The Burden of Diabetes in Colorado
Issued December 2008
Data Through 2007

Colorado
Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

Table of Contents

Colorado Department
of Public Health
and Environment

Colorado
Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

List of Figures

Colorado Department of Public Health and Environment

Colorado Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

List of Tables

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EXECUTIVE SUMMARY

This summary provides data extracted from the *Burden of Diabetes in Colorado* report to inform public health practices and to highlight areas for emphasis in diabetes prevention and control throughout the state.

Diabetes affected about one in 19 Colorado adults (or 5.3% of the adult population) in 2007, impacting their quality of life and ability to work. The statewide prevalence of the disease, which has increased slightly in recent years, remains lower than the national rate, which the Centers for Disease Control and Prevention reported as nearly 8% in 2007.[1] Coloradans ages 65 and over had the highest prevalence of diabetes (15.3% of the population). The percentage of women who developed diabetes during pregnancy fluctuated between 5% and 10% during 2000-2006. More than half of these women will develop diabetes within five to 10 years after their pregnancies.

Obesity contributes greatly to the onset of diabetes in children, adolescents and adults.[2] In 2007, about four out of 10 Hispanic children ages 2-14 were either overweight or obese. In Colorado, Hispanic children had the highest percentage of obesity and overweight (38.3%) compared to White/Non-Hispanic (21.3%) and Black children (27.5) in 2007. Nearly half of Colorado adults (42.2%) diagnosed with diabetes were obese as well.

Today, there is no cure for diabetes, and its prevalence is increasing both in Colorado and across the nation. If not adequately treated, diabetes can affect the quality of an individual's life and result in a shorter life span. Serious complications caused or associated with diabetes are heart attacks, stroke, high blood pressure, blindness, kidney failure, tooth loss and amputations.

While Colorado death rates for diabetes consistently have been lower than those nationally since 1994, it remains one of the top 10 leading causes of death in the state. For 700 people, diabetes caused premature death, and diabetes contributed to another 2,457 deaths in 2007. The age-adjusted mortality rate for diabetes as the underlying cause of death was 17.2 deaths per 100,000 people in Colorado.

In addition to diminishing quality and length of life, diabetes generates significant economic costs. The American Diabetes Association estimated the total cost of diabetes for people in Colorado in 2006 was more than $2.5 billion.[3] This amount included excess medical costs of $1.6 billion attributed to diabetes and lost productivity valued at more than $900 million.

Fortunately, however, there are health practices that Coloradans of all ages can employ to prevent the disease or manage it more effectively. It is possible to prevent diabetes from occurring, and early identification of pre-diabetes can identify individuals more likely to develop diabetes. The focus of diabetes prevention is on modifying risk factors, such as obesity, poor nutrition and lack of exercise. Reducing these risks prevents not only the onset of diabetes and associated complications, but also risks associated with other chronic diseases that share the same risk factors as diabetes, such as cancer and cardiovascular diseases.

Educating people with diabetes about preventive care practices and self-management has proven to be effective in helping them manage the disease and reduce the risks of developing complications. Techniques such as regularly monitoring blood glucose levels, blood pressure and cholesterol levels are learned through diabetes self-management education, an integral part of a treatment plan. While progress is being made in many areas of diabetes self-management education, only 60.7% of Colorado adults with diabetes reported taking a class to manage their diabetes in 2007.

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Colorado
Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

As mentioned, a critical component of diabetes self-management education is to learn how to monitor blood glucose levels, which helps people with diabetes and their health care providers assess the efficacy of treatment. With this information, changes can be made to medical nutrition therapy, exercise and medications to prevent acute glycemic reactions and long-term diabetes complications. In 2007, 59.3% of people with diabetes checked their blood glucose levels at least once a day.

In addition, people with diabetes who also have high blood pressure are at greater risk of developing eye disease, kidney disease, heart attacks and strokes. In fact, cardiovascular disease is the leading cause of death for people with diabetes. Early detection of elevated blood pressure levels and appropriate treatment can significantly decrease risk of complications. As of 2007, 60.2% of adults with diabetes reported also having high blood pressure, compared to 18.5% of adults without diabetes.

Increasing opportunities for diabetes self-management education throughout Colorado are a priority of the Colorado Diabetes Prevention and Control Program, whose mission is to support and promote a comprehensive system of evidence-based community and health care services to reduce or delay the onset of diabetes and its complications, and to enhance the quality of life of people affected by diabetes. Data from the *Burden of Diabetes in Colorado* report directs the efforts of the Colorado Department of Public Health and Environment. Using this information, practitioners and community leaders throughout the state can promote targeted evidence-based practices to assist more Coloradans with diabetes to effectively manage their disease.

INTRODUCTION

Diabetes is a fact of life for 23.6 million children and adults in the United States. This number represents 8% of the total population.[4] In Colorado, about 190,000 adults or 5.3% had diabetes in 2007. Prevalence of diabetes increases with age. Coloradans aged 65 and older are the largest portion of the population with diabetes (15.3%).

The direct medical cost of diabetes in the United States was an estimated $116 billion in 2007. The indirect costs to cover disability, work loss and premature mortality total $58 billion. As a result, the total cost of diabetes is $174 billion.[5] The per capita cost of health care for people with diabetes is $11,744 a year; 57% of this total cost is attributed to diabetes.[6]

Diabetes was the seventh leading cause of death in 2006 in the United States.[5] In Colorado in 2007, diabetes accounted for 700 deaths where diabetes was the underlying cause. An additional 2,457 deaths occurred with diabetes as a contributory cause in the state in the same year.

Diabetes not only is costly in terms of health care costs and a shorter life span; it also can lead to a variety of complications such as heart disease, stroke, high blood pressure, blindness, kidney disease, dental disease, neuropathies and amputations. Diabetes is the leading cause of new cases of blindness in adults aged 20-74. Additionally, diabetes is the leading cause of kidney failure. More than half of the people with diabetes experience impaired sensation or pain in the lower extremities. Controlling levels of blood glucose, blood pressure and blood lipids through timely preventive care practices can reduce the risk for diabetes-related complications. These practices can be learned through diabetes self-management education.

The good news is that the complications from diabetes can be prevented. Even better news is that the progression from pre-diabetes to diabetes is not inevitable. Lifestyle changes to increase physical activity and to lose weight are effective in delaying or preventing the onset of diabetes. Changes such as healthy food intake and physical activity benefit both people at risk for diabetes and people with diabetes by decreasing their risk of cardiovascular disease and hypertension. Though medications also can be used for these purposes, lifestyle interventions are cost-effective and have multiple health benefits.

Purpose and Organization of this Report

This burden report provides current information on the prevalence of diabetes, diabetes preventive care practices, diabetes complications and diabetes mortality. The relationship between diabetes, associated risk factors and healthy lifestyle behaviors will be reviewed. Local communities, coalitions, diabetes educators and other health care providers can use this information to prioritize needs, direct resources and target prevention strategies with the ultimate goal of preventing diabetes and its complications for all Coloradans with emphasis placed on disparate populations.

The first section of this report is an overview of diabetes and defines the types and magnitude of the disease. It briefly reviews the variation of the prevalence of diabetes by demographic characteristics with a focus on the subgroups with the greatest burden. The second section provides data on health practices that can decrease the chance of diabetes-related complications. This section will be useful to diabetes educators and other health care professionals. In Section 3, details are provided on the rates of complications. Information in this section can help focus work on secondary prevention. Section 4 on mortality highlights the most serious outcomes of diabetes and attempts to quantify the ultimate burden of diabetes. Section 5 focuses on the goal of preventing diabetes by providing information on modifiable risk factors

(smoking, diet, exercise, obesity). The percentage of people with diabetes who have health insurance coverage is presented, and together this information will be useful to inform health promotion efforts across the state.

Data Sources

Data used in this report are drawn from several sources:

1) Colorado Behavioral Risk Factor Surveillance System
2) Colorado Pregnancy Risk Assessment Monitoring System
3) Colorado Child Health Survey
4) Colorado Youth Risk Behavior Survey
5) Birth certificates from the Vital Statistics Section of the Colorado Department of Public Health and Environment
6) Death certificates from the Vital Statistics Section
7) Intermountain End Stage Renal Disease Network (ESRD Network #15)
8) Colorado Hospital Association

Behavioral Risk Factor Surveillance System

The Colorado Behavioral Risk Factor Surveillance System (BRFSS) is housed within the Health Statistics Section at the Colorado Department of Public Health and Environment. Colorado participated in BRFSS with point-in-time surveys in 1982 and 1987. Since 1990, the department has entered into a yearly cooperative agreement with the Centers for Disease Control and Prevention (CDC) to develop and implement the BRFSS survey in Colorado. Data are collected through telephone interviews on a random sample of non-institutionalized adults. The Survey Research Unit now completes more than1,000 BRFSS surveys a month with adult residents of Colorado. Additional information on the BRFSS is available at
http://www.cdphe.state.co.us/hs/brfss/

Pregnancy Risk Assessment Monitoring System

The Colorado Pregnancy Risk Assessment Monitoring System (PRAMS) is a population-based risk factor surveillance system designed to monitor selected self-reported maternal behaviors and experiences that occur before, during and after pregnancy among women who deliver a live-born infant. Colorado PRAMS is housed within the Health Statistics Section at the Colorado Department of Public Health and Environment. The PRAMS questionnaire is revised periodically to reflect changing priorities and emerging issues. PRAMS uses a combination of two data-collection approaches: statewide mailings of the surveys and telephone follow-up with women who do not return the survey by mail. Approximately 240 women in Colorado will receive the survey each month, with an expected response rate of at least 70%. Additional information on PRAMS is available at http://www.cdphe.state.co.us/hs/prams/

Child Health Survey

The Colorado Child Health Survey (CHS) was designed to fill the health data gap in Colorado that exists for children ages 1-14 and was initiated in 2004. Participants who complete the BRFSS are asked if they have a child in the target age range and about their willingness to complete the child health survey. Approximately 10 days later, the parent is called to complete the survey on a variety of topics including their child's physical activity, nutrition, access to health and dental care, behavioral health, school health, sun safety, injury and many others. Data are collected over the calendar year. At the end of the year, data are cleaned and weighted to reflect the general population of children 1-14 years old. Approximately 1,000

surveys are completed each year. Additional information is available at
http://www.cdphe.state.co.us/hs/yrbs/ChildHealth.html

Youth Risk Behavior Survey

The Colorado Youth Risk Behavior Survey (YRBS) is one component of the Youth Risk
Behavior Surveillance System (YRBSS) developed by the Centers for Disease Control and
Prevention. The YRBS monitors six categories of priority health-risk behaviors among youth and
young adults including behaviors that contribute to unintentional injuries and violence, tobacco
use, alcohol and other drug use, sexual behaviors that contribute to unintended pregnancies
and sexually transmitted diseases, unhealthy dietary behaviors and physical inactivity. In
addition, the YRBS monitors the prevalence of obesity and asthma among youth and young
adults. The YRBS is a school-based state survey that is administered to students in grades 9-12
in Colorado. This self-administered survey is anonymous and completed voluntarily by students.
Additional information is available at http://www.cdphe.state.co.us/hs/yrbs/yrbs.html

Birth Certificate Data

Information on Colorado births is collected from the Certificate of Live Birth. Data items are
presented as reported on the certificate. Completeness and accuracy of items on the birth
certificate may vary by facility and year. Data for all births that occurred within the state of
Colorado, resident and nonresident, are collected; however, at this time, the Colorado Health
Information Dataset (CoHID) reports data only for Colorado resident births. Resident births are
births to those individuals who reported being residents of Colorado, even if the birth occurred to
residents while outside of Colorado. Interstate agreements allow for the exchange of vital
information about births to Colorado residents that occurred in other states. Additional
information is available at http://www.cdphe.state.co.us/hs/vs/

Death Certificate Data

Death data are compiled from information reported on the Certificate of Death, collected by the
Vital Statistics Unit at the Department of Public Health. 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 to 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 to Colorado
residents that occurred in other states.

All causes of death listed on a death certificate must be coded. The underlying cause of death is
defined by World Health Organization as the disease or injury that initiated the sequence of
events leading directly to the death, or the circumstance of the accident or violence that caused
the injury. 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. Additional information is available at
http://www.cdphe.state.co.us/hs/vs/

End-Stage Renal Disease

The Intermountain End-Stage Renal Disease (ESRD) Network (Network #15) is a federally
mandated, nonprofit Colorado corporation that contracts with the Centers for Medicare &

Medicaid Services (CMS) to implement the ESRD Network program in its six-state area: Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming. CMS contracts with and funds 18 ESRD Network organizations covering all 50 states and U.S. territories. End-stage renal disease is the only disease that entitles an individual to Medicare benefits. The mission of the Intermountain ESRD Network is to facilitate the improvement of quality of care provided to end-stage renal disease patients. The Network also is charged with the collection and validation of information about and treatment of people with end-stage renal disease. Additional information is available at http://www.esrdnet15.org/aboutus.htm

Hospitalization Data

The Colorado Hospital Association collects hospital discharge data. Clinical, financial and patient demographic information is collected for use by member hospitals and other organizations. This data reflects the number of inpatient hospitalizations, as opposed to the number of individuals hospitalized, because the data are de-identified. Hospital charges represent the list price for services, not costs or reimbursement the hospitals receive. These charges include the hospital lab, pharmacy, radiology and routine hospital charges and relate to the hospital admission only. These charges do not include pre-hospital care costs, ambulance costs, physician fees, inpatient rehabilitation, home health or lost productivity at work. Additional information is available at http://www.cha.com/.

SECTION 1: OVERVIEW OF DIABETES

Types of Diabetes

There are three main types of diabetes: type 1, type 2 and gestational. The majority of people with diabetes have one of these three types. Other specific types of diabetes, which may account for 1% to 2% of all diagnosed cases, result from specific genetic syndromes, surgery, drugs, malnutrition, infections and other illnesses.

Type 1 diabetes, previously called insulin-dependent diabetes mellitus or juvenile onset diabetes, occurs when the body's immune system destroys pancreatic beta cells, which are the cells that produce insulin. People with type 1 diabetes must have insulin injected into the body. Type 1 usually is diagnosed in children and young adults, but can occur at any age. Risk factors are less well defined for type 1 diabetes, but autoimmune, genetic and environmental factors are involved in developing this type of diabetes.

Type 2 diabetes, previously called non-insulin dependent diabetes mellitus or adult onset diabetes, is the most common type. This disease begins with insulin resistance but progresses to a point when the pancreas loses its ability to produce insulin. The onset of type 2 diabetes is more common in older age groups, but is being diagnosed increasingly in children and adolescents. Risk factors for type 2 diabetes include older age, obesity, family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, physical inactivity and race/ethnicity. African Americans, Hispanic/Latino Americans, American Indians and some Asian Americans and Pacific Islanders are at particularly high risk for type 2 diabetes.

Gestational diabetes is glucose intolerance that is diagnosed in women during pregnancy. This form of diabetes requires treatment during pregnancy to avoid complications in the infant. Additionally, some women who experience gestational diabetes are at an increased risk of developing type 2 diabetes in the subsequent 5-10 years. Research suggests around 50% of women with a history of gestational diabetes developed diabetes later in life. The baby of a mother who had gestational diabetes also is at increased risk of developing diabetes in the future, as well as becoming obese. This excess risk goes beyond genetics and is associated with intrauterine glucose exposure.[7] Gestational diabetes occurs more frequently in African Americans, Hispanic/Latino Americans, American Indians and people with a family history of diabetes compared to other groups. Obesity also is associated with higher risk of gestational diabetes.

Pre-diabetes is a new classification in which individuals have higher-than-normal blood glucose levels. These levels are not high enough to be classified as diabetes, but people with pre-diabetes are at increased risk of developing type 2 diabetes, heart disease and stroke. Progression to diabetes among those with pre-diabetes is not inevitable. Studies suggest that weight loss and increased physical activity among people with pre-diabetes may prevent or delay diabetes. An estimated 57 million (26%) Americans aged 20 years or older had pre-diabetes in 2007.[5]

Prevalence of Diabetes

Diabetes in the United States

In the United States in 2007, 17.9 million people had diagnosed diabetes and another 5.7 million had undiagnosed diabetes.[4] A total of 23.6 million people in the United States had diabetes, which represents about 8% of the total population in 2007. Prevalence is defined as the proportion of individuals in a population who have a disease or condition at a specific time. The

prevalence of diabetes in adults in the United States increased from 4.9% in 1990 to 8% in 2007, a 63% increase during this 18-year period.

Figure 1: Trend in Percentage of Adults With Diabetes, Colorado and the United States, 1990-2007[1,2,3]

1. Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Dept. of Public Health & Environment
2. Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention
3. Percentages in 1990-1993 included gestational diabetes

Population Demographics for Colorado

In 2006, Colorado had an estimated population of 4,753,377 residents. Census estimates from 2006 showed that females accounted for 49.7% of the population, while males made up the remaining 50.3%. In 2006, 24.6% of the population was under 18 years of age. About 10% of the total Colorado population was aged 65 and older. The majority of the population (71.7%) was Non-Hispanic and White. People of Hispanic or Latino origin made up the largest minority group in the state at 19.7% of the population. The Hispanic/Latino designation signifies ethnicity, not race, so these people are counted in the estimates for the other race categories. About 4.1% of the population was Black. American Indian and Alaska Native people represented 1.1% of the population in Colorado. Asian people made up 2.6% of the population, while Native Hawaiians and other Pacific Islanders accounted for less than 1%. Another 1.8% of people in the state reported belonging to two or more races. High school graduates composed 86.9% of the population, while 32.7% had a bachelor's degree or higher. The median household income estimate in Colorado was $50,105 in 2004.[8]

Diabetes in Colorado

Gender

The Behavioral Risk Factor Surveillance System (BRFSS) is a primary source for information on diabetes in adults aged 18 and over in Colorado. In 2007, 5.3% of the adult population in Colorado reported having diabetes, which is equivalent to about 195,000 residents. As seen in Figure 1, the prevalence of diabetes in Colorado still is lower than the prevalence for the nation as a whole. Figure 2 shows the trends in the prevalence of diabetes from 1990-2007 in Colorado by gender. The prevalence among

Figure 2: Trend in the Percentage of Adults With Diabetes by Gender, Colorado, 1990-2007[1,2,3]

1. Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Dept. of Public Health & Environment
2. Behavioral Risk Factor Surveillance System, Health Statistics Section, Centers for Disease Control and Prevention
3. Percentages in 1990-1993 included gestational diabetes

males and among females was similar during this period. Figure 3 shows that in 2007, the prevalence of diabetes was 5.6% in male adults and 5.1% in female adults.

