The Burden of Asthma in Connecticut
2012 Surveillance Report

Connecticut Department of Public Health

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FAST FACTS ABOUT ASTHMA IN CONNECTICUT

- In 2010, 9.2% of adults and 11.3% of children had asthma.[a]

- There were 50 asthma deaths in 2009.[b]

- 54% of people with asthma limited their usual activities because of asthma [c]

- 66% of people with asthma had asthma that was not well or very poorly controlled [c]

- 10.2% of adults with asthma smoked [c]

- 22.3% of children with asthma lived in a household with at least one adult who smoked [c]

- 19.6% of obese children also had asthma [c]

- 40.1% of people with asthma did not have a routine checkup during the past year [c]

- 65.7% of people with asthma have never been given an Asthma Action Plan [c]

- From 2000 to 2009, non-Hispanic Black children had the highest annual rates of asthma hospitalizations across all other child and adult race/ethnicity groups.[d]

- Hispanic adults had 5.2 times the rate of asthma hospitalizations as non-Hispanic White adults from 2005 to 2009.[d]

- From 2000 to 2009, Hispanic children had the highest asthma ED visit rates of all race/ethnicity subgroups. Non-Hispanic Black children experienced the second highest asthma ED visit rates for that time period.[d]

- Between 2005 and 2009, the asthma ED visit rate for Hispanic children increased 50.9%.[d]

- New Haven residents had the highest asthma hospitalization rate in the state in 2009.[d]

- The rate of asthma ED visits was highest in 2009 for Hartford residents.[d]

- Public insurance was the payment source for 73.8% of asthma hospitalizations and 60% of asthma ED visits in 2009.[d]

- Of the 2,741 children enrolled in HUSKY A who had asthma ED visits in 2007, only 24.4% received follow-up care within two weeks of their ED visits in accordance with national treatment guidelines.[e]

- Approximately 11.3% of HUSKY A enrollees less than age 21 had asthma in 2007.[e]

http://www.ct.gov/dph/asthma

DPH
Connecticut Department
of Public Health

Summary

This report describes the burden of asthma in Connecticut by providing information on asthma prevalence, health care utilization, disproportionately affected populations, and asthma mortality. Six data sources are used to provide information about asthma in Connecticut from 2005 to 2010. They include: 1) the Behavioral Risk Factor Surveillance System (BRFSS); 2) Connecticut Hospital Information Management Exchange (CHIME); 3) Healthcare for UninSured Kids & Youth Part A (HUSKY A); 4) School-based Asthma Surveillance System (SBASS); 5) Occupational Illness and Injury Surveillance System (OIISS); and 6) Connecticut Death Registry.

Asthma Prevalence

Adults

BRFSS data collected in 2010 showed that approximately 246,100 (9.2%) of Connecticut adults had asthma. From 2005 – 2010, asthma prevalence for adults was highest among women, non-Hispanic Blacks, and 18 – 24 year olds. BRFSS data for 2008 – 2010 show that the current asthma prevalence for adults with annual household incomes less than $15,000 was almost double the prevalence for adults with annual household incomes of $75,000 and greater. The BRFSS data also show that among adults, current asthma prevalence was highest for residents of Windham County and lowest for residents of Litchfield and Fairfield counties.

Children

Approximately 89,300 (11.3%) of Connecticut children (0 – 17 years old) had asthma in 2010 according to BRFSS data. From 2005 – 2009, current asthma prevalence in Connecticut children was highest among boys and children aged 5 and older. BRFSS data for 2008 – 2010 show that current asthma prevalence among children in households with annual incomes less than $15,000 was twice that of children living in households with annual incomes of $75,000 and above. The BRFSS data also show that current asthma prevalence was highest for children residing in Windham county and lowest for those living in New London County.

Living with Asthma

BRFSS findings for 2008 – 2010 show that among adults with current asthma, approximately 10.2% were current smokers and 9.1% were former smokers. Also, an estimated 12.8% were obese and 8.5% were overweight. The BRFSS data also show that among obese children in Connecticut, 19.6% had current asthma.

The 2007 – 2009 Asthma Call-back Survey (ACBS) data show that among persons with current asthma in Connecticut:

- Approximately 54% limited their usual activities because of asthma.
- In the past 12 months, an adult was unable to work or conduct usual activities because of asthma for approximately 5.1 days. A child who attended day care or school missed approximately 2.3 days because of asthma.
- Overall, asthma was considered not well-controlled for approximately 48.2% and very poorly controlled for approximately 17.8%. Persons with annual household incomes of $15,000 – $24,999 were least likely to have well-controlled asthma compared to households with greater annual incomes.
- An estimated 45,700 or 13.9% lived in households with a current tobacco smoker. Among children with current asthma in Connecticut, approximately 22.3% lived in a household with at least one adult smoker. That almost a quarter of Connecticut children with current asthma are exposed in their dwellings to environmental tobacco smoke (ETS) and potential third-hand smoke (THS) is of great concern.

Asthma Self-Care, Knowledge, and Management

According to 2007 – 2009 ACBS data for Connecticut residents with current asthma:

- An estimated 239,800 (73.6%) had ever been taught to recognize early asthma signs or symptoms.
- Approximately 274,900 (83%) had ever been taught what to do during an asthma attack.
- More than half (65.7%) had never been given an Asthma Action Plan (AAP) to help them to better manage their condition, even though an AAP is a key component of asthma management.
- Approximately 211,300 (63.8%) used at least one type of complementary or alternative care (e.g., breathing techniques, vitamins, aromatherapy).

Asthma and Healthcare Utilization

ACBS data for 2007 – 2009 show that approximately 67.9% of persons with current asthma had a prescription for asthma medication. Within the past 12 months, approximately 242,800 (73.3%) of persons with current asthma had spoken to a doctor or other healthcare professional about their asthma, and 197,200 (59.9%) had had at least one routine checkup.

Asthma Hospitalizations

With appropriate diagnosis, medical management, and patient education about asthma self-management, asthma hospitalizations and ED visits can be avoided. Between 2005 and 2009,

there was a 13.2% increase from 12.9 per 10,000 persons to 14.6 per 10,000 persons in hospitalizations for which asthma was the primary diagnosis. Overall, asthma hospitalization rates for 2005 – 2009 were highest among: females, children less than five years old, non-Hispanic Blacks, and Hispanics. If non-Hispanic Blacks, Hispanics, and non-Hispanic Others had experienced asthma hospitalization at the same rate as non-Hispanic Whites in 2009, there would have been about 2,000 fewer asthma hospitalizations in that year.

Adults

Female adults were hospitalized for asthma at twice the rate of male adults and asthma hospitalization rates were highest for persons aged 65 years and older. In 2005 – 2009, Hispanics experienced 5.2 times the rate of asthma hospitalizations as non-Hispanic Whites. The largest increase in asthma hospitalization rates among racial/ethnic groups was among non-Hispanic Blacks, for whom there was a 28.9% increase in hospitalization rates from 2005 – 2009.

Children

From 2005 – 2009, asthma hospitalization rates were higher for boys than girls. The average asthma hospitalization rate among non-Hispanic Blacks was 4.7 times that of non-Hispanic Whites, 1.6 times that of Hispanics, and 2.7 times that of Other non-Hispanics. The greatest increase in the rate of asthma hospitalizations among children was for Hispanics, for whom the hospitalization rate for asthma as a primary diagnosis increased 21% between 2005 and 2009.

Geography

In 2009, non-rural Connecticut residents had twice the asthma hospitalization rate as rural residents (15.4 per 10,000 versus 7.6 per 10,000). New Haven County residents experienced the highest rate of asthma hospitalizations overall (22.9 per 10,000 persons). The combined asthma hospitalization rate for the five largest Connecticut cities – Bridgeport, Hartford, New Haven, Stamford, and Waterbury – was 35.3 per 10,000 for the year 2009, 3.4 times greater than the combined asthma hospitalization rate for the rest of the state. City of New Haven residents had the highest asthma hospitalization rate, with 74.6 events of asthma hospitalization per 10,000 persons.

Asthma Emergency Department Visits

From 2005 to 2009, there were on average 22,133 emergency department (ED) visits each year for Connecticut residents with a primary diagnosis of asthma. Overall, asthma ED visit rates for 2005 to 2009 were highest among children, females, and Hispanics. If Hispanics had ED visits for which asthma was the primary diagnosis at the same rate as non-Hispanic Whites in 2009, there would have been 6,358 <u>fewer</u> asthma ED visits among Hispanics. Likewise, there would have

been 3,208 and 144 fewer asthma ED visits among non-Hispanic Blacks and non-Hispanic Others, respectively.

Children

Asthma ED visit rates were consistently higher for children than adults from 2005 – 2009. Compared to all other age groups, children less than four years old had the highest rates of asthma ED visits. From 2005 – 2009, they experienced a 38.2% increase in the rate of asthma ED visits. From 2000 to 2009, Hispanic children had the highest asthma ED visit rates of all race/ethnicity subgroups and non-Hispanic Black children experienced the second highest asthma ED visit rates for that ten-year period. There was a 50.9% increase in asthma ED visits for Hispanic children from 146.6 per 10,000 in 2005 to 225.4 per 10,000 in 2009.

Adults

Among adults, there was an inverse relationship between age and the rate of asthma ED visits. Persons aged 65 years and older had the lowest rates of asthma ED visits of any age group. Hispanics had highest asthma ED visit rates among adults from 2000 to 2009. The rate of asthma ED visits for Hispanic adults was almost five times greater than the rate for non-Hispanic White adults in 2008.

Geography

The rate of asthma ED visits was lower for rural areas than for non-rural areas in 2009. In 2009, the highest rate of asthma ED visits was among residents of New London County. The combined, five largest cities-rate of asthma ED visits per 10,000 in the year 2009 was 156.4, almost three times that of the rest of the state. The asthma ED visit rate was highest amongst city of Hartford residents at 253.4 per 10,000.

Asthma Emergency Department Visits that Result in Hospitalization

On average, 4,079 asthma ED visits resulted in hospital admission each year from 2006 – 2009. Such events were more frequent for adults than children. In 2009, 13.7% of asthma ED visits resulted in asthma hospitalizations. Hispanics were less likely than non-Hispanic White, non-Hispanic Blacks, and non-Hispanic Others to be admitted as hospital inpatients. Non-Hispanic Blacks were almost twice as likely to be hospitalized for asthma from the ED as Hispanics (19.1% versus 10.8%). Persons $\geq$ 65 years old had the highest percentage of asthma hospitalizations from the ED (46.8%) while 18 – 24 year olds had the lowest percentage, 4.9%, of asthma hospital admission from the ED.

New Haven county residents had the highest percent of asthma hospitalizations from the ED (17.5%). Among the five largest Connecticut cities, New Haven had the largest percentage of

asthma hospitalizations from the ED (25.7%) followed by: Bridgeport (14.3%); Stamford (12.4%); Hartford (11.7%); and Waterbury (9.1%). For the rest of Connecticut cities and towns combined, the percent of asthma ED visits that resulted in hospitalization was 13%.

Asthma Hospital Healthcare Charges

Hospital healthcare charges for asthma increased each year. In 2009, the hospital healthcare charges (i.e., charges of both inpatient and ED care) for asthma in Connecticut were $112,854,345, almost 1% of total hospital healthcare charges in that year. From 2005 – 2009, there was a 19.8% increase in asthma hospitalization and ED visit charges from $94,199,808 to $112,854,345. On average, from 2005 – 2009 asthma inpatient hospitalization charges were 2.6 times that of asthma ED charges.

From 2005 – 2009, asthma hospital healthcare charges for adults were 3.4 times greater than the charges for children. In 2009, adults aged 65 years or older accounted for 28.5% of all asthma hospital healthcare charges. Inpatients aged 65 years or older accounted for 20.3% of the charges, the largest proportion of charges across all hospitalization types and age groups. Hospital healthcare charges for females receiving inpatient services were twice the charges for males.

In 2009, total asthma inpatient charges were highest for non-Hispanic Whites at $37,885,112. Asthma ED charges were highest for Hispanics at $10,624,952. Overall, 13.4% of the total asthma hospital healthcare charges in 2009 would not have occurred if non-Hispanic Blacks, non-Hispanic Others, and Hispanics had the same hospital healthcare utilization rates for asthma treatment as non-Hispanic Whites. The greatest potential avoidance of charges would have resulted from fewer asthma hospitalizations among Hispanics and non-Hispanic Blacks, and fewer asthma ED visits among Hispanics.

In 2009, public insurance (Medicare or Medicaid), was the source of payment for 73.8% of asthma hospitalizations, 60% of asthma ED visits and 69.6% of inpatient hospitalizations that resulted from ED visits for which asthma was the primary diagnosis. The average cost of inpatient services paid by public insurance was $16,524 per hospitalization, $2,933 more than the average cost of inpatient services paid for by private insurance.

Asthma in HUSKY A/Medicaid Recipients (2007)

The estimated prevalence of asthma in the HUSKY A population less than age 21 for 2007 was 11.3%. Asthma prevalence was higher among males (12.8%) compared to females (9.8%). Asthma was most prevalent among children aged one to five years old (12.7%) compared to participants less than one year old (6.1%), 6 – 14 year olds (11.8%), and 15 – 20 year olds (8.5%). Among

race/ethnicity groups, asthma prevalence was highest among Hispanic children (12.1%) compared to non-Hispanic Blacks (11.5%), non-Hispanic Whites (10.8%), and non-Hispanic Others (8.4%).

Approximately 3% of children with asthma were hospitalized at least once. Among children who were ever hospitalized for asthma, 18% were hospitalized more than once. Only about half of the children hospitalized for asthma or an asthma-related diagnosis received follow-up care within the recommended two weeks of discharge, per the *Guidelines for the Management and Diagnosis of Asthma*.

Approximately 2,741 HUSKY A children with asthma had asthma ED visits in 2007. Of these, less than one in four (24.4%) received follow-up care within two weeks of their ED visit in accordance with national treatment guidelines.

Asthma in School Children (2006 – 2009)

Based on School-based Asthma Surveillance System (SBASS) data, the calculated asthma prevalence rates among the school-aged children in the participating Connecticut public and private schools for the 2006 – 2007, 2007 – 2008, and 2008 – 2009 school years were 13.2%, 13.2%, and 13.1%, respectively. Overall, asthma prevalence rates were higher among students in pre-kindergarten (PK) or kindergarten (K) when compared to students in grades 6 or 7, and grades 9, 10, or 11. Asthma prevalence rates were higher for males than females for each of the three school years considered. School districts in Bridgeport, Hartford, New Haven, and Waterbury had the highest asthma rates. An Asthma Action Plan (AAP) was on file for only one out of every 20 student asthma cases reported.

Work-Related Asthma

Data from the Occupational Illness and Injury Surveillance System (OIISS) show that from 1992 to 2008, 497 cases of work-related asthma (WRA) in Connecticut residents were reported. Females, whites, and individuals 35 – 54 years old were the most frequently affected by WRA during this time period. White females represented the majority (42.3%) of all reported WRA cases.

Asthma Mortality

Asthma deaths are preventable; nonetheless, from 2005 to 2009, asthma was the underlying cause of death for 197 Connecticut residents. Females, Black non-Hispanics, persons aged 65 years and older, and residents of Connecticut's five largest cities experienced higher rates of asthma death compared to other state residents. Asthma deaths during 2005 – 2009 among

residents of Bridgeport, Hartford, New Haven, Stamford, and Waterbury occurred at a rate of 18.9 per 1,000,000 compared to 8.3 per 1,000,000 for the rest of Connecticut.

Progress on Healthy People 2010 Objectives

Comparing the 2001 – 2005 reporting period to the 2005 – 2009 reporting period, decreases in the five-year average asthma mortality rate were observed among children less than five years of age, 15 – 34 year olds, 35 – 64 year olds, and persons aged 65 years and older. Among children 5 – 14 years old, the five-year average mortality rate increased 23.8% from 2.1 per million to 2.6 per million. Asthma hospitalization indicators increased across all age groups (<5 years, 5 – 64 years, and > 65 years).

Moving Forward

The increase in asthma prevalence, hospitalizations, and ED visits in Connecticut, in concert with underuse of AAPs and late/no post hospitalization/ED follow-up care, indicate that more efforts to improve the asthma self-management education of individuals and encourage clinicians and healthcare systems to adhere to national asthma management guidelines are needed.

In addition, gaps in our understanding of asthma in Connecticut point to the need for data sources beyond the ones that are currently available. More sociodemographic data, like primary language, are needed. As the Connecticut Department of Public Health moves toward integrating chronic disease programs and focuses on the elimination of health inequities, there will be opportunities to collect richer, more accurate information on the Connecticut populations which are disproportionately affected by asthma.

Introduction

The distribution of a disease in a population cannot be fully appreciated without knowledge of its natural history and the context in which the disease occurs. This report begins with a brief description of what asthma is, its prevalence in the United States and Connecticut, and what can be done to control asthma. Next, so that the burden of asthma in Connecticut may be appreciated in its social context, a brief review of literature on asthma disparities is provided. A sociodemographic profile of Connecticut follows to provide information on population characteristics such as sex, age, marital status, and household income which, in addition to race and ethnicity, are important in depicting health disparities.

Before the asthma surveillance data are presented, brief descriptions of each of data source used in the report and their related legal mandates are given. Next, the burden of asthma in Connecticut is described using information on: asthma prevalence; living with asthma; healthcare utilization and charges; asthma prevalence and asthma care among Medicaid recipients; prevalence of asthma in school-aged children; work-related asthma; and asthma mortality. Comparisons of asthma rates by age group, sex, race/ethnicity, place of residence, and annual household income are presented to highlight the populations which are disproportionately affected by asthma in Connecticut.

The discussion section of this report shows how data analysis findings inform Connecticut asthma control, prevention, and education initiatives. Also included in this report are appendices containing important acronyms, technical notes, and detailed tables of the data presented in each of the data sections. This report will be useful to epidemiologists, policy makers, advocates, and others who are interested in decreasing the burden of asthma in Connecticut.

Asthma is a burden, not just on the individual sufferer, but on families, communities, and society. Since 2000, the Connecticut Department of Public Health Asthma Program has worked to monitor and decrease the burden of asthma in Connecticut through asthma surveillance, education, prevention, and control initiatives. This report is the fifth in a series summarizing the available asthma surveillance data for the state of Connecticut. It describes the burden of asthma in Connecticut by providing information on asthma prevalence, morbidity, mortality, disproportionately affected populations, and healthcare utilization.

What is Asthma?

Asthma is a chronic respiratory disease that affects the lives of millions of Americans. Asthma encroaches on the ability of children and adults to perform and enjoy daily activities. It is characterized by reversible obstruction of the passages or airways (bronchi) that take air into the lungs. Blockage of the airways results from chronic inflammation associated with hyper-responsiveness to a variety of stimuli (e.g., pollen, mold, tobacco smoke). Constriction of the airways results in recurrent episodes of wheezing, shortness of breath, chest pain or tightness, and/or coughing. Edema and excess mucus production of the airway membranes can also limit airflow (National Heart, Lung, and Blood Institute [NHLBI], 2007). While the exact cause of asthma is unknown, research demonstrates that asthma susceptibility (Su et al., 2012; Liu et al., 2011) and response to medication (Jin et al., 2010; Leung & Searing 2010) are related to the interaction of host genes with environmental factors. Currently, there is no cure for asthma, but asthma symptoms can be controlled. Disease symptoms are reversible with treatment for the vast majority of persons with asthma.

Asthma in the United States

In 2010, 8.2% or 18.7 million adults (U.S. Department of Health and Human Services, 2012) and 9.4% or 7 million children (Bloom, Cohen, & Freeman, 2011) in the United States had asthma.[1] Despite public health initiatives aimed at asthma prevention and control, asthma prevalence is increasing nationally. According to the findings of a Centers for Disease Control and Prevention (CDC) analysis of Behavioral Risk Factor Surveillance System (BRFSS) and National Health Information Survey (NHIS) data, asthma prevalence in the United States increased from 7.3% (20.3 million persons) in 2001 to 8.2% (24.6 million persons) in 2009 (Zahran, Bailey, & Garbe, 2011).

Some members of the population are disproportionately affected by asthma. Nationally, asthma prevalence is highest among children, women, non-Hispanic Blacks, the poor, multiracial persons, and Puerto Rican Hispanics (Moorman, Zahran, Truman, & Molla, 2011). These disparities are increasing. Between 2001 and 2009, a rising trend in asthma prevalence was observed for: non-Hispanic Black children (11.4% to 17.0%); non-Hispanic White women (8.9% to 10.1%); and non-Hispanic Black men (4.7% to 6.4%) (Zahran et al., 2011, p. 548).

Left uncontrolled or poorly-managed, asthma can lead to emergency department (ED) visits, hospitalization, or death. There were an estimated 1.75 million asthma-related ED visits and 456,000 asthma hospitalizations nationwide in 2007 (Akinbami, Moorman, & Liu, 2011). In 2008, there were 3,397 deaths caused by asthma in the United States (Miniño, Murphy, Xu, & Kochanek, 2011).

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[1] These are crude rates.
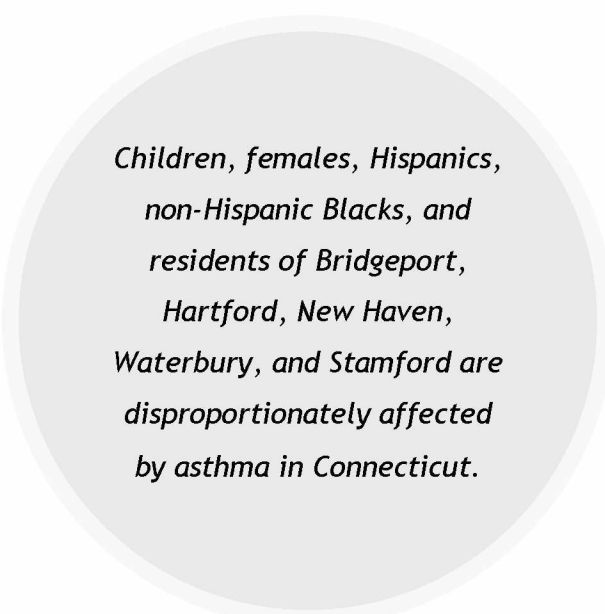
Asthma-related losses of productivity and health care costs add to the economic burden on society. Data from the 2008 NHIS demonstrate that because of asthma attacks, 10.5 million school days among children 5 – 17 years old, 14.2 million work days among employed adults, and 22 million days of housework or similar activities among adults not currently employed, were missed (Akinbami et al., 2011).

From their study of Medical Expenditure Panel Survey data for the period 2002-2007, Barnett and Nurmagambetov (2011) estimated that the total cost of asthma in the U.S. (productivity losses and incremental direct medical costs combined) was 56 billion dollars in 2007. The asthma morbidity- and mortality-related productivity losses in 2007 were estimated at 3.76 and 2.15 billion dollars, respectively (p. 149). Between 2002 – 2007, the estimated incremental direct cost of asthma per person per year was $3,259 (p. 148).

Asthma in Connecticut

The Connecticut Department of Public Health (DPH) Asthma Program conducts asthma surveillance activities to identify at-risk populations and monitor trends in asthma rates across the state. In 2010, approximately 89,300 (11.3%) of children and 246,100 (9.2%) of adults in Connecticut suffered from asthma.[2] Between 2000 and 2010, the current prevalence of asthma in Connecticut adults increased 17.9% (7.8% to 9.2%). From 2005 to 2010, the current prevalence of asthma in Connecticut children increased 7.6% (10.5% to 11.3%). Since the year 2000, asthma prevalence in Connecticut adults and children has been higher than national prevalence rates. Children, females, Hispanics, non-Hispanic Blacks, and residents of Connecticut's five largest cities are disproportionately affected by asthma.

Children, females, Hispanics, non-Hispanic Blacks, and residents of Bridgeport, Hartford, New Haven, Waterbury, and Stamford are disproportionately affected by asthma in Connecticut.

In 2009, there were 5,146 hospitalizations and 24,239 ED visits attributed to asthma. In that same year, there were 50 asthma deaths. According to 2007 – 2009 BRFSS data, Connecticut adults with asthma were unable to work or do their usual activities for approximately 303,366.5 days annually because of asthma. School-aged children in Connecticut missed approximately 59,814 days from school or day care each year due to asthma. Connecticut hospital

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[2] These estimates of current asthma prevalence are based on 2008 – 2010 BRFSS data.

discharge data reveal that in 2009, the cost of hospital (inpatient and ED) care for asthma in Connecticut was $112,854,345.

Asthma Management

Successful asthma management relies of the actions of individuals, communities, and health care providers. Asthma can be managed with patient education, appropriate medication, avoidance of environmental triggers, and use of an asthma action plan (AAP). Asthma medications include: bronchodilators which ease the constriction of muscles that surround the airways; anti-inflammatories which reduce airway swelling and mucus production; and formulations that combine a bronchodilator with an anti-inflammatory agent. Asthma control medications are used regularly to decrease airway inflammation and mucus production. Asthma rescue medications are used during attacks or before exercise.

Asthma triggers include air pollution, tobacco smoke, pet dander, dust mites, and exposure to mold, rodents, and cockroaches. Because of the nature of the triggers, both individual-level and community-level action must be taken to reduce exposures to triggers. Asthma education addresses individual-level strategies (e.g., no tobacco smoke inside the home, keep pets outside of the bedroom) that persons with asthma or their caregivers can use to reduce the persistence of allergens in their environment. At the community level, enforcement of housing regulations can help to decrease the presence of certain triggers that are associated with inadequate housing (e.g., mold, rodents, cockroaches).

The AAP is a key component of asthma management. The National Asthma Education and Prevention Program (NAEPP) Expert Panel recommends that the health care provider for a person with moderate, severe, or poorly controlled asthma develop a written AAP for the patient. Having an AAP has been associated with decreased risk of death among persons with severe asthma exacerbations (NHLBI, 2007, p. 120). The components of an AAP are:

- Patient's emergency contact information;
- Health care provider's contact information;
- Asthma severity classification;
- Triggers that may cause an asthma attack;
- Special instructions for what to do when the patient is feeling good, not good, and awful;
- Information about medication dosage and use; and
- What to do in the case of an emergency.

Asthma Disparities

The health of an individual is influenced by one's biological makeup, the surrounding physical and social environments, interactions with societal institutions and other individuals, access to resources, and one's beliefs about control over one's own circumstances.[3]

The World Health Organization (WHO) defines *social determinants of health* as: "... the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics" (WHO, 2008, p. 1). A major challenge of addressing asthma disparities is that social determinants overlap and intersect with one another. It is difficult to predict the pathways and mechanisms by which specific social determinants influence health (Adler & Rehkopf, 2008), making it challenging to prevent adverse health outcomes. Also, individual- and community-level factors contribute to disparities in asthma incidence, prevalence, and morbidity (Gold & Wright, 2005).[4]

This section presents literature on asthma disparities with a focus on some social determinants. Aspects of race/ethnicity, environment, and healthcare that are relevant to observed differences in asthma prevalence, morbidity, hospitalization rates, ED visits rates, and mortality between population groups are discussed. Socioeconomic position[5] intersects with these determinants, so some of its measures (e.g., household income, housing characteristics, education) are also discussed.

Health disparities refer to the differences in disease risk, incidence, prevalence, morbidity, mortality and other adverse conditions, such as unequal access to quality health care, that exist among specific population groups in Connecticut. Population groups may be based on race, ethnicity, age, gender, socioeconomic position, immigrant status, sexual minority status, language, disability, homelessness, and geographic area of residence. Specifically, health disparities refer to those avoidable differences in health that result from cumulative social disadvantage.

(Stratton, Hynes, & Nepaul, 2007, p. 2)

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[3] Evidence indicates that social stressors and poor coping with stress can become embodied, affecting physiological systems in ways that make people more susceptible to disease and adverse health outcomes (Brunner & Marmot, 2006; Kristenson 2006; Bosma 2006).

[4] Differences in asthma medication use and adherence (Crocker et al., 2009; McQuaid et al., 2012), self-management of symptoms (George, Campbell, & Rand, 2009), and control of potential asthma triggers in the home (Everhart et al., 2011) are some examples of factors that are within the control of individuals with asthma. Community-level factors may be pre-existing (e.g., location) or produced by individuals (e.g., opportunities for social interaction) or institutions within or outside of the community (e.g., commercial zoning laws).

[5] Socioeconomic position refers to both the economic and social factors that influence the positions that individuals or groups hold within the structure of a society (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006, p. 7).

Race and Ethnicity

When discussing health disparities, the focus is often on differences in rates between racial and ethnic groups. However, in reviewing information presented by race and/or ethnicity, it is important to understand that in some populations, these labels are markers for socio-economic differentials like differences in housing, income, and/or education (Nazroo & Williams, 2006). Race/ethnicity may be a risk marker or a risk factor (Kaplan & Bennett, 2003). It is also important for readers to recognize that the methods for collection of race and ethnicity data are necessarily not standard across studies, healthcare systems, databases, or reports (Nepaul, Hynes, & Stratton 2007; Connecticut Department of Public Health, 2012).

Race and ethnicity are deeply rooted social constructs in the United States. Despite increasing population diversity, the U.S. remains a persistently race-conscious society and differential treatment because of one's race/ethnicity remains a reality for some Americans. Indeed, this was a major finding of the Institute of Medicine (IOM) study of racial and ethnic health disparities, *Unequal Treatment*. Even after controlling for healthcare access-related factors like health insurance, compared to Whites, racial and ethnic minorities were less likely to receive needed medical services (IOM, 2003).

A recent study assessed the prevalence of hypertension, dyslipidemia, type II diabetes, and asthma in active-duty U.S. Air Force (USAF) members aged 21 years or older (Hatzfeld, LaVeist, & Gaston-Johansson, 2012). These USAF members all had at least a high school diploma, received housing benefits, and had equal access to free preventive screening and health care. Nonetheless, higher prevalence of chronic diseases was found among members who were American Indians/Alaska Natives (AI/AN), Asian/Pacific Islanders (API), non-Hispanic Blacks, and Hispanics compared to their non-Hispanic White counterparts. Higher chronic disease prevalence was consistent and significant for non-Hispanic Blacks, even though non-Hispanic Blacks were more likely to have had a current preventive health assessment than non-Hispanic Whites. The study authors suggest that the health risks members incurred outside of the military and before enlistment (e.g., racism, low socioeconomic status, access to health care) have long-term effects on health outcomes. They conclude that more preventive care and community outreach are needed, particularly for non-Hispanic Blacks.

Where People Live

Differential treatment based on race/ethnicity and resulting differences in life chances are evident in where people live. The location of neighborhoods, places of residence, and the dwellings which people occupy are associated with factors that influence their well-being. As stated by Williams and Collins (2001), "Racial residential segregation is a fundamental cause of racial disparities in

health" (p. 404). A form of institutionalized discrimination, racial residential segregation[6] begets other social disadvantages such as differential access to educational opportunities and low socioeconomic status. In *Social Determinants: Taking the Social Context of Asthma Seriously*, Williams, Sternthal, and Wright (2009) articulate how the social disadvantages associated with racial residential segregation – air pollution, exposure to stress and violence, problems of access to healthy food, limited access to medical care and appropriate medication, and erosion of collective efficacy – are tied to asthma. They posit that the long-term improvement of asthma outcomes requires policies and interventions that focus on improving neighborhood conditions and housing quality and for children living in poverty, particularly minority children (Williams et al., 2009).

Neighborhood

The social and spatial dimensions of neighborhoods are related to health outcomes (Kissane, 2011; Krivo, Peterson, & Kuhl, 2009; Krieger, Waterman, Chen, Soobader, & Subramanian, 2003; Krieger, Chen, Waterman, Rehkopf, & Subramanian, 2005; Krieger, 2006). Social and economic aspects of a neighborhood determine the residential environment. Regardless of the economic status of an individual, the quality of housing and level of crime in the neighborhood within which s/he resides can influence the individual's health (Cubbin, LeClere, & Smith, 2000; Pickett & Pearl, 2001; Sampson & Lauritsen, 1994; Robert, 1998). Exposure to community violence is associated with increased asthma-related hospitalizations and ED visits in adults (Apter et al., 2010).

Community characteristics influence the reactions to psychological stress, behaviors, and health outcomes of individuals (Wright & Schulte, 2003). Macintyre and Ellaway (2003) suggest that the physical and social aspects of neighborhoods that may promote or damage health include: physical features (e.g., air quality); availability of healthy environments at home, work, and play; public services that support daily living (e.g., transportation); sociocultural features (e.g., politics); and how the area is perceived by residents and non-residents. These community factors are not simply the aggregation of the individual-level characteristics; rather, they are tangible and intangible products of the interactions between individuals and communities with social institutions (e.g., education, government).

Housing

Housing is an important social determinant of health (Shaw, 2004). Persons living in inadequate housing have increased odds of exposure to agents that exacerbate asthma. Using 2007 and 2009 American Housing Survey data, CDC researchers assessed inadequate and unhealthy housing in the

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[6] Housing segregation along racial and ethnic lines in the United States is the result of past discriminatory practices of the private housing industry, states, and the federal government (U.S. Commission on Civil Rights, 1973). Redlining restricted nonwhites from purchasing homes in "desirable" neighborhoods. Thus, racial and ethnic minorities became concentrated in urban areas. The Fair Housing Act was passed in 1968 to eliminate housing discrimination; however, the result of the years of redlining is that racial and ethnic residential segregation persists in the United States and is most pronounced for Blacks or African Americans (Williams & Collins, 2001; Charles, 2003).

United States. They defined inadequate housing as a housing unit with deficiencies in plumbing, heating, electricity, and upkeep that are moderate or severe. Unhealthy housing was defined as having characteristics that are related to environmental factors that negatively affect the health of occupants (e.g., rodents, peeling paint, water leaks in the past 12 months) in addition to meeting the criteria for inadequate housing. The findings suggest that individuals living in inadequate or unhealthy homes may have increased odds of exposure to agents that exacerbate asthma, exposure to lead (Pb), and injury or death resulting from undetected house fires (Raymond, William, & Brown, 2011).[7]

In *The Role of Housing Type and Housing Quality in Urban Children with Asthma*, Northridge, Ramirez, Stingone, and Claudio (2010) examined the relationship between childhood asthma and the type and quality of housing in New York City. After adjusting for markers of housing quality and individual disease risk factors, residents of public housing still had higher odds of current asthma compared to residents of all types of private housing, suggesting differential exposure to asthma triggers. The authors posit that the increased asthma morbidity observed in public housing may be due to the lack of control residents have over the maintenance of public spaces in which asthma triggers can persist. In addition to having little control over the maintenance of one's housing, additional housing-related stressors – cost, overcrowding, lack of residential satisfaction, lack of stable housing, and trouble with neighbors – can influence asthma morbidity (Sandel & Wright, 2006; Quinn, Kaufman, Siddiqi, & Yeatts, 2010). However, it is difficult to separate out the independent effects of inner city residence, low socioeconomic status, and minority race or ethnicity on asthma morbidity because residential racial segregation in the United States persists (Wright & Subramanian, 2007).

Environment

A growing body of environmental justice literature examines how unequal exposures to environmental pollutants and social determinants manifest as health disparities (Brulle & Pellow, 2006; Downey, Dubois, Hawkins, & Walker, 2008). Analysis of data from the Americans' Changing Lives Study demonstrated significant associations between low income and proximity to a polluting industrial facility (PIF) and regional variations in the association between race and closeness to a PIF (Mohai, Lantz, Morenoff, House, & Mero, 2009). Epidemiologic research demonstrates that asthma morbidity and mortality are highest in inner cities, where environmental pollutants and airborne allergens are important factors (Eggleston, 2007). In a study of a New York State birth cohort,

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[7] Analyses demonstrated that in 2009, the odds of living in inadequate housing were higher for persons classified as non-Hispanic Blacks (OR= 2.3), Hispanics (OR= 2.0), American Indian/Alaska Native (OR= 1.9), and Asians/Pacific Islanders (OR= 1.1) compared to non-Hispanic whites. Unhealthy housing units were most likely to be found in the Northeast region (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, and New Jersey) in 2007; and in the Northeast and Midwest in 2009. The odds of living in unhealthy housing were highest for American Indians/Alaska Natives (OR for males= 1.6; OR for females= 1.4) and non-Hispanic Black females (OR= 1.4) compared to their non-Hispanic White counterparts. Compared to households that did not have a person with a disability, living in inadequate housing was 1.2 higher and the odds of living in unhealthy housing was 1.4 times higher for households that had at least one person with a disability. With regard to the individual unhealthy environmental exposures that were assessed, householders with annual incomes < $24,999 were more likely that those with annual incomes > $75,000 to occupy housing with a recent sighting of a rodent (OR = 1.9), peeling paint in a home built before 1978 (OR= 3.4), and no working smoke alarm (OR= 5.4).

researchers found that chronic exposure to ozone (O_3) in early childhood was associated with increased risk of hospital admission for asthma care (Lin, Liu, Le, & Hwang, 2008). Statistically significant associations were found between asthma hospitalizations and: age 1 – 2 years; living in poor neighborhoods; having a mother with less than 12 years of education; having Medicaid or no insurance coverage at the time of birth; and Hispanic ethnicity. According to Meng and colleagues (2008), the higher prevalence of asthma among low-income persons is related to exposure to high traffic density and increased susceptibility to adverse environmental exposures because of compromised health and decreased access to health care. There is also evidence of a dose-response relationship between asthma prevalence and the proximity of where a person lives relative to sources of particulate air pollution (Oyana, Rogerson, & Lwebuga-Mukasa, 2004).

There is a complex interplay between environmental inequality, residential segregation, income inequality, and race/ethnicity. In a study of environmental inequality in 329 metropolitan areas of the continental United States, Downey and colleagues (2008) examined the roles of residential segregation and income inequality in producing environmental inequality. They conducted analyses using pollution data from the Environmental Protection Agency Risk-Screening Environmental Indicators (RSEI) Project and the 2000 U.S. Census. The researchers found that in general, Blacks and Hispanics experienced a greater pollution burden than other racial/ethnic groups in metropolitan areas, with Blacks being more likely than other groups to be "pollution burdened." In extremely polluted areas with more than one million residents, Blacks, Hispanics, and Pacific Islanders were more likely to have high pollution disadvantage compared to other racial/ethnic groups. However, environmental inequality outcomes varied widely across the metropolitan areas examined. Whites, Pacific Islanders, Native Americans, and Asian Americans also experienced heavy pollution burdens in many of the metropolitan areas included in the study. The major study conclusions were that: 1) residential segregation and racial income inequality are not good predictors of environmental inequalities; 2) the proximity of environmental hazards varies with the degree of residential segregation in an area; and 3) "the roles income inequality and residential segregation play in producing environmental inequality vary from one racial/ethnic group to another" (Downey et al., 2008, p. 14).

Healthcare

Asthma disparities can result from differences in the provision of asthma care. Ash and Brandt (2006) examined racial disparities in asthma hospitalizations in Massachusetts. From 1994 – 2002 hospital discharge data, they extracted hospital admission records for 5 - 64 years olds with a primary diagnosis of asthma and no comorbid emphysema diagnosis. Variables of interest included: race/ethnicity (White, Black, Hispanic, and other), residential zip code, and type of payer (e.g., commercial insurance, Medicare, self-pay). Residential zip code matching was performed to

determine median household income. Using these data, Ash and Brandt looked at the number of asthma hospital admissions each patient in the sample had during the two years after their first asthma hospital admission. They found that even after controlling for age, type of payer, and median neighborhood income, race/ethnicity was a strong predictor of hospital readmission for asthma care – Blacks and Hispanics had a higher odds of hospital readmission compared to Whites. Because asthma hospitalization is preventable if care is appropriate, Ash and Brandt conclude that their analysis of the Massachusetts data shows the persistence of racial/ethnic disparities in asthma management and outcomes (p. 362).

In their examination of race/ethnicity differences in the inpatient management of asthma in the U.S., Chandra, Clark, and Camargo (2009) did not find any statistically significant differences in hospital inpatient asthma treatment and outcomes for adults or children. However, they found that at the time of hospital discharge, Asthma Action Plans were given to Hispanic children at half the frequency that they were given to Black children. The authors suggest that this may have been caused by language barriers, differences in insurance coverage, or lack of cultural competency; however, no data to examine these suggestions was collected. Closer examination of differential hospital discharge practices is needed.

Diette and Rand (2007) posit that poor health care communication contributes to health disparities for minorities with asthma. From their review of the literature, they found that poor provider/patient communication may be more common for minority patients and may result in underestimation of asthma severity for minority asthma patients. Diette and Rand discuss how patient, physician, and healthcare system factors may result in poor provider/patient communication and contribute to asthma disparities. The patient factors include: healthy literacy; health beliefs that differ from those of the health care provider (e.g., lack of trust in prescribed medications); and lack of patient adherence to daily inhaled corticosteroid therapy. The physician factors that may contribute to poor communication include: physicians' expectations about the condition and its severity based on pre-existing beliefs about the patient; stereotyping that may influence interpretation of patient behaviors and clinical findings; and communication skills (e.g., use of close-ended versus open-ended questions). Physician race is another factor identified as a contributor to patient/provider communication – patient satisfaction ratings are higher when the physician is the same race as the patient. Healthcare system factors that play a role in poor patient/provider communication include: absence of culturally and linguistically appropriate services; complex reimbursement procedures that may discourage people from seeking care; and insufficient time for visits.

In a review of reasons for disparities in the quality of asthma care, Cabana, Lara, and Shannon (2007) discuss issues with healthcare system elements – structure (e.g., staff, equipment, policies), process (i.e., care delivery), and outcomes (e.g., hospital readmissions). They identify the following potential sources of racial and ethnic disparities in asthma care: 1) access to a health care provider

(e.g., availability of culturally competent providers); 2) navigation of the healthcare system (e.g., knowledge of the relevant services that are available); and 3) interaction with the health care provider. They suggest interventions at the structural, healthcare system, and interpersonal levels to improve asthma care and reduce asthma care disparities.

At the structural level, they propose: increasing the number African American and Hispanic physicians, particularly in the fields of allergy immunology, and pulmonology; adopting the culturally linguistically appropriate service (CLAS) standards promulgated by the U.S. Department of Health and Human Services; improving the structure of healthcare plans so that providers adhere to the same standard of care, regardless of the patient's health insurance; and improving access to primary health care services through community health centers. At the healthcare system level, Cabana and colleagues suggest: improving adherence to the National Heart, Lung, and Blood Institute *Guidelines for the Management of Asthma*; training for physicians in patient/provider communication; implementing care quality improvement programs; and providing professional language interpretation to serve diverse populations. At the interpersonal level, the authors recommend reducing stereotyping and improving patient education about asthma self-management.

Health Insurance

According to the Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care (IOM, 2003), "Insurance status, perhaps more than any other demographic or economic factor, determines the timeliness and quality of healthcare, if it is received at all" (p. 84). In their study of ED use among children with asthma, Canino and colleagues (2012) found an association between frequent ED use for asthma care and public insurance for Latino children in living in Puerto Rico (PR), but no such association for publicly-insured Latino children living in Rhode Island (RI). The authors postulate that the difference in ED presentation frequency between the two groups is that public insurance benefits in PR differ from those in RI. Dispensing of asthma control and quick relief medications to publicly-insured children in Puerto Rico was significantly less frequent than dispensing of such medications to privately-insured children in PR (Vila et al., 2010). Moreover, in PR there is a disincentive to prescribing inhaled asthma controller medications to publicly-insured children because medication costs are included in the fixed payment to physicians and clinics (Canino et al., 2010).

Adequate health insurance increases the likelihood of asthma control. In New York City, asthma care improved among children who were newly enrolled in the New York State Children's Health Insurance Program (SCHIP). Szilagyi and colleagues (2006) analyzed data from telephone interviews of the parents of SCHIP enrollees. Baseline interviews were conducted in 2001 and follow-up interviews were done 13 months later. The interviews were conducted in English and Spanish, seven days per week, and during days and evenings. Baseline interviews were completed for 2,644 children and follow-up interviews for 2,310 children. The researchers found that after SCHIP enrollment, there

were statistically significant reductions in the percent of children who had no usual source of care, who had to travel $\geq$ 30 minutes to get to the location of health care provision, and who experienced difficulty getting an appointment. During SCHIP enrollment, there were also statistically significant reductions in unmet needs among those children who had a need for: any health service, specialty care, acute care, prescription medications, or ED care. With regard to utilization of care, there were significant reductions in: the mean number of asthma attacks; mean number of asthma hospitalizations, and mean number of asthma ED visits.

Toward Addressing Asthma Disparities in Connecticut

The Connecticut Department of Public Health Asthma Program draws on a variety of data sources to describe the distribution of asthma in Connecticut. Using surveillance and survey data, the Asthma Program is able to identify the population subgroups which are disproportionately affected by asthma. Surveillance findings inform public health interventions aimed at individuals, communities, health care providers, schools, and workplaces. Moreover, asthma data serve as the starting point for policy creation and reform.

In subsequent sections of this report, data on the Connecticut population and the populations affected by asthma are presented. In recognition of the fact that social determinants of health are interwoven, the asthma data are stratified in a variety of ways. Data are presented by: age groups and major age categories (i.e., child versus adult); gender (male and female); race/ethnicity (Hispanic, non-Hispanic Black, non-Hispanic White, and non-Hispanic Other); geographic designation (city/town and county), and annual household income. Data on more social determinants (e.g., years of education, primary language) that are not currently available would help to build a stronger evidence base for interventions to reduce asthma prevalence, morbidity, and mortality among all Connecticut residents.

Connecticut Sociodemographic Profile

According to the 2010 U.S. Census, there are 3,574,097 people living in Connecticut. The median age of state residents is 40 years, males account for 51.2% of the population, and 71.2% of inhabitants are classified as non-Hispanic Whites (Table 1). American Community Survey Data (2007-2009), presented in Table 2, illustrate some of the differences between the Connecticut population and the population of the United States. Compared to the nation, Connecticut has: higher median household income; a greater percentage of foreign-born residents who were from a European country; a higher percentage of persons aged 25 years and older who were graduates of high school or had completed higher degrees; and a larger percentage of occupied housing units which were heated with oils or other fuels (excluding gas).

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Connecticut is a small state with large contrasts... Aggregate numbers obscure marked inequalities in economic opportunity, income, educational attainment, and health disparities.

(Stratton, Hynes & Nepaul, 2009, p. 10)

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Connecticut is a densely-populated state with fewer families living below the federal poverty level compared to the nation as a whole. However, data from the 1990 and 2000 censuses demonstrated that the lowest income levels, highest poverty rates, greatest population densities, and highest concentration of racial and ethnic minorities were in the cities of Bridgeport, Hartford, New Britain, New Haven, New London, Waterbury, and West Haven (Levy, Rodriguez & Villemez, 2004).[8]

The *self-sufficiency standard* measures how much income a family of a certain composition in a specific place needs to adequately meet basic needs (e.g., housing, food, health care) without private or public assistance. Pearce, Huang, and Newby (2007) analyzed 2000 U.S. Census data to assess the self-sufficiency standard for Connecticut[9] and found that: 1)19% of Connecticut households lacked the necessary income to meet basic needs without assistance; 2) People of color (especially Hispanics) were more likely to have high rates of inadequate income than Whites; 3) Households maintained by women were twice as likely to have insufficient incomes compared to those maintained by men; 4) Households maintained by single mothers were three times as likely to not meet the self-sufficiency standard than those maintained by married couples with children; and 5) the highest concentrations of households below the standard were in Bridgeport, Hartford, New Haven, Stamford, and Waterbury.

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[8] Evenness, exposure, concentration, centralization, and clustering are aspects of racial and ethnic residential segregation measured by the U.S. Census Bureau. The dissimilarity index is a measure of evenness that identifies "the percentage of a group's population that would have to change residence for each neighborhood to have the same percent of that group as the metropolitan area overall" (Iceland, Weinberg, & Steinmetz, 2002, p. 8). 2000 U.S. Census data show that the dissimilarity index for non-Hispanic Blacks was 66.0 for the city of Hartford, 58.8 for New Haven; and 47.9 for Bridgeport (Frey, Myer, & SSDAN, n.d.). These dissimilarity indices represent the percent of non-Hispanic Blacks that would have to relocate to other places in order for the number of non-Hispanic Whites to be evenly distributed across the respective cities.

[9] Pearce based the self-sufficiency standard for Connecticut on costs for housing, child care, food, health care, transportation, and taxes across 23 regions within the State.

Table 1. Connecticut Demographic Profile – Census 2010

	Adults 18+ years old		Children 0 -17 years old		Total Population	
	Number	Percent	Number	Percent	Number	Percent
Total	2,757,082	100.0%	817,015	100.0%	3,574,097	100.0%
Sex						
Male	1,321,418	47.9%	418,196	51.2%	1,739,614	48.7%
Female	1,435,664	52.1%	398,819	48.8%	1,834,483	51.3%
Race						
White	2,199,380	79.8%	573,030	70.1%	2,772,410	77.6%
Black or African American	261,438	9.5%	100,858	12.3%	362,296	10.1%
American Indian or Alaska Native	7,940	0.3%	3,316	0.4%	11,256	0.3%
Asian	101,416	3.7%	34,149	4.2%	135,565	3.8%
Native Hawaiian or Other Pacific Islander	1,050	0.0%	378	0.0%	1,428	0.0%
Some other race	136,900	5.0%	61,566	7.5%	198,466	5.6%
Two or more races	48,957	1.8%	43,719	5.4%	92,676	2.6%
Ethnicity						
Hispanic or Latino	318,947	11.6%	160,140	19.6%	479,087	13.4%
Not Hispanic or Latino	2,438,134	88.4%	656,876	80.4%	3,095,010	86.6%
Race/Ethnicity						
White, non-Hispanic	2,046,547	74.2%	499,715	61.2%	2,546,262	71.2%
Black, non-Hispanic	246,016	8.9%	89,103	10.9%	335,119	9.4%
American Indian, non-Hispanic	5,044	0.2%	1,841	0.2%	6,885	0.2%
Asian, non-Hispanic	100,486	3.6%	33,605	4.1%	134,091	3.8%
Pacific Islander, non-Hispanic	729	0.0%	229	0.0%	958	0.0%
Other race, non-Hispanic	8,512	0.3%	3,678	0.5%	12,190	0.3%
Two or more races, non-Hispanic	30,800	1.1%	28,705	3.5%	59,505	1.7%
Age group						
0 – 4 years			202,106	24.7%	202,106	5.7%
5 – 9 years			222,571	27.2%	222,571	6.2%
10 – 14 years			240,265	29.4%	240,265	6.7%
15 – 17 years			152,073	18.6%	152,073	4.3%
18 – 24 years	326,659	11.8%			326,659	9.1%
25 – 34 years	420,377	15.2%			420,377	11.8%
35 – 44 years	484,438	17.6%			484,438	13.6%
45 – 54 years	575,597	20.9%			575,597	16.1%
55 – 64 years	443,452	16.1%			443,452	12.4%
65 + years	506,559	18.4%			506,559	14.2%

Table 2. Selected Population Profile – Connecticut and the United States, 2007 – 2009

Connecticut	Subject	United States
2.56 ± 0.01	Average household[a] size (persons)	2.62 ± 0.01
3.13 ± 0.01	Average family size (persons)	3.21 ± 0.01
$67,724 ± 601	Median household income	$51,369 ± 49
$36,570 ± 289	Per capita income	$27,100 ± 37
9% ± 0.3	Poverty rate for all people	13.6% ± 0.1
12% ± 0.6	Poverty rate for individuals less than 18 years old	18.9% ± 0.1
41.4% ± 4.3	Female-headed households with related children under 5 years old living in poverty	45.4% ± 0.4
	Marital status among persons > 15 years old	
50.3% ± 0.3	Now married	49.7% ± 0.1
6.4% ± 0.1	Widowed	6.2% ± 0.1
10% ± 0.2	Divorced	10.6% ± 0.1
1.2 ± 0.1	Separated	2.2% ± 0.1
31.9 ± 0.2	Never married	31.4% ± 0.1
	Educational attainment of population ≥ 25 years old	
88.4% ± 0.2	High school graduate or higher	84.9% ± 0.1
11.6 ± 0.2	Less than high school diploma	15.1% ± 0.2
13%	Not born in the United States (foreign-born)	12.5%
	World region of birth of foreign-born residents[b]	
41.2% ± 0.8	Latin America	53.2% ± 0.1
29.5% ± 0.7	Europe	13.0% ± 0.1
21.4% ± 0.5	Asia	27.2% ± 0.1
20% ± 0.2	Language other than English spoken at home by population ≥ 5 years old	19.8% ± 0.1
68.3% ± 0.2	Population ≥ 16 years old in the labor force	65.3% ± 0.1
73.1% ± 0.5	Occupied housing units built pre-1939 to 1979	59.1% ± 0.2
51% ± 0.3	Occupied housing units heated with oil or other fuels (excluding gas)	9.6% ± 0.1

Source: U.S. Census Bureau. 2007 – 2009 American Community Survey 3-Year Estimates (S0201). Tables for Connecticut and the United States were retrieved using American FactFinder.
[a] An household includes everyone who occupies a housing unit as their usual place of residence.
[b] Excludes persons born at sea.

