health care coverage			
Yes	23.1 (22.1-24.0)	34.4 (33.3-35.5)	80.2 (79.1-81.4)
No	12.7 (10.6-14.8)	26.2 (25.5-29.9)	42.9 (39.3-46.5)
Regular health care provider			
Yes (one or more than one)	24.3 (23.3-25.2)	35.1 (33.9-36.2)	81.9 (80.8-83.1)
No	10.0 (8.4-11.7)	24.0 (20.9-27.1)	43.6 (40.5-46.7)
Time since last routine checkup			
Within past year	26.1 (25.0-27.3)	36.9 (35.6-38.3)	84.8 (83.5-86.2)
Within past two years	18.4 (16.3-20.5)	29.7 (27.1-32.3)	77.3 (74.5-80.1)
Within past five years	11.1 (9.3-13.0)	26.1 (22.8-29.4)	61.4 (57.5-65.2)
Five or more years ago	11.4 (9.1-13.6)	22.5 (18.7-26.4)	30.5 (27.0-34.1)
Never	9.8 (3.3-16.3)	23.0* (10.1-36.0)	19.4* (11.9-27.0)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Definitions: High blood pressure: adults who have been told they have high blood pressure by their doctor, nurse, or other health professional; High cholesterol: adults who have ever had their blood cholesterol checked and have been told it was high by their doctor, nurse, or other health professional

* Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 19. Knowledge of heart attack and stroke signs and symptoms and first response if someone was having a heart attack or stroke –Colorado, 2004

Heart attack signs and symptoms	Percent responding correctly (95% CI)
Pain or discomfort in the jaw, neck, or back (symptom)	66.2 (64.3-68.1)
Feeling weak, lightheaded, or faint (symptom)	84.4 (83.0-85.8)
Chest pain or discomfort (symptom)	97.9 (97.4-98.5)
Pain or discomfort in the arms or shoulder (symptom)	94.5 (93.5-95.5)
Shortness of breath (symptom)	95.0 (94.1-95.8)
Sudden trouble seeing in one or both eyes (not a symptom)	47.0 (44.8-49.1)
Stroke signs and symptoms	Percent responding correctly (95% CI)
Sudden confusion or trouble speaking (symptom)	97.0 (96.3-97.7)
Sudden numbness of face, arm, or leg, especially on one side (symptom)	98.1 (97.5-98.7)
Sudden trouble seeing in one or both eyes (symptom)	90.9 (89.6-92.2)
Sudden trouble walking, dizziness, or loss of balance (symptom)	96.1 (95.3-97.0)
Severe headache with no known cause (symptom)	84.3 (82.8-85.8)
Sudden chest pain or discomfort (not a symptom)	50.9 (48.8-53.0)
First response if someone was having a heart attack or stroke	Percent responding (95% CI)
Call 911 (best response)	88.3 (87.1-89.5)
Take them to the hospital	4.7 (3.9-5.5)
Tell them to call their doctor	0.8* (0.4-1.1)
Call their spouse or a family member	0.8* (0.3-1.2)
Do something else	5.5 (4.6-6.3)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

Supplemental table 20. Knowledge of heart attack and stroke signs and symptoms and first response to call 911 if someone was having a heart attack or stroke by sex, age, race/ethnicity and household income – Colorado, 2004

