

Colorado

Asthma Surveillance Report 2008

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Asthma Surveillance Report 2008

Table of Contents

Page

iii	Acknowledgements
v	Table of Contents
viii	List of Figures
xi	List of Tables
xii	List of Maps
xii	List of Appendices
xiv	Executive Summary
1	Introduction
2	National Data
3	Health and Social Impact
4	Economic Impact
4	Racial Disparities
5	Colorado Demographics and Survey Samples
6	State Size and Geography
8	Demographics of Colorado from the 2000 Colorado Census
10	Child Health Survey and Lifetime Asthma (2006, 2007)
10	Behavioral Risk Factor Surveillance System and Call Back Survey (2006, 2007)
	Asthma Prevalence
12	Current and Lifetime Asthma Defined
12	Current and Lifetime Asthma Among Children (Child Health Survey Data)
	Yearly Trends 2004 to 2007
	Gender 2006-2007 (combined)
	Race/Ethnicity 2006-2007 (combined)
	Age Group 2006-2007 (combined)

- 16 Current Asthma and Lifetime Asthma, Colorado compared to U.S., Yearly Trends 2000-2007 (BRFSS)
- 17 Current and Lifetime Asthma Among Adults (BRFSS)
 - Overall, Gender 2007
 - Ethnicity/Race 2007
 - Age 2007
 - Income 2007

Hospital Discharges

- 22 Colorado Hospital Discharge Rates for Asthma
 - Yearly Trends 2000 to 2007
 - Yearly Trends by Gender 2000 to 2007
 - Yearly Trends by Age Group 2000 to 2007
- 24 Discharge Rates Mapped by County 2002-2007 (combined)
 - Age-Adjusted Total
 - Ages Under 5 Years
 - Ages 5 to 14 Years
 - Ages 15 to 64 Years
 - Ages 65 and Older
- 30 Number of hospital discharges, average length of stay, average charge per hospitalization, total asthma hospitalization charges by sex and age, 2007
- 31 Distribution of the primary payer for asthma hospitalizations, 2007
- 32 Asthma hospitalizations by season of discharge, 2004-2007

Hospitalizations, Emergency Room, School Missed, Activity Limitations, Sleep Disturbances, Episodes, and Symptoms

- 34 Hospitalization Among Children with Asthma, 2004 to 2007 (Child Health Survey)
- 35 Emergency Room Visits for Children with Asthma, 2004 to 2007 (Child Health Survey)
- 36 Emergency Room Visits for Adults with Asthma, 2005 to 2007 (BRFSS and BRFSS Asthma Call Back Survey)
- 37 School Days or Childcare Missed Due to Asthma (Child Health Survey)
 - School Days Missed, 2004 to 2007
 - School Days by Gender, 2006-2007 (combined)
 - School Days by Race/Ethnicity, 2006-2007 (combined)
 - School Days by Age Group, 2006-2007 (combined)
- 39 Limited Activities Due to Asthma Among Adults 2005 to 2007 (BRFSS and BRFSS Asthma Call Back Survey)
- 40 Difficulty Staying Asleep 2007 (BRFSS Asthma Call Back Survey)
- 41 Episodes or Attacks Among Adults 2005 to 2007 (BRFSS and BRFSS Asthma Call Back Survey)

- 42 Last Occurrence of Asthma Symptoms Among Adults 2006 to 2007(BRFSS Asthma Call Back Survey)

Asthma Mortality

- 44 Underlying Cause and Mentioned Cause of Death, Age-adjusted Asthma Mortality Rates 2000 to 2007
- 45 Mortality Rates Using Underlying Cause 2000-2007 (combined) (Vital Statistics)
Gender 2000-2007 (combined)
Race/Ethnicity 2000-2007 (combined)
Age 2000-2007 (combined)

Asthma Medications

- 48 Use of Rescue Medication and Who Carry Rescue Inhalers at School (Child Health Survey Data)
Gender, 2006-2007 (combined)
Age, 2006-2007 (combined)
- 49 Ever Used Over-the-Counter Medication for Asthma Among Adults 2006 to 2007 (BRFSS Asthma Call Back Survey)
- 50 Prescription Inhalers for Asthma, 2006 to 2007 (BRFSS Asthma Call Back Survey)
Ever used a prescription inhaler
Health professional showed how to use the inhaler
Health professional watched inhaler used
- 51 Medications for Asthma Used in the Past Three Months, 2006 to 2007(BRFSS Asthma Call Back Survey)
Prescription medicine using an inhaler
Medicine in pill form
Medicines used with a nebulizer

Management Plans

- 53 Has an Asthma Management Plan and Provided the Plan to School (Child Health Survey Data)
Gender, 2006-2007 (combined)
Age, 2006-2007 (combined)
- 54 Ever been given an Asthma Action Plan, 2006 to 2007 (BRFSS Asthma Call Back Survey)

Knowledge

- 56 Ever taught by a doctor or other health professional
 - How to recognize early signs or symptoms of an asthma episode
 - What to do during an asthma episode or attack
 - How to use a peak flow meter to adjust your daily medications
- 57 Ever taken a course or class on how to manage your asthma

Immunizations, Work-Related Asthma

- 59 Influenza Immunization By Current Asthma and Health Insurance Status (2007) (BRFSS)
- 59 Influenza Immunization By Lifetime Asthma and Health Insurance Status (2007)
- 60 Work-related Asthma caused by chemicals, smoke, fumes or dust in any previous job (2006 to 2007) (BRFSS Asthma Call Back Survey)
- 60 Work-related Asthma made worse by chemicals, smoke, fumes or dust in any previous job (2006 to 2007)
- 61 Changed or quit a job because chemicals, smoke, fumes, or dust caused your asthma or made asthma worse (2006 to 2007)
- 61 Told by a doctor or other medical person that your asthma was job related (2006 to 2007)

Smoking

- 63 Households with People Who Smoke (Child Health Survey)
 - Gender (2006-2007 combined)
 - Age, 2006-2007 (combined)
- 64 Children Exposed to Second Hand Smoke Inside the Home or In a Car
 - Gender, 2006-2007 (combined)
 - Age, 2006-2007 (combined)
- 65 Smoke Allowed in Home Among Those with Current Asthma (2005-2007 combined)

66 The Future Direction

Page List of Figures

- 12 Figure 1: Prevalence of Asthma by Year, Colorado Children Ages 1-4, 2004 to 2007
- 13 Figure 2: Prevalence of Asthma by Gender, Colorado Children Ages 1-14, 2006-2007
- 14 Figure 3: Prevalence of Asthma by Age Group, Colorado Children Ages 1-14, 2006-2007
- 15 Figure 4: Prevalence of Asthma by Race/Ethnicity, Colorado Children Ages 1-14, 2006-2007
- 16 Figure 5: Prevalence of Asthma by Year, Colorado and U.S. Adults, 2000-2007
- 17 Figure 6: Prevalence of Asthma Overall and by Gender, Colorado Adults, 2007
- 18 Figure 7: Prevalence of Asthma by Race/Ethnicity, Colorado Adults, 2007
- 19 Figure 8: Prevalence of Asthma by Age Group, Colorado Adults, 2007
- 20 Figure 9: Prevalence of Asthma by Annual Income, Colorado Adults, 2007
- 22 Figure 10: Age-Adjusted Colorado Hospital Discharge Rates for Asthma as Principle Diagnosis, 2000 to 2007
- 22 Figure 11: Age-Adjusted Colorado Hospital Discharge Rates for Asthma as a Principle Diagnosis by Gender, 2000-2007
- 23 Figure 12: Colorado Hospital Discharge Rates for Asthma as a Principal Diagnosis by Age Group, 2000 to 2007
- 31 Figure 13: Distribution of the Primary Payor for Asthma Hospitalization*, Colorado Residents, 2007
- 32 Figure 14: Asthma Hospitalizations* by Season of Discharge, Colorado, 2004-2007
- 34 Figure 15: One of More Hospitalizations Within the Past Year for Asthma: Colorado Children Ages 1-14, 2004 to 2007
- 35 Figure 16: One or More Emergency Room or Urgent Care Visits Within the Past Year for Asthma: Colorado Children Ages 1-14, 2004 to 2007

Page List of Figures (contd.)

- 36 Figure 17: Emergency Room or Urgent Care for Adults with Asthma, 2005 to 2007
- 37 Figure 18: Missed School or Childcare Within the Past Year Due to Asthma: Colorado Children Ages 1-14, 2004 to 2007
- 39 Figure 19: Activity Limitations Due to Asthma, Colorado Adults, 2005 to 2007
- 40 Figure 20: Days Where Asthma Symptoms Made it Difficult to Stay Asleep During the Past 30 Days, 2007
- 41 Figure 21: Percentage of Adults Reporting an Episode of Asthma or an Asthma Attack in Past 12 Months, Colorado Adults, 2005 to 2007
- 44 Figure 22: Colorado Asthma Mortality Rates Among Colorado Residents by Underlying and Mentioned Cause, 2000 to 2007
- 49 Figure 23: Ever Used Over-the-Counter Medications for Asthma, Colorado Adults, 2006 and 2007
- 50 Figure 24: Prescription Inhalers for Asthma, Colorado Adults, 2006 and 2007
- 51 Figure 25: Medicine for Asthma Used in the Past Three Months, Colorado Adults with Lifetime Asthma, 2006 and 2007
- 54 Figure 26: Even Been Given an Asthma Action Plan, Colorado Adults, 2006 and 2007
- 56 Figure 27: Taught by a Doctor or Other Health Professional, Colorado Adults, 2006 and 2007
- 57 Figure 28: Ever Taken a Course or Class on How to Manage Asthma, Colorado Adults, 2006 and 2007
- 60 Figure 29: Chemicals, Smoke, Fumes or Dust in Any Previous Job Ever Had Caused or Made Asthma Worse, Colorado Adults, 2006 and 2007
- 61 Figure 30: Work Related Asthma, Colorado Adults, 2006 and 2007
- 63 Figure 31: Percent of Households with People Who Smoke Cigarettes, Cigars or Pipes by Gender, Colorado Children Ages 1-14, 2006-2007 (combined)

Page List of Figures (contd.)

- 64 Figure 32: Percent of Households with People Who Smoke Cigarettes, Cigars or Pipes by Age, Colorado Children Ages 1-14, 2006-2007 (combined)
- 64 Figure 33: Colorado Children Ages 1-14 Exposed to Second Hand Smoke in the Past 7 Days by Gender, 2006-2007 (combined)
- 65 Figure 34: Colorado Children Ages 1-14 Exposed to Second Hand Smoke in the Past 7 Days by Age, 2006-2007 (combined)
- 65 Figure 35: Smoking Allowed in Home with Children Ages 1-14, Colorado, 2007

Page List of Tables

- 9 Table 1: Population Numbers for the US, Colorado, Metro Denver, and Denver County, US Census Summary, 2000
- 9 Table 2: Population Percentages for the US, Colorado, Metro Denver, and Denver County, US Census Summary, 2000
- 30 Table 3: Number of Asthma Hospitalizations*, Mean Length of Stay, Median Charge per Asthma Hospitalization, and Total Asthma Hospitalization Charges by Sex and Age, Colorado Residents, 2007
- 38 Table 4: Days of School or Childcare Missed Within the Past Year Due to Asthma by Gender, Age, and Race/Ethnicity, Colorado Children Ages 1-14, 2006-2007
- 42 Table 5: Amount of Time Since Last Asthma Symptoms, 2006 to 2007
- 45 Table 6: Mortality Rates* with Asthma as an Underlying Cause by Gender, Age, and Race/Ethnicity, Colorado Residents, 2000-2007
- 48 Table 7: Percentage of Colorado Children Ages 1-14 Who Use a Rescue Inhaler and Users Who Also Carry Rescue Inhalers at School by Gender and Age, 2006-2007
- 53 Table 8: Percentage of Colorado Children Ages 1-14 with an Asthma Management Plan and Provision of Plan to the Child's School Among Children With a Plan by Gender and Age, 2006-2007

Page List of Maps

- 7 Map 1: Relief Map of Colorado
- 7 Map 2: Frontier, Rural, and Urban Counties
- 7 Map 3: City Boundaries and Interstate Highways
- 7 Map 4: In set of Metropolitan Denver Area
- 25 Map 5: Colorado Age-Adjusted Hospital Discharge Rates and Numbers by County: Asthma 2002-2007
- 26 Map 6: Colorado Hospital Discharge Rates and Numbers by County: Asthma 2002-2007, Ages Under 5 Years
- 27 Map 7: Colorado Hospital Discharge Rates and Numbers by County: Asthma 2002-2007, Ages 5 to 14 Years
- 28 Map 8: Colorado Hospital Discharge Rates and Numbers by County: Asthma 2002-2007, Ages 15 to 64 Years
- 29 Map 9: Colorado Hospital Discharge Rates and Numbers by County: Asthma 2002-2007, Ages 65 and Older

Page List of Appendices

68 Appendix 1: Data Sources

70 Appendix 2: Healthy People 2010

71 Appendix 3: Asthma Program Logic Model

Executive Summary

The Asthma Surveillance Report 2008 summarizes state and national data describing who has asthma and what can be done to better manage the disease. Readers can use this information to assist those living with asthma and their caregivers, so that they can lead normal lives. The overall goal is to improve management of asthma that leads to better control of this disease and its symptoms, which in turn reduces sleep disturbances, missed school or work days, emergency department visits, hospitalizations, and deaths.

Asthma is a serious but manageable chronic disease that affects more than 28 million Americans in 2006, including an estimated 427,000 Coloradans.¹

Asthma is a chronic disease of the lungs characterized by intermittent episodes of wheezing, shortness of breath, and chest tightness. Although symptoms are often reversible, inflammation and muscular constriction around bronchial tubes can cause permanent damage to lung tissue. Asthma attacks are primarily a sudden hyper-response to stimuli such as mold/mildew, pet dander, allergens, environmental tobacco smoke, air pollutants (such as ozone, exhaust fumes, dust, and strong odors), cold air, exercise, and pollen. An asthma attack can result in death, though rarely.

United States

In 2005, an estimated 7.7% of people (22.2 million) in the United States currently had asthma: 8.9% (6.5 million) of children 0-17 years and 7.2% of adults (15.7 million) had asthma.²

Approximately 497,000 hospitalizations in the United States were attributed to asthma in 2004.³ Through careful monitoring and management, most hospitalizations can be prevented. Hospital outpatient visits per 100 with current asthma were higher for black children (19.9) than for white children (8.7), and higher for black adults (10.0) than white adults (4.3).⁴

¹ American Lung Association, Epidemiology and Statistics Unit, Trends in Asthma Morbidity and Mortality, Table 12. Asthma-Estimated Lifetime Prevalence in Adults by State (in 2006), November 2007.

² CDC, National Center for Health Statistics, Asthma Prevalence, Health Care Use and Mortality: United States, 2003-2005.

³ CDC, National Center for Health Statistics, Asthma Prevalence, Health Care Use and Mortality: United States, 2003-2005.

⁴ Centers for Disease Control and Prevention. National Surveillance for Asthma – United States, 1980-2004. Surveillance Summaries, October 19, 2007, MMWR 2007;56 (No. SS-8).

Approximately 1.8 million emergency department visits were attributed to asthma in 2004.⁵ Emergency department visits per 100 persons with current asthma were higher for blacks (21.0) than whites (7.0).⁶

“In 2003, 4,055 people died from asthma in the United States, or a rate of 1.4 per 100,000 people.⁷ Death rates, per 10,000 persons with current asthma, were higher for blacks (3.4) than whites (1.9).⁸

Colorado

Prevalence

In 2007, 6.6 percent of adult residents currently had asthma.⁹ In comparison, 9.1 percent of children ages 1-14 years old had current asthma in 2007.¹⁰

In 2007, 12.9 percent of adult residents had ever had asthma.¹¹ In comparison, 11.9 percent of children ages 1-14 years old had ever had asthma in 2007.¹² These results are also known as the prevalence of lifetime asthma. The prevalence of lifetime asthma among children in 2007 is not statistically different from the prevalence in 2004.

Controlled asthma?

Being hospitalized with a primary discharge diagnosis of asthma is an outcome of uncontrolled asthma and therefore indicates that the asthma is uncontrolled. In 2007, there were 4,044 hospital discharges with asthma listed as the first diagnosis in Colorado among Colorado residents of all ages. The mean length of stay was 2.5 days. Medicaid was the expected payment source for 23% of these hospitalizations. Medicare was expected to pay for 16% of these hospitalizations.

Based on survey results, 6.6 percent of the children (ages 1-14 years) with lifetime asthma had at least one hospitalization in the past year.

In Colorado, the hospitalization rate for asthma in 2007 had declined below the target of 91.4 hospitalizations per 100,000 population. Between 2000 and 2003, the age-adjusted hospital discharge rates for asthma in Colorado ranged from 90.3 to 106.6 per 100,000 persons. In 2004 the rate was 94.9 hospitalizations with asthma as the

⁵ CDC, National Center for Health Statistics, Asthma Prevalence, Health Care Use and Mortality: United States, 2003-2005.

⁶ Centers for Disease Control and Prevention. National Surveillance for Asthma – United States, 1980-2004. Surveillance Summaries, October 19, 2007, MMWR 2007;56 (No. SS-8).

⁷ CDC, National Center for Health Statistics, Asthma Prevalence, Health Care Use and Mortality: United States, 2003-2005.

⁸ Centers for Disease Control and Prevention. National Surveillance for Asthma – United States, 1980-2004. Surveillance Summaries, October 19, 2007, MMWR 2007;56 (No. SS-8).

⁹ Colorado Behavioral Risk Factor and Surveillance System, CDPHE

¹⁰ Colorado Child Health Survey, CDPHE

¹¹ Colorado Behavioral Risk Factor and Surveillance System, CDPHE

¹² Colorado Child Health Survey, CDPHE

primary diagnosis per 100,000 persons and has declined to a rate of 85.6 in 2007.¹³ Colorado currently does not have centralized, electronic emergency department data to use to determine if this decline in hospitalizations reflects a shift in the setting of the care from inpatient units to being treated and released directly from the emergency department. The Colorado Hospital Association is developing such a central data set with the expectation that data on emergency visits will be complete for visits in 2010.

In 2007, 20.2 percent of children who were ages 1-14 years old and had ever had asthma reportedly had been to an emergency department or urgent care center for asthma within the previous 12 months. For adults 18 and older and with lifetime asthma, 4.3 percent had been to an emergency department or urgent care center for their asthma within the previous 12 months.

In 2007, 37.2 percent of the children who were ages 1 to 14 years old and had ever had asthma reportedly missed one or more days of school or childcare due to their asthma during the previous year.

In 2007, Colorado adults 18 years and older with lifetime asthma reported on the following:

- 17.8% had difficulty staying asleep during the past 30 days due to asthma symptoms.
- 18.4% were unable to work or carry out their usual activities for one or more days during the past 12 months.
- 33.1% had an episode or attack of asthma during the past 12 months.

Though rare, death from asthma is another outcome of uncontrolled asthma. The overall mortality rate for 2000-2007 combined was 1.3 per 100,000 persons in Colorado. Mortality rates by race/ethnicity indicate that Blacks (2.6 per 100,000 persons) had the highest rate, followed by White Non Hispanics (1.3) and White Hispanics (1.3).¹⁴ For 2000-2007, the average annual rates for 5 to 14 year olds and for 15 to 34 year olds were twice the target of the Healthy People 2010.

Asthma Management

Of the children ages 1 to 14 years old with lifetime asthma, 75.3 percent use a rescue medication such as Albuterol, Alupent, Ventolin, Proventil, Atrovent or Maxair inhaler. Of these children who use such medication:

- 50.8%% actually carry the inhaler to school.

Of the children ages 1 to 14 years old with lifetime asthma, 50.3 percent received an asthma management plan from a doctor or other health professional. Of these children with a plan:

- 49.6% provided the plan to their school.