Data Sources

The Connecticut Department of Public Health (DPH) Asthma Program monitors the burden of asthma in Connecticut using a variety of data sources. Through legislative reporting mandates, data related to hospital and emergency department (ED) utilization, asthma related to occupational exposure, and asthma in public school children are obtained. Data are also provided by other DPH programs and a research-based public education and advocacy organization. The data sources which inform this report are described in this section. See Appendix B for technical notes.

Data Sources at A Glance

- Behavioral Risk Factor Surveillance System (BRFSS)
    - Asthma Call-back Survey (ACBS)
- Connecticut Hospital Information Management Exchange (CHIME)
- Healthcare for UninSured Kids & Youth Part A (HUSKY A)
- School-based Asthma Surveillance System (SBASS)
- Occupational Illness and Injury Surveillance System (OIISS)
- Connecticut Death Registry

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS), coordinated by the Centers for Disease Control and Prevention (CDC), enables states to monitor the prevalence of the major behavioral risk factors associated with chronic disease, injuries, and preventable infectious diseases among the U.S. population. Using a random digit-dial telephone survey, the BRFSS collects data on the health risk behaviors, preventive healthcare practices, and healthcare access of non-institutionalized civilians aged 18 years and older in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam.[10] The BRFSS survey consists of a core questionnaire and optional modules. Some states also add additional questions. Thus, the BRFSS facilitates collection of data that are comparable across all state populations, as well as data that are specific to the interests of individual states.

Using the core BRFSS questionnaire and optional modules, the DPH Asthma Program is able to calculate two types of prevalence estimates – lifetime asthma and current asthma – in Connecticut adult and child populations. The BRFSS core questionnaire includes two questions about asthma prevalence. The first, "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?" allows calculation of lifetime asthma prevalence in adults. The second, "Do you still have asthma?" allows estimation of current prevalence of asthma in adults. A respondent who answers "Yes" to either of the asthma prevalence questions is asked if s/he will complete a follow-up survey about asthma, the adult Asthma Call-back Survey (ACBS).

Similarly, the Connecticut Asthma Program uses two optional BRFSS modules, Random Child Selection and Childhood Asthma Prevalence, to estimate lifetime and current asthma prevalence in children. Random Child Selection involves asking a randomly-selected BRFSS respondent about presence of children in his/her household. If there are one or more children under age 17 years in the household, one of the children is randomly selected. Information on the child's demographic characteristics and health conditions, including history of asthma, are collected. The parent/guardian is asked "Has a doctor, nurse or other health professional ever said that the child has asthma?" and "Does the child still have asthma?" If the response is "Yes" to either question and the parent/guardian gives consent, the household is called at another time and the adult with the most knowledge about the child is administered the child version of the ACBS.

The ACBS for adults collects data on: asthma history; healthcare utilization; knowledge of asthma management plan; household and living environment; medications; cost of asthma-related medical care; work-related asthma; comorbid conditions; and complementary and alternative therapies. The child ACBS is similar to the adult version. It gathers data on school-related asthma instead of work-

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[10] Complete BFSS questionnaires are available on the CDC website at: http://www.cdc.gov/brfss/questionnaires/questionnaires.htm

related asthma, and inquires about child body mass index and birth weight. The child ACBS does not collect information on comorbid conditions.[11]

Because the BRFSS includes only a sample of the population of interest, all prevalence percentages represent an estimate of the true percent of cases in the population. In order to calculate these estimates, data from the sample are adjusted by a process called weighting. Weighting produces data that are more representative of the entire population. Information about age and sex distribution of the Connecticut population, and the probability of being selected for the survey, are used to weight the BRFSS data.[12] All BRFSS-derived prevalence estimates presented in this report were generated using weighted data.

Hospitalization Data

Data on hospitalization, both inpatient admissions and emergency department (ED) visits, are available from individual hospitals and the Connecticut Hospital Information Management Exchange (CHIME), an affiliate of the Connecticut Hospital Association (CHA). The CHIME-Data Program is a proprietary healthcare information system that member hospitals use to record patient, clinical, provider, and financial information. CHIME began in 1980 with collection of inpatient data from Connecticut's acute care hospitals. Since then, the CHIME database has expanded to include information about care-related finances, hospital-based ambulatory surgery, ambulatory medical records, and ED data.

Connecticut hospitals are legally mandated to report financial, utilization, and certain statistical information to the DPH (Public Health Code § 19a-654). Accordingly, on the behalf of its member hospitals, CHA submits CHIME data to the DPH Office of Health Care Access (OHCA) annually; hospitals that do not participate in CHIME submit data directly to OHCA. Since 2006, hospital discharge and billing data from Connecticut's 29 acute care hospitals and one children's hospital have been submitted to OHCA. Although these data do not contain information on all persons with asthma in Connecticut, they provide a picture of persons with the most severe or poorly controlled asthma, and those who may not have appropriate access to preventive care. The hospitalization or ED visit information in this report, unless otherwise stated, refers to persons with a primary diagnosis of asthma (*International Classification of Diseases-9-CM* codes 493.0-493.9).

HUSKY A

The State of Connecticut provides subsidized health insurance coverage to eligible residents through Healthcare for UninSured Kids & Youth (HUSKY). HUSKY A provides free health care coverage

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[11] The adult and child Asthma Call-back Survey questionnaires are available online at
http://www.cdc.gov/asthma/pdfs/SurveyQuestionsAdult08.pdf and http://www.cdc.gov/asthma/pdfs/SurveyQuestionsChild08.pdf, respectively.
[12] More information about the weighting formula used to adjust BRFSS data can be found on the CDC website at
http://www.cdc.gov/brfss/technical_infodata/weighting.htm.

for persons in low income households. HUSKY A members are children under age 19, their parents (or relative caregivers), and pregnant women.[13]

The health services that must be delivered to Medicaid recipients under age 21 compose the Early Periodic Screening, Diagnosis, and Treatment (EPSDT) Program. These comprehensive health services, listed in United States Code, Title 42§ 1396d(e), include health screenings, health education, dental services, developmental tests, case management services, personal care services, and special services that are of medical necessity. Connecticut Voices for Children (CVC) monitors the impact of managed care on children's health under the EPSDT Program using enrollment and encounter data from the Connecticut Department of Social Services (DSS). CVC issues annual reports on asthma prevalence and asthma-related health care utilization and quality among children enrolled in HUSKY A.

CVC estimates the annual prevalence of pediatric asthma in Connecticut's Medicaid population using a modified version of the National Committee for Quality Assurance (NCQA) criteria for persistent asthma. CVC determines the percentage of children under age 21 who: 1) were continuously enrolled in HUSKY A for the entire calendar year; and 2) received any inpatient, outpatient, or emergency care with a *primary or secondary diagnosis of asthma* (ICD-9-CM codes 493.0-493.9) or *prescriptions for asthma medication*. In 2005 and 2006, one or more prescription asthma medications were sufficient to meet inclusion criteria; in 2007, four or more medications were required (Lee & Learned, 2007).

School-Based Asthma Surveillance System

In accordance with Connecticut General Statutes Section 19a-62a(b), since 2003 the DPH Asthma Program has conducted school-based asthma surveillance using data from the Health Assessment Record (HAR). The HAR is distributed to school health care providers by the Connecticut State Department of Education (SDE). Pursuant to CGS §10-206, the HAR records physical exam findings, screenings, immunizations, and chronic diseases (asthma, anaphylaxis, allergies, diabetes, seizures, and other). Information on medications that need to be taken in school, insurance status, asthma severity, diagnostic source, and school location are also recorded on the HAR. Demographic information captured on the HAR includes: age, gender, race, and ethnicity. Based on the options provided by the legislation, school districts choose the grades for which health assessments will be conducted. The districts may choose to require a HAR for each student in grades pre-kindergarten (PK) or kindergarten (K), 6 or 7, and 9 or 10.[14]

The School-Based Asthma Surveillance System (SBASS) entails school districts submitting HAR data on students with asthma to the DPH Asthma Program annually. A student is considered to have asthma

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[13] HUSKY A was Medicaid managed care until January 2012 when Connecticut adopted an administrative services organization (ASO) model. It is expected that the ASO will streamline health care administration, enhance the coordination of benefits, and promote the patient-centered medical home (PCMH) model.

[14] Prior to adoption of Public Act 07-58 in July 1, 2008, health assessments for adolescents were required for grades 10 or 11.

if s/he meets any of the following conditions: 1) diagnosis of asthma indicated on the HAR; 2) an order for asthma medication by a health care provider is on file in the school health record; 3) an Asthma Action Plan (AAP) is on file; 4) the child exhibits asthma symptoms at the time of the examination; or 5) a parental note is on file that indicates that the child has asthma. Abstraction of specific demographic and asthma symptom data from the HARs into a designated reporting form is done by public school nurses. The completed reports from each school are sent to the DPH by school district nurse supervisors. Asthma Program staff review the forms for completeness and enter them into a database.

There are two limitations to the SBASS data. First, while the public schools are required to submit to DPH asthma data for the HAR grades only, sometimes HAR asthma data for other grades were reported as well. This was problematic when districts were not explicit about which grades they had selected for HAR completion during a specific school year (e.g., data for both 6th and 7th graders were submitted). In such an instance, the calculation of the asthma rate for the district was made using school- and grade-specific enrollment data from SDE, and selecting as the denominator the count of students in the grade for which the most reports of children with asthma were submitted. This algorithm is explained in greater detail in *Connecticut School-based Asthma Surveillance Report 2010, School Years: Fall 2006 – Spring 2009* (Nguyen, Peng, & Hargrove, 2010, p. 3).[15] Second, data on students with asthma from schools without enrollment data broken down by race and gender were not included in the calculation of race- and gender-specific asthma rates. However, race and gender information was not available for approximately one percent of the reported students with asthma, so there was little effect on race- and gender-specific asthma rates.

Occupational Illness and Injury Surveillance System

CGS §31-40a mandates report of employment-related illness or injury using the Physician's Report of Occupational Disease to the Connecticut Department of Labor. These reports are sent to the DPH Regulatory Branch's Environmental Epidemiology and Occupational Health Section (EEOHA), and the data are recorded in the Occupational Illness and Injury Surveillance System (OIISS). Despite the legal mandate to report occupational illness in Connecticut, there is underreporting (Morse & Schenck, 2011). Approximately 2,100 reports of occupational disease are recorded in the OIISS annually. From the OIISS, information about reported work-related asthma (WRA) can be derived.

WRA is defined as asthma that is caused or exacerbated by exposures in the workplace. The diagnosis of WRA is made by confirming the asthma diagnosis, determining symptom onset, and then

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[15] To mitigate data submission errors, starting with the 2006-2007 school year, districts were asked to clearly state the grades for which HARs were required and informed that the asthma rate would be calculated using only the data for those three specific grades. In other words, for each of the three grades identified by the district, the asthma rate numerator would be the number of students in the HAR grade and the asthma rate denominator would be the total number of students enrolled in the HAR grade.

assessing the relationship between asthma symptoms and factors in the work environment. WRA is classified as either *occupational asthma* (OA) or *work-exacerbated asthma* (WEA). OA is new onset of asthma caused by exposure to sensitizers in the workplace. WEA is pre-existing asthma that is made worse by exposure in the work environment. Reactive airways dysfunction (RADS) is a condition that results from acute exposure to respiratory irritants in the workplace, and is considered a form of irritant-induced OA. In *Asthma in Connecticut 2008*, RADS was presented as a condition that is closely-related but separate from WRA. In this report, informed by the American College of Chest Physicians Consensus Statement (Tarlo et al., 2008), data on and statements about WRA include RADS.

Connecticut Death Registry

Pursuant to CGS§s 7-62b, deaths in Connecticut are reported on the Connecticut Certificate of Death to the Registrar of Vital Statistics in the town where the death occurred. Certified deaths are reported to the DPH Office of Vital Statistics in accordance with CGS §7-42 and maintained in a death registry (DPH, 2012). Office of Vital Statistics staff ensure that deaths of Connecticut residents are captured in the death registry through a reciprocal relationship with counterparts in other states and Canada to obtain copies of death records for residents who died outside of their places of residence. Summary reports of Connecticut mortality statistics are prepared by analysts in the DPH Health Information Systems and Reporting Section (HISR) and submitted to the National Center for Health Statistics (NCHS) for inclusion in the National Vital Statistics Report. The asthma mortality data for Connecticut residents presented in this report were provided by HISR.

The asthma mortality data presented in this report consist of records of death among Connecticut residents for whom asthma was listed as the *underlying cause* or *contributing cause* of death on the Certificate of Death which were coded J45 – J46 in accordance with the *International Classification of Diseases-10*. Underlying cause refers to the first-listed cause of death (i.e., the disease or injury that initiated the chain of events leading directly to death). Contributing cause refers to the second-listed causes of death (i.e., significant conditions that may have contributed to the death).

Asthma Prevalence

The Behavioral Risk Factor Surveillance Survey (BRFSS) supplies data that are used to estimate lifetime and current asthma prevalence in Connecticut adults aged 18 years and older. Using the Random Child Selection component of the BRFSS, data are gathered to generate estimates of lifetime and current asthma prevalence in children. The information presented in this section is the result of analyses of 2007 – 2010 BRFSS data that were collected from a random sample of Connecticut residents.

Lifetime Asthma Prevalence in Adults

Lifetime asthma prevalence in adults $\geq$ 18 years old was estimated from responses to the BRFSS question: "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?".[16] The estimated lifetime prevalence of asthma in Connecticut adults in 2010 was 411,100 or 15.3% (95% Confidence Interval [CI], 13.9 – 16.7). During 2000 – 2010, the lifetime asthma prevalence in Connecticut adults was generally higher than the lifetime adult asthma prevalence for the nation as a whole (Figure 1). There was a 41.7% increase in Connecticut adult lifetime asthma prevalence from 10.8% in 2000 to 15.3% in 2010; and there was a 29.8% increase in the lifetime prevalence of asthma in U.S. adults from 10.4% in 2000 to 13.5% in 2010.

From 2005 – 2010, the lifetime asthma prevalence in Connecticut women was higher than that for Connecticut men, and increased 17.1% (from 14.6% in 2005 to 17.1% in 2010). During the same six-year period, the lifetime asthma prevalence for men increased 34.3% from 9.9% in 2005 to 13.3% in 2010. From 2005 – 2007, the lifetime prevalence of asthma among adult, non-Hispanic Blacks was higher than that for other racial/ethnic groups. In 2008, lifetime asthma prevalence was highest among Hispanics (19.3%) and lowest among non-Hispanic Others (12.5%). Sharp increases in lifetime asthma prevalence were observed among non-Hispanic Blacks and non-Hispanic Others in Connecticut from 2009 to 2010. In 2010, the non-Hispanic Black asthma prevalence rate was 23.2% compared to 19.1% for non-Hispanic Others, 18.9% for Hispanics, and 14.3% for non-Hispanic Whites. Refer to Appendix C for detailed tables on lifetime asthma prevalence in adults.

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[16] 2009 BRFSS questionnaire, Section 10, question 10.1

Figure 1. Lifetime Adult Asthma Prevalence by Year, Connecticut & United States, 2000 – 2010, with 95% Confidence Intervals
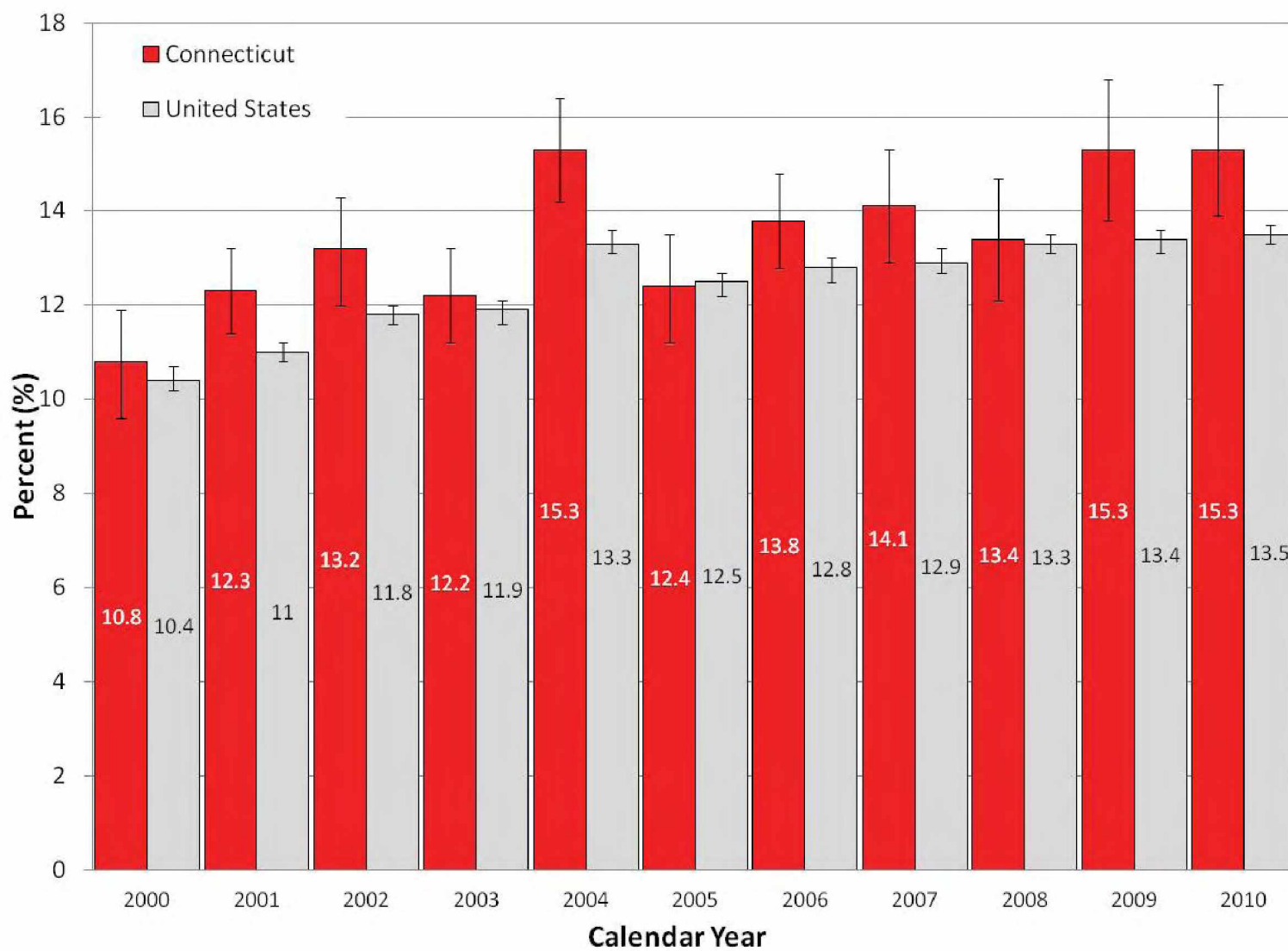
Current Asthma Prevalence in Adults

Current asthma prevalence is estimated from responses to the BRFSS question, "Do you still have asthma?"[17] which immediately followed the probe about lifetime history of asthma. The estimated prevalence of current asthma among Connecticut adults in 2010 was 246,100 or 9.2% (95%CI, 8.1 – 10.2), with females (11.3%) experiencing higher prevalence than males (6.8%). The estimated prevalence of current asthma among Connecticut adults has been higher than that of U.S. adults since 2000, peaking at 9.7% in 2004 (Figure 2). There was a 17.9% increase in current asthma prevalence in Connecticut adults from 7.8% in 2000 to 9.2% in 2010. In the same period, there was a 19.4% increase in current asthma prevalence in U.S. adults from 7.2% in 2000 to 8.6% in 2010. In Connecticut adults from 2005 – 2010, current asthma prevalence was higher for females than males, higher for non-Hispanic Blacks compared to other racial/ethnic groups, and higher among adults 18 – 24 years old compared to other adult age groups.

Current asthma prevalence for female adults was consistently higher than current asthma prevalence for male adults from 2005 – 2010 (Figure 3). In 2008, there was a decrease in current asthma prevalence among females, but an increase in current asthma prevalence among males. In 2010, the current asthma prevalence for adult females was 11.3%, almost twice (1.7 times) that of the current asthma prevalence for males.

From 2005 – 2010, the prevalence of current asthma among adults was generally higher among non-Hispanic Blacks than other racial/ethnic groups (Figure 4). With the exception of the year 2008, non-Hispanic Blacks had the highest prevalence of current asthma among adults in Connecticut. The largest increase in current asthma prevalence among Connecticut adults was for those classified as non-Hispanic Others. For this group, current asthma prevalence doubled (115.8% increase) from 5.7% in 2005 to 12.3% in 2010. A sharp 73.2% increase in current adult asthma prevalence was observed in adult non-Hispanic Others from 2009 to 2010.

With respect to age, current asthma prevalence was consistently highest during 2005 – 2010 among adults aged 18 – 24 years and generally lowest among adults aged 65 or more years (Figure 5). Current asthma prevalence fluctuated for all age groups from 2005 – 2010. Between 2008 and 2010, there was a 27.7% decline in current asthma prevalence among 18 – 24 year olds (from 15.5% to 11.2%) and an 18.2% decline in current asthma prevalence among 23 – 34 year olds (from 12.1% to 9.9%). Meanwhile, there was a 42.3% increase in current asthma prevalence among 35 – 44 years olds (from 7.1% to 10.1%); a 21.9% increase in current asthma prevalence for 45 – 54 year olds (from 7.3% to 8.9%); and a 28.4% increase in current asthma prevalence for 55 – 64 year olds (from 6.7% to 8.6%). Current asthma prevalence among adults ≥ 65 years old was the same in 2008 and 2010.

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[17] 2009 BRFSS questionnaire, Section 10, question 10.2

Figure 2. Current Adult Asthma Prevalence by Year, Connecticut & United States, 2000 – 2010, with 95% Confidence Intervals
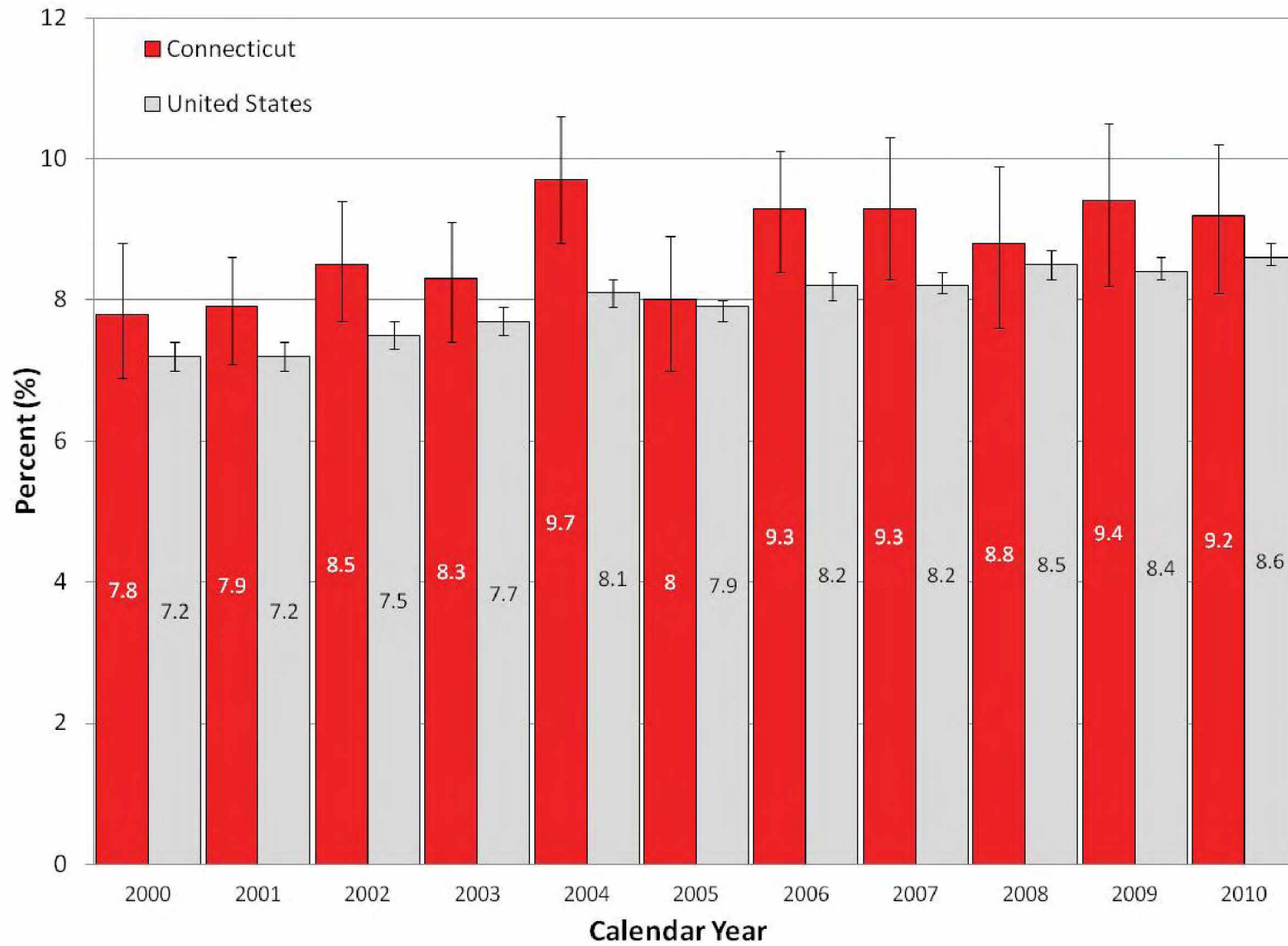
Figure 3. Current Adult Asthma Prevalence by Year and Sex, Connecticut, 2005 – 2010
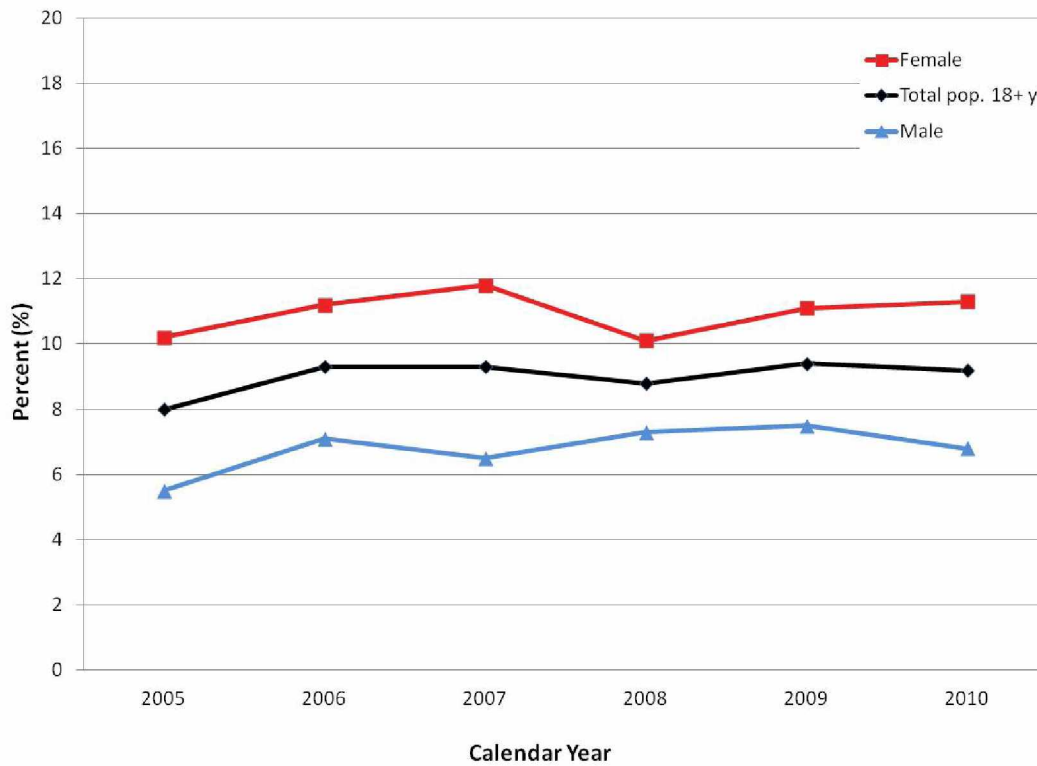
Figure 4. Current Adult Asthma Prevalence by Year and Race/Ethnicity, Connecticut 2005 – 2010
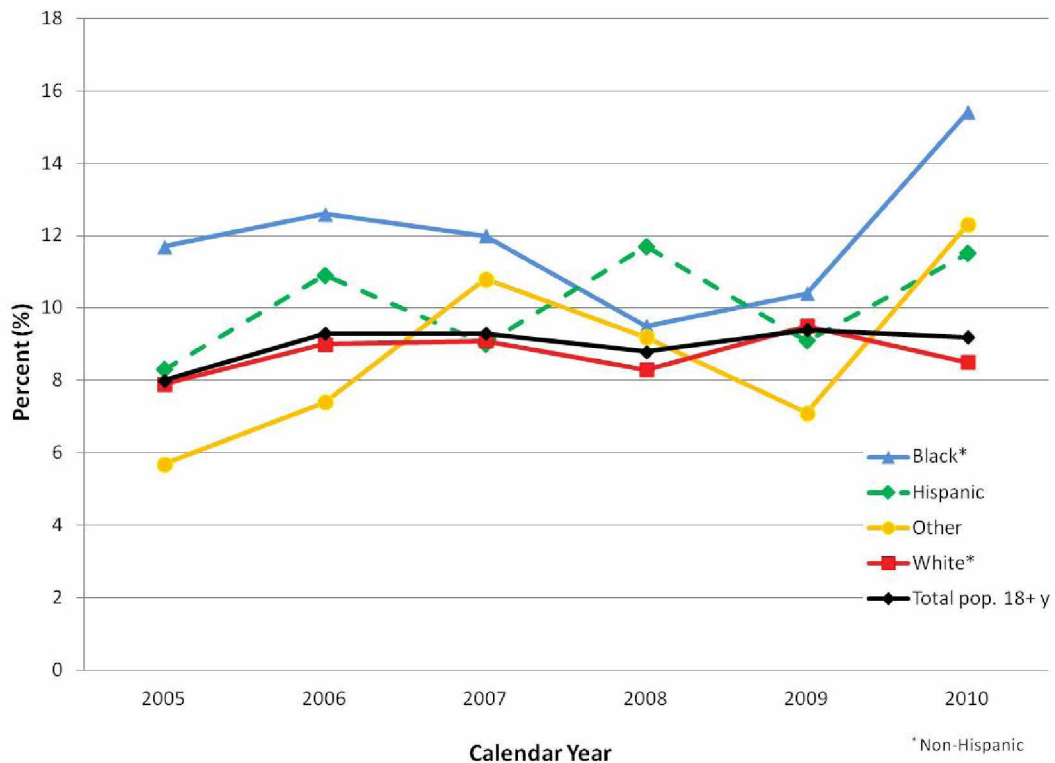
Figure 5. Current Adult Asthma Prevalence by Age Year and Age Group, Connecticut, 2005 – 2010
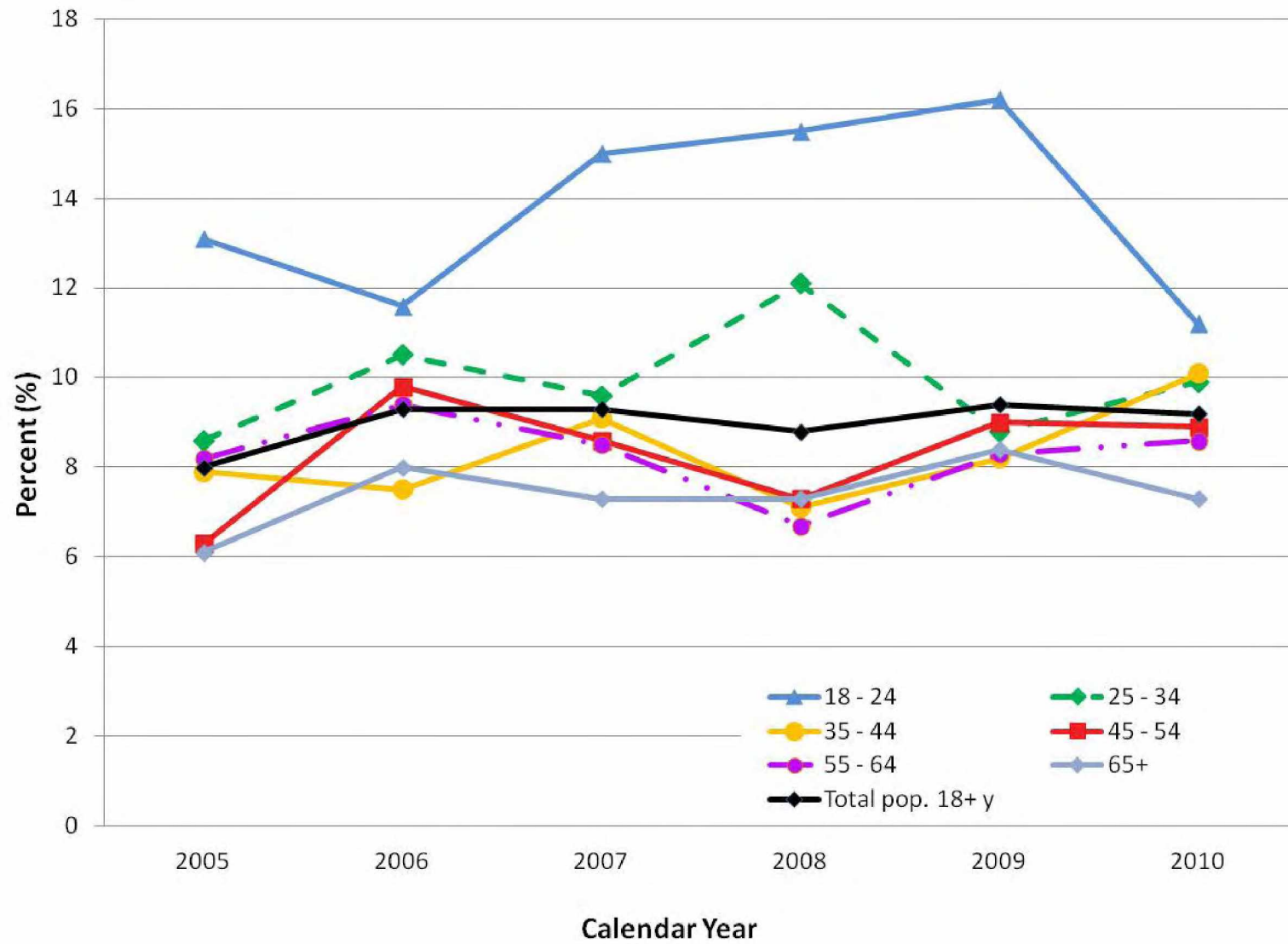
Analysis of 2008 – 2010 BRFSS survey data demonstrated that estimates of current asthma prevalence among Connecticut adults by marital status was: 13.2% among persons who were divorced or separated; 12.9% of persons who were never married; 11% of individuals who were part of an unmarried couple; 8.4% of widowed persons; and 7.3% of married people. With respect to employment status, current asthma prevalence was highest among adults who were unable to work (24.6%) and students (20.2%), followed by unemployed persons (12.3%), homemakers (9.3%), employed persons (7.8%), and retired persons (7.1%).

With respect to educational attainment, 2008 – 2010 BRFSS survey data estimates were that current asthma prevalence was highest for adults with less than a high school education (14.2%) and lowest for adults who were college graduates (7.8%). The current asthma prevalence for adults with household incomes less than $15,000 per year was 16.1%, almost double the prevalence for adults with annual household incomes of $75,000 or greater (Figure 6). With respect to geographic area of residence, the current asthma prevalence of adults in Windham County for 2008 – 2010 was 12.2%, followed by: New London County (10.4%); Middlesex County (10.3%); Hartford County (9.4%); New Haven County (9.1%); Tolland County (8.2%); Litchfield County (8.1%); and Fairfield County (8.1%).

Figure 6. Current Adult Asthma Prevalence by Household Income, Connecticut 2008 – 2010, with 95% Confidence Intervals
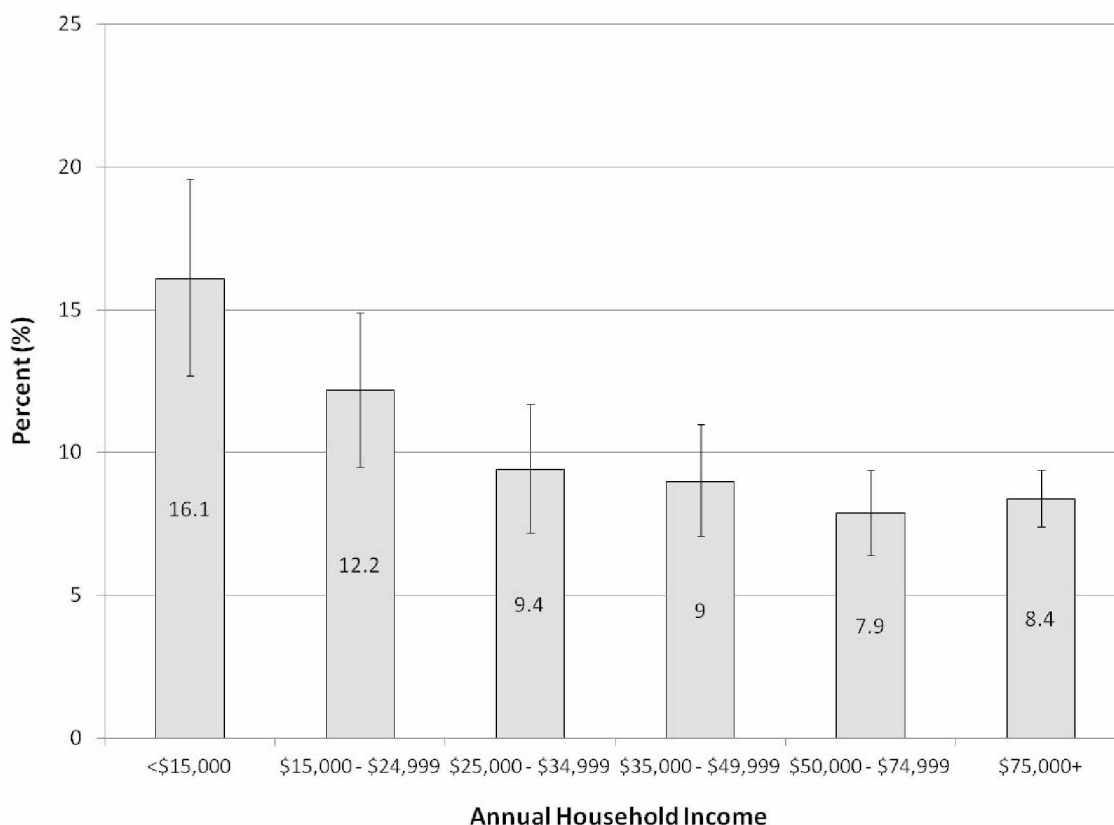
Lifetime Asthma Prevalence in Children

In 2010, the estimated lifetime asthma prevalence in Connecticut children was 121,900 or 15.3% (95%CI, 13.1 – 17.6). From 2005 – 2008, the lifetime prevalence of asthma in Connecticut residents 0 – 17 years old was consistently higher than that among children in United States (Figure 7). Among boys, lifetime asthma prevalence was higher than the prevalence among girls from 2005 – 2010 (Figure 8). During the same six-year period, non-Hispanic Black and Hispanic children generally had higher lifetime asthma prevalence rates than other racial/ethnic groups. In 2008, 30.1% of non-Hispanic Black children had a history of asthma, the highest observed lifetime asthma prevalence in Connecticut children from 2005 – 2010 (Figure 9). In comparison, the lifetime asthma prevalence rates among Hispanic, non-Hispanic Other, and non-Hispanic White children in 2008 were 28.0%, 17.5%, and 13.6%, respectively. Refer to Appendix C for detailed tables on lifetime asthma prevalence in children.

**Figure 7. Lifetime Child Asthma Prevalence by Year,
Connecticut and United States, 2005 – 2010, with 95% Confidence Intervals**
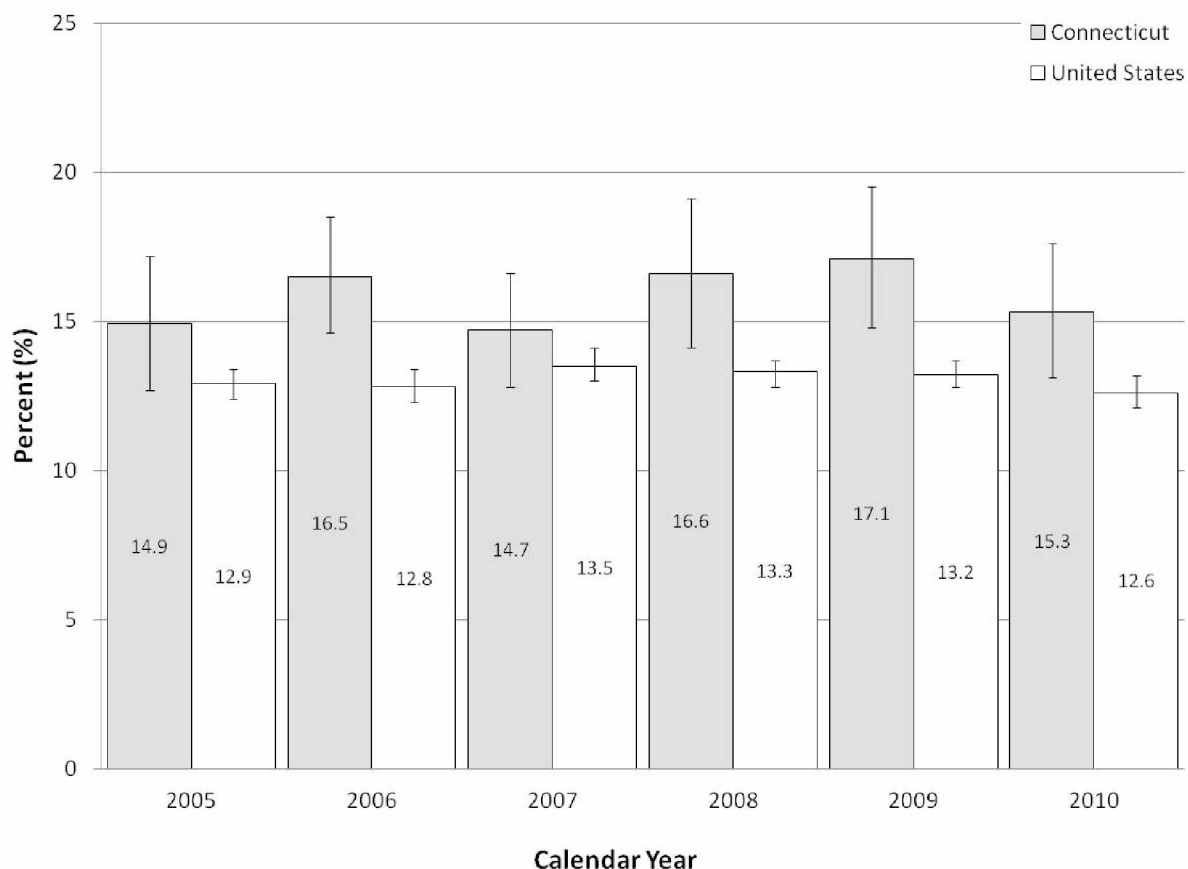
Figure 8. Lifetime Child Asthma Prevalence by Year and Sex, Connecticut, 2005 – 2010
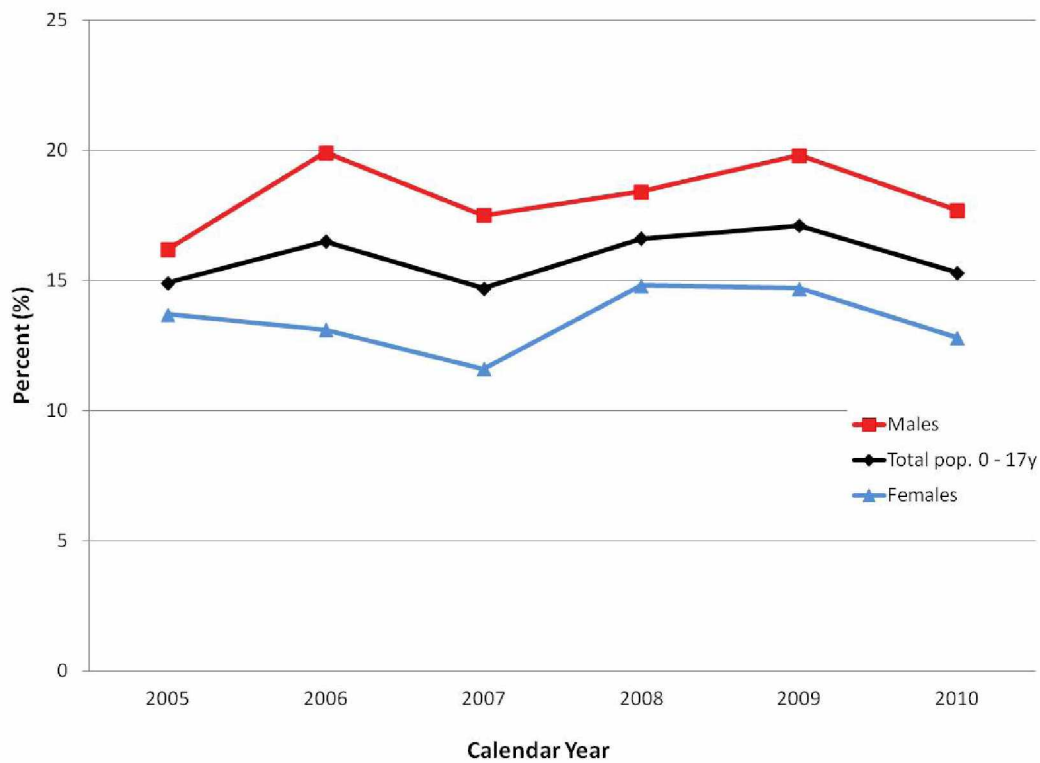
Figure 9. Lifetime Child Asthma Prevalence by Year and Race/Ethnicity, Connecticut, 2005 – 2010
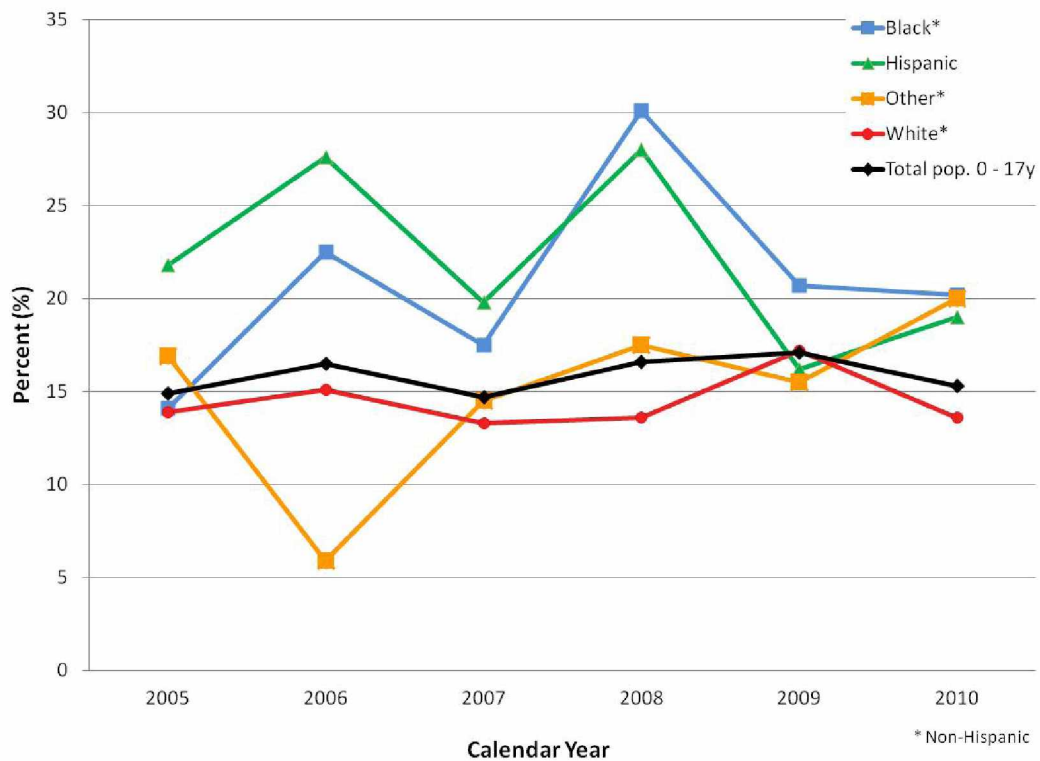
Current Asthma Prevalence in Children

The current asthma prevalence estimate for asthma in Connecticut children in 2010 was 89, 280 or 11.3% (95%CI, 9.3 – 13.3). From 2005 –2010, the prevalence of current asthma among Connecticut children was higher than the current asthma prevalence among Connecticut adults (9.2%) and U.S. children (8.4%). Between 2007 and 2010, Connecticut children experienced a 16.5% increase in the prevalence of current asthma. During the same period, a 5.6% decrease in the prevalence of current asthma among children was observed nationally (Figure 10).

