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November 2012

National Surveillance of Asthma: United States, 2001–2010



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
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Background

Asthma is prevalent but treatable: adherence to evidence-based treatment lessens impairment and lowers the risk of future exacerbations.

Objective

This report details recent trends in asthma prevalence, health care use, and mortality since 2001 and presents an overview of trends since 1980.

Methods

Asthma prevalence estimates were obtained from the National Health Interview Survey (2001–2010). Physician office visit data were obtained from the National Ambulatory Medical Care Survey, hospital outpatient department and emergency department (ED) visit data from the National Hospital Ambulatory Medical Care Survey, hospitalization data from the National Hospital Discharge Survey, and death data from the National Vital Statistics System (2001–2009). Two types of rates were calculated: population-based rates based on the total population and risk-based rates based on the population with asthma.

Results

Current asthma prevalence increased from 2001 to 2010. There were no significant changes in rates for hospital outpatient department visits, ED visits, or hospitalizations, whereas risk-based rates for private physician office visits declined. Asthma death rates decreased from 2001 to 2009. Over the long term, asthma prevalence rose more slowly after 2001 than during 1980–1996, asthma hospitalizations declined since 1984 and deaths declined since 1999. Disparities by race and sex for adverse outcomes remained high despite these declines.

Conclusion

Since 2001, asthma prevalence increased, risk-based rates for visits to private physician offices and deaths declined, and risk-based rates for other types of ambulatory visits and for hospitalizations showed no clear trend.

Keywords: prevalence • health care use • morbidity • mortality

National Surveillance of Asthma: United States, 2001–2010

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Introduction

Asthma is a common chronic disorder of the airways characterized by periods of reversible airflow obstruction known as asthma exacerbations or attacks (1,2). Airflow is obstructed by factors which narrow airways in the lungs, including inflammation and airway hyperreactivity (contraction of the small muscles surrounding the airways), in reaction to certain exposures. Exposures may include exercise; airway infections; airborne allergens (e.g., pollen, mold, animal dander, dust mite, and cockroach allergens); occupational exposures (e.g., sensitizing chemicals or dusts); and airborne irritants (e.g., particulate matter and environmental tobacco smoke). Symptoms during an asthma attack may include wheezing, coughing, shortness of breath, and chest tightness or pain. Attacks can range from a nuisance to a life-threatening event. Although many people with asthma have only occasional mild symptoms, others have severe asthma that interferes with daily activity (1). Although causal occupational exposures have been identified, it is not clear how to prevent asthma from developing and there is no cure (1,3). Yet, the means to control and prevent exacerbations in persons who have asthma are well established (1).

Once an exacerbation begins, treatment for short-term relief includes medication to relax the small muscles in the airways and to decrease inflammation. The cornerstone of treatment, however, is long-term prevention to control inflammation and airway hyperreactivity (1). Asthma management strategies include adequate patient education, consistent use of preventive medication, and control of environmental factors that affect asthma (home-based, multi-trigger multi-component interventions). These strategies have been shown to be effective in improving the health of individuals affected by asthma and are integral to reducing the impact of asthma in the United States (1,2,4).

Public health goals for asthma, outlined in the Healthy People objectives, focus on mitigating the impact of asthma rather than on reducing asthma incidence or prevalence (5). Public health efforts, therefore, include interventions to reduce asthma deaths, hospitalizations, and emergency department (ED) visits, and to increase the proportion of persons who receive health care consistent with the Guidelines for the Diagnosis and Management of Asthma (1). This report is the fourth in a series of national asthma surveillance summaries (2,7,8). It presents data from national health surveys conducted by the Centers for

Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS), and describes the overall asthma surveillance picture for the United States since 2001. Two types of rates for asthma outcomes are presented: population-based rates that indicate the rate for the entire U.S. population and population subgroups (e.g., race and ethnic group, sex, and geographic region) and reflect the overall burden on the general population; and risk-based rates for which the denominator is restricted to estimates of the number of persons who have asthma and are at risk for asthma-related outcomes. Risk-based measures control for differences in asthma prevalence among population subgroups and across time so that the magnitude of the outcome and the trends among people with asthma can be seen more clearly. The measures and definitions used are consistent with those presented in the 2007 surveillance summary so that the historic estimates in that previous report can be directly compared with estimates in this report (2). An overview of long-term trends from 1980 for asthma prevalence, health care use, and mortality is also presented.

Methods

Data Sources

Asthma prevalence and morbidity data are obtained from national surveys conducted by NCHS. Asthma prevalence data are self-reported by respondents to the National Health Interview Survey (NHIS) 2001–2010; asthma office visit data are obtained from the National Ambulatory Medical Care Survey (NAMCS) 2001–2009; hospital outpatient department visits and ED data are obtained from the National Hospital Ambulatory Medical Care Survey (NHAMCS) 2001–2009; asthma hospitalization data are obtained from the National Hospital Discharge Survey (NHDS) 2001–2009; and asthma death data are obtained from the National Vital Statistics System (NVSS),

Underlying Cause of Death files 2001–2009. Details on each data source can be found in [Appendix I: Data Sources and Limitations](#).

Analytic Methods

For all survey data, survey weights were used to calculate population-based estimates. With the exception of death record data from 1980–2009 and hospitalization data from 1980–1987, standard errors were calculated using SUDAAN software to account for each survey's complex sample design (9). Standard errors for death rates were based on the number of deaths (10). For hospitalizations between 1980 and 1987, standard errors were estimated using relative standard error tables provided by NCHS' Division of Health Care Statistics (11). Reliability of estimates was based on the relative standard error (RSE), which is calculated by dividing the estimate into its standard error and multiplying by 100. Estimates with an RSE between 30% and 50% are noted. Estimates with an RSE greater than 50% are not shown. For mortality data, estimates based on fewer than 20 deaths are also not shown.

Significance testing for trends was performed with Joinpoint software (12). Joinpoint regression characterizes trends as joined linear segments on a logarithmic scale. A joinpoint is the year when two segments with different slopes meet. Average annual percentage change for each segment was estimated based on the natural logarithm of rates. A 95% confidence interval around the annual percent change was used to determine whether the annual percent change for each segment is significantly different from zero.

Data on demographic characteristics (age, sex, race and ethnicity, and geographic region) were standardized across all data sources to the extent possible. Poverty status and detailed race and ethnicity groups were only available for prevalence data (NHIS). Age groups 15–19, 20–24, and 25–34 are not shown separately for hospital outpatient (NHAMCS) and office visits (NAMCS)

due to small sample sizes. Hispanic ethnicity was not available for hospital discharge data (NHDS).

To obtain sufficient sample sizes to produce stable estimates for demographic subgroups, 3 years of data for the most recent period were combined and presented as 3-year average annual estimates. For NHIS, data are presented for 2008–2010, and for the remaining data sources, data are presented for 2007–2009. Risk-based rates were calculated by dividing estimates of the number of events (office visits, hospital outpatient visits, ED visits, and hospitalizations) and the number of deaths by the estimated number of persons with current asthma from NHIS for the same demographic group and the same year or the same 3-year period. Population-based rates were calculated by dividing estimates of the number of events (office visits, hospital outpatient visits, ED visits, and hospitalizations) and the number of deaths by the estimated population size for the same demographic group and the same year or the same 3-year period.

Age-adjusted estimates are provided only for population-based rates to account for age-related differences over time and between population subgroups. Risk-based rates are not age adjusted because they already account for asthma prevalence differences. Comparisons can be made between groups without concern that variations in asthma prevalence are contributing to observed differences. Additionally, there were no substantial changes in the age distribution among the population with current asthma or with at least one asthma attack in the previous year.

Additional details on methods can be found in [Appendix II: Technical Notes](#). Additional details on each demographic characteristic and each asthma-specific measure can be found in [Appendix III: Definition of Terms](#).

Current Asthma Prevalence and Asthma Attack Prevalence

Estimates of asthma prevalence indicate the number of persons and percentage of the population with asthma at a given point in time. Current asthma prevalence estimates, available from 2001 through 2010, indicate the number and percentage of people who reported receiving a diagnosis of asthma and still having asthma at the time of the health survey. Asthma attack prevalence estimates, available from 1997 through 2010, indicate the number and percentage of people with an asthma diagnosis who reported having at least one asthma attack in the previous 12 months. This measure is an indicator of suboptimal asthma control. Those who report experiencing an attack are at risk for additional adverse outcomes such as missing work or school, or requiring acute medical treatment or hospitalization.

This section analyzes trends for 2001–2010 for current asthma prevalence and asthma attack prevalence for population-based rates, risk-based rates, and counts of persons with current asthma or at least one asthma attack within the past year. Differences between population subgroups are assessed over this time period, and increased demographic detail using average annual estimates is presented for the period 2008–2010. Additional details not included in the figures can be found in [Tables 1–6](#).