¹³ Colorado Hospital Association

¹⁴ Colorado Vital Statistics, CDPHE

In 2007, a third of the adults with lifetime asthma (33.5%) reported ever receiving an asthma action plan from their doctor or other health professional.

In 2007, 38.9% percent of the adults with lifetime asthma reported taking a prescription medication using an inhaler during the three previous months.

Almost all adults with lifetime asthma (90.9%) had ever used a prescription inhaler and had a health professional show them how to use it. However, only 82.1 of these adults who had used an inhaler also had a health professional watch them use it. Only 27.2 percent of the adults with lifetime asthma have ever used over-the-counter medication.

The percentage of the Colorado adults with lifetime asthma who had been taught by a doctor or other health professional were:

- 64.6% taught how to recognize the early signs or symptoms of an asthma episode,
- 78.2% taught what to do during an asthma episode, and
- 45.2% taught how to use a peak flow meter to adjust daily medication.

Only 11.6 percent of Colorado adults with lifetime asthma reported in 2007 that they had ever taken a course or class on how to manage their asthma.

Despite 84.1% of the Colorado adults with lifetime asthma having health insurance, only 51.2% of them received a flu shot during the previous 12 months. Only 27.0% of the adults with lifetime asthma and without insurance received a flu shot.

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Introduction

Asthma is a chronic disease of the lungs that impacts both children and adults. Shortness of breath, wheezing, chest tightness, inflammation of the lung tissue and overproduction of mucous that causes airway blockage characterize it. If not relieved, these conditions may lead to death. Asthma is a hyper responsive reaction to “triggers” like environmental tobacco smoke, pet fur and dander, allergens, particles in the air, strong odors, mold/mildew, dust mites, and cockroaches. The last three are not very common in Colorado due to low humidity.

The cause of asthma is unknown. Researchers and clinicians know that asthma is a manageable disease when treated with appropriate short and long-term medications. The keys to leading a normal lifestyle is a management plan tailored to the specific triggers that cause the response and consistent use of appropriate treatment. According to asthma experts, all but persons with the most severe asthma should be able to lead normal, active lifestyles.

Purpose

This surveillance report summarizes, in one document, the current statewide and national data regarding asthma. Specifically, it describes the segments of the state’s population that are at highest risk for poorly controlled asthma. It highlights the results related to the asthma targets, as defined by the Healthy People 2010, to reduce:

- Hospitalizations for asthma,
- Days of school or work missed due to asthma, and
- Asthma deaths,

The intended use of these results is to formulate ways to reduce the number of hospitalizations, emergency department visits, missed school/work days, and deaths, due to this very manageable disease, and measure progress of previous efforts to do so. This report will also be a guide in recognizing areas where further data gathering and research are needed to give a clearer picture of the impact asthma has on Coloradans. The report is organized into two major parts; (1) Asthma Burden and (2) Asthma Management and Control. Asthma burden is the impact of asthma. This first part of the report covers the prevalence of asthma among adults and children in Colorado and the resulting impact of this prevalence as reflected by the rates of hospitalizations and deaths related to asthma. The second part of the report covers the management of asthma in terms of education, medication, and the use of management plans.

National Surveillance Results

In the U.S., increases in both counts and rates were seen from 1980 to 1995 for self-reported asthma attacks during the preceding 12-months. From 1997 to 2004, there has been no noticeable change in asthma attack estimates or in current asthma prevalence from 2001 to 2004. Asthma hospitalization rates declined during 1980 to 2000, followed by a return to the 1980 level in 2003 and 2004. Children ages four and younger were an exception to this pattern as their rates increased from 1980 to 1985 and remained high through 2004. The number of emergency department visits for asthma increased from 1.5 million in 1992 to 1.9 million in 1995 and no changes have been observed through 2004 with 1.8 million visits. Asthma deaths increased from 1980 to 1995. The asthma death rate has decreased every year since 2000. A definitional change for asthma death occurred in 1999 in the International Classification of Diseases (ICD) from the Ninth to the Tenth Revision. Because of the change in coding, estimates for 1995 and earlier are not comparable with estimates for 2000 and later.¹⁵

¹⁵ Centers for Disease Control and Prevention. National Surveillance for Asthma- United States, 1980-2004. Surveillance Summaries, October 19, 2007. MMWR 2007;56(No. SS-8).

Health and Social Impact¹⁶

- In 2005, an estimated 7.7 percent of people (22.2 million) in the United States currently had asthma: 8.9 percent (6.5 million) of children 0-17 years and 7.2 percent of adults (15.7 million) had asthma.
- Lifetime asthma diagnosis among adults in 2005 was 10.7 percent (23 million) compared to 12.7 percent (9 million) for children.
- During 2005, an estimated 3.9 percent of adults (8.4 million) had at least one asthma attack in the previous year: 5.2 percent of children (3.8 million) had an asthma attack in the previous year.
- In 2004, there were 14.7 million outpatient asthma visits to physician offices and hospital outpatient departments.
- Approximately 497,000 hospitalizations and 1.8 million emergency department visits were attributed to asthma in 2004. The average annual rate of death due to asthma among Blacks was 3.4 deaths per 10,000 persons with current asthma in 2001-2003. In comparison, the average annual rate of death due to asthma among Whites was 1.9 deaths per 10,000 persons with current asthma.
- In 2003, 4,055 people died from asthma in the United States, or a rate of 1.4 per 100,000 people.
- Among children, asthma deaths are rare; in 2003, 195 children aged 0-17 years died from asthma, or 0.3 deaths per 100,000 children.

¹⁶ CDC, National Center for Health Statistics, Asthma Prevalence, Health Care Use and Mortality: United States, 2003-2005.

Economic Impact

- The total cost of asthma (among adults and children) to the U.S. economy was calculated to be approximately \$19.7 billion for 2007, with direct costs (hospital care, physicians' services, and prescription drugs) contributing \$14.7 billion and indirect costs (morbidity and mortality) for asthma \$5 billion.¹⁷
- In 2000, the annual cost of asthma-related in-patient hospital services was more than \$3.5 billion, and the annual cost of asthma-related emergency room visits was more than \$650 million, according to estimates.¹⁸
- The total yearly cost of asthma treatment in the U.S. more than doubled between 1990 and 2000, from \$6.2 billion to \$12.7 billion.^{19,20}

Racial Disparities²¹

- For a 3-year period 2001-2003, current asthma prevalence was 12.5 percent for black children, 7.7 percent for white children, and 7.0 for Hispanic children. Current asthma prevalence for the same years was 7.6 percent for black adults, 6.7 percent for white adults, and 4.6 for Hispanic adults.
- For a 3-year period 2001-2003, hospital outpatient visits per 100 persons with current asthma were higher for black children (19.9) than for white children (8.7), and higher for black adults (10.0) than white adults (4.3).
- For a 3-year period 2001-2003, emergency department visits per 100 with current asthma were higher for blacks (21.0) than whites (7.0).
- For a 3-year period 2001-2003, death rates among persons with current asthma were higher for blacks (3.4 deaths per 100,000 persons) than whites (1.9 deaths per 100,000 persons).

¹⁷ American Lung Association, Epidemiology and Statistics Unit, Trends in Asthma Morbidity and Mortality, November 2007.

¹⁸ American Lung Association, Epidemiology and Statistics Unit, Trends in Asthma Morbidity and Mortality, February 2002.

¹⁹ American Lung Association, Epidemiology and Statistics Unit, Trends in Asthma Morbidity and Mortality, February 2002.

²⁰ Kevin B. Weiss, Peter J. Gergen, and Thomas A. Hodgson. An Economic Evaluation of Asthma in the U.S. The New England Journal of Medicine, 1992, 326:862-6.

²¹ Centers for Disease Control and Prevention. National Surveillance for Asthma – United States, 1980-2004. Surveillance Summaries, October 19, 2007, MMWR 2007;56 (No. SS-8).

Colorado Demographics and Survey Samples

State Geography and Population

Maps of Colorado

- Relief Map

- Frontier, Rural, and Urban Counties

- City Boundaries and Interstate Highways

- Metropolitan Denver Area

Child Health Survey and Lifetime Asthma: State Sample Sizes and Demographics (2006, 2007)

Behavioral Risk Factor Surveillance System and Call Back Survey: State Sample Sizes and Demographics (2006, 2007)

State Geography and Population

Colorado is the seventh largest state in the continental U.S., covering 103,600 square miles. The geography presents multiple factors that influence asthma and the efficiency and equality of health services delivery. The population was estimated to have reached 5 million²² in June 2008.

Of the state's 64 counties, 23 are classified as "frontier", containing less than six people per square mile and 24 are classified as "rural." Many of these sparsely populated counties are part of the mountainous "Western Slope" (referring to the area west of the continental divide), which has more than 54 peaks over 14,000 feet high in elevation (Map 1 and Map 2). Other large geographic areas composed of frontier counties are located in the high plains portion of the state in eastern and southeast Colorado.

Denver is the state's most populated county, estimated to have a population of 596,000 in July 2007. The state's metropolitan area includes seven counties, which are Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson, and are situated east of the Rocky Mountains (Map 3 and Map 4). It is estimated that the metropolitan area comprises 2.7 million people or 55 percent of the state's total population.

According to the American Community Survey for 2005-2007 by U.S. Census Bureau, the Colorado population was 4,767,161 residents. From this survey, the Census Bureau estimated that 85.4% of the state's population reported that they were only white, 3.9% were only black or African American, 2.8% were only Asian, 1.0% were only American Indian or Alaska Native, and 0.1% were only native Hawaiian and other Pacific Islander. Another 2.6% of the population identified themselves as multi-racial. An estimated 19.6% of the Colorado population are Hispanic or Latino.

²² Colorado Division of Local Government, Demography Office, November 2007

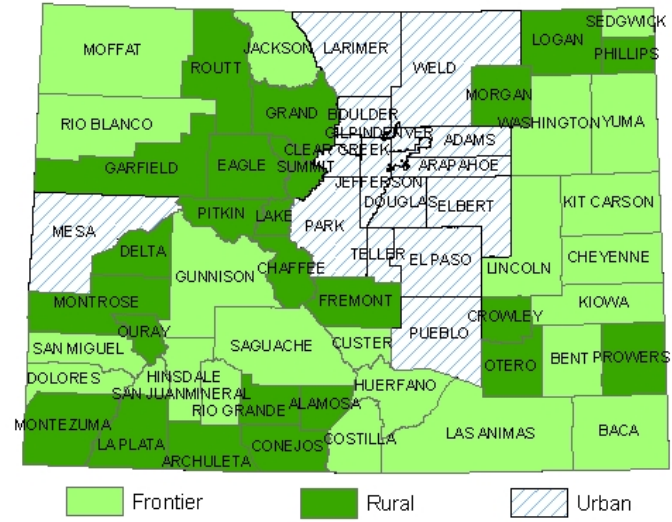
Map 1

Relief Map of Colorado

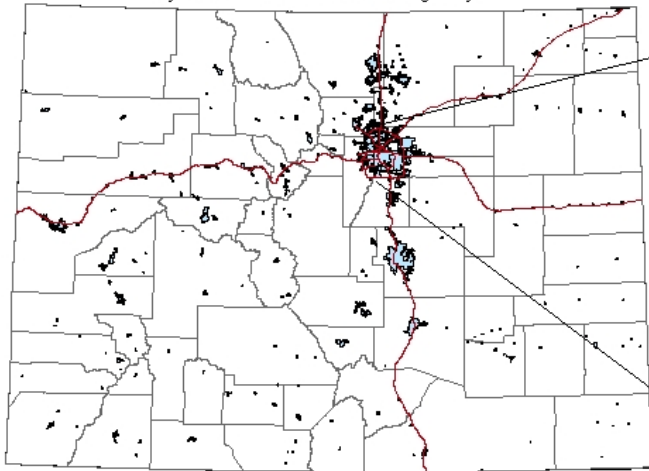


Map 2

Frontier, Rural, and Urban Counties

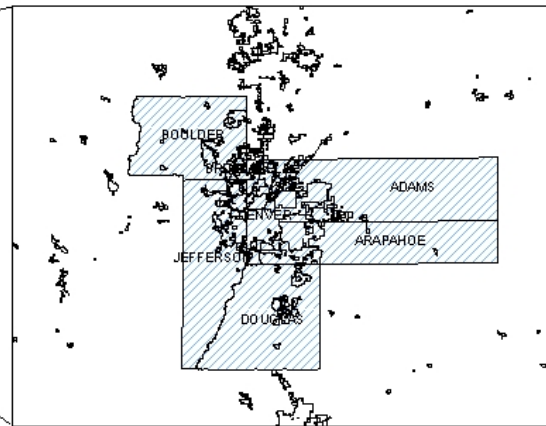


City Boundaries and Interstate Highways



Map 3

Inset of Metropolitan Denver Area



Map 4



Demographics of Colorado from the 2000 Census

The U.S. Bureau of the Census in 2000 counted 4.3 million individuals in Colorado, making it the 24th most populated state in the country (Table 1 and Table 2). The census number amounts to an increase of more than one million people (30.6 percent) since the 1990 population count of 3.2 million. This equals an annual average growth rate of 2.7 percent, which compares to a national average of 2.3 percent implied by the Census Bureau's estimates during the decade.

Growing in population by more than 1 million between the 1990 and 2000 Census, the most recent birth rate shows an unprecedented 18.8 percent increase, adding more than 12,000 individuals to the population in 1999. A highly admired quality of life has drawn significant migration to both urban and rural areas.

The migration of people to the state to take advantage of the stable job market in the 1990s has resulted in a decrease in the state poverty level, which declined from 11.7 percent in 1990 to 10.5 percent in 1996. This translates to 14.6 percent of children under age 18, or roughly 180,000, living below the federal poverty line. Approximately 100,100 women of childbearing age also fall into this category. These numbers have likely increased during the economic downturn of 2000-2003. Many of the residents with income below the federal poverty level live in the southern counties of the state.

Despite the general state growth and prosperity over the past decade, it is clear that a significant portion of the current population does not have full access to many medical services. Additionally, there are profound disparities in the health status of various segments of the population, particularly among racial/ethnic groups. This is particularly obvious in a review of maternal and child health issues associated with the growth of the Hispanic community. The number of Hispanic births increased by more than 110 percent from 1990 to 2001.

In late 2008, near the end of the current decade, Colorado is again experiencing a significant economic downturn and an estimated increase of another 1 million in resident population.

Table 1. Population Numbers for the US, Colorado, Metro Denver, and Denver County, US Census Summary, 2000

	US	Colorado	Metro Denver	Denver County
White	211,460,626	3,560,005	1,128,709	362,180
Black or African American	34,658,190	165,063	91,239	61,649
American Indian or Alaska Native	2,475,956	44,241	16,187	7,290
Asian	10,242,998	95,213	36,790	15,611
Native Hawaiian or Other Pacific Islander	398,835	4,621	1,472	648
Some other race	15,359,073	309,931	148,630	88,464
Two or more races	6,826,228	122,187	50,034	20,794
TOTAL	281,421,906	4,301,261	1,471,589	556,636
Hispanic or Latino	35,305,818	735,601	328,164	175,704
Not Hispanic or Latino	246,116,088	3,565,660	1,143,425	378,932
TOTAL	281,421,906	4,301,261	1,471,589	554,636

Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P3, P4, PCT4, PCT5, PCT8, and PCT11.

Table 2. Population Percentages for the US, Colorado, Metro Denver, and Denver County, US Census Summary, 2000

	US	Colorado	Metro Denver	Denver County
White	75.1%	82.8%	76.7%	65.3%
Black or African American	12.3%	3.8%	6.2%	11.1%
American Indian or Alaska Native	0.9%	1.0%	1.1%	1.3%
Asian	3.6%	2.2%	2.5%	2.8%
Native Hawaiian or Other Pacific Islander	0.1%	0.1%	0.1%	0.1%
Some other race	5.5%	7.2%	10.1%	15.6%
Two or more races	2.4%	2.8%	3.4%	3.7%
TOTAL*	100.0%	100.0%	100.0%	100.0%
Hispanic or Latino	12.5%	17.1%	22.3%	31.7%
Not Hispanic or Latino	87.5%	82.9%	77.7%	68.3%
TOTAL	100.0%	100.0%	100.0%	100.0%

* Columns may not add up to exactly 100% due to errors in rounding.

Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P3, P4, PCT4, PCT5, PCT8, and PCT11.

Child Health Survey and Lifetime Asthma

From these two years of data, the numbers of those with lifetime asthma were combined to allow for the reporting of findings using sufficient numbers. This allowed for numerous analyses to be conducted for this report by gender and by age group, however, the numbers were too small to report all racial/ethnic groups.

Behavioral Risk Factor Surveillance System and Call Back Survey

This report includes data from the Behavioral Risk Factor Surveillance System (BRFSS) and those that participated in the Asthma Call Back Survey conducted in 2006 and 2007.

Asthma Burden

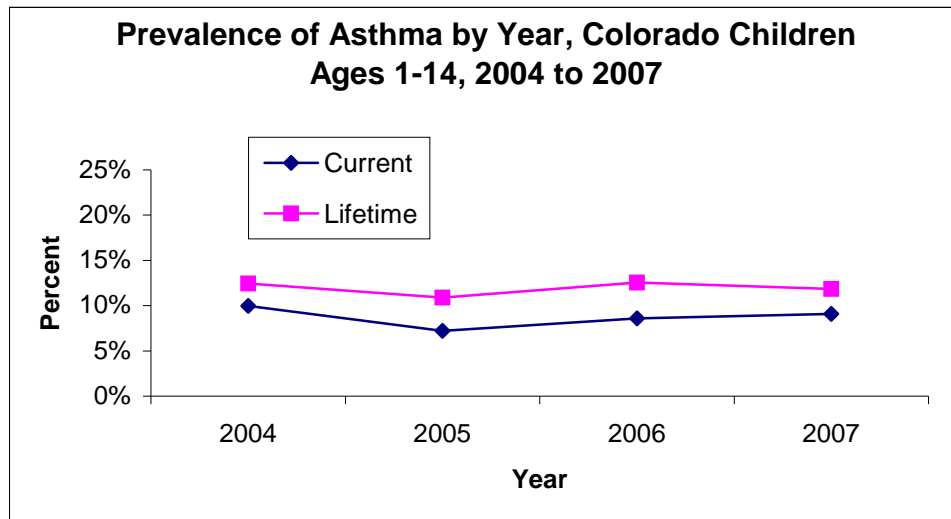
Current and Lifetime Asthma Defined

The main measure of the burden of asthma is the prevalence of asthma in the Colorado population. Prevalence means the number or percent of persons with the disease. For asthma, there are two useful measures of prevalence: lifetime and current. The definition for lifetime asthma for both adults and children, according to the Behavioral Risk Factor Surveillance System and the Child Health Survey, is if a respondent reports that a doctor, nurse, or other health professional has at some time told them they have asthma. Current asthma is defined as reporting having lifetime asthma and also responding “yes” when asked if they still have asthma.

Current and Lifetime Asthma Among Children

Current and lifetime asthma prevalence among children was measured using the Colorado Child Health Survey. Children were defined as 1-14 years of age. Combining 2006 and 2007 data, a total of 14,693 children were identified. The prevalence of lifetime asthma among children was 12.5 percent in 2004 and 11.9 percent in 2007 (Figure 1). The prevalence of current asthma was 10.0 percent in 2004 and 9.1 percent in 2007 (Figure 1).