Figure 3: Percentage of Adults With Diabetes by Gender, Colorado, 2007 (n=819)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health & Environment

Confidence intervals are at the 95% confidence level.
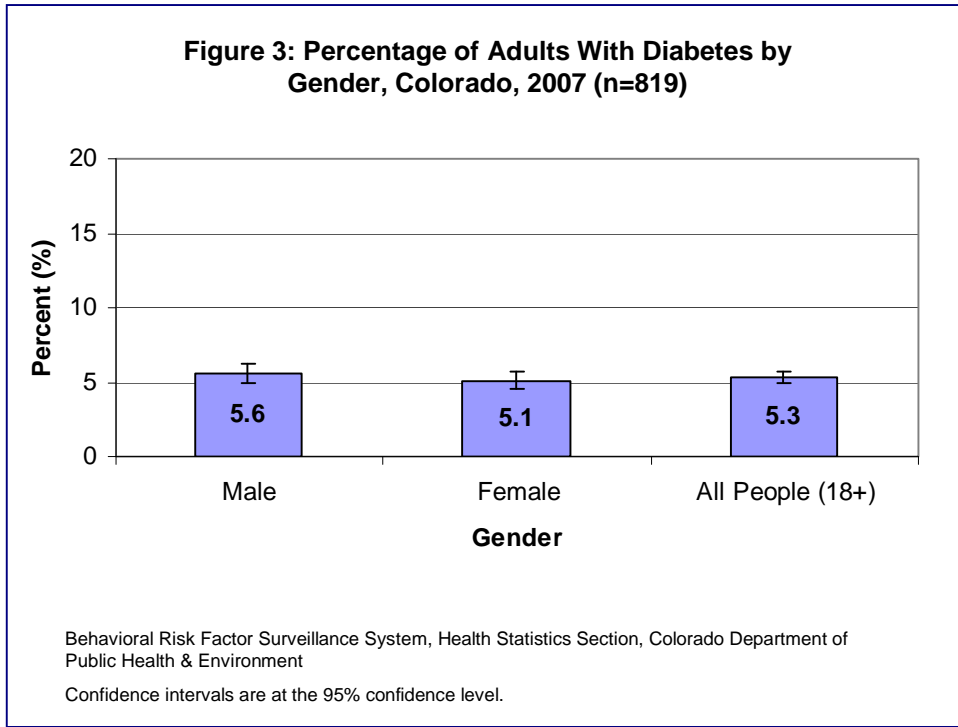
Age

As seen in Figure 4, the prevalence of diabetes is higher in older age groups. Younger adults aged 18-44 had a prevalence of 4.1%. The prevalence was 11% in the 55-64 age group, and 15.3% in the oldest age group, those 65 and older.

Figure 4: Percentage of Adults With Diabetes by Age Group, Colorado, 2007 (n=812)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health & Environment

Confidence intervals are at the 95% confidence level.

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Race/Ethnicity

Figure 5 illustrates how the prevalence of diabetes is lower for Coloradans who report to be White/Non-Hispanic, compared to Coloradans who report to be Hispanic, or Black/Non-Hispanic. Only 4.5% of the White/Non-Hispanic population reported having diabetes. An estimated 7.7% of the Hispanic population and 10.3% of the Black/Non-Hispanic population reported having diabetes. These prevalence estimates are not statistically different.

Figure 5: Percentage of Diabetes by Race/Ethnicity, Colorado, 2007 (n=809)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health & Environment

Confidence intervals are at the 95% confidence level.
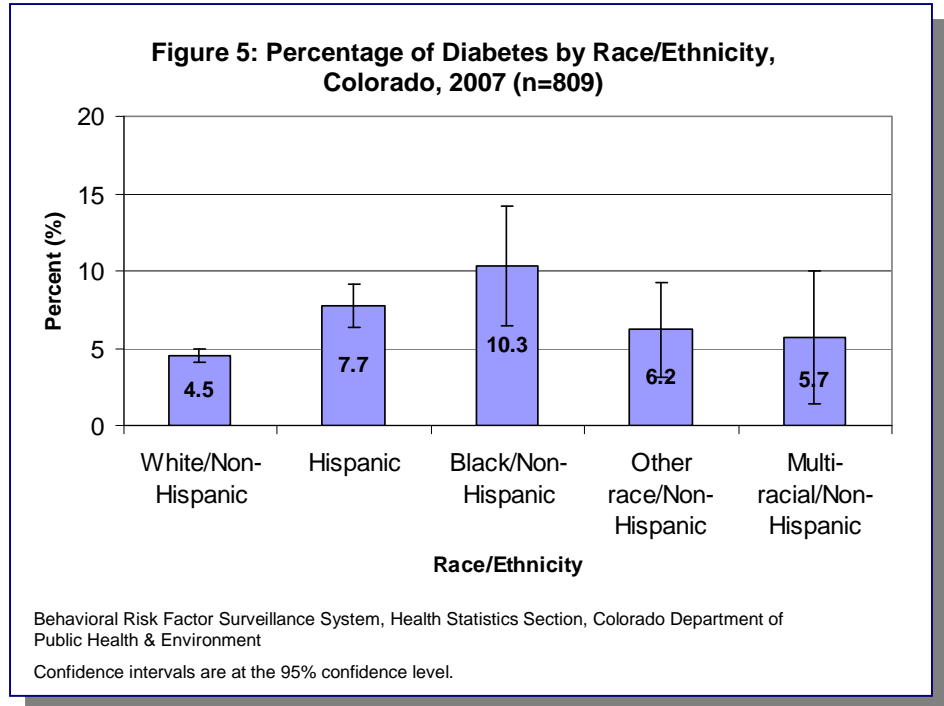
Education Level

Figure 6 shows the distribution of diabetes among Coloradans by level of education obtained. The prevalence of diabetes is higher in groups that have fewer years of education. About 8% of people who had less than a high school education reported having diabetes. Only 3.8% of college graduates reported being diagnosed with diabetes. This figure highlights disparities in diabetes prevalence based on education level.

Figure 6: Percentage of Adults With Diabetes by Education Level, Colorado, 2007 (n=819)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health & Environment

Confidence intervals are at the 95% confidence level.

Annual Household Income

The prevalence of diabetes by annual household income is shown in Figure 7. Diabetes is more common in adults with lower levels of household income. The prevalence of diabetes was 9.8% for people whose income level was below $15,000 per year, while only 2.5% of people whose income level was $75,000 or greater had diabetes. The prevalence of diabetes in adults residing in households with annual incomes less than $15,000 is almost twice as high as adults residing in households with annual incomes between $50,000 and $74,999 (9.8% versus 5.1%). This figure highlights disparities in diabetes prevalence based on income.

Figure 7: Percentage of Adults With Diabetes by Annual Household Income, Colorado, 2007 (n=699)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health & Environment

Confidence intervals are at the 95% confidence level.

Figure 8: Percentage of Adults Aged 20 Years and Older With Diagnosed Diabetes by County, Colorado, 2005

Behavioral Risk Factor Surveillance System, Center for Disease Control and Prevention

Diabetes Prevalence by County

Figure 8 shows the prevalence of diagnosed diabetes by county in Colorado. The data are part of County Level Estimates of Diagnosed Diabetes derived from census data and the 2005 BRFSS. The map, along with the percentages in each county, is posted on the Internet at the following address:

http://apps.nccd.cdc.gov/DDT_STRS2/CountyPrevalenceData.aspx.[9] The highest prevalence of diabetes occurs in some of the more rural counties such as Baca, Costilla, Huerfano, Jackson, Kiowa, Montezuma, Phillips, Pueblo, Sedgwick and Washington counties.

Gestational Diabetes in Colorado

Figure 9: Percentage of Women With Gestational Diabetes by Year*, Colorado, 2000-2006

Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment

* Percentages for 2000-2003 included pre-existing and gestational diabetes combined. Percentages for 2004-2006 represent gestational diabetes only.
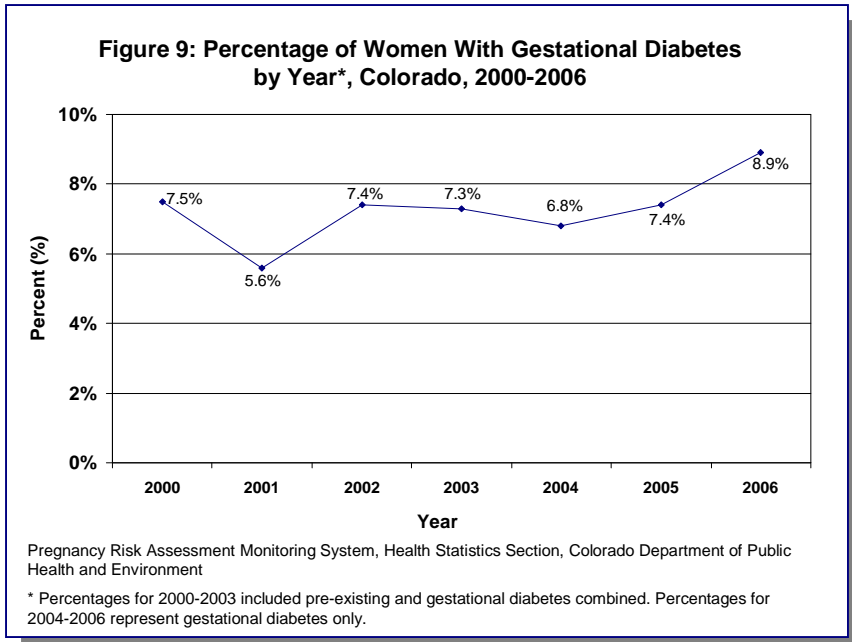
The Pregnancy Risk Assessment Monitoring System (PRAMS) is a source for information on women who develop diabetes during pregnancy. Birth certificate data are another source for information on gestational diabetes. The birth certificate is often incomplete, which results in the underreporting of gestational diabetes in Colorado mothers.[10] Because of this, the majority of the information presented related to gestational diabetes are from the PRAMS data.

In Colorado, the percentage of women who had diabetes during pregnancy fluctuated between 5% and 10% during 2000-2006 (Figure 9). These results are not comparable during this time period, because from 2004 forward the PRAMS question related to diabetes during pregnancy was changed to differentiate between pre-existing and gestational diabetes. Therefore, the other figures in this section report results for 2004-2006 only. The highest percentage was 8.9% of mothers who gave birth in 2006 and reported having gestational diabetes during pregnancy. This estimate for 2006 did not include women with pre-existing diabetes.

Age

Figure 10 shows the percentage of women who developed diabetes during pregnancy by age group. From 2004-2006, 4.5% of Colorado teenagers who gave birth had diabetes during pregnancy. Almost 11% of the women aged 35 or older reported having gestational diabetes. The prevalence estimates of gestational diabetes appear to increase with increasing age of the mother, though this increase is statistically significant only for the younger and older age groups.

Figure 10: Percentage of Women With Gestational Diabetes by Age Group, Colorado, 2004-2006 (n=455)

Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment

Confidence intervals are at the 95% confidence level.

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Colorado **Diabetes**
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

Race/Ethnicity
Figure 11 shows the percentage of women who developed gestational diabetes by race/ethnicity. More than 11% of the White/Hispanic women who gave birth during 2004-2006 reported having gestational diabetes. This percentage is almost two times higher than the percentage of White/Non-Hispanic women who reported having gestational diabetes.

Figure 11: Percentage of Women With Gestational Diabetes by Race/Ethnicity, Colorado, 2004-2006 (n=455)

Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment

Confidence intervals are at the 95% confidence level.
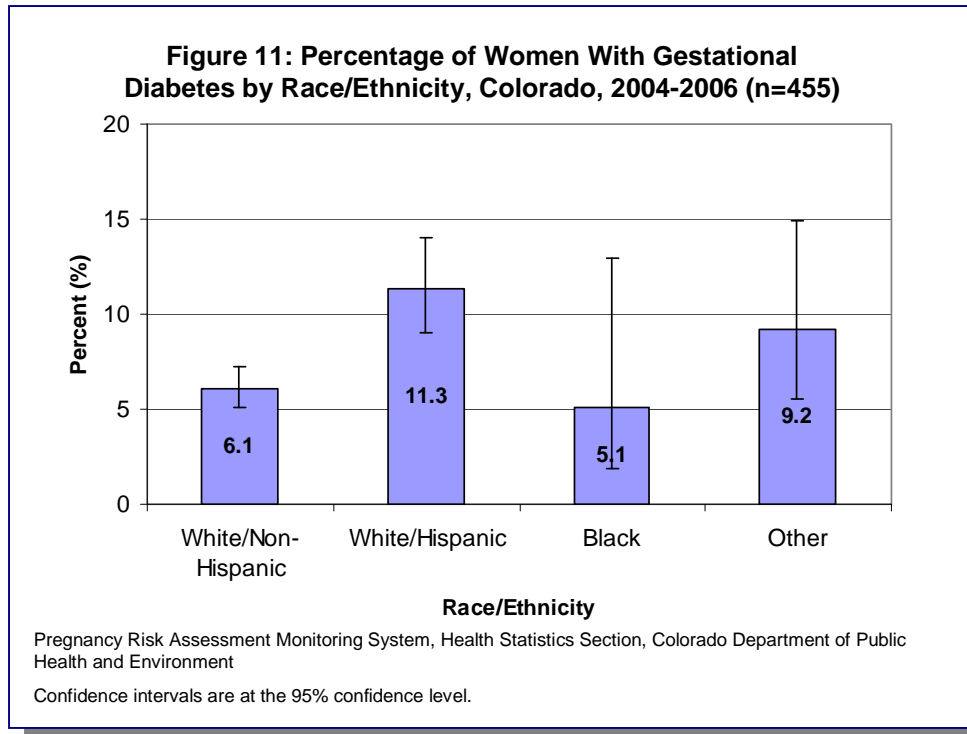
Years of Education Received
Gestational diabetes was more common in women with fewer years of education (Figure 12). Of the women with fewer than 12 years of education, 10.8% reported gestational diabetes. This percentage was significantly higher than that among the women with more than 12 years of education. Of the women with more than 12 years of education, only 6.2% reported having gestational diabetes.
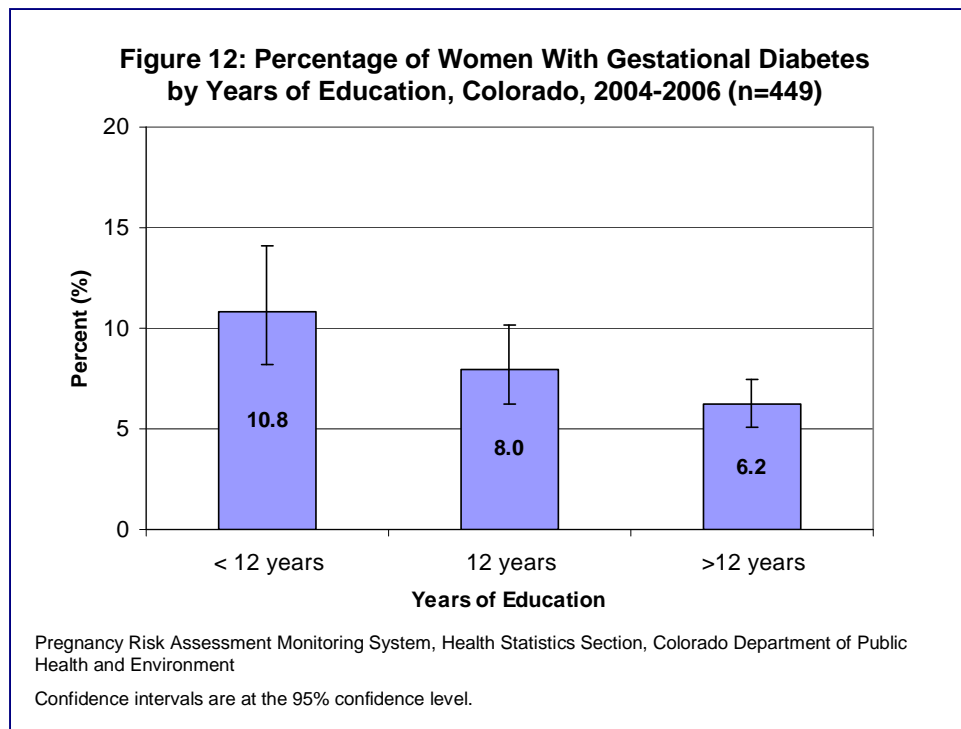
Figure 12: Percentage of Women With Gestational Diabetes by Years of Education, Colorado, 2004-2006 (n=449)

Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment

Confidence intervals are at the 95% confidence level.

Figure 13: Percentage of Women With Gestational Diabetes by Poverty Level, Colorado, 2004-2006 (n=455)

[Bar chart showing Percent (%) on the y-axis from 0 to 20, and Federal Poverty Level (FPL) on the x-axis with three categories: <=185% FPL (10.2), >185% FPL (5.5), and Unknown (8.8)]

Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment

Confidence intervals are at the 95% confidence level.

Poverty Level

Figure 13 displays the percentage of women who developed gestational diabetes by federal poverty level (FPL). A significantly higher percentage of women who were at or below 185% of the federal poverty level had gestational diabetes (10.2%) compared to women whose household income was almost twice the federal poverty level.