Current Asthma Prevalence Trends

Number of persons with asthma—The number of persons with asthma increased 2.9% each year, from 20.3 million persons in 2001 to 25.7 million persons in 2010 ([Figure 1](#)). Of the 25.7 million, 7.0 million

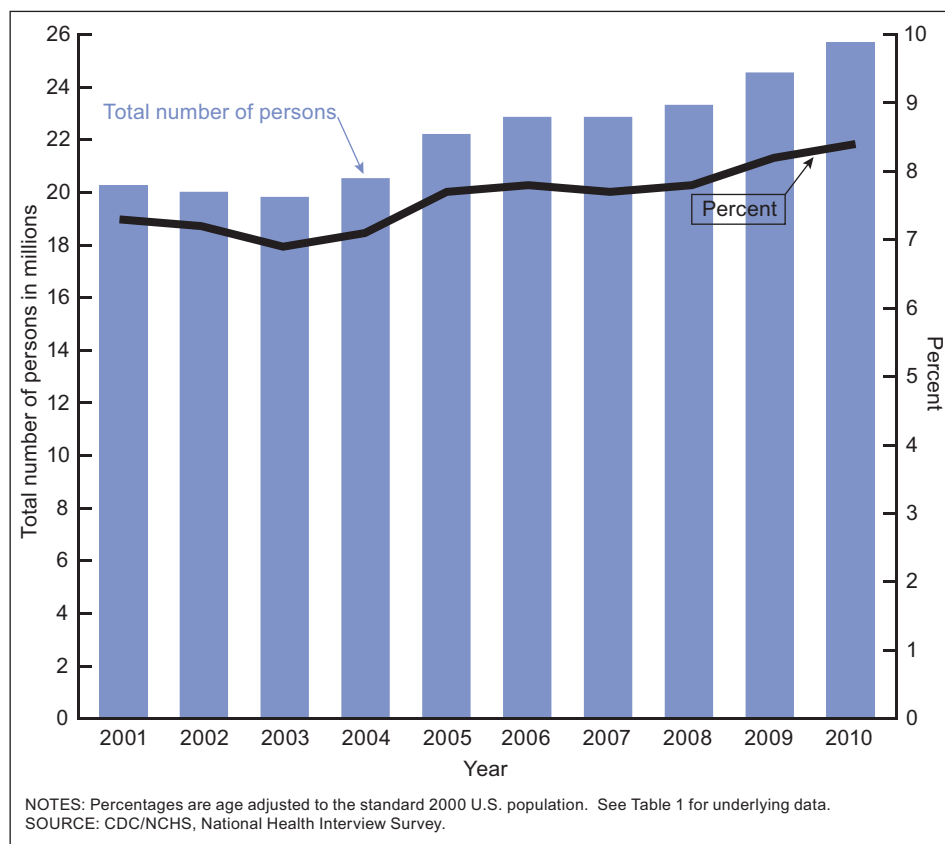


Figure 1. Current asthma prevalence: United States, 2001–2010

were children and 18.7 million were adults. Among adults, 3.1 million people aged 65 and over had asthma. By race, 19.1 million were white, 4.7 million were black, and 1.9 million were of other races. By ethnicity, 3.6 million were Hispanic and 22.1 million were non-Hispanic.

Trends in current asthma prevalence overall, by age group and sex—Current asthma prevalence increased at a rate of 1.5% per year to a prevalence of 8.4% in 2010 ([Figure 1](#)). Among children aged 0–17 years, current asthma prevalence increased at a rate of 1.4% per year, and among adults aged 18 and over, prevalence increased at a rate of 2.1% per year. Current asthma prevalence increased at a rate of 1.8% per year among males and females ([Table 1](#)).

Trends in current asthma prevalence, by race and ethnicity—Among white persons, current asthma prevalence increased at a rate of 1.4% per year to a prevalence of 7.8% in 2010. Among black persons, current asthma prevalence increased at a rate of 3.2% per year to 11.9% in 2010. By ethnicity, current asthma prevalence rose among Hispanic persons at a rate of 3.2% per year to 7.2% in 2010. Among non-Hispanic persons, prevalence rose at a rate of 1.9% per year to 8.7% in 2010 ([Table 1](#)).

Current Asthma Prevalence by Selected Characteristics

Age group and sex differences in 2008–2010 current asthma prevalence

For the period 2008–2010, average annual current asthma prevalence was higher in children aged 0–17 years (9.5%) than in adults aged 18 and over (7.7%), and was higher in females (9.2%) than in males (7.0%) (Figure 2). However, the difference in prevalence between males and females varied by age group. Among children, boys had higher prevalence than girls (11.1% compared with 7.8%) whereas among adults, men had lower prevalence than women (5.7% compared with 9.7%) (Table 2).

Race differences in 2008–2010 current asthma prevalence—Current asthma prevalence was higher in black persons (11.2%) than in white persons (7.7%) (Figure 2, Table 2).

Ethnicity differences in 2008–2010 current asthma prevalence—Among Hispanic persons, Puerto Rican persons had higher prevalence (16.1%) compared with Mexican persons (5.4%) (Figure 2, Table 2).

Differences by poverty status in 2008–2010 current asthma prevalence—Current asthma was more prevalent among persons with family income below 100% of the federal poverty threshold (11.2%) than among persons with family income at or above the federal poverty threshold (8.5% for

100% to less than 250% of the poverty threshold, 7.8% for 250% to less than 450% of the poverty threshold, and 6.7% for at or above 450% of the poverty threshold). Asthma prevalence was significantly lower for each successively higher poverty level group (Figure 2, Table 2).

Differences by geographic region and urbanicity in 2008–2010 current asthma prevalence—The current asthma prevalence rate was higher in the Northeast (8.8%) than in the South (7.6%) or in the West (8.0%), and was higher in the Midwest (8.7%) than in the South (7.6%). Current asthma prevalence did not differ between metropolitan and nonmetropolitan areas (Figure 2, Table 2).

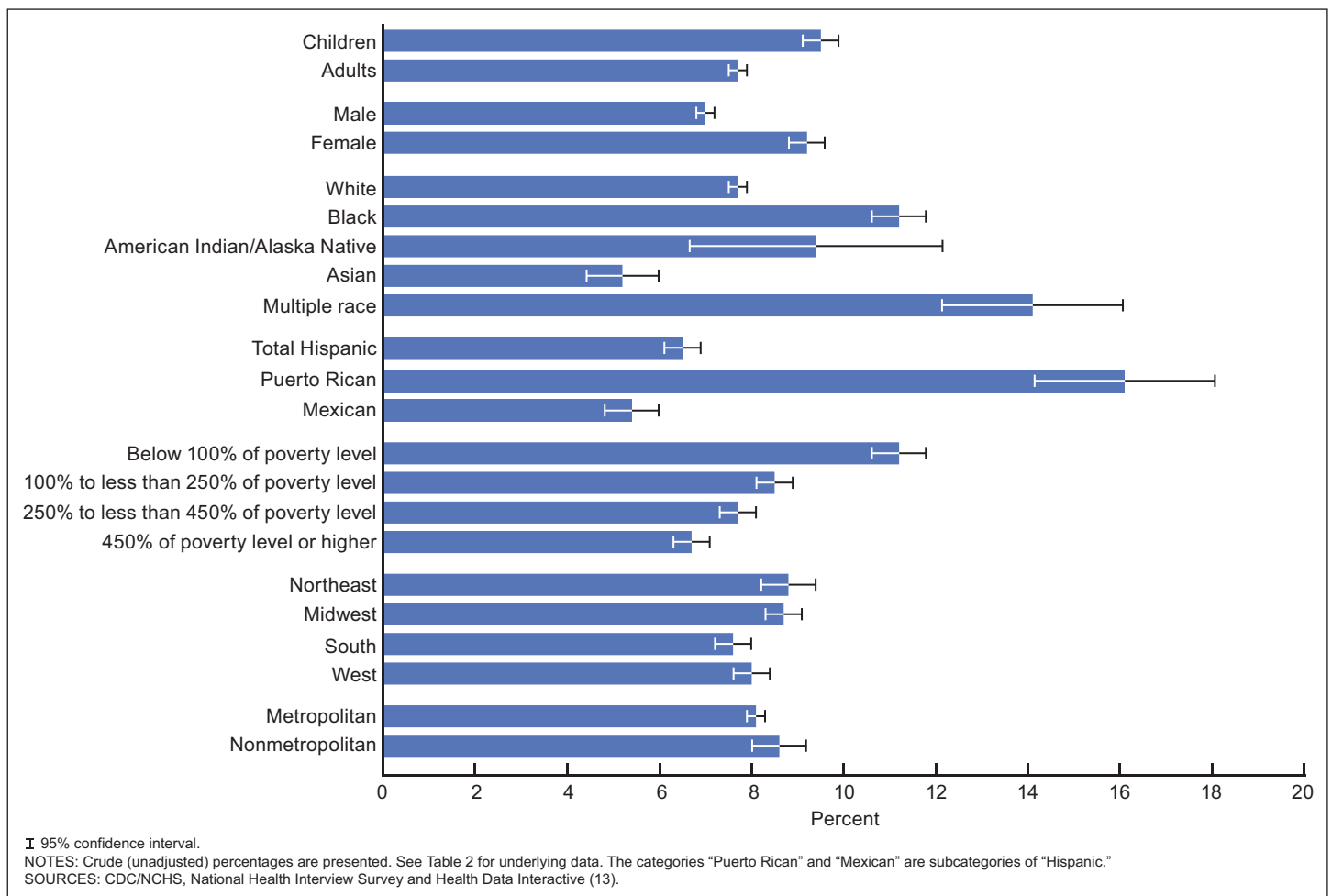


Figure 2. Current asthma prevalence, by age group, sex, race and ethnicity, poverty status, geographic region, and urbanicity: United States, average annual 2008–2010

Asthma Attack Prevalence Trends

Number of persons with an asthma attack in the previous 12 months—The number of persons with at least one asthma attack in the previous 12 months was stable from 2001 to 2003 then increased 2.6% per year from 11.0 million in 2003 to 13.9 million in 2010 (Figure 3). Among this number, 4.3 million were children and 9.6 million were adults; 5.4 million were males and 8.5 million were females. By race, 10.4 million were white, 2.3 million were black, and 1.2 million were of another race. By ethnicity, 2.0 million were Hispanic and 11.9 million were non-Hispanic.

Trends in population-based asthma attack prevalence overall, by age group and sex—The percentage of people with at least one asthma attack in the previous 12 months remained level during the period from 2001 to 2003 (range: 3.9% to 4.3%) but increased 1.6% per year from 2003 to 2010, from 3.9% to 4.6% (Figure 3, Table 3). Children had asthma attack prevalence rates (range: 5.2% to 5.8%) that were higher than adult rates (range: 3.3% to 4.2%). Females had higher asthma attack prevalence (range: 4.4% to 5.4%) compared with males (range: 3.1% to 3.7%) (Table 3).

Trends in population-based asthma attack prevalence, by race and ethnicity—Black persons had higher asthma attack prevalence (range: 4.6% to 5.8%) compared with white persons (range: 3.7% to 4.3%) in most years during the period. In 2005 and 2006 there was no significant difference between black and white persons. For race and Hispanic groups except white persons, asthma attack prevalence rates remained level for the period. For white persons, asthma attack prevalence increased 1.6% per year from 2003 to 2010 (Table 3).