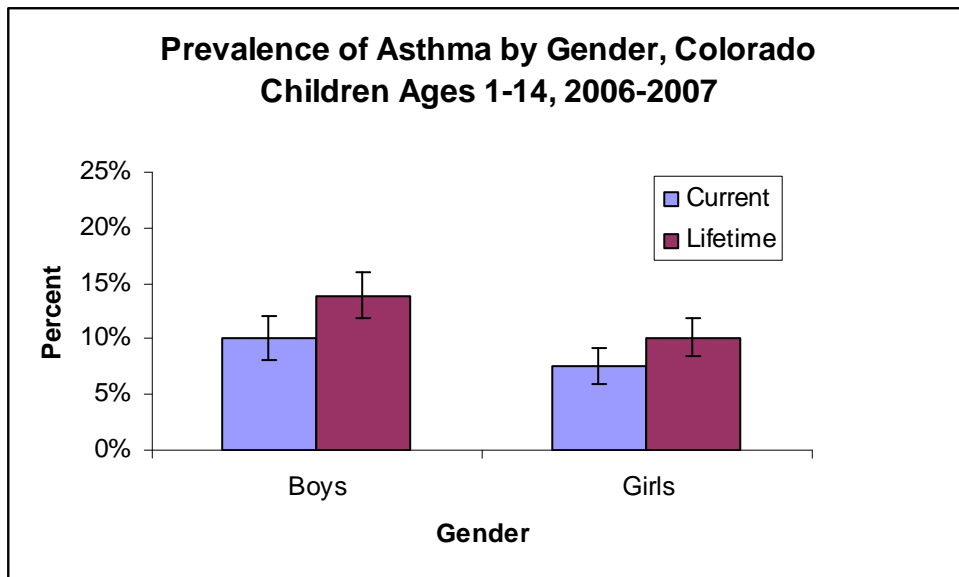
Figure 1.



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

Combining 2006 and 2007 data, boys (13.9 percent) had a higher prevalence of lifetime asthma as compared to girls (10.1 percent). Boys also had a higher prevalence of current asthma, 10.1 percent as compared to 7.5 percent among girls. The differences in the estimated current or lifetime prevalence between boys and girls were not statistically significant (Figure 2).

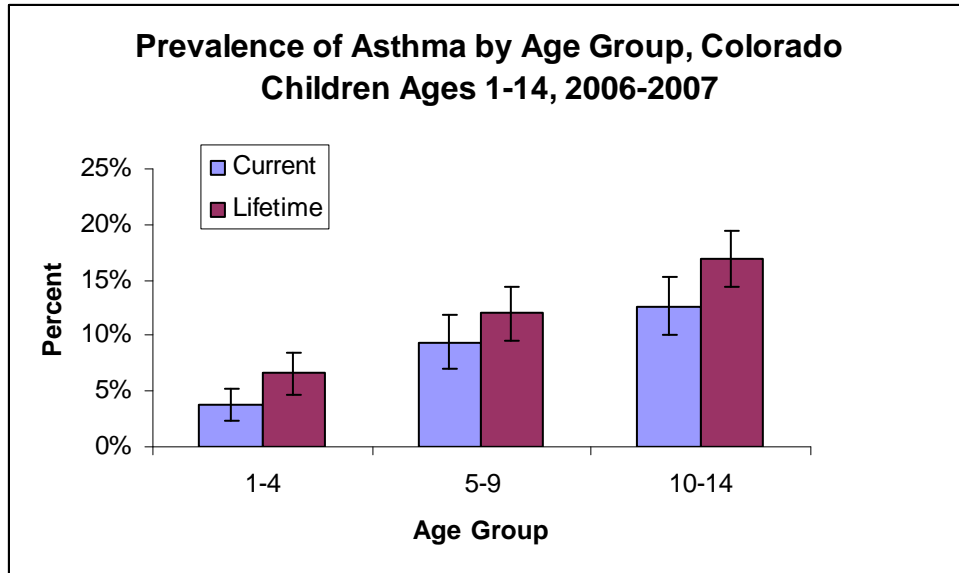
Figure 2.



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

The prevalence of current and lifetime asthma increases by age group (Figure 3). Current asthma was 3.8 percent of 1 to 4 years olds, 9.4 percent for 5 to 9 year olds, and 12.6 percent for 10 to 14 year olds. Lifetime asthma was 6.6 percent for 1 to 4 year olds, 12.0 percent for 5 to 9 year olds, and 16.9 for 10 to 14 year olds. Current asthma prevalence for 1-4 year olds was significantly lower than the current prevalence for 5-9 year olds and 10-14 year olds (Figure 3). The same significant differences between these age groups existed for lifetime asthma as well.

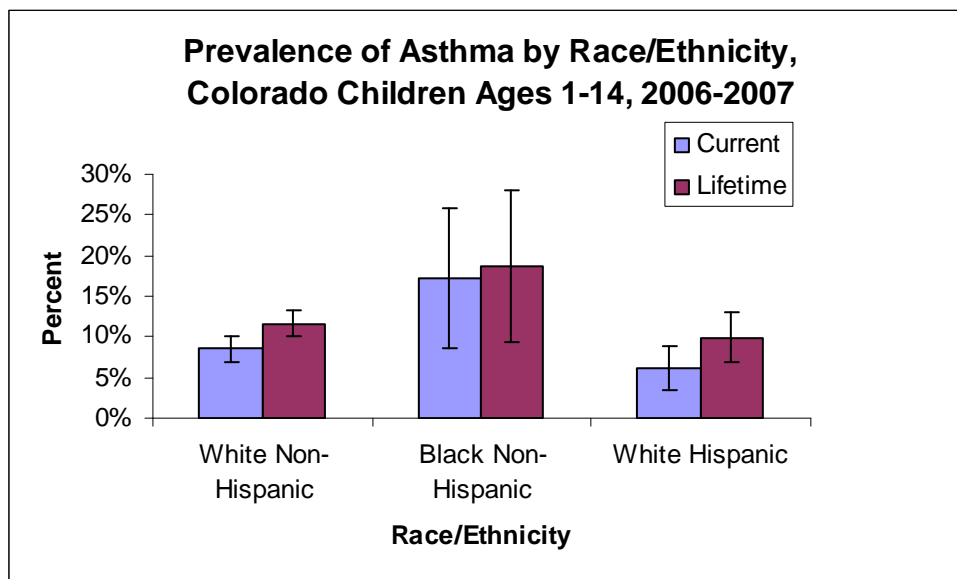
Figure 3.



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

White Non-Hispanic children had a higher current and lifetime prevalence (8.6 and 11.6 percent, respectively) than White Hispanic children (6.2 and 9.9 percent, respectively). The percentages for Black Non-Hispanic appear to be higher than for White Non-Hispanic and White Hispanic children; however, these percentages are based on small numbers, which can vary greatly from year to year, as reflected by the large confidence intervals, indicated by the length of the lines above each bar (Figure 4). None of the current or lifetime prevalence differences between the three racial/ethnic groups were significant. Numbers for Asians were too small to report (See Table 3). Child Health Survey data from the 2008 survey, combined with 2006 and 2007, may provide enough data to make reliable estimates by race/ethnicity for future reports (Figure 4).

Figure 4.

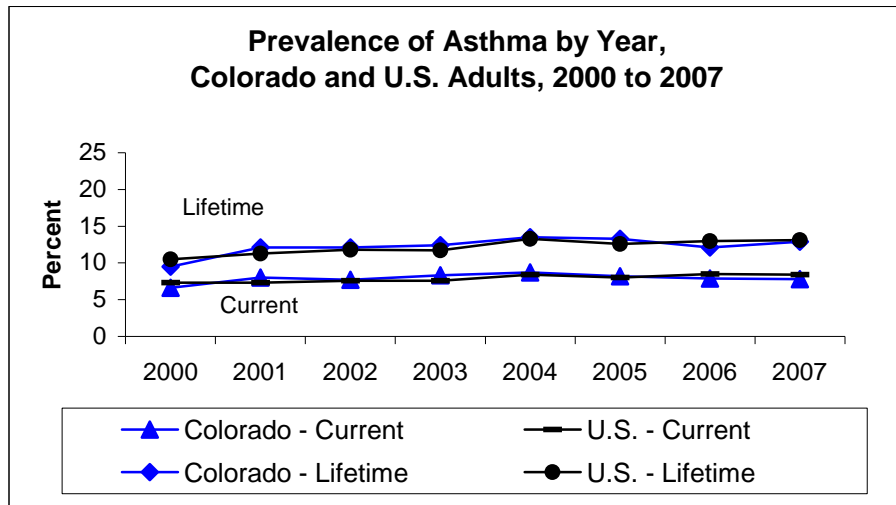


Source: Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Current Asthma and Lifetime Asthma Among Adults, Colorado compared to U.S., Yearly Trends 2000-2007 (BRFSS)

Asthma is a serious chronic disease that affects more than 28 million Americans adults including an estimated 427,726 Coloradans.²³ Trends in the prevalence of current asthma in Colorado have been similar to trends in the U.S. (Figure 5). In 2000, the prevalence of current asthma among Colorado adults was 6.6 percent and increased to 7.8 percent in 2007, while the U.S. prevalence was 7.3 percent in 2000 and 8.4 percent in 2007. Trends in lifetime asthma were also similar between Colorado and the U.S. with adult prevalence at 9.5 percent in Colorado and 10.5 percent in the U.S. in 2000 and 12.9 percent in Colorado and 13.1 percent in the U.S. in 2007 (Figure 5).

Figure 5.



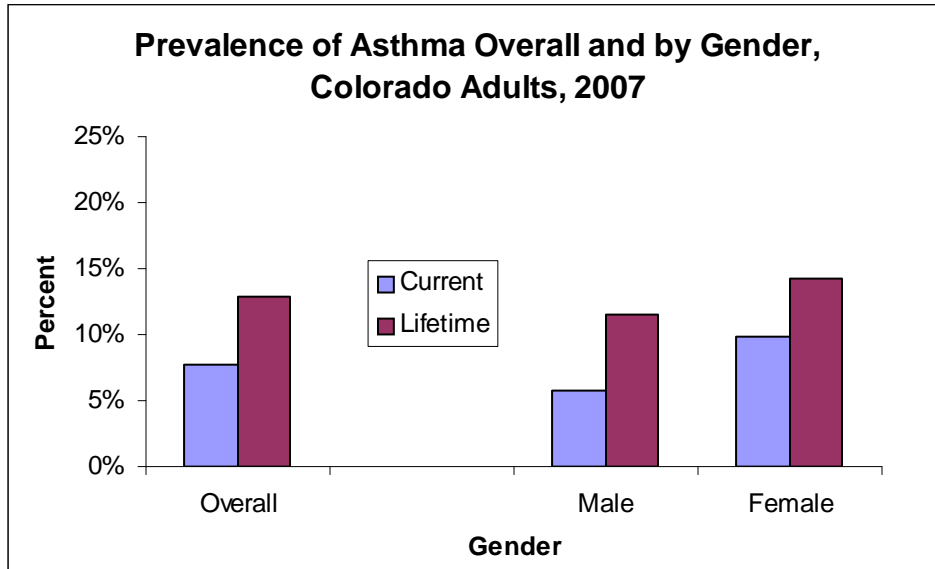
Source: Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment

²³ American Lung Association, Epidemiology and Statistics Unit, Trends in Asthma Morbidity and Mortality, Table 12. Asthma-Estimated Lifetime Prevalence in Adults by State, November 2007.

Current and Lifetime Asthma Among Adults (BRFSS)

Female adults had a higher prevalence of both current and lifetime asthma compared to male adults. The current asthma prevalence was 5.7 percent for males and 9.9 percent for females. The lifetime asthma prevalence was 11.5 percent for males and 14.2 percent for females (Figure 6)

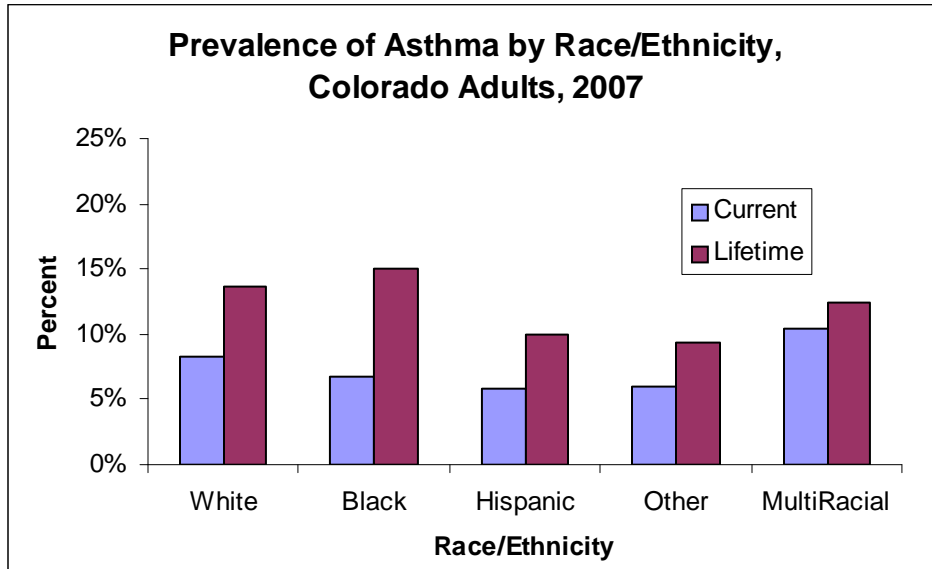
Figure 6.



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

Current asthma prevalence was highest for multiracial adults (10.5 percent), followed by White adults (8.3 percent), Blacks (6.7 percent), Other (6.0 percent) and Hispanics (5.9 percent). Black adults (15.1 percent) had the highest prevalence of lifetime asthma, followed by Whites (13.7 percent), Multiracial (12.4 percent), Hispanics (9.9 percent), and Other (6.0 percent) (Figure 7)

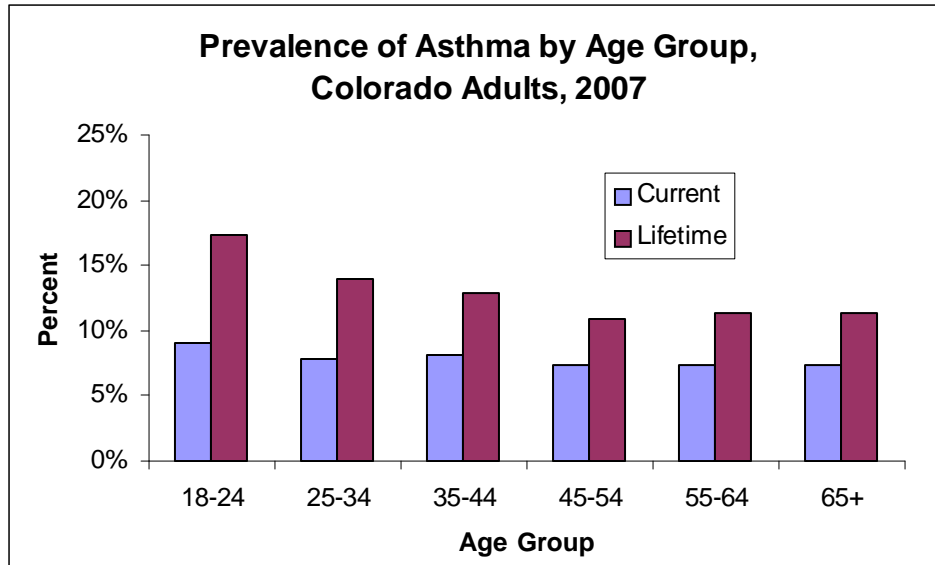
Figure 7.



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

Current asthma by age group ranged from 7.3 percent for the 45-54, 55-64, and 65 and older age groups to 9.0 percent for those ages 18-24. The prevalence of current asthma in the 35-44 and the 25-34 age groups was 8.1 percent and 7.8 percent, respectively (Figure 8). The prevalence of lifetime asthma by age group declined with each older age group. Those ages 18-24 had the highest prevalence at 17.3 percent, followed by 25-34 (13.9 percent), 35-44 (12.9 percent), 45-54 (10.9 percent), 55-64 (11.4 percent) and 65+ (11.3 percent) (Figure 8).

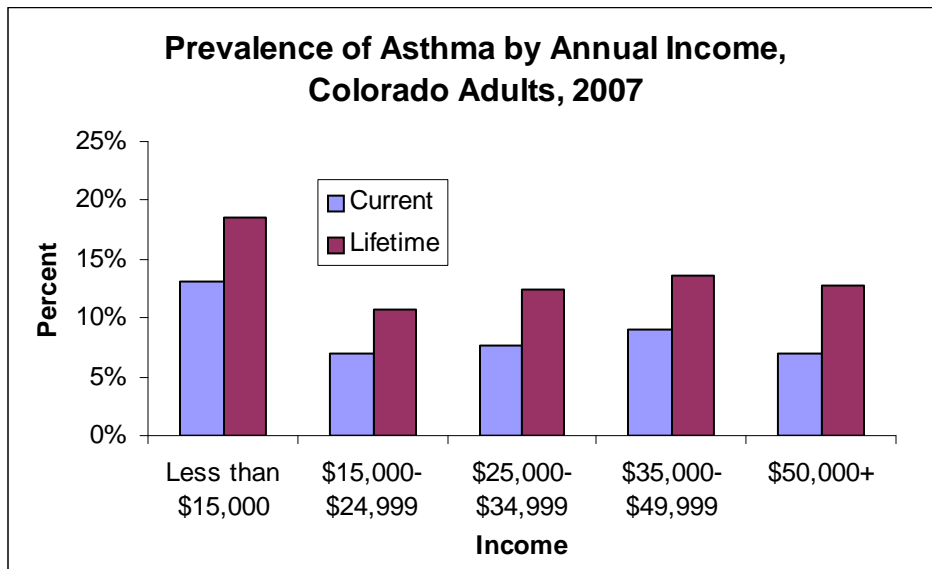
Figure 8.



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

Both current and lifetime asthma prevalence was highest for those with an annual income less than \$15,000 compared to all other income categories (Figure 9). Current asthma was 13.1 percent for those making less than \$15,000, 6.9 percent for \$15,000 to \$24,999, 7.7 percent for \$25,000 to \$34,999, 9.0 percent for \$35,000 to \$49,999, and 7.0 percent for those making \$50,000 annually. Lifetime asthma was 18.6 percent for those making less than \$15,000, 10.7 percent for \$15,000 to \$24,999, 12.4 percent for \$25,000 to \$34,999, 13.6 percent for \$35,000 to \$49,999, and 12.7 percent for those making \$50,000 annually.

Figure 9.



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

Hospital Discharges

Colorado Hospital Discharge Rates for Asthma

Yearly Trends 2000 to 2007

Yearly Trends by Gender 2000 to 2007

Yearly Trends by Age Group 2000 to 2007

Discharge Rates Mapped by County 2002-2007 (combined)

Age-Adjusted Total

Ages Under 5 Years

Ages 5 to 14 Years

Ages 15 to 64 Years

Ages 65 and Older

Number of hospital discharges, mean length of stay, median charge per hospitalization, total asthma hospitalization charges by sex and age, 2007

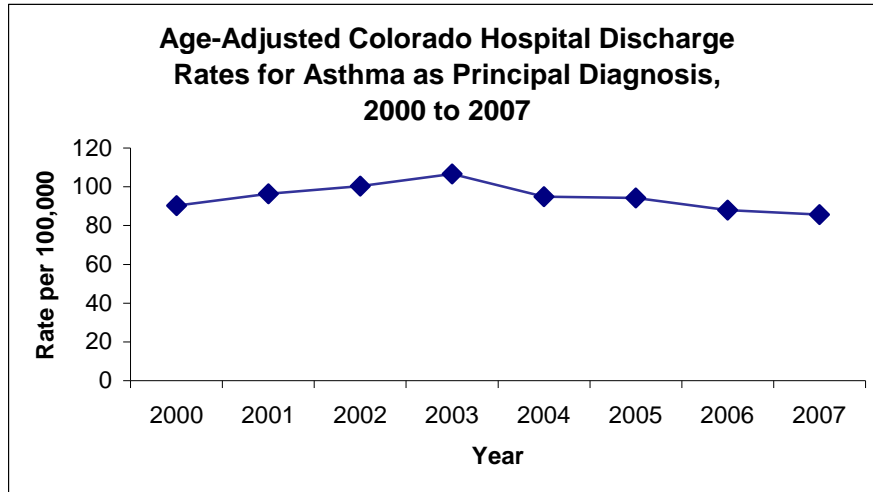
Distribution of the Primary Payer for Asthma Hospitalizations, 2007

Asthma Hospitalizations by Season of Discharge, 2004-2007

Yearly Trends in Hospital Discharge Rates for Asthma 2000 to 2007

Between 2000 and 2003, the age-adjusted hospital discharge rates for asthma have increased from 90.3 to 106.6 per 100,000. In 2004 the rate was down to 94.9 and has declined to a rate of 85.6 in 2007 (Figure 10).