Diabetes in Colorado Youth

Diabetes in people under age 20 is relatively rare. In the United States, 0.2% of people under age 20 (or 186,300 people) had diabetes in 2007. Type 1 diabetes is the most common form of diabetes in youth, although the prevalence of type 2 diabetes among youth is increasing. This increase is directly linked to the growing rates of obesity among children and teenagers. [5, 11] The prevalence of obesity has nearly tripled in the past two decades for adolescents aged 12-19 in the United States.[12]

The study 'SEARCH for Diabetes in Youth' focuses on children and youth in the United States who have diabetes. Colorado has one of the six clinical study centers in the nation that is identifying prevalent and incident cases of all types of diabetes among individuals under age 20. A research article published in 2007 on SEARCH study results provided the following information on the incidence of type 1 diabetes in children and youth ages 0 to 17 years old in Colorado:[13] The

Figure 14: Age-Specific Incidence Rate of Type 1 Diabetes in 0- to 17-Year-Old Youth by Gender and Race/Ethnicity, Colorado, 2002-2004 (n=746)

[Line chart showing Rate per 100,000 on the y-axis from 0% to 40%, and Age Group on the x-axis with four categories: 0-4, '5-9, '10-14, 15-17. Four lines represent: White/Non-Hispanic Females, White/Non-Hispanic Males, Hispanic White Females, Hispanic White Males]

White/Non-Hispanic Females ■   White/Non-Hispanic Males ◆
Hispanic White Females ▲   Hispanic White Males ✕

From 'Increasing Incidence of Type 1 Diabetes in 0- to 17-Year-Old Colorado Youth,' by K. Vehik et al., 2007, *Diabetes Care, 30*, p. 503. Copyright © 2007 by the American Diabetes Association. Reprinted with permission from *The American Diabetes Association.*

overall incidence rate for type 1 diabetes in Colorado children and youth ages 0-17 was 23.9 per 100,000 people during 2002-2004. Figure 14 shows the age-specific incidence rates of type 1 diabetes in youth ages 17 and younger by gender and race/ethnicity. The incidence rates were higher in White/Non-Hispanics compared to White/Hispanics, while there are no strong

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differences in the incidence rates between females and males.[13] The incidence of type 1 diabetes is on the rise in Colorado as well as across the nation.

Pre-Diabetes in Colorado

There is not a system in place currently to measure the prevalence of pre-diabetes in Colorado. By applying the national estimate to the Colorado population, about 914,000 people aged 20 years and older had pre-diabetes in 2007.[14] Monitoring pre-diabetes is important, because diabetes can be prevented in people diagnosed with pre-diabetes. In the future, surveillance systems will be developed to ascertain the incidence and prevalence of pre-diabetes.

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of Public Health
and Environment

Colorado
Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

SECTION 2: PREVENTION OF COMPLICATIONS

Diabetes can occur in almost any population, and all people with diabetes need education to manage this disease. Self-management training is a popular tool for teaching people with diabetes about the disease and what steps they can take to optimize their health. A systematic review of intervention studies related to the effectiveness of self-management training for type 2 diabetes concluded that the training is effective, especially in the short term.[15] Diabetes self-management is extremely important in reducing the risk for complications associated with diabetes. These techniques first need to be learned through diabetes self-management education, which is an integral part of the treatment plan. People with diabetes and their physicians are responsible for maintaining these preventive health practices to ensure the best health possible. This section presents the prevalence of preventive health practices among people with diabetes in Colorado from the 2007 Colorado Behavioral Risk Factor Surveillance System (BRFSS). Rationales for these preventive practices along with the Colorado Healthy People 2010 goals and actual prevalence for each practice are presented in Table 1. Please refer to Table 3 in the Appendix for percentages that are mentioned in the text, but not included in the graph.

Table 1 Rationales for Diabetes Preventive Health Practices/Management and Colorado 2010 Objectives

Preventive Health Practices	Rationales[16]	Colorado 2010 Objective[17]	2007 BRFSS
Self-Monitoring Blood Sugar	Self-monitoring of blood glucose is important for assessing the efficacy of treatment and to guide changes in medical nutrition therapy, exercise and medications to achieve the best possible glucose control. This is important to prevent acute glycemic reactions and long-term diabetes complications. This process measure provides information about diabetes self-management.	75% (checked blood sugar at least once a day)	**59.3%**
A1C (glycosylated hemoglobin)	Glycemic control is essential for preventing diabetes-related complications. A1C exams provide information on blood sugar levels over the prior 2-3 months. This process indicator provides information about the quality of diabetes care provided.	90% (checked A1C at least once a year)	**85.0%**
Foot Exam	People with diabetes are at increased risk of hospitalization, morbidity, disability and mortality associated with lower extremity amputations. Early detection and treatment of foot ulcers can reduce the risk of lower extremity amputation. This process indicator provides information about the quality of diabetes care provided.	75% (foot exam at least once a year)	**74.1%**
Dilated Eye Exam	Diabetes is the leading cause of blindness among working age adults. Early detection through eye exams and appropriate treatment can substantially reduce blindness among people with diabetes.	75% (at least once a year)	**66.6%**
Diabetes Management Education	Self-management is critical to the effective management of diabetes and prevention of complications. This process measure provides information about the number of people with diabetes who have taken a course in diabetes self-management in a jurisdiction.	75% (received formal diabetes education)	**60.7%**
Flu Shot	People with diabetes are at increased risk of hospitalization, morbidity and mortality associated with influenza. Influenza vaccination has the potential to improve morbidity and mortality outcomes among people with diabetes. This process indicator provides information about the quality of diabetes care provided.	75% (at least once a year)	**67.9%**
Pneumococcal Vaccination	People with diabetes are at increased risk of hospitalization, morbidity and mortality associated with pneumonia. Pneumococcal vaccination has the potential to improve morbidity and mortality outcomes among people with diabetes. This process indicator provides information about the quality of diabetes care provided.	60% (at least once in lifetime)	**61.0%**
Cholesterol Profile	People with diabetes are at increased risk of complications from cardiovascular disease, such as stroke, angina and congestive heart failure. Early detection of elevated lipid levels and appropriate treatment can decrease risk for cardiovascular complications as well as retinopathy. This process measure may provide information about the quality of diabetes care provided and/or diabetes self-management behavior.	95% (had cholesterol checked within the past year)	**91.5%***
Blood Pressure	People with diabetes are at increased risk of complications from cardiovascular disease (CVD), such as hypertension. CVD is the leading cause of death for people with diabetes. Early detection of elevated blood pressure levels and appropriate treatment can decrease risk for both macrovascular and microvascular complications. This process measure provides information about the quality of diabetes care and/or diabetes self-management.	16%** (had high blood pressure)	**60.2%**

* Percentage is from BRFSS data for 2005-2007 combined.

** Percentage is from the national Healthy People 2010 objective to reduce high blood pressure in people with diabetes.

Self-Management Education

Diabetes self-management education is a critical component of comprehensive diabetes care. In Colorado in 2007, 60.7% of adults with diabetes reported having taken a class to manage their diabetes. Figure 15 shows the distribution of adults who took a self-management class by gender, age and race. A higher percentage of female adults (66.3%) reported taking a class to manage their diabetes than male adults (55.7%). Only 54.4% of older adults (aged 75 years and older) reported taking a class to manage their diabetes. Less than 52% of Hispanic adults with diagnosed diabetes reported taking a class to help them manage their diabetes; the percentage was significantly lower than White/Non-Hispanics. As

Figure 15: Percentage of Adults With Diabetes Who Have Ever Taken a Class to Manage Diabetes by Gender, Age and Race, Colorado, 2007 (n=819)

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

Confidence intervals are at the 95% confidence level.
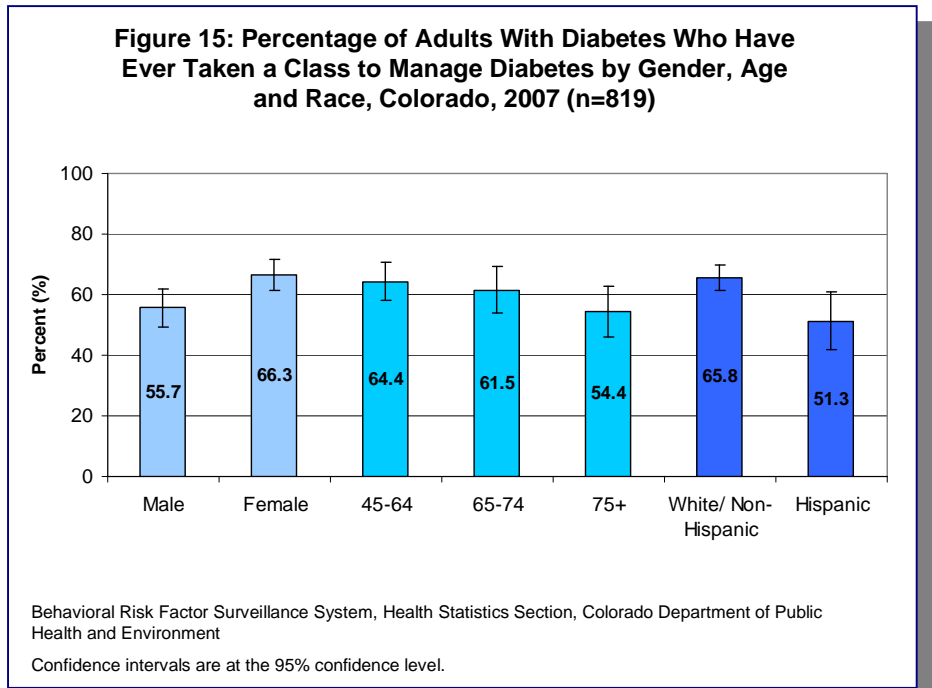
shown in the Appendix, about 70% of adults with diabetes who had at least some college experience had taken a diabetes management class, while only 56.3% of those who graduated from high school reported taking a class. About 55% of adults with diabetes who had an annual household income less than $24,999 reported taking a class to manage their diabetes. This prevalence was lower compared to adults with diabetes who reported higher income levels.

Figure 16: Percentage of Adults With Diabetes Who Check Blood Glucose Levels Daily by Gender, Age and Race, Colorado, 2007 (n=819)

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

Confidence intervals are at the 95% confidence level.
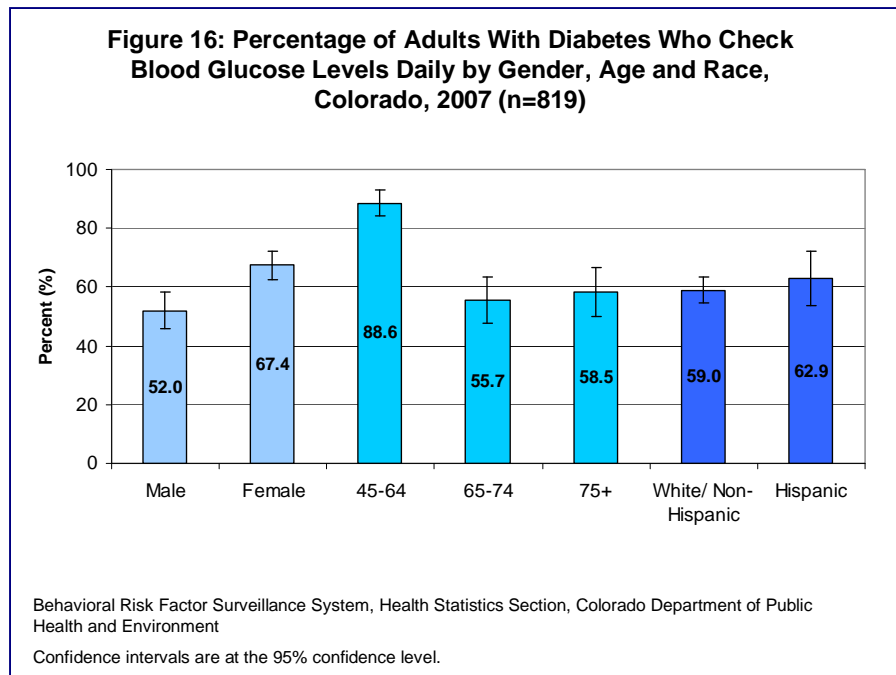
Self-Monitoring Blood Glucose

People with diabetes should conduct self-monitoring of blood glucose levels on a regular schedule to reach glycemic goals.[18] In 2007, more than one-half (59.3%) of adults with diagnosed diabetes in Colorado reported checking their blood sugar on a daily basis. Figure 16 shows that two-thirds of females with diabetes (67.4%) checked their blood sugar daily,

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Colorado
Diabetes
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COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

compared to only 52% of males with diabetes. This was significantly different between males and females. A significantly higher percentage of adults aged 45-64 years checked their blood sugar every day, as compared to other age groups. About 63% of Hispanic adults with diabetes tested their blood sugar daily, compared to 59% of White/Non-Hispanic adults with diabetes. The Appendix shows that only 54.2% of the people with diabetes who had some high school education or less checked their blood glucose levels daily. The percentage of adults with diabetes who checked their blood sugar daily was lowest for people with diabetes whose annual household incomes were below $15,000 (55.9%) and whose incomes were $50,000 or more (50.9%).

Glycosylated Hemoglobin

The glycosylated hemoglobin test, also called A1C or hemoglobin A1C, measures the average level of glucose in the blood over the prior three months. The standard of medical care for people with diabetes is to receive an A1C test at least twice a year.[18] About 66% of adult Coloradans with diagnosed diabetes reported having their A1C checked at least twice in the past year. As shown in Figure 17, 66.9% of women reported receiving this test, compared to 65.4% of men. Also, 67.9% of adults with diabetes aged 45-64 received an A1C test at least twice per year. Of all White/Non-Hispanic people with diabetes, 69.3% received an A1C test at least
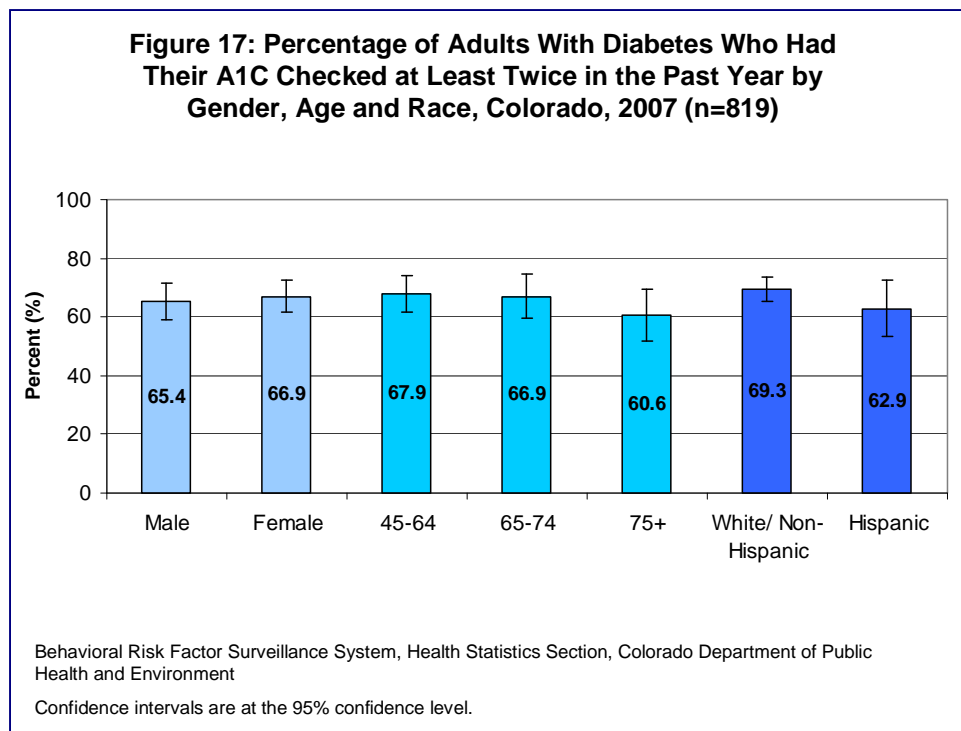
Figure 17: Percentage of Adults With Diabetes Who Had Their A1C Checked at Least Twice in the Past Year by Gender, Age and Race, Colorado, 2007 (n=819)

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

Confidence intervals are at the 95% confidence level.

twice in the past year, compared to 62.9% of Hispanic adults with diabetes. About 65% of adults with some college and 74.6% of adults with a college diploma or higher reported having an A1C test at least twice in the past year. More than 72% of adults with diabetes who had an annual household income of $50,000 or more reported having this test in the past year (Appendix).

Foot Exam

Adults with diabetes should receive a comprehensive foot exam by a health professional on an annual basis to identify risk factors predictive of ulcers and amputations.[18] In Colorado, 74.1% of adults with diagnosed diabetes received a foot exam by a health care professional in the past year (male: 70.9%, female: 77.8%). As shown in Figure 18, a higher percentage of Hispanic adults (79.1%) reported having a health professional check their feet in the past year than White/Non-Hispanic adults (70.7%). Of the adults with diabetes who had some high school education or lower, 79.1% received a foot exam by a health care professional in the past year,

Figure 18: Percentage of Adults With Diabetes Who Had a Professional Foot Exam in the Past Year by Gender, Age and Race, Colorado, 2007 (n=819)
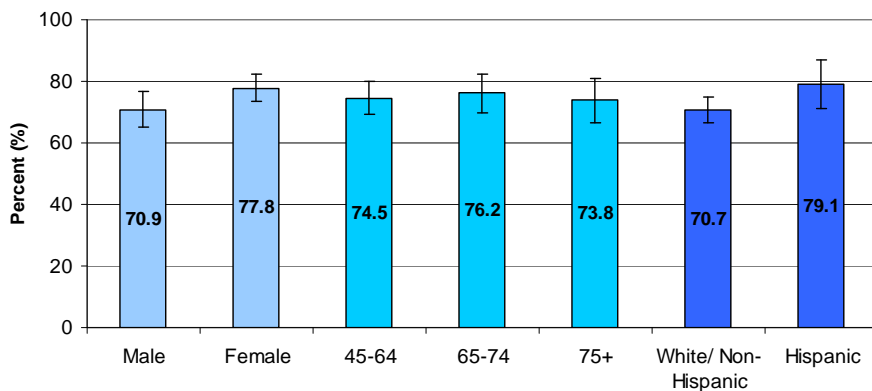
Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Confidence intervals are at the 95% confidence level.

compared to 72% of the adults with a high school diploma or some college. Slightly more than 75% of adults with diabetes who reported an annual household income of $35,000-$49,999 and $50,000 or more indicated receiving a foot exam from a health care professional in the past year, compared to less than 70% of adults with diabetes whose annual household income was less than $15,000 (Appendix).