Figure 10. Current Asthma Prevalence in Children by Year,
Connecticut and United States, 2005 – 2010, with 95% Confidence Intervals
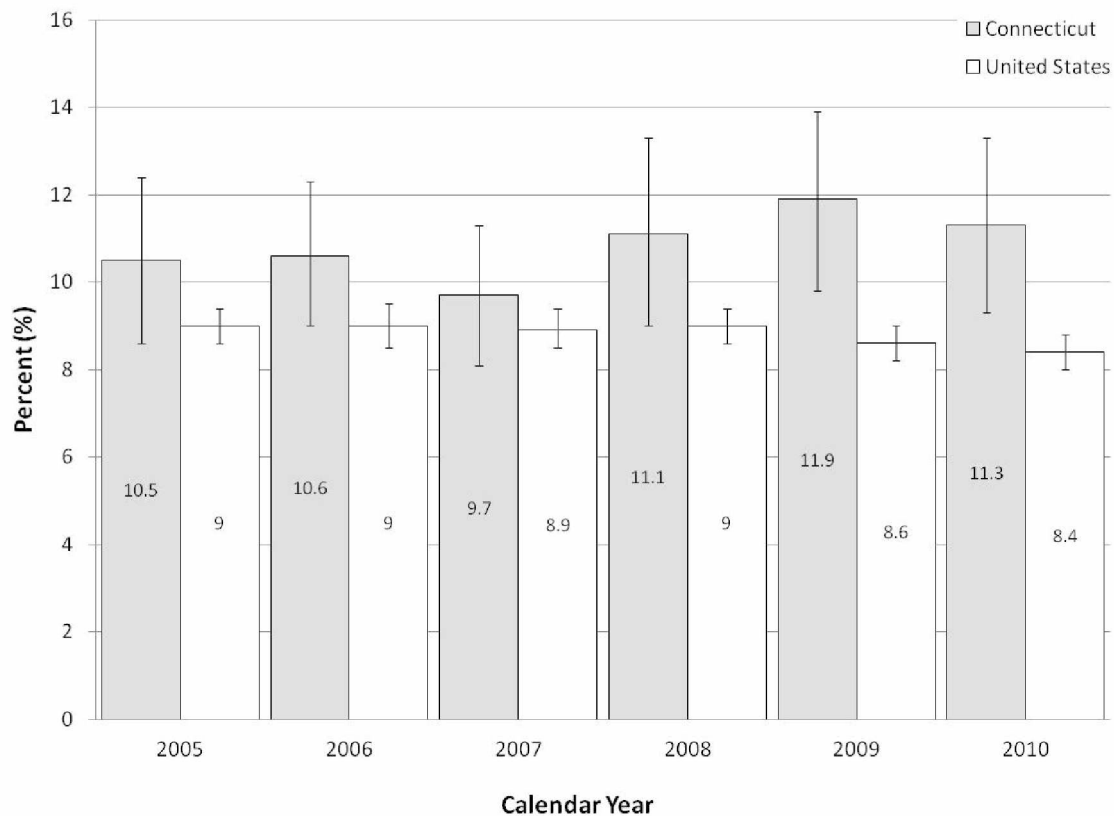
Among male children, current asthma prevalence was consistently higher than prevalence among female children from 2005 – 2010. In 2009, the peak of overall current child asthma prevalence in Connecticut, current asthma prevalence was 12.7% for boys and 11.3% for girls (Figure 11). In 2010, current asthma prevalence was highest among non-Hispanic Black children (18.9%), followed by non-Hispanic Others (15.6%), Hispanics (12.3%), and non-Hispanic Whites (9.9%) (Figure 12).

Figure 11. Current Asthma Prevalence in Children by Year and Sex, Connecticut, 2005 – 2010
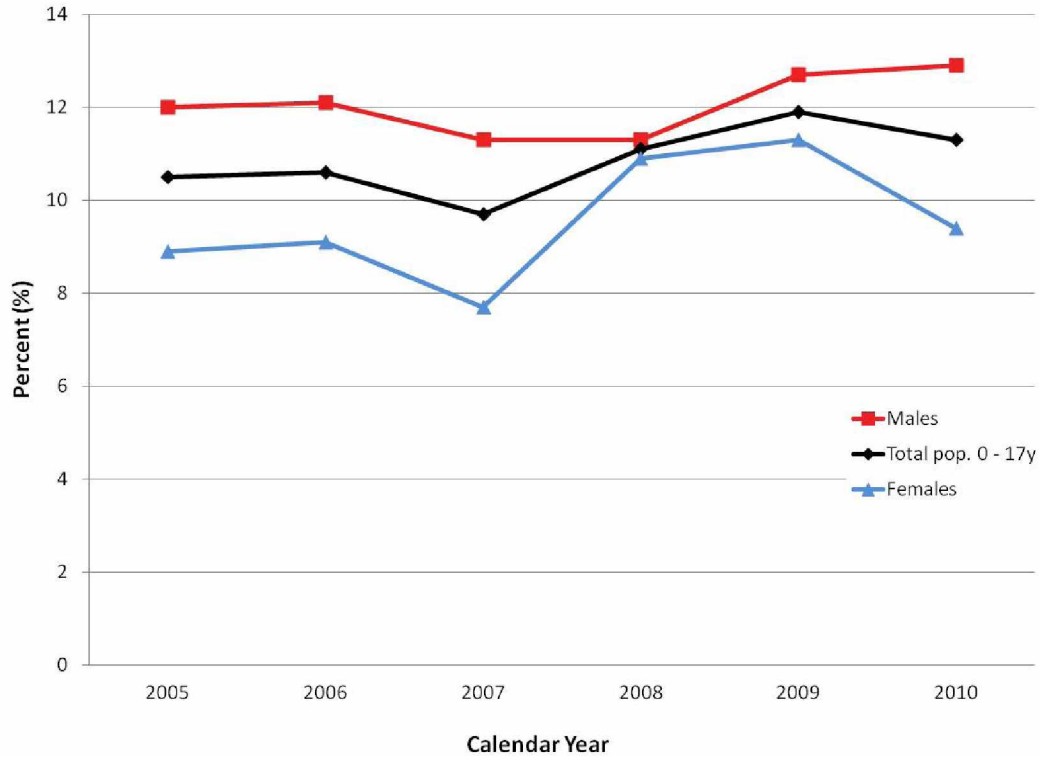
Figure 12. Current Asthma Prevalence in Children by Year and Race/Ethnicity, Connecticut, 2005 – 2010
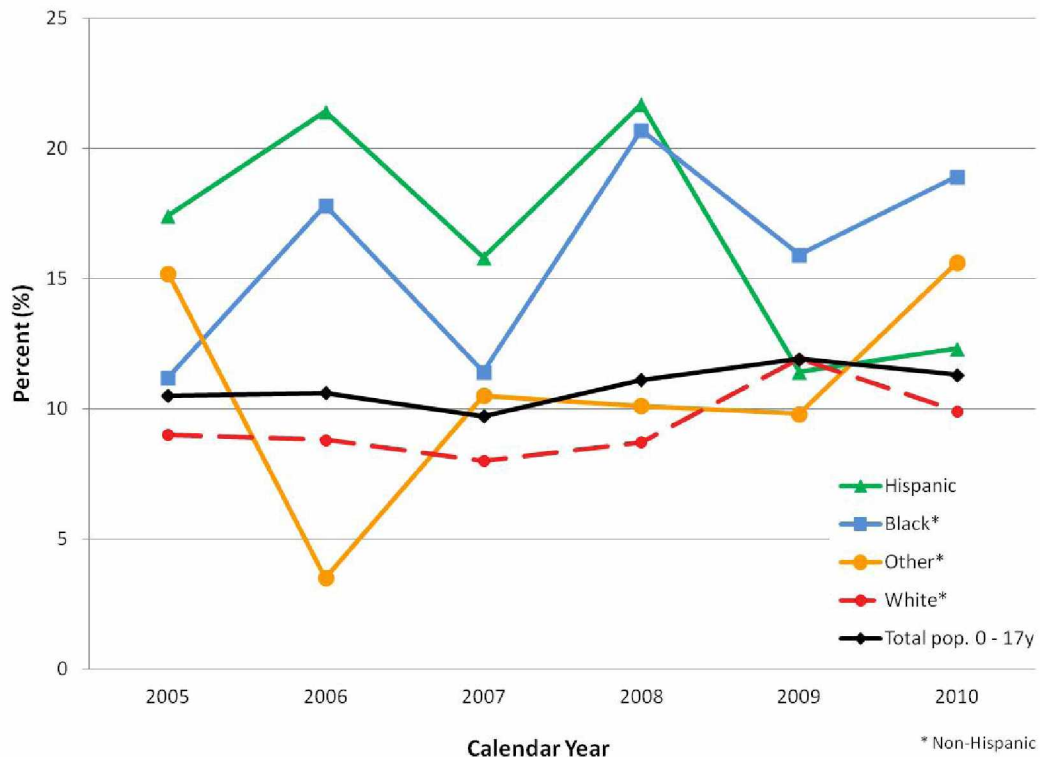
With respect to age, the prevalence of current asthma was highest among children 5 – 17 years old during 2005 – 2010. In 2010, current asthma prevalence was 13.6% for 5 – 11 year olds, 13% for 12 – 17 year olds (13%), and 5.9% for children less than five years old (5.9%).

Figure 13. Current Asthma Prevalence in Children by Year and Age Group, Connecticut, 2005 – 2010
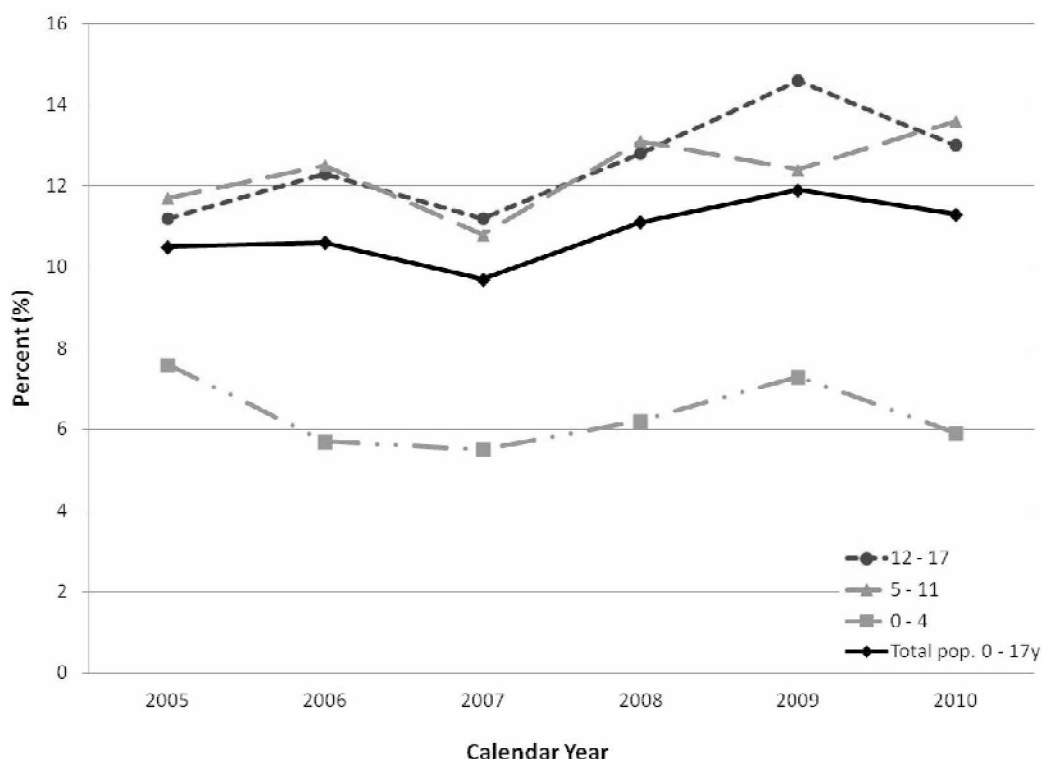
According to 2008 – 2010 BRFSS data, current asthma prevalence among children with at least one parent who has current asthma was 28.5%, compared to 9.6% for children who did not have a parent with current asthma. An inverse relationship between household income and current asthma prevalence in Connecticut children was observed. The current asthma prevalence among children in households with annual incomes less than $15,000 was double that of children living in households with incomes of $75,000 and above (20.4% versus 9.9%) (Figure 14). Current asthma prevalence among children was highest for those residing in Windham County (18.9%) and lowest for children living in New London County (8.6%) (Table 3).

Figure 14. Current Child Asthma Prevalence by Household Income, Connecticut, 2008 – 2010, with 95% Confidence Intervals
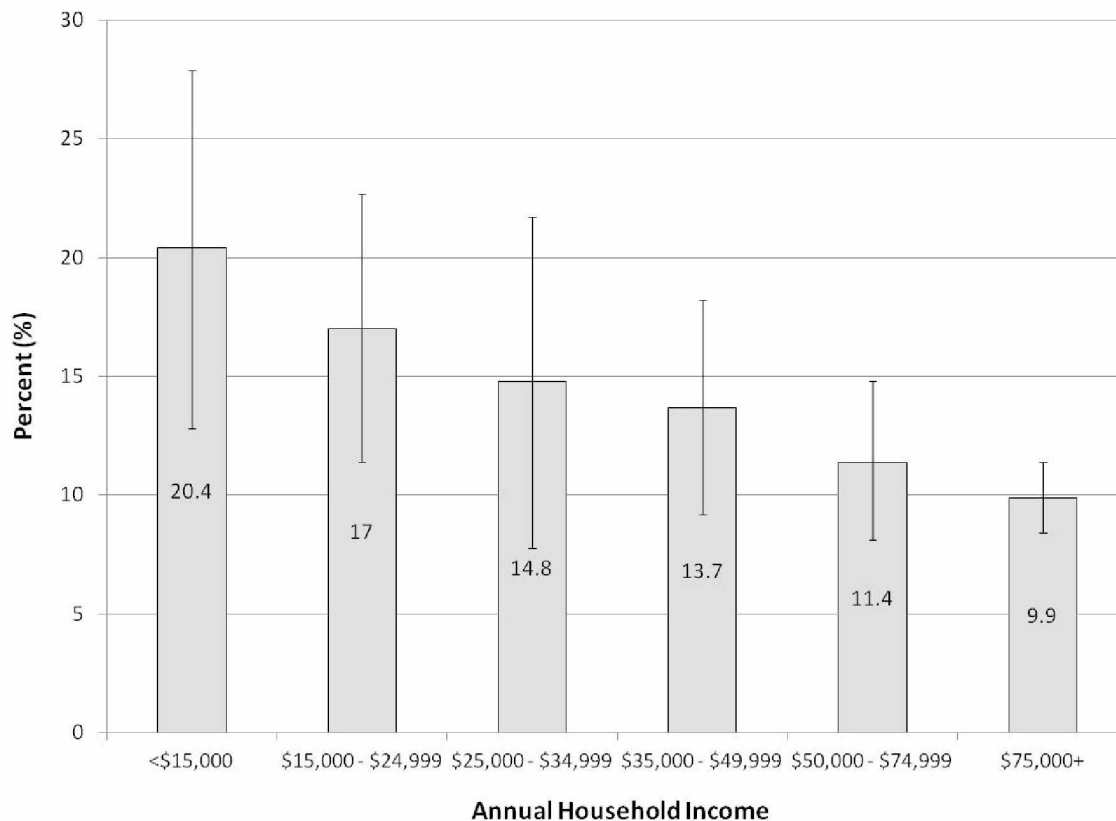
Table 3. Current Child Asthma Prevalence by County of Residence, Connecticut, 2008 – 2010

County	Percent	95% CI Lower Limit	95% CI Upper Limit
Fairfield	10.4	8.1	12.7
Hartford	12	9.6	14.5
Litchfield	10.3	5.4	15.1
Middlesex	10.4	5.8	15
New Haven	12.1	9.6	14.7
New London	8.6	5.1	12
Tolland	11.9	6.8	16.9
Windham	18.9	10.6	27.2

Living with Asthma

The Asthma Call-back Survey (ACBS), an optional Behavioral Risk Factor Surveillance System (BRFSS) module, is conducted annually in Connecticut. The ACBS yields information regarding asthma control status, comorbid conditions, medication, healthcare utilization, and quality of life. Most of the information presented in this section is the result of analyses of 2007 – 2009 ACBS data that were collected from a random sample of Connecticut residents. Refer to Appendix D for tables of estimates and their 95% confidence intervals.

Health Risk Profile of Persons with Current Asthma

The 2008 – 2010 BRFSS survey collected information on the status of health risk factors among Connecticut adults and children. Current asthma prevalence estimates among Connecticut adults by risk factor status are listed in the table below. The 2008 – 2010 BRFSS data show that current asthma prevalence among Connecticut children with no health care coverage was 9.4% compared to 11% among children with health care coverage. Current asthma prevalence among obese children in Connecticut was 14.1% compared to 14.4% for the overweight, 11.7% for children of healthy weight, and 10.4% for underweight children.

Table 4. Current Adult Asthma Prevalence by Selected BRFSS Risk Factors Status, Connecticut, 2008 – 2010, with 95% Confidence Intervals

Risk Factor Status	Current Asthma Prevalence (%)	95% CI lower limit	95% CI upper limit
Health care coverage			
No	9.8	8.3	9.6
Yes	8.9	7	12.7
Weight			
Underweight	11.7	4.7	18.6
Healthy weight	7.1	6.1	8.2
Overweight	8.5	7.5	9.5
Obese	12.8	11.4	14.2
General Health			
Excellent	5.5	4.3	6.7
Very Good	8.5	7.4	9.6
Good	9.8	8.5	11
Fair	15.6	13.2	18
Poor	24.3	19.6	29.1
Smoking			
Current Smoker	10.2	8.3	12.1
Former Smoker	9.1	8.1	10.2
Never Smoked	8.8	7.9	9.7

Asthma Symptoms

In 2009, approximately 9.4% (250,900) of Connecticut adults and 11.9% (94,900) children aged zero to 17 years old had current asthma. ACBS data from 2007 to 2009 showed that more than two-thirds (70.1%) of current asthma sufferers reported experiencing symptoms within the past three months. Another 14.2% had symptoms in the previous 3 months to one year. Adults (31.1%) were more likely than children (12.4%) to report that asthma symptoms occurred less than one day ago. Males reported experiencing asthma symptoms less than one day ago more often than females (31.3% versus 22.3%).

The occurrence of asthma symptoms varied by race/ethnicity classification. Among non-Hispanic Whites, asthma symptom occurrence less than one day ago was most frequent (28.4%) followed by occurrence one week to less than three months ago (24.4%). Among non-Hispanic Blacks, asthma symptoms were reported one week to less than three months ago for 6,200 (43%) of those with current asthma. Approximately 12,000 (39.7%) Hispanics reported last having asthma symptoms one to six days ago, and 3,200 (28.3%) non-Hispanic Others reported experiencing asthma symptoms one week to less than three months ago.

Among persons with current asthma, approximately 206,100 (62.7%) experienced asthma symptoms within the past 30 days. Among children with current asthma, 42,900 (49.7%) had asthma symptoms within the past 30 days compared to 163,200 (67.3%) adults. Approximately 43,300 (50.2%) children with current asthma had no asthma symptoms in the past 30 days. Among persons with current asthma, there was little difference between males and females in the report of recent asthma symptoms. With respect to race/ethnicity, 23,100 (76.2%) Hispanics reported having asthma symptoms in the past month compared to 10,000 (69.5%) non-Hispanic Blacks, 163,200 (61.3%) non-Hispanic Whites, and 5,500 (48.9%) Other non-Hispanics.

The majority of persons with current asthma (76.5%) reported no days of asthma-related difficulty staying asleep. Among the persons who reported asthma-related difficulty staying asleep within the past month, a higher percentage of children than adults experienced 1-10 days of difficulty staying asleep due to asthma (19.9% versus 14.6%). With respect to sleep difficulty, there was little difference between males and females with current asthma (24.9% versus 22.5%). Relative to non-Hispanic Whites and non-Hispanic Others, non-Hispanic Blacks and Hispanics with current asthma had more days of asthma-related sleep problems within the past 30 days. The percentages of asthma-related sleep difficulty for one to ten days in the past month among Non-Hispanic Blacks and Hispanics with current asthma were 2.2 and 1.9 times that of non-Hispanic Whites, respectively.

Half (50.4%) of persons with current asthma had an asthma attack within the past year. Asthma attack within the past 12 months was reported for 54.7% (47,200) of children and 48.9% (119,800) of adults with current asthma. Females with current asthma more frequently reported having had an asthma attack within the past year compared to males, with 53.6% of females having attacks compared to 46.4% of males. During 2007 – 2009, non-Hispanic Whites with current asthma

experienced the least number of asthma attacks compared to other groups while non-Hispanic Blacks had the most. Approximately 8,100 (57.1%) non-Hispanic Blacks with current asthma had an asthma attack within the past 12 months compared to 134,100 (49.8%) non-Hispanic Whites, 5,900 (52.9%) non-Hispanic Others, and 15,600 (51.4%) Hispanics.

Among all persons with current asthma, approximately 128,500 (39.1%) experienced at least one asthma episode or attack within the past 3 months. A higher proportion of children (43.8%) than adults (37.4%) with current asthma had at least one episode/attack during the last three months. However, while children experienced a greater proportion of single episodes or attacks, adults experienced a slightly higher proportion of three or more asthma attacks or episodes. There was little difference in the overall occurrence of asthma attacks between males and females (38.7% for males compared to 39.2% for females); however, 11.4% of females compared to 6.3% of males experienced four or more asthma attacks/episodes in the last three months. A single asthma episode or attack within the last three months was most common in non-Hispanic Blacks (31.8%) compared to other race/ethnic groups with current asthma; however, two or more attacks were most frequent among non-Hispanic Others (29.8%) and Hispanics (27.6%).

Among the persons with current asthma who reported having an asthma attack/episode within the past 12 months, 12,100 (7.4%) reported that it lasted weeks while 79,300 (48.6%) reported an attack/episode that lasted minutes. Almost half of adults (49.3%) and children (46.8%) with current asthma had an asthma episode/attack within the last year that lasted minutes. Overall, during 2007 to 2009, females with current asthma experienced asthma episodes/attacks of longer duration than did males with current asthma. Males who had recent episodes/attacks experienced shorter events than females, with 62.4% of males reporting an episode/attack lasting minutes compared to 39.3% of females. The reported length of the most recent asthma episode/attack for persons with current asthma was greatest among non-Hispanic Blacks. This group experienced a higher proportion of episodes/attacks that lasted hours, days, or weeks compared to other race/ethnicity groups. Specifically, 92.2% of non-Hispanic Blacks with current asthma had episodes lasting hours, days or weeks compared to 50.2% of Hispanics, 48.4% of non-Hispanic Others, and 49.5% of non-Hispanic Whites.

Comorbid Conditions

2007 – 2009 ACBS respondents were asked, using four separate questions, if they had ever been told by a doctor or health professional that they had chronic obstructive pulmonary disease (COPD), emphysema, chronic bronchitis, and/or depression.[18] Based on the self-reported survey responses, it was estimated that among adults with current asthma: 21,300 (8.8%) had COPD; 11,100 (4.5%) had

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[18] Responses were not mutually exclusive.

emphysema; and 52,600 (21.5%) had chronic bronchitis.[19] Approximately 61,400 (25.5%) had one to three respiratory conditions in addition to asthma. The respiratory score for an individual is measured by assigning a value of one for each comorbid condition that person has, and the score can range from zero to three. The average respiratory score (which simply is the average of all individual respiratory scores) of Connecticut adults with current asthma was 0.346, indicating that the respiratory distress of most adults with asthma was very mild. Depression was present for 69,100 (28.2%) of adults with current asthma.

Environmental Exposures

Among Connecticut residents with current asthma, approximately 45,700 (13.9%) were in households with a current tobacco smoker. Approximately 27,400 (8.2%) persons with current asthma were exposed to smoking in the home within the past week. Environmental tobacco smoke (ETS) is a well-known asthma trigger and the effects of third-hand smoke (THS) on human health are being investigated (Sleiman, Gundel, Pankow, et al., 2010; Matt, Quintana, Destaillats et al., 2011). Among children with current asthma in Connecticut, approximately 22.3% lived in a household with at least one adult smoker. That almost a quarter of Connecticut children with current asthma are exposed in their dwellings to ETS and potential THS is of great concern.

In addition to ETS, the ACBS also assessed exposure to: gas used for cooking; mold in the past 30 days; domestic pets; cockroaches in the past 30 days; mice or rats in the past 30 days; wood burning heating equipment; unvented heating equipment; and carpeting or rugs. The percentage estimates for these exposures are in Appendix D.

The BRFSS survey and the ACBS assess the presence or absence of ten environmental exposures in the home that may exacerbate asthma symptoms. The average proportion of environmental exposures measures the relative number of exposures reported by survey respondents in the home environment. It is calculated by dividing the number of reported exposures (excluding missing values) by the total number of exposures. The average proportions of environmental exposures for children and adults with current asthma were almost equal (0.225 for children and 0.232 for adults). For females, the average proportion of environmental exposures was 0.236 compared to 0.223 for males. The average proportion for environmental exposures was highest among non-Hispanic Blacks (0.274) and lowest among non-Hispanic Others (0.222).

Approximately 147,100 (44.4%) people with current asthma received medical advice to change things in their home, school, or work environments to improve their asthma. The ACBS inquires about eight potential modifications that can be made to the household living environment that may help to minimize asthma symptoms. The modifications that people made included regular use of: an air cleaner/purifier (25.8%); dehumidifier (40.1%); kitchen exhaust fan (55.8%); and bathroom exhaust fan

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[19] Diagnosis of COPD can include chronic obstructive bronchitis, chronic obstructive asthma, or chronic emphysematous bronchitis.

(57%). People with current asthma also used mattress covers (40.5%) and pillow covers (36.3%), and washed sheets/pillowcases in hot water (42.7%). Among the estimated 212, 100 persons with current asthma who own pets, 28.5% did not allow pets in the bedroom.

The proportion of actions to reduce exposures measures the relative number of actions which reduce exposures in the home environment. It is calculated by dividing the number of reported actions (excluding missing values) by the total number of actions. The proportion of actions to reduce exposures was 0.414 for Connecticut residents with current asthma. This proportion was higher for children (0.451) than adults (0.401); higher for males (0.423) than females (0.406); and higher for non-Hispanic Whites (0.429) than Hispanics (0.363), non-Hispanic Others (0.315), and non-Hispanic Blacks (0.308).

Lost Productivity and Activity Limitation

Respondents to the 2007 - 2009 Asthma Call-back Survey were asked, "During the past 12 months, how many days were you unable to work or carry out your usual activities because of your asthma?" Among adults with current asthma, approximately 41,400 (17.1%) were unable to work or carry out their usual activities because of asthma for one to seven days, and 17,500 (7.3%) were unable to work for eight or more days. Missing work for one to seven days was more frequent among women (22.5%) than men (8.7%). On average in the past 12 months, a Connecticut adult with current asthma was unable to work or conduct usual activities because of asthma for 5.1 days. In the past year, a child with current asthma who attended school or day care missed 2.3 days because of asthma.

ACBS respondents with current asthma were also asked about the amount to which they limited their usual activities due to asthma. Overall, 152,500 (46.1%) had no activity limitation, 128,300 (38.8%) had little, 41,300 (12.5%) had a moderate amount, and 8,900 (2.7%) limited activities "a lot". While a higher percentage of children (42.7%) limited their activities "a little" compared to adults (37.4%), a higher percentage of adults (3.4%) compared to children (0.8%) limited their usual activities "a lot" because of asthma. Among persons with current asthma, a higher proportion of females (59.2%) than males (47.4%) experienced activity limitation in the past 12 months because of asthma.

Asthma Control

Following the guidelines in the National Asthma Education and Prevention Program *Expert Panel Report 3: Guidelines for the Management and Diagnosis of Asthma*, asthma control was classified as well controlled, not well controlled, or very poorly controlled using four parameters: daytime symptoms, nighttime symptoms, interference with normal activity, and use of short-acting beta agonists (SABA).[20] ACBS findings for 2007 - 2009 show that among persons with current asthma, it was

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[20] See also the article Factors associated with asthma control among adults in five New England states, 2006–2007 by Nguyen, Zahran, Iqbal, Peng, and Boulay (2011).

considered well controlled for 34.1%, not well controlled for 48.2%, and very poorly controlled for 17.8%. A greater percentage of adults (19.7%) experienced poor asthma control compared to children (12.3%). Among children, those less than five years old had the poorest asthma control with 74.9% experiencing asthma that was categorized as not well controlled or very poorly controlled. Among adults, 25 - 34 year olds had the highest percentage (70.5%) of asthma that was not well-controlled or very poorly controlled. Females (52.5%) were more likely than males (42.5%) to report asthma that was not well controlled. Persons with annual household incomes of $15,000 - $24,999 (14.4%) were least likely to have well-controlled asthma while those with annual household incomes greater than or equal to $75,000 (40.3%) were the most likely to have well-controlled asthma.

Medication

According to 2007 - 2009 ACBS findings, approximately 235,600 (72.4% of adults and 67.4% of children) took asthma medication less than three months ago. With respect to sex, 132,000 (70.9%) females and 102,600 (71.2%) males with current asthma took asthma medication within the last three months; 2.3% of males reported never taking asthma medication compared to 0.8% of females. Asthma medication was taken less than one day ago by a higher proportion of non-Hispanic Blacks (46.5%) and non-Hispanic Whites (44.3%) than Hispanics (33.9%) and non-Hispanic Others (20.8%).

Overall, approximately 67.9% of persons with current asthma had a prescription for asthma medication in the past three months - approximately forty percent of the prescriptions were for asthma control and 55.7% were for rescue medications. A third (32.6%) of current asthma sufferers did not use any prescribed asthma medication; 28.1% used prescribed rescue medication only; 11.7% used prescribed control medication only; and 27.5% had prescriptions for both control and rescue medications.

Less than half (43.8%) of people with current asthma used an inhaled corticosteroid (ICS). Among ICS users, 86.7% had daily use and 40.4% took an ICS during an asthma attack. Short-acting beta agonist (SABA) medications were used by 79.1% and long-acting beta agonist (LABA) medications were used by 30.4%. Among SABA users, 21.7% used it daily and 93.4% used it during an asthma attack. Overall, 56.6% of people with current asthma properly used inhalant asthma control medication and 64.8% properly used asthma rescue medication.[21] Sixty percent of adults compared to 43.1% of children, and 55.8% of females compared to 57.3% of males properly used asthma control medication. A greater proportion of adults (67.7%) properly used rescue medications than children (56.9%). See the appendices for additional information on use of asthma medications.

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[21] "Proper use" of control and rescue medications was determined by comparing the reported prescription medications taken in the past three months with: the number of metered doses; use of a spacer; use during an asthma attack or episode; use before exercise; daily, and daily use schedule. See the *Medications* section of the ACBS.

Health Care Utilization

ACBS respondents were asked "How long has it been since you last talked to a doctor or other health professional about your asthma?" Among Connecticut residents with current asthma, approximately 242,800 (73.3%) had talked to a doctor or other healthcare professional about their asthma within the past 12 months and 197,200 (59.9%) had at least one routine asthma checkup. Within the past year, approximately 70.4% of adults and 81.6% of children with current asthma had spoken with a doctor about asthma. More females with current asthma (76.3%) talked with a doctor about asthma than their male counterparts (69.2%). Non-Hispanic Blacks (91.4%) followed by Hispanics (81.2%) were more likely to have spoken to a doctor about asthma within the past 12 months than non-Hispanic Whites (71.7%) and non-Hispanic Others (60.9%).

Children (69.3%) were more likely than adults (56.5%) to have had one or more routine asthma checkups in the past year. Fewer males (55.6%) than females (63.1%) had at least one asthma checkup in the past year. A greater percentage of non-Hispanic Whites (42.5%) did not have routine asthma checkups in the past 12 months compared to non-Hispanic Blacks (21.4%) and Hispanics (26.5%).

Approximately 294,900 (89%) individuals with current asthma did not have any ED or urgent care visits in the past 12 months because of asthma. Children (11.9%) were slightly more likely than adults (10.7%) to have had at least one ED or urgent care asthma-related visit within the past 12 months. Females (11.2%) and 10.9% of males with current asthma sought care at an ED or urgent care facility. A greater percentage of non-Hispanic Blacks (24.8%) than Hispanics (18.1%) and non-Hispanic Whites (9.5%) visited an ED or urgent care center due to asthma in the past year. Most (97.2%) people with current asthma in Connecticut were not hospitalized because of it according to ACBS findings. It is estimated that 9,300 persons had at least one asthma hospitalization within the past 12 months. Roughly one in six people who had an asthma hospitalization had two or more such events.

An estimated 246,200 Connecticut residents with current asthma did not visit a doctor for urgent treatment of worsening asthma symptoms within the past 12 months. Among the 84,100 (25.5%) who did, an estimated 14,300 (16.6%) children and 28,900 (11.8%) adults had two or more doctor visits for urgent treatment of asthma symptoms. Females (16.1%) more than males (9.3%) had two or more doctor visits for urgent treatment. The percentage of two or more doctor visits for treatment of worsening asthma symptoms was highest among non-Hispanic Blacks (28.7%) followed by Hispanics (22.4%), non-Hispanic Others (14.3%), and non-Hispanic Whites (11.1%).

Alternative Care

Findings of the 2007 – 2009 ACBS were that at least one type of complementary or alternative care was used by approximately 211,300 (63.8%) persons with current asthma in the past 12 months. Alternative types of care used to control asthma included: herbs (2.3%); vitamins (8.3%); aromatherapy (3.5%); homeopathy (2.7%); yoga (3.1%); breathing techniques (25.5%); acupuncture

(1.2%); acupressure (1.5%); reflexology (1.1%); naturopathy (2%); and other alternative care (6.4%). Self-care therapy refers to using herbs, vitamins, aromatherapy, homeopathy, yoga, and breathing techniques to control asthma. Approximately 109,800 (33.2%) people with current asthma used at least one self-care alternative therapy in the last 12 months. Practitioner-care therapy refers to using acupuncture, acupressure, reflexology, and naturopathy to control asthma. Among people with current asthma, approximately 13,600 (4.1%) used at least one type of practitioner-care therapy in the past year.

Knowledge of Asthma and Asthma Management

ACBS respondents were asked if they were ever taught to recognize early asthma signs or symptoms. Based on responses to this question, it is estimated that 239,800 (73.6%) persons with current asthma had ever received education on this topic area. More children (87.2%) than adults (68.7%) had received some education about recognizing asthma signs or symptoms. Seventy-two percent (72.2%) of males and 74.4% of females had been educated. Among non-Hispanic Blacks, 85.3% had ever been taught to recognize asthma signs and symptoms compared to 79.9% of Hispanics, 77.8% of non-Hispanic Others, and 71.8% of non-Hispanic Whites. Approximately 274,900 (83%) people with current asthma had ever been taught what to do during an asthma attack. Children (88.2%) more than adults (81.6%), and males (85.9%) more than females (81.3%), had ever received education about what to do during an asthma attack. It is estimated that 34,600 (10.4%) of people with current asthma in Connecticut had ever taken a course on asthma management. Children (15.2%) were more likely than adults (8.8%) to have ever had such a course. Males (12.9%) more than females (8.6%) had ever taken a course on how to manage asthma.

Less than half (44.7% or 148,500) of individuals with current asthma had ever been taught to use a peak flow meter to adjust their daily medications. Children (48.3%) more than adults (43.5%), and males (45%) more than females (44.2%), had ever been taught to use a peak flow meter. Hispanics (60.1%) more than non-Hispanic Whites (43.3%), non-Hispanic Others (40.2%), and non-Hispanic Blacks (39.1%) had ever received education on using a peak flow meter.

ACBS respondents were asked if a doctor or other health professional had ever given them an asthma action plan (AAP). Based on their responses, is estimated that among Connecticut residents with current asthma, 112,500 (34.3%) had ever been given an AAP by their health care providers and approximately 215,700 (65.7%) had not ever been given an AAP. A higher percentage of adults (73.2%) than children (44%), and a higher percentage of females (70.9%) than males (59.2%), had not ever been given an AAP. An estimated 79.5% of non-Hispanic Blacks, 72.4% of non-Hispanic Others, 65.3% of non-Hispanic Whites, and 61.8% of Hispanics had not ever been given an asthma action plan.

Cost of Asthma Care

The ACBS inquired about cost as a barrier to accessing care for asthma within the past 12 months. Respondents were asked if cost was a barrier to: 1) seeing a primary care doctor; 2) seeing a specialist; or 3) purchasing medication. Based on ACBS responses, it is estimated that among persons in Connecticut with current asthma:

- 22,200 (6.7%) regarded cost as a barrier to visiting a primary care physician for asthma care;
- 8,900 (2.7%) experienced cost as a barrier to seeing a specialist for asthma care; and
- 35,600 (10.7%) encountered cost as a barrier to buying medication for their asthma.

The cost barrier score is a summary variable that combines positive responses to three cost barrier questions in the ACBS. The cost barrier score ranges from zero to three. Zero indicates that cost was not a barrier to primary care, specialist care, or buying medication. Three indicates that cost was a barrier to all three things. The average cost barrier score is the sum of cost barrier scores divided by the total number of persons who gave a response to all three cost barrier questions. The average cost barrier score for persons with current asthma in Connecticut was 0.201, indicating that few persons with current asthma saw cost as inhibiting them from receiving asthma care and medication. As shown in Figure 15, approximately 88% of Connecticut residents with current asthma did not regard cost as a barrier to care.

Overall, 40,200 (12.1%) of people with current asthma in Connecticut encountered any cost barrier to asthma care (5.5% had one; 5.2% had two; and 1.4% had three barriers). Cost was an impediment to care for: 3.5% of children; 15.2% of adults; 9.7% of males; 14.1% of females; 18.1% of Hispanics; 17.1% of non-Hispanic Blacks; 11.2% of non-Hispanic Others; and 11.1% of non-Hispanic Whites with current asthma. Unfortunately, the underlying natures of the cost barriers (e.g., transportation, insufficient insurance coverage, income) are unknown.

Figure 15. Cost Barriers to Asthma Care Encountered in the Past 12 Months by Persons with Current Asthma, Connecticut, 2007 – 2009, with 95% Confidence Intervals
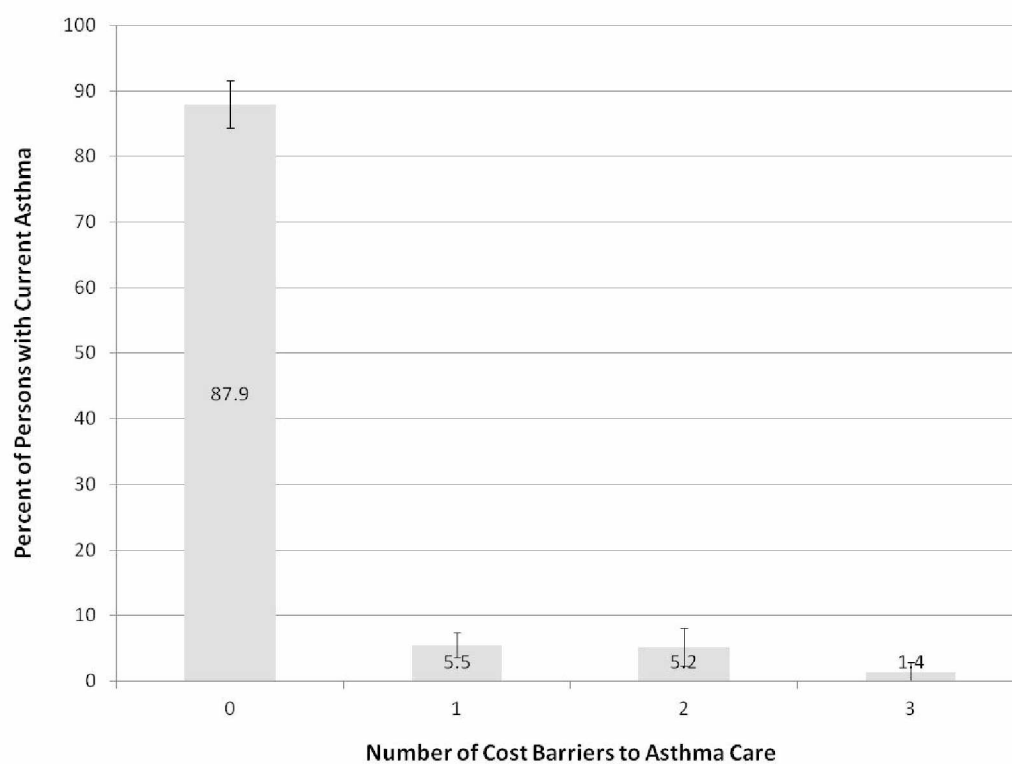
Asthma and Health Care Utilization

Asthma hospitalizations and emergency department (ED) visits are important indicators of asthma morbidity. Such events are potentially avoidable with appropriate health care, medication, and self-management. Being hospitalized or presenting at the ED for asthma-related care is serious and costly. The Connecticut DPH Asthma Program analyzes hospital and ED discharge data provided by acute care hospitals and the Connecticut Hospital Information Management Exchange (CHIME) to determine asthma-related health care utilization frequency and charges. These data are about *events* of hospitalization or ED visit. Therefore, the rates presented in this section should be interpreted as the number of events per population, not the number of affected individuals per population. All hospitalization and ED visit data were selected for analysis by the admission year. Consequently, rates for the most recently available year (2009) may not include events for persons discharged in the following year (2010).

An event of hospitalization for which asthma is the primary diagnosis at discharge is referred to as an *asthma hospitalization*. An ED visit for which asthma is the primary diagnosis at discharge is termed an *asthma ED visit*. Refer to Appendices E and F for detailed tables on asthma hospitalizations and Appendices G and H for detailed tables on asthma ED visits.

Hospitalizations

From 2005 to 2009, there were an average of 4,810 hospitalizations of Connecticut residents with a primary diagnosis of asthma and an average of 25,437 hospitalizations for which asthma was a secondary diagnosis. As depicted in Figure 16, from 2000 to 2009, the rates of hospitalization with a primary diagnosis of asthma increased 29.2% (from 11.3 per 10,000 to 14.6 per 10,000) while rates of hospitalization with a secondary diagnosis of asthma steadily increased 86.2% (from 38.5 per 10,000 to 71.7 per 10,000). Between 2005 and 2009, there was a 13.2% increase from 12.9 per 10,000 to 14.6 per 10,000 in asthma hospitalizations, and asthma hospitalization rates were higher for children than adults (Table 5). For the same time period, the rates of hospitalization for asthma as a secondary diagnosis were higher for adults than children.

Figure 16. Hospitalization Rates for Primary and Secondary Diagnoses of Asthma by Year, Connecticut, 2000 – 2009
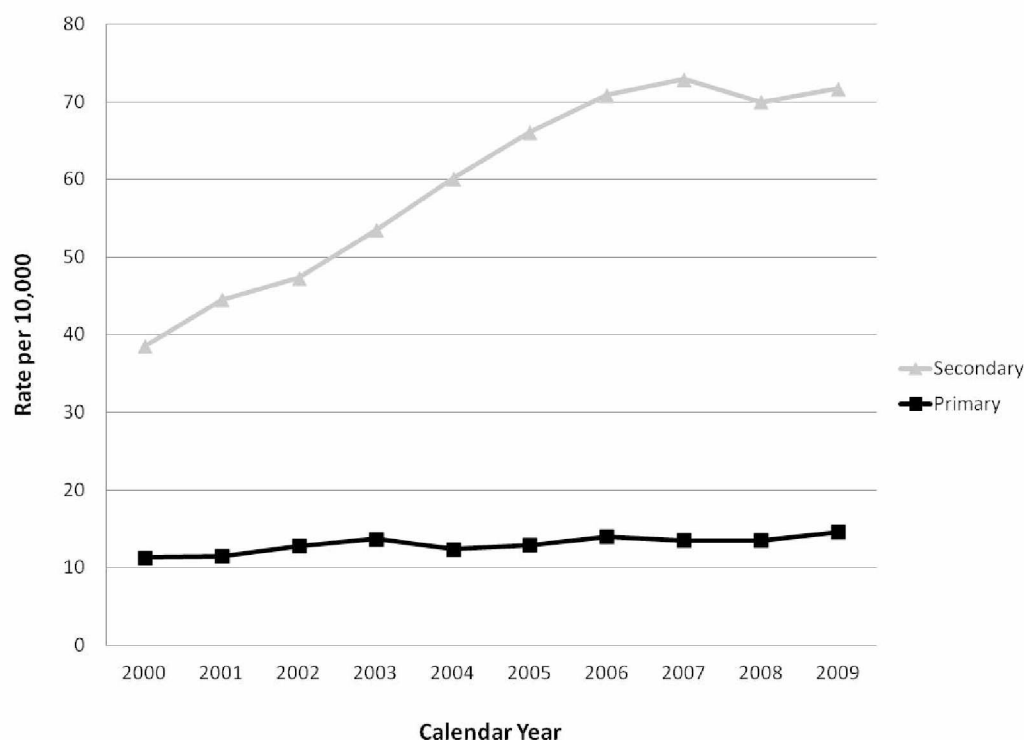
Table 5. Hospitalization Rates for Children and Adults by Primary and Secondary Asthma Diagnoses, Connecticut, 2005 – 2009

Year	Child (0 – 17 years)		Adult (18+ years)	
	Primary Age-adjusted rate per 10,000	Secondary Age-adjusted rate per 10,000	Primary Age-adjusted rate per 10,000	Secondary Age-adjusted rate per 10,000
2005	16.8	25.7	11.5	80.1
2006	19.2	27.3	12.2	86.1
2007	18.1	28.9	11.8	88.1
2008	16.5	26.8	12.5	85
2009	18.9	31.6	13.1	85.6

Asthma Hospitalizations

Rates of asthma hospitalization for 2005 – 2009 were calculated for the estimated Connecticut population for each year and stratified by age groupings, sex, race/ethnicity, and geographic designation (e.g., county, town). Descriptive statistics on temporal characteristics (e.g., month of admission, day of week of admission), admission sources, discharge destinations, and lengths of stay were generated for 2009 asthma hospitalizations. The rates presented in this section are age-adjusted. Overall, asthma hospitalization rates for 2005 – 2009 were highest among children less than five years old, females, non-Hispanic Blacks, and Hispanics. Cross tabulation revealed important details about subpopulations.

An event of hospitalization for which asthma is the primary diagnosis is referred to as an asthma hospitalization.

For the total population, females had higher rates of asthma hospitalization than males; however, among children, asthma hospitalization rates in 2005 – 2009 were higher for boys than girls (Figure 17). The hospitalization rate among boys was highest in 2006 at 24.2 per 10,000. The rates of asthma hospitalization for adult females were twice that of the rates for males from 2005 – 2009. The rate of asthma hospitalization for adult females increased 16.2% from 15.4 per 10,000 in 2005 to 17.9 per 10,000 in 2009. In comparison, the adult male asthma hospitalization rates in 2005 and 2009 were 7.3 per 10,000 and 8 per 10,000, respectively. Rates of adult asthma hospitalizations increased with increasing age. Among adults, asthma hospitalization rates were highest for those aged 65 years and older from 2005 to 2009 (Figure 18).