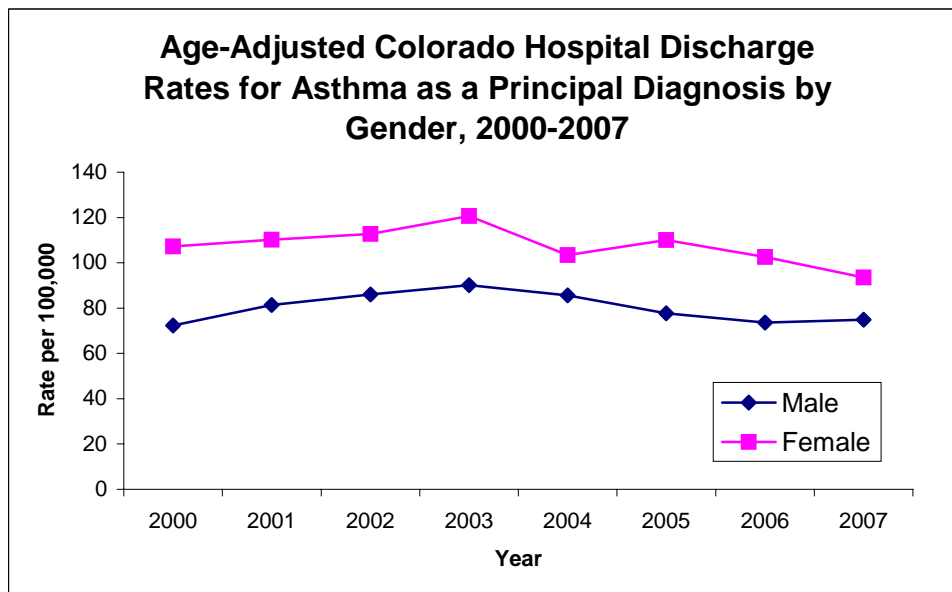
Figure 10.



Prepared by the Epidemiology, Planning, and Evaluation Branch,
Colorado Department of Public Health and Environment

From 2000 to 2007, women have had higher hospital discharge rates for asthma compared to men. Rates for women ranged from 107.2 to 93.5 per 100,000 while rates for men ranged from 72.4 to 90.2 per 100,000 (Figure 11).

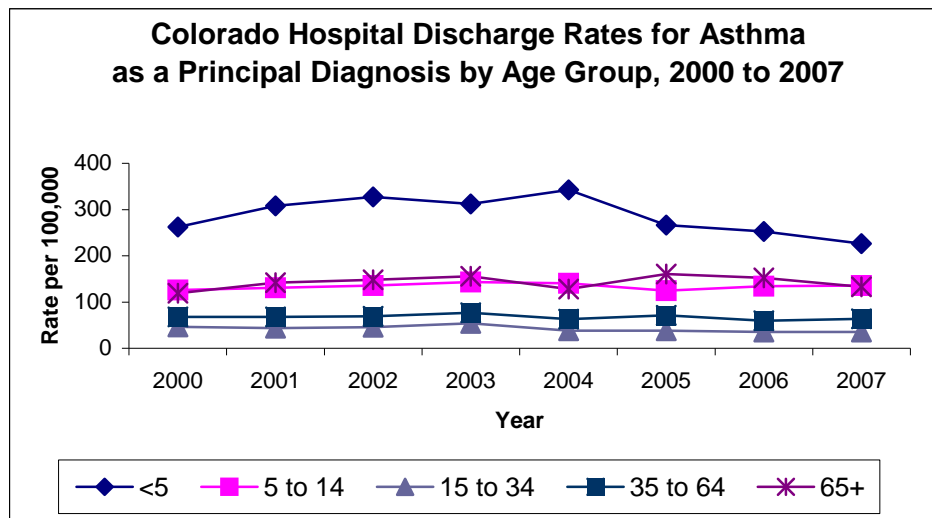
Figure 11.



Prepared by the Epidemiology, Planning, and Evaluation Branch,
Colorado Department of Public Health and Environment

Hospital discharge rates for asthma by age group was consistently higher for those younger than five years old from 2000 to 2007 (Figure 12). Those 65 years and older and those ages 5 to 14 were the next two groups with the highest rates. In 2007, the rate was 226.5 per 100,000 for those younger than 5 years old, compared to the Healthy People 2010 target of 250 hospitalizations per 100,000 children under age 5 years. In 2007, the rate was 135.6 hospitalizations per 100,000 children age 5 to 14 years, 35.4 for 15 to 34 year olds, and 63.5 for 35 to 64 year olds. For Colorado adults age 65 years or older, the asthma-related hospitalization rate was 133.1 hospitalizations per 100,000 persons, above the Healthy People 2010 target of 110 hospitalizations per 100,000 persons age 65 or older.

Figure 12.



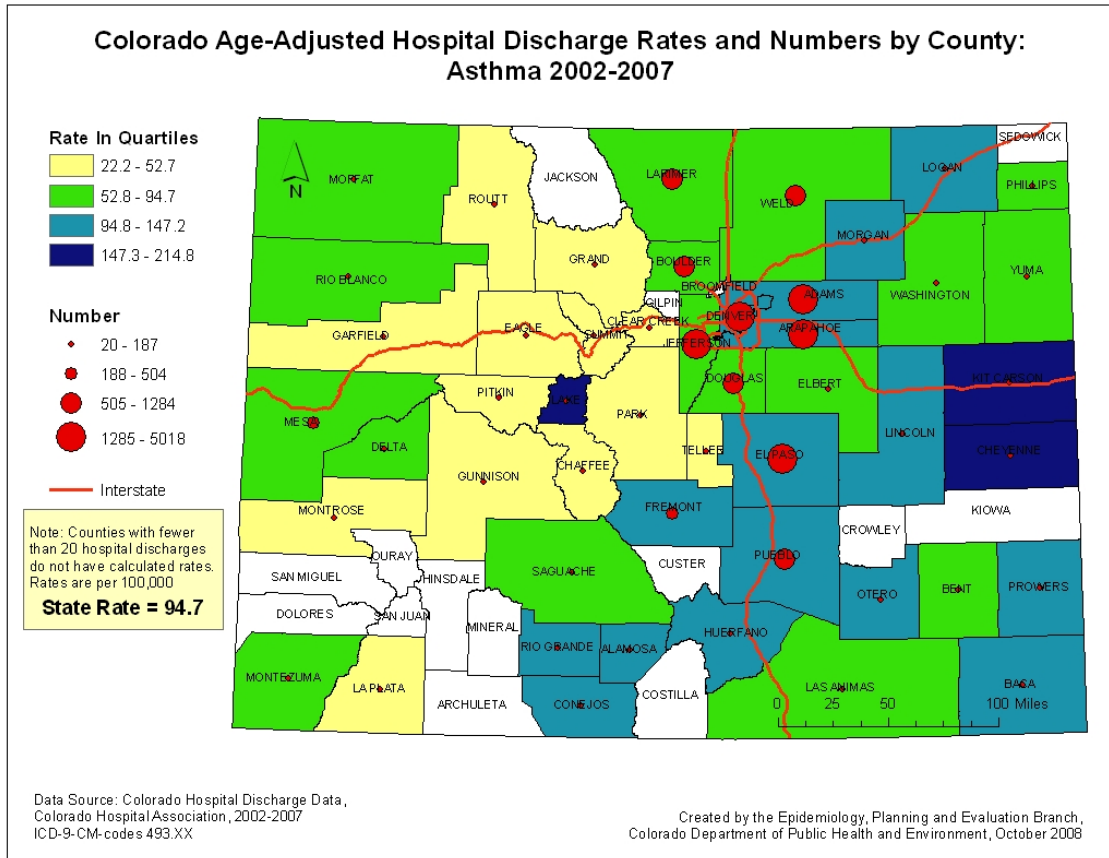
*Prepared by the Epidemiology, Planning, and Evaluation Branch,
Colorado Department of Public Health and Environment*

Of the 4,044 hospitalizations where asthma was listed as the first diagnosis in 2007, 98.8 percent included information on the race of the person. Based on these asthma hospitalizations, 52.7 percent of the persons were white; 17.9 percent were Hispanic; 9.8 percent were Black, and 9.1 percent were Asian, Native American, and other races. Races for the remaining hospitalizations were unknown.

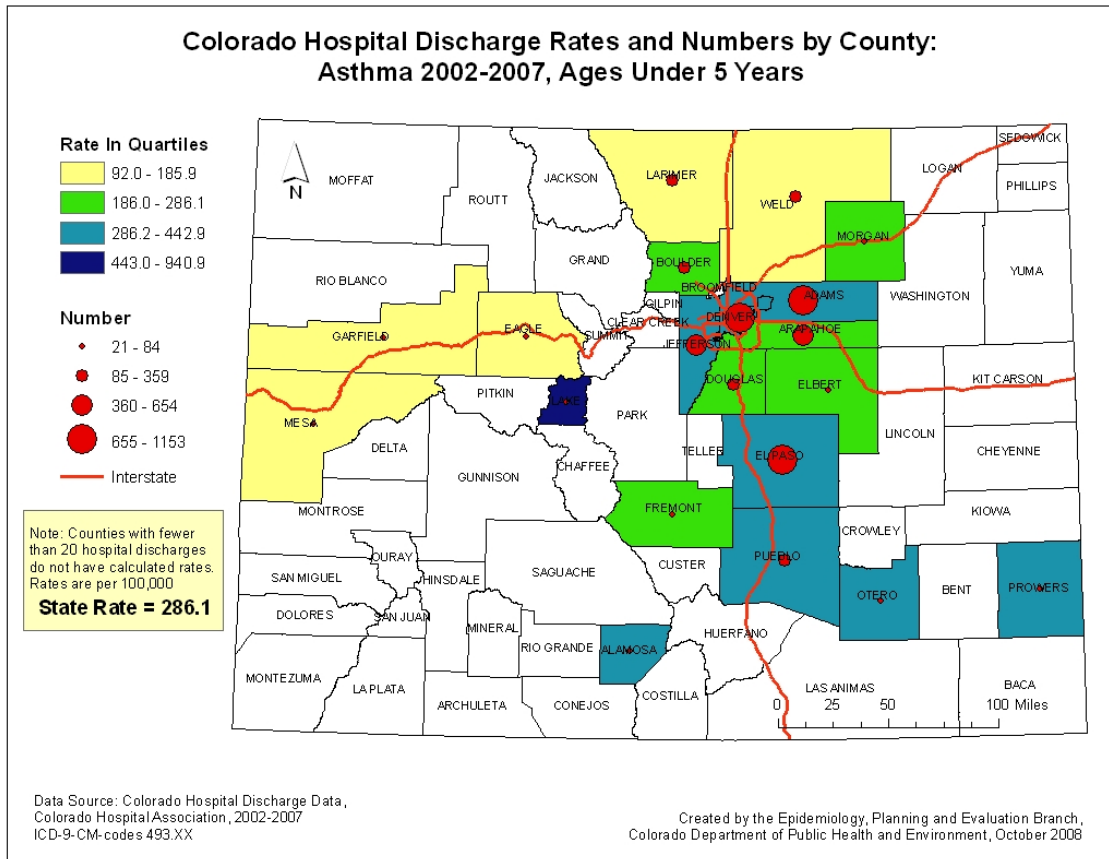
Discharge Rates Mapped by County 2002-2007 (combined)

County mapped age-adjusted hospital discharge rates and counts for asthma are presented in Map 5 and age-specific rates are presented in Maps 6 through 9. Data from 2002 to 2007 were combined to make reliable estimates of rates for as many counties as possible. However, due to small numbers, it was necessary to suppress many county level estimates despite combining several years of data. For counties with sufficient data, rates are presented in quartiles, with two quartiles displaying rates below the state average and two above the state average. As presented in Map 5, the average rate was 94.7 per 100,000. Several counties in eastern and southern Colorado had hospitalization discharge rates higher than the state average. Map 6 shows age specific rates for those less than 5 years of age. Map 7 presents rates for ages 5 to 14 years. Map 8 presents data for ages 15 to 64 years, and Map 9 includes data for those ages 65 and older.

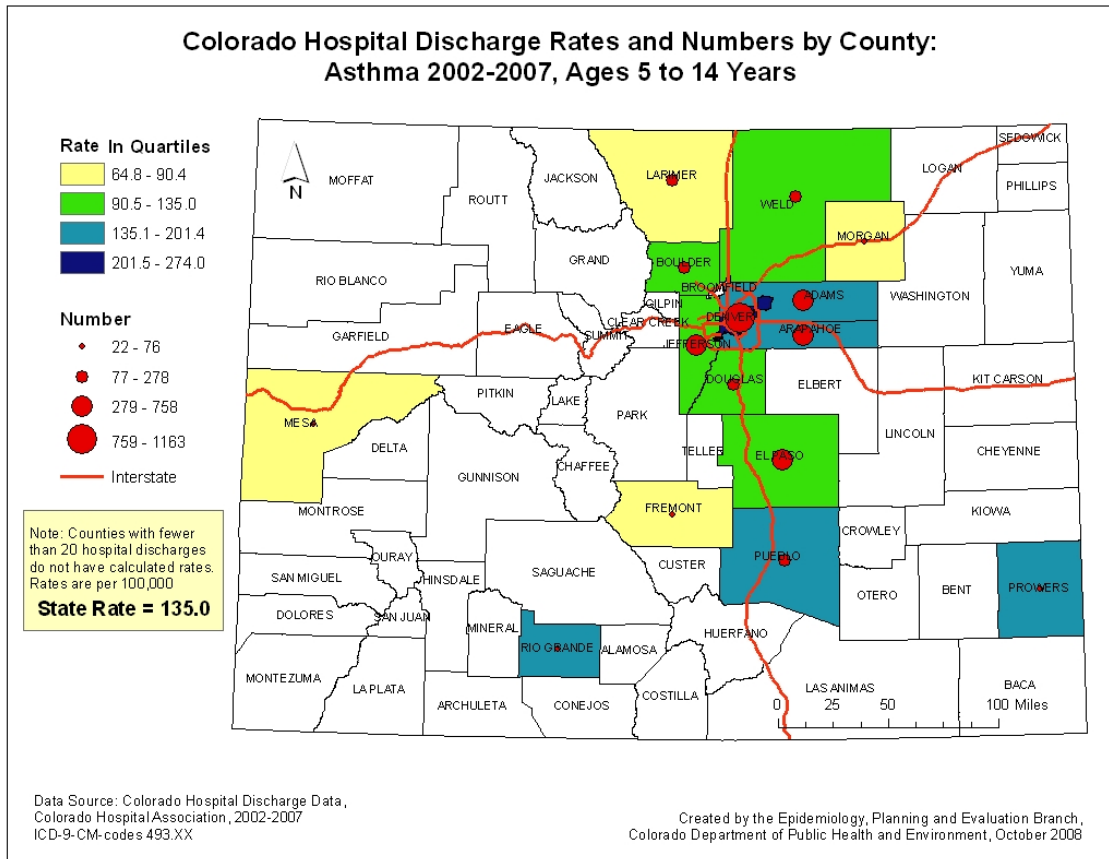
Map 5.



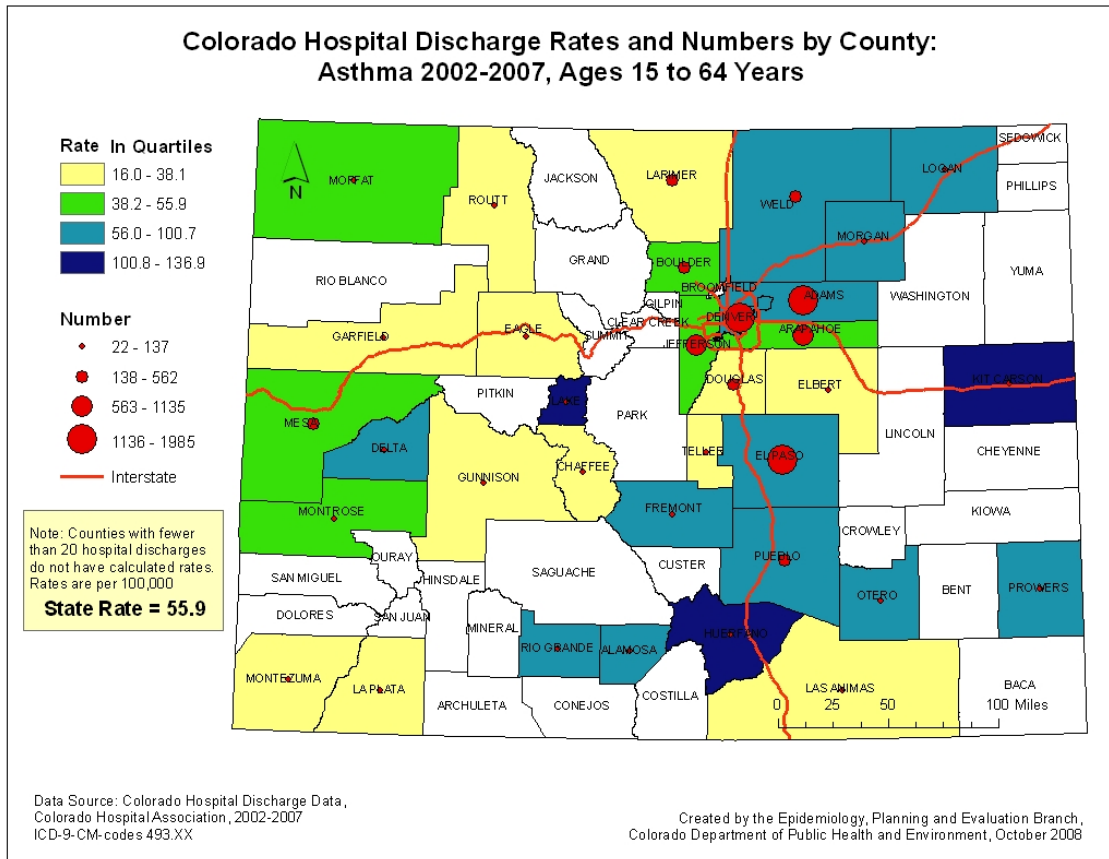
Map 6



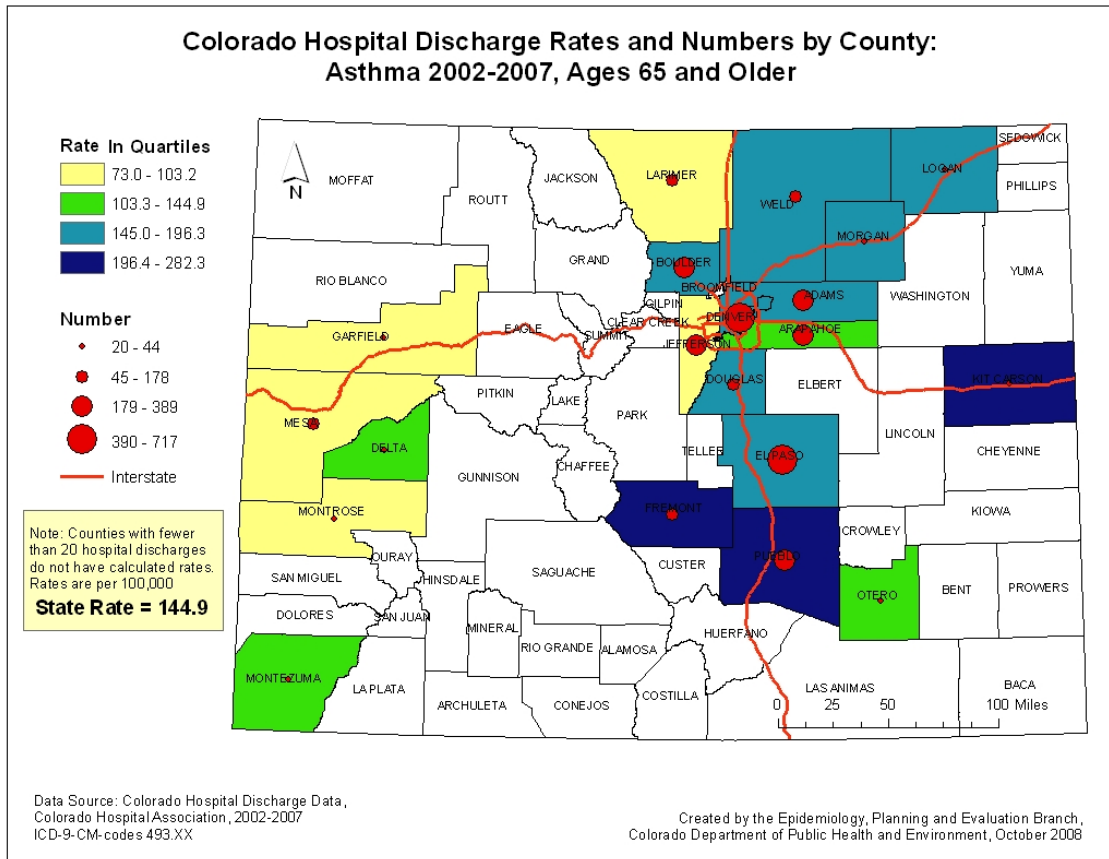
Map 7



Map 8.