Dilated Eye Exam

Adults with diabetes need dilated and comprehensive eye exams annually to monitor the health of the retina. If eye disease is diagnosed in the initial stages, it can be reversed. Diabetes is the leading cause of blindness but through proper screening and optimal glycemic control, it can be avoided.[18] Overall, 66.6% of adults with diabetes in Colorado reported having a dilated eye exam in the past year. The prevalence of female adults with diagnosed diabetes who had a dilated eye exam in the past year (65.1%) was slightly lower than their male counterparts (68.1%) as demonstrated in Figure 19. Also, 82.2% of adults aged 75 years

Figure 19: Percentage of Adults With Diabetes Who Had a Dilated Eye Exam in the Past Year by Gender, Age and Race, Colorado, 2007 (n=819)

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

Confidence intervals are at the 95% confidence level.

and older had their eyes dilated in the past year compared to 63.5% of adults with diabetes aged 45-64. Comparing across racial/ethnic groups, 58.8% of Hispanic adults with diagnosed diabetes had a dilated eye exam in past year, compared to 71.2% of White/Non-Hispanics. The

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Colorado **Diabetes**
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COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

Appendix shows that about 77% of adults with a college education reported having a dilated eye exam in the past year. The higher the annual household income was, the higher the percentage of adults with diabetes who indicated that they received a dilated eye exam in the past year.

Flu Shot

The standards of medical care recommend that people with diabetes receive an influenza vaccine every year. [18] The percentage of Colorado adults with diagnosed diabetes who received a flu shot in the past year was 67.9%. Figure 20 shows that almost 72% of the females with diabetes had a flu shot in the past year. As age increased, the percentage of adults with diabetes receiving a flu shot in the past year also increased. For White/Non-Hispanics, 70.8% received an annual flu shot, compared to 66.7% of Hispanics, though

Figure 20: Percentage of Adults With Diabetes Who Had a Flu Shot in the Past Year by Gender, Age and Race, Colorado, 2007 (n=819)

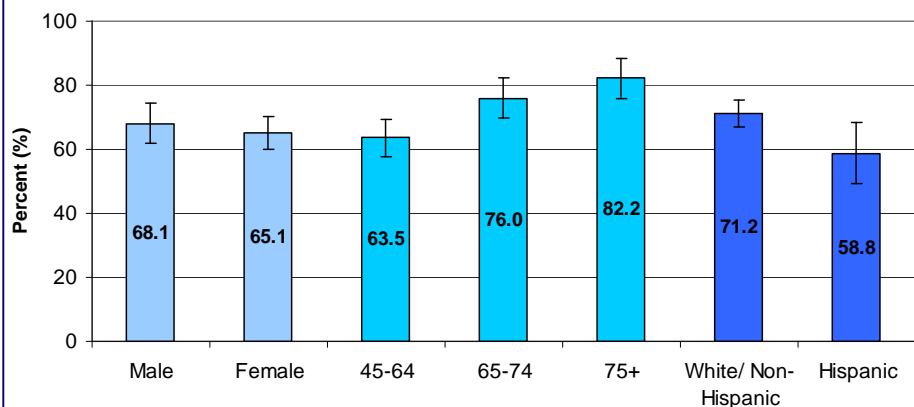| Category	Percent
Male	64.4
Female	71.8
45-64	62.6
65-74	79.6
75+	86.1
White/ Non-Hispanic	70.8
Hispanic	66.7

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Confidence intervals are at the 95% confidence level.

these estimates are not statistically different. The Appendix shows the following prevalence estimates: Comparing among education levels, 70.2% of adults with some high school education or less reported receiving a flu shot in the past year, while 68.8% of adults with a college degree received a flu shot in the same period. Adults with diabetes who had an annual household income of less than $15,000 had the highest prevalence for receipt of a flu shot in the past year (75.1%), while those who earned $50,000 or more per year had the lowest (61.1%).

Figure 21: Percentage of Adults With Diabetes Who Have Ever Had a Lifetime Pneumococcal Vaccination by Gender, Age and Race, Colorado, 2007 (n=819)
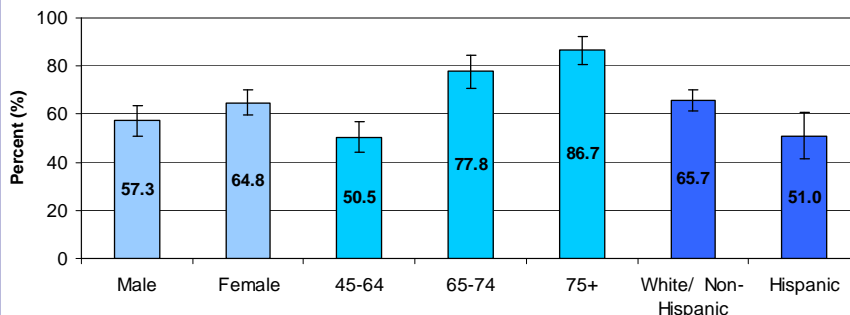
Category	Percent
Male	57.3
Female	64.8
45-64	50.5
65-74	77.8
75+	86.7
White/ Non-Hispanic	65.7
Hispanic	51.0

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Confidence intervals are at the 95% confidence level.

Pneumococcal Vaccination

It is recommended that adults with diabetes receive at least one pneumococcal vaccine. Additionally, a one-time revaccination is recommended for those age 65 and older if they received a vaccine given prior to age 65 more than five years ago. [18] Of the adults with diabetes, 61% met this recommendation in 2007. Figure 21 shows that in 2007, 64.8% of female adults with

diagnosed diabetes in Colorado reported receiving a pneumonia vaccination, compared to 57.3% of males. In adults with diabetes aged 75 and older, 86.7% reported ever receiving a pneumonia vaccination while 50% of people with diabetes aged 45-64 reported ever receiving a pneumonia vaccination. A higher percentage of White/Non-Hispanic adults with diabetes received a pneumonia vaccination (65.7%) compared to Hispanic adults with diabetes (51%). As shown in the Appendix, about 58% of adults with less than a high school degree have ever had a pneumonia vaccination, compared to 62.2% of adults with diabetes who had a high school diploma. Adults with diabetes whose incomes were under $15,000 had the highest prevalence for receipt of a pneumonia vaccination (76.9%).

Cholesterol

Standards of medical care recommend that most adults with diabetes measure their cholesterol at least once a year. [18] Adults with low-risk lipid levels can go longer between measurement intervals. During 2007, almost 97% of Colorado adults with diagnosed diabetes reported having their blood cholesterol checked within the past five years.

Figure 22: Percentage of Adults With Diabetes With a Cholesterol Check in the Past Five Years by Gender, Age and Race, Colorado, 2007 (n=819)
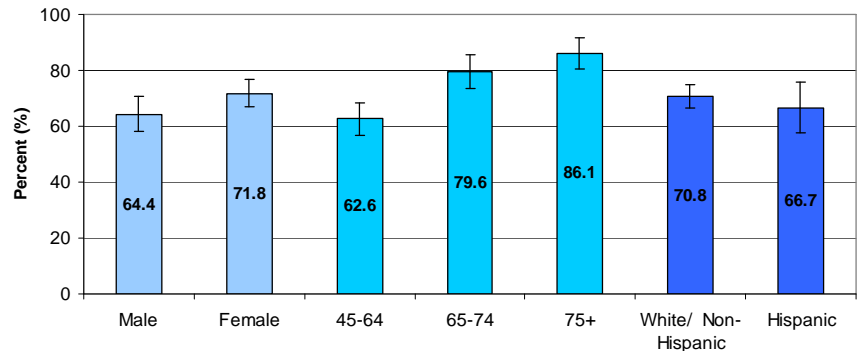

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Confidence intervals are at the 95% confidence level.

Males with diabetes (96.3%) and females with diabetes (97.1%) had a similar prevalence of having cholesterol checked in the past five years (Figure 22). The percentage of people with diabetes who had their cholesterol checked within the past five years was about the same across all age groups. About 98% of White/Non-Hispanics with diabetes had their cholesterol checked in the past five years, compared to 96.2% of Hispanics with diabetes (Figure 22). The Appendix shows that 99% of adults with a college degree reported having their cholesterol checked within the past five years, whereas 88.6% of adults with some high school education or lower reported the same. About 93% of adults with diabetes who had an annual household income of less than $15,000 had their blood cholesterol checked within the preceding five years. This was the lowest prevalence compared to other income levels.

Figure 23: Percentage of Adults With High Cholesterol by Diabetes Status, Colorado, 2005 & 2007 (n=1,117; 13,870)
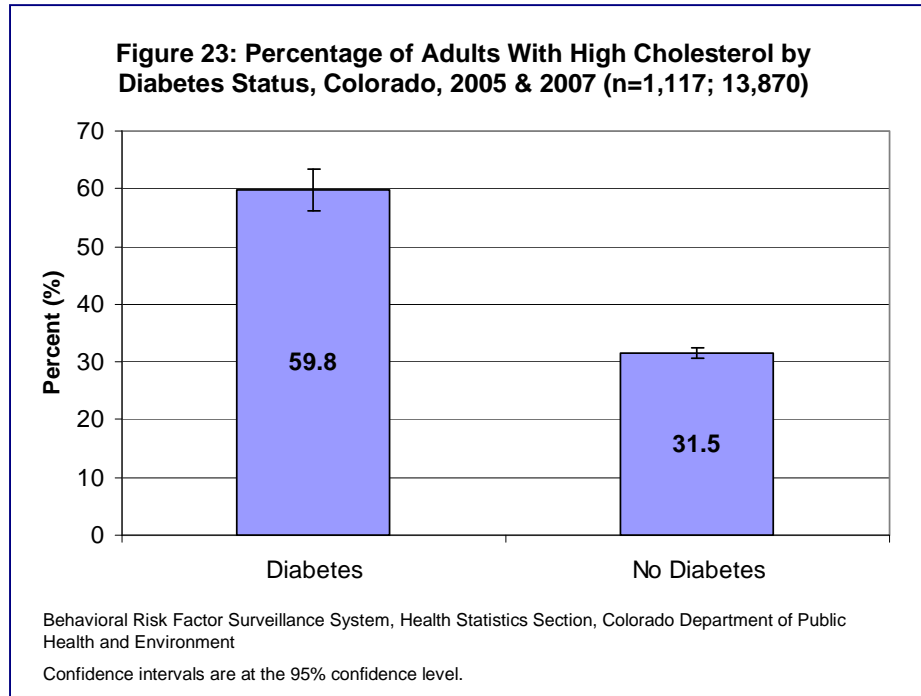
High cholesterol levels can lead to cardiovascular complications, insulin resistance and retinopathy. Thus, it is important to detect high lipid levels in people with diabetes to reduce the risk of these detrimental complications. Figure 23 shows the prevalence of high cholesterol in adults with diabetes and in adults without diabetes in Colorado. Almost 60% of people with diabetes reported having high cholesterol,

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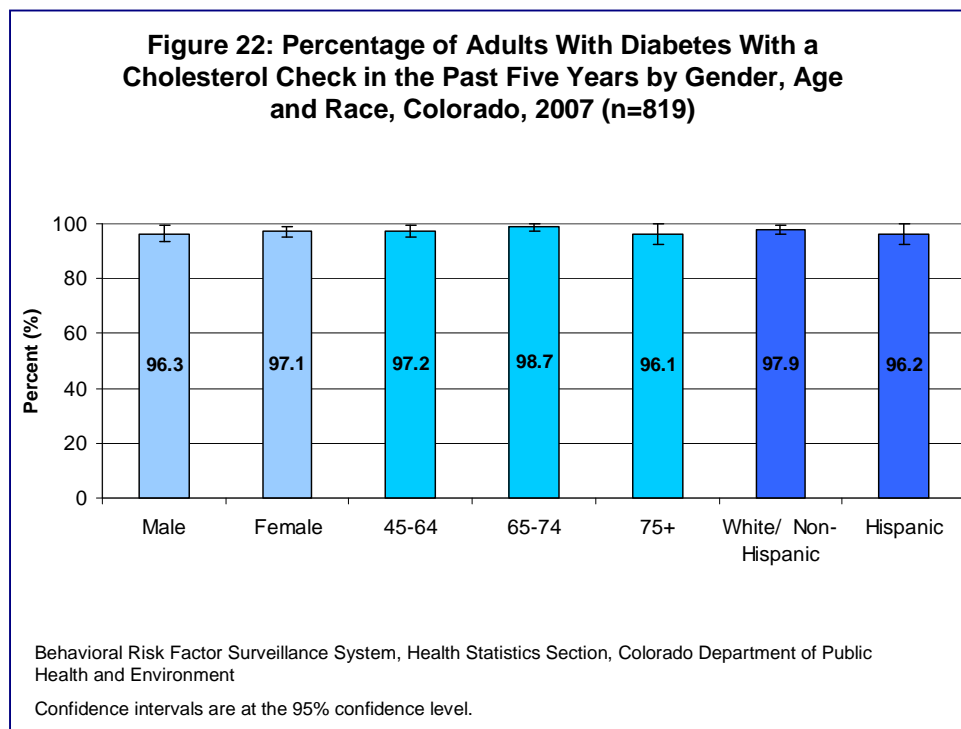Confidence intervals are at the 95% confidence level.

compared to only 31.5%, of people without diabetes. The prevalence of high cholesterol levels in people with diabetes is twice what it is in people without diabetes.

Blood Pressure

People with diabetes are at increased risk of complications from cardiovascular disease, such as hypertension. Early detection of elevated blood pressure levels and appropriate treatment can decrease risk for both macrovascular and microvascular complications. Figure 24 illustrates the prevalence of high blood pressure in adults with and without diabetes. Sixty percent of adults with diabetes reported having high blood pressure, compared to 18.5% of the adults without diabetes.

Figure 24: Percentage of Adults With High Blood Pressure by Diabetes Status, Colorado, 2005 & 2007 (n=1,166; 16,696)

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Confidence intervals are at the 95% confidence level.
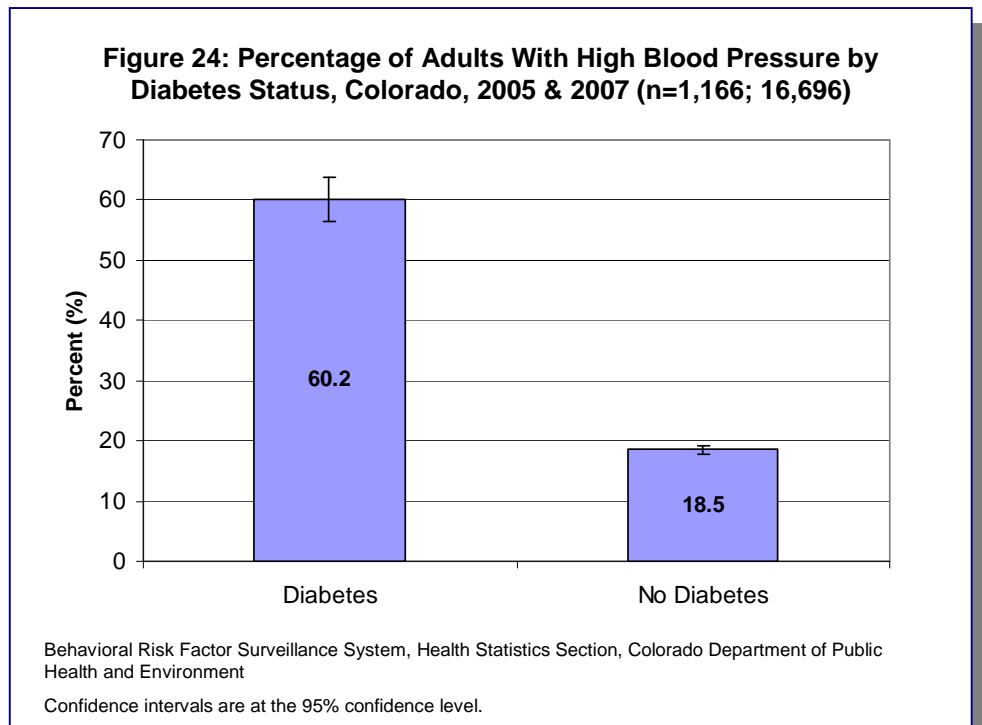
SECTION 3: COMPLICATIONS OF DIABETES

The preventive health practices presented in Section 2 are extremely important for preventing the complications and disabilities associated with diabetes. The following sections detail some of the morbidities associated with all types of diabetes.

Overall Health

Physical Health

People with diabetes may have poor physical health, because of an increase in morbidities associated with the disease. Figure 25 shows the mean number of days that adults reported their physical health as 'not good' in the past 30 days. The definition of physical health included physical illness or injury. On average, people with diabetes reported that during the past 30 days about 16 days were not good. This average means that people with diabetes spent half the month in poor physical health. In comparison, adults without diabetes reported a mean of only 8.4 days per month where their physical health was not good or about a quarter of the month.

Figure 25: Mean Number of Days That Adults Reported Physical Health as "Not Good" in the Past 30 Days by Diabetes Status, Colorado, 2005-2007 (n=737; 7,183)

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Confidence intervals are at the 95% confidence level.