Figure 17. Asthma Hospitalization Rates for Children and Adults by Year and Sex, Connecticut, 2005 – 2009
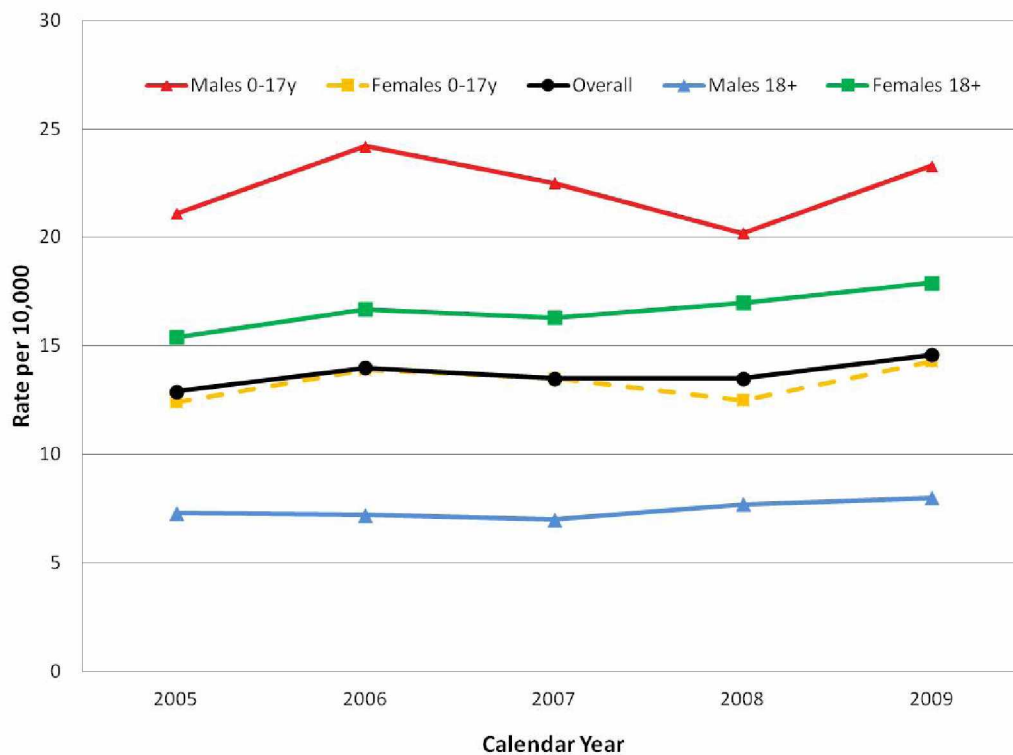
Figure 18. Asthma Hospitalization Rates for Adults by Age Group, Connecticut, 2005 – 2009
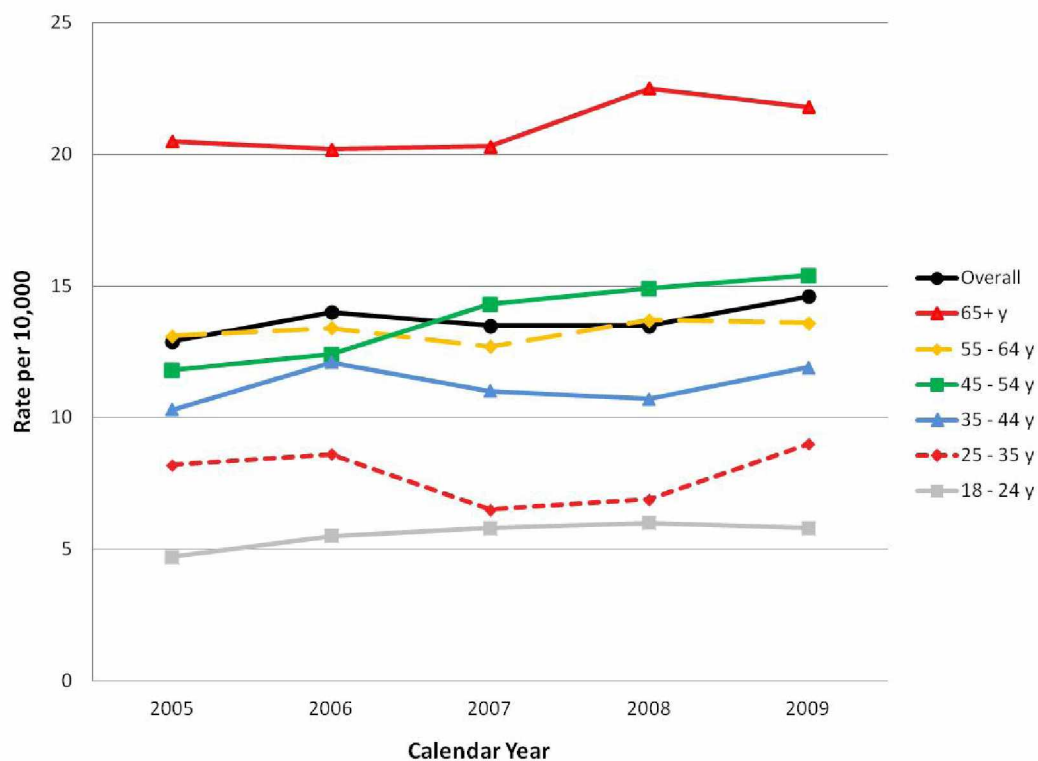
Between 2000 and 2009, asthma hospitalization rates for non-Hispanic Blacks and Hispanics were higher than those for non-Hispanic Whites or non-Hispanic Others (Figure 19). In 2009, the rates of asthma hospitalization for non-Hispanic Blacks and Hispanics were equal. The greatest increase in asthma hospitalization rates during 2005 – 2009 among racial/ethnic groups was experienced by Hispanics — there was a 25.8% increase in asthma hospitalizations from 32.2 per 10,000 in 2005 to 40.5 per 10,000 in 2009 for persons classified as Hispanic. Among non-Hispanic Blacks, there was a 21.3% increase in the rate of asthma hospitalization from 33.4 per 10,000 in 2005 to 40.5 per 10,000 in 2009.

Figure 19. Asthma Hospitalization Rates by Year and Race/Ethnicity, Connecticut, 2000 – 2009
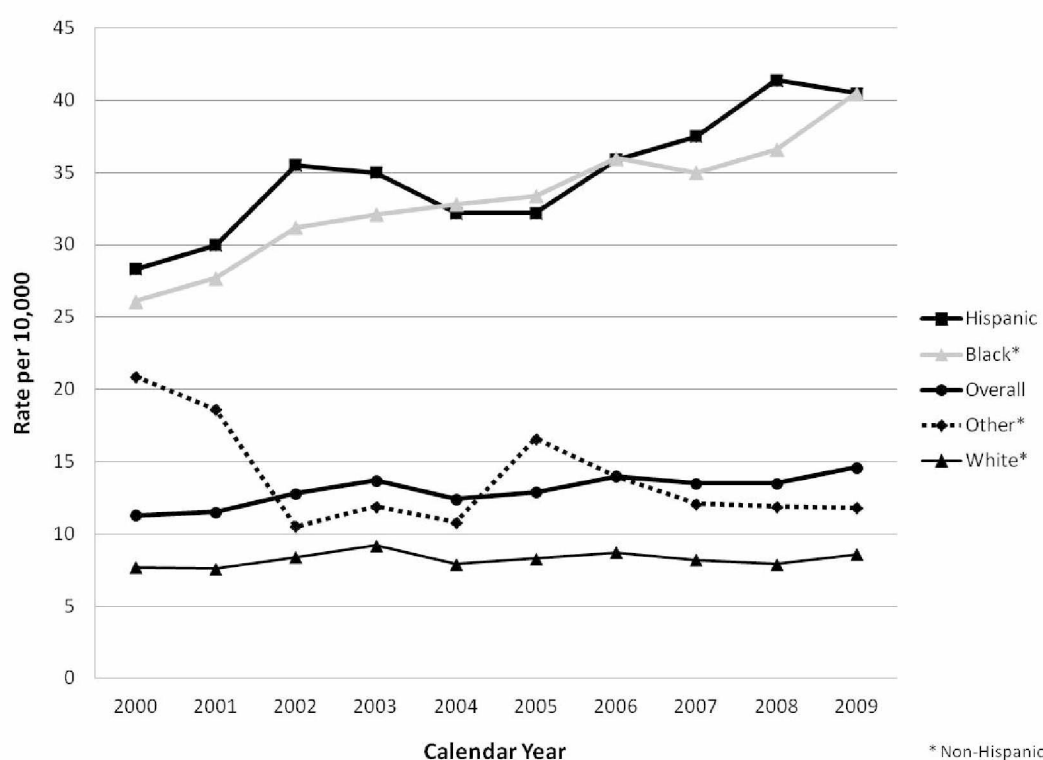
From 2000 -2009, non-Hispanic Black children had the highest average annual rates of asthma hospitalizations across all other child and adult race/ethnicity groups (Figure 20). From 2005 – 2009, the average asthma hospitalization rate among non-Hispanic Black children was 4.7 times that of non-Hispanic White children, 1.6 times that of Hispanic children, and 2.7 times that of Other non-Hispanic children. The greatest increase in the rate of asthma hospitalizations among children was for Hispanics, with a 21% increase in hospitalization for asthma as the primary diagnosis from 25.7 per 10,000 in 2005 to 31.1 per 10,000 in 2009. Among adults in 2005 – 2009, Hispanics experienced 5.2 times the rate of hospitalizations as non-Hispanic White adults (Figure 21) with a 27% increase in the adult Hispanic rate from 34.5 per 10,000 to 43.8 per 10,000. However, the greatest increase in

hospitalization rates among adults from 2005 - 2009 was the 28.9% increase from 29.8 per 10,000 to 38.4 per 10,000 among non-Hispanic Black adults.

Figure 20. Asthma Hospitalization Rates for Children by Year and Race/Ethnicity, Connecticut, 2000 – 2009
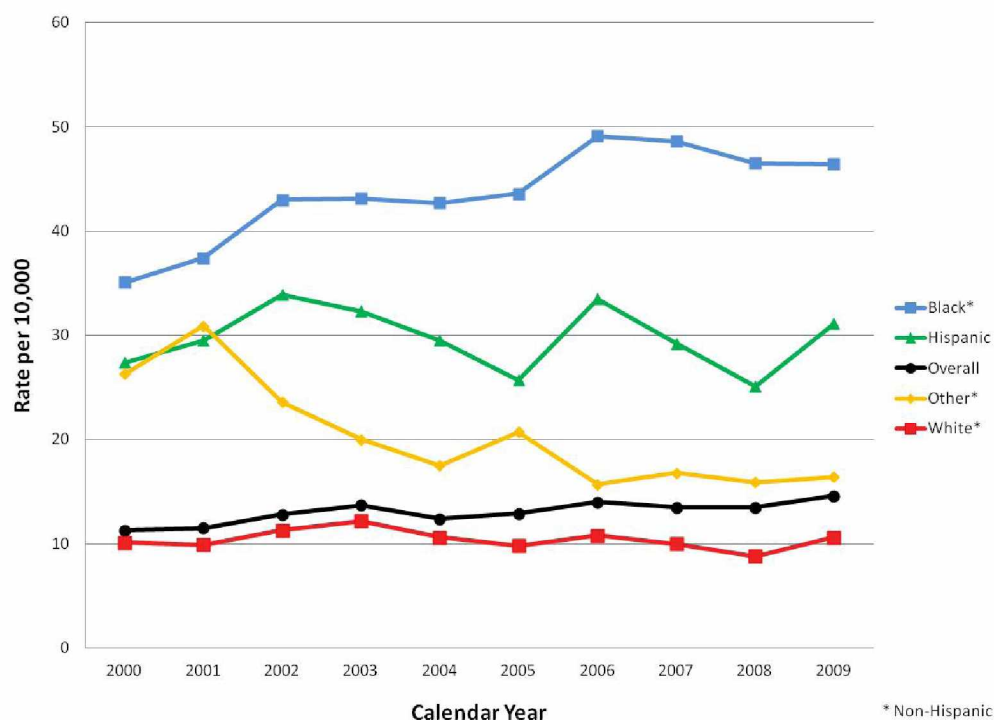
Figure 21. Asthma Hospitalization Rates for Adults by Year and Race/Ethnicity, Connecticut, 2005 – 2009
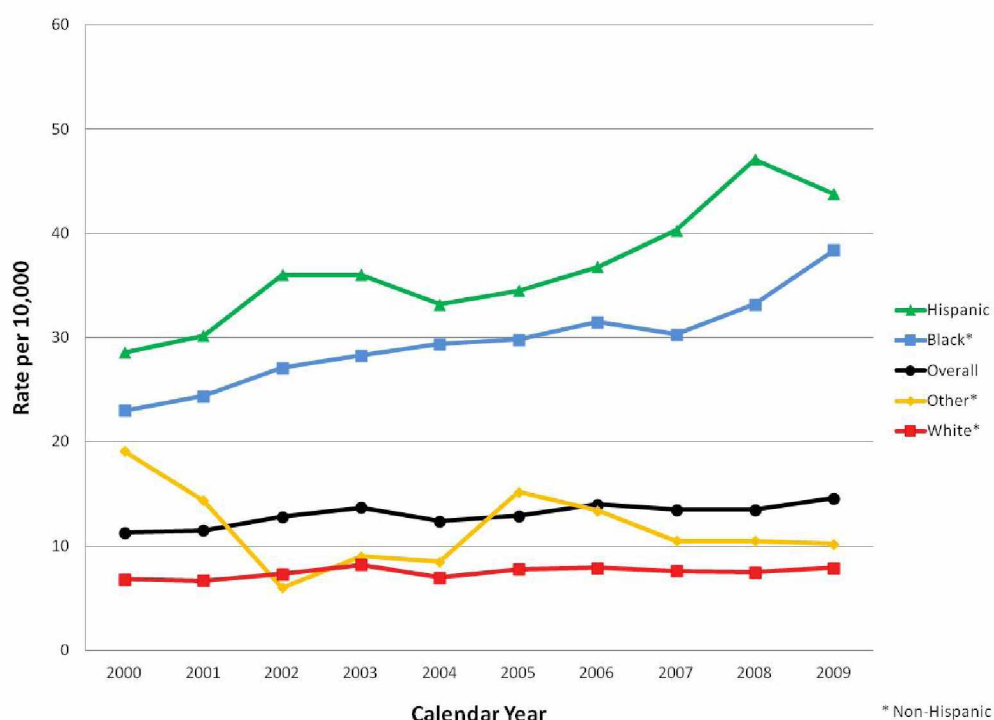
Place of Residence and Asthma Hospitalization

With regard to geography of residence, non-rural Connecticut residents had twice the asthma hospitalization rate as rural residents (15.4 per 10,000 versus 7.6 per 10,000) in 2009 (Figure 22). In the same year, New Haven County residents experienced the highest rate of asthma hospitalizations compared to state residents elsewhere. The rate of asthma hospitalizations among New Haven County residents was 22.9 per 10,000 persons, 3.5 times greater than the asthma hospitalization rate for Middlesex County residents (6.5 per 10,000 persons). Consistent with the differences observed in rates at the county and rural/non-rural classifications, four of Connecticut's largest cities had higher asthma hospitalization rates than the rest of the state combined in 2009. New Haven had the highest rate, with 74.6 events of asthma hospitalization per 10,000 persons. If the five largest Connecticut cities – Bridgeport, Hartford, New Haven, Stamford, and Waterbury – are considered together, their combined asthma hospitalization rate would be 35.3 per 10,000 for the year 2009, 3.4 times greater than the combined asthma hospitalization rate for the rest of the state. Asthma hospitalization rates by town of residence are listed in Appendix F.

Figure 22. Asthma Hospitalization Rates by Geographic Designation, Connecticut, 2009
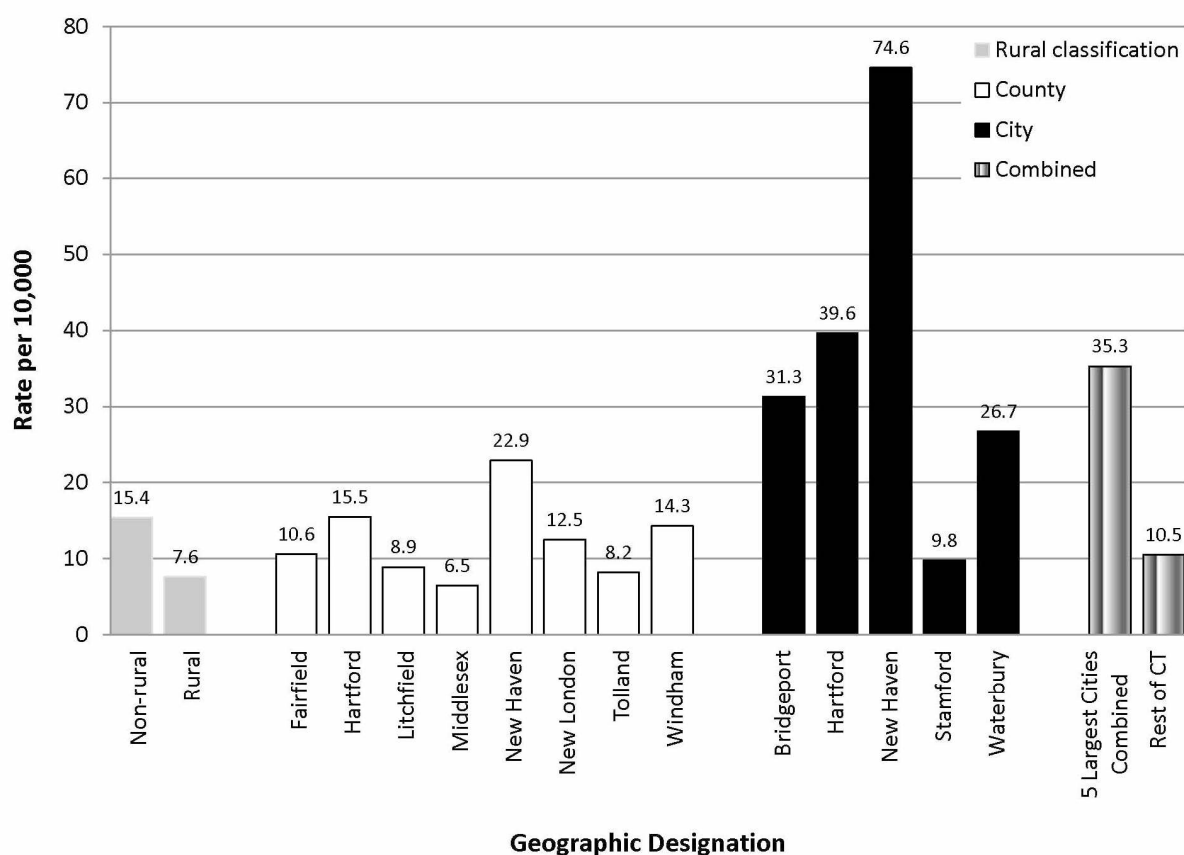
Temporality of Asthma Hospitalizations

The number of asthma hospitalizations in 2009 was highest from September to October and lowest from July to August. Asthma hospital admissions most often occurred on a Monday (17.3%) or Tuesday (15.4%) and were most frequent between 1pm to 6pm, with 36.2% of asthma hospitalizations recorded within that seven-hour period. The majority (74.6%) of persons hospitalized for asthma in 2009 was admitted from the ED. Most (92.3%) persons hospitalized with a primary diagnosis of asthma in 2009 were discharged to their homes.

From 2005 to 2009, the average length of stay (LOS) for persons hospitalized with asthma declined by 9.1% from 3.63 days in 2005 to 3.3 days in 2009. During that time period, the average length of stay for adults was twice as long as the average length of stay for children (Figure 23). In 2009, the average LOS was greatest for persons aged 65 years and older; thus, for adults, the LOS increased with increasing age. Among children, 12 – 17 year olds had the longest asthma hospitalization stays. In 2009, publicly-insured persons experienced longer asthma hospitalization stays (3.49 days) than the self-pay/uninsured (2.63 days) and the privately-insured (2.89 days).

Figure 23. Average Length of Stay for Asthma Hospitalization for Adults and Children by Year, Connecticut, 2005 – 2009
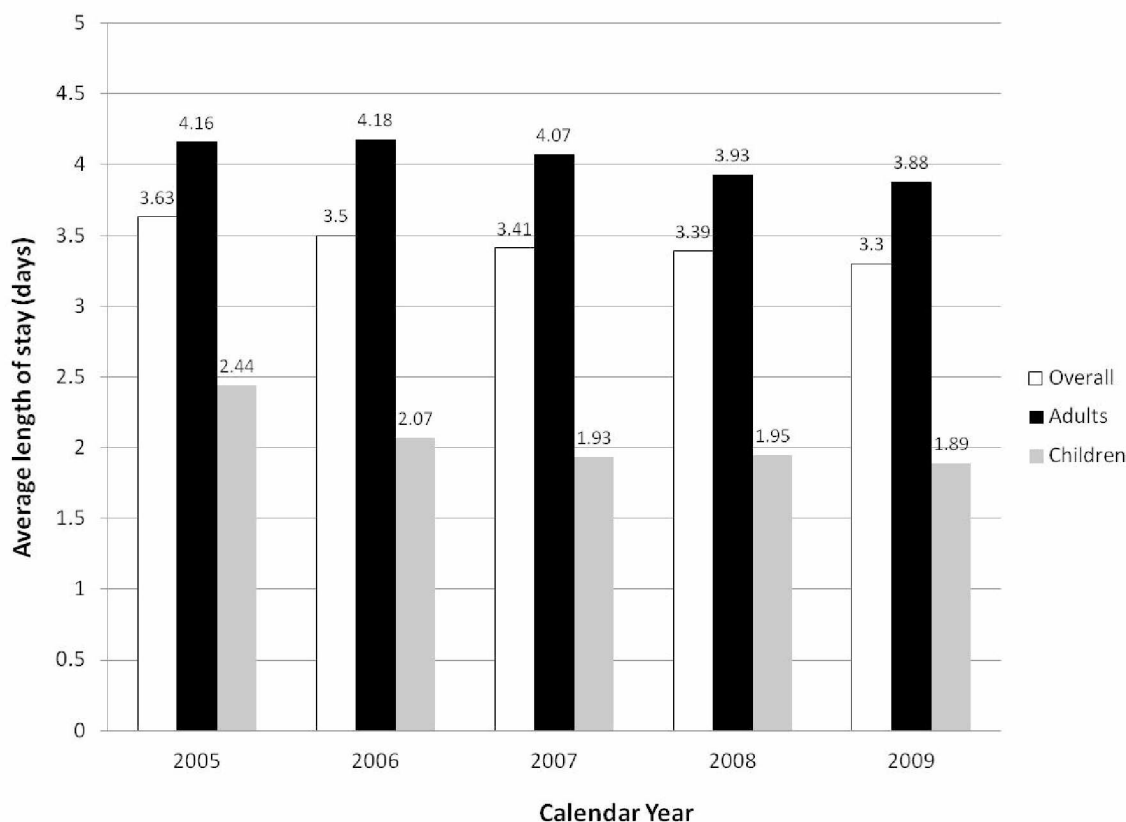
Excess Asthma Hospitalizations

The hospital discharge data demonstrate that during 2000 – 2009, Hispanics and non-Hispanic Blacks were hospitalized with a primary diagnosis of asthma at higher rates than non-Hispanic Whites or non-Hispanic Others. By comparing the age-adjusted asthma hospitalization rates for these race/ethnicity groups, the number of excess asthma hospitalizations was determined.

Using non-Hispanic Whites as the reference population, the number of excess asthma hospitalizations for other race/ethnicity groups was calculated for the year 2009. As shown in Table 6, if non-Hispanic Blacks, Hispanics, and non-Hispanic Others had experienced hospitalization at the same rate as non-Hispanic Whites in 2009, there would have been a total of 2,157 fewer asthma hospitalizations in that year.

Table 6. Asthma Hospitalizations and Hospitalization Rates by Race/Ethnicity, Connecticut, 2009

Race/Ethnicity	Number of Hospitalizations	Age-Adjusted Hospitalization Rate (per 10,000)	Relative Risk (Minority/White) [a]	Excess [b] (Fewer) Events
White, Non-Hispanic	2,280	8.6	1.0	0
Black, Non-Hispanic	1,300	40.5	4.7	1,024
Hispanic	1,373	40.5	4.7	1,081
Other, Non-Hispanic	192	11.8	1.4	52

[a] "Relative risk" is estimated to be the ratio of the minority group to the non-Hispanic White group.

[b] "Excess events" are the hospitalizations that would not have occurred if the hospitalization rate for the minority group was the same as the hospitalization rate for the non-Hispanic White group.

Emergency Department Visits

From 2005 to 2009, there were on average 22,133 ED visits each year for Connecticut residents with a primary diagnosis of asthma. During the same five-year period, there was an average of 39, 944 ED visits per year for which asthma was a secondary diagnosis. In 2009, the rates of ED visit for asthma as the primary and a secondary diagnosis were the highest observed between 2000 – 2009 (Figure 24). With regard to the rate of ED visits for which asthma was the primary diagnosis during 2005 – 2009, there was a 13.5% increase from 64.3 per 10,000 to 73 per 10,000. From 2000 to 2009, the rates per 10,000 of ED admissions for asthma as a secondary diagnosis tripled from 51.5 per 10,000 to 151.6 per 10,000. From 2005 – 2009, the rate of ED visits for which asthma was a secondary diagnosis increased 72.1% from 88.1 per 10,000 to 151.6 per 10,000.

Figure 24. ED Visit Rates for Primary and Secondary Diagnoses of Asthma by Year, Connecticut, 2000 – 2009
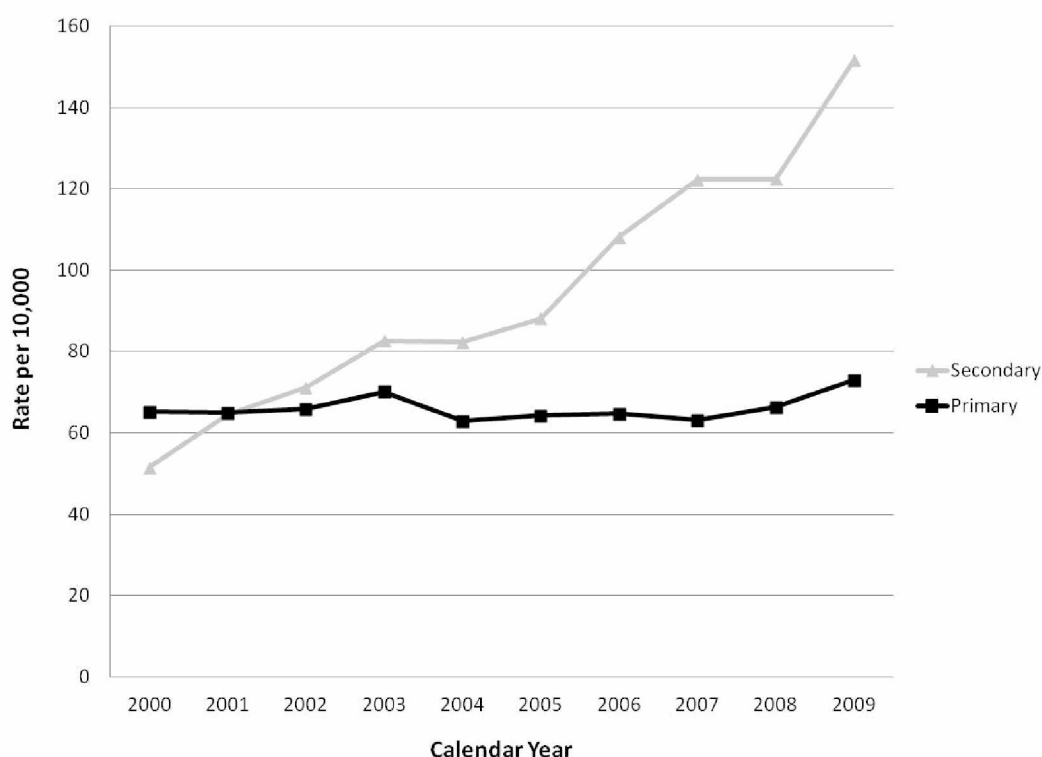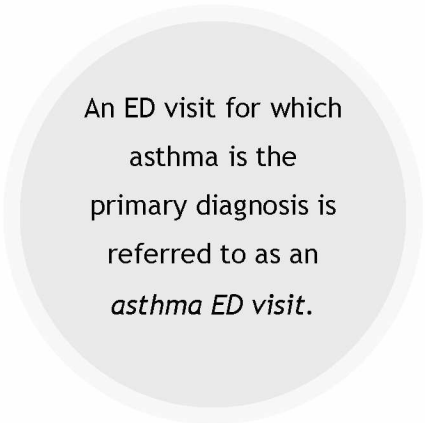
Asthma ED visit rates were consistently higher for children than adults from 2005 – 2009. The rate of asthma ED visit per 10,000 for children was 107.1 in 2009, 1.75 times greater than the asthma ED visit rate for adults in the same year. There was a 33.5% increase in the ED for asthma as primary diagnosis visit rate among children and a 4.1% increase in the rate among adults from 2005 – 2009. The rates of ED visit for a secondary diagnosis of asthma were slightly higher for children than adults from 2005 – 2009. There was a remarkable 99.3% increase from 98.4 per 10,000 to 196.1 per 10,000 in the asthma secondary diagnosis ED rate for children from 2005 to 2009. For the same period, there was a 61.1% increase in the asthma secondary diagnosis ED rate for adults (Table 7).

Table 7. ED Visits Rates for Children and Adults by Primary and Secondary Asthma Diagnoses, Connecticut, 2005 – 2009

Year	Child (0 – 17 years)		Adult (18+ years)	
	Primary	Secondary	Primary	Secondary
	Age-adjusted rate per 10,000	Age-adjusted rate per 10,000	Age-adjusted rate per 10,000	Age-adjusted rate per 10,000
2005	80.2	98.4	58.8	84.5
2006	86.7	120.7	57.2	103.7
2007	85.9	140.4	55.3	116.1
2008	91.8	133.2	57.4	118.6
2009	107.1	196.1	61.2	136.1

Asthma ED Visits

Asthma ED visit rates for 2005 – 2009 were calculated for the estimated Connecticut population for each year and stratified by age groupings, sex, race/ethnicity, and geographic designation. The rates presented in this section are age-adjusted. Descriptive statistics on temporal characteristics, admission sources, and discharge destinations were generated for 2009 asthma ED visits. Overall, asthma ED visit rates for 2005 to 2009 were highest among children, females, and Hispanics. Stratified analyses demonstrated that Hispanic children were the group most disproportionally represented in the asthma ED visit dataset.

An ED visit for which asthma is the primary diagnosis is referred to as an *asthma ED visit.*

Children ≤ 4 years old had the highest rates of asthma ED visits during 2005 – 2009 compared to all other age groups. They experienced a 38.2% increase in the rate of asthma ED visits from 108.6 per 10,000 in 2005 to 150.1 per 10,000 in 2009. Among adults, there was an inverse relationship between age and the rate of asthma ED visits. Persons aged 65 years and older had the lowest rates of asthma ED visits of any age group with a decline of 14.7% from 21.7 per 10,000 to 18.5 per 10,000 from 2005 to 2009. In contrast, the rates of asthma ED visits among adults were highest for 18 – 24 year olds and 25 – 34 year olds. Rates for these two young adult groups were similar between 2005 and 2009 (Figure 25).

Similar to the trend observed with asthma hospitalization rates among children, asthma ED visit rates in 2005 – 2009 were higher for boys than for girls. In 2009, the asthma ED visit rate for boys was 127.9 per 10,000 and 84.9 per 10,000 for girls. Among adults, the female rate of asthma ED visits from 2005 to 2009 was higher than the rate for males (Figure 26). During 2005 – 2009, Hispanic adults had the highest rates of asthma ED visits, ranging from 4.4 times the non-Hispanic White rate in 2005 to five times the ED visit rate for non-Hispanic Whites in 2009. Among Hispanics, the asthma ED visit rate per 10,000 increased 17.2% from 145.5 to 170.5 between 2005 and 2009. In contrast, the asthma ED visit rate per 10,000 for non-Hispanic Whites during the same period increased by 4% from 32.9 to 34.2 (Figure 27).

From 2000 to 2009, Hispanic children had the highest asthma ED visit rates of all race/ethnicity subgroups. Non-Hispanic Black children experienced the second highest asthma ED visit rates for that ten-year period. Examination of 2005 – 2009 asthma ED visit data demonstrate that there was a 50.9% increase in asthma ED visits for Hispanic children from 146.6 per 10,000 in 2005 to 225.4 per 10,000 in 2009 (Figure 28). Among adults, Hispanics had highest asthma ED visit rates from 2000 to 2009. During the period of 2005 – 2009, the rate of asthma ED visits per 10,000 for Hispanic adults was highest in 2008 at 154.7, almost five times greater than the rate for non-Hispanic White adults in the same year.

Figure 25. Asthma ED Visit Rates Among Adults by Year and Age Group, Connecticut, 2005 – 2009
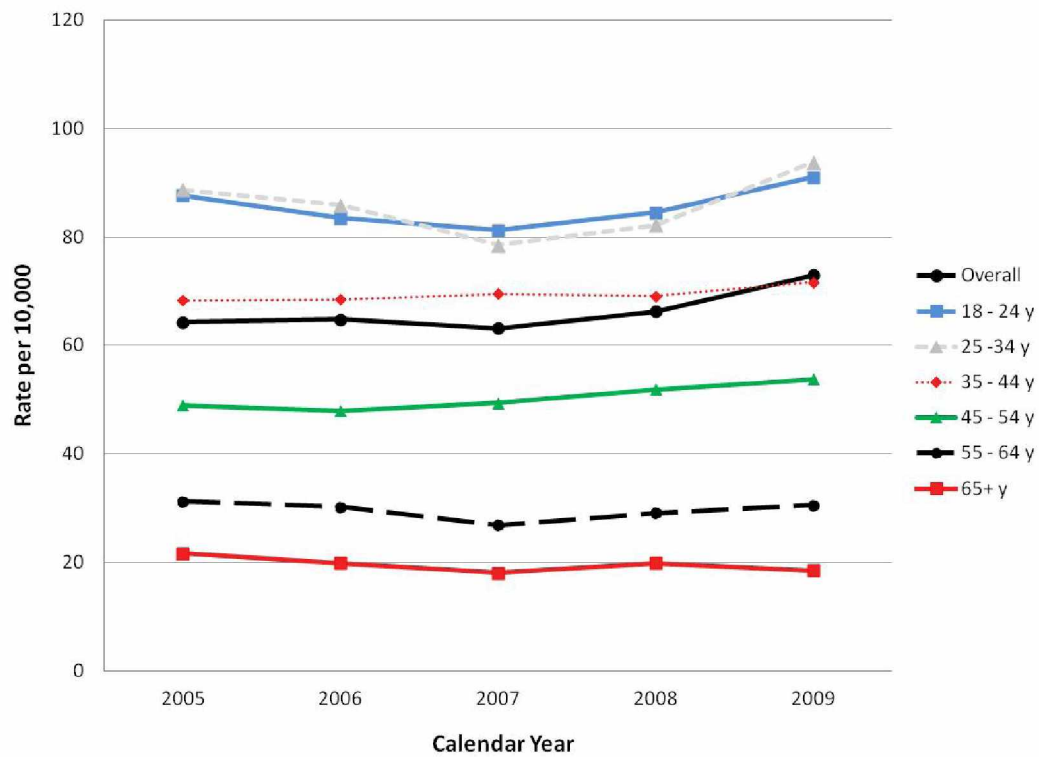
Figure 26. Asthma ED Visit Rates for Children and Adults by Year and Sex, Connecticut, 2005 – 2009
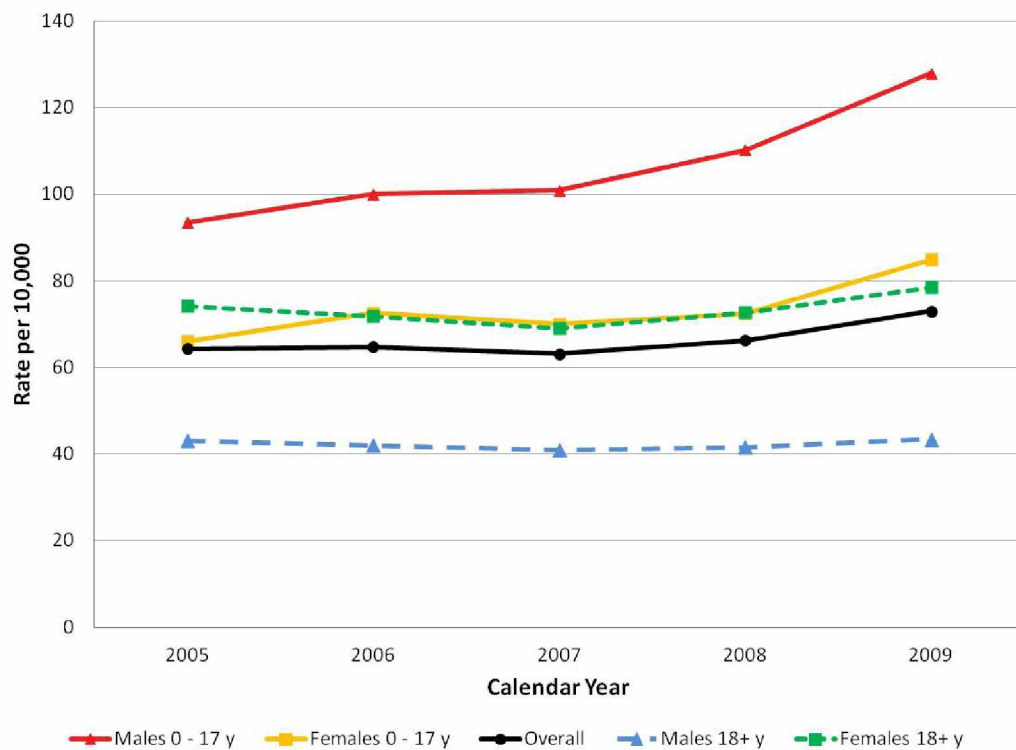
Figure 27. Asthma ED Visit Rates for Adults by Year and Race/Ethnicity, Connecticut, 2005 – 2009
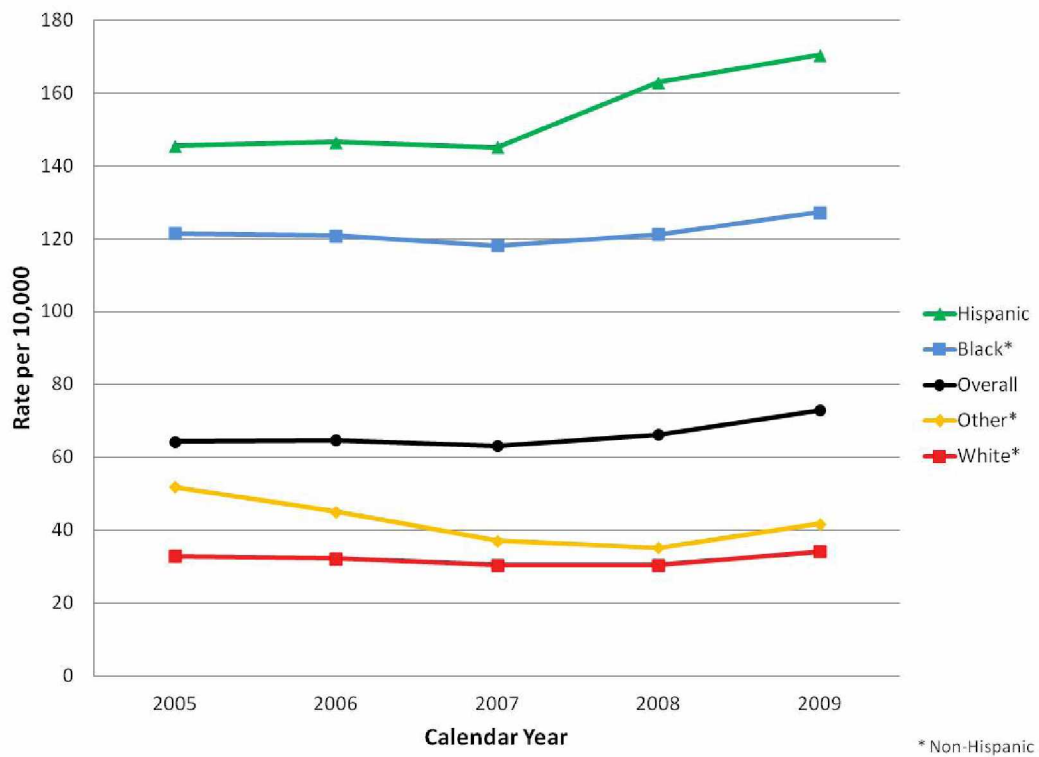
Figure 28. Asthma ED Visit Rates for Children by Race/Ethnicity, Connecticut, 2005 – 2009
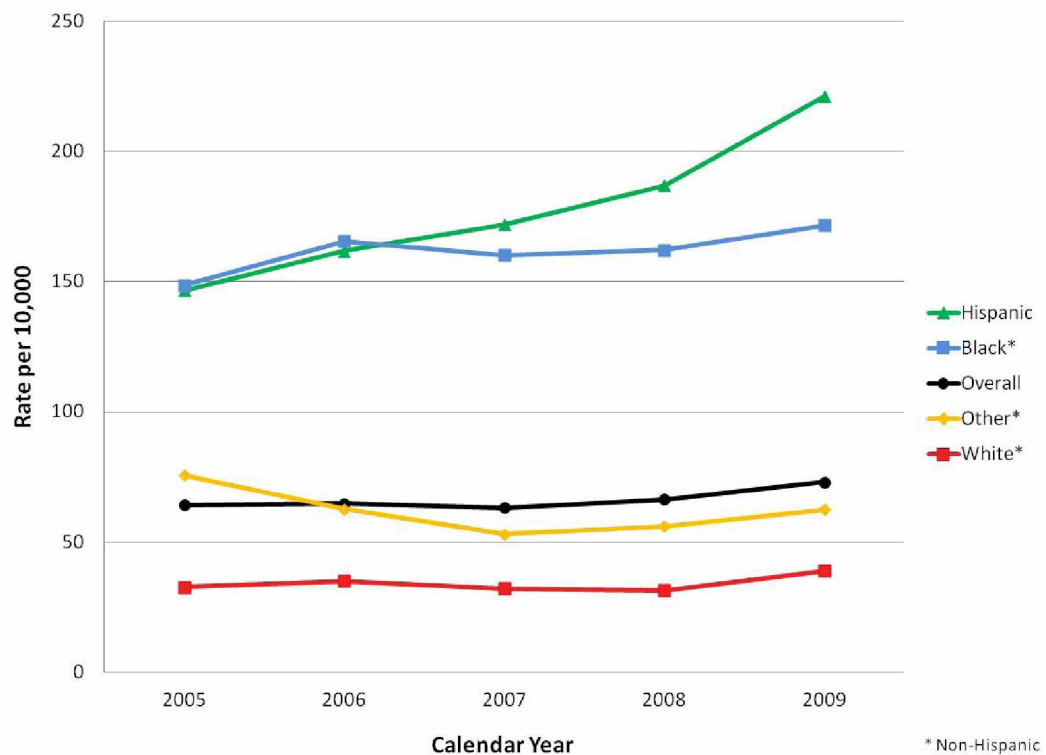
Place of Residence and Asthma ED Visits

Similar to the distribution of asthma hospitalizations, the rate of asthma ED visits was lower for rural areas than for non-rural areas in 2009 (Figure 29). Asthma ED visits among non-rural Connecticut residents was 76 per 10,000 compared to 41.4 per 10,000 for rural residents. In 2009, the highest rate of asthma ED visits was among residents of New London County, with a rate of 106.7 asthma ED visits per 10,000 population. Middlesex County residents had the lowest rate of asthma ED visits at 38.1 per 10,000 population. The rate of asthma ED visits for the five largest Connecticut cities exceeded that of the rate for the rest of the state in 2009. The asthma ED visit rates per 10,000, in order from highest to lowest, were: 1) 253.4 for Hartford; 2) 202.2 for Waterbury; 3) 143.7 for New Haven; 4) 129.6 for Bridgeport; and 5) 65.7 for Stamford. In comparison, the asthma ED visit rate was 54.2 for the rest of Connecticut. The combined five-cities rate of asthma ED visits per 10,000 was 156.4, almost three times that of the rest of the state. Asthma ED visit rates by town are listed in Appendix H.

Figure 29. Asthma ED Visit Rates by Geographic Designation, Connecticut, 2009
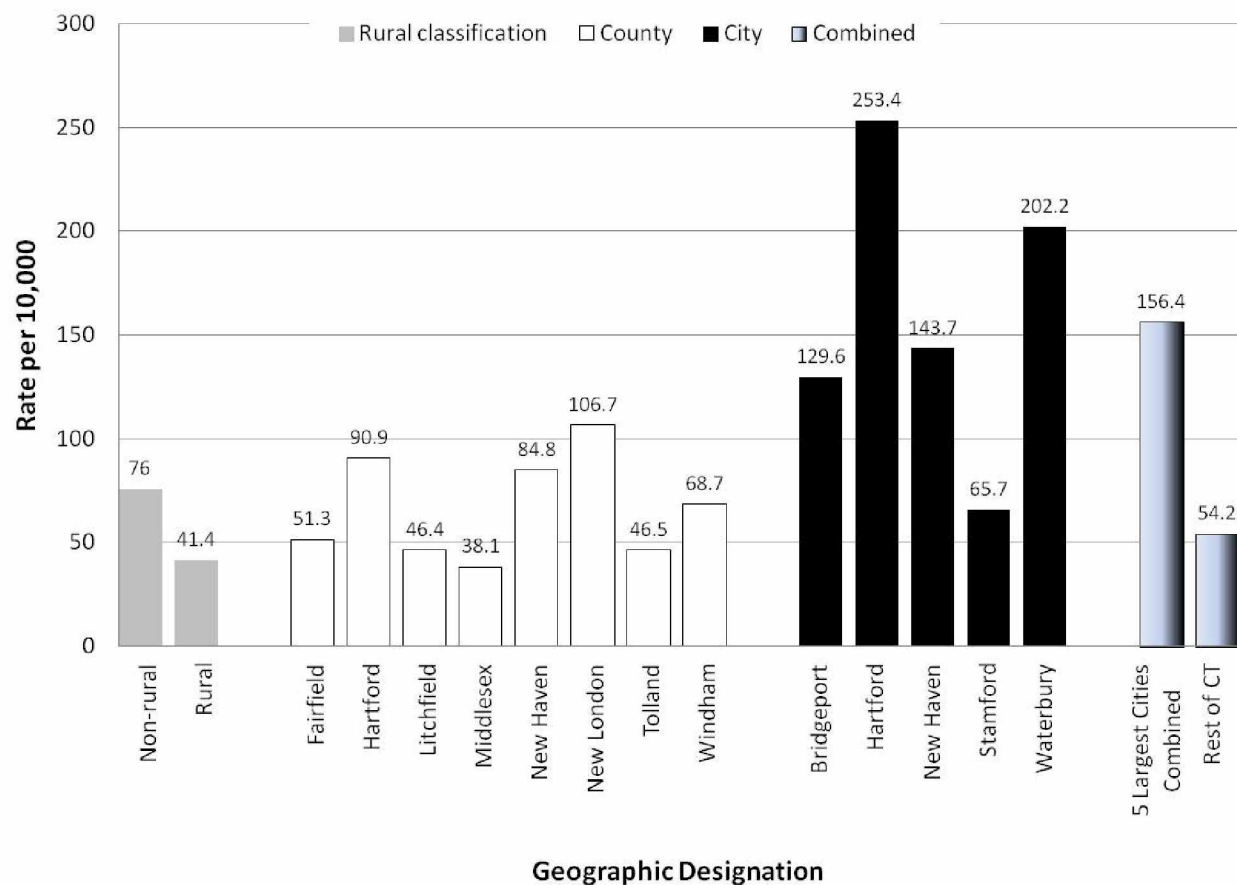
Selected Characteristics of Asthma ED Visits

The number of asthma ED visits in 2009 was highest from September to October and lowest from July to August. Most asthma ED visits occurred on Sundays (16.3%) and Mondays (16%). Asthma ED visits were most frequent from 8 am to 11pm; morning visits to the ED were most frequent between 9 - 11am; and evening ED visits were most numerous between 6 - 9 pm. Almost all (98.3%) of all asthma ED visit patients in 2009 were discharged to their homes. One percent was sent to another medical facility. The remainder (0.8%) left the ED against medical advice.

Excess Asthma ED Visits

The hospital discharge data demonstrate that during 2000 - 2009, Hispanics and non-Hispanic Blacks had higher rates of ED visits with a primary diagnosis of asthma than persons classified as non-Hispanic Whites or non-Hispanic Others. By comparing the age-adjusted asthma ED visit rates for these race/ethnicity groups, the number of excess asthma ED visits was determined.

Using non-Hispanic Whites as the reference population, the number of excess asthma ED visits for the other race/ethnicity groups was calculated for the year 2009. As shown in Table 8, if Hispanics had ED visits for which asthma was the primary diagnosis at the same rate as non-Hispanic Whites in 2009, there would have been 6,358 fewer asthma ED visits among Hispanics. Likewise, there would have been 3,208 and 144 fewer asthma ED visits among non-Hispanic Blacks and non-Hispanic Others, respectively.

Table 8. Asthma ED Visits and ED Visit Rates by Race/Ethnicity, Connecticut, 2009

Race/Ethnicity	Number of ED Visits	Age-Adjusted ED Visit Rate (per 10,000)	Relative Risk (Minority/White) [a]	Excess [b] (Fewer) Events
White, Non-Hispanic	7,937	34.2	1.0	0
Black, Non-Hispanic	4,387	127.3	3.7	3,208
Hispanic	7,953	170.5	5.0	6,358
Other, Non-Hispanic	800	41.7	1.2	144

[a] "Relative risk" is estimated to be the ratio of the minority group to the non-Hispanic White group.

[b] "Excess events" are the ED visits that would not have occurred if the ED admission rate for the minority group was the same as the ED admission rate for the non-Hispanic White group.

Asthma ED Visits that Result in Hospitalization

Data on the instances wherein a person visiting the ED with a primary diagnosis of asthma was admitted to the hospital as an inpatient with a primary diagnosis of asthma were analyzed for 2006 – 2009.[22] These instances are referred to as *resultant asthma hospitalizations* (RAHs). On average, 4,079 or 16% of persons with a primary diagnosis of asthma were admitted to the hospital from the ED each year (Figure 30). Adults were more likely to experience RAH than children. Overall, there was a decline in the percent of inpatient hospital admissions from the ED during the four-year period (Figure 31). Among children, there was a 23.5% decrease in the number of RAHs; among adults, there was a 2.8% decrease in the number of RAHs between 2006 and 2009.

In 2009, 3,837 or 13.7% of asthma ED visits resulted in asthma hospitalizations. The percent of females admitted as inpatients with a primary diagnosis of asthma from the ED was 1.3 times greater than the percent of males (15.2% versus 11.7%). Hispanics were less likely than non-Hispanic White, non-Hispanic Blacks, and non-Hispanic Others to be admitted as hospital inpatients. Non-Hispanic Blacks were almost twice as likely to be hospitalized for asthma from the ED as Hispanics (19.1% of resultant hospitalizations versus 10.8%). With regard to age groups, persons ≥ 65 years old had the highest percentage of resultant asthma hospitalizations (46.8%) while 18 – 24 year olds had the lowest percentage, 4.9%, of asthma inpatient admissions from the ED. Table 9 summarizes this information.

The percentages of asthma hospitalizations from asthma ED visits in 2009 were roughly equivalent for rural and non-rural areas. Of the asthma ED visits by rural residents, 14% resulted in inpatient hospital admissions; of the asthma ED visits by non-rural residents, 13.7% resulted in hospitalization with asthma as the primary diagnosis. New Haven County had the highest percent of resultant asthma hospitalizations (17.5%) followed by: Windham County (15.7%); Fairfield County (14.6%); Middlesex County (13.3%); Litchfield County (12.7%); Tolland County (11.7%); Hartford County (11%); and New London County (9.3%). Among the five largest cities, New Haven had the largest percentage of resultant asthma hospitalizations (25.7%) followed by: Bridgeport (14.3%); Stamford (12.4%); Hartford (11.7%); and Waterbury (9.1%). For the rest of Connecticut cities and towns combined, the percent of resultant asthma hospitalizations was 13%. See Appendix I for information resultant asthma hospitalizations by town of patient residence.

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[22] Hospital discharge data for 2005 were not included in the analysis because there was a mid-year change in the coding of the variable that indicates the source of hospital admission. Therefore, the selection of cases would have been imprecise and not comparable to the subsequent years of data.