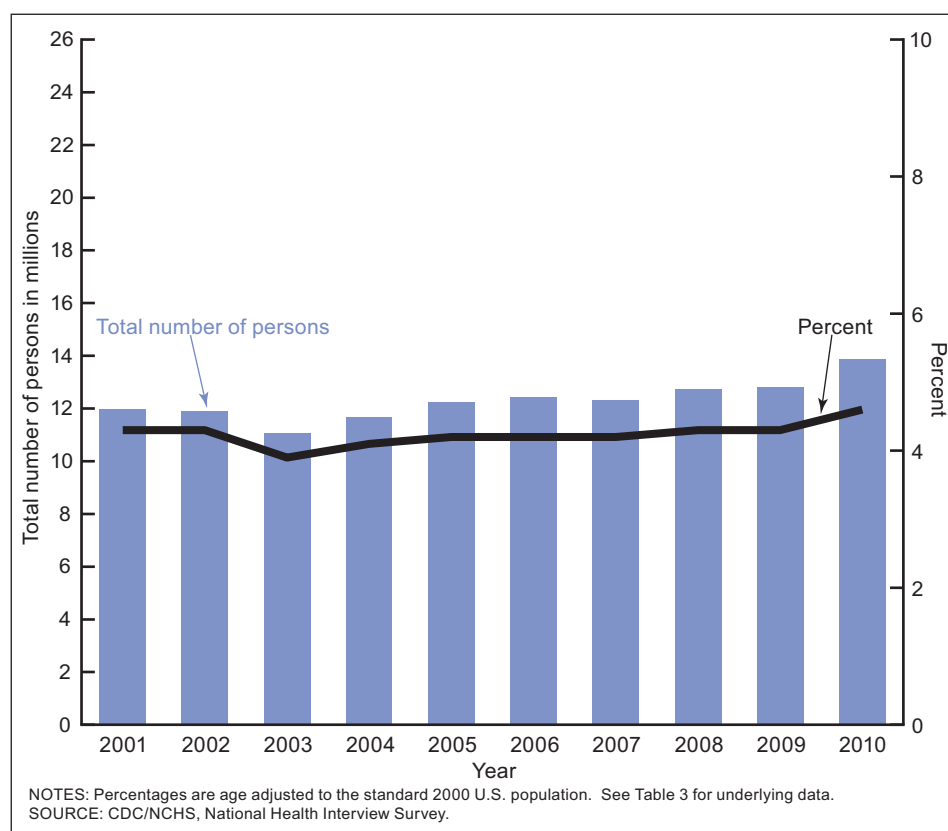


Figure 3. Asthma attack prevalence (population-based): United States, 2001–2010

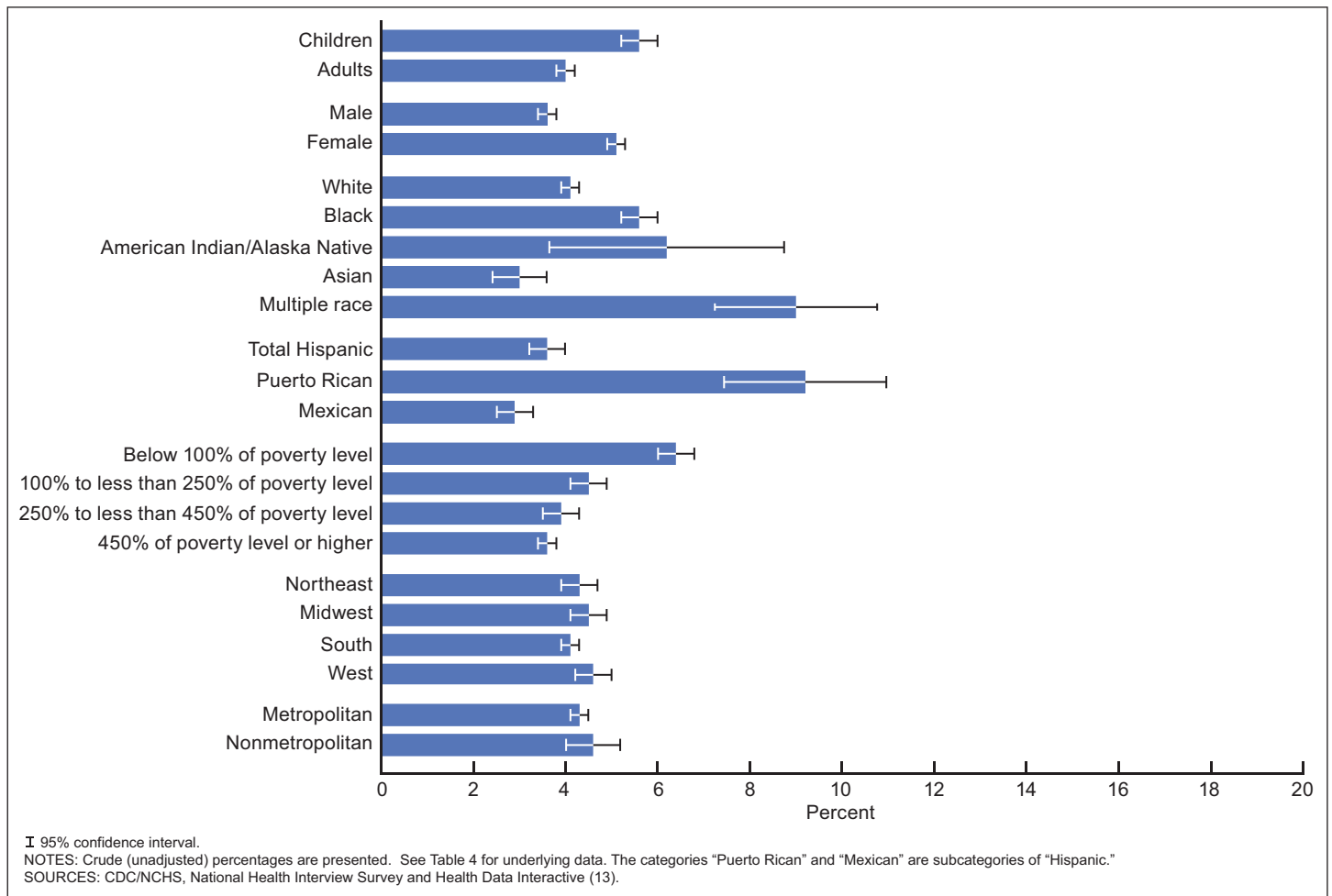


Figure 4. Asthma attack prevalence (population-based), by age group, sex, race and ethnicity, poverty status, geographic region, and urbanicity: United States, average annual 2008–2010

Asthma Attack Prevalence by Selected Characteristics

Asthma attack prevalence 2008–2010— Differences by age, gender, race and ethnicity, and poverty for population-based asthma attack rates were similar to those found for current asthma prevalence (Figure 2). Children had higher rates than adults, females had higher rates than males, black persons had higher rates than white persons, persons of Puerto Rican descent had higher rates than those of Mexican descent, and those below the poverty level had higher rates than those above the poverty level. However, unlike current asthma prevalence, population-based asthma attack prevalence rates for the South, the Northeast, and the Midwest were similar (Figure 4, Table 4).

Asthma Attack Prevalence Trends Among Children and Adults

Trends in asthma attack prevalence among persons with current asthma—

Asthma attack prevalence among persons with current asthma decreased from 55.8% in 2001 to 51.9% in 2010, at a rate of 1.0% per year. This decrease in the proportion reporting an attack in the past 12 months represents progress in asthma management (Figure 5, Table 5). However, Figure 3 shows an increasing trend in asthma attack prevalence among the general population from 2003 to 2010 (population-based rate). The population-based asthma attack prevalence rate increased because current asthma prevalence increased (see Figure 1). That is, a larger proportion of the population had asthma and was at risk for an asthma attack, which outweighed the lower risk among people with asthma of having an asthma attack. The result was that for asthma attack prevalence, the population-based rate increased even while the risk-based rate declined.

Risk-based asthma attack prevalence among children—In 2001, 61.7% of children with current asthma had at least one asthma attack in the previous 12 months compared with 58.3% in 2010;

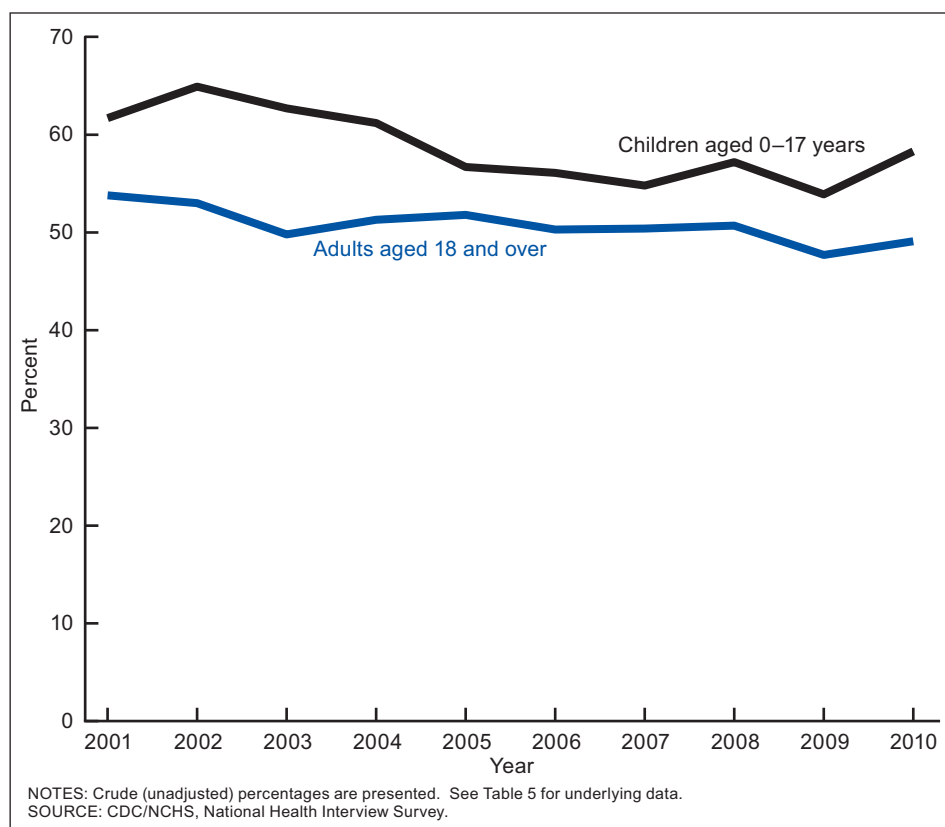


Figure 5. Asthma attack prevalence among children and adults with current asthma (risk-based): United States, 2001–2010

the rate of decrease per year from 2001 to 2010 was 1.5% (Table 5). In each year from 2001 to 2010, a higher percentage of children with current asthma had at least one attack in the previous 12 months compared with adults with current asthma.