	Heart attack signs and symptoms*		Stroke signs and symptoms†		Would call 911 if someone was having a heart attack or stroke	
	6 of 6 correct	5 of 5 correct	6 of 6 correct	5 of 5 correct	and 6 of 6 correct [¶]	and 5 of 5 correct ^{**}
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Total	11.1 (10.1-12.1)	38.3 (36.6-40.0)	19.6 (18.2-20.9)	45.8 (44.0-47.5)	5.5 (4.8-6.2)	24.2 (22.8-25.6)
Sex						
Male	9.0 (7.6-10.4)	33.7 (31.1-36.2)	17.8 (15.9-19.7)	41.7 (39.1-44.4)	4.1 (3.1-5.1)	20.0 (17.8-22.1)
Female	13.3 (11.9-14.7)	42.9 (40.7-45.0)	21.3 (19.6-23.1)	49.8 (47.6-52.0)	6.9 (5.9-7.9)	28.4 (26.5-30.4)
Age (years)						
18-24	5.4 [§] (2.8-8.0)	23.4 (18.0-28.7)	12.3 [§] (8.5-16.2)	32.7 (26.8-38.6)	1.2 [§] (0.0-2.4)	13.2 (8.9-17.5)
25-34	8.6 (6.4-10.7)	28.6 (25.0-32.1)	19.1 (16.0-22.2)	40.8 (36.8-44.9)	4.6 (3.0-6.2)	18.6 (15.6-21.7)
35-44	11.2 (9.0-13.4)	38.8 (35.1-42.5)	20.9 (18.0-23.8)	47.1 (43.4-50.9)	5.5 (3.9-7.0)	24.5 (21.4-27.7)
45-54	13.5 (11.1-15.8)	46.8 (43.1-50.5)	22.7 (19.7-25.6)	51.4 (47.7-55.1)	7.5 (5.7-9.3)	29.7 (26.3-33.0)
55-64	16.5 (13.6-19.5)	53.5 (49.5-57.5)	23.9 (20.5-27.2)	57.8 (53.8-61.8)	8.9 (6.7-11.1)	35.6 (31.7-39.4)
65+	12.1 (9.7-14.5)	40.1 (36.4-43.8)	16.5 (13.7-19.3)	44.6 (40.8-48.4)	5.2 (3.7-6.8)	24.3 (21.1-27.6)
Race/ethnicity						
White non-Hispanic	13.0 (11.8-14.2)	42.6 (40.7-44.5)	22.9 (21.3-24.5)	50.7 (48.8-52.6)	6.6 (5.7-7.5)	27.5 (25.8-29.1)
Black non-Hispanic	6.9 [§] (2.4-11.4)	27.5 (19.5-35.5)	12.7 [§] (6.4-18.9)	45.6 (35.7-55.4)	2.3 [§] (0.0-4.9)	15.6 (9.4-21.7)
Hispanic	5.1 [§] (3.3-7.0)	20.9 (16.8-24.9)	7.9 (5.6-10.2)	26.1 (21.8-30.5)	2.1 (1.0-3.2)	12.4 (9.0-15.8)
Household income						
Less than \$15,000	6.0 [§] (3.1-8.9)	27.1 (21.8-32.3)	13.1 (9.2-17.0)	34.2 (28.4-40.0)	4.0 [§] (1.5-6.6)	14.4 (10.3-18.4)
\$15,000-24,999	6.2 (4.4-8.0)	27.5 (23.1-32.0)	11.0 (8.2-13.8)	34.1 (29.5-38.8)	2.1 [§] (1.1-3.1)	15.3 (12.2-18.3)
\$25,000-34,999	9.2 (6.6-11.8)	33.1 (28.3-37.9)	13.2 (10.1-16.4)	39.3 (34.3-44.3)	3.8 [§] (2.1-5.4)	20.3 (16.3-24.3)
\$35,000-49,999	14.1 (11.2-16.9)	40.4 (36.1-44.6)	22.1 (18.6-25.7)	46.1 (41.7-50.5)	7.4 (5.2-9.6)	23.4 (19.8-26.9)
\$50,000 or more	13.7 (12.0-15.4)	45.5 (42.8-48.1)	25.5 (23.3-27.8)	55.4 (52.7-58.1)	6.9 (5.7-8.2)	30.3 (27.8-32.7)

Data source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

* "6 of 6 correct" means that the respondent answered correctly that pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath are heart attack symptoms and sudden trouble seeing in one or both eyes is not a symptom; "5 of 5 correct" means that the respondent answered correctly that pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath are heart attack symptoms.

† "6 of 6 correct" means that the respondent answered correctly that sudden confusion or trouble speaking; sudden numbness of face, arm, or leg, especially on one side; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, or loss of balance; and severe headache with no known cause are stroke symptoms and sudden chest pain or discomfort is not a symptom; "5

of 5 correct” means that the respondent answered correctly that sudden confusion or trouble speaking; sudden numbness of face, arm, or leg, especially on one side; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, or loss of balance; and severe headache with no known cause are stroke symptoms.

[§] Percent is based on less than 50 respondents and should be interpreted with caution due to statistical reliability concerns.

[¶] “6 of 6 correct” for both the heart attack and the stroke signs and symptoms

** “5 of 5 correct” for both the heart attack and the stroke signs and symptoms