Figure 30. Frequency of Asthma Admissions to Hospital from the ED, Connecticut, 2006 – 2009
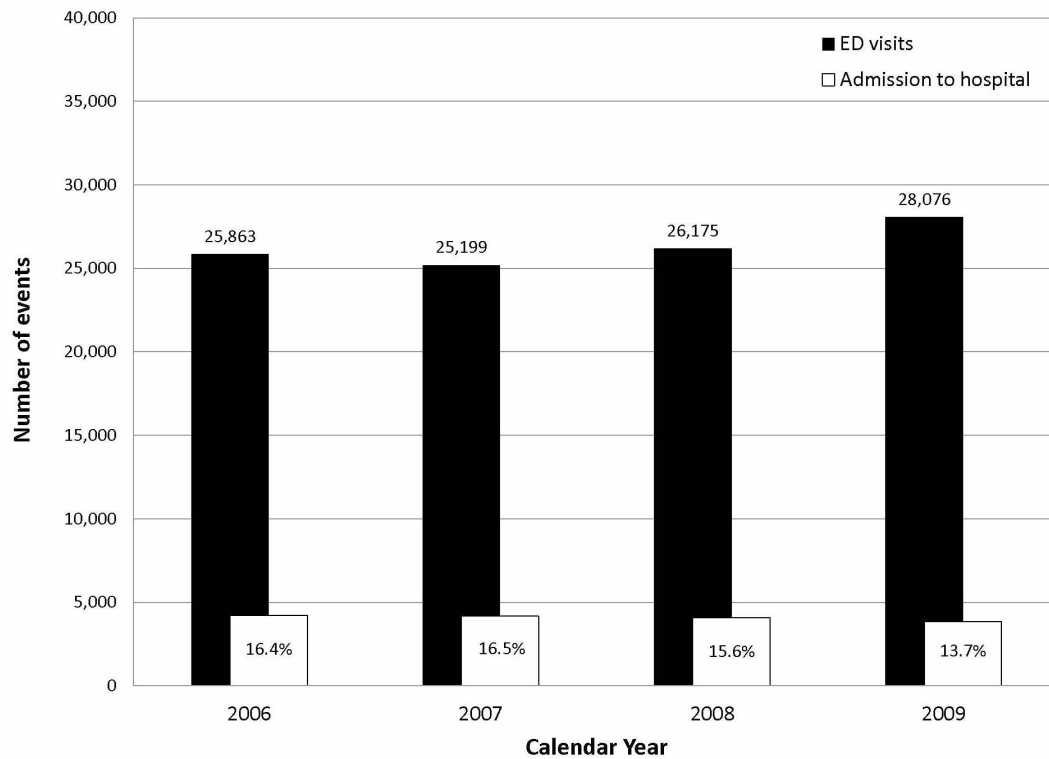
Figure 31. Resultant Asthma Hospitatlizations for Adults and Children by Year, Connecticut, 2006 – 2009
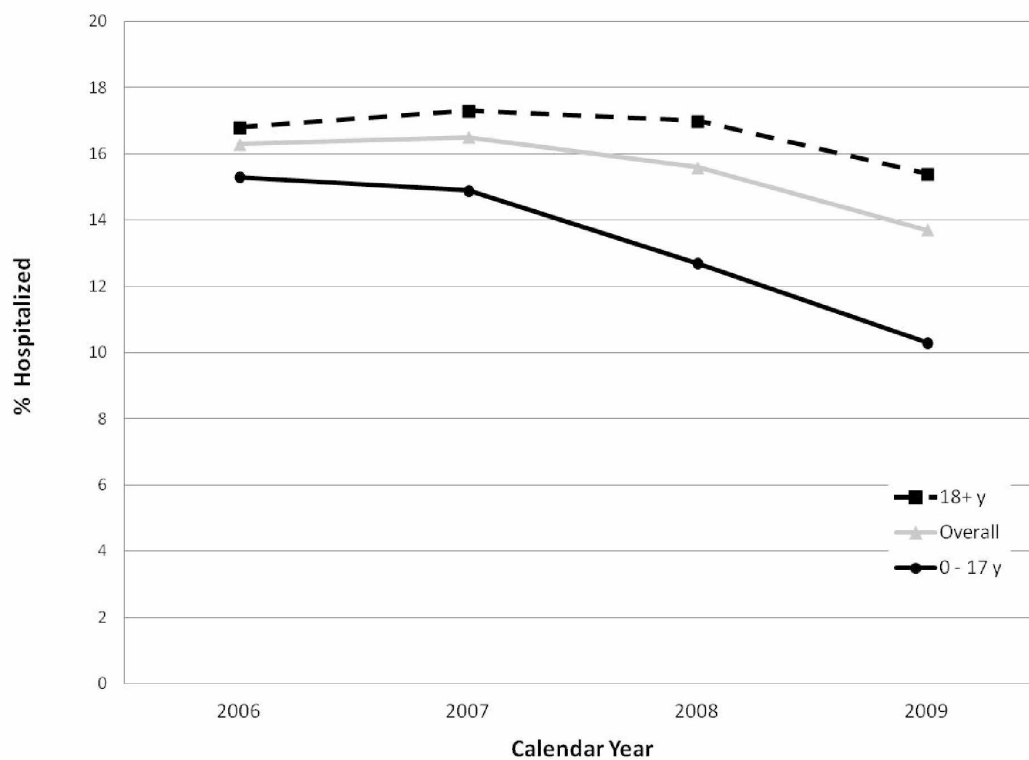
Table 9. Asthma ED Visits and Resultant Asthma Hospitalizations by Selected Demographic Characteristics, Connecticut, 2009

Characteristics	No. Went to ED	No. (%) Hospitalized
Total	28,076	3,837 (13.7)
Sex		
Male	12,132	1,420 (11.7)
Female	15,895	2,417 (15.2)
Race/Ethnicity		
White, non-Hispanic	9,634	1,697 (17.6)
Black, non-Hispanic	5,422	1,035 (19.1)
Hispanic	8,914	961 (10.8)
Other race, non-Hispanic	944	144 (15.3)
Age group		
0-4 years	3,639	480 (13.2)
5-11 years	3,777	374 (9.9)
12-17 years	2,140	131 (6.1)
18-24 years	3,258	159 (4.9)
25-34 years	4,151	293 (7.1)
35-44 years	3,961	460 (11.6)
45-54 years	3,715	691 (18.6)
55-64 years	1,738	455 (26.2)
65+ years	1,697	794 (46.8)

Asthma Healthcare Charges

The hospital discharge data provide information on the charges associated with the health care services provided to individuals who are hospitalized or visit the ED (see Appendix J). The charges discussed in this section are inflation-adjusted to 2009 dollars. The combination of ED visit and inpatient hospitalization charges are referred to as *hospital healthcare charges*. Please note that charges are not the same as cost – charges are not necessarily equal to the actual cost of a service (Finkler, 1982).

In 2009, the combined, inflation-adjusted charges for asthma ED visit and inpatient hospitalizations were $112,854,345 ($32,593,946 for ED visits and $80,260,399 for hospitalizations). This is equivalent to almost one percent of the total hospital healthcare charges in Connecticut in 2009. From 2000 to 2009, the asthma hospital healthcare charges increased 1.6 times from $70,719,238 to $112,854,345 (Figure 32). From 2005 – 2009, there was a 19.8% increase in asthma hospitalization and ED visit charges from $94,199,808 to $112,854,345.

Figure 32. Asthma Hospital Healthcare Charges* by Year, Connecticut, 2000 – 2009
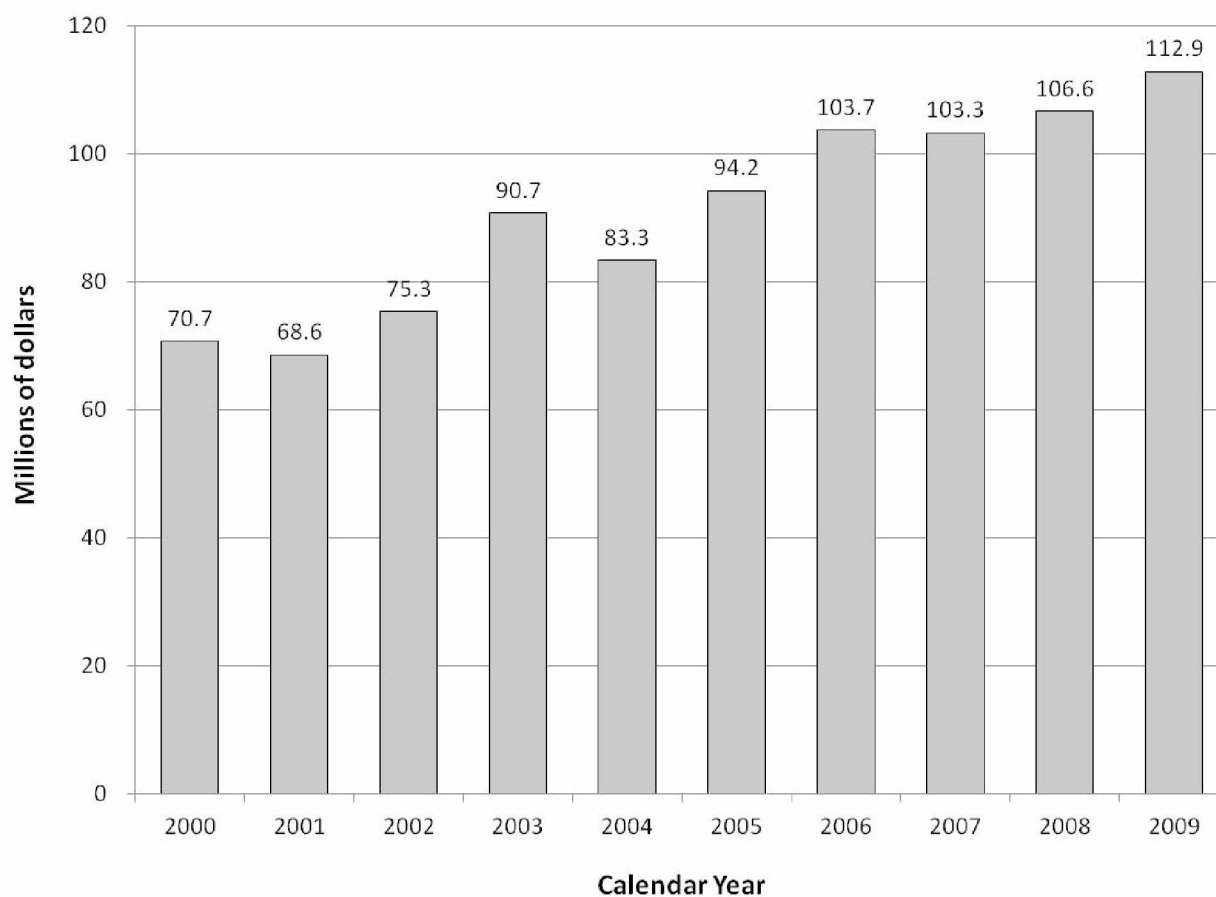
*Charges are inflation-adjusted to 2009 dollars.

To place the 2009 asthma hospital healthcare charges in the larger context of chronic disease care costs, they were compared to the 2009 hospital healthcare charges associated with primary diagnosis of diabetes.[23] In 2009, the combined charges for diabetes ED visits and hospitalizations were $147,138,697 ($13,238,116 for ED visits and $133,900,581 for hospitalizations). Asthma ED visits were 2.5 times the cost of diabetes ED visits and asthma hospitalizations were 0.6 times the cost of diabetes hospitalizations. Overall, asthma hospital healthcare charges were 0.8 times that of diabetes hospital healthcare charges (Figure 33).

Figure 33. Hospital Health Care Charges for Asthma and Diabetes, Connecticut, 2009

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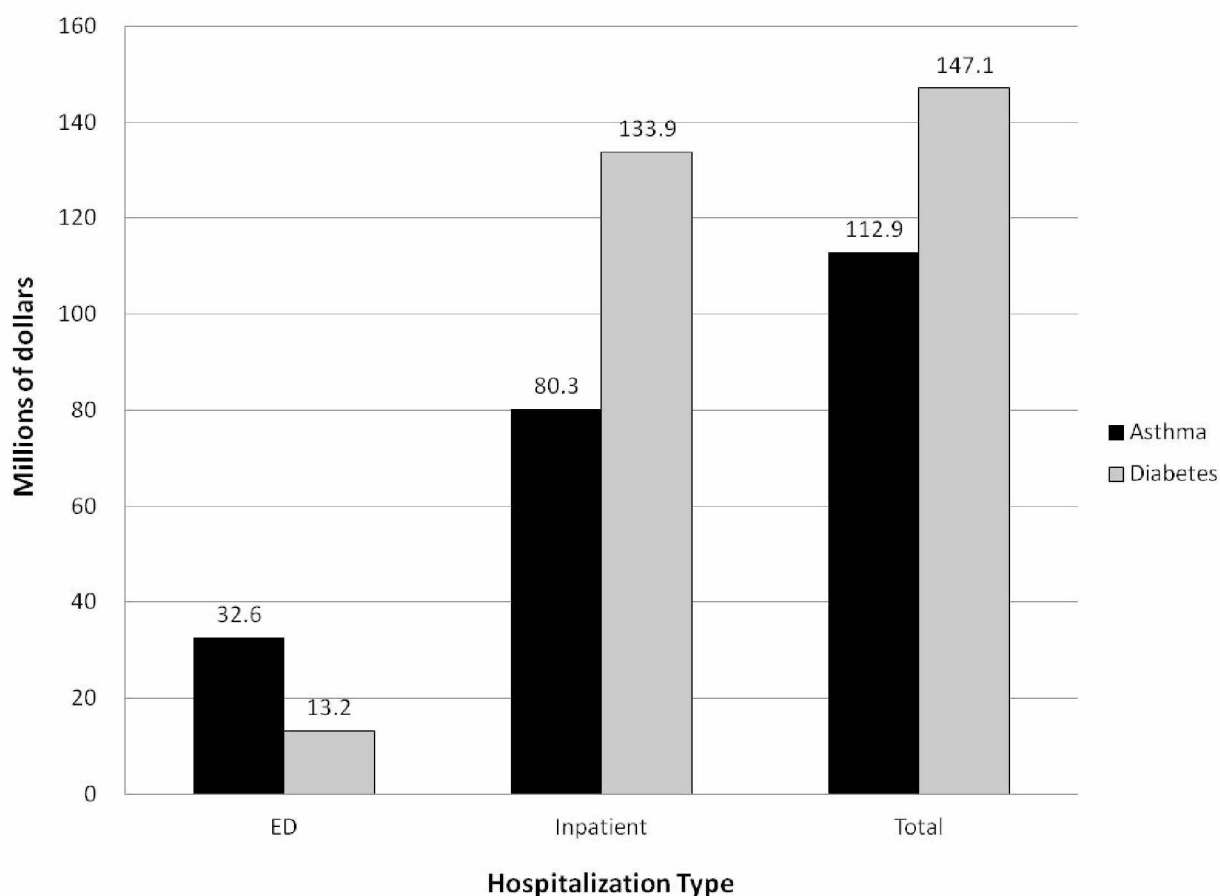
[23] According to 2009 BRFSS data analyses published online by the CDC, 6.7% (CI_{95} 6.0 – 7.4) of Connecticut residents $\geq$ 18 years old have ever been told that they had diabetes and 15.3% (CI_{95} 13.8 – 16.8) have ever been told that they had asthma. 2009 BRFSS Prevalence and Trends available online at http://apps.nccd.cdc.gov/brfss/page.asp?cat=AS&yr=2009&state=CT#AS.

Asthma inpatient and ED hospital healthcare charges

On average, from 2005 – 2009 asthma inpatient hospitalization charges were 2.6 times that of asthma ED charges (Figure 34). For the same five-year period, asthma hospital healthcare charges for adults were 3.4 times greater than the charges for children (Table 10). In 2009, adults > 65 years old accounted for 28.5% of all asthma inpatient hospitalization charges (Figure 35). The asthma ED visit charges associated with adults aged 25 – 34 years and 35 – 44 years accounted for 15.7% and 15.6%, respectively, of all asthma ED visit charges (Figure 36). In terms of overall asthma hospital healthcare charges in 2009, adults > 65 years old who were inpatients accounted for $22,908,484 or 20.3% of the charges, the largest proportion of charges across all hospitalization types and age groups.

Figure 34. Asthma Hospital Healthcare Charges by Hospitalization Year and Type, Connecticut, 2005 – 2009
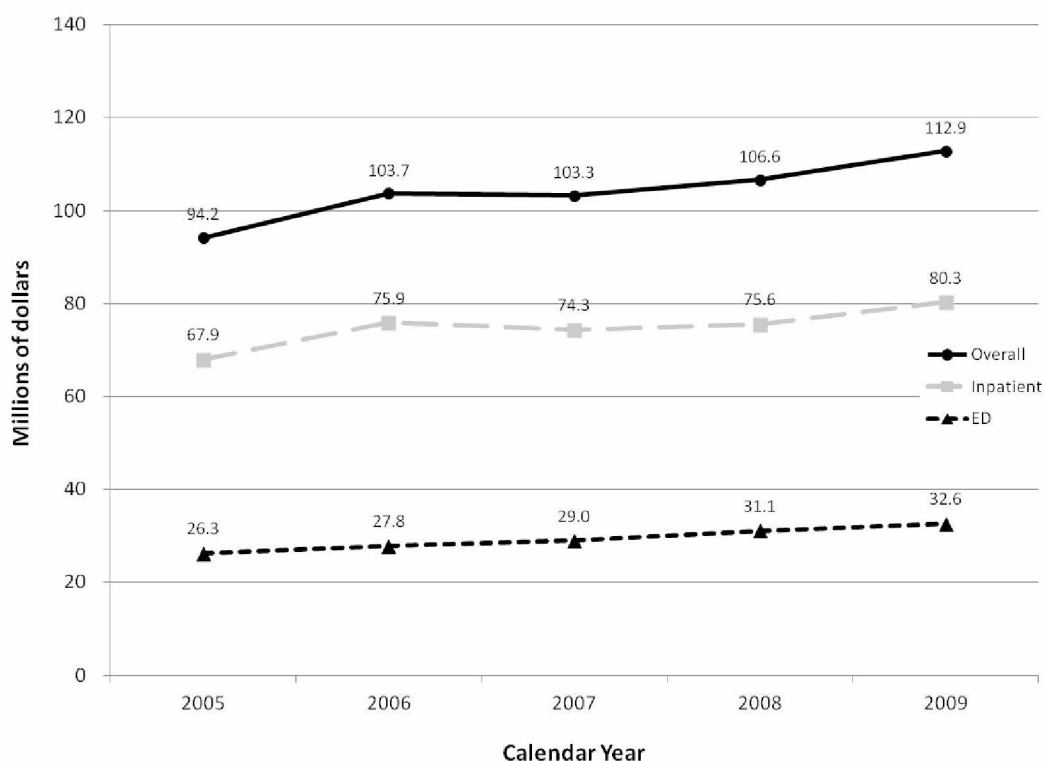
Table 10. Asthma Hospital Healthcare Charges for Children and Adults, Connecticut, 2005 – 2009

Year	Child (0 – 17 years)		Adult (18+ years)		Total	
	N	Inflation-Adjusted Charges	N	Inflation-Adjusted Charges	N	Inflation-Adjusted Charges
2005	8,028	$21,347,309	18,006	$72,852,499	26,034	$94,199,808
2006	8,690	$23,533,127	17,771	$80,168,547	26,461	$103,701,674
2007	8,436	$23,867,923	17,280	$79,406,596	25,716	$103,274,519
2008	8,716	$23,215,274	18,136	$83,413,544	26,852	$106,628,818
2009	10,054	$26,430,357	19,282	$86,423,988	29,336	$112,854,345

Figure 35. Asthma Inpatient Healthcare Charges by Age Group, Connecticut, 2009 – Comparison of charges within group and relative to overall asthma hospital healthcare charges
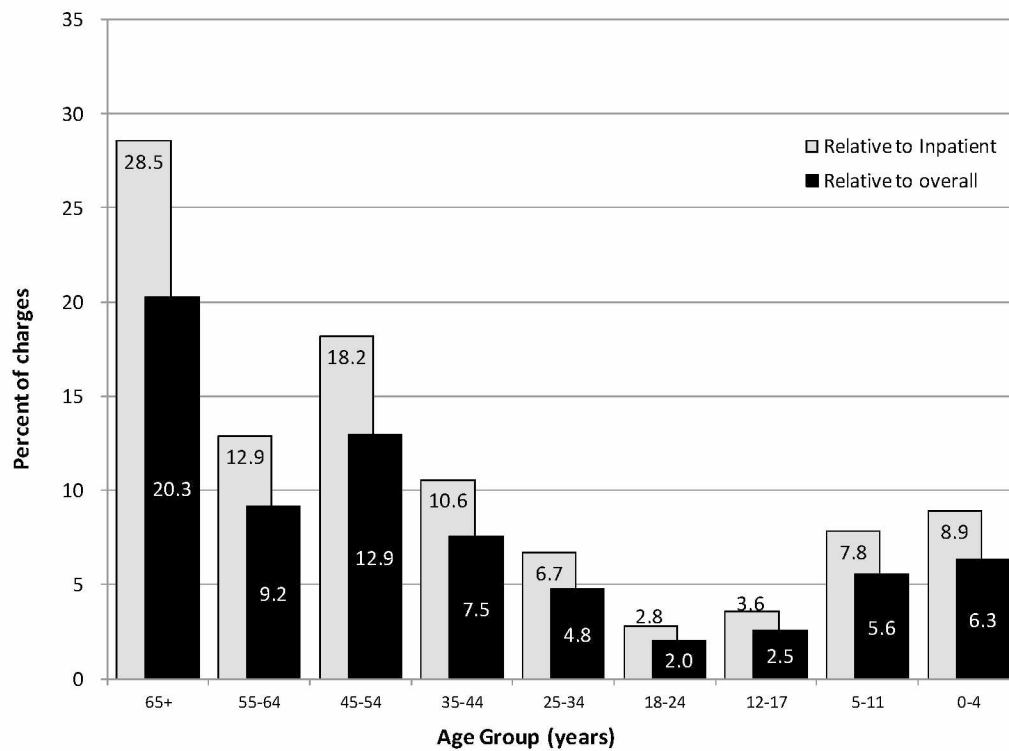
Figure 36. Asthma ED Visit Healthcare Charges by Age Group, Connecticut, 2009 – Comparison of charges within group and relative to overall asthma hospital healthcare charges
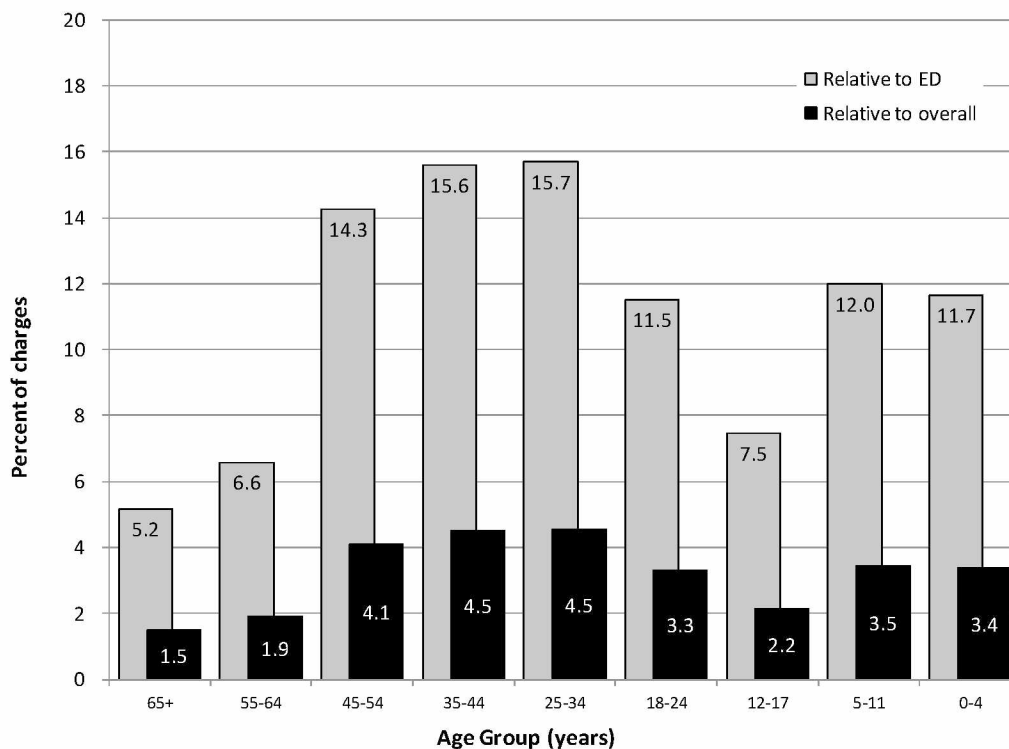
With regard to difference in charges by sex, in 2009, the asthma hospital healthcare charges for females were $71,905,436 and $40,948,909 for males. Charges for females receiving inpatient services were twice that for males ($53,293,649 for females and $26,966,750 for males). Charges for females receiving ED services were 1.3 times that for males ($18,611,787 for females and $13,982,159 for males).

In 2009, average asthma inpatient charges were $16,616 for non-Hispanic Whites; $14,894 for Hispanics; $14,811 for non-Hispanic Blacks; and $13,804 for non-Hispanic Others. Total asthma inpatient charges were highest for non-Hispanic Whites at $37,885,112. Average ED charges were $1,484 for non-Hispanic Blacks; $1,337 for Hispanics; $1,329 for non-Hispanic Others; and $1,301 for non-Hispanic Whites. Total asthma ED charges were highest for Hispanics at $10,624,952.

Asthma hospital healthcare charges in 2009 were highest among residents of the city of New Haven, for which the average charge per event were $6,064.70. Although Hamden was ranked 8th in asthma hospital healthcare charges, that city had the highest charges per event at $7,357.12. A list of the top ten cities for asthma hospital charges in 2009 is presented in Appendix J.

Excess asthma hospitalization healthcare charges

Earlier in this section, the numbers of excess asthma hospitalizations and ED visits for race/ethnicity groups in 2009 were calculated using the asthma hospitalization and ED visits rates for non-Hispanic Whites as the reference group. The race/ethnicity group-specific average charges were multiplied by the number of calculated excess events to determine the excess charges that result from racial/ethnic disparities in hospital healthcare utilization for asthma treatment (Table 11).

Overall, $15,114,800 (or 13.4% of the total asthma hospital healthcare charges in 2009) would not have occurred if non-Hispanic Blacks, non-Hispanic Others, and Hispanics had the same hospital healthcare utilization rates for asthma treatment as non-Hispanic Whites in 2009. This would have reduced the 2009 asthma hospital healthcare charges 15.5% from $112,854,345 to $97,739,545. The greatest potential avoidance of charges would have resulted from fewer asthma hospitalizations among Hispanics and non-Hispanic Blacks, and fewer asthma ED visits among Hispanics.

Sources of Healthcare Payment

In 2009, public insurance (Medicare or Medicaid), was the indicated payer for 73.8% of asthma hospitalizations, 60% of asthma ED visits (Table 12), and 69.6% of resultant asthma hospitalizations (i.e., inpatient hospitalizations that resulted from ED visits for which asthma was the primary diagnosis) in Connecticut. The average charges billed to public insurance for asthma hospitalizations and ED visits were higher than the average charges for services billed to private, self-pay/uninsured, or other insurances. The average cost of inpatient services billed to public insurance was $16,524 per hospitalization, $2,933 more than the average cost of inpatient services billed to private insurance.

Table 11. Excess Asthma Hospital Healthcare Charges by Race/Ethnicity, Connecticut, 2009

Race/Ethnicity	Relative Risk (Minority/ White) [a]	Excess [b] (Fewer) Events	Average Charges	Excess Charges [c]	Potentially-Avoidable Charges [d]
Inpatient					
White, Non-Hispanic	1	0	$1,301	—	—
Black, Non-Hispanic	4.7	1,024	$1,484	$15,166,464	+$4,087,802
Hispanic	4.7	1,081	$1,337	$16,100,414	+$4,349,345
Other, Non-Hispanic	1.4	52	$1,329	$717,808	+$1,932,651
ED					
White, Non-Hispanic	1	0	$16,616	—	—
Black, Non-Hispanic	3.7	3,208	$14,811	$4,760,672	+$1,748,713
Hispanic	5	6,358	$14,894	$8,500,646	+$2,124,306
Other, Non-Hispanic	1.2	144	$13,804	$191,376	+ $871,983

[a] "Relative risk" is estimated to be the ratio of the minority group to the non-Hispanic White group.
[b] "Excess events" are the ED visits that would not have occurred if the ED admission rate for the minority group was the same as the ED admission rate for the non-Hispanic White group.
[c] Excess Charges" are the result of multiplying excess events by the average charges.
[d] "Potentially-Avoidable Charges" are the result of subtracting the calculated excess charges from the actual charges.

Table 12. Asthma Hospital Healthcare Charges by Payor, Connecticut, 2009

Hospitalization Type	Payor			
	Public	Private	Self-pay/Uninsured	Other
Inpatient				
N	3,586	1,380	168	12
Average charges	$16,524	$13,531	$13,024	$12,076
Total charges	$59,254,691	$18,672,843	$2,187,958	$144,908
Percent of total charges	73.8%	23.3%	2.7%	0.2%
ED				
N	14,290	6,941	2,850	102
Average charges	$1,368	$1,311	$1,355	$836
Total charges	$19,546,626	$9,096,339	$3,860,336	$85,263
Percent of total charges	60.0%	27.9%	11.8%	0.3%
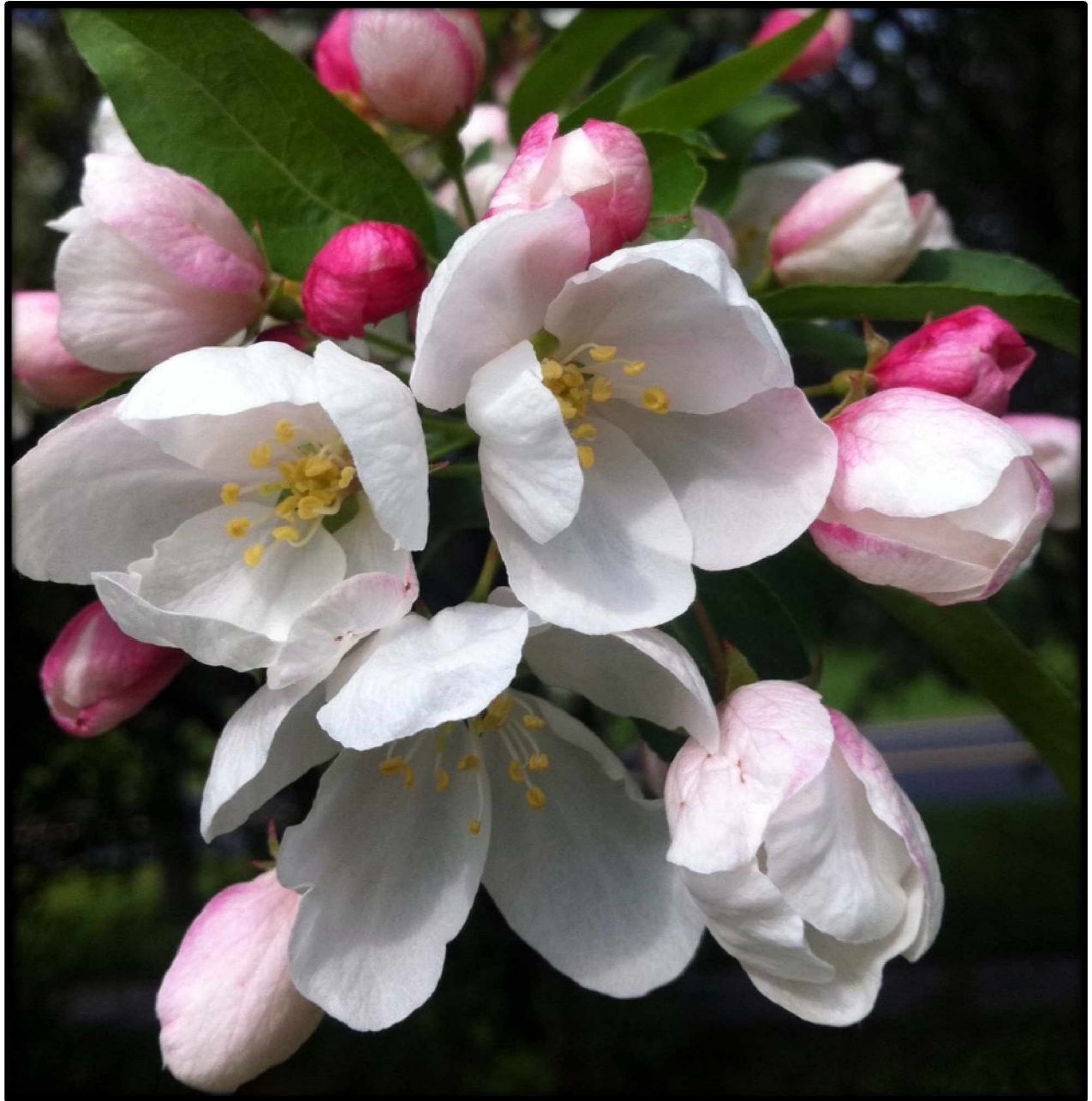
Asthma in HUSKY A Recipients

Reports on asthma and asthma-related health care for children under age 21 who are enrolled in Connecticut's Medicaid program, HUSKY A, are prepared periodically by Connecticut Voices for Children (CVC). In this section, CVC's findings about asthma prevalence, health care utilization, and quality of asthma care for HUSKY A recipients for the year 2007, published in *Asthma and Asthma Related Health Care for Children Enrolled in HUSKY A: 2007* (Lee & Learned 2009), are discussed.

Methods

For 2007 data analyses, CVC researchers updated the method they had previously used for estimating asthma prevalence in order to improve precision and make findings comparable to those in other states that use Medicaid claims data to monitor asthma. Therefore, the measures generated for 2007 are not comparable to those from previous years. The CVC 2007 case definition of a child with asthma was any continuously enrolled child under age 21 who received *any care for a primary diagnosis of asthma or four or more prescriptions for medication used to control or treat asthma.*[24] A child with persistent asthma was defined as one who, within the current measurement year, had: at least one hospital admission; or at least one asthma ED visit; or at least four asthma outpatient visits plus at least two asthma medication prescriptions; or at least four prescriptions for asthma treatment/control (Table 13). The types of health care utilization among children with asthma for asthma-related care that were examined were: visits for ambulatory care; office or clinic visits; ED visits; and hospitalizations.

Table 13. 2007 Case Definitions Used for Estimation of Asthma and Persistent Asthma Prevalence Among HUSKY A Children

Child with asthma	Child with persistent asthma
< 21 years old who was continuously enrolled in HUSKY A in 2007 plus:	*< 21 years old who was continuously enrolled in HUSKY A in 2007 plus:*
Any care for a primary diagnosis of asthma	≥ 1 asthma hospital admission
OR	OR
≥ 4 prescriptions for asthma medications	≥ 1 asthma ED visit
	OR
	≥ 4 asthma outpatient visits plus ≥ 2 prescriptions for asthma medications
	OR
	≥ 4 prescriptions for asthma medications

[24] For 2005 and 2006, the prevalence estimate included HUSKY A enrollees who received any care for a primary diagnosis of asthma or any prescriptions for asthma medication listed by the National Committee for Quality Assurance (NCQA) for managed-care performance monitoring.

Asthma Prevalence in HUSKY A Recipients

In 2007, there were 160,227 persons less than 21 years old who were continuously enrolled in HUSKY A. Of these, 18,126 received health care for a primary diagnosis of asthma or had at least four prescriptions for asthma medication. Thus, the estimated prevalence of asthma in the HUSKY A child population for 2007 was 11.3%. Of the children who met the case definition for asthma, 12,855 (71%) also met the case definition for a child with persistent asthma. Thus, the estimated prevalence of persistent asthma in the Connecticut Medicaid population under 21 years old was 8% in 2007.

Asthma prevalence in 2007 was higher among males (12.8%) than females (9.8%). Asthma was most prevalent among children 1 – 5 years old (12.7%) compared to children < 1 year old (6.1%), 6 – 14 year olds (11.8%), and 15 – 20 year olds (8.5%). With respect to race/ethnicity, asthma prevalence was highest among Hispanics (12.1%) compared to non-Hispanic Blacks (11.5%), non-Hispanic Whites (10.8%), and non-Hispanic Others (8.4%). Children of Spanish-speaking households were more likely than children of English- or other primary language- speaking households to have received asthma care or medication (risk ratio [RR] = 1.13 [95% confidence interval[CI]: 1.10, 1.17]). Children living in Bridgeport were more likely than children in other Connecticut towns to have had asthma care or medication in 2007 (RR = 1.10 [95%CI: 1.05, 1.15]).

Health Care Utilization and Quality of Asthma Care

In 2007, 66.4% of children with asthma enrolled in HUSKY A made an average of 3.8 office or clinic visits for asthma care, 41.3% had more than one asthma office or clinic visit, and 15.1% had asthma ED visits. The average number of ED visits per child was 1.3, with one in five children who received ED care making two or more visits. Of the 2,741 HUSKY A enrollees under age 21 who received emergency care for asthma in 2007, fewer than one in four (24.4%) received follow-up care within two weeks of their ED visit in accordance with asthma management guidelines. On at least one occasion, 467 (2.6%) children with asthma were hospitalized in 2007 for an average of 1.3 hospitalizations per child. Among children who were ever hospitalized for asthma, 18% were hospitalized more than once. Half (52.0%) of children hospitalized for asthma or an asthma-related diagnosis received follow-up care within the recommended two weeks of discharge.

With respect to the use of long-term or quick relief asthma medications, among HUSKY A children with asthma who had at least one encounter with the healthcare system in 2007 (i.e., clinic or office visit, ED visit, or hospitalization), 12,027 (66.4%) had at least four prescriptions for asthma medication. Among the HUSKY A children who met the case definition for a child with asthma but had no healthcare system encounter for asthma in 2007, 4,861 (26.8%) had at least four prescriptions for asthma medication. With regard to long-term asthma control medication use, among the 12,855 children who met the case definition for persistent asthma, 82.1% of prescriptions for preferred

therapies were filled for 5 - 17 year olds, in accordance with National Committee for Quality Assurance guidelines.

Table 14. Estimated Asthma Prevalence and Asthma Care Among HUSKY A Children, 2007

Continuously enrolled children < 21 years old	160,227
No. individuals meeting case definition for a child with asthma	18,126
Estimated asthma prevalence	
Asthma (overall)	11.3%
Persistent asthma	8.0%
Characteristics of children with asthma	
Sex	
Male	12.8%
Female	9.8%
Age Group	
Children < 1 year old	6.1%
Children 1 – 5 years old	12.7%
Children 6 –14 years old	11.8%
Children 15 – 20 years old	8.5%
Race	
Black	11.5%
White	10.8%
Hispanic	12.1%
Other	8.4%
Measures of health care utilization and quality of asthma care among children with asthma	
Average number of office or clinic visits	3.8
Percent with any asthma visit who had > 1 visit	41.3%
Percent with any emergency care	15.1%
Average number of ED visits	1.3
Percent with follow up within two weeks after ED visit	24.4%
Percent ever hospitalized	2.6%
Average number of hospitalizations	1.3
Percent with follow-up within two weeks after hospital discharge	52.0%

Limitations

In 2007, the Connecticut Department of Social Services (DSS) directed the four managed care organizations (MCOs) that administered HUSKY A to use the National Provider Identifier (NPI), a ten-digit number that uniquely identifies health care providers. One MCO did not implement the NPI. As a result, 67% of the data from that MCO on client encounters with the healthcare system from September to December 2007 were not uploaded into the DSS encounter database. CVC researchers estimated for that MCO, the monthly average number of encounters for the last four months of 2007 was reduced by 82% for inpatient care, 81% for clinic visits, and 55% for office visits. Please refer to the full CVC report for additional statements about the 2007 Medicaid data quality issues and limitations.

Westport Country Playhouse

Asthma in School Children

This section summarizes school-based asthma surveillance system (SBASS) data for the Fall 2006 through Spring 2009 school years in Connecticut. The *Connecticut School-based Asthma Report 2010* (Nguyen, Peng, & Hargrove, 2010) presents these data in detail, including district-level data. The table below summarizes the number of school districts and schools that provided data for the three school years that are discussed herein.

Table 15. Reporting School Districts, Schools, and Students with Asthma,Connecticut, 2006 – 2009

	School Year		
	2006 – 2007	**2007 – 2008**	**2008 – 2009**
# School Districts (%)	186 (96.9%)	186 (96.9%)	185 (96.4%)
#Schools	1,154	1,168	1,163
#Students	18,440	18,637	20,605

Using the data that were extracted from the Health Assessment Record (HAR) for specific grades across school districts, the calculated asthma prevalence rates among the school-aged children in the participating Connecticut public and private schools for the 2006 - 2007, 2007 - 2008, and 2008 - 2009 school years were 13.2%, 13.2%, and 13.1%, respectively. Overall, asthma prevalence rates were higher among students in pre-kindergarten (PK) or kindergarten (K) when compared to students in grades 6 or 7, and grades 9, 10, or 11. Asthma prevalence rates were higher for males than females for each of the three school years considered. Students classified as "Hispanic" had the highest rates of asthma compared to other race/ethnic groups; however, because the race/ethnicity category classifications for 8.8% of students were reported as "Unknown," the asthma prevalence rates by race/ethnicity were potentially underestimated.

School districts in four of the five largest cities (Bridgeport, Hartford, New Haven, and Waterbury) had the highest asthma rates. Each of these cities was classified in District Reference Group (DRG) I at the time of data collection. The DRG classification is based on specific socioeconomic (SES) characteristics of families that live in the district with children who attend public school (Prowda, 2006). DRG I districts rank the lowest in SES and highest in need (Canny, 2006), while DRG A districts have the highest SES and least need. In general, as the DRG classifications moved from A to I, student asthma rates increased (Figure 37) indicating that asthma prevalence increased with decreasing household SES (as summarized by the DRG class).

With regard to illness severity, the majority of asthma cases reported in public and private schools were mild. The percentage of mild asthma cases was greater for males than females. Mild asthma was most frequent among non-Hispanic Whites, while moderate asthma was most prevalent among non-

Hispanic Blacks. The percentage of exercise-induced asthma increased with increasing grade level. Females showed higher percentages of exercise-induced asthma compared to males, and exercise-induced asthma was more prevalent in non-Hispanic White students than non-Hispanic Black and Hispanic students.

Figure 37. Asthma Prevalence Rates by District Reference Groups, Connecticut, 2006 – 2009
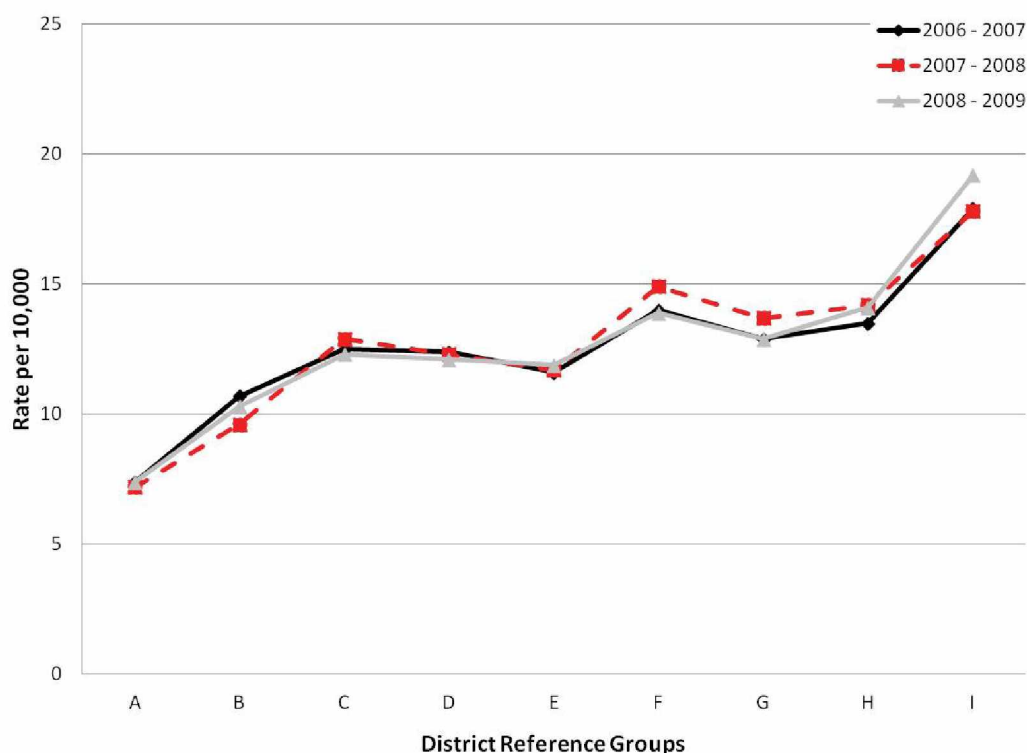
Documentation of asthma in the school health record was assessed by examining the reported presence of the following: 1) health care provider diagnosis of asthma recorded on the HAR; 2) Asthma Action Plan (AAP) completed by the health care provider; 3) a medication order from the health care provider; 4) a self-carry medication approval; 5) a note from a parent; 6) any other documented observations of asthma symptoms; and 7) any other documentation indicating that the child has asthma. Among the asthma cases reported through the SBASS for the Fall 2006 through Spring 2009 school years, an asthma diagnosis was recorded in the HAR for approximately three out of every four students; a medication order was on file for approximately one out of every three students; and an AAP was on file for one out of every 20 students. With regard to race/ethnicity: "The HAR was the most likely source and AAP was the least likely source of an asthma diagnosis for all races in both public and private schools" (Nguyen, Peng, & Hargrove, 2010, p. 6).

Work-Related Asthma

Among adults with asthma, approximately 15% may have occupational asthma (Balmes et al., 2003) and 21.5% may have work-exacerbated asthma (Henneberger et al., 2011). There are fewer than 60 physician reports of work-related asthma (WRA) in Connecticut annually. According to data from the CT DPH Occupational Illness and Injury Surveillance System (OIISS), from 1992 – 2008, 497 cases of WRA in Connecticut residents were reported (Figure 38). Females, whites, and individuals 35 – 54 years old were the most frequently affected by WRA during this time period (Table 16). With regard to ethnicity, 7.6% of the WRA cases reported from 1992 – 2008 were Hispanic; however, information on ethnicity was unknown or missing for 47.9% of cases. White females represented the majority of reported WRA cases, accounting for 210 (42.3%) of all cases.

Workers in service, manufacturing, and public administration sectors represented 33%, 24.9%, and 21.1% of reported WRA cases, respectively. Production jobs accounted for 14.1% of cases and office and administrative support jobs for 11.5%. Of the 474 WRA cases for which causes of illness were reported on the Physician's Report of Occupational Disease, 147 (31%) were attributed to the category "Other", which included a variety of agents such as: other unspecified cause, solder, acryl compounds, aldehydes, and smoke. Indoor air quality (IAQ) was listed as a cause of WRA for 133 (28.1%) cases. See Appendix K for additional information on the frequency of WRA by industry, occupation, and causative agent.

The 2007 – 2009 Asthma Call-back Survey (ACBS) collected information from adults with current asthma about their work environments. ACBS respondents were asked if they thought that their asthma was related to chemicals, smoke, fumes, or dust in their workplace. Based on their responses, it is estimated that 56,600 (23.4%) thought that their asthma was caused or made worse by exposure(s) in their current jobs. Approximately 98,400 (41.4%) thought that their asthma was caused or made worse by any job (current or previous) that they had held. ACBS participants were asked if they were ever told by or ever told a doctor or health professional that their asthma was related to any job that they had ever had. Findings were that among Connecticut adults with current asthma, approximately 18,400 (7.6%) were diagnosed with work-related asthma and 34,600 (14.2%) told a health professional that their asthma was related to any job they had ever had.

Approximately 103,400 (43.5%) of Connecticut adults with current asthma may have asthma that was caused or exacerbated by exposure(s) in the workplace. It is estimated that among adults with current asthma: 56,300 (38.9%) females and 47,100 (50.6%) males; 87,700 (43.5%) non-Hispanic Whites; 2,700 (42%) non-Hispanic Blacks; 7,400 (39.9%) Hispanics; and 2,900 (44.2%) non-Hispanic Others may have asthma that was caused or made worse by environmental factors at work. Roughly 21,700 (9.2%) Connecticut adults with current asthma changed or quit their jobs because chemicals, smoke, fumes, or dust caused or made their asthma worse.

Figure 38. Physician-Reported Cases of Work-Related Asthma by Year, Connecticut, 1992 – 2008
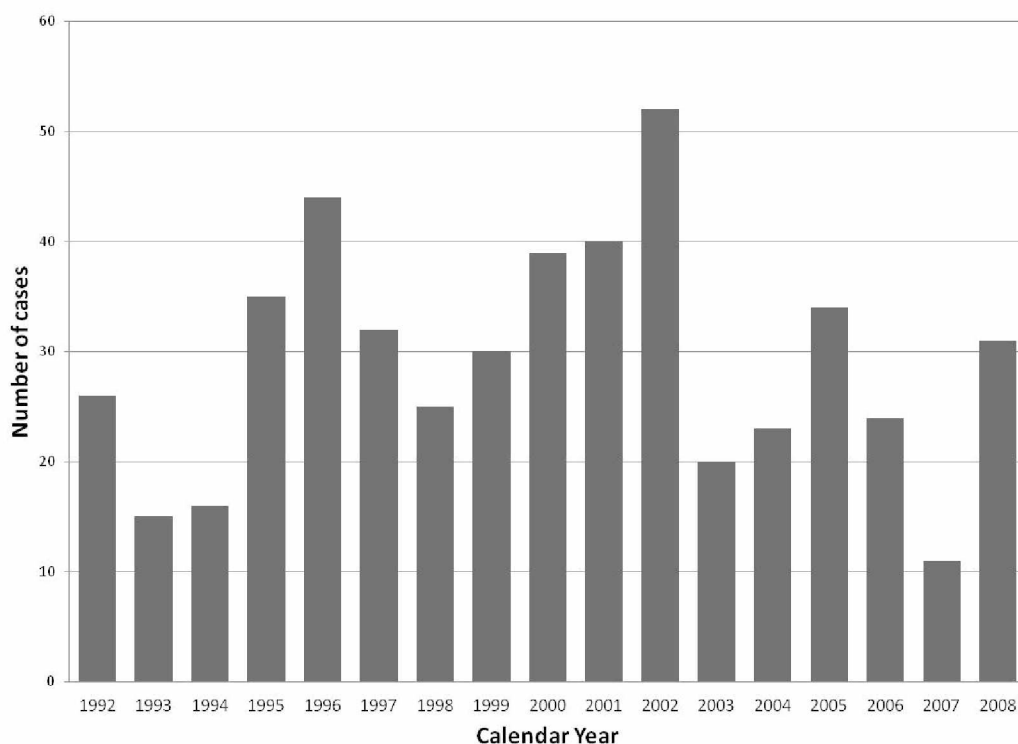
Table 16. Work-Related Asthma by Selected Demographics, Connecticut, 1992 – 2008

Characteristics	Number (%)
Total	497 (100.0)
Sex	
Male	198 (39.8)
Female	297 (59.8)
Missing/Unknown	2 (0.4%)
Race	
Asian	a
Black	65 (13.1)
White	347 (69.8)
Other	aa
Missing/Unknown	65 (13.1)
Ethnicity	
Hispanic	38 (7.6)
Not Hispanic	211 (42.5)
Missing/Unknown	248 (49.9)
Age group	
18 – 24 years	23 (4.6)
25 – 34 years	77 (15.5)
35 – 44 years	158 (31.8)
45 – 54 years	169 (34.0)
55 – 64 years	60 (12.1)
65 + years	a
Missing/Unknown	aa

[a] Number suppressed in keeping with confidentiality regulations.
[aa] Number suppressed to restrict calculation of cells < 6.