Risk-based asthma attack prevalence among adults—In 2001, 53.8% of adults with asthma had at least one asthma attack in the previous 12 months compared with 49.1% in 2010. Asthma attack prevalence among adults with current asthma declined from 2001 to 2010 at a rate of 1.0% per year (Table 5).

Asthma Attack Prevalence Among Persons With Current Asthma

Age group differences in 2008–2010 asthma attack prevalence among persons with current asthma—Overall, an average annual 51.2% of persons with current asthma reported having at least one asthma attack during the previous 12 months. Children aged 0–17 years with current asthma were more likely to have had at least one attack during the previous 12 months (56.5%) than adults aged 18 and over (49.1%) (Figure 6, Table 6).

Differences by sex and race and ethnicity in 2008–2010 asthma attack prevalence among persons with current asthma—Females with current asthma were more likely to have had an attack during the previous 12 months (52.7%) than males (49.2%). Asthma attack prevalence among persons with asthma did not vary significantly by race or ethnicity (Figure 6, Table 6).

Differences by poverty status in 2008–2010 asthma attack prevalence among persons with current asthma—Among persons with current asthma, having at least one asthma attack in the previous 12 months was more prevalent among those with family

income less than 100% of the federal poverty threshold (55.1%) than among persons with family income between 250% and less than 450% of the poverty threshold (47.9%) (Figure 6, Table 6).

Differences by geographic region in 2008–2010 asthma attack prevalence among persons with current asthma—The risk-based asthma attack prevalence rate was higher in the South (52.2%) and the West (54.1%) than in the Northeast (47.3%) (Figure 6, Table 6). This regional difference is the reverse of that seen for asthma prevalence. Current asthma prevalence was lower in the South and the West than in the Northeast (Figure 2, Table 2).

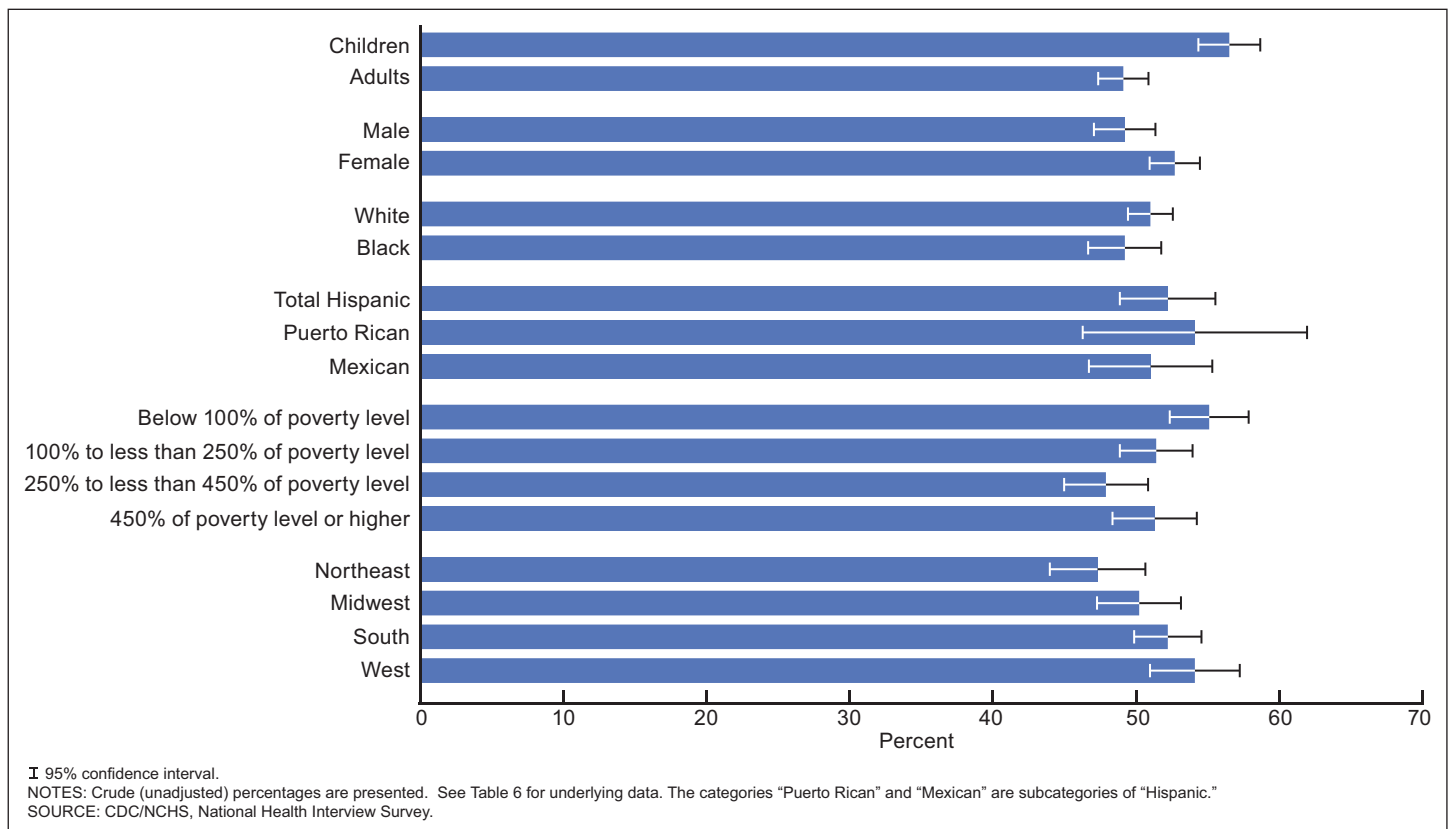


Figure 6. Asthma attack prevalence among persons with current asthma (risk-based), by age group, sex, race and ethnicity, poverty status, and geographic region: United States, average annual 2008–2010

Physician Office Visits and Hospital Outpatient Department Visits

Estimates for asthma physician office and hospital outpatient visits include the number of visits, the rate of visits for the general population (population-based rates), and the rate of visits for the population with current asthma (risk-based rates). Routine visits to a physician office or hospital outpatient clinic for preventive asthma care is a key component of asthma management and maintaining good asthma control (1). However, ambulatory care estimates based on visits to physician offices or hospital outpatient departments also include visits for patients with exacerbations of their asthma. To the extent that worsening symptoms are reversed and asthma control is improved, ambulatory visits in these nonacute settings may avert more severe outcomes such as asthma ED visits or hospitalizations.

This section presents 2001–2009 trends for asthma visits to private physician offices and hospital outpatient departments for population-based rates, risk-based rates, and counts of visits. Differences between detailed demographic subgroups are assessed using average annual estimates for the period 2007–2009. Additional detail not included in the figures can be found in Tables 7–12.

Physician Office Visit Trends

Number of physician office visits—

There was fluctuation in the number of asthma physician office visits from 2001 to 2009, but no clear trend. In 2009, there were 10.6 million asthma physician office visits (Figure 7).

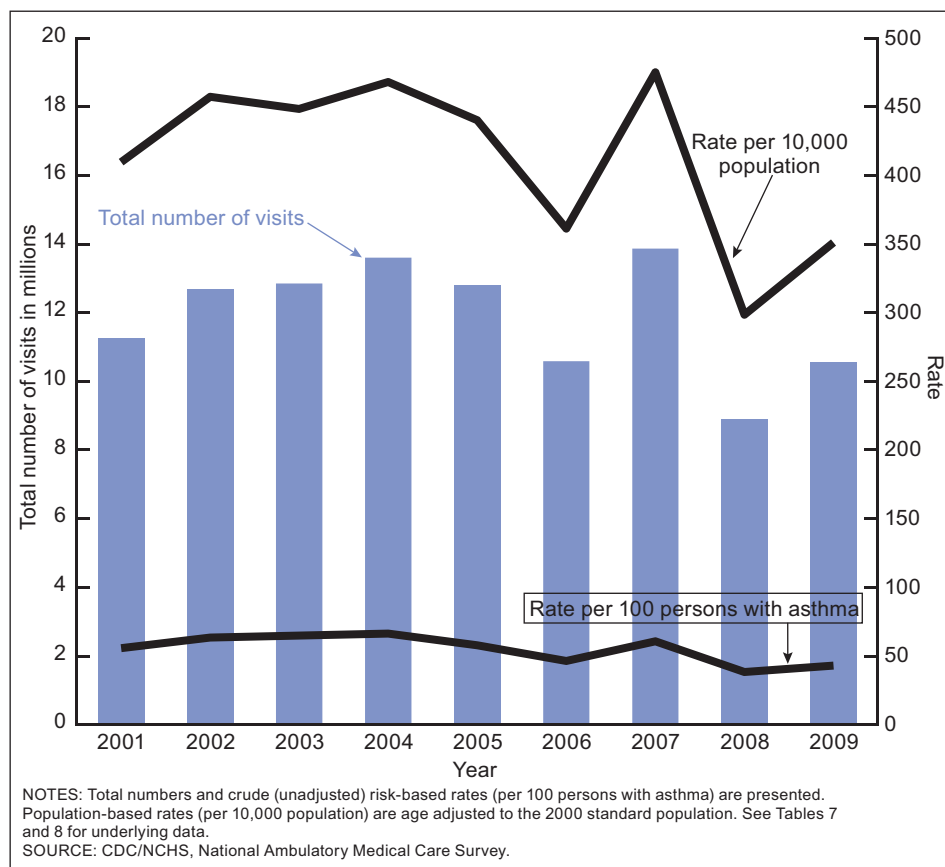


Figure 7. Asthma physician office visits: United States, 2001–2009

Population-based rate of physician office visits—

The population-based rate of physician office visits for asthma fluctuated but did not follow a significant trend from 2001 to 2009. In 2009, there were 351.2 visits per 10,000 population (Figure 7, Table 7).