Figure 26: Mean Number of Days That Adults Reported Mental Health as "Not Good" in the Past 30 Days by Diabetes Status, Colorado, 2005-2007 (n=479; 7,134)

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Confidence intervals are at the 95% confidence level.

Mental Health

In addition to physical health, mental health status also can be negatively affected in people who have diabetes. Figure 26 shows the mean number of days that adults reported their mental health as "not good" in the past 30 days. The definition of mental health included stress, depression and problems with emotions. People with and people without diabetes reported a significantly different mean number of days when their mental health was poor (11.9 and 8.8, respectively).

Cardiovascular Disease

Cardiovascular disease is the leading cause of diabetes-related deaths. People with diabetes often have risk factors such as high blood pressure and high cholesterol that increase their risk for heart disease and stroke.[19] The following three figures (27, 28, 29) demonstrate the prevalence of specific cardiovascular diseases among adults with and without diabetes in Colorado. People with diabetes were significantly more likely to report ever having a heart attack, angina or stroke, compared to people without diabetes.

Figure 27: Percentage of Adults Who Ever Had a Myocardial Infarction by Diabetes Status, Colorado, 2005-2007 (n=1,560; 22,330)

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Confidence intervals are at the 95% confidence level.
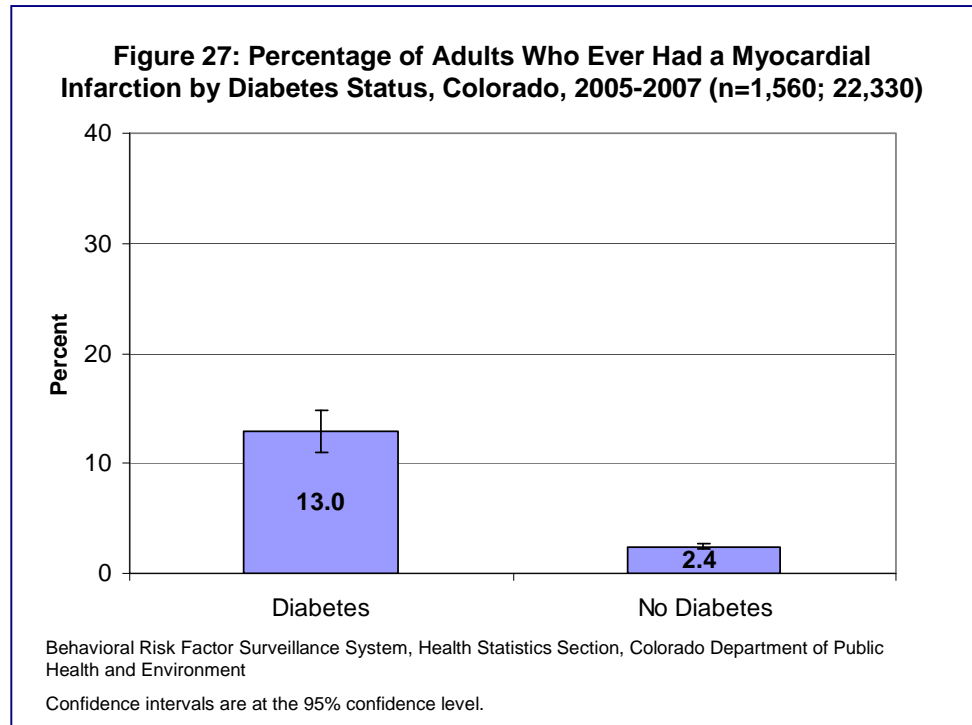
About 13% of people with diabetes reported that they had a heart attack in the past, also known as a myocardial infarction. This percentage is significantly higher than the 2.4% of people without diabetes who reported ever having a myocardial infarction.
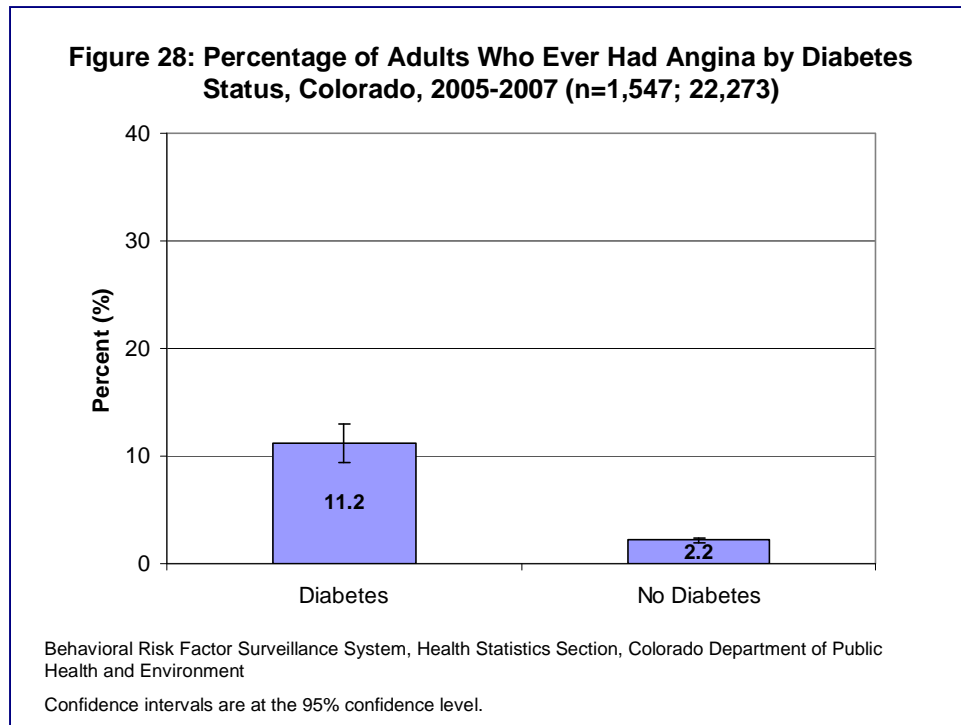
Among adults with diabetes, 11.2% reported having experienced angina. Only 2.2% of adults without diabetes reported ever experiencing angina.

Figure 28: Percentage of Adults Who Ever Had Angina by Diabetes Status, Colorado, 2005-2007 (n=1,547; 22,273)

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Confidence intervals are at the 95% confidence level.

Figure 29: Percentage of Lifetime History of Stroke by Diabetes Status, Colorado, 2005-2007 (n=1,568; 22,370)

Percent (%)

Diabetes: 5.2

No Diabetes: 1.4

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

Confidence intervals are at the 95% confidence level.

About 5% of adults with diabetes reported ever having a stroke, compared to only 1.4% of adults without diabetes reporting ever experiencing a stroke. Though the prevalence is low, it is significantly higher in people with diabetes.

End-Stage Renal Disease (ESRD)

Diabetes can cause permanent damage to the kidneys, which may result in chronic renal failure. End-stage renal disease, the last stage of renal failure, occurs when the kidneys fail to work and are no longer able to function to support everyday life by excreting wastes from the body.[20] Diabetes is the leading cause of renal failure. In 2005, diabetes caused 44% of the new cases of renal failure in the United States.[5] Many dialysis patients being treated for end-stage renal disease have diabetes as a primary diagnosis. These patients must stay on chronic dialysis or get a kidney transplant to survive.

End-Stage Renal Disease Incidence and Prevalence in Colorado

Figures 30 and 31 show the trend in the end-stage renal disease incidence and prevalence rates for Colorado. In 2007, the end-stage renal disease incidence rate

Figure 30: Incidence of End-Stage Renal Disease by Year, Colorado, 1997-2007

Incidence per 1,000,000

Year

About Network #15, Intermountain End-Stage Renal Disease Network #15

was 186.7 people per million population, and the prevalence rate was 684.6 people per million population in Colorado. Figure 31 shows that the prevalence rate has slowly increased each

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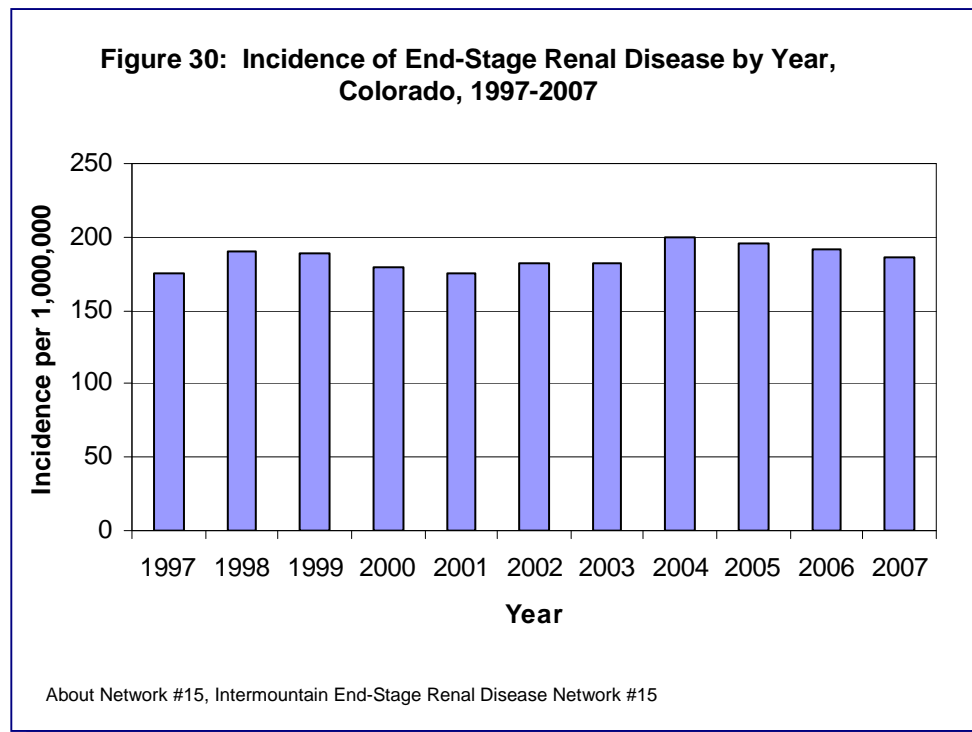
year, which may reflect that the annual number of deaths among patients in the end-stage renal disease network is lower than the number of new patients. For example, in 2007, there were 557 deaths among patients on dialysis in Colorado and 916 new end-stage renal disease patients.

Figure 31: Prevalence of End-Stage Renal Disease by Year, Colorado, 1997-2007
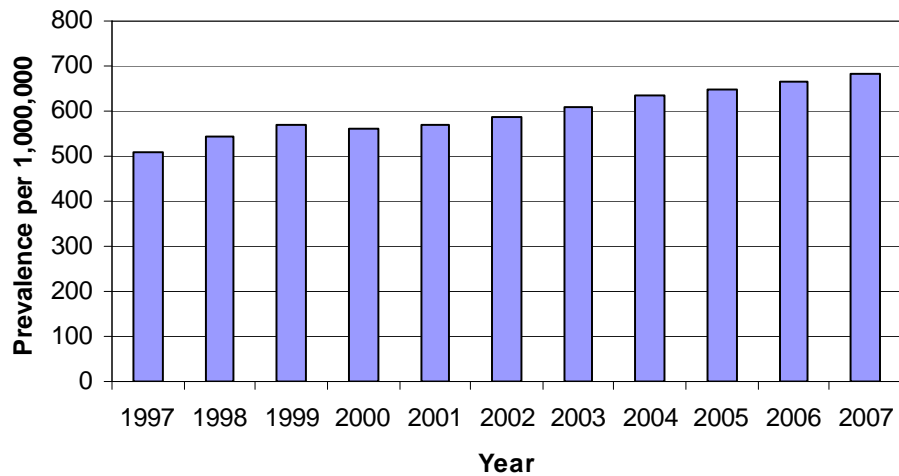
About Network #15, Intermountain End-Stage Renal Disease Network #15

Figure 32: Incidence of End-Stage Renal Disease by Primary Diagnosis, Colorado, 2007 (n=2,079)

- Diabetes
- Hypertension
- Glomerulonephritis
- Cystic Kidney
- Other Urologic
- Other
- Unknown
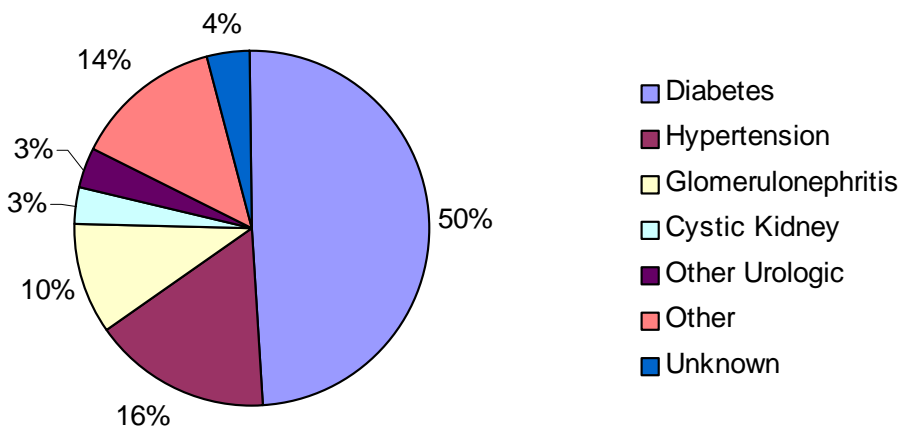
Intermountain End-Stage Renal Disease Network #15

Diagnosis
The leading cause of renal failure in the United States and in Colorado is diabetes. In Colorado in 2007, 50% of the newly diagnosed end-stage renal disease patients had a primary diagnosis of diabetes. Hypertension ranked second, accounting for 16 % of the newly diagnosed end-stage renal disease patients (Figure 32).

Colorado Department of Public Health and Environment

Colorado
Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

In 2007, there were 557 deaths among patients on dialysis in Colorado. A total of 266, or 48%, who died had a primary diagnosis of diabetes (Figure 33).

Figure 33: Deaths Among Dialysis Patients by Primary Diagnosis, Colorado, 2007 (n=557)

Intermountain End-Stage Renal Disease Network #15
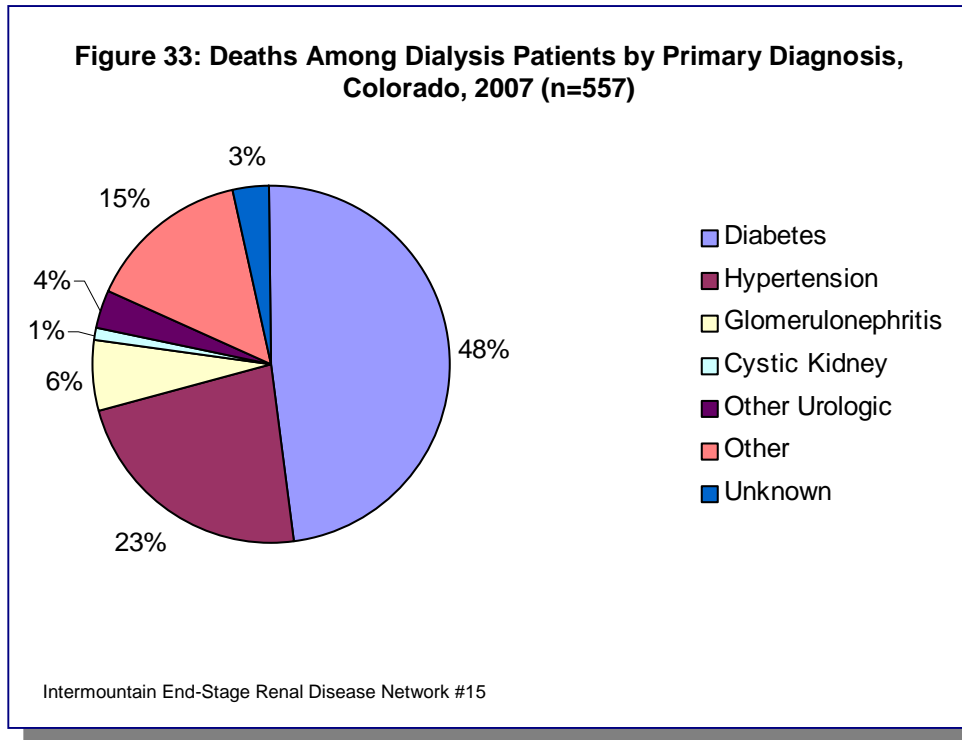
Hospitalizations

The Colorado Hospital Association collects hospital discharge data. Hospital discharge data are an important source of information for monitoring trends of diabetes-related complications and for assessing the burden of the disease on the health care system. This section gives an overview on hospital discharge rates between 2004 and 2007.