Map 9.



Number of Hospitalizations, Mean Length of Stay, Median Charge per Hospitalization, Total Asthma Hospitalization Charges by Sex and Age, 2007

During 2007, there were a total of 4,044 hospital discharges in Colorado due to asthma as a principal diagnosis. Among all of these discharges, the mean number of days spent in the hospital was 2.53 days with a median cost of \$10,729 per hospitalization. During 2007, hospitalization charges for all hospital discharges with asthma as a principal diagnosis totaled over \$59 million (Table 3).

Table 3: Number of Asthma Hospitalizations*, Mean Length of Stay, Median Charge per Asthma Hospitalization, and Total Asthma Hospitalization Charges by Sex and Age, Colorado Residents, 2007

	Number Hospital Discharges for Asthma	Mean Length of Stay (days)	Median Charge per Hospitalization	Total Hospitalization Charges
Sex				
Male	1786	2.73	\$9,397	\$23,443,839
Female	2258	3.24	\$11,967	\$35,949,294
Age (years)				
0-4	795	2.13	\$7,035	\$6,824,767
5-14	884	2.26	\$8,034	\$8,906,919
15-34	485	2.73	\$10,239	\$6,876,346
35-64	1,248	3.52	\$14,211	\$22,769,056
65+	632	4.39	\$16,318	\$14,016,045
Based on all asthma discharges	4,044	2.53	\$10,729	\$59,393,133

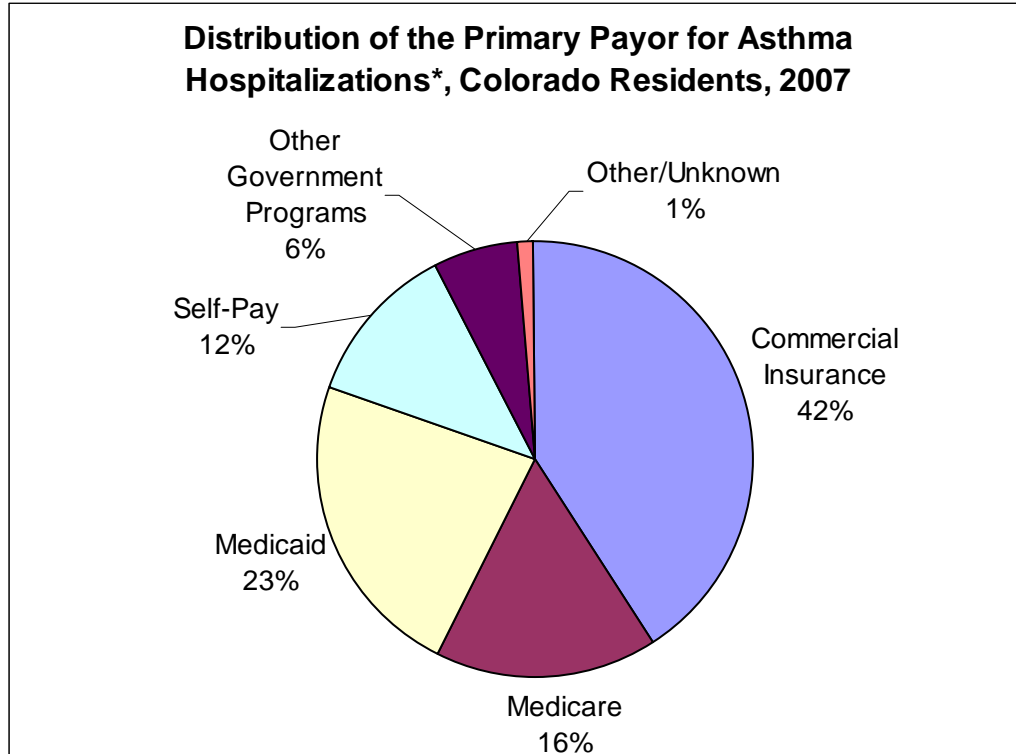
*Asthma listed as a principal diagnosis (ICD-9-CM 493.00-493.92)

Prepared by the Epidemiology, Planning, and Evaluation Branch, Colorado Department of Public Health and Environment

Distribution of the Primary Payer for Asthma Hospitalizations, 2007

As seen in Figure 13, commercial insurance accounted for 42 percent of primary payers for asthma hospitalizations, followed by Medicaid (23%) and Medicare (16%). Self-pay accounted for 12 percent, other government programs (includes CHAMPUS and the Colorado Medically Indigent program) represented 6 percent and other/unknown payers (includes charity/no charge) accounted for 1 percent.

Figure 13.



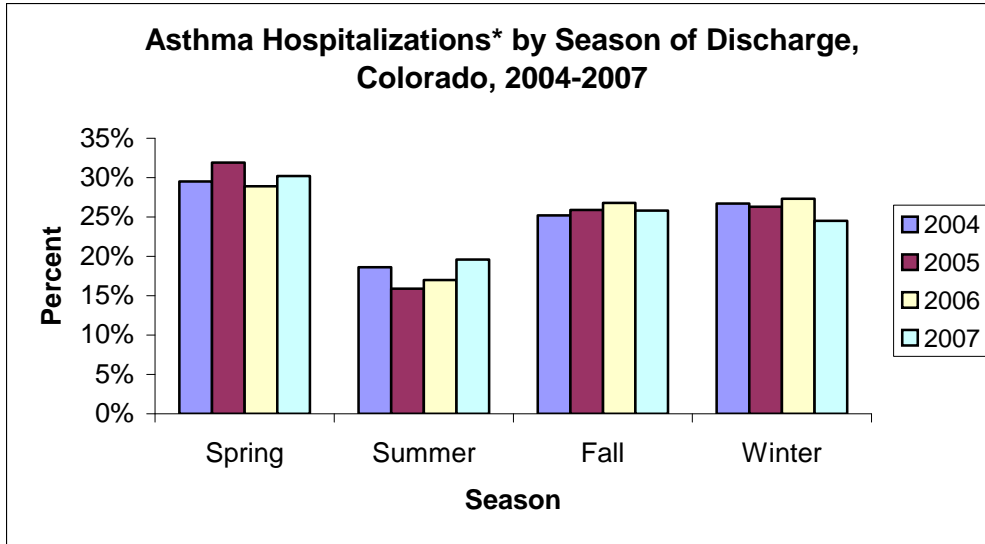
*Asthma listed as a principal diagnosis (ICD-9-CM 493.00-493.92)

Prepared by the Epidemiology, Planning, and Evaluation Branch, Colorado Department of Public Health and Environment

Asthma Hospitalizations by Season of Discharge, 2004-2007

Data from 2004 to 2007, presented in Figure 14, indicate that the highest percentages of asthma hospitalizations occurred during the season of spring, which includes the months of March, April, and May. Summer months include June, July, and August. Fall months include September, October, and November. Winter months include December, January, and February. The lowest percentages of asthma hospitalizations occurred during the summer.

Figure 14.



*Asthma listed as a principal diagnosis (ICD-9-CM 493.00-493.92)

Prepared by the Epidemiology, Planning, and Evaluation Branch, Colorado Department of Public Health and Environment

**Hospitalizations, Emergency Room, School Missed,
Activity Limitations, Sleep Disturbances, Episodes, and
Symptoms among Children & Adults with Lifetime
Asthma**

Hospitalization Among Children with Asthma, 2004 to 2007
(Child Health Survey)

Emergency Room Visits for Children with Asthma, 2004 to
2007 (Child Health Survey)

Emergency Room Visits for Adults with Asthma, 2005 to 2007
(BRFSS and BRFSS Asthma Call Back Survey)

School Days or Childcare Missed Due to Asthma
School Days Missed, 2004 to 2007
School Days by Gender, 2006-2007 (combined)
School Days by Age Group, 2006-2007 (combined)
School Days by Race/Ethnicity, 2006-2007 (combined)
(Child Health Survey)

Limited Activities Due to Asthma Among Adults 2005 to 2007
(BRFSS and BRFSS Asthma Call Back Survey)

Difficulty Staying Asleep Among Adults 2007
(BRFSS Asthma Call Back Survey)

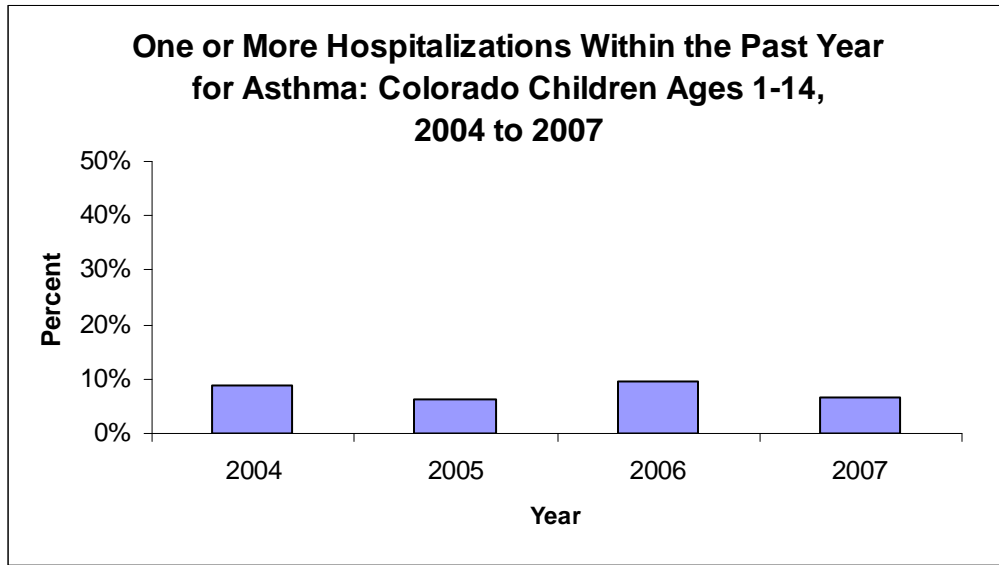
Episodes or Attacks Among Adults 2005 to 2007
(BRFSS and BRFSS Asthma Call Back Survey)

Last Occurrence of Asthma Symptoms Among Adults 2006 to
2007
(BRFSS Asthma Call Back Survey)

Hospitalization Among Children with Asthma, 2004 to 2007

Among children ages 1-14 with lifetime asthma, the percent of those hospitalized at least once within the past year for asthma has fluctuated slightly between 2004 and 2007, though not significantly. The percentage in 2004 was 8.9, followed by a decrease to 6.3 percent in 2005, an increase in 2006 to 9.5 percent, and a decrease in 2007 to 6.6 percent (Figure 15).

Figure 15.

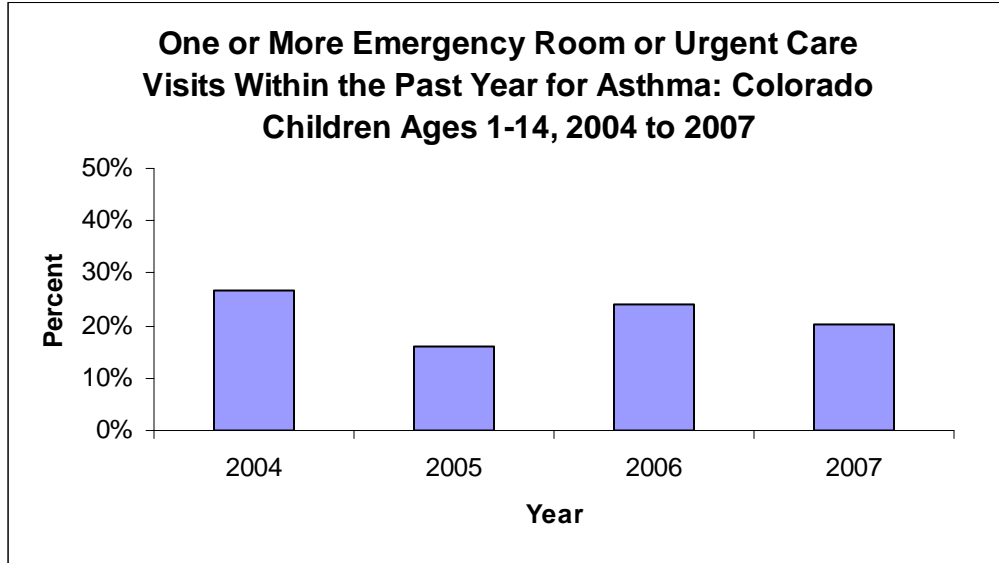


Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Emergency Room Visits for Children with Asthma

Among children ages 1-14 with lifetime asthma, the percentages of those that have been to an emergency room or urgent care center for asthma have fluctuated from 2004 to 2007. During 2004, this was 26.7 percent, 16.0 percent in 2005, 24.1 percent in 2006, and 20.2 percent in 2007 (Figure 16).

Figure 16.

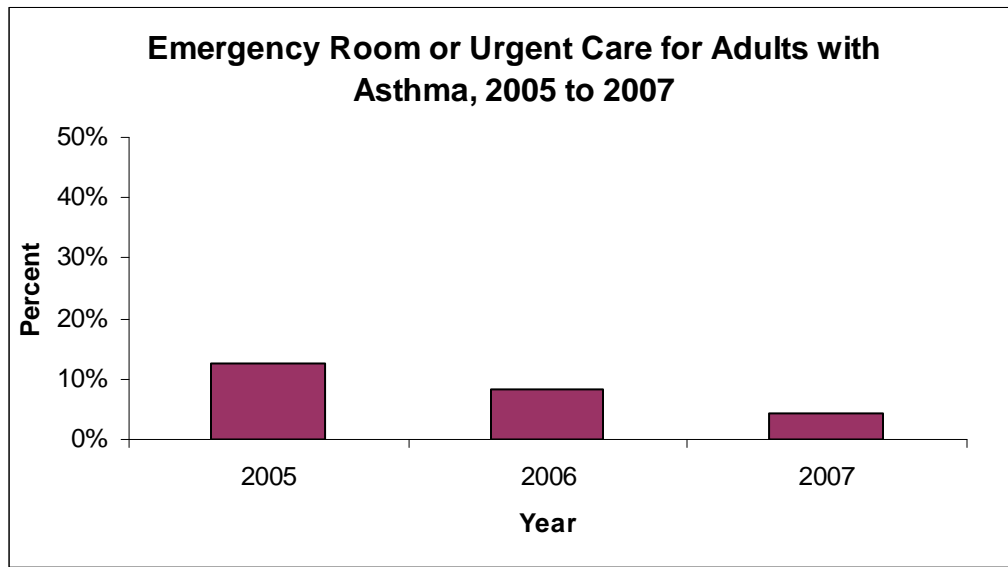


Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Emergency Room Visits for Adults with Asthma

Among adults with lifetime asthma in 2005, 12.6 percent had been to an emergency room or urgent care center for asthma at least once within the past 12 months. In 2006, the percentage was 8.3 and in 2007 it was 4.3 percent (Figure 17). (Is this a significant decrease?)

Figure 17.

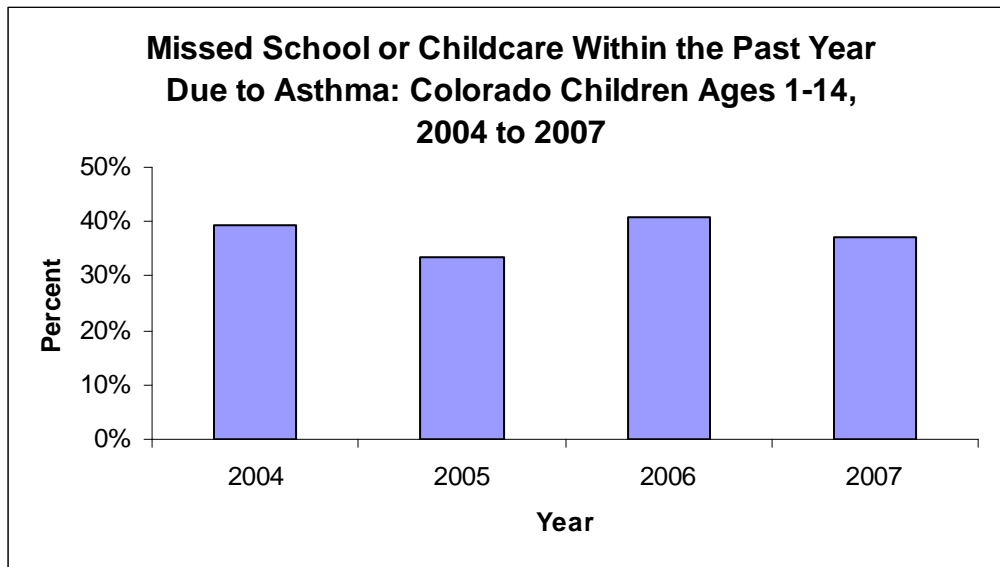


Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment (2005)
Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment (2006-2007)

School Days or Childcare Missed Due to Asthma

The percentages of children with lifetime asthma who missed one or more days of school or childcare due to asthma are presented in Figures 18 and Table 4. Trends from 2004 to 2007 fluctuated. In 2004, 39.3 percent missed school or childcare due to asthma. The percentage declined in 2005 to 33.6, then went up to 41.0 percent in 2006 and was 37.2 percent in 2007 (Figure 18).

Figure 18.



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

Child Health Survey data from 2006 and 2007 were combined to report on gender, age, and race/ethnicity (Table 4). A higher percentage of boys had missed school or childcare than girls. Among boys, 4.4 percent missed only one day within the past year due to asthma. An additional 3.5 percent missed two days and 34.7 percent missed three or more days within the past year. Among girls, 2.7 percent missed only one day within the past year due to asthma. An additional 3.5 percent missed two days and 27.9 percent missed three or more days within the past year. Differences were not significant between boys and girls. Children ages 5-9 had the highest overall percentage (44.6 percent) for missing school or childcare due to asthma. Among this age group the percentages were 3.0 (1 day), 3.8 (2 days), and 37.8 (3 or more days). Children ages 10-14 had an overall percentage of 36.4 with 4.7 (1 day), 4.3 (2 days), and 27.4 (3 or more days). For children ages 1-4, an overall 35.2 percent missed school or daycare due to asthma and the percentages were 1.9 (1 day) and 33.3 (3 or more days). Differences were not significant between the three age groups. Among White Hispanic children, 7.1 percent missed one day, 3.4 percent missed two days, and 40.9 percent missed three or more days of school within the past year. White Hispanics had the highest overall percentage of having missed school or childcare due to asthma (51.4%). Black Non-Hispanic children had a percentage of 45.4 for missing three or more days. Black Non-Hispanic children had a percentage of 45.4 for missing three or more days. Among White Non-Hispanic children percentages were 3.2 (1 day), 4.0 (2 days), 27.7 (3 or more days), and 34.9 (overall). Differences were not significant between the racial/ethnic groups.