Risk-based rate of physician office visits—

From 2001 to 2009, there was a 5.5% decrease per year in the risk-based rate of physician office visits for asthma. In 2009, there were 43.0 visits per 100 persons with asthma (Figure 7, Table 8).

Hospital Outpatient Department Visit Trends

Number of hospital outpatient department visits—There was no significant trend in the number of asthma hospital outpatient department visits from 2001 to 2009. In 2009, there were 1.2 million asthma hospital outpatient department visits (Figure 8).

Population-based rate of hospital outpatient department visits—The population-based rate of asthma hospital outpatient department visits for asthma fluctuated but did not follow a significant trend from 2001 to 2009. In 2009, there were 39.6 visits per 10,000 population (Figure 8, Table 9).

Risk-based rate of hospital outpatient department visits—From 2001 to 2009, there was no significant trend in the risk-based rate of hospital outpatient department visits for asthma. In 2009, there were 4.8 visits per 100 persons with asthma (Figure 8, Table 10).

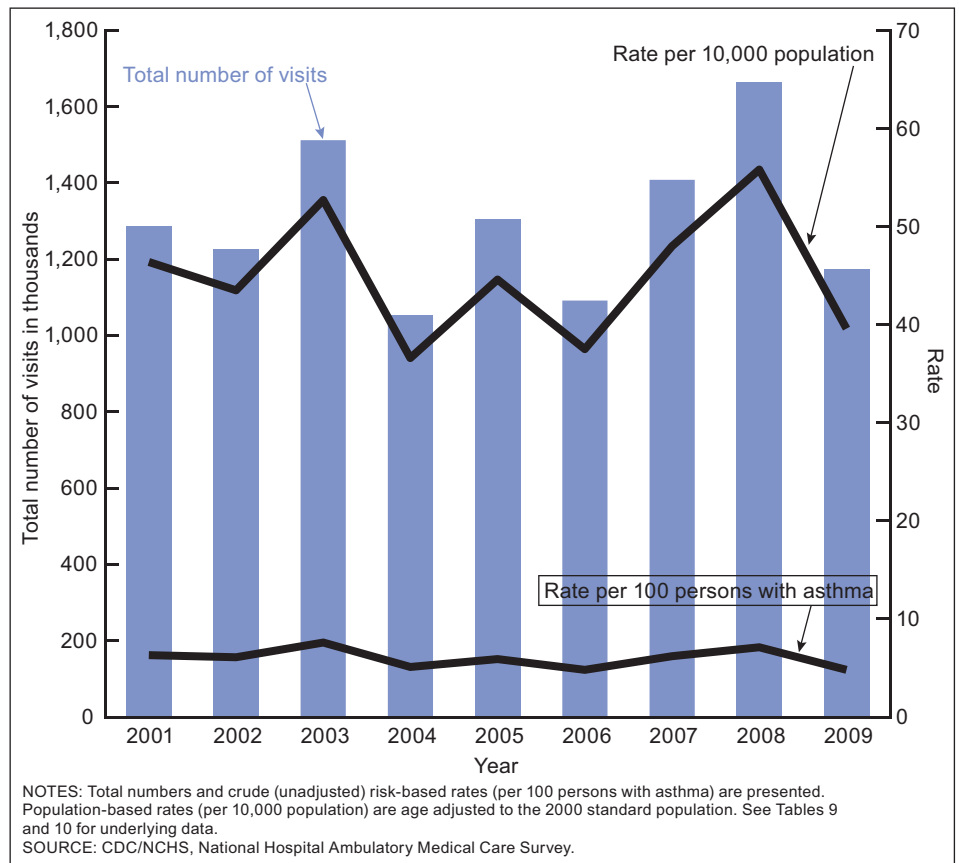


Figure 8. Asthma hospital outpatient department visits: United States, 2001–2009

Physician Office Visits by Selected Characteristics

Differences in risk-based rates of physician office visits, by age group and sex—For the period 2007–2009, the average annual rate of physician office visits for asthma was higher for children aged 0–17 years compared with adults aged 18 and over (66.9 compared with 38.9 visits per 100 persons with asthma). Males and females had similar rates (Figure 9, Table 11).

Differences in risk-based rates of physician office visits, by race and ethnicity—For the period 2007–2009, the average annual rate of physician office visits for asthma for white and black persons was similar. The rate for Hispanic persons was higher than the rate for non-Hispanic persons (72.6 compared with 43.5 per 100 persons with asthma) (Figure 9, Table 11).

Differences in risk-based rates of physician office visits, by geographic region—The average annual rate of physician office visits for asthma for persons living in the South (56.6 visits per 100 persons with asthma) was higher than for those living in the Midwest (33.9 per 100 persons with asthma) (Figure 9, Table 11).

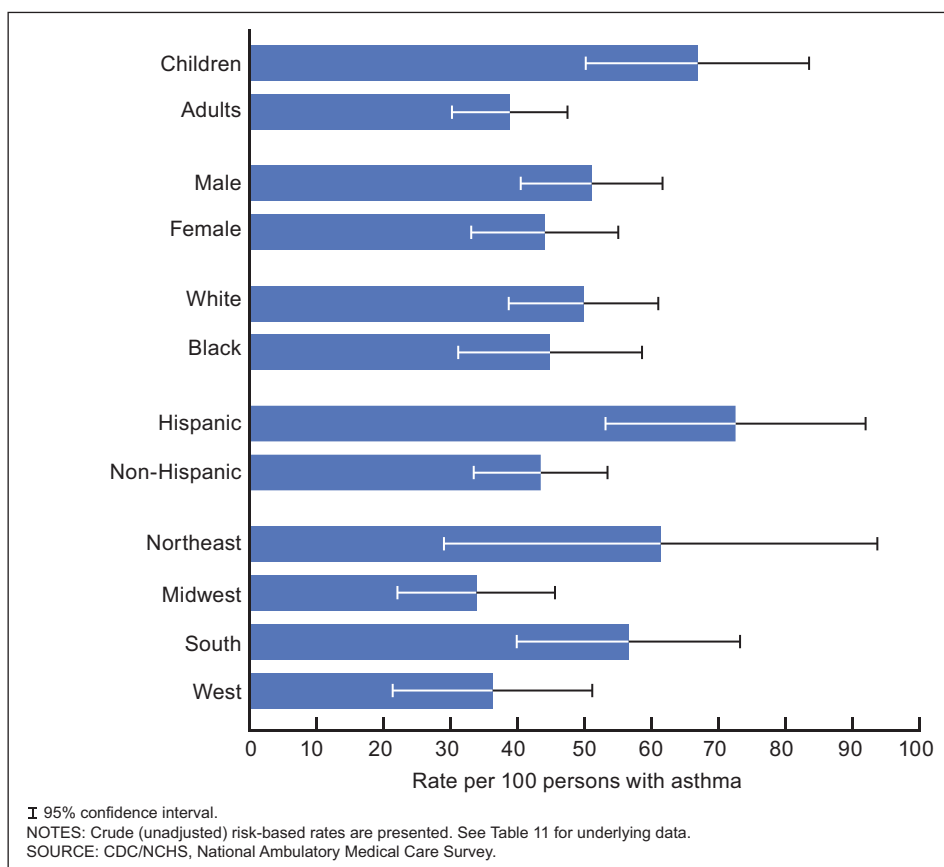


Figure 9. Asthma physician office visit rates (risk-based), by age group, sex, race and ethnicity, and geographic region: United States, average annual 2007–2009

Hospital Outpatient Department Visits by Selected Characteristics

Differences in risk-based rates of hospital outpatient department visits, by age group and sex—For the period 2007–2009, the average annual rate of hospital outpatient department visits for asthma was higher for children aged 0–17 years compared with adults aged 18 and over (11.8 compared with 3.6 visits per 100 persons with asthma). There was no difference by sex (Figure 10, Table 12).

Differences in risk-based rates of hospital outpatient department visits, by race and ethnicity—The average annual rate of hospital outpatient department visits for asthma was lower for white persons (5.1 visits per 100 persons with asthma) compared with black persons (11.1 visits per 100 persons with asthma). Compared with non-Hispanic persons with current asthma, Hispanic persons had a higher average annual rate of hospital outpatient department visits for asthma (9.9 compared with 5.4 per 100 persons with asthma) (Figure 10, Table 12).

Differences in risk-based rates of hospital outpatient department visits, by geographic region—There were no significant differences in risk-based rates of hospital outpatient department visits by geographic region (Figure 10, Table 12).

Physician Office Visits by Age Group

Differences in risk-based rates of physician office visits, by detailed age group—The average annual asthma physician office visit rate for children aged 0–4 years was the highest at 117.2 per 100 persons with asthma. For persons aged 15–34, the rate was the lowest at 27.2 per 100 persons with asthma (Figure 11, Table 11).