Hospital Discharge Rates for Diabetes
Figure 34 shows the percentage of hospitalizations for primary or secondary diagnosis of diabetes in Colorado in 2007. There were more than 58,000 people hospitalized with a diagnosis of diabetes. This represents approximately 12% of

Figure 34: Percentage of Hospitalizations for Diabetes: Principal vs. Secondary Diagnosis, Colorado, 2007

Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment
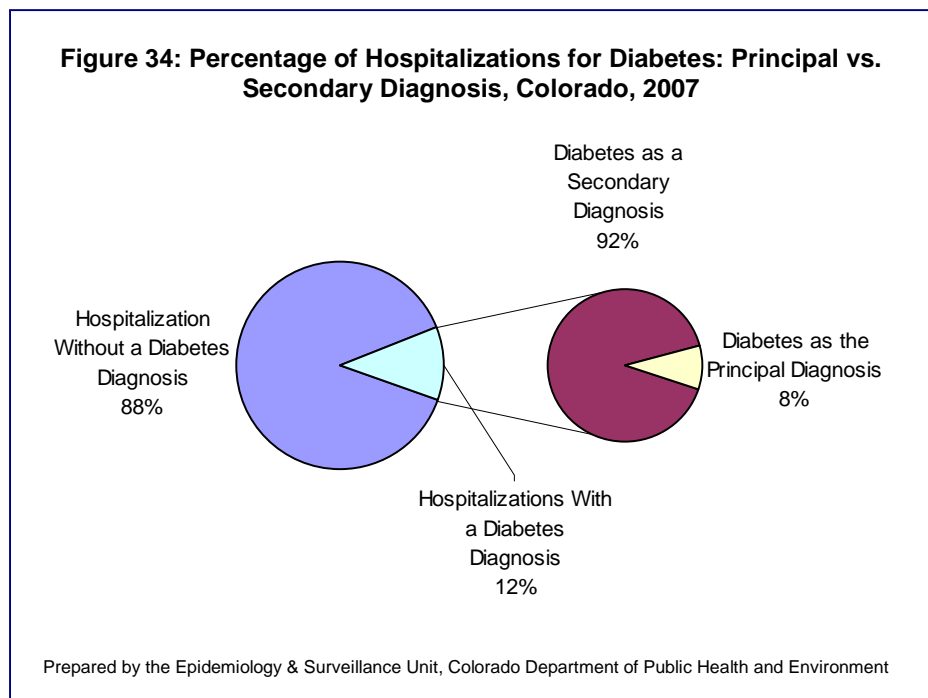
hospitalizations for Colorado residents. Of the 58,434 hospitalizations with a diabetes diagnosis, 8% had diabetes listed as the principal diagnosis, suggesting that the reason for the hospital admission was a direct result of diabetes. The other 92% of the hospitalizations with a diabetes diagnosis had diabetes listed as a secondary diagnosis.

Trends in Hospital Discharge Rates
Figure 35 shows the trend in age-adjusted hospital discharge rates with any mention of diabetes as a listed diagnosis. The rates increased slightly from 2004 to 2006 and decreased slightly in 2007.
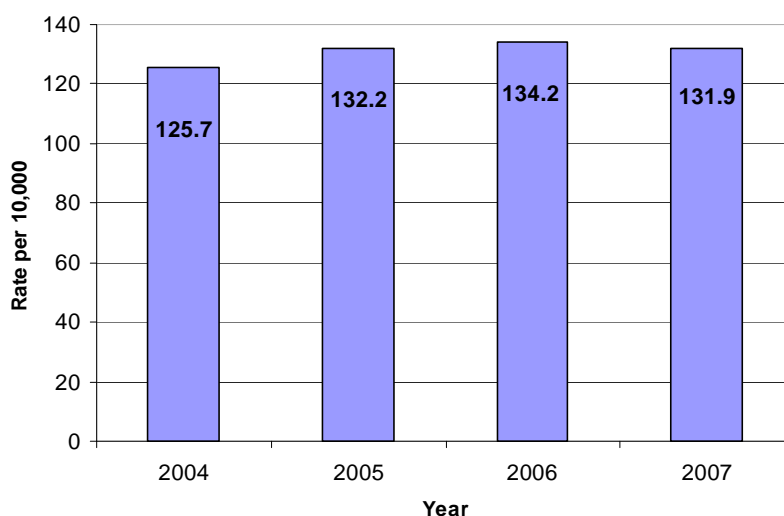
Diabetes-Related Complications
Almost 84% of the total 58,434 hospitalizations with any mention of diabetes also mentioned major cardiovascular disease. Cardiovascular

Figure 35: Discharge Rates with Any Mention of Diabetes at Discharge as a Listed Diagnosis by Year, Colorado, 2004-2007

Rates are age-adjusted to the 2000 United States population
Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment

disease includes hypertension, heart disease, cerebrovascular disease and more. Neurological (diabetic neuropathies) and renal manifestations (including kidney transplant and dialysis) were some of the other frequently listed complications. Eye disease (retinopathy, glaucoma, cataracts, etc.) is another major complication that increases morbidity in people with diabetes as well as increases costs for treatment of diabetes. The highest total hospital charge was for major cardiovascular disease, due to the high discharge rate (112.0 per 10,000) or high number of hospitalizations. The average patient age for each complication was in the range of 62 to 67 years old.

The age-adjusted rate for lower extremity amputations was 1.7 per 10,000. People hospitalized for lower extremity amputations had the longest average length of hospital stay (10.3 days) with an average charge of $67,900 per hospitalization (Table 2). Figure 36 shows the number of amputations by gender for 2004 through 2007. In every year, there were more than twice as many hospitalizations for amputations among males compared to females. Figure 37 shows the rates of hospitalizations by age for diabetes-related lower extremity amputations in 2007. Rates of diabetes-related, nontraumatic lower extremity amputations are higher in the older age groups (65 years and older).

Table 2 Hospitalizations With any Mention of Diabetes and Selected Complications as a Listed Diagnosis by Number of Discharges, Number of Days, Average Length of Stay, Discharge per 10,000 Residents, Total Charges, Average Charge and Average Age, Colorado, 2007

Complications	Number of Hospital Discharges Per Year	Total Number of Days	Average Length of Stay (Days)	Age-Adjusted Discharge Rate Per 10,000	Total Charges	Average Charge	Average Age
Lower Extremity Amputation	784	8,110	10.3	1.7	$53,233,533	$67,900	62.0
Renal Complications	5,971	33,402	5.6	13.1	$249,022,596	$41,705	62.9
Eye Disease	4,569	23,650	5.2	10.4	$158,189,852	$34,622	65.6
Neurological Complications	6,732	37,531	5.6	14.8	$245,668,482	$36,493	62.3
Major CVD*	48,805	241,462	4.9	112.0	$1,788,460,671	$36,645	67.1

*CVD = cardiovascular disease
Rates are age-adjusted to the 2000 United States population.
Lower extremity amputation: Any listed ICD-9-CM 250 with procedure code 84.1; Renal complications: Any listed ICD-9-CM 250.4 or any listed CM 250 with V42.0 (kidney transplant) or V45.1 (dialysis); Eye disease: Any listed ICD-9-CM 250.5 or ICD-9-CM 360-379 with any listed ICD-9-CM 250; Neurological complications: Any listed ICD-9-CM 250.6; Major cardiovascular disease: Any listed ICD-9-CM 390-448 with any listed ICD-9-CM 250.
Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment

Figure 36: Hospitalizations for Diabetes-Related Lower Extremity Amputations by Year and Gender, Colorado, 2004-2007
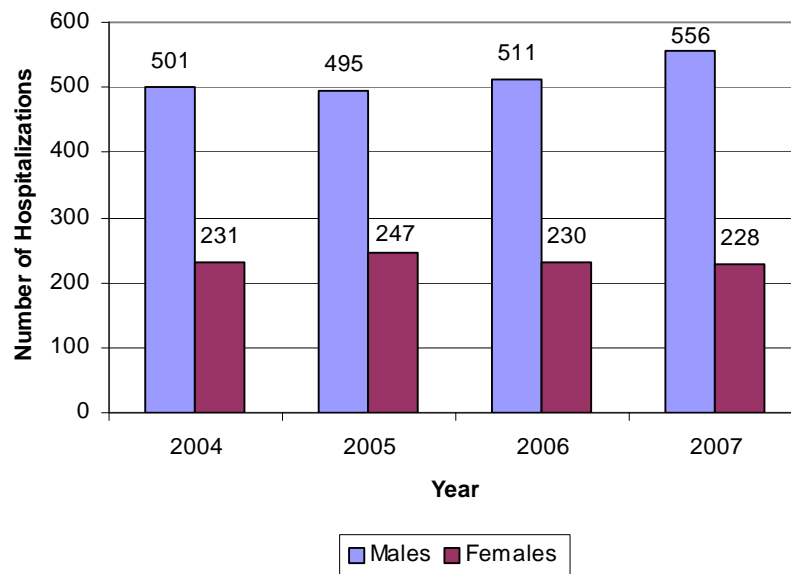
Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment

Figure 37: Hospitalizations for Diabetes-Related Lower Extremity Amputations by Age, Colorado, 2007 (n=784)

Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment

SECTION 4: MORTALITY

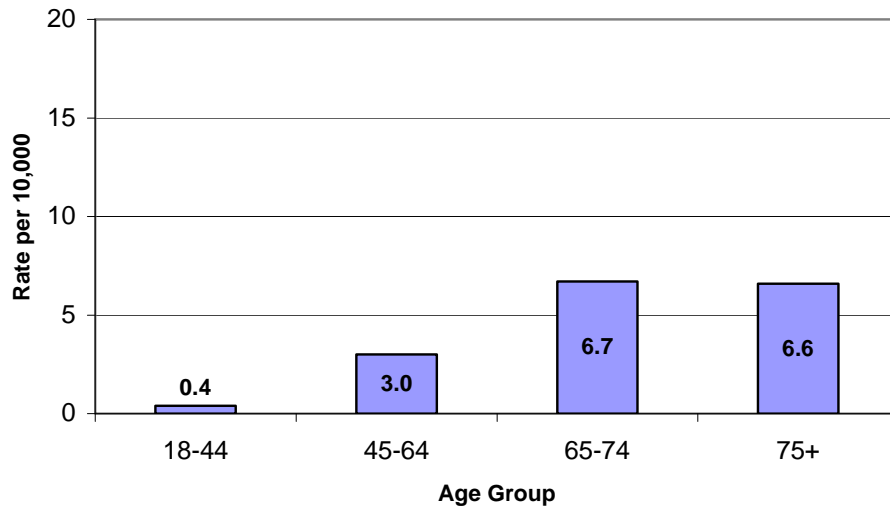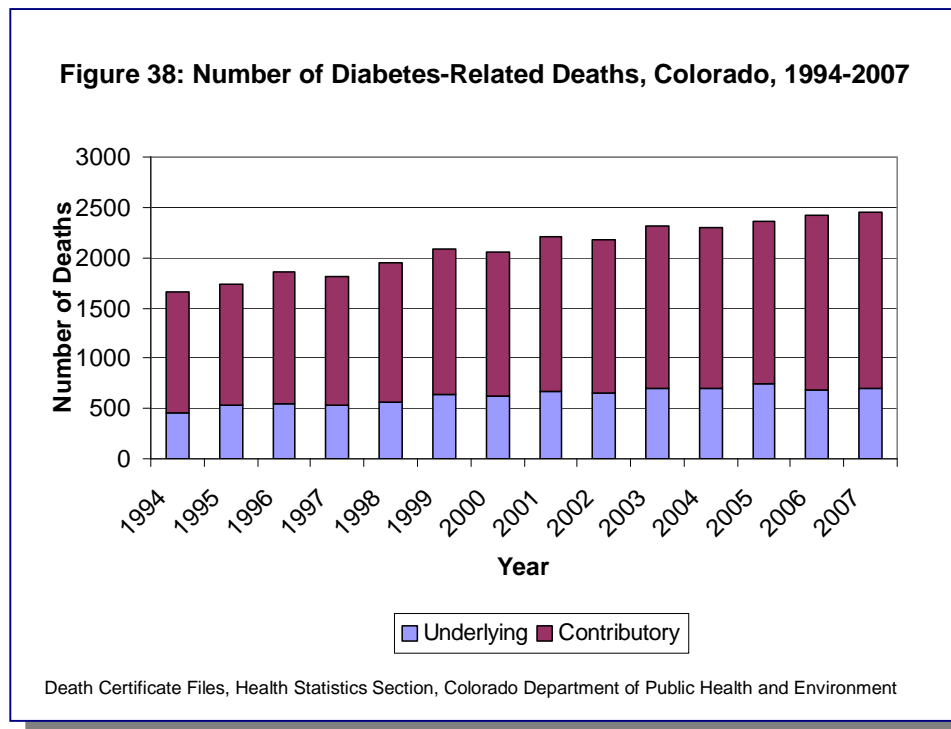Diabetes causes a variety of serious health complications that can cause or contribute to death. The following information is from death certificates. Causes of death are categorized as either underlying or contributory. The underlying cause of death is defined as "the disease or injury, which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury."[21] A contributory cause of death is any other disease or condition in the train of morbid events that is listed on the death certificate. Diabetes is underreported on death certificates; therefore, the number and rate of diabetes-related deaths presented are lower than the true number and rate.

In the United States, diabetes was the seventh leading cause of death. [5] In 2005, there were 75,119 deaths where diabetes was considered to be the main cause of death in the United States.[22]

Number of Diabetes-Related Deaths

Diabetes is one of the top ten leading causes of death in Colorado, ranking eighth in 2006, for example. Figure 38 shows that the lowest total number of diabetes-related deaths (both underlying and contributory causes) was 1,661 in 1994 and increased to a high of 2,457 in 2007.
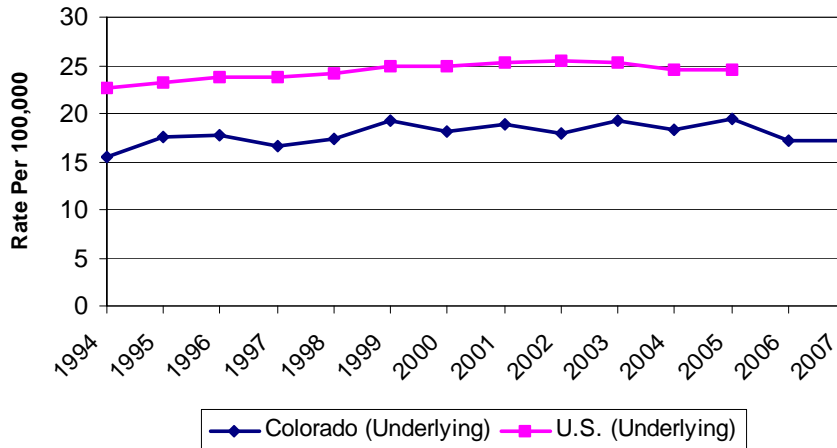

Figure 38: Number of Diabetes-Related Deaths, Colorado, 1994-2007

Death Certificate Files, Health Statistics Section, Colorado Department of Public Health and Environment

Mortality Trends

Mortality Trends in Colorado and the United States

Figure 39 presents the age-adjusted diabetes mortality rates for Colorado and the United States. In Colorado in 2007, the age-adjusted mortality rate for diabetes, as the underlying cause of death, was 17.2 deaths per 100,000 population. The most recent national mortality data are for 2005. In 2005 in the United States, age-adjusted mortality rate for diabetes as the underlying cause of death was 24.6 deaths per 100,000 population. In Colorado in 2005, the comparison rate was 19.5 deaths per 100,000 population. The Colorado mortality rates for diabetes have consistently been lower than those for the nation since 1994.

Figure 39: Age-Adjusted Mortality Rates for Diabetes as an Underlying Cause of Death, Colorado and the United States, 1994-2007*

*Mortality data for the United States were available only through 2005.
Age-adjusted mortality rates were calculated using the 2000 United States population as a standard.
Death Certificate Files, Health Statistics Section, Colorado Department of Public Health and Environment

Mortality Trends by Gender

Figure 40 shows the age-adjusted mortality rates related to diabetes for males and for females during 1994-2007. Overall, males had higher death rates related to diabetes, compared to females. The gender-specific mortality rates for diabetes as an underlying cause varied little over the 14-year period. From 1994 to 2007, the mortality rate for diabetes as an underlying or contributing cause in males increased by about 13% (from 67.8 deaths

Figure 40: Age-Adjusted Diabetes-Related Mortality Rates by Gender, Colorado, 1994-2007
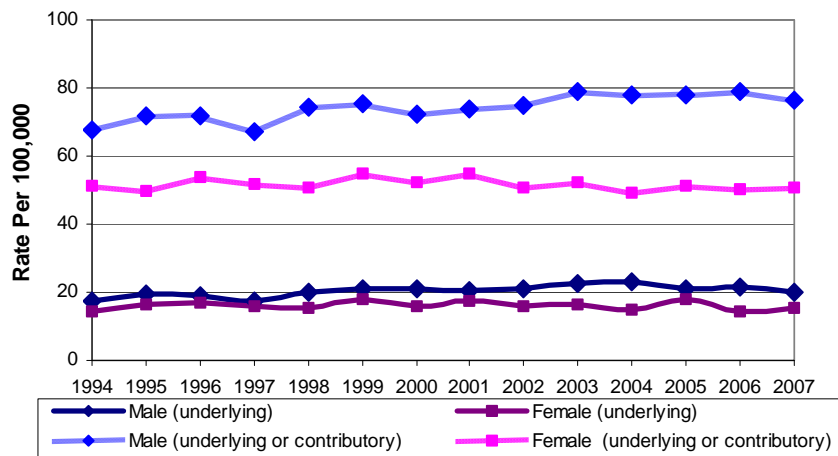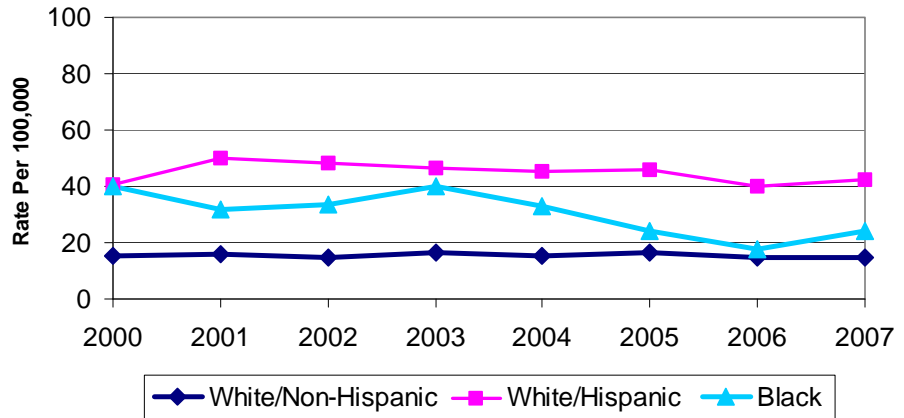

Age-adjusted mortality rates were calculated using the 2000 United States population as the age standard.
Death Certificates, Health Statistics Section, Colorado Department of Public Health and Environment

per 100,000 population to 76.4 deaths per 100,000 population). The rate for females over the same period stayed about the same, or 51.2 deaths per 100,000 population in 1994 and 50.7 deaths per 100,000 population in 2007.