Table 4. Days of School or Childcare Missed within the Past Year Due to Asthma by Gender, Age, and Race/Ethnicity, Colorado Children Ages 1-14, 2006-2007

Demographics	1 Day % (CI)	2 Days % (CI)	3 or More Days % (CI)
Boys	4.4% (1.3-7.4)	3.5% (0.3-6.7)	34.7% (25.7-43.7)
Girls	2.7% (0.0-5.6)	3.5% (0.6-6.3)	27.9% (18.8-37.0)
Both Sexes	3.7% (1.6-5.9)	3.5% (1.3-5.7)	32.0% (25.4-38.5)
1 to 4 years	1.9% (0.0-4.6)	*	33.3% (18.6-48.0)
5 to 9 years	3.0% (0.0-6.6)	3.8% (0.7-6.8)	37.8% (26.4-49.3)
10 to 14 years	4.7% (1.3-8.1)	4.3% (0.5-8.1)	27.4% (18.2-36.6)
White Non-Hispanic	3.2% (0.8-5.6)	4.0% (1.0-7.0)	27.7% (20.3-35.2)
Black Non-Hispanic	*	*	45.4%(19.3-71.6)
White Hispanic	7.1% (0.0-14.4)	3.4% (0.0-7.6)	40.9% (21.9-60.0)

*Insufficient data

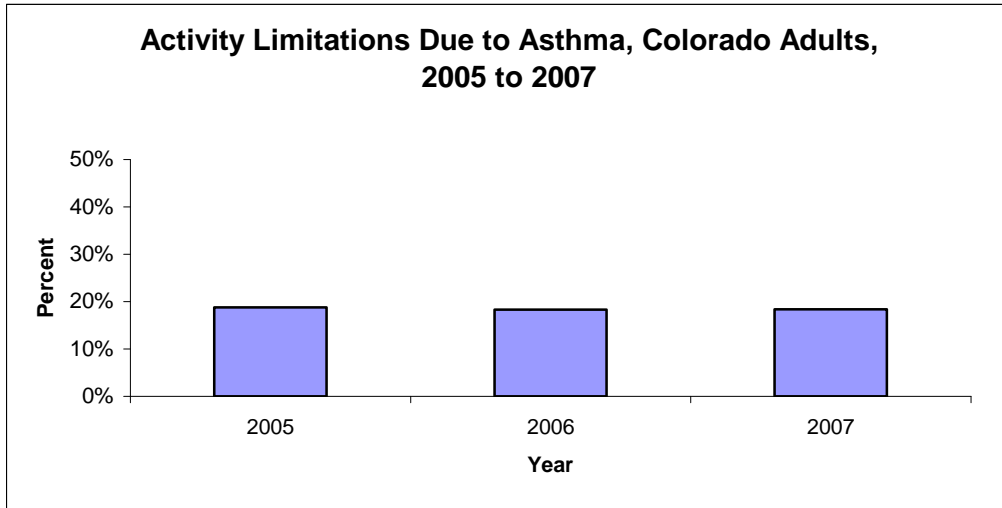
CI = 95% confidence interval

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

Limited Activities Due to Asthma Among Adults 2005 to 2007

The percentage of adults with lifetime asthma that were unable to work or carry out usual activities for one or more days because of asthma during the past 12 months was 18.8 percent in 2005, 18.3 in 2006, and 18.4 in 2007 (Figure 19).

Figure 19.



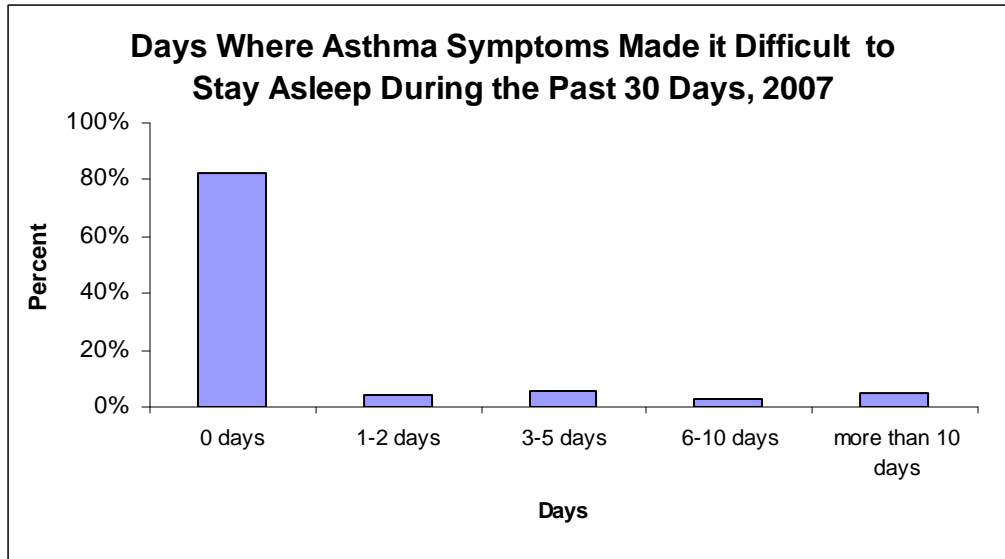
Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment (2005)

Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment (2006-2007)

Difficulty Staying Asleep Among Adults 2007

Among adults with lifetime asthma, 82.2 percent did not have any difficulty staying asleep in the past 30 days due to asthma symptoms. Almost 18 percent of the adults with lifetime asthma had one or more days during the past 30 days when their asthma symptoms made it difficult to stay asleep. The percentages based on the number of days were; 4.3 had 1-2 days, 5.5 had 3-5 days, 3.0 had 6-10 days, and 4.9 had more than 10 days of difficulty staying asleep due to asthma (Figure 20).

Figure 20.

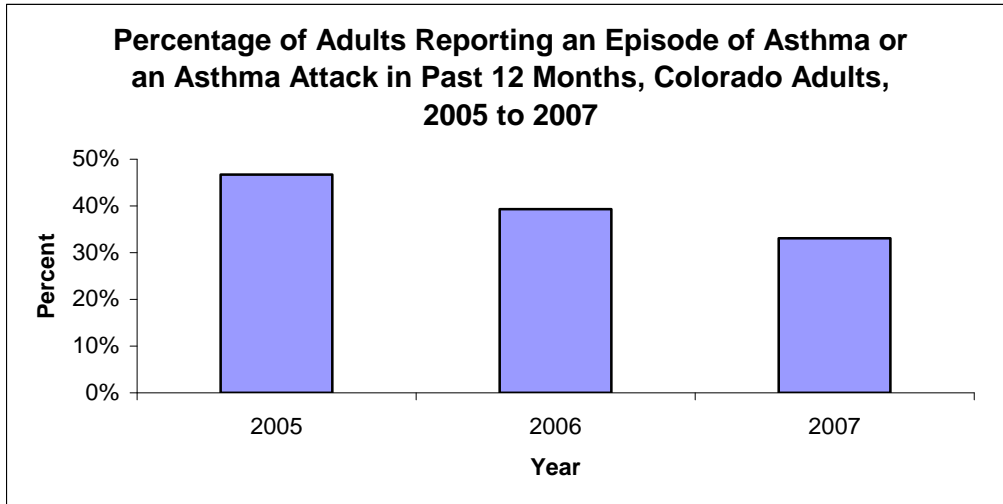


Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Episodes or Attacks Among Adults 2005 to 2007

Among adults with lifetime asthma, the percentages of those that had an episode of asthma or an asthma attack during the past 12 months were 46.7 in 2005, 39.3 in 2006, and 33.1 in 2007 (Figure 21).

Figure 21.



Behavioral Risk Factor Surveillance System, Health Statistics Section, Colorado Department of Public Health and Environment (2005)

Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment (2006-2007)

Last Occurrence of Asthma Symptoms Among Adults 2006 to 2007

In 2006 and 2007, 0.2 percent and 0.1 percent of adults with lifetime asthma did not have symptoms in the last year, respectively. The percentages of having symptoms of asthma less than one-day ago was 25.7 percent and 23.9 percent. The percentages of having symptoms 1-6 days ago was 10.5 and 11.7. The percentages of having symptoms one week to less than one year ago was 34.7 and 28.6. Symptoms more than one year ago were 28.9 percent and 35.7 percent (Table 5).

Table 5. Amount of Time Since Last Asthma Symptoms, 2006 to 2007

	2006	2007
Never	0.2%	0.1%
Less than 1 day ago	25.7%	23.9%
1-6 days ago	10.5%	11.7%
1 week to less than 1 year ago	34.7%	28.6%
More than 1 year ago	28.9%	35.7%

Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Asthma Mortality

Underlying Cause and Mentioned Cause of Death, Age-adjusted Asthma Mortality Rates 2000 to 2007

Asthma Mortality Rates Using Underlying Cause 2000-2007 (combined)

Gender 2000-2007 (combined)

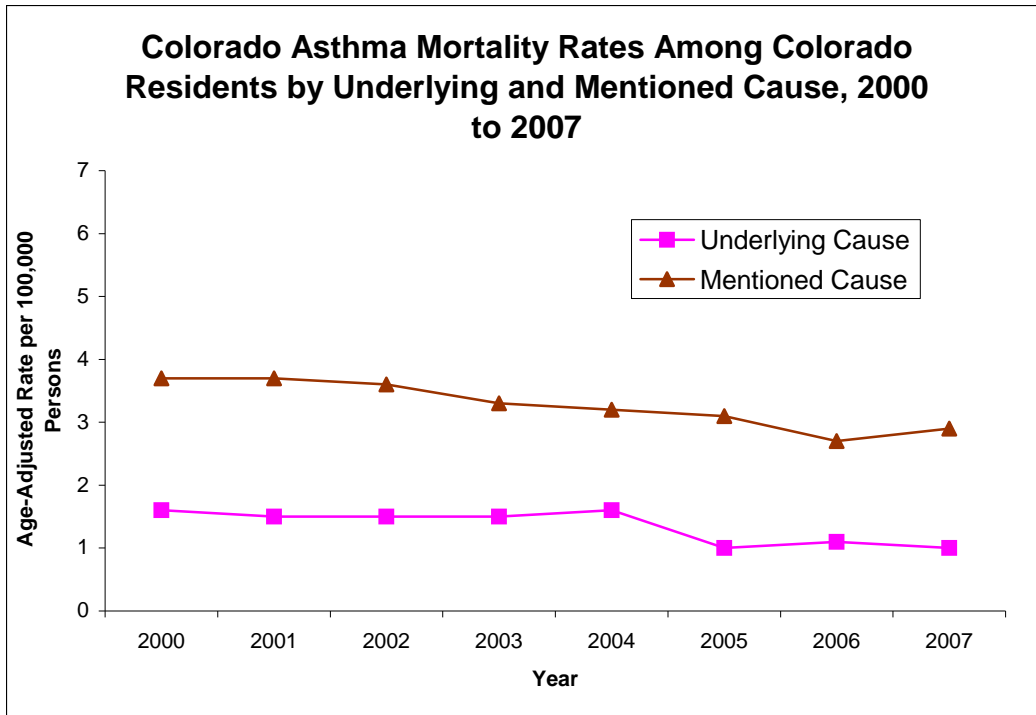
Age 2000-2007 (combined)

Race/Ethnicity 2000-2007 (combined)
(Vital Statistics)

Underlying Cause and Mentioned Cause of Death, Age-Adjusted Asthma Mortality Rates 2000 to 2007

The mortality rates for asthma as the underlying cause of death for Colorado residents was 1.6 per 100,000 persons in 2000 and 1.0 per 100,000 persons in 2007. Based on asthma mentioned as any of the 11 causes of death, mortality rates for asthma was 3.7 per 100,000 persons in 2000 and 2.9 per 100,000 persons in 2007 (Figure 22). The annual mortality rates displayed in Figure n do not differ significantly.

Figure 22.



Death Certificates, Health Statistics Section, Colorado Department of Public Health and Environment

Mortality Rates Using Underlying Cause 2000-2007 (combined)

The overall age-adjusted mortality rate for 2000-2007 combined was 1.3 per 100,000 population. For females, the age-adjusted mortality rate was 1.6 per 100,000 population, which was slightly higher than the rate for males and statistically different from the male rate. Age-specific rates for asthma as the underlying cause of death were highest for those ages 65 and older (6.4 per 100,000). This rate for this oldest group was significantly higher than the rate in all other age groups. Those 35-64 had a death rate of 1.0 per 100,000 which was significantly higher than the rates for 15-34 year olds (0.4 per 100,000) and 5-14 year olds (0.2 per 100,000). Age-adjusted mortality rates by race/ethnicity indicate that Blacks (2.6 per 100,000) had the highest rate, followed by White Non-Hispanics (1.3 per 100,000) and White Hispanics (1.3 per 100,000). The age-adjusted mortality rate for Blacks was significantly higher than the age-adjusted mortality rate for White Non-Hispanics (Table 6).

Table 6. Mortality Rates* with Asthma as an Underlying Cause by Gender, Age, and Race/Ethnicity, Colorado Residents, 2000-2007

Demographics	Rate (CI)	Healthy People 2010 Target
Males	1.1 (0.9-1.2)	
Females	1.6 (1.4-1.7)	
Both Sexes	1.3 (1.2-1.5)	
<1 year	**	
1 to 4 years	**	0.1 per 100,000
5 to 14 years	0.2 (0.0-0.3)	0.1 per 100,000
15 to 34 years	0.4 (0.3-0.5)	0.2 per 100,000
35 to 64 years	1.0 (0.8-1.1)	0.9 per 100,000
65+ years	6.4 (5.6-7.2)	6.0 per 100,000
White Non-Hispanic	1.3 (1.2-1.4)	
Black	2.6 (1.6-3.6)	
White Hispanic	1.3 (0.8-1.7)	
Asian/Pacific Islander	1.8 (0.6-3.0)	
American Indian	0.6 (0.0-1.2)	

*Rates are per 100,000 population. Rates for gender and race/ethnicity are age-adjusted to the 2000 U.S. standard population using the direct method applied to 10-year age groups.

** Indicates fewer than three events in the category

CI = 95% confidence interval

Death Certificates, Health Statistics Section, Colorado Department of Public Health and Environment

Asthma Management and Control

Asthma Medications

Use of Rescue Medication and Identification of Who Carry
Rescue Inhalers at School

Gender, 2006-2007 (combined)
Age, 2006-2007 (combined)
(Child Health Survey Data)

Ever Used Over-the-Counter Medication for Asthma Among
Adults 2006 and 2007
(BRFSS Asthma Call Back Survey)

Prescription Inhalers for Asthma, 2006 and 2007
Ever used a prescription inhaler
Health professional showed how to use the inhaler
Health professional watched inhaler used
(BRFSS Asthma Call Back Survey)

Medications for Asthma Used in the Past Three Months 2006
and 2007

Prescription medicine using an inhaler
Medicine in pill form
Medicines used with a nebulizer
(BRFSS Asthma Call Back Survey)

The most important change related to asthma in the last 10 years has come in the treatment of the disease. Through research and the development of more effective medications, the treatment of asthma has taken great strides forward. It is clear that the lives of most people with asthma do not need to be limited. By avoiding asthma triggers and using the prescribed medications appropriately, asthma does not have to interfere with an optimal quality of life.

Use of Rescue Medication and Identification of Who Carry Rescue Inhalers at School

Among boys with lifetime asthma, 73.4 percent of the boys use a rescue medication such as Albuterol, Alupent, Ventolin, Proventil, Atrovent, or Maxair inhaler. Among these boys, only 37.6 percent carry their inhaler to school. Results for girls were similar. Among girls with lifetime asthma, 79.3 percent of them use a rescue medication. Among these girls, only 48.4 percent carry their inhaler to school. There were no significant differences between boys and girls. (Table 7)

Table 7. Percentage of Colorado Children Ages 1-14 Who Use a Rescue Inhaler and Users Who Also Carry Rescue Inhalers at School by Gender and Age, 2006-2007

Demographics	Uses Rescue Inhaler % (CI)	Users Who Also Carry Inhaler to School % (CI)
Boys	73.4% (65.7-81.0)	37.6% (27.3-47.9)
Girls	79.3% (71.5-87.1)	48.4% (36.6-60.2)
1 to 4 years	64.8% (49.5-80.1)	24.5% (1.9-47.1)
5 to 9 years	75.6% (66.2-85.0)	24.6% (14.3-34.8)
10 to 14 years	79.2% (71.8-86.6)	55.9% (44.6-67.1)

CI = 95% confidence interval

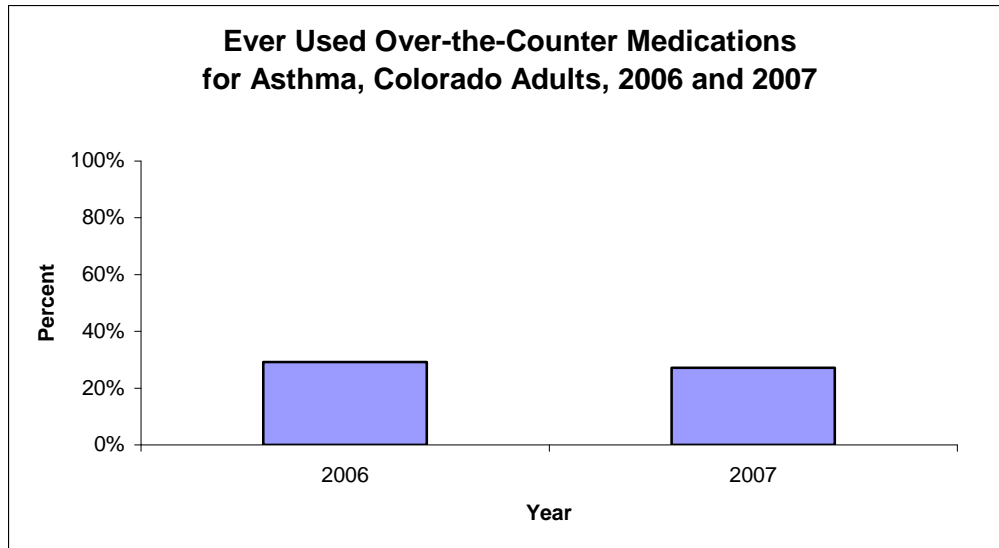
Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Among children ages 1-4 with lifetime asthma, 64.8 percent use a rescue medication. Among these children 1-4 years of age, 24.5 percent carry their inhaler to school. Among children ages 5-9 with lifetime asthma, 75.6 percent of them use a rescue. Of the 75.6 percent of children ages 5-9 who use such medication, only 24.6 percent carry their inhaler to school. Among children ages 10-14 with lifetime asthma, 79.2 percent of them use a rescue. Of the 79.2 percent of children ages 10-14 who use such medication, 55.9 percent carry their inhaler to school. There were no significant differences between the age groups (Table 7).

Ever Used Over-the-Counter Medication for Asthma Among Adults 2006 and 2007

The percentages of adults with lifetime asthma that have ever used over-the-counter medication for asthma were 29.2 percent in 2006 and 27.2 percent in 2007 (Figure 23).

Figure 23.