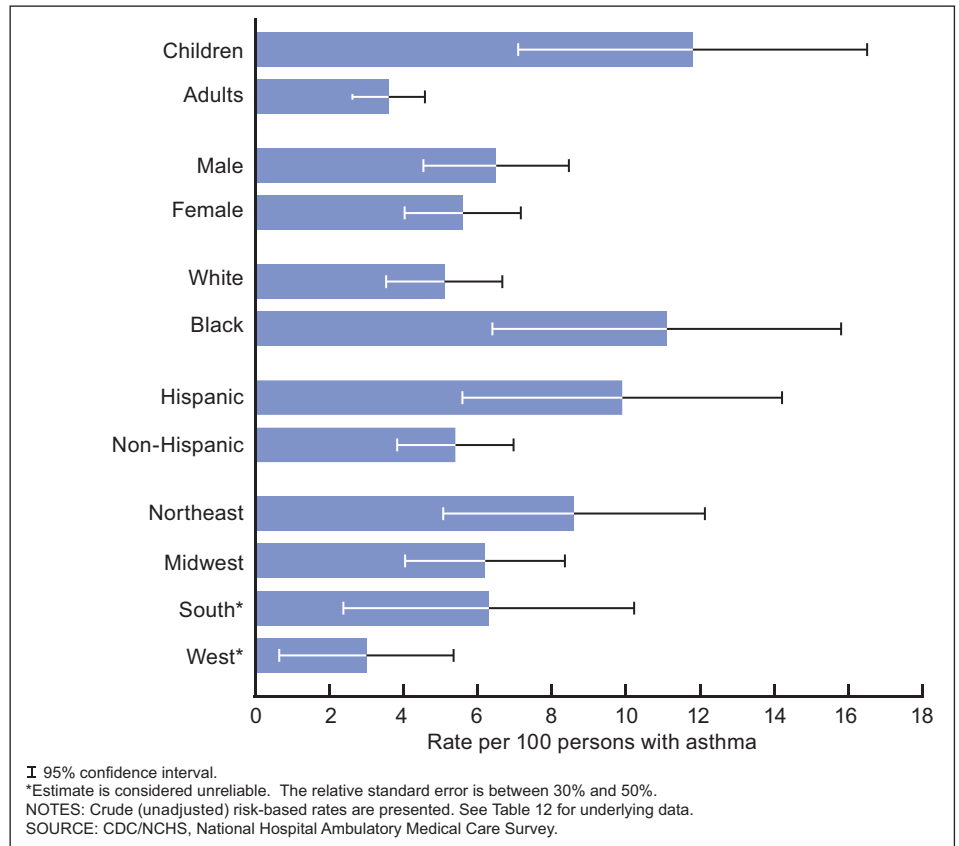


Figure 10. Asthma hospital outpatient department visit rates (risk-based), by age group, sex, race and ethnicity, and geographic region: United States, average annual 2007–2009

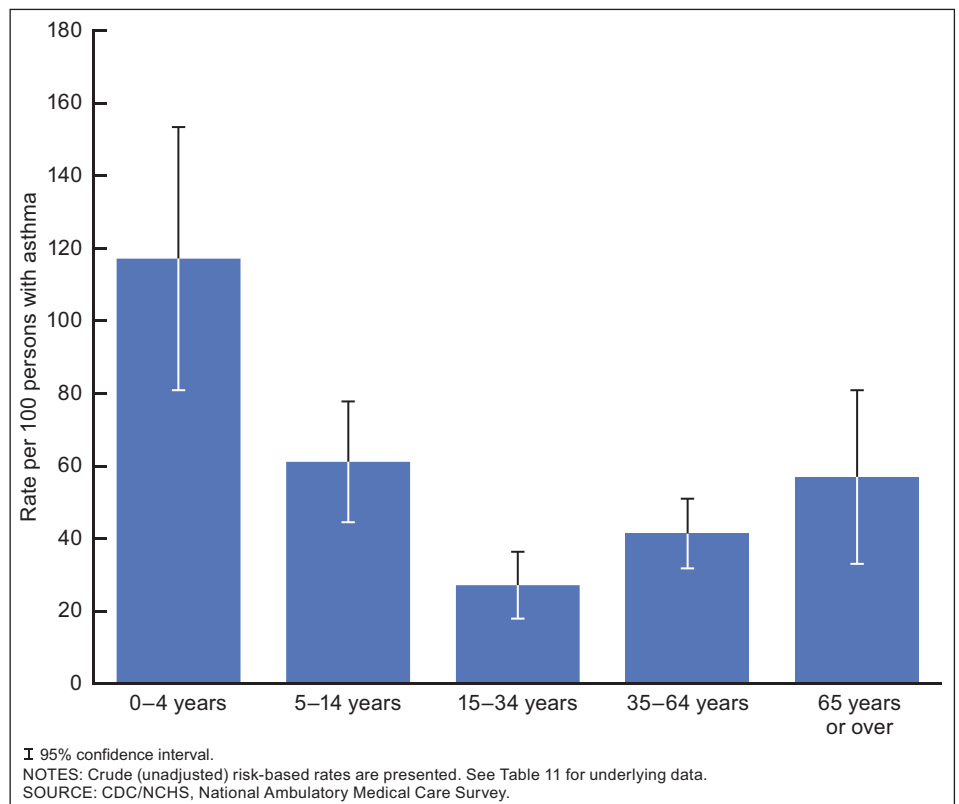


Figure 11. Asthma physician office visit rates (risk-based), by detailed age group: United States, average annual 2007–2009

Hospital Outpatient Department Visits by Age Group

Differences in risk-based rates of hospital outpatient department visits, by detailed age group—Average annual asthma hospital outpatient department visit rates for children aged 0–4 years were the highest at 21.8 per 100 persons with asthma. Visit rates were also higher for children aged 5–14 years (10.6) compared with older age groups (4.7 for those aged 15–34, 3.3 for those aged 35–64, and 3.1 for those aged 65 or over) (Figure 12, Table 12).

Physician Office and Hospital Outpatient Department Visit Trends by Race

Trends for health care encounter rates for persons with asthma in primary care settings (risk-based), by race—At the beginning of the period 2001–2009, black persons had lower visit rates for primary health care for asthma. Given their higher rates of adverse outcomes relative to white persons, the lower primary visit rates among black persons could indicate underutilization of preventive services. However, encounters in primary care settings increased for black persons with asthma relative to white persons so that during the latter part of the period, total primary care encounter rates were similar by race (Figure 13).

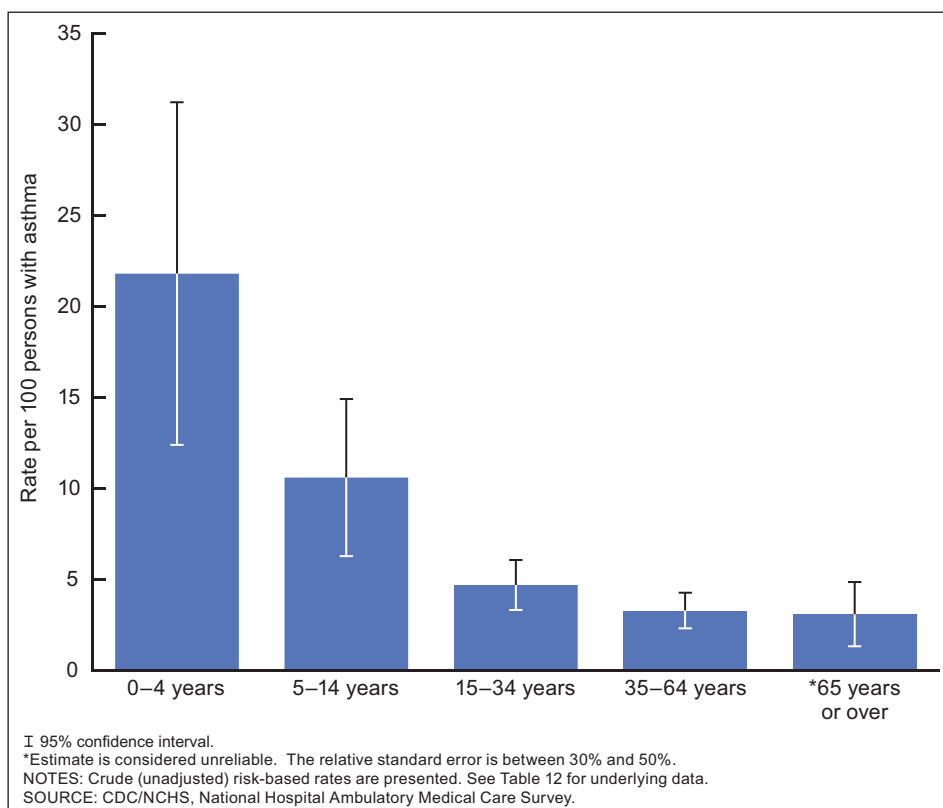


Figure 12. Asthma hospital outpatient department visit rates (risk-based), by detailed age group: United States, average annual 2007–2009

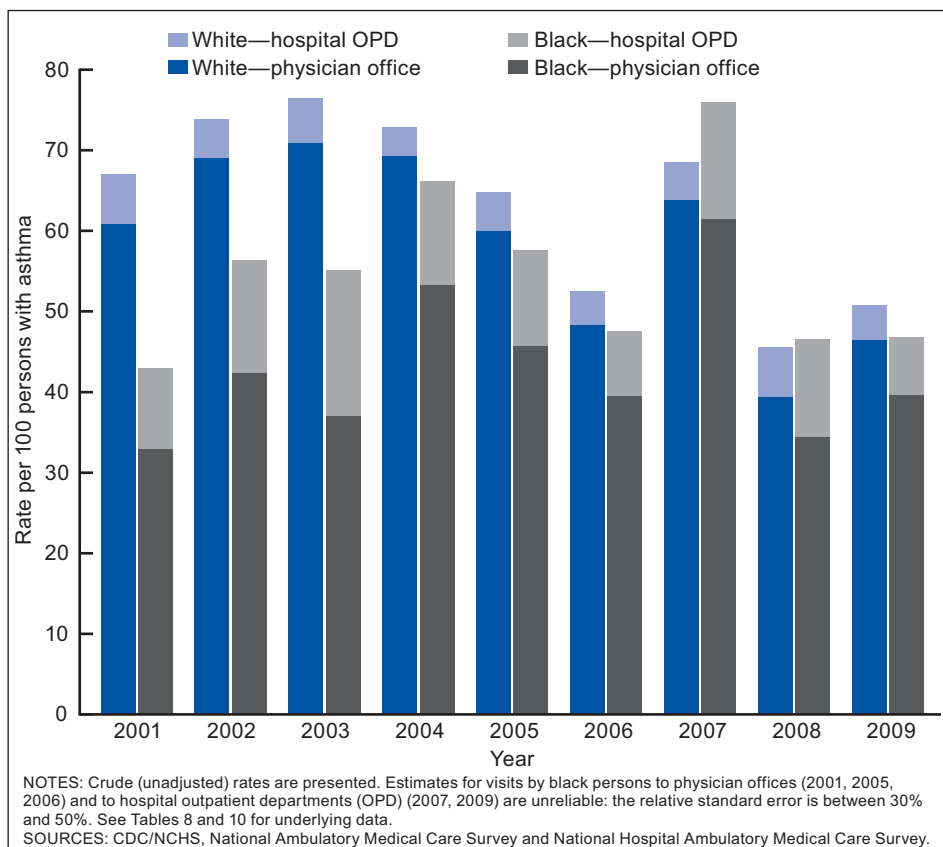


Figure 13. Asthma physician office visit rates and hospital outpatient department visit rates (risk-based), by race: United States, 2001–2009

Emergency Department Visits

Asthma ED measures include the count of visits, the rate of visits for the general population (population-based rates,) and the rate for the population with current asthma (risk-based rates). Visiting the ED for an asthma exacerbation is a key indicator of poorly controlled asthma and of risk for future asthma exacerbations (1). There are specific recommendations for patient education to help prevent future ED visits, including focused and targeted patient education in the physician office and ED setting (assessing inhaler technique, instructions for medication, and steps to follow for worsening symptoms) and referral for follow-up asthma care (1).