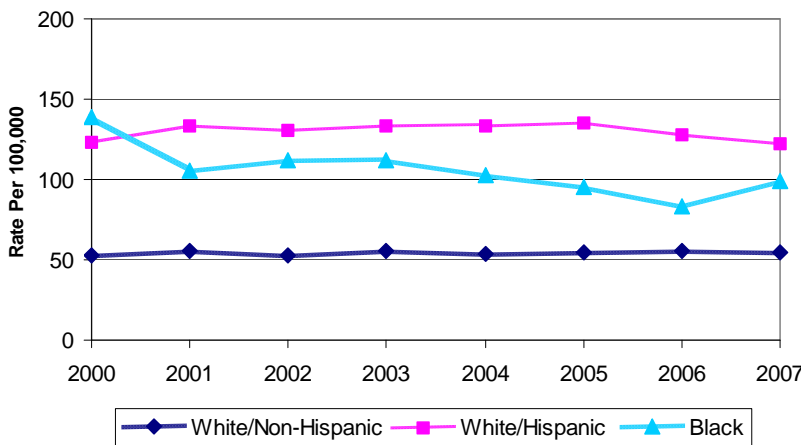### *Mortality Trends by Race/Ethnicity*

Figure 41 shows the age-adjusted mortality rates for diabetes as an underlying cause of death for specific racial/ethnic groups. White/Non-Hispanics consistently had the lowest annual mortality rate from diabetes as the underlying cause of death over the eight-year period. White/Hispanics had the highest annual mortality rate over the same period from 2000 to 2007. In 2007 in Colorado, the age-adjusted mortality rate for diabetes as the underlying cause of death among White/Non-

Figure 41: Age-Adjusted Mortality Rates for Diabetes as an Underlying Cause of Death by Race/Ethnicity, Colorado, 2000-2007

Age-adjusted mortality rates were calculated using the 2000 United States population as a standard.
Death Certificate Files, Health Statistics Section, Colorado Department of Public Health and Environment

Hispanics was 14.7 deaths per 100,000 population. Among Blacks, it was 24 deaths per 100,000 population. The rate for Hispanics was 42.1 deaths per 100,000 population, or three times the rate of White/Non-Hispanics. The rate for Blacks decreased from a high in 2003, such that in 2007, the rate for Blacks is similar to the rate for White/Non-Hispanics. This decrease may partly reflect a shift from reporting diabetes as the underlying cause to reporting it as a contributory cause of death.

Figure 42: Age-Adjusted Mortality Rates for Diabetes as any Mentioned Cause of Death by Race/Ethnicity, Colorado, 2000-2007

Age-adjusted mortality rates were calculated using the 2000 United States population as a standard.
Death Certificate Files, Health Statistics Section, Colorado Department of Public Health and Environment

Figure 42 shows the age-adjusted mortality rates for diabetes as either an underlying or contributory cause of death for each major racial/ethnic group in Colorado. Between 2000 and 2007,

White/Non-Hispanics consistently had the lowest diabetes-related mortality rates compared to White/Hispanics and Blacks. The rates for all racial/ethnic groups remained fairly constant over the eight-year period. In 2007 in Colorado, the age-adjusted mortality rate for diabetes as an underlying or contributory cause was 54.8 deaths per 100,000 population for White/Non-Hispanics. Among Blacks, it was 98.7 deaths per 100,000 population. The rate for Hispanics was 121.9 deaths per 100,000 population, or more than twice the rate for White/Non-Hispanics. The rate for Blacks decreased from a high in 2000, although it still is higher than the rate for White/Non-Hispanics.
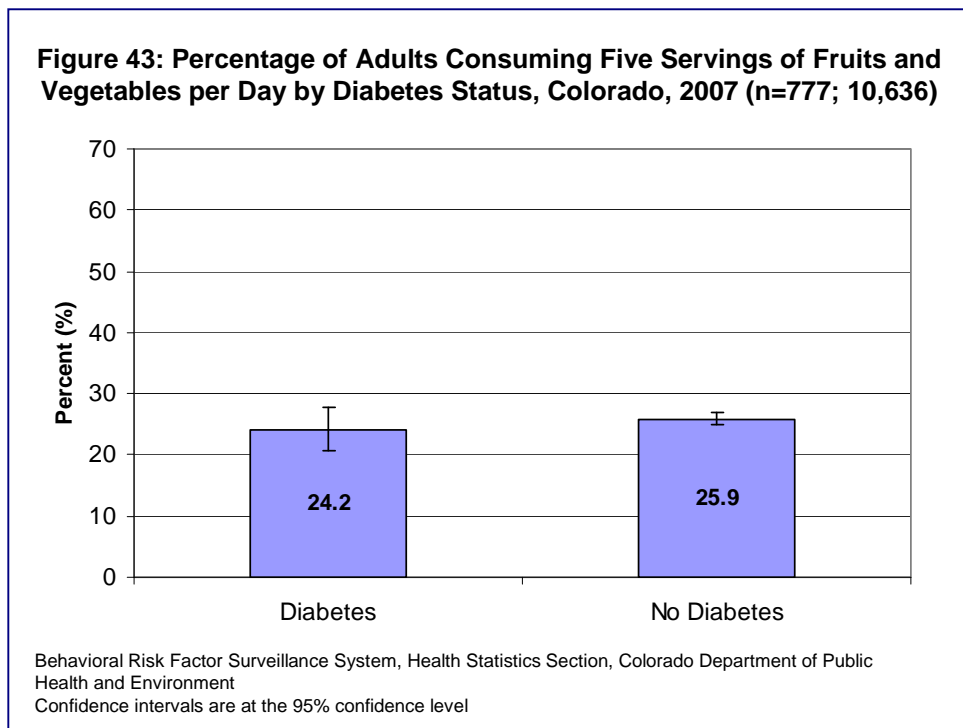
SECTION 5: PREVENTING DIABETES

Diabetes can result in serious health complications and premature death, and there is no cure for diabetes. Therefore, prevention is the key to long-term health. Lifestyle changes can prevent the onset of diabetes and access to appropriate health care can decrease complications. Health insurance or health care coverage determines if a person can afford appropriate, comprehensive health care for diabetes to reduce complications commonly associated with diabetes. This section presents information on risk factors for diabetes (smoking, poor nutrition, lack of exercise and obesity) that can be reduced with lifestyle or behavioral changes.

Modifiable Risk Factors

It is possible to prevent diabetes from occurring, especially in people who are known to be at risk or in people known to have pre-diabetes. The focus of prevention is on the modifiable risk factors for diabetes (such as smoking, poor nutrition, lack of exercise, obesity). Reducing these risks can prevent the onset of diabetes, complications from diabetes and other chronic disease, such as cancer and cardiovascular, which have many of the same risk factors as diabetes.

Fruits/Vegetables

Figure 43: Percentage of Adults Consuming Five Servings of Fruits and Vegetables per Day by Diabetes Status, Colorado, 2007 (n=777; 10,636)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level

Eating a healthy diet of nutritional food can prevent diabetes through healthy weight maintenance. Examples of healthy eating include choosing whole grains over processed grain products, eating lean meats, choosing non-fat dairy products, cutting back on high-calorie snacks and eating a variety of fruits and vegetables.[23] Fruits and vegetables contain vitamins, minerals and fiber that help prevent chronic diseases. [24] Figure 43 shows the percentage of adults with and without diabetes who consumed five servings of fruit and vegetables per day. About one-quarter of people with and without diabetes reported consuming five servings of fruit and vegetables per day.

Physical Inactivity

Physical activity is essential to prevent diabetes and stay healthy. Physical activity lowers blood glucose by increasing the effectiveness of insulin, lowers blood pressure and cholesterol, and improves blood circulation. It also reduces the risk for heart disease and stroke and strengthens the heart, muscles and bones. Exercising also assists in losing weight and relieving stress.[25] Figure 44 shows the percentage of adults with and without diabetes who were considered physically inactive. Among adults with diabetes, 33% reported no leisure time physical activity in the past 30 days. This is significantly higher than the 16.5% of adults without diabetes who reported no leisure time physical activity in the past 30 days.

Figure 44: Percentage of Adults Reporting No Leisure Time Physical Activity in the Past Month by Diabetes Status, Colorado, 2005-2007 (n=1,577; 22,395)
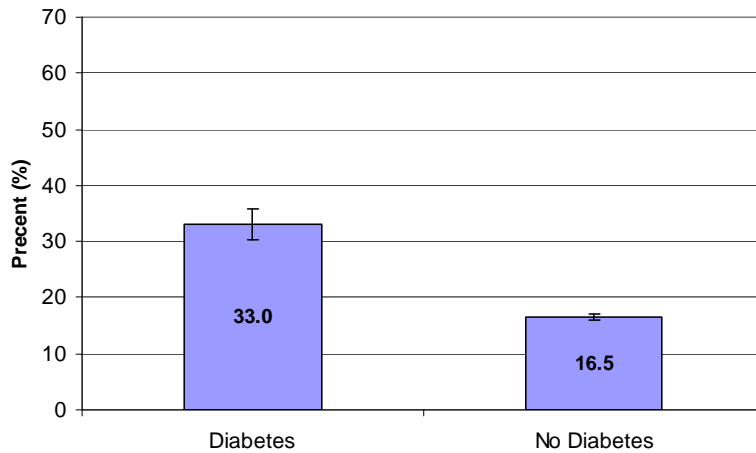
Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level

Obesity

Obesity is a major risk factor for the development of diabetes in adults. An adult who has a Body Mass Index (BMI) of 30 or higher is considered to be obese.[26] Recent studies demonstrate that diabetes incidence increases significantly by BMI category when controlling for other factors. [27]

Figure 45: Percentage of Obese Adults by Diabetes Status, Colorado, 2007 (n=769; 10,649)
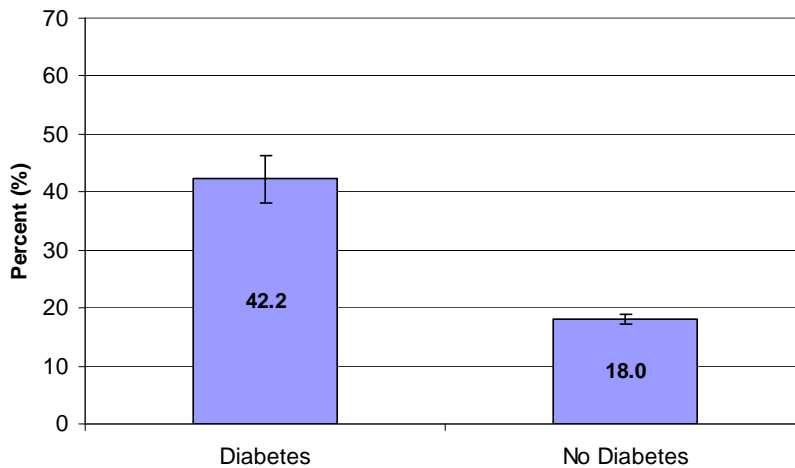
Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level.

Having more body fat can increase insulin resistance, and this can eventually result in the development of type 2 diabetes.[28]

Figure 45 illustrates the extent of obesity among adults in Colorado in 2007. Almost half of adults who have been diagnosed with diabetes are obese (42.2%). Almost one in five adults who do not have diabetes are obese. The prevalence of obesity is significantly lower in adults without diabetes.

Obesity also contributes greatly to the onset of diabetes in children and adolescents.[29] A child or teenager who has a weight that is at the 95th percentile or greater for his or her age is considered obese. A child or teenager who has a weight at or above the 85th percentile, but below the 90th percentile, for his or her age is considered overweight.[30] The Colorado Child Health Survey collects data on the weight status of children ages 14 and younger. However, this source cannot provide this information for children with and without diabetes. Figure 46 shows the percentage of children in Colorado ages 2-14 who are overweight or obese
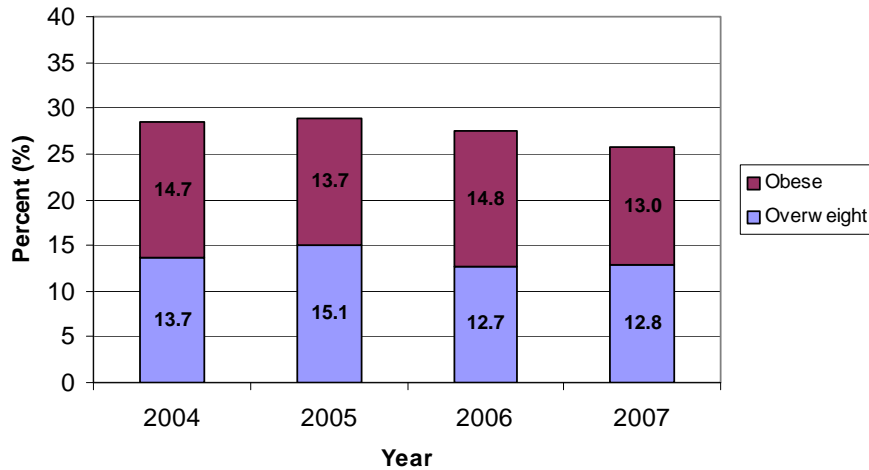
Figure 46: Percentage of Children Ages 2-14 Who Were Overweight or Obese, Colorado, 2004-2007

Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

from 2004-2007. For each year, about 13% to 15% of children were overweight, and about 14% of children were obese.

The percentage of children who were overweight or obese varied among the three major racial/ethnic groups in Colorado (Figure 47). Hispanic children had the highest percentages of obesity and overweight compared to White/Non-Hispanic and Black children. About four out of ten Hispanic children ages 2-14 either were overweight or obese. The proportions of White/Non-Hispanic children who were overweight or obese were the lowest.

Figure 47: Percentage of Children Ages 2-14 Who Were Overweight or Obese by Race/Ethnicity, Colorado, 2007
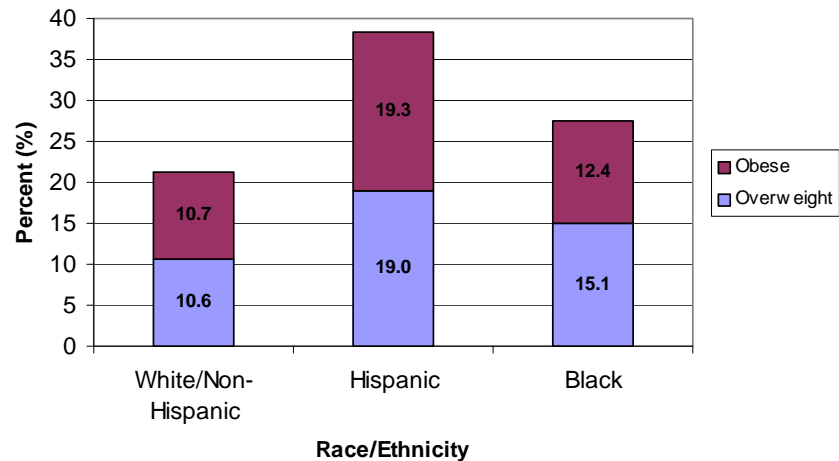
Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Household Results for Children and Adults

The Colorado Behavioral Risk Factor Surveillance System (BRFSS) was used to identify parents of children aged 14 or younger who are willing to complete the Colorado Child Health Survey. These adults were also asked if their BRFSS results can be linked to the child's results. Associations between adults and children in the same household were identified using these linked data:

If the adult in the household who answered the survey was obese, then the child was

- 2.3 times more likely to be overweight or obese;
- 1.6 times more likely to drink sugared beverages more than three times per week; and
- 1.6 times more likely to eat fast food.

In terms of healthy behaviors, if the adult ate five or more servings of fruits and vegetables per day, then the child was three times more likely to do so. If the family ate meals together at least once per day, the child was two times more likely to eat five or more servings of fruits and vegetables per day.

High School Students

The Youth Risk Behavior Survey collects data on students in high school in Colorado. The survey was used to estimate the percentage of high school students who are overweight or obese in Colorado. About 12% of high school students were overweight, and about 9.1% were obese in 2007. These results may not be representative of all high school students in 2007, due to non-response among sampled high schools.

Smoking

Smoking may have a role in the development of type 2 diabetes and has been shown to exacerbate complications of diabetes. People with diabetes are at increased risk of complications from cardiovascular disease, such as stroke, angina and congestive heart failure. Smoking tobacco further increases the risk of these cardiovascular complications. Smoking also increases the risk of renal disease and is associated with worsening eye disease, especially in young smokers. Smoking cessation may assist in both primary prevention of diabetes and in secondary prevention of diabetes-related complications.

Figure 48 shows the prevalence of current smoking among adults with and without diabetes in 2007. People with diabetes are less likely to be smokers than those people who do not have diabetes (15.1% to 19%). This finding is statistically significant.

Figure 48: Percentage of Current Smoking Among Adults by Diabetes Status, Colorado, 2005-2007 (n=1,568; 22,324)
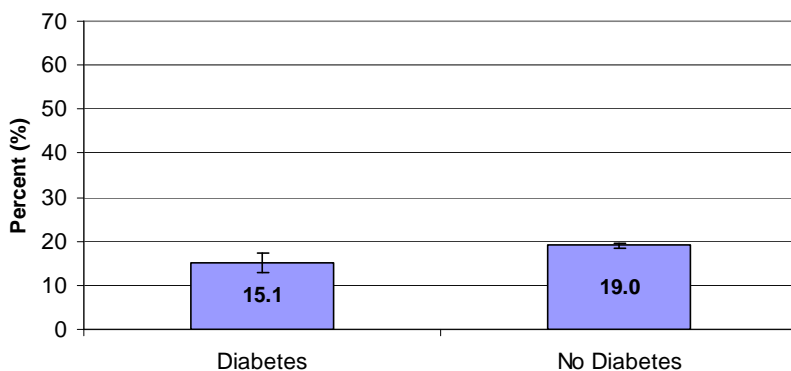
Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level.