Asthma Mortality

Death certificate data from the DPH Office of Vital Statistics demonstrate that from 2005 to 2009 in Connecticut, females, Black non-Hispanics, persons aged 65 years and older, and residents of Connecticut's five largest cities experienced the highest rates of asthma death compared to other state residents. *Asthma death* refers to any death for which asthma was the *underlying cause*, the first-listed cause of death (i.e., the disease or injury that initiated the chain of events leading directly to death). *Contributing cause* refers to the second-listed causes of death (i.e., significant conditions that may have contributed to the death). Unless otherwise specified, the rates presented here are age-adjusted. Please refer to Appendix L for detailed tables of the data discussed in this section.

From 2000 – 2009, the 10-year death rate for adults with asthma as the underlying cause was 14.6 per 1,000,000 persons and 26 per 1,000,000 persons with asthma as a contributing cause. In comparison, the 10-year child asthma death rate was 1.9 per 1,000,000 and 0.6 per 1,000,000 with asthma as the underlying cause and contributing cause, respectively. Since 1996, the rates of asthma as an underlying or contributing cause of death have been on a gradual, downward trend. The lowest observed asthma mortality rate within the last decade was 6.5 per 1,000,000 recorded in 2008 (Figure 39). In 2009 the rate of death for asthma as an underlying cause was 12.3 per 1,000,000, almost twice that of the previous year. The reasons for this are unclear at the time of this report. However, the Department of Public Health Asthma Program is examining potential contributing factors to the increased number of reported asthma deaths in 2009 (e.g., pandemic influenza, changes in coding of death certificates).

From 2005 – 2009, asthma was the underlying cause of death for 197 or 10 per 1,000,000 Connecticut residents. Of these deaths, 11.2% occurred in the month of March and 33.5% during the weekend (Saturday or Sunday). The majority of asthma deaths (72.6%) occurred in inpatient, ED, or outpatient settings. Asthma death rates were highest among females, Black non-Hispanics, and persons aged 65 years and older (Table 17). The asthma death rate for females was 11.1 per 1,000,000 or 1.3 times that of males. The rate of asthma deaths per million among persons classified as non-Hispanic Blacks was 26.1 compared to 16.6 for Hispanics, 7.7 for non-Hispanic Whites, and 4.7 for non-Hispanic Others. The asthma death rate for persons 65 years and older was 41.7 per 1,000,000. Children under five years old experienced the lowest asthma mortality with an asthma death rate of 0.9 per 1,000,000.

Figure 39. Asthma Death Rates by Underlying and Contributing Causes, Connecticut, 2000 – 2009
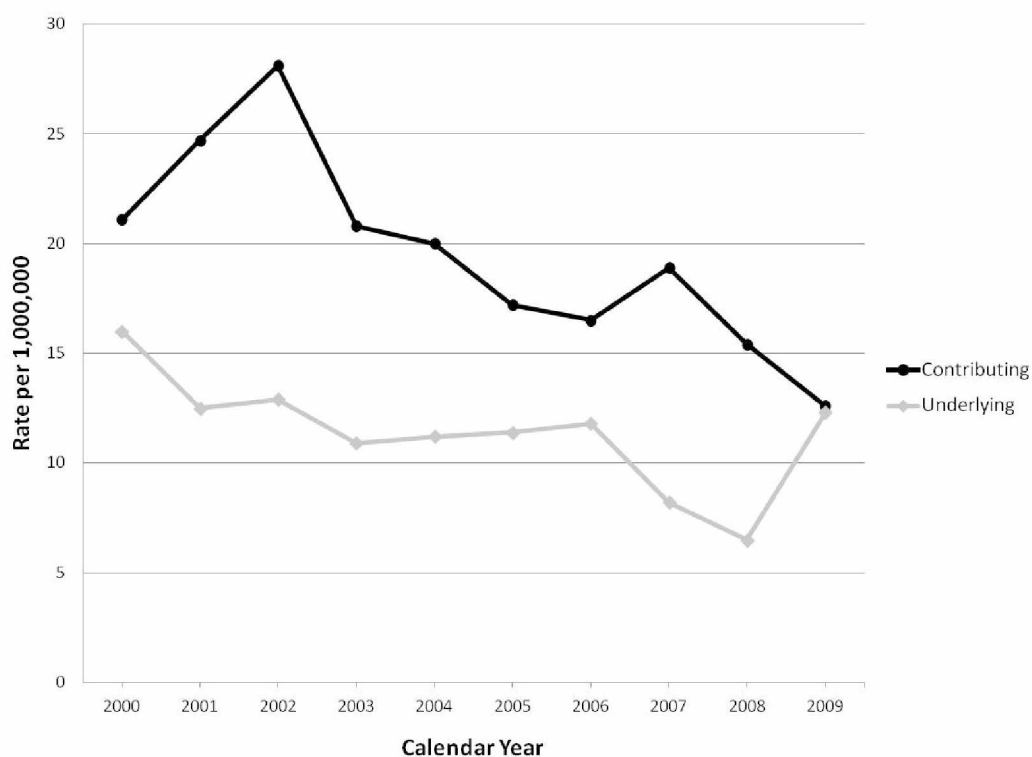
Table 17. Asthma Death Rates by Selected Demographic Characteristics, Connecticut, 2005 – 2009

Characteristics	Number	Age-adjusted rate per 1,000,000
Total	197	10
Sex		
Male	69	8.5
Female	128	11.1
Race/Ethnicity		
White, non-Hispanic	134	7.7
Black, non-Hispanic	38	26.1
Hispanic	23	16.6
Other race, non-Hispanic	2	4.7
Age group		
0 – 4 years	1	0.9
5 – 14 years	6	2.6
15 – 34 years	15	3.4
35 – 64 years	76	10.4
65 + years	99	41.7

With respect to geography of residence, most of the asthma deaths reported from 2005 – 2009 were among residents of Hartford County and persons in non-rural areas. Consistent with previously reported observations about the distribution of the asthma burden in Connecticut, the asthma mortality rate for Connecticut's five largest cities exceeded the combined asthma mortality rate for the rest of the state (Table 18). Deaths during 2005 – 2009 among residents of Bridgeport, Hartford, New Haven, Stamford, and Waterbury occurred at a rate of 18.9 per 1,000,000 compared to 8.3 per 1,000,000 for the rest of Connecticut.

Table 18. Asthma Death Rates by Five Largest Cities, Connecticut, 2005 – 2009

Town	Number	Age-adjusted rate per 1,000,000
Total	197	10
Bridgeport	15	22.9
Hartford	14	25.6
New Haven	11	22.7
Stamford	6	10.1
Waterbury	9	15.7
Rest of Connecticut	142	8.3

Progress on HP 2010 Objectives

Healthy People 2010 (HP 2010) presented a systematic approach to health improvement and set the agenda for nationwide public health activities for the first decade of this century. The goals of HP 2010 were to increase quality and years of healthy life and eliminate health disparities. There were 467 specific HP 2010 objectives aligned with 28 focus areas. Within the respiratory diseases focus area, there are eight asthma-related objectives:

1) Reduce deaths;
2) Reduce hospitalizations;
3) Reduce hospital emergency department visits;
4) Reduce activity limitations;
5) Reduce the number of school or workdays missed;
6) Increase the proportion of cases who receive formal patient education;
7) Increase the proportion of cases who receive care in accordance with the National Asthma Education and Prevention Program Guidelines; and
8) Establish in at least 15 states a surveillance system for tracking morbidity, mortality, disability, access to medical care, and disease management.

The Connecticut Department of Public Health (DPH) Asthma Program tracks Connecticut's progress toward meeting asthma-related HP 2010 objectives by analyzing mortality, hospitalization, emergency department (ED), and Behavioral Risk Factor Surveillance System (BRFSS) data. Table 19 presents information on the first seven HP 2010 asthma-related objectives and the progress that Connecticut has made toward achievement of the targets associated with each objective. Please note that information is not available to measure all of the objectives at the state level.

In comparing the 2001 – 2005 reporting period to the 2005 – 2009 reporting period, decreases in the five-year average mortality rate were observed among children less than five years of age, 15 – 34 year olds, 35 – 64 year olds, and persons aged 65 years and older. Among children 5 – 14 years old, the five-year average mortality rate increased 23.8% from 2.1 per million to 2.6 per million. Asthma hospitalization indicators increased across all three age groups. ED visit indicators also increased; however, there was a 6.1% decrease in the five-year rate of asthma ED visits among persons ≥ 65 years old.

The next Connecticut asthma burden report will address Connecticut's progress toward the *Healthy People 2020* (HP 2020) asthma targets. Refer to Appendix M to see how the HP 2010 targets compare to the HP 2020 ones.

Table 19. Progress Toward Healthy People 2010 Asthma Targets in Connecticut

Objective	Age Group	HP 2010 Target [a]	Connecticut (2005 – 2009)	% Change from 2000 – 2005
24-1. Reduce asthma deaths.	< 5 years	0.9 per million	0.9 [b]	-52.6%
	5 – 14 years	0.9 per million	2.6 [b]	+23.8%
	15 – 34 years	1.9 per million	3.4 [b]	-12.8%
	35 – 64 years	8.0 per million	10.4 [b]	-8.0%
	≥ 65 years	47.0 per million	41.7 [b]	-16.3%
24-2. Reduce hospitalizations for asthma.	< 5 years	25 per 10,000	33.9 [c]	+5.6%
	5 – 64 years	7.7 per 10,000	11.9 [c]	+16.7%
	≥ 65 years	11 per 10,000	21.8 [c]	+4.8%
24-3.Reduce hospital emergency department visits for asthma.	< 5 years	80 per 10,000	150.1 [d]	+16.6%
	5 – 64 years	50 per 10,000	71.6 [d]	+15.9%
	≥ 65 years	15 per 10,000	18.5 [d]	-6.1%
24-4. Reduce activity limitations among persons with asthma	(N/A)	6%	54.0% [e]	[f]
24-5. Reduce the number of school or work days missed by persons with asthma due to asthma.	(N/A)	2.0 days	2.0 days of school missed by children [g]	[f]
24-6. 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.	(N/A)	30.0%	10.4% [h]	[f]
24-7. Increase the proportion of persons with asthma who receive appropriate asthma care according to the *NAEPP Guidelines*.				
a. Persons with asthma who receive written asthma management plans from their healthcare provider.	(N/A)	38.0%	Data not available	
b. Persons with asthma with prescribed inhalers who receive instruction on how to use them properly.	(N/A)	98.8%	Data not available	
c. Persons with asthma who receive education about recognizing early signs and symptoms of asthma episodes and how to respond appropriately, including instruction on peak flow monitoring for those who use daily therapy.	(N/A)	71.0%	Data not available	
d. Person with asthma who receive medication regimens that prevent the need for more than one canister of short-acting beta agonists per month for relief symptoms.	(N/A)	92.0%	Data not available	
e. Persons with asthma who receive follow-up medical care for long-term management of asthma after any hospitalization due to asthma.	(N/A)	87.0%	Data not available	
f. Persons with asthma who receive assistance with assessing and reducing exposure to environmental risk factors in their homes, school, and work environments.	(N/A)	50.0%	Data not available	

[a] Targets published in *Healthy People 2010 Midcourse Review* (U.S. Department of Health and Human Services, 2007).

[b] Connecticut mortality data, 5-year average.   [c] CHIME Data, 2009 hospitalization data.   [d] CHIME Data, 2009 ED data.

[e] ACBS 2007 – 2009. Responses to question: "During the past 12 months, would you say you limited your usual activities due to asthma not at all, a little, a moderate amount, or a lot?" (items ACT_DAYS [5.9] for adults and ACT_DAYS [5.6] for children).

[f] The ACBS was first conducted in Connecticut in 2006.

[g] ACBS 2007 – 2009. Responses to question: "During the past 12 months, about how many days of school did he/she miss because of his/her asthma?" (Child ACBS item MISS_SCHL [10.5]).

[h] ACBS 2007 – 2009. "Have you ever taken a course or class on how to manage your asthma" (Adult and Child ACBS item MGT_CLAS [6.5]).

Moving Forward

Unfortunately, the burden that asthma places on the lives of Connecticut residents has increased since 2005. Behavioral Risk Factor Surveillance System (BRFSS) survey data analyses showed that approximately 9.2% of adults and 11.3% of children in Connecticut had current asthma in 2010. These prevalence estimates are higher than the 2005 BRFSS current asthma prevalence estimates, which were that 8% of adults and 10.5% of children in Connecticut had asthma. In Connecticut adults from 2005 – 2010, current asthma prevalence was highest for females, non-Hispanic Blacks, and 18 – 24 year olds. In Connecticut children from 2005 – 2010, current asthma prevalence was highest for males, children 5 – 17 years old, and non-Hispanic Blacks.

Despite well-established standards for asthma care and management and wide availability of inhaled asthma medications, asthma hospitalization and ED visit rates in Connecticut increased between 2005 and 2009 (see Tables 5 and 7). Among Connecticut residents from 2005 – 2009, adult asthma hospitalization rates were highest for females, persons aged 65 years and older, and Hispanics. For the same time period, child asthma hospitalization rates were highest for boys, children under five years old, and non-Hispanic Blacks. In 2009, the overall asthma hospitalization rate was highest for persons who lived in New Haven. With regard to asthma ED visits from 2005 – 2009, adult asthma ED visit rates were highest for: females, 18 -24 year olds, 25-34 year olds, and Hispanics. During the same five-year period, child asthma ED visits rates were highest for boys, children under five years old, and Hispanics. The 50.9% increase in asthma ED visits among Hispanic children from 2005 to 2009 is of particular concern. In 2009, the asthma ED visit rate was highest for people who lived in Hartford.

What explains the increase in events of asthma hospitalization and ED visits in Connecticut during 2005 – 2009? Findings of the Asthma Call-back Survey (ACBS) suggest that there may have been differences in provision of asthma care, management, education, and/or treatment that contributed to the observed overrepresentation of certain groups in the 2005 – 2009 hospitalization and ED visit data. Although the Asthma Action Plan (AAP) is emphasized in the NAEPP guidelines, 2007 – 2009 ACBS findings show that only approximately 34.3% of Connecticut residents with current asthma have ever been given an AAP by their health care providers. Also, supporting the need for improvements in adherence to national asthma management guidelines is the 2007 HUSKY A data which show that the provision of follow-up care to publicly-insured children within two weeks of asthma hospitalization or Asthma ED visits was lacking.

The increase in asthma prevalence, hospitalizations, and ED visits in Connecticut, in concert with underuse of AAPs and late or absent hospitalization/ED follow-up care, indicate that more efforts to improve the asthma self-management education of individuals and encourage clinicians and healthcare systems to adhere to national asthma management guidelines are needed. However, to

understand why ongoing activities are not more effective, additional information is needed. For example, poor provider/patient communication due to lack of access to language interpretation may contribute to underuse of AAPs in Connecticut and/or difficulty scheduling post-discharge follow-up visits. However, examination of this hypothesis is limited because information on primary language is not included in the hospital discharge data set provided to the DPH.

The gaps in our understanding of asthma in Connecticut point to the need for data sources beyond the ones that are currently available. In the absence of the availability of more sociodemographic data like primary language in large data sets, smaller studies could provide some idea of what is going on. Findings from research studies, such as the work conducted in Rhode Island and Puerto Rico on factors associated with disparities in ED use among Latino children with asthma (Canino et al., 2012), could be used to improve existing interventions and inform new ones. More data on outpatient asthma visits would help to refine estimates of asthma prevalence and comorbid diagnoses. Discussions surrounding an all payer claims database (APCD) have begun in Connecticut. This database would contain information on procedural codes, thus allowing for collection of data on asthma education provided by clinicians.

Current Activities

The DPH Asthma Control Program is committed to decreasing the burden of asthma in Connecticut through program activities and collaboration with stakeholders. The surveillance data presented in this report are the bases for program activities and also serve to inform community and healthcare organizations that are helping people with asthma to breathe more easily and enjoy more productive lives. Some of the activities currently underway include:

- *Easy Breathing Program.* Educates medical providers in the appropriate diagnosis and medical management of asthma patients based on national best practice guidelines.
- *Putting on AIRS (AIRS).* A free, in-home, patient self-management education and environmental assessment program. Local health departments lead the six regions that offer the program.
- *Provider Consensus Statement.* Endorses reimbursement to providers for following the National Asthma Education and Prevention Program (NAEPP) and the National Committees for Quality Assurance's Patient-Centered Medical Home (PCMH).
- *Asthma Action Plan (AAP).* Electronic and paper versions of the AAP in English and Spanish for health care providers to complete and give to their patients.
- *Five Cities Fact Sheet.* An update of a previous publication about the disproportionately higher rates of asthma morbidity, mortality, and cost in Connecticut's five largest cities (Bridgeport, Hartford, New Haven, Stamford, and Waterbury).

The Way Ahead

In 2011, the DPH was awarded the Coordinated Chronic Disease Prevention and Health Promotion Grant by the CDC. The purpose of this grant is to integrate existing DPH chronic disease programs – Asthma Control, Comprehensive Cancer, Diabetes Prevention & Control, Heart Disease & Stroke Prevention, Tobacco Use Prevention & Control, and Nutrition, Physical Activity & Obesity – into a Chronic Disease Unit that will more efficiently address chronic disease prevention, health promotion, risk factor reduction, and barriers to health care. It is envisioned that integration of these programs will:

- Enhance DPH's ability to: collect appropriate data on chronic disease morbidity, mortality, and associated risk factors; analyze these data; and disseminate findings widely.
- Foster comprehensive strategies that promote improvement of the social and physical environments in which Connecticut residents live, work, and play.
- Spur dialogue and collaboration with healthcare systems and health care providers about the delivery and accessibility of high-quality care and screening for chronic diseases.
- Promote strategies to improve community-clinical linkages to increase referral of patients to programs that improve chronic management.

In late 2011, the DPH was awarded funding through the Affordable Care Act in the form of the Community Transformation Grant (CTG). The goal of the CTG is to build capacity at the state and county levels to reduce chronic disease rates and address health disparities. CTG-funded activities in five Connecticut counties will allow communities to develop and/or enhance strong sustainable infrastructure and prevention efforts through policy, systems and environmental change. The CTG strategic areas – tobacco free living, active living/healthy eating, and quality clinical services – intersect with asthma control and management activities.

As the DPH moves toward integrating chronic disease programs, focus will be on the elimination of health inequities and increasing state and local level capacity for chronic disease reduction. There will be more opportunities to collect richer, more accurate information on the Connecticut populations which are disproportionately affected by asthma. Moreover, collaboration with a wider array of stakeholders will enhance the Asthma Control Program's ability to disseminate state and town level asthma data, and communicate with the health care providers, policy makers, advocates, and others who are interested in decreasing the burden of asthma in Connecticut.

Appendices

Appendix A: List of Selected Acronyms

AAP — Asthma Action Plan

ACBS — Asthma Call-back Survey

BRFSS — Behavioral Risk Factor Surveillance System

CDC — Centers for Disease Control and Prevention

CHIME — Connecticut Hospital Information Management Exchange

CGS — Connecticut General Statutes

CHA — Connecticut Hospital Association

COPD — chronic obstructive pulmonary disease

CVC — Connecticut Voices for Children

DPH — Connecticut Department of Public Health

DRG — District Reference Group

DSS — Connecticut Department of Social Services

ED — emergency department

EPSDT — Early Periodic Screening, Diagnosis, and Treatment Program

HAR — Health Assessment Record

HISR — Health Information Systems and Reporting Section

HUSKY — Healthcare for UninSured Kids and Youth

HP 2010 — Healthy People 2010

ICD — International Classification of Diseases

ICS — inhaled corticosteroid

LABA — long-acting beta agonist

LOS — length of stay

NAEPP — National Asthma Education and Prevention Program

NCQA — National Committee for Quality Assurance

NHIS — National Health Interview Survey

OA — occupational asthma

OHCA — Office of Health Care Access

OIISS — Occupational Injury and Illness Surveillance System

PCMH — Patient-Centered Medical Home

SABA — short-acting beta agonist

SES — socioeconomic status

WEA — work-exacerbated asthma

WRA — work-related asthma

Appendix B: Technical Notes

1. The Behavioral Risk Factor Surveillance System (BRFSS) collects self-reported ethnicity and race information. Ethnicity and race data for the other data sources referenced in this report may have been self- or observer-reported.

2. Crude and age-adjusted rates for the Connecticut population were calculated using state-level bridged race estimates for the years 2000 to 2009. Estimates of the population of Connecticut by age group, sex, race, and Hispanic ethnicity (ASRH) are routinely generated by the Statistics, Analysis & Reporting Section of the DPH Office of Health Care Quality. These annual state-level population estimates are available online at http://www.ct.gov/dph/cwp/view.asp?a=3132&q=388152.

3. Age-adjusted hospitalization, ED, and mortality rates were standardized to the year 2000 standard U.S. population.

Table B-1. Population distribution used for age-adjusting hospitalization. ED visit, and mortality data

Age group	2000
0-4	69,136
5-9	72,533
10-14	73,032
15-19	72,169
20-24	66,477
25-29	64,529
30-34	71,044
35-39	80,762
40-44	81,851
45-49	72,118
50-54	62,716
55-59	48,454
60-64	38,793
65-69	34,264
70-74	31,773
75-79	26,999
80-84	17,842
85+	15,508
Total	1,000,000

**Table C-1. Lifetime Asthma Prevalence Among Adults & Children by Year,
Connecticut & United States (2005 – 2010)**

Year	Adults (18+ years)				Children (0 – 17 years)			
	Connecticut		United States		Connecticut		United States	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
2005	12.4	11.2 – 13.5	14.9	12.7 – 17.2	14.9	12.7 – 17.2	12.9	12.4 – 13.4
2006	13.8	12.8 – 14.8	16.5	14.6 – 18.5	16.5	14.6 – 18.5	12.8	12.3 – 13.4
2007	14.1	12.9 – 15.3	14.7	12.8 – 16.6	14.7	12.8 – 16.6	13.5	13 – 14.1
2008	13.4	12.1 – 14.7	16.6	14.1 – 19.1	16.6	14.1 – 19.1	13.3	12.8 – 13.7
2009	15.3	13.8 – 16.8	17.1	14.8 – 19.5	17.1	14.8 – 19.5	13.2	12.8 – 13.7
2010	15.3	13.9 – 16.7	15.3	13.1 – 17.6	15.3	13.1 – 17.6	12.6	12.1 – 13.2

**Table C-2. Current Asthma Prevalence Among Adults & Children by Year,
Connecticut & United States (2005 – 2010)**

Year	Adults (18+ years)				Children (0 – 17 years)			
	Connecticut		United States		Connecticut		United States	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
2005	8	7 – 8.9	7.9	7.7 – 8	10.5	8.6 – 12.4	9	8.6 – 9.4
2006	9.3	8.4 – 10.1	8.2	8 – 8.4	10.6	9 – 12.3	9	8.5 – 9.5
2007	9.3	8.3 – 10.3	8.2	8.1 – 8.4	9.7	8.1 – 11.3	8.9	8.5 – 9.4
2008	8.8	7.6 – 9.9	8.5	8.3 – 8.7	11.1	9 – 13.3	9	8.6 – 9.4
2009	9.4	8.2 – 10.5	8.4	8.3 – 8.6	11.9	9.8 – 13.9	8.6	8.2 – 9
2010	9.2	8.1 – 10.2	8.6	8.5 – 8.8	11.3	9.3 – 13.3	8.4	8 – 8.8

Table C-3. Lifetime Asthma Prevalence Among Adults & Children by Sex & Year, Connecticut (2005 – 2010)

Sex	Year	Adults (18+ years)		Children (0 – 17 years)	
		Percent	95% CI	Percent	95% CI
Male	2005	9.9	8.1 – 11.6	16.2	13 – 19.4
	2006	12	10.6 – 13.5	19.9	17 – 22.7
	2007	10.9	9.1 – 12.7	17.5	14.6 – 20.4
	2008	11.2	9.1 – 13.2	18.4	14.8 – 21.9
	2009	14.1	11.8 – 16.4	19.8	16.3 – 23.3
	2010	13.3	11.1 – 15.4	17.7	14.3 – 21
Female	2005	14.6	13 – 16.2	13.7	10.6 – 16.8
	2006	15.4	14.1 – 16.8	13.1	10.5 – 15.8
	2007	17.1	15.4 – 18.7	11.6	9.1 – 14.1
	2008	15.4	13.8 – 17	14.8	11.2 – 18.3
	2009	16.5	14.6 – 18.3	14.7	11.5 – 17.9
	2010	17.1	15.3 – 18.9	12.8	9.9 – 15.7

Table C-4. Current Asthma Prevalence Among Adults & Children by Sex & Year, Connecticut (2005 – 2010)

Sex	Year	Adults (18+ years)		Children (0 – 17 years)	
		Percent	95% CI	Percent	95% CI
Male	2005	5.5	4.2 – 6.9	12	9.1 – 15
	2006	7.1	6 – 8.3	12.1	9.8 – 14.4
	2007	6.5	5 – 8.1	11.3	8.9 – 13.7
	2008	7.3	5.5 – 9.2	11.3	8.4 – 14.2
	2009	7.5	5.7 – 9.3	12.7	9.8 – 15.6
	2010	6.8	5.3 – 8.3	12.9	9.9 – 15.9
Female	2005	10.2	8.7 – 11.6	8.9	6.5 – 11.3
	2006	11.2	10 – 12.3	9.1	6.8 – 11.4
	2007	11.8	10.5 – 13.2	7.7	5.7 – 9.8
	2008	10.1	8.7 – 11.4	10.9	7.6 – 14.2
	2009	11.1	9.6 – 12.6	11.3	8.4 – 14.2
	2010	11.3	9.9 – 12.8	9.4	6.9 – 12

Table C-5. Lifetime Asthma Prevalence Among Adults & Children by Race/Ethnicity & Year, Connecticut (2005 – 2010)

Race/Ethnicity	Year	Adults (18+ years)		Children (0 – 17 years)	
		Percent	95% CI	Percent	95% CI
Hispanic	2005	17.1	11.5 – 22.8	21.8	14.3 – 29.3
	2006	15.6	11.9 – 19.3	27.6	20.9 – 34.2
	2007	14.7	10.6 – 18.7	19.8	13.9 – 25.8
	2008	19.3	14.4 – 24.3	28	19.7 – 36.2
	2009	16.7	10.1 – 23.3	16.2	10.5 – 21.9
	2010	18.9	13.3 – 24.4	19	12.5 – 25.4
Black, Non-Hispanic	2005	18	12.2 – 23.7	14.1	7.6 – 20.6
	2006	18.5	13.4 – 23.6	22.5	15 – 30
	2007	18.2	12.8 – 23.5	17.5	8 – 26.9
	2008	13	7.8 – 18.3	30.1	16.1 – 44.1
	2009	14.2	6.1 – 22.2	20.7	10.6 – 30.8
	2010	23.2	16 – 30.3	20.2	11 – 29.4
Other, Non-Hispanic	2005	9.2	4.7 – 13.7	16.9	6.8 – 27
	2006	10.3	5.1 – 15.5	5.9	2 – 9.8
	2007	13.9	8.1 – 19.8	14.5	7.6 – 21.4
	2008	12.5	6.2 – 18.7	17.5	8.9 – 26.1
	2009	11.2	6.1 – 16.4	15.5	6.7 – 24.4
	2010	19.1	12.2 – 26.1	20	11 – 29
White, Non-Hispanic	2005	11.8	10.5 – 13.1	13.9	11.3 – 16.5
	2006	13.5	12.4 – 14.6	15.1	12.9 – 17.3
	2007	13.9	12.6 – 15.3	13.3	11.1 – 15.5
	2008	12.9	11.5 – 14.4	13.6	10.9 – 16.2
	2009	15.6	13.9 – 17.2	17.2	14.4 – 20
	2010	14.3	12.8 – 15.8	13.6	11.1 – 16.2

Table C-6. Current Asthma Prevalence Among Adults & Children by Race/Ethnicity & Year, Connecticut (2005 – 2010)

Race/Ethnicity	Year	Adults (18+ years)		Children (0 – 17 years)	
		Percent	95% CI	Percent	95% CI
Hispanic	2005	8.3	4.7 – 11.8	17.4	10.2 – 24.6
	2006	10.9	7.9 – 13.9	21.4	15 – 27.8
	2007	9	5.8 – 12.2	15.8	10.4 – 21.2
	2008	11.7	7.8 – 15.7	21.7	13.8 – 29.6
	2009	9.1	5 – 13.2	11.4	6.3 – 16.5
	2010	11.5	7.3 – 15.7	12.3	6.9 – 17.7
Black, Non-Hispanic	2005	11.7	6.7 – 16.7	11.2	5.5 – 16.9
	2006	12.6	8 – 17.3	17.8	10.7 – 24.9
	2007	12	7.4 – 16.6	11.4	4.7 – 18.1
	2008	9.5	4.6 – 14.4	20.7	7.5 – 34
	2009	10.4	2.4 – 18.4	15.9	6.4 – 25.4
	2010	15.4	9.8 – 21	18.9	9.8 – 28.1
Other, Non-Hispanic	2005	5.7	2.2 – 9.2	15.2	5.3 – 25
	2006	7.4	2.4 – 12.4	3.5	1.1 – 5.9
	2007	10.8	5.4 – 16.2	10.5	4.7 – 16.4
	2008	9.2	4 – 14.5	10.1	3 – 17.1
	2009	7.1	2.5 – 11.6	9.8	2.7 – 16.9
	2010	12.3	6.8 – 17.8	15.6	7.1 – 24.1
White, Non-Hispanic	2005	7.9	6.8 – 9	9	7 – 11.1
	2006	9	8.2 – 9.9	8.8	7 – 10.5
	2007	9.1	7.9 – 10.3	8	6.3 – 9.8
	2008	8.3	7.1 – 9.6	8.7	6.5 – 10.9
	2009	9.5	8.2 – 10.7	11.9	9.5 – 14.3
	2010	8.5	7.3 – 9.6	9.9	7.6 – 12.1

Table C-7. Lifetime and Current Asthma Prevalence among Connecticut Residents by Age Group & Year (2005 – 2010)

Age Group	Year	Lifetime		Current	
		Percent	95% CI	Percent	95% CI
0 – 4 years	2005	9.4	5.8 – 13.1	7.6	4.2 – 11
	2006	8.1	5.2 – 11	5.7	3.3 – 8
	2007	7.3	4.4 – 10.2	5.5	2.9 – 8
	2008	8.1	3.4 – 12.8	6.2	1.7 – 10.7
	2009	8.6	4.9 – 21.3	7.3	3.8 – 10.7
	2010	7.3	3.9 – 10.8	5.9	2.8 – 9.1
5 – 11 years	2005	17.7	13.6 – 21.8	11.7	8.4 – 15.1
	2006	19	15.3 – 22.6	12.5	9.3 – 15.7
	2007	16.7	13.5 – 20	10.8	8.2 – 13.4
	2008	20.2	15.8 – 24.5	13.1	9.4 – 16.8
	2009	18.8	14.8 – 22.8	12.4	9 – 15.8
	2010	16.7	12.8 – 20.6	13.6	9.8 – 17.3
12 – 17 years	2005	16.4	12.4 – 20.4	11.2	7.9 – 14.5
	2006	20	16.6 – 23.4	12.3	9.5 – 15.1
	2007	17.4	13.9 – 20.8	11.2	8.3 – 14
	2008	19.6	15.2 – 24	12.8	9.1 – 16.6
	2009	21.4	17.2 – 25.7	14.6	10.9 – 18.3
	2010	19.9	15.8 – 24	13	9.5 – 16.5
18 – 24 years	2005	18.7	12 – 25.3	13.1	7.3 – 18.9
	2006	19.7	14.6 – 24.7	11.6	7.6 – 15.6
	2007	21.9	15.7 – 28.2	15	9.5 – 20.5
	2008	20.5	12.8 – 28.2	15.5	8.4 – 22.6
	2009	31.1	22.1 – 40.1	16.2	8.9 – 23.5
	2010	24.4	16.6 – 32.1	11.2	6 – 16.4
25 – 34 years	2005	15.8	12.3 – 19.2	8.6	5.9 – 11.2
	2006	16.5	13.5 – 19.5	10.5	8.1 – 12.9
	2007	18.5	14.2 – 22.8	9.6	5.9 – 13.3
	2008	17	12.8 – 21.1	12.1	8.2 – 15.9
	2009	17.1	12.6 – 21.6	8.8	5.3 – 12.3
	2010	19.9	15.3 – 24.5	9.9	6.4 – 13.3
35 – 44 years	2005	11.7	9.6 – 13.9	7.9	6 – 9.7
	2006	11.3	9.3 – 13.3	7.5	5.9 – 9
	2007	12.8	10.6 – 15	9.1	7.2 – 11.1
	2008	11.7	9.4 – 14	7.1	5.3 – 8.9
	2009	13.5	10.8 – 16.2	8.2	6.1 – 10.3
	2010	15.7	12.8 – 18.5	10.1	7.9 – 21.3
45 – 54 years	2005	9.6	7.7 – 11.5	6.3	4.8 – 7.7
	2006	13.6	11.8 – 15.4	9.8	8.1 – 11.4
	2007	13	10.9 – 15.1	8.6	6.9 – 10.3
	2008	13.4	11.1 – 15.6	7.3	5.6 – 9
	2009	13.4	11.2 – 15.6	9	7.2 – 10.9
	2010	13	10.8 – 15.3	8.9	7 – 10.9
55 – 64 years	2005	11.8	9.3 – 14.3	8.2	6.1 – 10.3
	2006	13.4	11.4 – 15.4	9.4	7.7 – 11
	2007	11.9	9.9 – 13.8	8.5	6.8 – 10.2
	2008	10.7	8.7 – 12.8	6.7	5 – 8.4
	2009	12.3	10.2 – 14.4	8.3	6.6 – 10.1
	2010	11.8	9.8 – 13.7	8.6	6.8 – 10.3
65+ years	2005	9.8	7.8 – 11.7	6.1	4.6 – 7.5
	2006	11.3	9.7 – 13	8	6.6 – 9.4
	2007	10	8.5 – 11.5	7.3	6.1 – 8.6
	2008	10.4	8.8 – 12	7.3	6 – 8.7
	2009	11.3	9.6 – 12.9	8.4	7 – 9.9
	2010	10.8	9.1 – 12.4	7.3	5.9 – 8.6

Appendix D: Selected Asthma Call-back Survey Findings

This appendix contains selected 2007 - 2009 Behavioral Risk Factor Surveillance System (BRFSS) Asthma Call-back Survey (ACBS) results for persons with current asthma in Connecticut. References to the ACBS questionnaire items, which solicited the responses on which the estimates are based, are provided at the bottom of each table. *AQ* refers to adult questionnaire and *CQ* refers to the child questionnaire.

Asthma Symptoms

Table D-1. Time of Last Asthma Symptoms Among Persons With Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	< 1 day ago Percent (95% CI)	1 – 6 days ago Percent (95% CI)	1 wk to < 3 months ago Percent (95% CI)	3 months to < 1 year ago Percent (95% CI)	1 year to < 3 years ago Percent (95% CI)	3 – 5 years ago Percent (95% CI)	> 5 years ago Percent (95% CI)	Never Percent (95% CI)
Overall	26.3 (21.5 – 31)	18.6 (14.5 – 22.7)	25.2 (21 – 29.3)	14.2 (11.3 – 17)	9.2 (6.4 – 11.9)	1.6 (0.3 – 2.8)	4 (1 – 6.9)	1.1 (0 – 2.1)
Children	12.4 (7 – 17.8)	15.5 (7.8 – 23.3)	33.5 (24.5 – 42.5)	19.2 (12.8 – 25.7)	13.5 (6.2 – 20.8)	1.9 (0 – 3.8)	0.5 (0 – 1.4)	3.4 (0 – 7.2)
Adults	31.1 (25.2 – 37)	19.7 (14.9 – 24.5)	22.3 (17.7 – 26.8)	12.4 (9.3 – 15.5)	7.7 (5 – 10.3)	1.5 (0 – 3)	5.2 (1.3 – 9)	0.2 (0 – 0.6)
Male	31.3 (22.3 – 40.4)	18.5 (11.3 – 25.7)	20.4 (14.1 – 26.6)	11.7 (7.3 – 16)	9.4 (4.7 – 14)	1.8 (0 – 4.4)	5.6 (0 – 11.6)	1.4 (0 –3.3)
Female	22.3 (18 – 26.6)	18.8 (14.2 – 23.5)	29 (23.6 – 34.3)	16.2 (12.4 – 19.9)	9.1 (5.8 – 12.4)	1.4 (0.5 – 2.4)	2.5 (0.3 – 4.7)	0.8 (0 – 1.9)
Hispanic	14.9 (5.6 – 24.2)	39.7 (21.3 – 58.1)	24.5 (13.1 – 35.9)	11.6 (3.3 – 19.9)	4.2 (0.6 – 7.7)	1.8 (0 – 4.9)	0.3 (0 – 1)	3 (0 – 8.9)
Black*	10.1 (2.5 – 17.6)	23.7 (3.4 – 44.1)	43 (17.2 – 68.8)	7 (0 – 14.1)	3.8 (0 – 10.9)	0.8 (0 – 2.3)	11.6 (0 – 32.5)	0
Other*	11.1 (1.1 – 21)	21.4 (2 – 40.8)	28.3 (6.4 – 50.2)	15 (1.1 – 28.8)	19.2 (0 – 41.7)	0	5.1 (0 – 14.8)	0
White*	28.4 (22.9 – 33.9)	16.2 (12.1 – 20.2)	24.4 (19.9 – 29)	14.8 (11.5 – 18.2)	9.7 (6.5 – 12.8)	1.7 (0.2 – 3.2)	3.8 (0.5 – 7.2)	1 (0 – 2.1)
* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 3.5.								

Table D-2. Symptoms of Asthma During the Past 30 Days Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	0 days Percent (95% CI)	1 – 10 days Percent (95% CI)	11 – 20 days Percent (95% CI)	21 – 30 days Percent (95% CI)
Overall	37.3 (32.4 – 42.1)	34.4 (29.5 – 39.3)	13.1 (9.6 – 16.6)	15.2 (11.7 – 18.7)
Children	50.2 (40.7 – 59.7)	34.8 (25.3 – 44.4)	7.6 (3.3 – 12)	7.3 (2.8 – 11.8)
Adults	32.7 (27.1 – 38.3)	34.2 (28.5 – 40)	15.1 (10.6 – 19.5)	18 (13.5 – 22.5)
Male	6.8 (28.3 – 45.3)	33.1 (24.4 – 41.8)	13.9 (7.3 – 20.4)	16.2 (9.5 – 23)
Female	37.6 (32 – 43.1)	35.6 (30 – 41.2)	12.6 (8.9 – 16.3)	14.2 (10.7 – 17.7)
Hispanic	23.9 (12.2 – 35.5)	51.2 (34.5 – 67.8)	13.3 (3.7 – 22.9)	11.7 (3.5 – 19.9)
Black*	30.5 (8.2 – 52.8)	57.6 (33.7 – 81.5)	3.5 (0 – 7.4)	8.4 (1.2 – 15.6)
Other*	51.1 (27.6 – 74.7)	32.5 (10 – 55)	9.9 (0 – 19.9)	6.5 (0 – 13.3)
White*	38.8 (33.3 – 44.3)	31.6 (26.3 – 36.9)	14 (9.8 – 18.1)	15.7 (11.5 – 19.8)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 4.1.

Table D-3. Number of Days Asthma Made it Difficult to Stay Asleep During the Past 30 Days Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	0 days Percent (95% CI)	1 – 10 days Percent (95% CI)	11 – 20 days Percent (95% CI)	21 – 30 days Percent (95% CI)
Overall	76.5 (72.2 – 80.8)	16 (12.6 – 19.3)	4.3 (2.2 – 6.4)	3.2 (0.8 – 5.6)
Children	78.7 (71.3)	19.9 (12.6 – 27.3)	1.1 (0 – 2.4)	0.2 (0 – 0.7)
Adults	75.7 (70.6 – 80.8)	14.6 (10.9 – 18.3)	5.4 (2.6 – 8.2)	4.3 (1.1 – 7.5)
Male	75.1 (67.2 – 83)	16.1 (10.2 – 22)	3.1 (0 – 6.6)	5.7 (0.4 – 11.1)
Female	77.5 (73 – 81.9)	16 (12.2 – 19.8)	5.2 (2.6 – 7.8)	1.3 (0.5 – 2.2)
Hispanic	64.5 (50.1 – 78.9)	27.4 (14.5 – 40.3)	4.2 (0 – 8.9)	3.9 (0 – 8.3)
Black*	62.5 (39.4 – 85.5)	31.5 (9.4 – 53.5)	3.7 (0 – 8.8)	2.3 (0 – 5.1)
Other*	82.7 (64.4 – 100)	17.3 (0 – 35.6)	—	—
White*	78.6 (73.8 – 83.3)	14.1 (10.5 – 17.6)	4.2 (1.8 – 6.7)	3.2 (0.3 – 6)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 4.3.

Table D-4. Episode of Asthma or Asthma Attack During the Past 12 Months Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	No Percent (95% CI)	Yes Percent (95% CI)
Overall	49.6 (44.5 – 54.7)	50.4 (45.3 – 55.5)
Children	45.3 (36 – 54.7)	54.7 (45.3 – 64)
Adults	51.1 (45.1 – 57.1)	48.9 (42.9 – 54.9)
Male	53.6 (44.6 – 62.7)	46.4 (37.3 – 55.4)
Female	46.4 (40.8 – 52.1)	53.6 (47.9 – 59.2)
Hispanic	48.6 (32 – 65.3)	51.4 (34.7 – 68)
Black*	42.9 (17.7 – 68)	57.1 (32 – 82.3)
Other*	47.1 (23.5 – 70.6)	52.9 (29.4 – 76.5)
White*	50.2 (44.6 – 55.9)	49.8 (44.1 – 55.4)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 4.5.

Table D-5. Number of Asthma Episodes or Attacks During the Past 3 Months Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	None Percent (95% CI)	1 Percent (95% CI)	2 Percent (95% CI)	3 Percent (95% CI)	≥ 4 Percent (95% CI)
Overall	61 (55.9 – 66)	14.2 (10.6 – 17.7)	9.7 (6.3 – 13)	6.1 (2.9 – 9.2)	9.1 (6.5 – 11.8)
Children	56.2 (46.9 – 65.6)	21.1 (13.1 – 29)	10.4 (5 – 15.9)	4.6 (1.1 – 8.1)	7.7 (2.7 – 12.7)
Adults	62.6 (56.6 – 68.6)	11.7 (7.9 – 15.6)	9.4 (5.3 – 13.5)	6.6 (2.6 – 10.6)	9.7 (6.6 – 12.7)
Male	61.2 (52.2 – 70.2)	14.6 (8.8 – 20.5)	11.2 (4.6 – 17.8)	6.6 (1 – 12.2)	6.3 (2.3 – 10.4)
Female	60.8 (55. 1 – 66.5)	13.6 (9.3 – 18)	8.5 (5.5 – 11.5)	5.7 (2.2 – 9.1)	11.4 (8 – 14.8)
Hispanic	59.8 (42.7 – 77)	12.5 (3.4 – 21.6)	2.3 (0 – 4.8)	19 (1 – 37.1)	6.3 (1.4 – 11.3)
Black*	48.9 (23 – 74.8)	31.8 (3.9 – 59.7)	7.2 (0 – 16.7)	8.1 (0 – 16.4)	4 (0 – 8.2)
Other*	69.7 (47.1 – 92.3)	0.4 (0 – 1.2)	12.4 (0 – 30.1)	16.7 (0 – 34.9)	0.7 (0 – 1.8)
White*	61.4 (55.8 – 67.1)	14 (10.2 – 17.9)	10.4 (6.5 – 14.4)	4.2 (1.2 – 7.1)	10 (6.8 – 13.1)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 4.6.

Table D-6. Duration of Most Recent Asthma Episode or Attack Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Minutes Percent (95% CI)	Hours Percent (95% CI)	Days Percent (95% CI)	Weeks Percent (95% CI)
Overall	48.6 (41.2 – 55.9)	24.5 (18.4 – 30.5)	19.6 (14.2 – 24.9)	7.4 (4.5 – 10.3)
Children	46.8 (34.1 – 59.5)	22.8 (11.1 – 34.5)	25.8 (15.4 – 36.2)	4.6 (1.2 – 8.1)
Adults	49.3 (40.4 – 58.1)	25.1 (18 – 32.1)	17.2 (11 – 23.4)	8.5 (4.6 – 12.3)
Male	62.4 (50.5 – 74.4)	18.7 (9.3 – 28.2)	14.6 (7.4 – 21.8)	4.3 (1.4 – 7.2)
Female	39.3 (31.7 – 47)	28 (20.6 – 35.5)	23 (15.8 – 30.3)	9.6 (5.2 – 14)
Hispanic	49.7 (24 – 75.5)	25.2 (8 – 42.4)	22.4 (4.4 – 40.4)	2.6 (0 – 6)
Black*	7.8 (0 – 16.7)	62.3 (32.7 – 91.9)	29.2 (4.3 – 54)	0.7 (0 – 1.9)
Other*	51.6 (18.8 – 84.5)	26.5 (1.7 – 51.2)	18.6 (0 – 44.4)	3.3 (0 -9.9)
White*	50.6 (42.5 – 58.6)	22.4 (16 – 28.7)	18.6 (12.5 – 24.7)	8.5 (4.9 – 12)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 4.7.

Comorbid Conditions

Table D-7. Comorbid Conditions Among Adults with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Chronic obstructive pulmonary disease		Emphysema		Chronic Bronchitis		Depression	
	No	Yes	No	Yes	No	Yes	No	Yes
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	91.2 (88.4 – 94)	8.8 (6 – 11.6)	95.5 (94.1 – 96.8)	4.5 (3.2 – 5.9)	78.5 (74 – 83.1)	21.5 (16.9 – 26)	71.8 (66.9 – 76.7)	28.2 (23.3 – 33.1)
Male	89.9 (83.8 – 96.1)	10.1 (3.9 – 16.2)	96.1 (93.9 – 98.3)	3.9 (1.7 – 6.1)	82.3 (74.2 – 90.4)	17.7 (9.6 – 25.8)	83.9 (76.7 – 91.1)	16.1 (8.9 – 23.3)
Female	92 (89.6 – 94.4)	8 (5.6 – 10.4)	95.1 (93.3 – 96.8)	4.9 (3.2 – 6.7)	76.1 (71 – 81.2)	23.9 (18.8 – 29)	64 (58.1 – 69.8)	36 (60.2 – 41.9)
Hispanic	98.4 (95.9 – 100)	1.6 (0 – 4.1)	95.3 (89.8 – 100)	4.7 (0 – 10.2)	84.8 (73.8 – 95.8)	15.2 (4.2 – 26.2)	75.1 (59.4 – 90.8)	24.9 (9.2 – 40.6)
Black*	91.3 (81.6 – 100)	8.7 (0 – 18.4)	91.8 (82.5 –100)	8.2 (0 – 17.5)	66 (43.1 – 88.9)	34 (11.1 – 56.9)	71.8 (49.7 – 93.8)	28.2 (6.2 – 50.3)
Other*	92.2 (78.2 – 100)	7.8 (0 – 21.8)	92.2 (78.2 – 100)	7.8 (0 – 21.8)	70.7 (44.4 – 96.9)	29.3 (3.1 – 55.6)	55.7 (24.9 – 86.6)	44.3 (13.4 – 75.1)
White*	90.5 (87.3 – 93.8)	9.5 (6.2 – 12.7)	95.7 (94.3 – 97.1)	4.3 (2.9 – 5.7)	78.4 (73.3 – 83.5)	21.6 (16.5 – 26.7)	55.7 (24.9 – 86.6)	44.3 (13.4 – 75.1)

* Denotes non-Hispanic. Responses to *AQ* questions 11.1 – 11.4.

Table D-8. Comorbid Respiratory Conditions Among Adults with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Any comorbid respiratory condition		No comorbid respiratory condition	One comorbid respiratory condition	Two comorbid respiratory conditions	Three comorbid respiratory conditions
	No	Yes	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
	Percent (95% CI)	Percent (95% CI)				
Overall	74.7 (70 – 79.4)	25.3 (20.6 – 30)	75 (70.3 – 79.6)	17.3 (13.3 – 21.3)	6 (3.4 – 8.5)	1.8 (0.9 – 2.7)
Male	79.8 (71.4 – 88.2)	20.2 (11.8 – 28.6)	80.1 (71.8 – 88.4)	10.3 (4.4 – 16.2)	7.6 (1.8 – 13.4)	2 (0.4 – 3.6)
Female	71.5 (66.2 – 76.8)	28.5 (23.2 – 33.8)	71.6 (66.3 – 76.9)	21.8 (16.7 – 26.8)	4.9 (3.1 – 6.7)	1.7 (0.6 – 2.9)
Hispanic	81.8 (69.5 – 94.2)	18.2 (5.8 – 30.5)	81.9 (69.7 – 94.2)	16 (4.3 – 27.6)	0.8 (0 – 2)	1.3 (0 – 3.6)
Black*	65.2 (42 – 88.4)	34.8 (11.6 – 58)	65.2 (42 – 88.3)	22.3 (4.2 – 40.3)	9.1 (0 – 18.9)	3.4 (0 – 9.6)
Other*	29.3 (3.1 – 55.6)	70.7 (44.4 – 96.9)	70.7 (44.4 – 96.9)	21 (0 – 44.9)	1 (0 – 2.5)	7.3 (0 – 21.3)
White*	74.4 (69.1 – 79.7)	25.6 (20.3 – 30.9)	74.7 (69.4 – 79.9)	17.1 (12.6 – 21.6)	6.5 (3.6 – 9.5)	1.7 (0.7 – 2.6)

* Denotes non-Hispanic.