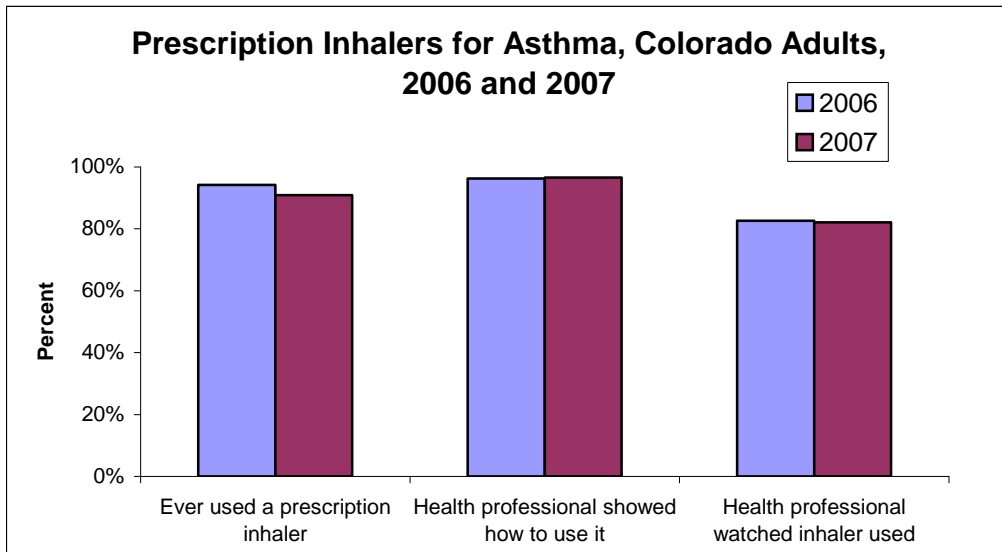


Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Prescription Inhalers for Asthma, 2006 and 2007

Among adults with lifetime asthma, 94.2 percent in 2006 and 90.9 percent in 2007 had ever used a prescription inhaler. Of those that had ever used a prescription inhaler, a doctor or other health professional showed how to use it 96.3 and 96.6 percent of the time in 2006 and 2007, respectively. Of those that had ever used a prescription inhaler, a doctor or other health professional watched the inhaler used 82.6 percent in 2006 and 82.1 percent in 2007 (Figure 24).

Figure 24.

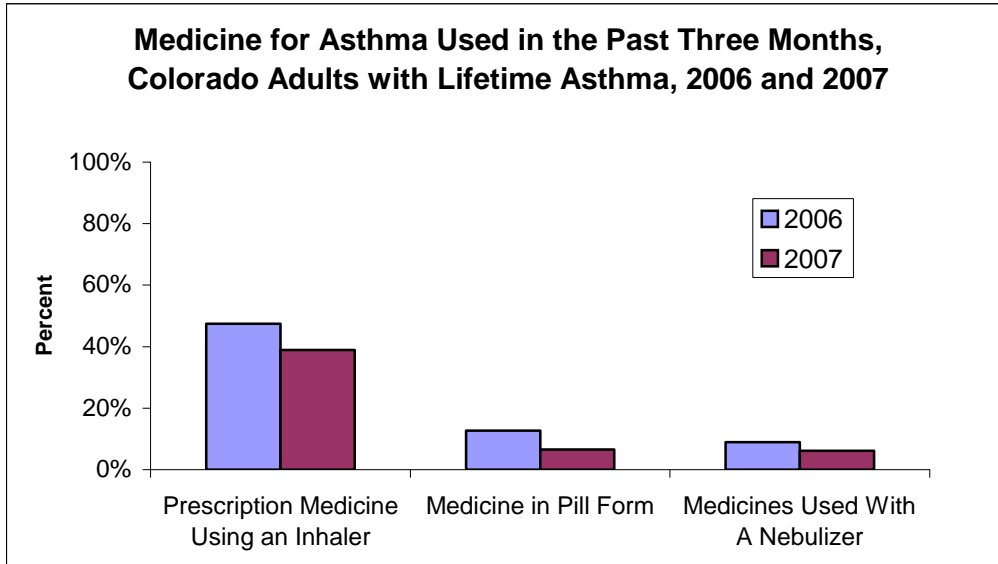


Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Medications for Asthma Used in the Past Three Months 2006 to 2007

Among adults with lifetime asthma, 47.4 percent took prescription asthma medicine using an inhaler in the past three months in 2006. The percentage was 38.9 in 2007. Medicine in pill form for asthma was taken 12.7 and 6.6 percent of the time during 2006 and 2007, respectively. A nebulizer was used to take asthma medications 9.0 and 6.1 percent of the time during 2006 and 2007 (Figure 25).

Figure 25.



Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Management Plans

Has an Asthma Management Plan and Provided the Plan to School
Gender, 2006-2007 (combined)
Age, 2006-2007 (combined)
(Child Health Survey Data)

Ever Been Given an Asthma Action Plan, 2006 to 2007
(BRFSS Asthma Call Back Survey)

Has an Asthma Management Plan and Provided the Plan to School

An asthma management plan is a form that describes when to change the amount of medicine, when to call the doctor for advice, and when to go to an emergency room. Among boys with lifetime asthma, 45.2 percent have ever been given an asthma management plan by their doctor or another health professional. Of the 45.2 percent of boys who use such medication, 45.0 percent have provided a copy of the plan to the school where they are currently enrolled. Among girls with lifetime asthma, 48.6 percent have ever been given an asthma management plan by their doctor or another health professional. Of the 48.6 percent of girls who use such medication, 52.3 percent have provided a copy to the school where they are currently enrolled. There are no significant differences between boys and girls. Among children ages 1-4 with lifetime asthma, 51.5 percent have ever been given an asthma management plan, while 21.5 percent of these gave a copy of it to school or daycare. Among children ages 5-9 with lifetime asthma, 49.2 percent have ever been given an asthma management plan, while 57.4 percent of these gave a copy of it to school. Among children ages 10-14 with lifetime asthma, 43.2 percent have ever been given an asthma management plan, while 42.7 percent of these gave a copy of it to school. There are no significant differences between the three age groups (Table 8).

Table 8. Percentage of Colorado Children Ages 1-14 with an Asthma Management Plan and Provision of Plan to the Child's School Among Children With a Plan by Gender and Age, 2006-2007

Demographics	Child Has a Plan % (CI)	Child with a Plan who Provided Plan to School % (CI)
Boys	45.2% (36.2-54.1)	45.0% (30.6-59.5)
Girls	48.6% (39.1-58.2)	52.3% (38.6-66.1)
1 to 4 years	51.5% (36.1-66.9)	21.5% (0.0-52.3)
5 to 9 years	49.2% (37.9-60.4)	57.4% (41.7-73.6)
10 to 14 years	43.2% (33.9-52.6)	42.7% (29.7-55.8)

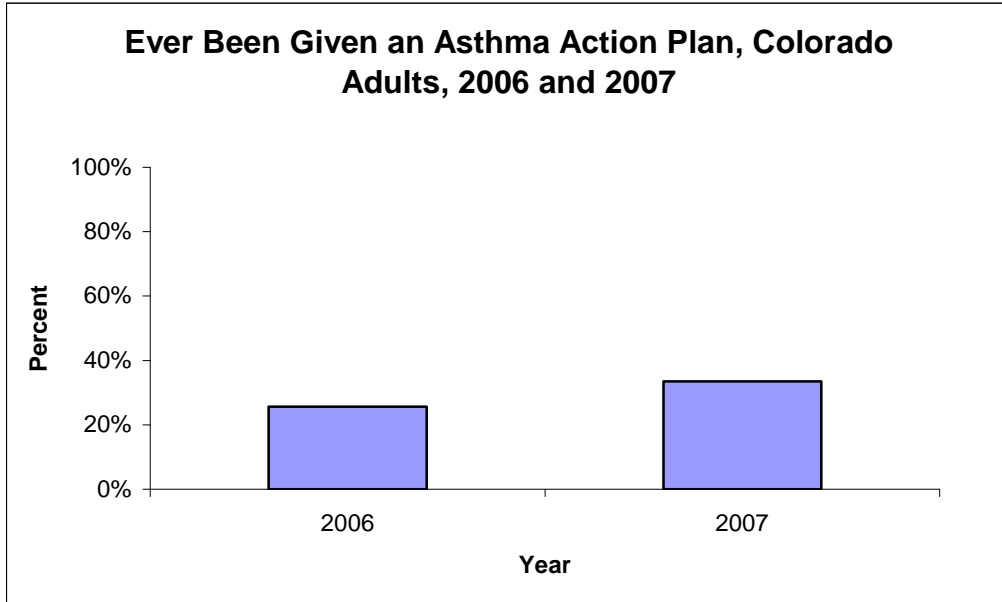
CI = 95% confidence interval

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

Ever Been Given an Asthma Action Plan, 2006 and 2007

For adults with lifetime asthma, 25.6 percent and 33.5 percent had ever been given an asthma action plan by their doctor or other health professional, as measured during 2006 and 2007, respectively, (Figure 26).

Figure 26.



Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Knowledge

Ever Taught by a Doctor or Other Health Professional

How to recognize early signs or symptoms of an asthma episode

What to do during an asthma episode or attack

How to use a peak flow meter to adjust your daily medications
(BRFSS Asthma Call Back Survey)

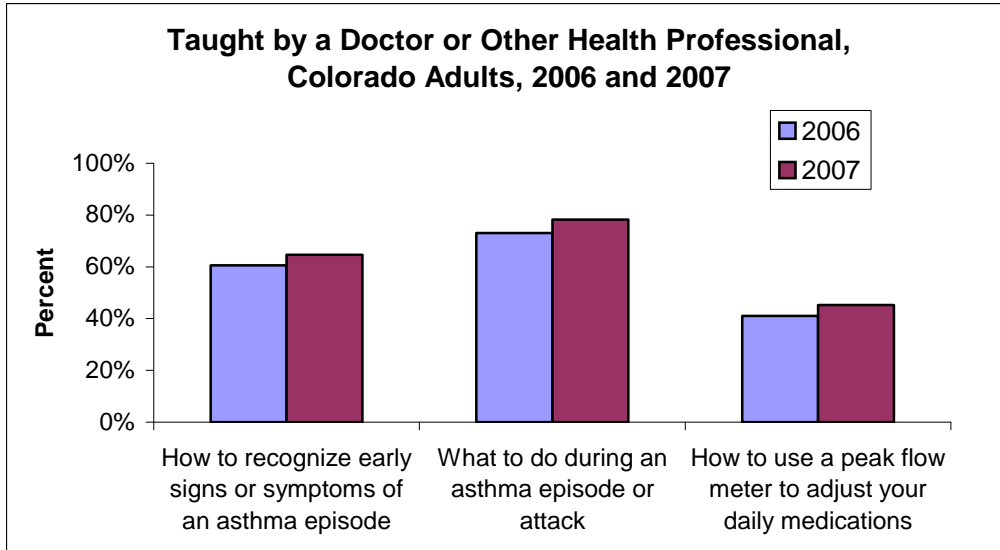
Ever Taken a Course or Class on How to Manage Your Asthma

(BRFSS Asthma Call Back Survey)

Ever Taught by a Doctor or Other Health Professional

In 2006 and 2007, 60.6 percent and 64.6 percent of adults, respectively, with lifetime asthma received instruction on how to recognize the early signs and symptoms of an asthma episode. Of those with lifetime asthma, 73.1 and 78.2 percent received instruction on what to do during an asthma episode or attack. Instructions on how to use a peak flow meter to adjust daily medications were taught 41.1 and 45.2 percent of the time (Figure 27).

Figure 27.

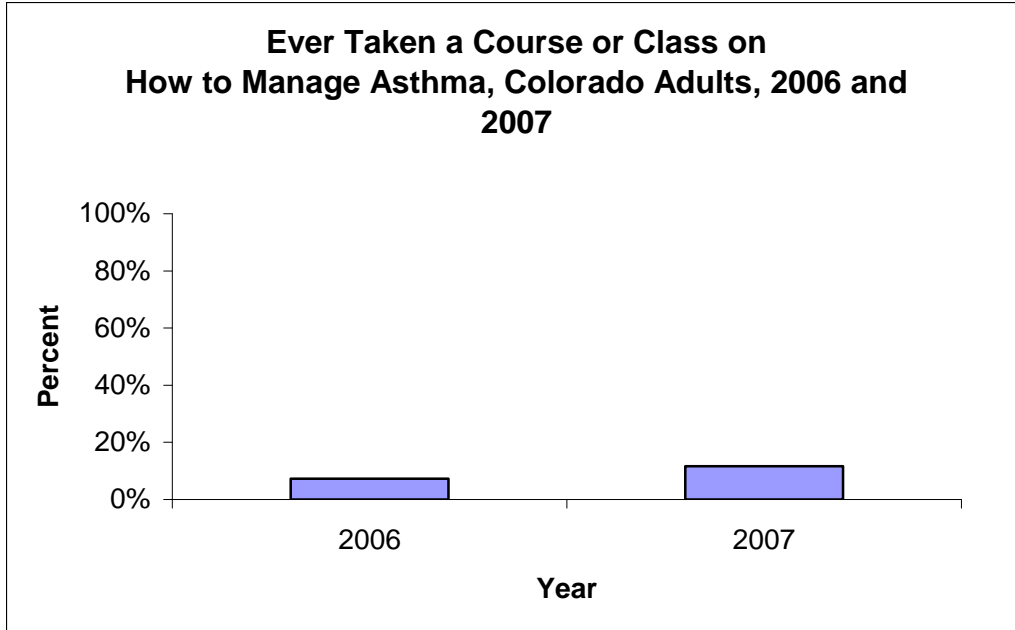


Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Ever Taken a Course or Class on How to Manage Your Asthma

Among adults with lifetime asthma, only 7.3 percent in 2006 and 11.6 percent in 2007 had ever taken a course or class on how to manage asthma (Figure 28).

Figure 28.



Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Immunizations

Influenza Immunization By Current Asthma and Health Insurance Status (2007)
Influenza Immunization By Lifetime Asthma and Health Insurance Status (2007)
(BRFSS)

Work-Related Asthma

Asthma Caused by Chemicals, Smoke, Fumes or Dust in Any Previous Job (2006 to 2007)
Asthma Made Worse by Chemicals, Smoke, Fumes or Dust in Any Previous Job (2006 to 2007)
(BRFSS Asthma Call Back Survey)

Changed or Quit a Job Because Chemicals, Smoke, Fumes, or Dust Caused Your Asthma or Made Asthma Worse (2006 to 2007)
Told by a Doctor or Other Medical Person that Your Asthma was Job Related (2006 to 2007)
(BRFSS Asthma Call Back Survey)

Influenza Immunization

The Advisory Committee on Immunization Practices (ACIP) recommends influenza vaccination for all persons with asthma because of higher risk of medical complications from influenza for people with asthma.²⁴

During the past 12 months, 47.4% of all Colorado adults with lifetime asthma received a flu shot. This percentage was significantly higher for persons who had health insurance (51.2%) compared to those without insurance (27.0%). Overall, 84.1% of the adults with lifetime asthma had insurance.

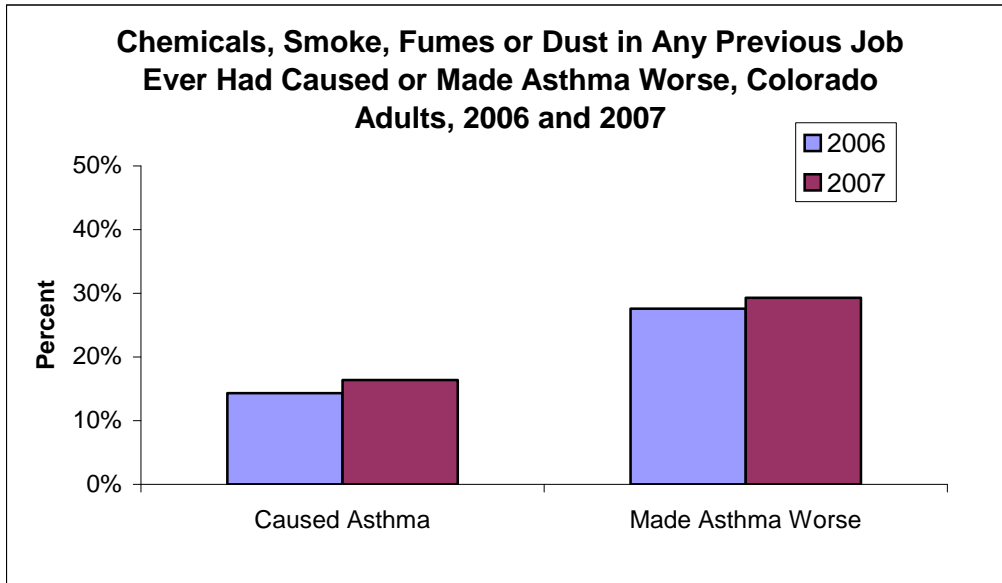
Fifty-three percent of adults with current asthma received a flu shot during the past 12 months. Twice the portion of adults with current asthma and with health insurance received a flu shot, compared to adults with current asthma who did not have insurance (57.1% compared to 28.9%, respectively). Overall, 85.7% of the adults with current asthma had insurance.

²⁴ Centers for Disease Control and Prevention, Influenza Vaccination Coverage Among Persons with Asthma – United States, 2005-06 Influenza Season, June 20, 2008. MMWR 2008;57(24):653-657.

Work-Related Asthma

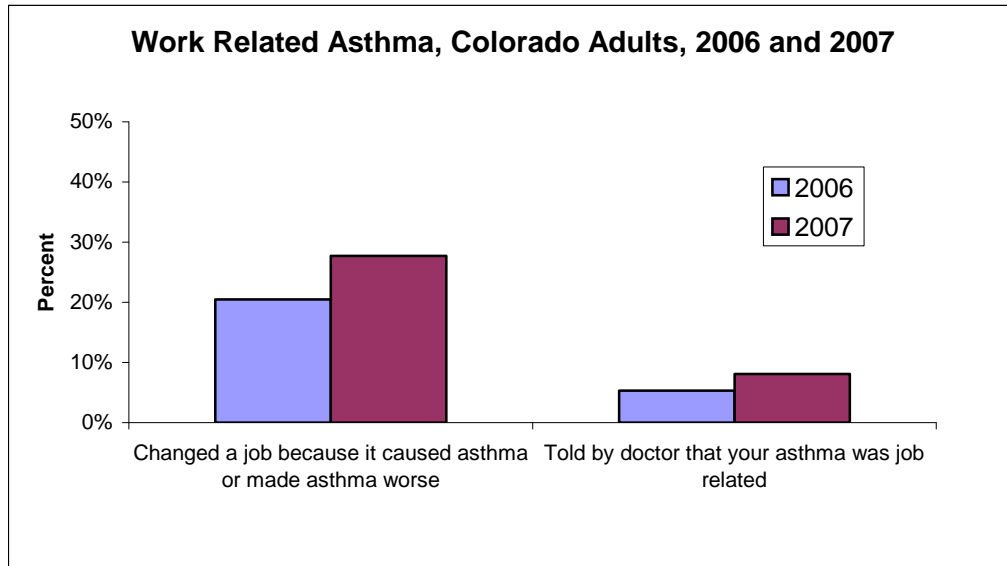
Among those with lifetime asthma, 14.3 percent (2006) and 16.4 percent (2007) had asthma that was caused by chemicals, smoke, fumes or dust from a previous job. Asthma became worse due to chemicals, smoke, fumes or dust from a previous job for 27.6 and 29.3 percent of people with lifetime asthma during 2006 and 2007 (Figure 29). In 2006 and 2007, 20.5 and 27.7 percent of those with lifetime asthma reported that they had to change a job because work-related asthma and 5.3 and 8.1 percent were told by a doctor that their asthma was job-related (Figure 30).

Figure 29.



Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Figure 30.



Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Second Hand Smoke Exposure

Households with People Who Smoke
Gender (2006-2007 combined)
Age, 2006-2007 (combined)
(Child Health Survey)

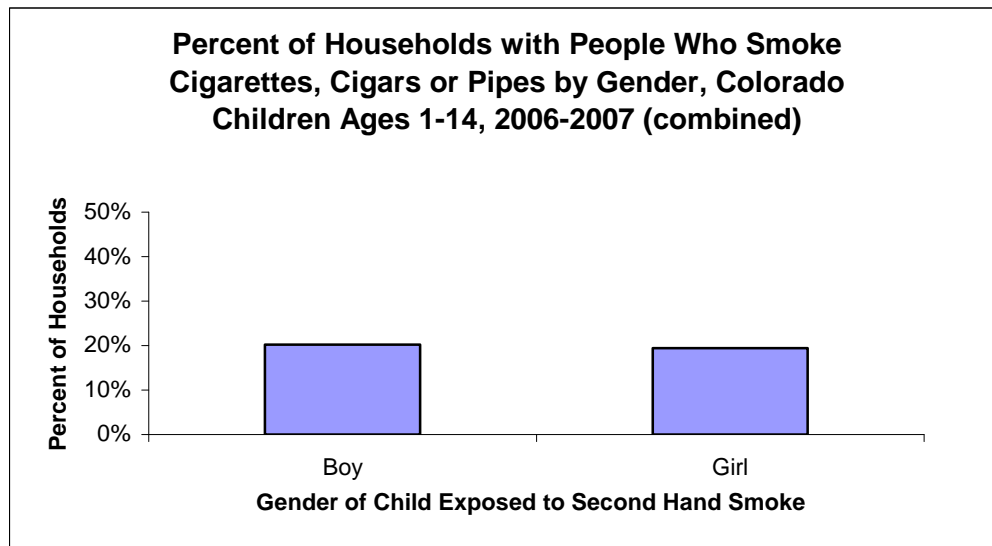
Children Exposed to Second Hand Smoke Inside the Home or
In a Car
Gender, 2006-2007 (combined)
Age, 2006-2007 (combined)
(Child Health Survey)

Smoke Allowed in Home Among Those with Current Asthma
(2005-2007 combined)
(Child Health Survey)

Second Hand Smoke Exposure

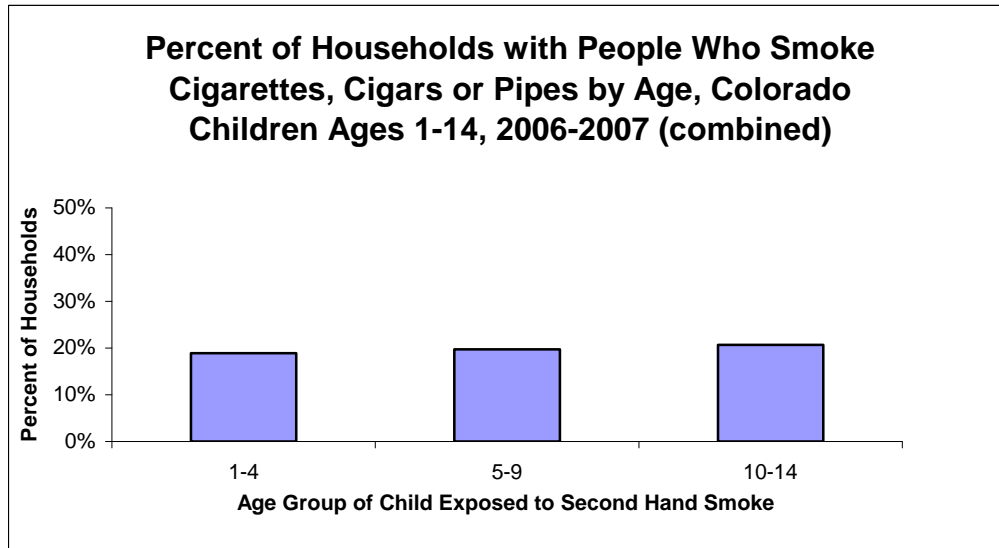
Among all children included in the Child Health Survey, 20.2 percent of boy's and 19.4 percent of girl's households had one or more people that smoke cigarettes, cigars or pipes (Figure 31). Broken down by age group, the percentages of children's households exposed to second hand smoke are 18.9 percent (1 to 4 years), 19.7 percent (5 to 9 years) and 20.7 percent (10 to 14 years) (Figure 32). Boys were exposed to smoke inside the home and inside of a car slightly more than girls. For boys, 6.0 percent and 7.0 percent were exposed to smoke inside the home or car, respectively, in the past seven days compared to 5.1 percent and 5.6 percent of girls (Figure 33). The percentage of children exposed to second hand smoke inside the home in the past seven days increased by age group. The percentages were 2.7 for 1 to 4 year olds, 6.4 for 5 to 9 year olds and 7.2 for 10 to 14 year olds (Figure 34). The percentage of children exposed to second hand smoke inside a car in the past 7 days also increased by age group. The percentages were 3.0 for 1 to 4 year olds, 6.7 for 5 to 9 year olds and 8.7 for 10 to 14 year olds. Smoking is allowed inside of 7.2 percent of homes with children ages 1-14 years old. In households where at least one child aged 1-14 has current asthma, 2.4 percent of homes allow smoking inside (Figure 34.).

Figure 31.



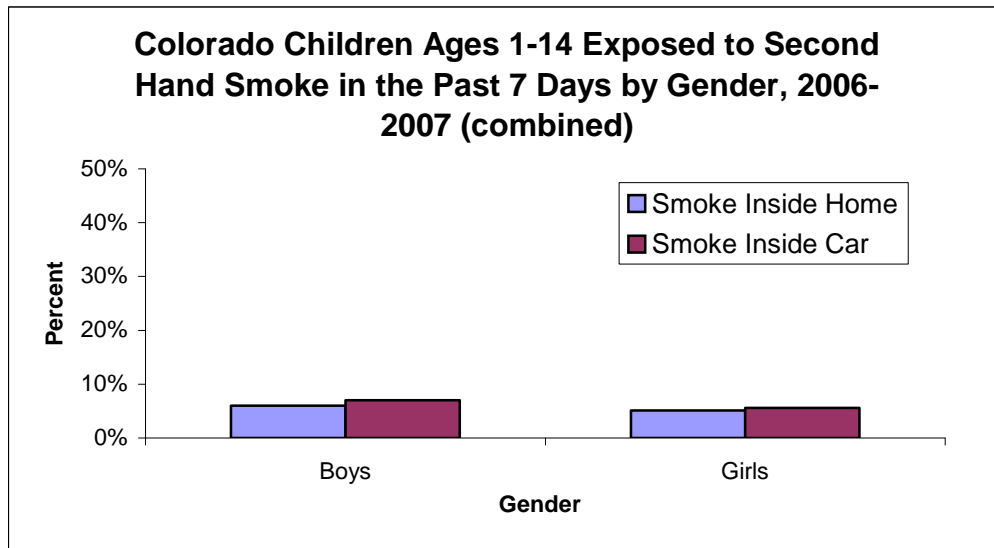
Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Figure 32.



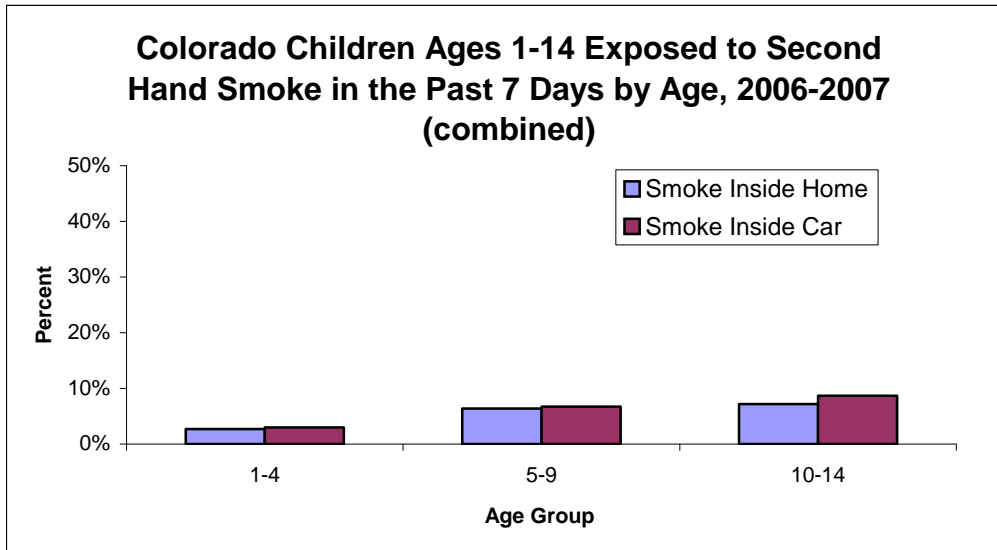
Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Figure 33.



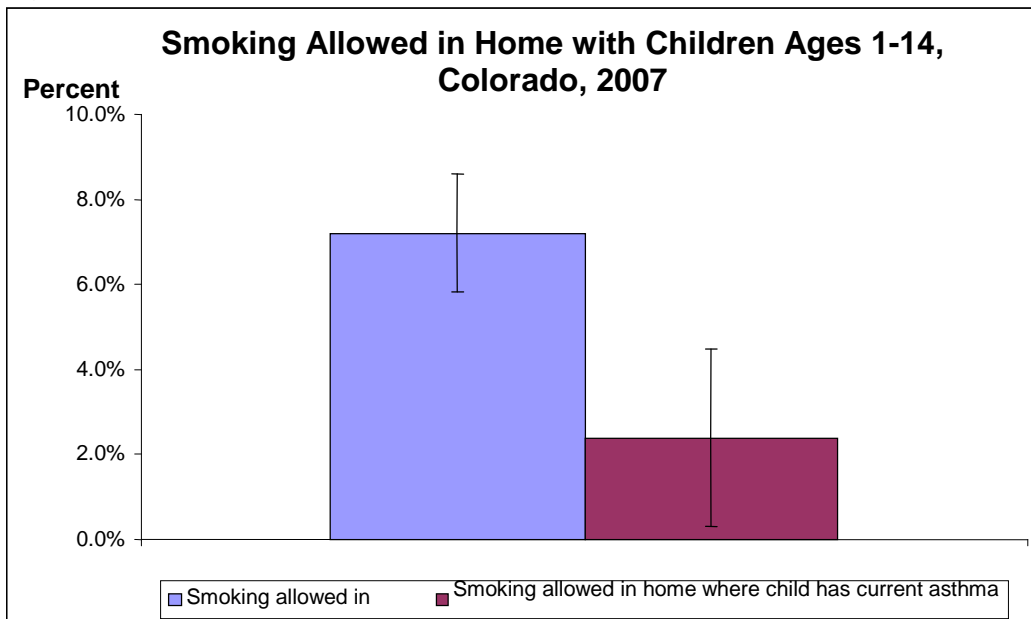
Child Health Survey, Health Statistics Section, Colorado Department of Public Health and Environment

Figure 34.



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

Figure 35.



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

The Future Direction

The report highlights that: adult prevalence of current asthma in Colorado is lower at 6.6% than the 7.7% for the United States as a whole; child prevalence of current asthma is slightly higher for Colorado at 9.1% than the 8.9% for the nation overall; the data for deaths and hospitalizations suggest that people living in Colorado with asthma are improving their control of the disease because the death rate from asthma as a primary cause is down from 1.6 per 100,000 in 2000 to 1.0 per 100,000 in 2007 and hospitalization rates have declined from 106.6 per 100,000 in 2003 to 85.6 per 100,000 in 2007, which is already below the 2009 target set by the Centers for Disease Control and Prevention of 91.4 per 100,000.

While progress on reducing asthma disparities has been made, continued attention to death rates and hospitalization rates is needed in coming years. Disparities by race/ethnicity persist. African Americans died at a rate (2.6 per 100,000) twice that of Whites and Hispanics (each at 1.3 per 100,000) during the period 2000-2007 and they are hospitalized at a rate 2.5 times that of Whites. Surveillance in Colorado would be improved with a thorough analysis of statewide Medicaid data, a process that is currently being positively negotiated. Our understanding and ability as a Program to serve Colorado would be improved with data on Native American and Asian populations. Work is underway, with the help of the Commission on Indian Affairs, to partner with Native American tribes to gather data and develop educational services. Data from the Asian American community has been gathered by community-based partners but not analyzed by the department, as of this printing. They will be analyzed and reported in subsequent reports. Lastly, access to statewide emergency department data would benefit the program. The Colorado Hospital Association is developing a central data set with the expectation that data on emergency visits will be complete for visits that occur in 2010.

We need to continue to pursue and report data that will broaden our view and perspective on this disease, particularly in rural and disparate communities, allowing us to more effectively target health education messages, develop provider education initiatives and partner with communities throughout the state. We need everyone involved with this disease to be more aware of the things that cause limitations on daily living activities – and how to prevent or avoid them. Most importantly, we need, teachers, school nurses, school administrators, coaches, and administrative staff to work with parents, students and their primary care providers to ask for and assure that an asthma action plan is in place and being followed for every child with asthma. Those children are more likely to grow up to be adults that will manage their asthma appropriately, work more productively, play more enthusiastically - and die from old age.

Appendices

Appendix A

Data Sources

Data Provider	Name of Data Set	Description	Contents	Years of data currently available for analyses
Health Statistics Section, Colorado Department of Public Health and Environment (CDPHE)	Behavioral Risk Factor Surveillance System (BRFSS)	Annual phone survey of adults 18 years and older to monitor lifestyles and behaviors related to the leading causes of mortality and morbidity.	Demographics, asthma, alcohol consumption, diabetes, exercise, tobacco use, cancer screening, fruit and vegetable consumption, hypertension, cholesterol, etc.	2000 to 2007
Health Statistics Section, Colorado Department of Public Health and Environment	BRFSS Asthma Call Back Survey	Call back survey for BRFSS respondents identified with asthma	Asthma history, health care utilization, knowledge of asthma/management plan	2006, 2007
Health Statistics Section, Colorado Department of Public Health and Environment	Vital Statistics	According to Colorado state statute, reportable events are provided to the CDPHE via standardized forms, such as birth certificates and death certificates.	Births, deaths, spontaneous fetal deaths, induced terminations of pregnancy, marriages and marriage dissolutions (divorces or annulments).	1990 to 2007
Colorado	Colorado	Inpatient	Demographics,	1993 to

Data Provider	Name of Data Set	Description	Contents	Years of data currently available for analyses
Health and Hospital Association	Hospital Discharge Data	claims data consisting of medical record information from all patients discharged from Colorado hospitals	diagnosis and procedures, duration of stay and admission/discharge status, total charge and charge components.	2007
State Demography Office, Colorado Department of Local Affairs	Current Population Survey (CPS)	Provides estimates and forecasts of Colorado's population by state, county and region	Past, present and future population, components of change (births and death), households, housing and economic and social characteristics of the population.	2000 and annual population estimates through 2006
Health Statistics Section, Colorado Department of Public Health and Environment	Child Health Survey (CHS)	Annual phone survey of parents with children ages 1 to 14 years. BRFSS respondents are asked if they have a child in the target age range and are willing to complete the CHS.	Child's physical activity, asthma, nutrition, access to health and dental care, behavioral health, school health, sun safety, injury, etc.	2004 to 2007

Appendix B

Healthy People 2010

One of the keys to the development of a coordinated national approach to asthma has been the inclusion of eight objectives in the Healthy People 2010 Guidelines. They are:

- ✓ Reduce asthma deaths. (Targets: 1 per million among children under age 5 years, 1 per million among children aged 5 to 14 years, 2 per million among adolescents and adults aged 15 to 34 years, 9 per million among adults aged 35 to 64 years, and 60 per million among adults aged 65 years and older)
- ✓ Reduce hospitalizations for asthma. (Targets: 25 per 10,000 among children under age 5 years, 7.7 per 10,000 among children and adults aged 5 to 64 years, 11 per 10,000 among adults aged 65 years and older)
- ✓ Reduce hospital emergency department visits for asthma. (Target: 50 per 10,000 among children and adults aged 5 to 64 years)
- ✓ Reduce activity limitations among persons with asthma. (Target: 10 percent)
- ✓ Reduce the number of school or workdays missed due to asthma.
- ✓ Increase the proportion of persons with asthma who receive formal patient education, including information about community and self-help resources, as an essential part of the management of their condition. (Target: 30 percent)
- ✓ Increase the proportion of persons with asthma who receive appropriate asthma care according to the National Asthma Education and Prevention Program (NAEPP) Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma.
- ✓ Establish in at least 25 states a surveillance system for tracking asthma deaths, illness, disability, impact of occupational and environmental factors on asthma, access to medical care, and asthma management.

These objectives were created with the belief that “effective management of asthma comprises four major components: controlling exposure to factors that trigger asthma episodes, adequately managing asthma with medicine, monitoring the disease by using objective measures of lung function, and educating asthma patients to become partners in their own care.”²⁵

²⁵ U.S. Department of Health and Human Services. Healthy People 2010: Understanding and Improving Health, 2nd ed. Washington, DC: US Government Printing Office, November 2000.

Appendix C

CDPHE Asthma Program Logic Model - 1/2008

Inputs	Activities	Outputs	Outcomes - Impact		
			Short term	Medium term	Long term
Staff 1.5 FTE Contract Evaluator 1.0 FTE CDC funding Partners Data (BRFSS, CHS, CHA, Vital Stats) Asthma Coalition State Plan Local Coalitions	Surveillance Evaluation Provider Education and Best Practice Guideline revision and implementation, Community meetings with providers Focus groups w/ providers Put on CCGC website IPIP (partnering with CCGC)	Triennial surv report, Brief topical reports 2/yr Logic models, Outcome tracking, Program monitoring # of meetings, # of providers attended Barriers to implementation identified # website hits	Data to inform program planning, development of surveillance system Program improvement Focused evaluation Increased provider awareness and knowledge of practices Increased cultural competence Increased knowledge Increased access to healthcare at school Increased awareness of poor air days Increased knowledge re: managing exposure to poor air quality	Data informed decision making, surveillance system enhancement Data informed decision making Improve practice, Increase corticosteroid Rx, Increase action plan use Decreased school days missed Improved school environmental factors Decreased exposure Decreased work and school data missed	Comprehensive asthma surveillance system Demonstrating program impact on asthma morbidity/ mortality Reduced morbidity Reduced mortality Decreased ER visits Decreased hospitalizations Decreased morbidity for African Americans
	TA to OHD and CCPD Funded Programs Obtain asthma data for Native Americans and Asian Americans Programs focused on asthma in schools	# grantees, # evidence-based programs implemented Increased data availability	Increased access to healthcare at school	Decreased school days missed Improved school environmental factors	Decreased hospitalizations
	Environment and Occupational Health Expand Enviroflash to other large counties Environmental impacts on asthma	# of Coloradoans subscribing	Increased awareness of poor air days Increased knowledge re: managing exposure to poor air quality	Decreased exposure Decreased work and school data missed	Decreased morbidity for African Americans
	Public Education and Awareness Distribute brochures for African Americans (adults, adolescents, children) Health Fair booth Ongoing improvement to CDPHE asthma website GIS atlas	# brochures, # sites distributed # fairs attended, # materials given out # website hits, change over time # website hits (live by _)	Increased awareness on managing asthma symptoms Increased awareness about asthma Increased awareness about asthma and state activities Increased awareness about asthma and environmental triggers and exposures	Better asthma management, Decreased smoking, Decreased 2nd hand smoke exposure, Increased physical activity (adults)	Decreased morbidity for African Americans
	Outreach (Beyond Metro Denver) (1) Coalition Development (outside Denver metro), identify local priorities, identify future implementation activities, identify existing activities and resources, money to local orgs to fund local coalitions (2) Information Distribution (brochures, poster)	# meetings held, # attendees, activities of interest, interest in local coalition, geographic distribution Types of activities linked to state goals, \$ given, process evaluation	Establish coalitions (beyond Denver metro) to implement state plan objectives at local level Implementation activities	Progress towards stated goals (linked to state plan)	Decreased morbidity for African Americans
	Coalition Coordination of activities across entities, Development of State Plan 2008-2012, Develop plan for flow of information to/from Colo Asthma Coalition and Regional Coalitions, Collaborations with CSH, CASH, and TGYS to build asthma components into child health programs	# partners, partner directory	More coordinated system	Less duplication of services	Decreased morbidity for African Americans