Gestational Diabetes

Gestational diabetes can lead to complications in both the mother and the baby. In particular, delivery by cesarean section, pre-term birth, and macrosomia may contribute to complications for the mother and the baby later in life. Figure 49 shows the prevalence of these three birth outcomes, in mothers who had gestational diabetes compared to mothers who did not have gestational diabetes in 2006. The prevalence of these three birth outcomes was significantly greater for mothers with gestational diabetes, compared to mothers without diabetes.

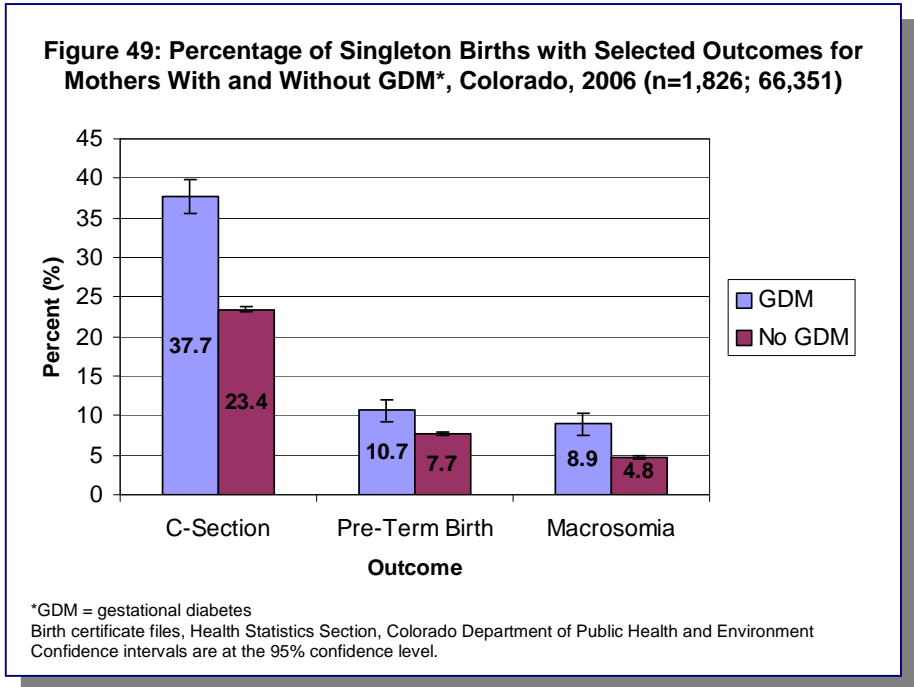**Figure 49: Percentage of Singleton Births with Selected Outcomes for Mothers With and Without GDM*, Colorado, 2006 (n=1,826; 66,351)**

*GDM = gestational diabetes
Birth certificate files, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level.

Cesarean Section (Primary and Repeated)

In Colorado, more than a third of the mothers with gestational diabetes delivered by cesarean section, compared to a quarter of the mothers who did not have gestational diabetes.

Pre-Term Birth

Pre-term birth is defined as a birth where the gestation period lasts fewer than 37 weeks. Almost 11% of Colorado mothers with gestational diabetes had pre-term births, compared to only 7.7% of mothers who did not have diabetes during their pregnancies (Figure 49) as reported on birth certificates. Figure 50 shows the percentage of women with and without gestational diabetes who had a pre-term birth according to Colorado Pregnancy Risk Assessment Monitoring System (PRAMS) data. Women with gestational diabetes had a higher percentage of pre-term births (12.7%) than those who did not have diabetes during pregnancy (8.7%). This is similar to what was found using the birth certificate data.
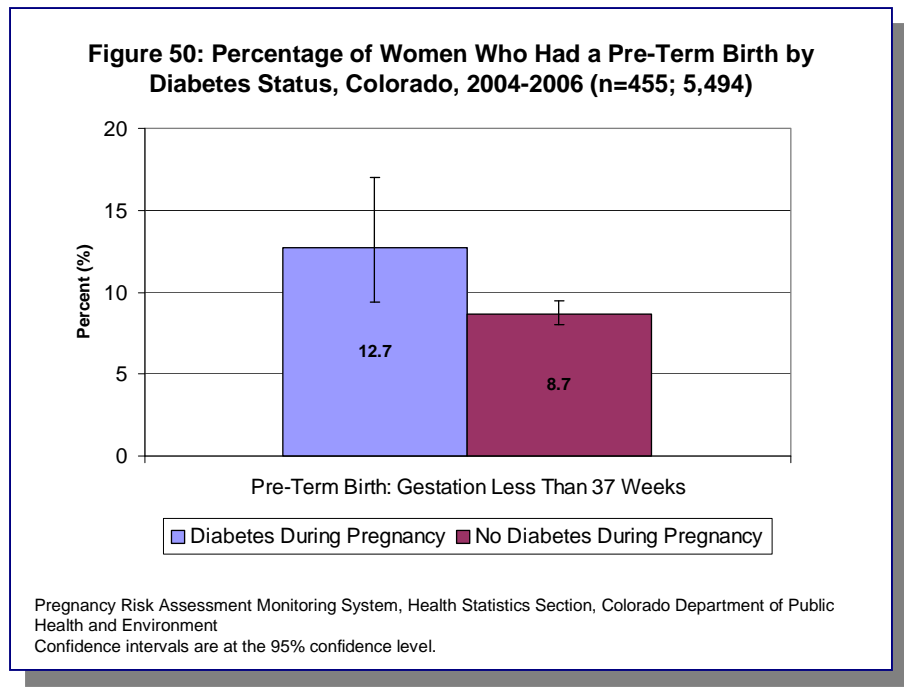
Figure 50: Percentage of Women Who Had a Pre-Term Birth by Diabetes Status, Colorado, 2004-2006 (n=455; 5,494)

Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level.

Colorado Department
of Public Health
and Environment

Colorado
Diabetes
Prevention & Control Program
COLORADO DEPARTMENT OF
PUBLIC HEALTH & ENVIRONMENT

Macrosomia

Macrosomia is the condition where the newborn's birth weight is greater than 4,000 grams (8 pounds, 13 ounces). Among babies born to mothers with gestational diabetes, the prevalence of macrosomia was 9%. In contrast, only 4.8% of mothers without gestational diabetes had a macrosomic baby.

The PRAMS data also are used to describe gestational diabetes and birth outcomes. Figures 49 and 50 display data about risk factors for women with gestational diabetes and data about birth outcomes from 2004-2006 combined for mothers with gestational diabetes and for mothers without gestational diabetes.

Pre-Pregnancy Weight Status

Being overweight prior to becoming pregnant is a risk factor for developing diabetes during pregnancy. Figure 51 shows the percentage of women who developed gestational diabetes by pre-pregnancy weight status. A higher percentage of women whose pre-pregnancy weight status was overweight or obese developed diabetes during pregnancy, compared to women who were at a normal pre-pregnancy weight. About 14.4% of women who were obese prior to pregnancy reported having gestational diabetes, which is almost three times higher than the percentage of women who were at normal weight prior to pregnancy and developed gestational diabetes (5.1%).

Figure 51: Percentage of Women Who Developed Gestational Diabetes by Pre-Pregnancy Weight Status, Colorado, 2004-2006 (n=411)
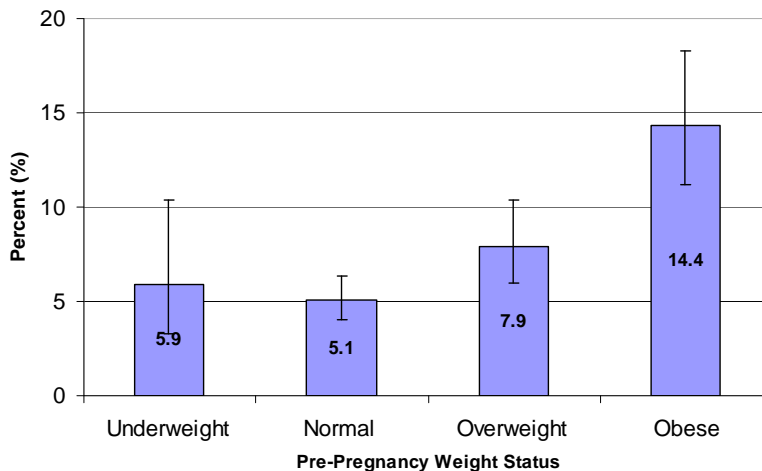
Pregnancy Risk Assessment Monitoring System, Health Statistics Section, Colorado Department of Public Health and Environment
Confidence intervals are at the 95% confidence level.

Health Care Coverage

Figure 52 shows that among people with diabetes, 91.2% reported having some type of health care coverage. This percentage is significantly higher than the population without diabetes (82.7%).

Figure 52: Prevalence of Health Care Coverage Among Adults by Diabetes Status, Colorado, 2005-2007 (n=1,546; 22,222)

Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment
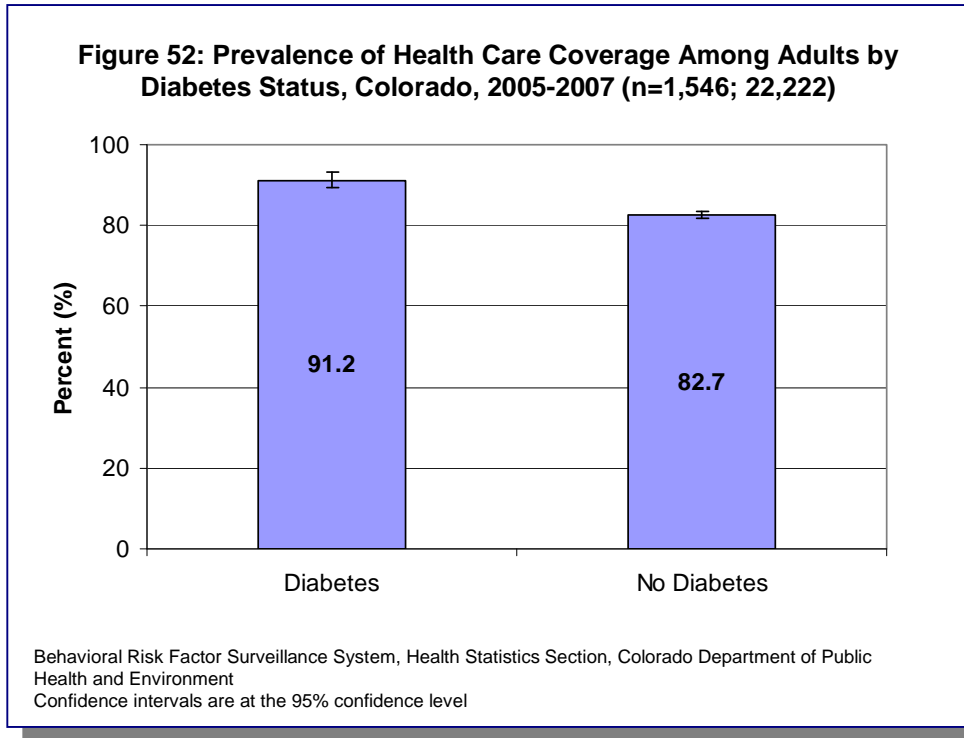Confidence intervals are at the 95% confidence level

APPENDIX

Table 3 Preventive Health Practices Among Adults with Diagnosed Diabetes, Colorado, 2007

	# of Adults with Diabetes	All People	Sex		Age				Race			Education				Annual Household Income				
			Male	Female	18-44	45-64	65-74	75+	White/non-Hispanic	Hispanic	Other	Some high school or lower	HS graduate	Some college	College graduate or higher	< $15,000	$15,000 - $24,999	$25,000 - $34,999	$35,000 - $49,999	$50,000 or more
Checked blood sugar daily	488	59.3	52.0	67.4	***	88.6	55.7	58.5	59.0	62.9	***	54.2	61.5	59.6	58.9	55.9	61.2	62.3	62.3	50.9
Checked A1C twice in past year	524	66.1	65.4	66.9	65.9	67.9	66.9	60.6	69.3	62.9	***	***	62.7	64.5	74.6	62.3	62.5	49.8	70.3	72.5
Foot exam by health professional in past year	576	74.1	70.9	77.8	***	74.5	76.2	73.8	70.7	79.1	79.3	79.1	72.0	71.9	76.0	67.2	71.0	74.3	75.6	81.2
Dilated eye exam in past year	552	66.6	68.1	90.9	***	63.5	76.0	82.2	71.2	58.8	***	61.4	62.7	63.1	77.3	58.4	62.9	60.4	62.1	71.8
Ever taken class to manage diabetes	519	60.7	55.7	66.3	***	64.4	61.5	54.4	65.8	51.3	***	***	56.3	70.6	69.2	55.5	54.2	63.0	59.1	61.5
Flu shot in past year	581	67.9	64.4	71.8	***	62.6	79.6	86.1	70.8	66.7	***	70.2	67.4	66.1	68.8	75.1	67.5	66.4	62.3	61.1
Ever had a pneumonia vaccination	502	61.0	57.3	64.8	***	50.5	77.8	86.7	65.7	51.0	***	58.0	62.2	61.2	60.8	76.9	56.0	61.0	55.3	57.9
Had cholesterol checked in the past five years	772	96.7	96.3	97.1	93.3	97.2	98.7	96.1	97.9	96.2	93.3	88.6	97.1	98.4	99.0	92.7	96.0	93.0	98.9	98.6

***Number of respondents fewer than 50: too small for a meaningful analysis.
Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

Table 4 Hospitalizations With any Mention of Diabetes as a Listed Diagnosis by Year, Gender, Number of Discharges, Number of Days, Average Length of Stay, Discharges per 10,000 Residents, Total Charges, Average Charge and Average Age, Colorado, 2004-2007

Year	Gender	Number of Hospital Discharges	Total Number of Days	Average Length of Stay (Days)	Age-Adjusted Discharge Rate Per 10,000	Total Charges	Average Charge	Average Age
2004	Male	24,262	119,808	4.9	132.6	$717,800,015	$29,585	63.8
	Female	27,204	129,111	4.7	121.8	$703,231,081	$25,850	64.3
	Total	51,467	248,920	4.8	125.7	$1,421,043,998	$27,611	64.1
2005	Male	26,666	128,982	4.8	143.1	$864,073,221	$32,404	63.9
	Female	28,598	137,798	4.8	125.5	$816,564,742	$28,553	64.5
	Total	55,266	266,787	4.8	132.2	$1,680,687,320	$30,411	64.2
2006	Male	27,260	131,078	4.8	141.3	$941,333,374	$34,532	64.0
	Female	30,317	143,288	4.7	129.8	$930,396,964	$30,689	64.7
	Total	57,579	274,373	4.8	134.2	$1,871,799,125	$32,508	64.4
2007	Male	27,931	136,965	4.9	139.9	$1,048,294,361	$37,532	63.8
	Female	30,502	146,684	4.8	127.0	$1,012,429,647	$33,192	64.4
	Total	58,434	283,650	4.9	131.9	$2,060,746,260	$35,266	64.1

Rates are age-adjusted to the 2000 United States population.

Totals may be higher than the sum of the numbers for males and females due to missing gender data.

Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment

Table 5 Hospitalizations With any Mention of Diabetes as a Listed Diagnosis by Year, Age Group, Number of Discharges, Number of Days, Average Length of Stay, Discharges per 10,000 Residents, Total Charges and Average Charge, Colorado, 2007

Year	Age Group	Number of Hospital Discharges	Total Number of Days	Average Length of Stay (Days)	Age-Specific Discharge Rate Per 10,000	Total Charges	Average Charge
2004	0-17	460	1,518	3.3	3.9	$7,501,348	$16,307
	18-44	5,686	24,000	4.2	30.2	$127,556,825	$22,433
	45-64	17,679	85,072	4.8	154.8	$526,134,628	$29,760
	65-74	12,203	60,414	5.0	497.9	$363,911,694	$29,821
	75+	15,436	77,903	5.0	754.1	$395,912,240	$25,649
	Total	51,464	248,907	4.8	-	$1,421,016,735	$27,611
2005	0-17	461	1,239	2.7	3.9	$6,333,233	$13,738
	18-44	6,034	25,024	4.1	31.9	$148,469,612	$24,606
	45-64	18,799	90,837	4.8	158.6	$617,611,577	$32,853
	65-74	13,160	65,333	5.0	526.4	$439,940,652	$33,430
	75+	16,812	84,354	5.0	806.9	$468,332,246	$27,857
	Total	55,266	266,787	4.8	-	$1,680,687,320	$30,411
2006	0-17	513	1,422	2.8	4.3	$8,074,673	$15,740
	18-44	6,206	25,681	4.1	32.5	$165,212,826	$26,621
	45-64	19,396	93,125	4.8	157.5	$683,814,437	$35,255
	65-74	13,748	67,016	4.9	534.0	$489,589,244	$35,612
	75+	17,715	87,128	4.9	828.5	$525,106,609	$29,642
	Total	57,578	274,372	4.8	-	$1,871,797,789	$32,508
2007	0-17	493	1,146	2.3	4.0	$7,940,631	$16,107
	18-44	6,352	26,531	4.2	33.0	$181,111,247	$28,512
	45-64	20,333	100,514	4.9	159.9	$786,329,289	$38,673
	65-74	13,664	67,993	5.0	511.5	$522,960,745	$38,273
	75+	17,591	87,461	5.0	804.4	$562,394,719	$31,971
	Total	58,433	283,645	4.9	-	$2,060,736,631	$35,266

Rates are age-adjusted to the 2000 United States population.
Totals may be higher than the sum of the numbers for each age group due to missing age data.
Prepared by the Epidemiology & Surveillance Unit, Colorado Department of Public Health and Environment

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