Table D-9. Environmental Exposures Inside the Home Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Cooking gas		Environmental mold		Indoor pet(s)		Cockroaches	
	No	Yes	No	Yes	No	Yes	No	Yes
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	71.7 (67.4 – 76.1)	28.3 (23.9 – 32.6)	89.2 (86.4 – 91.9)	10.8 (8.1 – 13.6)	36.2 (31.5 – 40.9)	63.8 (59.1 – 68.5)	97.2 (95.3 – 99.1)	2.8 (0.9 – 4.7)
Children	73.2 (64.9 – 81.5)	26.8 (18.5 – 35.1)	90.3 (85.4 – 95.2)	9.7 (4.8 – 14.6)	27.2 (19.6 – 34.7)	72.8 (65.3 – 80.4)	95.7 (90 – 100)	4.3 (0 – 10)
Adults	71.2 (66.1 –76.3)	28.8 (23.7 – 33.9)	88.8 (85.5 – 92.1)	11.2 (7.9 – 14.5)	39.4 (33.7 – 45)	60.6 (55 – 66.3)	97.7 (96.1 – 99.2)	2.3 (0.8 – 3.9)
Male	74.1 (66.8 – 81.3)	25.9 (18.7 – 33.2)	89.9 (85.1 – 94.8)	10.1 (5.2 – 14.9)	39.8 (31.1 – 48.4)	60.2 (51.6 – 68.9)	97.9 (95.7 – 100)	2.1 (90 – 4.3)
Female	69.8 (64.5 – 75)	30.2 (25 – 35.5)	88.5 (85.4 – 91.6)	11.5 (8.4 – 14.6)	33.5 (28.6 – 38.5)	66.5 (61.5 – 71.4)	96.6 (93.7 – 99.5)	3.4 (0.5 – 6.3)
Hispanic	59.9 (44.5 – 75.4)	40.1 (24.6 – 55.5)	93.2 (86.7 – 99.7)	6.8 (0.3 – 13.3)	49 (32.3 – 65.7)	51 (34.3 – 67.7)	84.3 (72.7 – 95.9)	15.7 (4.1 – 27.3)
Black*	28.2 (10.7 – 45.6)	71.8 (54.4 – 89.3)	97.1 (94.4 – 99.9)	2.9 (0.1 – 5.6)	52.3 (26.5 – 78.1)	47.7 (21.9 – 73.5)	79.9 (51.6 – 100)	20.1 (0 – 48.4)
Other*	72.6 (52.7 – 92.6)	27.4 (7.4 – 47.3)	98.9 (97.2 – 100)	1.1 (0 – 2.8)	41.5 (19.6 – 63.4)	58.5 (36.6 – 80.4)	99.3 (98.2 – 100)	0.7 (0 – 1.8)
White*	75.5 (71 – 80.1)	24.5 (19.9 – 29)	88.2 (85 – 91.4)	11.8 (98.6 –15)	33.9 (28.7 – 39.2)	66.1 (60.8 – 71.3)	99.4 (98.8 – 100)	0.6 (0 – 1.2)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 7.4, 7.5, 7.6, and 7.8.

Table D-9 (continued)

Population Group	Rodents		Wood burning heating equipment		Unvented gas heating equipment		Carpeting or rugs in bedroom	
	No	Yes	No	Yes	No	Yes	No	Yes
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	88.8 (85 – 92.6)	11.2 (7.4 – 15)	75.2 (71 – 79.4)	24.8 (20.6 – 29)	93.3 (90.7 – 95.9)	6.7 (4.1 – 9.3)	40.3 (35.4 – 45.2)	59.7 (54.8 – 64.6)
Children	88.8 (80.8 – 96.7)	11.2 (3.3 – 19.2)	75.5 (68.1 – 82.9)	24.5 (17.1 – 31.9)	94.6 (90.3 – 98.9)	5.4 (1.1 – 9.7)	55.3 (46 – 64.5)	44.7 (35.5 – 54)
Adults	88.8 (84.5 – 93.1)	11.2 (6.9 – 15.5)	75.1 (70.1 – 80.1)	24.9 (19.9 – 29.9)	92.9 (89.7 – 96.1)	7.1 (3.9 – 10.3)	35 (29.5 – 4.5)	65 (59.5 – 70.5)
Male	91 (85.2 – 96.7)	9 (93.3 – 14.8)	71.8 (64.1 – 79.6)	28.2 (20.4 – 35.9)	92.1 (87.5 – 96.8)	7.9 (3.2 – 12.5)	37.3 (28.8 – 45.7)	62.7 (51.3 – 71.2)
Female	87 (81.9 – 92.1)	13 (7.9 – 18.1)	77.7 (73.2 – 82.1)	22.3 (17.9 – 26.8)	94.2 (91.2 – 97.20)	5.8 (2.8 – 8.8)	42.4 (36.8 – 48.1)	57.6 (51.9 – 63.2)
Hispanic	93.7 (84.9 – 100)	6.3 (0 – 15.1)	85.2 (67.1 – 100)	14.8 (0 – 32.9)	93 (84 – 100)	7 (69.3 – 16)	39.1 (24.2 – 54)	60.9 (46 – 75.8)
Black*	79.5 (51.3 – 100)	20.5 (0 – 48.7)	98.4 (96.2 – 100)	1.6 (0 – 3.8)	99 (97.6 – 100)	1 (0 – 2.4)	50.9 (25.8 – 76)	49.1 (24 – 74.2)
Other*	85.1 (63.3 – 100)	14.9 (0 – 36.7)	69.9 (49.2 – 90.6)	30.1 (9.4 – 50.8)	86.9 (69.3 – 100)	13.1 (0 – 30.7)	47.7 (24.1 – 71.3)	52.3 (28.7 – 75.9)
White*	89 (84.9 – 93.1)	11 (6.9 – 15.1)	73.4 (68.8 – 78)	26.6 (22 – 31.2)	93.5 (90.6 – 96.4)	6.5 (6.3 – 9.4)	39.9 (34.4 – 45.4)	60.1 (54.6 – 65.6)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 7.9, 7.10, 7.11, and 7.16.

Table D-10. Exposure to Tobacco Smoke Inside the Home Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Anyone smoked inside home in past week		Adult survey respondent is a tobacco smoker	
	No	Yes	No	Yes
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	91.8 (89.5 – 94)	8.2 (6 – 10.5)	86.1 (82.9 – 89.4)	13.9 (10.6 – 17.1)
Children	96.8 (94.1 – 99.5)	3.2 (0.5 – 5.9)	77.7 (69.4 – 85.9)	22.3 (14.1 – 30.6)
Adults	90 (87.1 – 92.8)	10 (7.2 – 12.9)	89.1 (85.9 – 92.3)	10.9 (7.7 – 14.1)
Male	94.1 (91.1 – 97.2)	5.9 (2.8 – 8.9)	88.7 (83.6 – 93.8)	11.3 (6.2 – 16.4)
Female	89.9 (86.7 – 93)	10.1 (7 – 13.3)	84 (79.7 – 88.3)	11.3 (6.2 – 16.4)
Hispanic	92.7 (86.9 – 98.4)	7.3 (1.6 – 13.1)	78.5 (66.7 – 90.2)	21.5 (9.8 – 33.3)
Black*	82 (68 – 96)	18 (94 –32)	58.2 (31 – 85.5)	41.8 (14.5 – 69)
Other*	95.5 (89.6 – 98.4)	4.5 (0 – 10.4)	80.3 (61.4 – 99.2)	19.7 (0.8 – 38.6)
White*	92.2 (89.7 – 94.7)	7.8 (5.3 – 10.3)	88.9 (85.7 – 92)	11.1 (8 – 14.3)

* Denotes non-Hispanic. Response to *AQ* and *CQ* items numbered 7.12.   Analysis of BRFSS variable RFSMOK3.

Table D-11. Actions Taken to Reduce Environemental Exposures Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Air cleaner/purifier regularly used		Dehumidifier regularly used		Kitchen exhaust fan regularly used		Bathroom exhaust fan regularly used	
	No	Yes	No	Yes	No	Yes	No	Yes
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	74.2 (69.8 – 78.7)	25.8 (21.3 – 30.2)	59.9 (54.9 – 64.9)	40.1 (35.1 – 45.1)	44.2 (39.2 – 49.2)	55.8 (50.8 – 60.8)	43 (38 – 48)	57 (52 – 62)
Children	72.1 (63.3 – 80.8)	27.9 (16.2 – 36.7)	59.3 (49.9 – 68.7)	40.7 (31.3 – 50.1)	47.8 (38.3 – 57.3)	52.2 (42.7 – 61.7)	36.3 (27 – 45.6)	63.7 (54.4 – 73)
Adults	75 (69.8 – 80.1)	25 (19.9 – 30.2)	60.1 (54.2 – 66)	39.9 (34 – 45.8)	42.9 (37.1 – 48.8)	57.1 (51.2 – 62.9)	45.3 (39.4 – 51.3)	54.7 (48.7 – 60.6)
Male	74.5 (66.6 – 82.4)	25.5 (17.6 – 33.4)	55.1 (46 – 64.1)	44.9 (35.9 – 54)	44.4 (35.4 – 53.4)	55.6 (46.6 – 64.6)	36.7 (27.7 – 45.7)	63.3 (54.3 – 72.3)
Female	73.9 (98.8 – 78.9)	26.1 (21.1 – 31.2)	63.7 (58.2 – 69.2)	36.3 (30.8 – 41.8)	44.1 (38.4 – 49.7)	55.9 (50.3 – 61.6)	47.7 (42 – 53.3)	52.3 (46.7 – 58)
Hispanic	80.5 (66.7 – 94.2)	19.5 (5.8 – 33.3)	65.6 (49.7 – 81.5)	34.4 (18.5 – 50.3)	41.3 (23.5 – 59)	58.7 (41 – 76.5)	57.7 (41.5 – 73.9)	42.3 (26.1 – 58.5)
Black*	83.6 (71.3 – 95.9)	16.4 (4.1 – 28.7)	65.2 (42.6 – 87.8)	34.8 (12.2 – 57.4)	52 (27.2 – 76.8)	48 (23.2 – 72.8)	56.2 (32.2 – 80.1)	43.8 (19.9 – 67.8)
Other*	83.5 (70.5 – 96.4)	16.5 (3.6 – 29.5)	74.2 (54.2 – 94.1)	25.8 (5.9 – 45.8)	53.6 (30.1 – 77.2)	46.4 (22.8 – 69.9)	61.6 (40.5 – 82.6)	38.4 (17.4 – 59.5)
White*	72.3 (67.2 – 77.4)	27.7 (22.6 – 32.8)	58.8 (53.2 – 64.5)	41.2 (35.5 – 46.8)	43.4 (37.8 – 49)	56.6 (51 – 62.2)	39.6 (34 – 45.2)	60.4 (54.8 – 66)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 7.1, 7.2, 7.3, and 7.18.

Population Group	Mattress cover		Pillow cover		Sheets/pillowcases washed in hot water		Pets not allowed in bedroom	
	No	Yes	No	Yes	No	Yes	No	Yes
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	59.5 (54.5 – 64.5)	40.5 (35.5 – 45.5)	63.7 (58.8 – 68.6)	36.3 (31.4 – 41.2)	57.3 (52.2 – 62.3)	42.7 (37.7 – 47.8)	71.5 (65.4 – 77.6)	28.5 (22.4 – 34.6)
Children	53.2 (43.7 – 62.7)	46.8 (37.3 – 56.3)	57.2 (47.7 – 66.7)	42.8 (33.3 – 52.3)	55.4 (45.9 – 65)	44.6 (35 – 54.1)	56.6 (45.3 – 68)	43.4 (32 – 54.7)
Adults	61.8 (55.8 – 67.7)	38.2 (32.3 – 44.2)	66 (60.3 – 71.7)	34 (28.3 – 39.7)	58 (52 – 63.9)	42 (36.1 – 48)	77.8 (70.7 – 84.9)	22.2 (15.1 – 29.3)
Male	59.9 (51 – 68.8)	40.1 (31.2 – 49)	65.9 (57.4 – 74.5)	34.1 (25.5 – 42.6)	58.3 (49.2 – 67.4)	41.7 (32.6 – 50.8)	71.4 (60.3 – 52.6)	28.6 (17.4 – 39.7)
Female	59.3 (53.6 – 65)	40.7 (35 – 46.4)	62.1 (56.5 – 67.7)	37.9 (32.3 – 43.5)	56.6 (51 – 62.2)	43.4 (37.8 – 49)	71.7 (64.9 – 78.5)	28.3 (21.5 – 35.1)
Hispanic	72.1 (58.9 – 85.4)	27.9 (14.6 – 41.1)	76.5 (64.8 – 88.3)	23.5 (11.7 – 35.2)	52.7 (37.6 – 67.8)	47.3 (32.2 – 62.4)	55.5 (29.1 – 81.8)	44.5 (18.2 – 70.9)
Black*	81.6 (68 – 95.3)	18.4 (4.7 – 32)	86.4 (74.2 – 98.6)	13.6 (1.4 – 25.8)	70.5 (49.1 – 92)	29.5 (8 – 50.9)	57.3 (14.2 – 100)	42.7 (0 – 85.8)
Other*	66 (41.8 – 90.3)	34 (9.7 – 58.2)	80.2 (62 – 98.4)	19.8 (1.6 – 38)	53.4 (28.7 – 78)	46.6 (22 – 71.3)	82.8 (54.1 – 100)	17.2 (0 – 45.9)
White*	56.7 (51 – 62.4)	43.3 (37.6 – 49)	60.3 (54.8 – 65.9)	39.7 (34.1 – 45.2)	57.1 (51.5 – 62.7)	42.9 (37.3 – 48.5)	73.5 (67 – 80.1)	26.5 (19.9 – 22)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 7.14, 7.15, 7.17, and 7.7.

Lost Productivity and Activity Limitation

Table D-12. Days Unable to Work or Carry Out Usual Activities because of Asthma During the Past 12 Months Among Adults with Current Asthma, Connecticut, ACBS 2007 – 2009

Adults (18+ years old)	0 days Percent (95% CI)	1 – 7 days Percent (95% CI)	8 – 30 days Percent (95% CI)	31 or more days Percent (95% CI)
Overall	75.7 (70.9 – 80.5)	17.1 (12.6 – 21.5)	5.5 (3.4 – 7.5)	1.8 (0.7 – 2.8)
Male	83.3 (75.3 – 91.4)	8.7 (1.8 – 15.7)	6.3 (2.1 – 10.4)	1.7 (0 – 3.3)
Female	70.7 (65.1 – 76.3)	22.5 (17.1 – 27.9)	4.9 (2.8 – 7.1)	1.8 (0.4 – 3.2)
Hispanic	62 (41.3 – 82.7)	19.4 (5.7 – 33.1)	16.1 (0.7 – 31.5)	2.5 (0 – 7.2)
Black*	77.6 (60.3 – 94.9)	13.2 (0.1 – 26.3)	7.2 (0 – 15.6)	2 (0 – 5.3)
Other*	84.4 (67.3 – 100)	2.9 (0 – 7.5)	7.3 (0 – 21.3)	5.4 (0 – 14.3)
White*	76.6 (71.3 – 81.8)	17.5 (12.5 – 22.5)	4.3 (2.5 – 6.2)	1.6 (0.5 – 2.7)

* Denotes non-Hispanic. Responses to *AQ* question 5.8A.

Table D-13. Days of School and Day Care Missed During the Past 12 Months because of Asthma Among Children with Current Asthma, Connecticut, ACBS 2007 – 2009

Children (0 – 17 years old)	School			Daycare		
	0 days	1 – 7 days	8 – 30 days	0 days	1 – 7 days	8 – 30 days
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	65.3 (56.7 – 73.9)	25.4 (18 – 32.9)	9.3 (3.5 – 15)	54 (29.8 – 78.2)	35.7 (11.8 – 59.7)	10.3 (0 – 26.7)
Male	69.1 (58.2 – 80)	22.5 (13. 1—32)	8.4 (1.2 – 15.6)	53.6 (11.9 – 95.2)	46.4 (4.8 – 88.1)	–
Female	59.7 (44.9 – 74.5)	29.7 (16.8 – 42.6)	10.6 (1.2 – 20)	54.2 (23.9 – 84.5)	30.1 (1.5 – 58.6)	15.7 (0 – 39.9)
Hispanic	61.3 (38.7 – 84)	33.2 (11.3 – 55.1)	5.4 (0 – 12.1)	93.7 (78.7 – 100)	6.3 (0 – 21.2)	–
Black*	41.1 (0 – 86.1)	23.5 (0 – 48.1)	35.4 (0 – 73.7)	73.1 (17. 1—100)	26.9 (0 – 82.9	–
Other*	43.6 (7 – 80.2)	52.2 (14.3 – 90)	4.2 (0 – 12.8)	40 (0 – 95.4)	51 (0 – 100)	9 (0 – 28.4)
White*	70.6 (61.2 – 80.1)	22 (13.9 – 30.1)	7.3 (1.2 – 13.4)	50.6 (20.7 – 80.5)	35.6 (6 – 65.2)	13.8 (0 – 39.4)
* Denotes non-Hispanic. Responses to *CQ* questions 10.5 and 10.12.						

Table D-14. Days of School and Day Care Missed During the Past 12 Months because of Asthma Among Children with Current Asthma, Connecticut, ACBS 2007 – 2009

Children (0 – 17 years old)	School or Daycare		
	0 days	1 – 7 days	8 – 30 days
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	65.2 (56.7 – 73.7)	23.8 (16.9 – 30.8)	11 (4.8 – 17.2)
Male	69.3 (58.5 – 80)	22.5 (13.2 – 31.8)	8.2 (1.2 – 15.3)
Female	59.2 (44.5 – 73.9)	26.1 (14.6 – 37.7)	14.6 (3.8 – 25.5)
Hispanic	61.3 (38.7 – 84)	32.5 (10.6 – 54.3)	6.2 (0 – 13.1)
Black*	41.1 (0 – 86.1)	23.5 (0 – 48.1)	35.4 (0 – 73.7)
Other*	42 (5.8 – 78.1)	31.4 (0 – 69.1)	26.7 (0 – 63.5)
White*	70.6 (61.3 – 80)	21.4 (13.4 – 29.4)	7.9 (1.9 – 14)
* Denotes non-Hispanic.			

Table D-15. Average Number of Days Missed Work (Adults) or School/Daycare (Children) in Past 12 Months Among Person with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Work	School
	Adults (18+ years)	Children (0 - 17 years)
	Percent (95% CI)	Percent (95% CI)
Overall	5.15 (2.84 – 7.45)	2.33 (1.35 – 3.31)
Male	4.48 (1.27 – 7.70)	1.77 (0.80 – 2.75)
Female	5.58 (2.40 – 8.76)	3.08 (1.15 – 5.01)
Hispanic	6.2 (1.46 – 10.96)	2.12 (0.84 – 3.40)
Black*	3.32 (0 – 6.92)	5.34 (0.24 – 10.44)
Other*	22.03 (0 – 59.25)	4.45 (2.13 – 6.77)
White*	4.56 (2.12 – 7.00)	1.86 (0.81 – 2.90)
* Denotes non-Hispanic.		

Table D-16. Activity Limitation due to Asthma During the Past 12 Months Among Persons with Current Asthma, Connecticut, ACBS 2007 –2009

Population Group	Not at all	A little	A moderate amount	A lot
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	46.1 (41 – 51.2)	38.8 (33.9 – 43.6)	12.5 (9 – 16)	2.7 (1.6 – 3.8)
Children	45.2 (35.8 – 54.6)	42.7 (33.5 – 51.9)	11.3 (5.6 – 16.9)	0.8 (0 – 1.8)
Adults	46.4 (40.4 – 52.4)	37.4 (31.6 – 43.1)	12.9 (8.7 – 17.1)	3.4 (2 – 4.8)
Male	52.6 (43.6 – 61.6)	30.8 (22.7 – 38.9)	15 (8.1 – 21.8)	1.6 (0.5 – 2.8)
Female	40.8 (35.3 – 46.3)	45.1 (39.4 – 50.7)	10.6 (7.6 – 13.6)	3.5 (1.9 – 5.2)
Hispanic	39.8 (21.7 – 57.9)	36.4 (21.5 – 51.4)	22 (9.7 – 34.3)	1.8 (0.1 – 3.4)
Black*	48.4 (22.8 – 74)	26.8 (9.8 – 43.8)	23.8 (3.4 – 44.2)	1 (0 – 1.9)
Other*	47.4 (23.9 – 70.9)	31.3 (9.2 – 53.5)	16.3 (0 – 34.6)	4.9 (0 – 10.9)
White*	46.7 (41.1 – 52.4)	40.4 (34.9 – 46)	10 (6.3 – 13.8)	2.8 (1.6 – 4.1)
* Denotes non-Hispanic. Responses to *AQ* question 5.9 and *CQ* question 5.6.				

Asthma Control

The classification of asthma control is based on responses to ACBS questions about the occurrence of asthma symptoms, asthma-related sleep difficulty, interference of asthma with normal activities, and use of short-acting beta agonists.

Table D-17. Classification of Asthma Control by Selected Population Demographics Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Classification of Asthma Control		
	Well-controlled	Not well-controlled	Very poorly controlled
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	34.1 (29.2 – 38.9)	48.2 (43.2 – 53.2)	17.8 (13.5 – 22)
Children	36.7 (27.7 – 45.7)	51 (41.6 – 60.4)	12.3 (5 – 19.6)
Adults	33.1 (27.4 – 38.9)	47.2 (41.3 – 53.1)	19.7 (14.5 – 24.8)
Male	38.5 (29.6 – 47.3)	42.5 (33.7 – 51.3)	19 (11.4 – 26.7)
Female	30.6 (25.5 – 35.7)	52.5 (46.9 – 58.2)	16.9 (12.1 – 21.6)
Hispanic	23.5 (9.2 – 37.9))	56.2 (40 – 72.4)	20.3 (9.9 – 30.7)
Black*	26 (4.3 – 47.7)	56 (31.3 – 80.8)	18 (0 – 36.5)
Other*	40.1 (16.6 – 63.7)	55 (31.5 – 78.5)	4.9 (0 – 10.9)
White*	35.9 (30.5 – 41.4)	46.6 (41.1 – 52.2)	17.4 (12.5 – 22.4)
* Denotes non-Hispanic.			

Table D-18. Classification of Asthma Control by Age Group Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Age Group	Classification of Asthma Control		
	Well-controlled	Not well-controlled	Very poorly controlled
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
0 – 4 years	25.1 (3.9 – 46.3)	53 (24.7 – 81.4)	21.9 (3.4 – 40.4)
5 – 11 years	39.7 (25.4 – 54)	47.3 (32.9 – 61.8)	13 (0 – 26.5)
12 – 17 years	35.1 (22 – 48.3)	55.7 (42 – 69.3)	9.2 (0.8 – 17.6)
18 – 24 years	39 (13 – 65)	34.5 (10.8 – 58.1)	26.5 (4.3 – 48.8)
25 – 34 years	29.6 (13.6 – 45.5)	47.7 (29.3 – 66)	22.8 (5 – 40.5)
35 – 44 years	31.1 (19.5 – 72.7)	51.3 (39.2 – 63.4)	17.7 (8.5 – 26.8)
45 – 54 years	35.7 (26.3 – 45.2)	50.4 (40.7 – 60.1)	13.9 (7.3 – 20.4)
55 – 64 years	31.9 (22.9 – 40.9)	47.4 (38.2 – 56.6)	20.7 (13.2 – 28.3)
65+ years	33.3 (25.4 – 41.2)	47.5 (39.4 – 55.5)	19.2 (13.3 – 25.1)

Table D-19. Classification of Asthma Control by Household Income Among Person with Current Asthma, Connecticut, ACBS 2007 – 2009

Household Income	Classification of Asthma Control		
	Well-controlled	Not well-controlled	Very poorly controlled
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
< $15,000	27.1 (5.1 – 49)	42.6 (25 – 60.3)	30.3 (15.5 – 45.1)
$15,000-$24,999	14.4 (5.8 – 23)	47.2 (32.2 – 62.3)	38.3 (21.4 – 55.3)
$25,000-$34,999	31.7 (14.8 – 48.6)	54.4 (35.9 – 73)	13.9 (4.9 – 22.9)
$35,000-$49,999	24.9 (5.6 – 44.2)	58.5 (40.2 – 76.9)	16.5 (5 – 28.1)
$50,000-$74,999	32.7 (20.1 – 45.3)	60.7 (48.2 – 73.2)	6/6 (1/7 – 11.5)
$75,000+	25.1 (33 – 47.6)	45.5 (37.7 – 53.3)	14.2 (7.3 – 21)

Table D-20. Asthma Medication Use Among Persons with Current Asthma in Past 3 Months, Connecticut, ACBS 2007 – 2009

Population Group	Prescription asthma medication use	Control medication	Rescue medication
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	67.9 (63.1 – 72.6)	40.0 (35.3 – 44.7)	55.7 (50.6 – 60.7)
Children	65.3 (56.1 – 74.6)	35.2 (26.8 – 43.5)	59.2 (49.6 – 68.7)
Adults	68.8 (63.2 – 74.3)	41.7 (36.0 – 47.4)	54.4 (48.5 – 60.4)
Male	67.9 (59.4 – 76.4)	35.3 (27.1 – 43.4)	56.4 (47.3 – 65.6)
Female	67.7 (62.4 – 73.0)	43.4 (37.9 – 48.9)	55.1 (49.5 – 60.8)
Hispanic	76.3 (64.2 – 88.4)	42.6 (27.1 – 58.1)	66.9 (53.3 – 80.5)
Black*	72.8 (52.1 – 93.5)	27.0 (13.7 – 40.3)	70.5 (49.9 – 91.0)
Other*	51.9 (30.2 – 73.6)	37.6 (23.5 – 51.8)	44.0 (21.3 – 66.7)
White*	67.1 (61.7 – 72.5)	40.4 (35.1 – 45.7)	54.2 (48.5 – 59.9)
* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 8.9, 8.21, 8.24, and 8.27.			

Table D-21. Asthma Medication Use Among Persons with Current Asthma in Past 3 Months, Connecticut, ACBS 2007 – 2009

Population Group	Control only	Rescue only	Control & rescue
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	11.7 (9.0 – 14.4)	28.1 (22.9 – 33.4)	27.5 (23.4 – 31.7)
Children	5.5 (2.2 – 8.8)	30.2 (20.2 – 40.2)	29.3 (21.2 – 37.3)
Adults	13.9 (10.4 – 17.4)	27.4 (21.2 – 33.6)	26.9 (22.1 – 31.8)
Male	10.7 (5.7 – 15.6)	33.1 (23.7 – 42.6)	23.5 (16.8 – 30.3)
Female	12.3 (9.3 – 15.2)	24.5 (18.7 – 30.2)	30.6 (25.5 – 35.7)
Hispanic	9.4 (2.3 – 16.4)	33.7 (15.2 – 52.2)	33.2 (19.6 – 46.8)
Black*	2.3 (-0.8 – 5.4)	45.5 (26.9 – 64.0)	24.5 (11.6 – 37.4)
Other*	6.1 (-2.1 – 14.4)	14.8 (-6.5 – 36.0)	29.2 (15.9 – 42.5)
White*	12.3 (9.2 – 15.4)	27.0 (21.3 – 32.8)	27.2 (22.6 – 31.9)
* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 8.8, 8.20, 8.23, and 8.25.			

Table D-22. Proper Use of Inhaled Control & Rescue Medications Among Persons with Current Asthma in Past 3 Months, Connecticut, ACBS 2007 – 2009

Population Group	Proper use of control medication	Proper use of rescue medication
	Percent (95% CI)	Percent (95% CI)
Overall	56.6 (49.8 – 63.4)	64.8 (58.0 – 71.6)
Children	43.1 (29.7 – 56.5)	56.9 (43.6 – 70.2)
Adults	60.2 (52.3 – 68.0)	67.7 (59.5 – 75.4)
Male	57.3 (45.5 – 69.1)	63.3 (51.5 – 75.2)
Female	55.8 (47.5 – 64.1)	65.8 (57.9 – 73.8)
Hispanic	31.4 (12.9 – 49.8)	51.4 (30.4 – 72.4)
Black*	48.2 (34.2 – 62.2)	65.6 (58.4 – 72.8)
Other*	50.9 (42.3 – 59.5)	93.2 (85.3 – 101)
White*	60.6 (52.9 – 68.2)	65.2 (57.5 – 72.8)
* Denotes non-Hispanic. Responses to questions in the Medications section of the *AQ* and *CQ*.		

Table D-23. Last Talked With Doctor or Other Health Care Professional About Asthma Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Within past year	1 to < 3 years ago	3 – 5 years ago	> 5 years ago	Never
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	73.3 (68.6 – 78)	18 (13.7 – 22.2)	3.9 (2.1 – 5.8)	4.6 (2.5 – 6.7)	0.2 (0 – 0.5)
Children	81.6 (74.5 – 88.7)	16.4 (9.5 – 23.4)	1.4 (0 – 2.9)	0 (0 – 0.1)	0.5 (0 – 1.3)
Adults	70.4 (64.7 – 76.1)	18.5 (13.3 – 23.6)	4.8 (2.4 – 7.2)	6.2 (3.4 – 9)	0.2 (0 – 0.3)
Male	69.2 (60.4 – 78)	22.7 (14.5 – 30.9)	3.8 (0.2 – 7.4)	4 (0.2 – 7.9)	0.3 (0 – 0.6)
Female	76.3 (71.8 – 80.9)	14.3 (10.5 – 18.2)	4 (2.2 – 5.9)	5 (2.8 – 7.2)	0.2 (0 – 0.6)
Hispanic	81.2 (66.1 – 96.2)	9.9 (0 – 22.9)	5.2 (0 – 14)	3.8 (0 – 8.2)	—
Black*	91.4 (84.5 – 98.3)	6 (0.5 – 11.5)	0.9 (0 – 2.4)	1.7 (0 – 4.7)	—
Other*	60.9 (36.9 – 84.9)	29.7 (5.9 – 53.6)	0.8 (0 – 2.3)	8.6 (0 – 20.4)	—
White*	71.7 (66.4 – 77)	19.3 (14.5 – 24.2)	4 (2 – 6.1)	4.6 (2.2 – 7.1)	0.3 (0 – 0.6)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 3.3.

Table D-24. Number of Routine Checkups for Asthma in Past 12 Months Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	None	One	2 – 5 visits	6 or more visits
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	40.1 (35.1 – 45.2)	29.1 (24.3 – 33.9)	27.2 (23 – 31.5)	3.6 (2.2 – 4.9)
Children	30.6 (22.1 – 39.1)	31.2 (22.4 – 40.1)	34.3 (25.4 – 43.2)	3.8 (0.3 – 7.4)
Adults	43.5 (37.5 – 49.5)	28.3 (22.6 – 34)	24.7 (20.1 – 29.4)	3.5 (2.1 – 4.8)
Male	44.4 (35.3 – 53.3)	30 (21.3 – 38.6)	22.6 (16.2 – 29)	3 (0.7 – 5.3)
Female	36.9 (31.6 – 42.2)	28.3 (23 – 33.5)	31 (25.6 – 36.5)	3.8 (2.2 – 5.3)
Hispanic	26.5 (10.6 – 42.3)	28.8 (11.1 – 46.5)	39 (23.8 – 54.2)	5.7 (1.3 – 10.2)
Black*	21.4 (0.5 – 42.3)	13.8 (2.1 – 25.5)	53.3 (28.4 – 78.3)	11.5 (0 – 29.7)
Other*	54.2 (30.8 – 77.6)	1.2 (11.8 – 57.1)	34.4 (11.8 – 57.1)	10.2 (0 – 21.6)
White*	42.5 (36.8 – 48.1)	31 (25.6 – 36.4)	24 (19.5 – 28.5)	2.5 (1.5 – 3.6)

* Denotes non-Hispanic. Responses to *AQ* item 5.1 and *CQ* item 5.7.

Table D-26. Number of Emergency Room or Urgent Care Center Visits for Asthma in Past 12 Months by Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	None	One	Two or more
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	89 (85.4 – 92.5)	5.8 (3.2 – 8.5)	5.2 (2.7 – 7.7)
Children	88.2 (92.3 – 94)	7.3 (2.1 – 12.5)	4.6 (1.6 – 7.5)
Adults	89.2 (85 – 93.5)	5.3 (2.3 – 8.4)	5.4 (2.2 – 8.6)
Male	89.1 (83.3 – 95)	5.5 (0.8 – 10.1)	5.4 (1.5 – 9.3)
Female	88.8 (84.5 – 93)	6.1 (3.1 – 9.2)	5.1 (1.8 – 8.4)
Hispanic	81.9 (72 – 91.8)	3.8 (0 – 7.6)	14.3 (5.3 – 23.3)
Black*	75.2 (54.7 – 95.7)	15.7 (0 – 34.2)	9.1 (0 – 19.7)
Other*	83.3 (64.5 – 100)	12.3 (0 – 29.9)	4.4 (0 – 12.8)
White*	90.5 (86.5 – 94.5)	5.4 (2.4 – 8.3)	4.1 (1.3 – 7)

* Denotes non-Hispanic. Responses to *AQ* item 5.3 and *CQ* item 5.9.

Table D-27. Number of Doctor Visits for Urgent Treatment of Worsening Asthma Symptoms in Past 12 Months by Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	None Percent (95% CI)	One Percent (95% CI)	Two or more Percent (95% CI)
Overall	74.5 (70.2 – 78.9)	12.4 (9.1 – 15.7)	13.1 (9.8 – 16.4)
Children	70.8 (62.6 – 79)	12.5 (6.8 – 18.3)	16.6 (10 – 23.3)
Adults	75.8 (70.7 – 81)	12.3 (8.4 – 16.3)	11.8 (8 – 15.6)
Male	80 (73 – 87)	10.7 (4.9 – 16.5)	9.3 (407 – 13.9)
Female	70.2 (64.8 – 75.5)	13.8 (10 – 17.6)	16.1 (11.5 – 20.7)
Hispanic	59 (41.7 – 76.3)	18.6 (0.4 – 36.7)	22.4 (11.1 – 33.8)
Black*	66.3 (44.1 – 88.4)	5.1 (0.3 – 9.9)	28.7 (7.2 – 50.1)
Other*	60.3 (36.7 – 84)	25.4 (3.8 – 46.9)	14.3 (0 – 31.3)
White*	77.5 (72.9 – 82.1)	11.3 (8.1 – 14.6)	11.1 (7.5 – 14.8)
* Denotes non-Hispanic. Responses to *AQ* question 5.4 and *CQ* questions 5.10.			

Alternative Care

Table D-24. Alternative Self-Care Therapies Used to Control Asthma in Past 12 Months Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Herbs	Vitamins	Aromatherapy	Homeopathy	Yoga	Breathing Techniques	At least one self-care therapy
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	2.3 (1.1 – 3.4)	8.3 (5.3 – 11.2)	3.5 (1.2 – 5.7)	2.7 (0 – 5.5)	3.1 (1.9 – 4.3)	25.5 (20.9 – 30)	33.2 (28.2 – 38.1)
Children	0.3 (0 – 0.7)	8.8 (2.3 – 15.3)	2 (0 – 4.4)	0.9 (0 – 2.6)	2.5 (0.1 – 4.9)	18.7 (10.6 – 26.8)	23.8 (15.3 – 32.2)
Adults	3 (1.4 – 4.5)	8.1 (4.8 – 11.4)	4 (1 – 6.9)	3.4 (0 – 7.1)	3.3 (2 – 4.7)	27.8 (22.4 – 33.2)	36.5 (30.6 – 42.4)
Male	2 (0 – 4)	8.6 (3.4 – 13.7)	4.1 (0 –8.9)	5.1 (0 – 11.3)	1.9 (0.3 – 3.4)	22.2 (14.6 – 29.9)	31.4 (22.6 – 40.2)
Female	2.5 (1.3 – 3.8)	8 94.6 – 11.5)	3 (1.4 – 4.6)	0.9 (0.2 – 1.6)	4.1 (2.4 – 5.8)	28.1 (22.7 – 33.5)	34.7 (29.2 – 40.2)
Hispanic	6 (0 – 14.9)	14.4 (3.3 – 25.4)	2.1 (0 – 5.3)	2.6 (0 – 7.4)	0.2 (0 – 0.5)	26.9 (14.3 – 39.5)	42.4 (26.5 – 58.3)
Black*	1 (0 – 2.8)	3 (0 – 7.4)	3.2 (0 – 8.3)	—	2.6 (0 – 6.9)	19.9 (0.5 – 39.2)	25.1 (4.8 – 45.3)
Other*	4.8 (0 – 1.8)	15.6 (0 – 31.8)	1.7 (0 – 4.5)	0.3 (0 –0.8)	3.5 (2.1 – 4.9)	24.6 (2.4 – 46.9)	38.6 (4.7 – 62.5)
White*	1.8 (0.9 – 2.7)	7.6 (4.2 – 11)	3.7 (1 – 6.5)	3 (0 – 6.4)	3 (0 – 7.3)	25.7 (20.5 – 30.9)	32.5 (26.9 – 38.1)

* Denotes non-Hispanic. Responses to *AQ* questions 12.1, 12.2, 12.5, 12.6, 12.8, and 12.9; and *CQ* questions 11.1, 11.2, 11.5, 11.6, 11.8, and 11.9.

Table D-25. Alternative Practitioner-Care Therapies Used to Control Asthma in Past 12 Months Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Population Group	Acupuncture	Acupressure	Reflexology	Naturopathy	At least one practitioner-care therapy
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Overall	1.2 (0.2 – 2.2)	1.5 (0 – 3.1)	1.1 (0.4 – 1.7)	2 (0.2 – 3.8)	4.1 (2 – 6.2)
Children	0.2 (0 – 0.5)	0.5 (0 – 1.4)	0.4 (0 – 1.1)	1.9 (0 – 5.2)	3 (0 – 6.5)
Adults	1.6 (0.3 – 2.9)	1.9 (0 – 3.9)	1.3 (0.5 – 2.1)	2 (0 – 4.1)	4.5 (2 – 7.1)
Male	1.6 (0 – 3.6)	2.1 (0 – 5.5)	0.4 (0 – 0.8)	3.2 (0 –7.1)	5.4 (1 – 9.8)
Female	0.9 (0.2 – 1.7)	1 (0.1 – 1.9)	1.6 (0.5 – 2.7)	1.1 (0.2 – 1.9)	3.1 (1.6 – 4.6)
Hispanic	6.8 (0 – 16)	—	1.6 (0 – 4.6)	0.3 (0 – 1)	8.7 (0 – 18.2)
Black*	—	—	1.3 (0 – 3.8)	10 (0 – 28.2)	10 (0 – 28.2)
Other*	—	—	—	1.7 (0 – 5.2)	3 (0 – 7.3)
White*	0.7 (0.2 – 1.3)	1.8 (0 – 3.8)	1.1 (0.4 – 1.8)	1.8 (0 – 3.7)	3.4 (1.3 – 5.5)

* Denotes non-Hispanic.
Responses to *AQ* questions 12.3, 12.4, 12.7, and 12.10; and CQ questions 11.3, 11.4, 11.7, and 11.10.

Table D-26. Education from Health Professional about Asthma Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Has a doctor or other health professional ever taught you...	Overall	Child	Adult	Male	Female	Hispanic	Black*	Other*	White*
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
How to recognize early signs or symptoms of an asthma episode?	73.6 (69.1 – 78)	87.2 (81.7 – 92.7)	68.7 (63.1 – 74.3)	72.2 (63.6 – 80.9)	74.4 (70.1 – 78.7)	79.9 (67.2 – 92.6)	85.3 (74.7 – 95.8)	77.8 (59.8 – 95.9)	71.8 (66.6 – 77)
What to do during an asthma episode or attack?	83.3 (80.1 – 86.5)	88.2 (81..8 – 94.5)	81.6 (77.9 – 85.4)	85.9 (80.6 – 91.2)	81.3 (77.4 – 85.2)	75.5 (62.6 – 88.4)	88.8 (79.4 – 98.2)	88.4 (76.1 – 100)	83.8 (80.3 – 87.4)
How to use a peak flow meter to adjust your daily medications?	44.7 (39.7 – 49.7)	48.3 (42.3 – 61)	43.5 (37.5 – 49.4)	45 (36 – 54)	44.2 (38.7 – 49.8)	60.1 (43.8 – 76.5)	39.1 (16.2 – 62)	40.2 (16.9 – 63.4)	43.3 (37.8 – 48.9)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* questions 6.1 – 6.3.

Table D-27. Ever Received and Asthma Action Plan from a Health Professional Among Persons with Current Asthma, Connecticut, ACBS 2007 – 2009

Question	Overall	Child	Adult	Male	Female	Hispanic	Black*	Other*	White*
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)
Has a doctor or other health professional ever given you an asthma action plan?	34.3 (29.5 – 39)	56 (46.5 – 65.5)	26.8 (21.6 – 32)	40.8 (32 – 49.6)	29.1 (24.1 – 34)	38.2 (23.3 – 53.2)	20.5 (1.2 – 39.8)	27.6 (7.2 – 48)	34.7 (29.3 – 40.1)

* Denotes non-Hispanic. Responses to *AQ* and *CQ* items numbered 6.4.

Appendix E: Asthma Hospitalization Detailed Tables

Table E-1. Asthma Hospitalization Rates by Year and Primary and Secondary Diagnosis, Connecticut (2000 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. Hospitalizations	Age-adjusted rate per 10,000	No. Hospitalizations	Age-adjusted rate per 10,000	No. Hospitalizations	Age-adjusted rate per 10,000
Primary Diagnosis						
2000	2,518	9.6	1,370	16.3	3,888	11.3
2001	2,527	9.6	1,430	17.1	3,957	11.5
2002	2,817	10.6	1,584	19	4,401	12.8
2003	3,154	11.8	1,602	19.2	4,756	13.7
2004	2,842	10.5	1,467	17.7	4,309	12.4
2005	3,126	11.5	1,378	16.8	4,504	12.9
2006	3,306	12.2	1,557	19.2	4,863	14
2007	3,278	11.8	1,459	18.1	4,737	13.5
2008	3,487	12.5	1,314	16.5	4,801	13.5
2009	3,648	13.1	1,498	18.9	5,146	14.6
Secondary Diagnosis						
2000	12,283	46.9	1,207	14.5	13,490	38.5
2001	14,299	54.3	1,365	16.3	15,664	44.5
2002	15,333	57.8	1,443	17.2	16,776	47.3
2003	17,384	65	1,709	20.3	19,093	53.5
2004	19,602	73	1,939	23	21,541	60.1
2005	21,585	80.1	2,151	25.7	23,736	66.1
2006	23,318	86.1	2276	27.3	25594	70.9
2007	23,934	88.1	2,397	28.9	26,331	72.9
2008	23,224	85	2,210	26.8	25,434	70
2009	23,507	85.6	2,581	31.6	26,088	71.7

Table E-2. Asthma Hospitalization Rates by Year and Sex, Primary Diagnosis, Connecticut (2005 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. Hospitalizations	Age-adjusted rate per 10,000	No. Hospitalizations	Age-adjusted rate per 10,000	No. Hospitalizations	Age-adjusted rate per 10,000
Male						
2005	902	7.3	883	21.1	1,785	10.8
2006	912	7.2	1,003	24.2	1915	11.6
2007	882	7	925	22.5	1,807	11
2008	983	7.7	824	20.2	1,807	10.9
2009	1,024	8	944	23.3	1,968	11.9
Female						
2005	2,224	15.4	495	12.4	2,719	14.6
2006	2393	16.7	554	13.9	2947	16
2007	2,394	16.3	534	13.5	2,928	15.6
2008	2,503	17	490	12.5	2,993	15.8
2009	2,624	17.9	554	14.3	3,178	17

Table E-3. Asthma Hospitalization Rates by Year and Race/Ethnicity, Primary Diagnosis, Connecticut (2005 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. Hospitalizations	Age-adjusted rate per 10,000	No. Hospitalizations	Age-adjusted rate per 10,000	No. Hospitalizations	Age-adjusted rate per 10,000
Hispanic						
2005	620	34.5	343	25.7	963	32.2
2006	731	36.8	460	33.5	1,191	35.9
2007	790	40.3	416	29.2	1,206	37.5
2008	923	47.1	369	25.1	1,292	41.4
2009	905	43.8	468	31.1	1,373	40.5
Black, non-Hispanic						
2005	640	29.8	397	43.6	1,037	33.4
2006	688	31.5	443	49.1	1,131	36
2007	681	30.3	435	48.6	1,116	35
2008	753	33.2	415	46.5	1,168	36.6
2009	885	38.4	415	46.4	1,300	40.5
Other, non-Hispanic						
2005	114	15.2	115	20.7	229	16.6
2006	118	13.4	89	15.7	207	14
2007	86	10.5	100	16.8	186	12.1
2008	92	10.5	96	15.9	188	11.9
2009	92	10.2	100	16.4	192	11.8
White, non-Hispanic						
2005	1,752	7.8	523	9.8	2,275	8.3
2006	1768	7.9	565	10.8	2333	8.7
2007	1,719	7.6	508	10	2,227	8.2
2008	1,718	7.5	434	8.8	2,152	7.9
2009	1,765	7.9	515	10.6	2,280	8.6

Table E-4. Asthma Hospitalization Rates by Year and Age Group, Primary Diagnosis, Connecticut (2005 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. Hospitalizations	Crude rate per 10,000	No. Hospitalizations	Crude rate per 10,000	No. Hospitalizations	Crude rate per 10,000
0 – 4 years						
2005			675	31.3	675	31.3
2006			781	36.5	781	36.5
2007			769	36.1	769	36.1
2008			704	33.3	704	33.3
2009			714	33.9	714	33.9
5 – 11 years						
2005			485	15.1	485	15.1
2006			522	16.4	522	16.4
2007			480	15.3	480	15.3
2008			432	13.9	432	13.9
2009			578	18.7	578	18.7

Table E-4 (continued)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. Hospitalizations	Crude rate per 10,000	No. Hospitalizations	Crude rate per 10,000	No. Hospitalizations	Crude rate per 10,000
12 – 17 years						
2005			218	7.3	218	7.3
2006			254	8.5	254	8.5
2007			210	7.1	210	7.1
2008			178	6.1	178	6.1
2009			206	7.2	206	7.2
18 – 24 years						
2005	149	4.7			149	4.7
2006	179	5.5			179	5.5
2007	190	5.8			190	5.8
2008	200	6			200	6
2009	197	5.8			197	5.8
25 – 34 years						
2005	334	8.2			334	8.2
2006	345	8.6			345	8.6
2007	261	6.5			261	6.5
2008	281	6.9			281	6.9
2009	369	9			369	9
35 – 44 years						
2005	561	10.3			561	10.3
2006	647	12.1			647	12.1
2007	573	11			573	11
2008	543	10.7			543	10.7
2009	581	11.9			581	11.9
45 – 54 years						
2005	629	11.8			629	11.8
2006	671	12.4			671	12.4
2007	788	14.3			788	14.3
2008	827	14.9			827	14.9
2009	866	15.4			866	15.4
55 – 64 years						
2005	493	13.1			493	13.1
2006	519	13.4			519	13.4
2007	507	12.7			507	12.7
2008	555	13.7			555	13.7
2009	571	13.6			571	13.6
65+ years						
2005	960	20.5			960	20.5
2006	945	20.2			945	20.2
2007	959	20.3			959	20.3
2008	1,081	22.5			1,081	22.5
2009	1,064	21.8			1,064	21.8

Appendix F: Asthma Hospitalization Rates by Town 2005 – 2009

Table F-1. Asthma Hospitallization Rates by Town of Residence, Primary Diagnosis, Crude and Age-Adjusted Rates, Connecticut (2005 – 2009)

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
Andover	10	6.1	7.1
Ansonia	152	16.4	16.9
Ashford	27	12.2	11
Avon	35	4.1	3.3
Barkhamsted	11	6	6.3
Beacon Falls	18	6.3	6.3
Berlin	71	7.1	6.7
Bethany	14	5.1	6
Bethel	45	4.9	4.8
Bethlehem	*a*	*a*	*a*
Bloomfield	144	14.1	13.3
Bolton	9	3.5	5.1
Bozrah	13	10.8	11.7
Branford	206	14.2	15
Bridgeport	1,820	26.6	27.5
Bridgewater	*a*	*a*	*a*
Bristol	580	19.1	18.7
Brookfield	20	2.4	2.9
Brooklyn	31	7.9	7.9
Burlington	14	3.1	3.1
Canaan	32	56.1	39.4
Canterbury	17	6.7	7
Canton	30	6	6.3
Chaplin	15	11.9	12.8
Cheshire	66	4.6	4.8
Chester	6	3.1	3.6
Clinton	46	6.8	7.1
Colchester	53	6.8	7.4
Colebrook	*a*	*a*	*a*
Columbia	24	9	11
Cornwall & Warren	*a*	*a*	*a*
Coventry	38	6.2	6.4
Cromwell	32	4.7	4.7
Danbury	307	7.8	8
Darien	20	2	1.7
Deep River	13	5.6	6
Derby	84	13.6	13.2
Durham	23	6.2	7.4
East Granby	17	6.6	6.3

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
East Haddam	22	5	5.3
East Hampton	33	5.3	5.8
East Hartford	386	15.9	16.1
East Haven	323	22.6	23.4
East Lyme	79	8.4	8.6
East Windsor	52	9.8	8.9
Eastford	7	8.3	7.3
Easton	15	4.1	4.4
Ellington	21	2.9	3.2
Enfield	298	13.2	12.4
Essex	10	3	3.3
Fairfield	165	5.8	5.6
Farmington	55	4.4	4.3
Franklin	7	7.7	7.4
Glastonbury	69	4.2	4.4
Goshen	7	4.4	5
Granby	23	4.1	4.9
Greenwich	233	7.6	6.9
Griswold & Lisbon	87	11.1	11.9
Groton	226	11.3	11.2
Guilford	83	7.4	7.6
Haddam	11	2.8	5
Hamden	523	18.1	18.9
Hampton	6	6	6.2
Hartford	1,994	32.2	35
Hartland	9	9	9.9
Harwinton	15	5.4	6.4
Hebron	21	4.5	5.4
Kent	*a*	*a*	*a*
Killingly	106	12	12.6
Killingworth	8	2.5	2.1
Lebanon	22	6	6
Ledyard	54	7.1	7.3
Litchfield	18	4.2	3.3
Madison	68	7.3	8.2
Manchester	236	8.5	8.8
Mansfield	57	4.6	9.1
Marlborough	12	3.8	4.5
Meriden	437	14.8	14.9
Middlebury	24	6.7	6.5
Middlefield	9	4.2	4.9
Middletown	210	8.8	9.2
Milford	220	8	7.8

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
Monroe	76	7.9	7.5
Montville	98	9.9	9.8
Morris	a	a	a
Naugatuck	193	12.1	12.4
New Britain	1,265	35.9	37.7
New Canaan	35	3.5	3.6
New Fairfield	21	3	3
New Hartford	7	2.1	2
New Haven	3,428	55.5	63.4
New London	299	22.9	27.7
New Milford	52	3.7	3.8
Newington	153	10.4	9.2
Newtown	49	3.7	3.7
Norfolk	a	a	a
North Branford	66	9.2	9.2
North Canaan	a	a	a
North Haven	133	11.1	11.3
North Stonington	16	6.1	5.3
Norwalk	468	11.2	11.4
Norwich	367	20.1	20
Old Lyme	23	6.2	6.2
Old Saybrook	29	5.5	6.6
Orange	58	8.4	7.4
Oxford	35	5.7	6.1
Plainfield	94	12.2	12.8
Plainville	113	13.1	12.4
Plymouth	83	13.8	14.3
Pomfret	9	4.3	4.8
Portland	33	6.9	6.8
Preston	42	17.1	12.7
Prospect	35	7.5	7.6
Putnam	60	12.9	12
Redding	22	5	4.3
Ridgefield	30	2.5	2.3
Rocky Hill	52	5.6	4.6
Roxbury	a	a	A
Salem	13	6.3	6.5
Salisbury	11	5.5	5.5
Scotland	a	a	a
Seymour	66	8.2	9.5
Sharon	11	7.3	6.1
Shelton	149	7.5	6.8
Sherman	a	a	a

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
Simsbury	31	2.6	2.6
Somers	34	6.2	5.8
South Windsor	80	6.2	6.4
Southbury	43	4.4	3.4
Southington	173	8.2	7.5
Sprague	18	12	15.9
Stafford & Union	103	16.5	15.4
Stamford	530	8.9	9.1
Sterling	12	6.5	6.2
Stonington	30	3.3	3.2
Stratford	291	11.9	11.3
Suffield	44	5.9	5.5
Thomaston	21	5.4	7.1
Thompson	40	8.7	10.3
Tolland	33	4.5	5.3
Torrington	203	11.4	11.8
Trumbull	147	8.5	7.7
Vernon	138	9.3	9.1
Voluntown	10	7.6	7.5
Wallingford	164	7.4	7.8
Washington	9	4.9	5.7
Waterbury	1,499	28	27.7
Waterford	114	12.1	11.6
Watertown	73	6.6	6.4
West Hartford	247	8.2	7.4
West Haven	785	29.8	31
Westbrook	16	4.8	5.4
Weston	18	3.6	3.8
Westport	53	4	4.2
Wethersfield	107	8.3	7.4
Willington	20	6.5	13
Wilton	32	3.6	3.3
Winchester	48	8.9	9
Windham	499	42.2	46.4
Windsor	151	10.5	10.2
Windsor Locks	37	6	5.7
Wolcott	65	8	8.7
Woodbridge	56	12.2	12.5
Woodbury	22	4.6	4.2
Woodstock	18	4.4	4.8

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.