This section presents 2001–2009 trends for asthma ED visits for population-based rates, risk-based rates, and counts of visits. Differences between population subgroups are assessed over this period, and more detailed demographic groups are compared using average annual estimates for the period 2007–2009. Additional detail not provided in the figures can be found in [Tables 13–15](#).

ED Visit Trends

Number of asthma ED visits—Over the period 2001 through 2009, the number of ED visits fluctuated without a clear trend. In 2009, there were 2.1 million asthma ED visits ([Figure 14](#)).

Population-based rates of asthma ED visits—The ED visit rate per 10,000 population fluctuated but did not follow a consistent trend. In 2009, there were 69.7 ED visits per 10,000 population ([Figure 14](#), [Table 13](#)).

Risk-based rates of asthma ED visits—There was also no significant trend in the risk-based based rates of ED visits. In 2009, there were 8.4 ED visits per 100 persons with asthma; a similar rate persisted throughout the period ([Figure 14](#), [Table 14](#)).

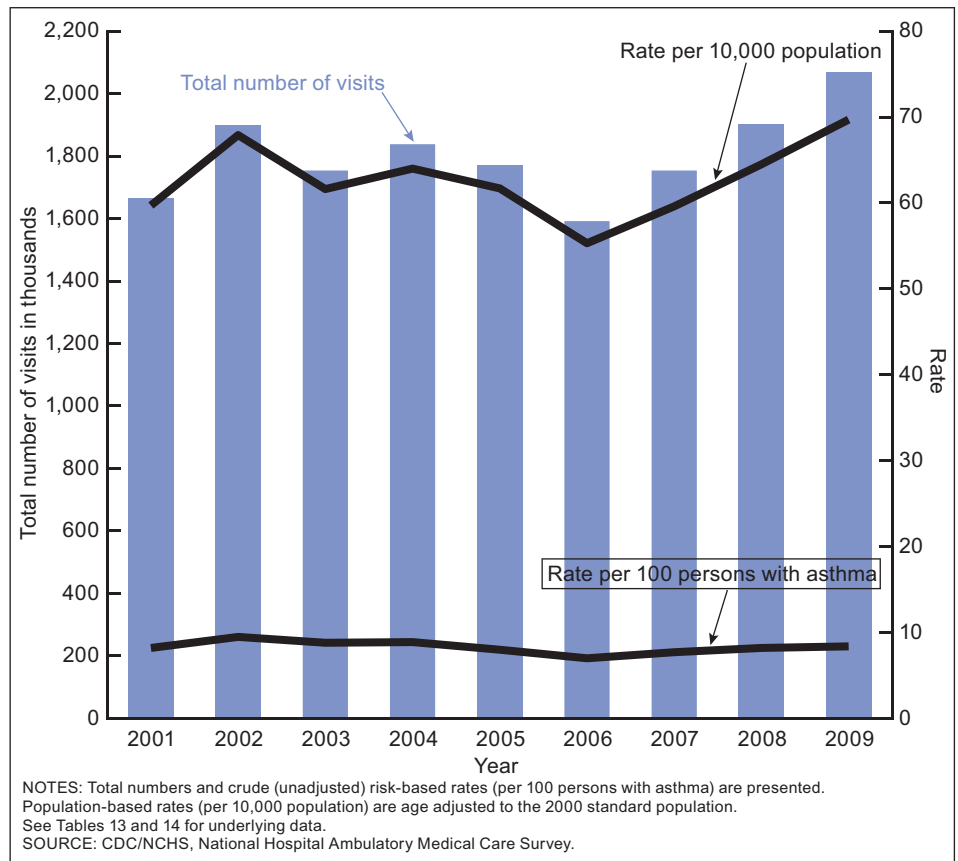


Figure 14. Asthma emergency department visits: United States, 2001–2009

ED Visits by Selected Characteristics

Differences in risk-based rates of ED visits, by age group and sex—For the period 2007–2009, children aged 0–17 years had a higher ED visit rate compared with adults aged 18 and over (10.7 compared with 7.0 per 100 persons with asthma). There was no difference in ED rates by sex (8.7 and 7.6 per 100 persons with asthma for males and females, respectively) (Figure 15, Table 15).

Differences in risk-based rates of ED visits, by race and ethnicity—Black persons had an ED visit rate three times as high as white persons (18.3 compared with 6.1 per 100 persons with asthma). Hispanic persons had a higher ED visit rate than non-Hispanic persons (10.8 compared with 7.7 per 100 persons with asthma) (Figure 15, Table 15).

Differences in risk-based rates of ED visits, by geographic region—Among geographic regions, the ED visit rate was higher in the Northeast (10.2 per 100 persons with asthma) and in the South (8.7) than in the West (5.5) (Figure 15, Table 15).

ED Visit Trends by Race

Differences in risk-based rates of ED visits, by race—The ED visit rate per 100 persons with asthma for black persons was more than twice as high as the rate for white persons during each year from 2001 to 2009 (Figure 16, Table 14).

Trends in risk-based rates of ED visits, by race—There was fluctuation but no significant trend in the ED visit rate per 100 persons with asthma for white and black persons from 2001 through 2009 (Figure 16, Table 14).

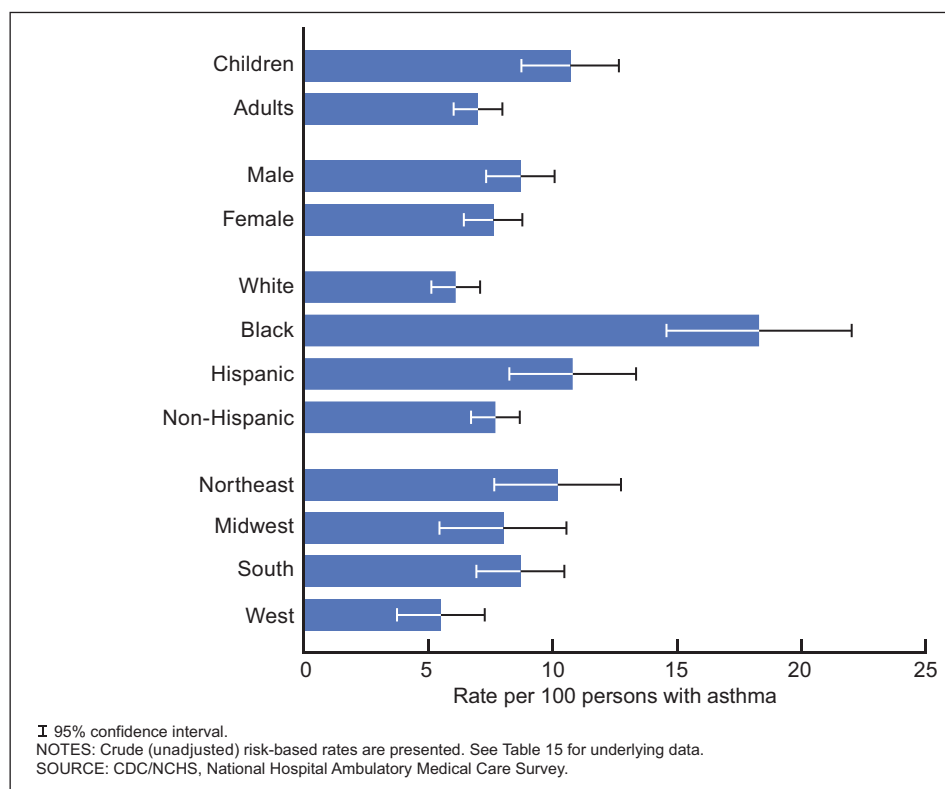


Figure 15. Asthma emergency department visit rates (risk-based), by age group, sex, race and ethnicity, and geographic region: United States, average annual 2007–2009