State of Connecticut

Hospitalizations with
Asthma as Primary Diagnosis
Age-Adjusted Rates by Town of Residence
5-Year Period (2005 - 2009)

Legend

**Connecticut Towns
Rate**

☐	0 to 9 per 10,000
☐	10 to 24 per 10,000
☐	25 to 49 per 10,000
■	50+ per 10,000

0   5   10   20   30   40   50
Miles
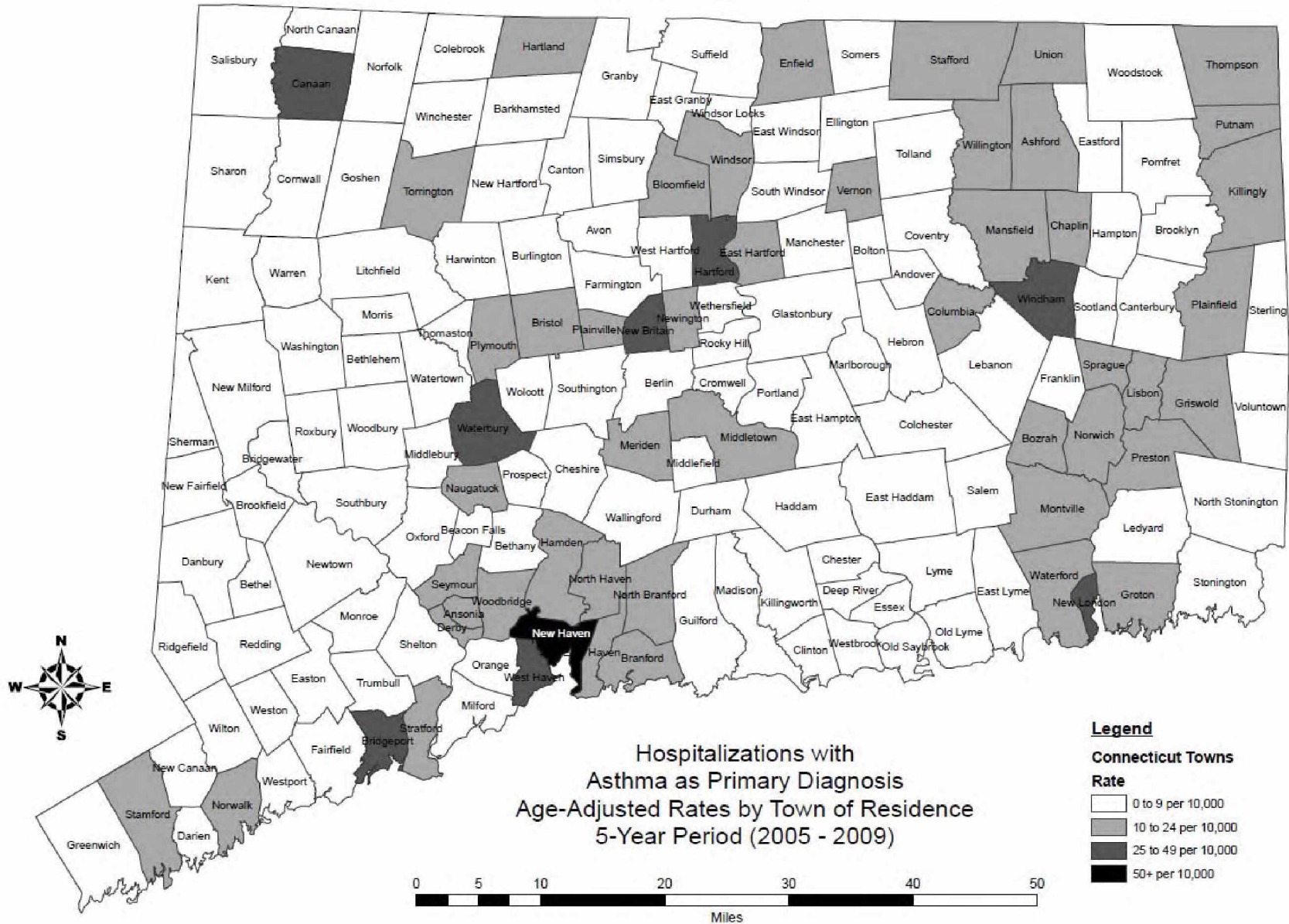
Appendix G: ED Visit Detailed Tables

Table G-1. Asthma ED Visit Rates by Year and Primary and Secondary Diagnosis, Connecticut (2000 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. ED Visits	Age-adjusted rate per 10,000	No. ED Visits	Age-adjusted rate per 10,000	No. ED Visits	Age-adjusted rate per 10,000
Primary Diagnosis						
2000	14,819	59.6	6,854	81.5	21,673	65.2
2001	14,485	58.1	7,140	84.9	21,625	65
2002	14,683	58.5	7,310	87	21,993	65.9
2003	15,904	63.1	7,587	90.3	23,491	70.1
2004	13,994	55.4	7,069	84.7	21,063	62.9
2005	14,880	58.8	6,650	80.2	21,530	64.3
2006	14,610	57.6	7,169	87.1	21,779	65.2
2007	14,047	55.3	6,986	85.9	21,033	63.2
2008	14,678	57.4	7,405	91.8	22,083	66.3
2009	15,668	61.2	8,571	107.1	24,239	73
Secondary Diagnosis						
2000	11,946	46.5	5,118	61	17,064	51.5
2001	14,489	56.1	6,964	82.9	21,453	64.6
2002	16,161	62.1	7,529	89.5	23,690	71.1
2003	19,055	72.7	8,692	103.2	27,747	82.7
2004	20,067	76.2	7,639	91	27,706	82.3
2005	21,436	81.1	8,209	98.4	29,645	88.1
2006	26,797	100.9	10,122	122	36,919	109.4
2007	29,534	110.8	11,559	140.4	41,093	122.3
2008	30,377	113	10,852	133.2	41,229	122.4
2009	35,015	129.2	15,817	196.1	50,832	151.6

Table G-2. Asthma ED Visit Rates by Year and Sex, Primary Diagnosis, Connecticut (2005 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. ED Visits	Age-adjusted rate per 10,000	No. ED Visits	Age-adjusted rate per 10,000	No. ED Visits	Age-adjusted rate per 10,000
Male						
2005	5,322	43.1	3,952	93.5	9,274	56.1
2006	5,264	42.2	4,201	100.3	9,465	57.2
2007	5,087	41	4,178	100.9	9,265	56.5
2008	5,228	41.6	4,525	110.2	9,753	59.3
2009	5,498	43.4	5,214	127.9	10,712	65.2
Female						
2005	9,558	74.2	2,698	66.1	12,256	72.1
2006	9,310	72.3	2,962	73	12,272	72.5
2007	8,917	69.1	2,799	70	11,716	69.3
2008	9,422	72.7	2,877	72.5	12,299	72.7
2009	10,136	78.5	3,342	84.9	13,478	80.2

Table G-3. Asthma ED Visit Rates by Year and Race/Ethnicity, Primary Diagnosis, Connecticut (2005 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. ED Visits	Age-adjusted rate per 10,000	No. ED Visits	Age-adjusted rate per 10,000	No. ED Visits	Age-adjusted rate per 10,000
Hispanic						
2005	3,694	145.1	1,937	146.6	5,631	145.5
2006	3,811	141.4	2,190	161.8	6,001	146.7
2007	3,807	135.9	2,404	172	6,211	145.2
2008	4,480	154.7	2,682	186.9	7,162	163
2009	4,696	152.9	3,257	221.2	7,953	170.5
Black, non-Hispanic						
2005	2,679	112.1	1,384	148.6	4,063	121.5
2006	2,561	105.9	1,526	165.8	4,087	121.3
2007	2,532	103.6	1,452	160.2	3,984	118.2
2008	2,665	107	1,465	162.1	4,130	121.2
2009	2,846	111.9	1,541	171.7	4,387	127.3
Other, non-Hispanic						
2005	467	43.6	376	75.6	843	51.9
2006	467	39	332	64.7	799	45.1
2007	375	31.6	289	54.7	664	37.1
2008	365	28	310	57.3	675	35.2
2009	445	34.5	355	63.9	800	41.7
White, non-Hispanic						
2005	6,169	33	1,820	32.6	7,989	32.9
2006	5,905	31.8	1,954	35.5	7,859	32.7
2007	5,515	30	1,715	32.2	7,230	30.5
2008	5,591	30.1	1,634	31.4	7,225	30.5
2009	5,953	32.6	1,984	39	7,937	34.2

Table G-4. Asthma ED Visit Rates by Year and Age Group, Primary Diagnosis, Connecticut (2005 – 2009)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. ED Visits	Crude rate per 10,000	No. ED Visits	Crude rate per 10,000	No. ED Visits	Crude rate per 10,000
0 – 4 years						
2005			2,344	108.6	2,344	108.6
2006			2,589	121	2,589	121
2007			2,614	122.6	2,614	122.6
2008			2,843	134.3	2,843	134.3
2009			3,159	150.1	3,159	150.1
5 – 11 years						
2005			2,478	77	2,478	77
2006			2,554	80.4	2,554	80.4
2007			2,642	84.2	2,642	84.2
2008			2,802	89.9	2,802	89.9
2009			3,403	109.9	3,403	109.9

Table G-4 (continued)

Year	Adults (18+ years old)		Children (0 – 17 years old)		Total population	
	No. ED Visits	Crude rate per 10,000	No. ED Visits	Crude rate per 10,000	No. ED Visits	Crude rate per 10,000
12 – 17 years						
2005			1,828	61.3	1,828	61.3
2006			2,026	68	2,026	68
2007			1,730	58.5	1,730	58.5
2008			1,760	60.4	1,760	60.4
2009			2,009	69.8	2,009	69.8
18 – 24 years						
2005	2,764	87.7			2,764	87.7
2006	2,712	83.8			2,712	83.8
2007	2,654	81.3			2,654	81.3
2008	2,822	84.5			2,822	84.5
2009	3,099	91			3,099	91
25 – 34 years						
2005	3,601	88.7			3,601	88.7
2006	3,446	86.2			3,446	86.2
2007	3,129	78.5			3,129	78.5
2008	3,329	82.2			3,329	82.2
2009	3,858	93.8			3,858	93.8
35 – 44 years						
2005	3,720	68.3			3,720	68.3
2006	3,673	68.7			3,673	68.7
2007	3,619	69.5			3,619	69.5
2008	3,500	69.1			3,500	69.1
2009	3,501	71.7			3,501	71.7
45 – 54 years						
2005	2,604	49			2,604	49
2006	2,646	48.8			2,646	48.8
2007	2,720	49.4			2,720	49.4
2008	2,889	51.9			2,889	51.9
2009	3,024	53.8			3,024	53.8
55 – 64 years						
2005	1,178	31.3			1,178	31.3
2006	1,190	30.6			1,190	30.6
2007	1,072	26.9			1,072	26.9
2008	1,184	29.1			1,184	29.1
2009	1,283	30.6			1,283	30.6
65+ years						
2005	1,013	21.7			1,013	21.7
2006	943	20.2			943	20.2
2007	853	18.1			853	18.1
2008	954	19.9			954	19.9
2009	903	18.5			903	18.5

Appendix H: Asthma ED Visit Rates by Town 2005 – 2009

Table H-1. Asthma ED Visit Rates by Town of Residence, Primary Diagnosis, Crude and Age-Adjusted Rates, Connecticut (2005 – 2009)

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
Andover	54	33	40.2
Ansonia	1,076	116.1	120.7
Ashford	79	35.6	36
Avon	92	10.7	12.5
Barkhamsted	76	41.4	45.2
Beacon Falls	122	42.6	46.7
Berlin	217	21.6	26
Bethany	56	20.3	28.7
Bethel	266	28.8	32
Bethlehem	32	17.9	21.4
Bloomfield	484	47.3	59.3
Bolton	56	21.8	33.7
Bozrah	59	48.9	56.2
Branford	370	25.6	31.1
Bridgeport	8,782	128.5	126.3
Bridgewater	12	14.6	18.6
Bristol	2,760	90.7	95.5
Brookfield	170	20.8	22.7
Brooklyn	125	31.9	32.7
Burlington	71	15.6	24.8
Canaan	86	150.9	177.3
Canterbury	86	33.9	37.7
Canton	92	18.4	20.8
Chaplin	46	36.6	35.2
Cheshire	230	15.9	16.6
Chester	58	30.3	33.9
Clinton	306	45.1	57.7
Colchester	404	52	53.5
Colebrook	15	19.5	17.2
Columbia	79	29.6	33.7
Cornwall & Warren	14	9.6	12.9
Coventry	213	34.9	37.8
Cromwell	182	26.8	30.8
Danbury	1,871	47.5	49.2
Darien	114	11.3	11.9
Deep River	77	32.9	36.4
Derby	655	105.7	115.9
Durham	73	19.8	21.8

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.
Note: Rates based on < 20 ED visits may be unstable and should be interpreted with caution.

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
East Granby	30	11.6	11.9
East Haddam	131	29.6	32.3
East Hampton	376	60.1	67
East Hartford	2,318	95.3	103
East Haven	681	47.7	54
East Lyme	298	31.7	34
East Windsor	222	41.7	46.5
Eastford	18	21.3	23.1
Easton	29	7.9	9.5
Ellington	270	37.4	39.6
Enfield	790	35.1	37.2
Essex	86	25.4	29.4
Fairfield	463	16.2	18.5
Farmington	253	20.3	22.7
Franklin	43	47.4	63.3
Glastonbury	317	19.2	20.5
Goshen	47	29.7	41.2
Granby	55	9.9	12.8
Greenwich	754	24.5	28.6
Griswold & Lisbon	403	51.6	56.4
Groton	2,790	139.1	141.7
Guilford	219	19.7	22.7
Haddam	96	24.7	29.3
Hamden	1,197	41.4	46.1
Hampton	28	28	33.4
Hartford	13,473	217.4	216.6
Hartland	21	21.1	28.5
Harwinton	67	24.1	28.4
Hebron	202	43.8	53
Kent	31	21	30.4
Killingly	551	62.6	67.2
Killingworth	55	17	18.3
Lebanon	114	31	32.8
Ledyard	634	83.6	86.5
Litchfield	101	23.3	28.9
Lyme	*a*	*a*	*a*
Madison	172	18.4	23.9
Manchester	2,281	81.8	85.2
Mansfield	151	12.1	22.8
Marlborough	137	43.5	49.8
Meriden	3,025	102.4	106.9
Middlebury	54	15	16.5

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.

Note: Rates based on < 20 ED visits may be unstable and should be interpreted with caution.

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
Middlefield	62	29.1	37.6
Middletown	1,435	60.2	64.6
Milford	1,253	45.3	47.5
Monroe	140	14.5	16.2
Montville	632	63.9	66.5
Morris	27	22.5	24.1
Naugatuck	777	48.8	49.5
New Britain	5,527	156.7	166.2
New Canaan	94	9.5	10.6
New Fairfield	120	17.1	18.9
New Hartford	77	22.9	25.7
New Haven	8,303	134.3	136.6
New London	2,359	180.6	193
New Milford	524	36.8	38.9
Newington	332	22.5	24.9
Newtown	230	17.2	20.5
Norfolk	38	44.1	46.2
North Branford	142	19.8	22.9
North Canaan	16	9.5	12.4
North Haven	248	20.8	24.6
North Stonington	100	38.1	40.1
Norwalk	1,947	46.8	48.4
Norwich	2,109	115.3	119.3
Old Lyme	128	34.5	38.6
Old Saybrook	163	31	41.1
Orange	169	24.5	27.8
Oxford	185	29.9	33.4
Plainfield	389	50.6	54.6
Plainville	369	42.9	46.7
Plymouth	361	60	63.4
Pomfret	41	19.8	20.6
Portland	139	29.2	32.9
Preston	102	41.5	47.9
Prospect	102	22	25
Putnam	271	58.5	62.7
Redding	47	10.7	11.5
Ridgefield	133	11.1	11.5
Rocky Hill	192	20.5	22.6
Roxbury	22	19.1	20.7
Salem	75	36.5	44.2
Salisbury	40	20	43
Scotland	20	21.2	22.3

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.
Note: Rates based on < 20 ED visits may be unstable and should be interpreted with caution.

Town	N	Crude Rate (per 10,000)	Age-Adjusted Rate (per 10,000)
Seymour	521	64.5	70.7
Sharon	66	43.7	46.6
Shelton	661	33.3	38.1
Sherman	27	13.2	15.1
Simsbury	146	12.4	13.7
Somers	126	23	25.1
South Windsor	310	23.9	28.6
Southbury	130	13.3	18
Southington	700	33.3	37.3
Sprague	112	74.7	97
Stafford & Union	342	54.9	64.2
Stamford	3,281	55.2	58.3
Sterling	45	24.5	27.2
Stonington	263	28.6	33.1
Stratford	1,144	46.8	51.1
Suffield	78	10.4	12.2
Thomaston	127	32.5	37
Thompson	190	41.1	57
Tolland	176	24	25.8
Torrington	1,230	69.3	75.3
Trumbull	296	17.1	19.7
Vernon	1,167	78.5	84
Voluntown	51	38.8	39.7
Wallingford	607	27.2	29.8
Washington	52	28.3	34.6
Waterbury	8,969	167.8	168.7
Waterford	637	67.5	77.9
Watertown	293	26.5	29.7
West Hartford	831	27.4	31
West Haven	1,956	74.2	77.8
Westbrook	125	37.7	45.6
Weston	43	8.5	8
Westport	117	8.8	9.8
Wethersfield	244	18.9	23.5
Willington	81	26.3	35.9
Wilton	93	10.5	11.2
Winchester	571	106.1	110.3
Windham	1,532	129.4	137.5
Windsor	597	41.5	44.8
Windsor Locks	152	24.5	27.5
Wolcott	245	30.1	34
Woodbridge	77	16.8	23
Woodbury	76	15.7	19.7
Woodstock	81	19.9	25.3

[a] In keeping with confidentiality regulations, numbers and rates are suppressed when the number is less than 6, and marked "*aa*" when the number is 6 or greater, but suppressed to preserved the censoring of an adjacent cell.
Note: Rates based on < 20 ED visits may be unstable and should be interpreted with caution.

State of Connecticut

Emergency Department Visits with
Asthma as Primary Diagnosis
Age-Adjusted Rates by Town of Residence
5-Year Period (2005 - 2009)

Legend

Rate per 10,000

- 0 to 49
- 50 to 99
- 100 to 149
- 150+
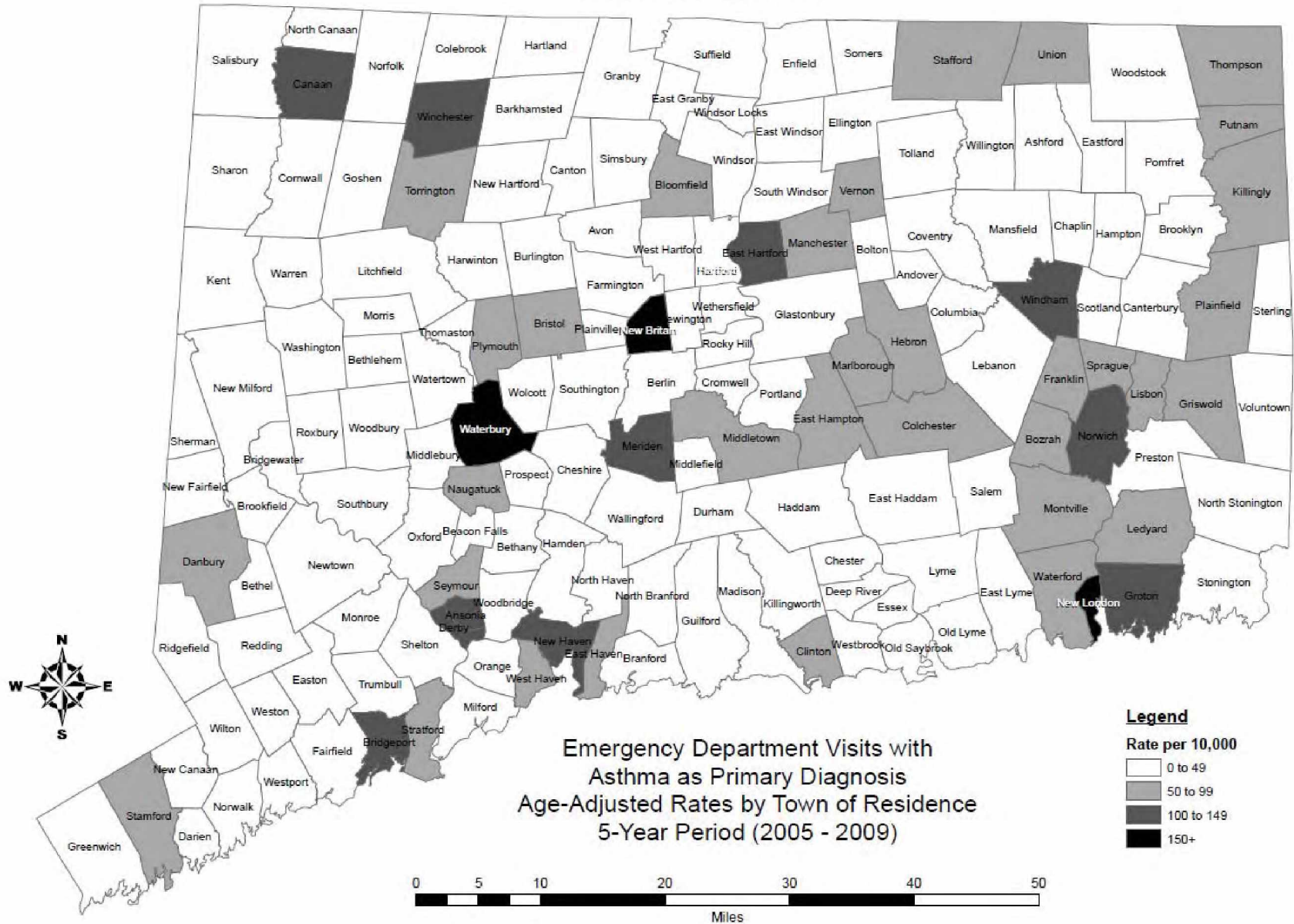
Appendix I: Asthma Hospitalization Resulting from Asthma ED Visit

Table I-1. Asthma Hospitalization Resulting from Asthma ED Visit by Town of Residence, Connecticut (2006 – 2009)

Town	Total Number Went to ED	Number Hospitalized	Percent Hospitalized
Andover	46	7	15.2
Ansonia	965	112	11.6
Ashford	81	17	21
Avon	103	26	25.2
Barkhamsted	*a*	*a*	7.8
Beacon Falls	113	13	11.5
Berlin	201	29	14.4
Bethany	52	11	21.2
Bethel	241	33	13.7
Bethlehem	*a*	*a*	3.8
Bloomfield	496	97	19.6
Bolton	*a*	*a*	8.7
Bozrah	*a*	*a*	11.6
Branford	450	151	33.6
Bridgeport	8,233	1,272	15.5
Bridgewater	*a*	*a*	8.3*
Bristol	2,457	411	16.7
Brookfield	146	15	10.3
Brooklyn	130	24	18.5
Burlington	56	7	12.5
Canaan	75	17	22.7
Canterbury	79	8	10.1
Canton	102	25	24.5
Chaplin	46	10	21.7
Cheshire	214	40	18.7
Chester	*a*	*a*	8.9
Clinton	270	34	12.6
Colchester	320	34	10.6
Colebrook	*a*	*a*	15.4*
Columbia	71	13	18.3
Cornwall & Warren	*a*	*a*	25.0*
Coventry	199	27	13.6
Cromwell	164	17	10.4

[a] In keeping with confidentiality regulations, numbers are suppressed when the number hospitalized is less than 6.

* Percentages based on fewer than 20 total number went to ED may be unstable and should be interpreted with caution.

Table I-1 (continued)

Town	Total Number Went to ED	Number Hospitalized	Percent Hospitalized
Danbury	1,654	209	12.6
Darien	106	11	10.4
Deep River	69	8	11.6
Derby	603	60	10
Durham	74	20	27
East Granby	37	9	24.3
East Haddam	105	14	13.3
East Hampton	301	28	9.3
East Hartford	2,180	280	12.8
East Haven	809	239	29.5
East Lyme	275	48	17.5
East Windsor	208	40	19.2
Eastford	*a*	*a*	22.2*
Easton	35	10	28.6
Ellington	234	14	6
Enfield	754	134	17.8
Essex	68	8	11.8
Fairfield	482	97	20.1
Farmington	240	35	14.6
Franklin	*a*	*a*	9.5
Glastonbury	303	54	17.8
Goshen	38	7	18.4
Granby	63	16	25.4
Greenwich	727	155	21.3
Griswold & Lisbon	373	51	13.7
Groton	2,347	144	6.1
Guilford	216	49	22.7
Haddam	81	7	8.6
Hamden	1,353	381	28.2
Hampton	*a*	*a*	4.8
Hartford	12,654	1,480	11.7
Hartland	20	6	30
Harwinton	62	9	14.5
Hebron	146	11	7.5
Kent	*a*	*a*	6.9
Killingly	494	67	13.6
Killingworth	*a*	*a*	11.4
Lebanon	104	11	10.6

[a] In keeping with confidentiality regulations, numbers are suppressed when the number hospitalized is less than 6.

* Percentages based on fewer than 20 total number went to ED may be unstable and should be interpreted with caution.

Table I-1 (continued)

Town	Total Number Went to ED	Number Hospitalized	Percent Hospitalized
Ledyard	520	29	5.6
Litchfield	91	13	14.3
Madison	180	49	27.2
Manchester	1,959	151	7.7
Mansfield	167	38	22.8
Marlborough	103	9	8.7
Meriden	2,657	309	11.6
Middlebury	48	12	25
Middlefield	58	9	15.5
Middletown	1,274	160	12.6
Milford	1,380	175	12.7
Monroe	160	50	31.3
Montville	555	67	12.1
Morris	*a*	*a*	14.3
Naugatuck	718	118	16.4
New Britain	5,035	567	11.3
New Canaan	97	19	19.6
New Fairfield	103	10	9.7
New Hartford	*a*	*a*	7.2
New Haven	9,289	2,601	28
New London	2,108	186	8.8
New Milford	436	28	6.4
Newington	353	89	25.2
Newtown	223	30	13.5
Norfolk	*a*	*a*	6.9
North Branford	162	48	29.6
North Canaan	*a*	*a*	6.3*
North Haven	312	104	33.3
North Stonington	100	15	15
Norwalk	1,964	323	16.4
Norwich	1,929	250	13
Old Lyme	110	17	15.5
Old Saybrook	128	17	13.3
Orange	207	51	24.6
Oxford	170	20	11.8
Plainfield	379	66	17.4
Plainville	341	54	15.8
Plymouth	346	65	18.8

[a] In keeping with confidentiality regulations, numbers are suppressed when the number hospitalized is less than 6.

* Percentages based on fewer than 20 total number went to ED may be unstable and should be interpreted with caution.

Table I-1 (continued)

Town	Total Number Went to ED	Number Hospitalized	Percent Hospitalized
Pomfret	43	7	16.3
Portland	113	22	19.5
Preston	103	22	21.4
Prospect	101	22	21.8
Putnam	259	42	16.2
Redding	54	17	31.5
Ridgefield	118	16	13.6
Rocky Hill	182	32	17.6
Roxbury	a	a	5.9*
Salem	72	8	11.1
Salisbury	a	a	17.2
Scotland	a	a	10
Seymour	465	48	10.3
Sharon	48	6	12.5
Shelton	647	107	16.5
Sherman	a	a	4.2
Simsbury	147	22	15
Somers	119	15	12.6
South Windsor	306	54	17.6
Southbury	128	28	21.9
Southington	563	69	12.3
Sprague	105	9	8.6
Stafford & Union	318	55	17.3
Stamford	3,139	393	12.5
Sterling	43	8	18.6
Stonington	236	16	6.8
Stratford	1,169	205	17.5
Suffield	89	24	27
Thomaston	97	8	8.2
Thompson	180	28	15.6
Tolland	155	22	14.2
Torrington	1,091	119	10.9
Trumbull	356	105	29.5
Unknown CT	a	a	6.6
Vernon	1,039	90	8.7
Voluntown	52	7	13.5
Wallingford	587	124	21.1
Washington	a	a	7

[a] In keeping with confidentiality regulations, numbers are suppressed when the number hospitalized is less than 6.

* Percentages based on fewer than 20 total number went to ED may be unstable and should be interpreted with caution.

Table I-1 (continued)

Town	Total Number Went to ED	Number Hospitalized	Percent Hospitalized
Waterbury	8,260	951	11.5
Waterford	559	65	11.6
Watertown	284	38	13.4
West Hartford	844	173	20.5
West Haven	2,273	598	26.3
Westbrook	110	12	10.9
Weston	44	8	18.2
Westport	130	35	26.9
Wethersfield	261	73	28
Willington	85	13	15.3
Wilton	95	18	18.9
Winchester	488	30	6.1
Windham	1,628	348	21.4
Windsor	580	100	17.2
Windsor Locks	144	24	16.7
Wolcott	223	34	15.2
Woodbridge	106	40	37.7
Woodbury	70	17	24.3
Woodstock	76	12	15.8

[a] In keeping with confidentiality regulations, numbers are suppressed when the number hospitalized is less than 6.

* Percentages based on fewer than 20 total number went to ED may be unstable and should be interpreted with caution.

Appendix J: Hospital Charges

Table J-1. Actual and Inflation-Adjusted[*] Hospital Charges for Asthma Hospitalizations and ED Visits, Connecticut (2000 – 2009)

Year	No. Hospitalization and ED visit events	Total Charges (Actual)	Total Charges (Inflation Adjusted*)
2000	25,561	$38,793,210	$70,719,238
2001	25,582	$40,335,976	$68,567,993
2002	26,394	$48,783,051	$75,302,533
2003	28,247	$62,547,151	$90,728,979
2004	25,372	$60,450,076	$83,333,374
2005	26,034	$71,855,789	$94,199,808
2006	26461	$83,987,965	$103,701,674
2007	25,716	$90,560,361	$103,274,519
2008	26,852	$98,988,982	$106,628,818
2009	29,336	$112,854,345	$112,854,345

* Inflation adjusted to 2009 dollars.

Table J-2. Actual and Inflation-Adjusted[*] Asthma Hospital Health Care Charges by Year and Hospitalization Type, Connecticut (2005 – 2009)

Year	Inpatient Hospitalizations			ED Visits		
	N	Total Charges (Actual)	Total Charges (Inflation Adjusted*)	N	Total Charges (Actual)	Total Charges (Inflation Adjusted*)
2005	4,504	$51,831,689	$67,949,085	21,530	$20,024,101	$26,250,723
2006	4,862	$61,441,491	$75,863,077	21,599	$22,546,474	$27,838,597
2007	4,735	$65,153,170	$74,300,303	20,981	$25,407,191	$28,974,216
2008	4,800	$70,140,433	$75,553,778	22,052	$28,848,548	$31,075,041
2009	5,146	$80,260,399	$80,260,399	24,190	$32,593,946	$32,593,946

* Inflation adjusted to 2009 dollars.

Table J-3. Actual and Inflation-Adjusted[*] Asthma Hospital Health Care Charges for Adults and Children Hospitalization Type and Year, Connecticut (2005 – 2009)

Hospitalization Type	Year	Adults (18+ years old)			Children (0 – 17 years old)		
		N	Total Charges (Actual)	Total Charges (Inflation Adjusted*)	N	Total Charges (Actual)	Total Charges (Inflation Adjusted*)
Inpatient Hospitalizations	2005	1,378	$10,895,216	$14,283,153	3,126	$40,936,473	$53,665,932
	2006	1,557	$12,678,257	$15,654,106	3,305	$48,763,234	$60,208,971
	2007	1,459	$13,545,795	$15,447,548	3,276	$51,607,375	$58,852,756
	2008	1,314	$12,927,856	$13,925,611	3,486	$57,212,577	$61,628,167
	2009	1,498	$16,280,581	$16,280,581	3,648	$63,979,819	$63,979,819
ED Visits	2005	14,880	$14,635,549	$19,186,567	6,650	$5,388,552	$7,064,156
	2006	14,466	$16,165,256	$19,959,576	7,133	$6,381,218	$7,879,021
	2007	14,004	$18,023,451	$20,553,840	6,977	$7,383,740	$8,420,375
	2008	14,650	$20,224,480	$21,785,378	7,402	$8,624,069	$9,289,663
	2009	15,634	$22,444,170	$22,444,170	8,556	$10,149,776	$10,149,776

* Inflation adjusted to 2009 dollars.

Table J-4. Total Charges for Asthma Hospital Health Care in State Residents by Hospitalization Type and Selected Demographic Characteristics, Connecticut (2009)

Characteristic	Inpatient Hospitalizations		ED Visits	
	N	Total Charges	N	Total Charges
Total	5,146	$80,260,399	24,190	$32,593,946
Age Group				
0 – 4 years	714	$7,137,953	3,157	$3,801,088
5 – 11 years	578	$6,274,395	3,397	$3,912,093
12 – 17 years	206	$2,868,232	2,002	$2,436,595
18 – 24 years	197	$2,265,355	3,092	$3,754,811
25 – 34 years	369	$5,386,699	3,848	$5,117,983
35 – 44 years	581	$8,487,483	3,496	$5,087,348
45 – 54 years	866	$14,603,566	3,016	$4,650,091
55 – 64 years	571	$10,328,232	1,280	$2,148,229
65+ years	1,064	$22,908,484	902	$1,685,707
Sex				
Male	1,968	$53,293,649	10,712	$18,611,787
Female	3,178	$26,966,750	13,478	$13,982,159
Race/Ethnicity				
Hispanic	1,373	$20,449,759	7,945	$10,624,952
Black, non-Hispanic	1,300	$19,254,266	4,387	$6,509,385
Other, non-Hispanic	192	$2,650,459	800	$1,063,359
White, non-Hispanic	2,280	$37,885,112	7,937	$10,328,229

Table J-5. Top Ten Cities for Asthma Hospital Healthcare Charges, Connecticut, 2009

Rank	Town	N	Total Charges
1	New Haven	2,551	$15,471,054
2	Hartford	3,616	$10,790,406
3	Bridgeport	2,225	$9,157,581
4	Waterbury	2,440	$7,276,175
5	New Britain	1,576	$5,137,656
6	Stamford	857	$3,644,555
7	West Haven	608	$3,267,745
8	Hamden	353	$2,597,065
9	Bristol	666	$2,435,276
10	Norwalk	598	$2,433,776

Appendix K: Work-Related Asthma Data

Table K-1. WRA Frequency and Percent by Industry, Connecticut, 1992 – 2008

Industry	N (%)
Total	497 (100.0)
Service	164 (33.0)
Manufacturing	124 (24.9)
Public administration	105 (21.1)
Retail trade	22 (4.4)
Construction	13 (2.6)
Wholesale trade	13 (2.6)
Finance and insurance	12 (2.4)
Transportation and warehousing	8 (1.6)
Real estate and rental and leasing	*a*
Agriculture, forestry, fishing and	*a*
Utilities	*a*
Unknown/Not classified	32 (6.4)

[a] Number suppressed in keeping with confidentiality regulations.

Table K-2. WRA Frequency and Percent by Occupation, Connecticut, 1992 – 2008

Occupation	N (%)
Total	497 (100.0)
Production	70 (14.1)
Office and Administrative Support	57 (11.5)
Education, Training, and Library	44 (8.9)
Construction and Extraction	40 (8.0)
Business and Financial Operations	38 (7.6)
Healthcare Practitioners and Technical	35 (7.0)
Other	34 (6.8)
Management	25 (5.6)
Community and Social Services	16 (3.2)
Protective Service	14 (2.8)
Healthcare Support	12 (2.4)
Building and Grounds Cleaning and Maintenance	12 (2.4)
Transportation and Material Moving	9 (1.8)
Food Preparation and Serving Related	6 (1.3)
Personal Care and Service	6 (1.3)
Sales and Related	6 (1.3)
Life, Physical, and Social Science	*a*
Computer and Mathematical	*a*
Arts, Design, Entertainment, Sports, and Media	*a*
Architecture and Engineering	*a*
Legal	*a*
Unknown or Not classified	49 (9.9)

[a] Number suppressed in keeping with confidentiality regulations.

Table K-3. WRA Frequency and Percent by Causative Agent, Connecticut, 1992 – 2008

| Agent | Industry | | | | | | | | | | | | Total | % of Total |
	Agriculture, forestry, fishing & hunting	Utilities	Construction	Manufacturing	Wholesale trade	Retail trade	Transportation	Finance & insurance	Real estate & rental & leasing	Service	Public administration	Unknown/ Not classified		
Total	a	a	11	122	11	21	8	10	a	155	103	29	474	100.0
Other	0	0	a	64	6	a	a	7	0	32	18	11	147	31.0
IAQ	0	0	0	a	0	a	0	a	0	63	57	a	133	28.1
Isocyanate	0	0	a	11	a	a	0	0	0	a	a	a	25	5.3
Latex	0	0	0	a	0	0	a	0	0	8	0	a	13	2.7
Epoxy	0	0	a	7	0	0	0	0	0	0	0	0	11	2.3
Chlorine	0	0	0	a	a	a	0	0	0	a	a	a	10	2.1
Fumes	0	0	0	a	a	a	a	0	0	a	a	a	10	2.1
Solvent	0	0	0	a	a	0	0	0	0	a	a	0	9	1.9
Paint	0	0	a	a	0	a	a	0	0	a	a	0	8	1.7
Animals	a	a	a	a	a	a	a	a	a	a	a	a	< 6	–
Cleaning	a	a	a	a	a	a	a	a	a	a	a	a	< 6	–
Acid	a	a	a	a	a	a	a	a	a	a	a	a	< 6	–
Smoke	a	a	a	a	a	a	a	a	a	a	a	a	< 6	–
Adhesives	a	a	a	a	a	a	a	a	a	a	a	a	< 6	–
Exercise	a	a	a	a	a	a	a	a	a	a	a	a	< 6	–
Unknown	a	a	a	19	0	a	a	a	a	36	15	a	91	19.2
Missing	–	–	–	–	–	–	–	–	–	–	–	–	23	4.9

[a] Number suppressed in keeping with confidentiality regulations.

Table L-1. Asthma Mortality - Underlying Cause Crude and Age-Adjusted Rates by Year, Connecticut

Year	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
2000	58	17	16
2001	46	13.4	12.5
2002	49	14.2	12.9
2003	41	11.8	10.9
2004	43	12.4	11.2
2005	43	12.4	11.4
2006	46	13.2	11.8
2007	32	9.2	8.2
2008	26	7.4	6.5
2009	50	14.2	12.3

Table L-2. Asthma Mortality - Contributing Cause Crude and Age-Adjusted Rates by Year, Connecticut

Year	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
2000	80	23.4	21.1
2001	93	27.1	24.7
2002	109	31.6	28.1
2003	81	23.4	20.8
2004	80	23	20
2005	69	19.8	17.2
2006	68	19.5	16.5
2007	76	21.8	18.9
2008	63	18	15.4
2009	51	14.5	12.6

Table L-3. Asthma Mortality – Underlying Cause Crude and Age-Adjusted Rates by Children/Adults by Year, Connecticut

Adults/Children	Year	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
Children (0 – 17 years old)	2000	2	2.4	2.3
	2001	3	3.6	3.5
	2002	2	2.4	2.4
	2003	0	—	—
	2004	1	1.2	1.2
	2005	3	3.6	3.5
	2006	2	2.4	2.4
	2007	2	2.4	2.5
	2008	0	—	—
	2009	1	1.2	1.3
Adult (18+ years old)	2000	56	21.8	20.8
	2001	43	16.6	15.7
	2002	47	18.1	16.6
	2003	41	15.6	14.7
	2004	42	16	14.7
	2005	40	15.1	14.1
	2006	44	16.6	15
	2007	30	11.3	10.2
	2008	26	9.7	8.7
	2009	49	18.1	16.1

Table L-4. Asthma Mortality - Underlying Cause
Crude and Age-Adjusted Rates by Sex, Connecticut, 2005 – 2009

Sex	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
Male	69	8.1	8.5
Female	128	14.3	11.1

Table L-5. Asthma Mortality - Underlying Cause
Crude and Age-Adjusted Rates by Race/Ethnicity, Connecticut, 2005 – 2009

Race/Ethnicity	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
White, Non-Hispanic	134	10.3	7.7
Black, Non-Hispanic	38	23.4	26.1
Hispanic	23	11.3	16.6
Other, Non-Hispanic	2	2.4	4.7

Table L-6. Asthma Mortality - Underlying Cause
Crude Rates by Standard Age Group, Connecticut, 2005 – 2009

Age Group	N	Crude rate
0-4 years	1	0.9
5-11 years	5	3.2
12-17 years	2	1.4
18-24 years	5	3
25-34 years	9	4.5
35-44 years	26	10
45-54 years	25	9.1
55-64 years	25	12.6
65+ years	99	41.7

Table L-7. Asthma Mortality - Underlying Cause
Number and Percent of Death by Month, Connecticut, 2005 – 2009

Month	N	Percent
January	18	9.1
February	17	8.6
March	22	11.2
April	18	9.1
May	18	9.1
June	11	5.6
July	10	5.1
August	11	5.6
September	15	7.6
October	17	8.6
November	15	7.6
December	25	12.7

Table L-8. Asthma Mortality - Underlying Cause
Number and Percent of Death by Day of Week, Connecticut, 2005 – 2009

Month	N	Percent
Sunday	31	15.7
Monday	27	13.7
Tuesday	27	13.7
Wednesday	25	12.7
Thursday	24	12.2
Friday	28	14.2
Saturday	35	17.8

Table L-9. Asthma Mortality - Underlying Cause
Number and Percent of Death by Place of Death, Connecticut, 2005 – 2009

Month	N	Percent
Inpatient	56	28.7
ED/Outpatient	48	24.6
Dead on Arrival	11	5.6
Nursing Home	38	19.5
Residence	39	20
Other	3	1.5

Table L-10. Asthma Mortality - Underlying Cause Crude and Age-Adjusted Rates by County, Connecticut, 2005 – 2009

County	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
Fairfield	46	10.3	9.2
Hartford	62	14.2	12.1
Litchfield	9	9.6	8.4
Middlesex	8	9.8	9
New Haven	46	10.9	9.6
New	16	12	11.7
Tolland	5	6.7	7
Windham	5	8.6	7.9

Table L-11. Asthma Mortality - Underlying Cause Crude and Age-Adjusted Rates by Rural/Non-rural, Connecticut, 2005 – 2009

Location	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
Rural	12	7.6	7.2
Non-rural	185	11.6	10.3

Table L-12. Asthma Mortality - Underlying Cause
Crude and Age-Adjusted Rates by Five Largest Cities, Connecticut, 2005 – 2009

County	N	Crude rate (per 1,000,000)	Age-adjusted rate (per 1,000,000)
Bridgeport	15	21.9	22.9
Hartford	14	22.6	25.6
New Haven	11	17.8	22.7
Stamford	6	10.1	10.1
Waterbury	9	16.8	15.7
5 Largest Cities	55	18	18.9
Rest of CT	142	9.8	8.3

Appendix M: Summary Table of HP 2010, HP 2010 Midcourse Review, and HP 2020 Targets

Objective	Age Group	Targets		
		HP 2010 (original)	HP 2010 Midcourse Review	HP 2020
24-1. Reduce asthma deaths. *[RD-1]* [*]	< 5 years	1.0 per million	0.9 per million	—
	5 – 14 years	1.0 per million	0.9 per million	—
	15 – 34 years	2.0 per million	1.9 per million	—
	35 – 64 years	9.0 per million	8.0 per million	6.0 per million
	≥ 65 years	60.0 per million	47.0 per million	22.9 per million
24-2. Reduce hospitalizations for asthma. *[RD-2]* [*]	< 5 years	25 per 10,000	25 per 10,000	18.1 per 10,000
	5 – 64 years	7.7 per 10,000	7.7 per 10,000	8.6 per 10,000
	≥ 65 years	11 per 10,000	11 per 10,000	20.3 per 10,000
24-3. Reduce hospital emergency department visits for asthma. *[RD-3]* [*]	< 5 years	80 per 10,000	80 per 10,000	95.5 per 10,000
	5 – 64 years	50 per 10,000	50 per 10,000	49.1 per 10,000
	≥ 65 years	15 per 10,000	15 per 10,000	13.2 per 10,000
24-4. Reduce activity limitations among persons with asthma. *[RD-4]* [*]	—	10.0%	6.0%	10.2%
24-5. Reduce the number of school or work days missed by persons with asthma due to asthma.	—	—	2.0 days	—
RD-5. Reduce the proportion of persons with asthma who miss school or work days [*]	5 – 17 year olds who miss school days	—	—	48.7%
	18 –64 year olds who miss work days	—	—	26.8%
24-6. 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. *[RD-6. Increase the proportion of persons with current asthma who received formal patient education.]* [*]	—	30.0%	30.0%	14.4%

[*] *HP 2020* enumerates respiratory disease objectives using the nomenclature RD-#. The RD objectives are presented in brackets and italics. The wordings of the RD objectives are provided when they differ from that of the *HP 2010* objectives.

Sources: United States Department of Health and Human Services publications: *Healthy People 2010; Healthy People 2010 Midcourse Review;* and *Healthy People 2020.*

Summary Table of HP 2010, HP 2010 Midcourse Review, and HP 2020 Asthma Targets (continued)

Objective	Targets		
	HP 2010 (original)	HP 2010 Midcourse Review	HP 2020
24-7. Increase the proportion of persons with asthma who receive appropriate asthma care according to the *NAEPP Guidelines*. *[RD-7]*			
Persons with asthma who receive written asthma management plans from their health care provider. *[RD-7.1. Persons with current asthma who receive written asthma management plans from their health care provider.]* [*]	—	38.0%	36.8%
Persons with asthma with prescribed inhalers who receive instruction on how to use them properly. *[RD-7.2 Persons with current asthma with prescribed inhalers who receive instruction on their use.]* [*]	—	98.8%	—
Persons with asthma who receive education about recognizing early signs and symptoms of asthma episodes and how to respond appropriately, including instruction on peak flow monitoring for those who use daily therapy. *[RD-7.3. Persons with current asthma who receive education about appropriate response to asthma episode, including recognizing early signs and symptoms or monitoring peak flow results.]* [*]	—	71.0%	68.5%
Persons with asthma who receive medication regimens that prevent the need for more than one canister of short-acting inhaled beta agonists per month for relief of symptoms. *[RD-7.4. Increase the proportion of persons with current asthma who do not use more than one canister of short-acting inhaled beta agonist per month.]* [*]	—	92.0%	90.2%
Persons with asthma who receive followup medical care for long-term management of asthma after any hospitalization due to asthma.	—	87.0%	—
Persons with asthma who receive assistance with assessing and reducing exposure to environmental risk factors in their home, school, and work environments.	—	50.0%	—
RD-7.5. Persons with current asthma who have been advised by a health professional to change things in their home, school, and work environments to reduce exposure to irritants or allergens to which they are sensitive. [*]	—	—	54.5%
RD-7.6. Persons with current asthma who have had at least one routine followup visit in the past 12 months. [*]	—	—	Developmental
RD-7.7. Persons with current asthma whose doctor assessed their asthma control in the past 12 months. [*]	—	—	Developmental
RD-7.8. Adults with current asthma who have discussed with a doctor or other health professional whether their asthma was work related. [*]	—	—	Developmental

[*] *HP 2020* enumerates respiratory disease objectives using the nomenclature RD-#. The RD objectives are presented in brackets and italics. The wordings of the RD objectives are provided when they differ from that of the *HP 2010* objectives.

Sources: United States Department of Health and Human Services publications: *Healthy People 2010*, *Healthy People 2010 Midcourse Review*, and *Healthy People 2020*.

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