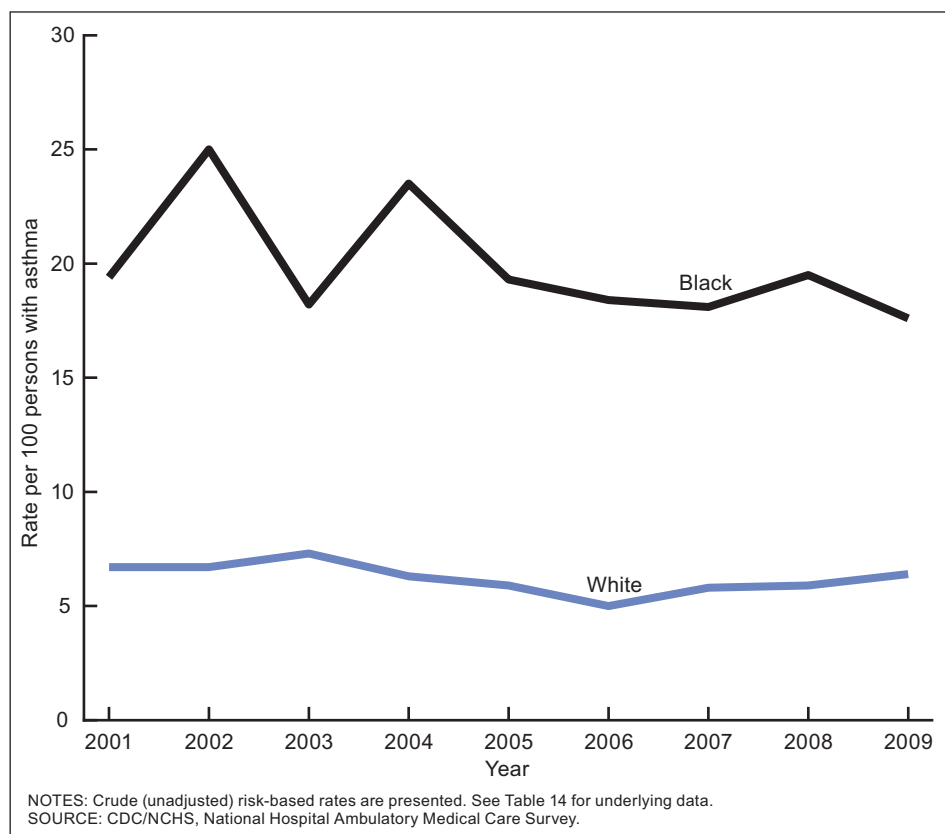


Figure 16. Asthma emergency department visit rates (risk-based), by race: United States, 2001–2009

ED Visits by Age Group

Differences in risk-based rates of ED visits, by detailed age group—The asthma ED visit rate was the highest for children aged 0–4 years (20.8 visits per 100 persons with asthma) and lowest for adults aged 65 or over (4.0 visits per 100 persons with asthma) (Figure 17, Table 15).

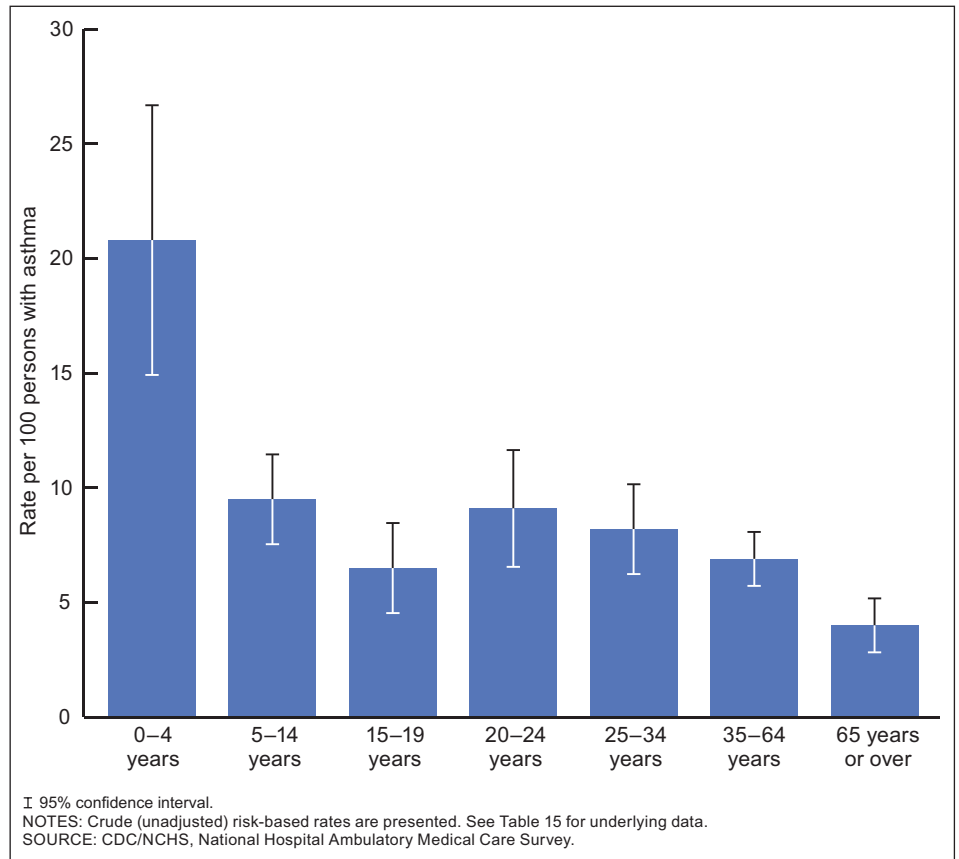


Figure 17. Asthma emergency department visit rates (risk-based), by detailed age group: United States, average annual 2007–2009

Hospital Inpatient Stays

Asthma hospitalization measures include the numbers and rates (population-based rates and risk-based rates) of discharges from nonfederal short-stay hospitals. Asthma hospitalizations represent a serious adverse outcome that is theoretically preventable with high-quality health care, patient education, and optimal management of asthma. Furthermore, an asthma hospitalization is a marker for increased risk of future asthma exacerbations (1).

This section presents 2001–2009 trends for asthma hospital inpatient stays for population-based rates, risk-based rates, and counts of hospitalizations. Differences between population subgroups are assessed over this period and for additional demographic detail using average annual estimates for the period 2007–2009. Additional detail not included in the figures can be found in [Tables 16–18](#).

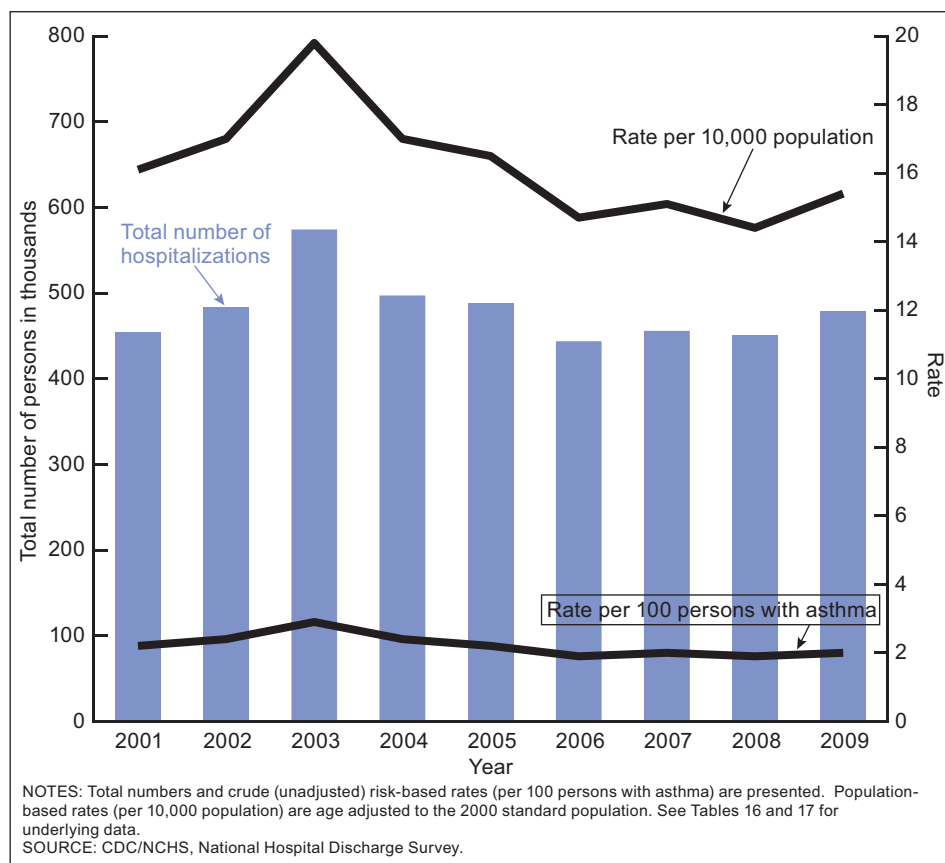


Figure 18. Asthma hospitalizations: United States, 2001–2009

Hospitalization Trends

Number of asthma hospitalizations—

There was no significant trend in the total number of asthma hospitalizations from 2001 through 2009. In 2009, there were 479,300 hospitalizations for asthma ([Figure 18](#)).

Population-based rate of asthma

*hospitalizations—*From 2001 through 2009, the trend in hospitalization rates was not significant ([Figure 18](#), [Table 16](#)).

Risk-based rate of asthma

*hospitalizations—*Hospitalization rates for persons with asthma did not follow a significant trend from 2001 through 2009 ([Figure 18](#), [Table 17](#)).

Hospitalizations by Selected Characteristics

Differences in risk-based rates of asthma hospitalizations, by age group and sex—For the period 2007–2009, average annual asthma hospitalizations rates were similar between children aged 0–17 years and adults aged 18 and over (2.1 and 1.9 per 100 persons with asthma), and were similar between males and females (1.8 and 2.1 per 100 persons with asthma) (Figure 19, Table 18).

Differences in risk-based rates of asthma hospitalizations, by race—Black persons had an asthma hospitalization rate more than twice as high as white persons (2.8 compared with 1.3 hospitalizations per 100 persons with asthma) (Figure 19, Table 18).

Differences in risk-based rates of asthma hospitalizations, by geographic region—The rate of hospitalizations in the Northeast (2.7 per 100 persons with asthma) was higher than the rate in the Midwest (1.4 per 100 persons with asthma). There were no other statistically significant differences in hospitalization risk-based rates by geographic region (Figure 19, Table 18).

Hospitalizations by Race

Differences in annual risk-based rates of asthma hospitalization, by race—The hospitalization rate per 100 persons with asthma among black persons was between 1.9 and 2.5 times higher than the rate for white persons during each year from 2001 to 2009 (Figure 20, Table 17).

Trends in risk-based rates of asthma hospitalization, by race—For black persons, the asthma hospitalization rate per 100 persons with asthma declined by an average rate of 6.3% per year from 2001 to 2009. For white persons, the asthma hospitalization rate declined by an average rate of 3.7% per year from 2001 to 2009 (Figure 20, Table 17).

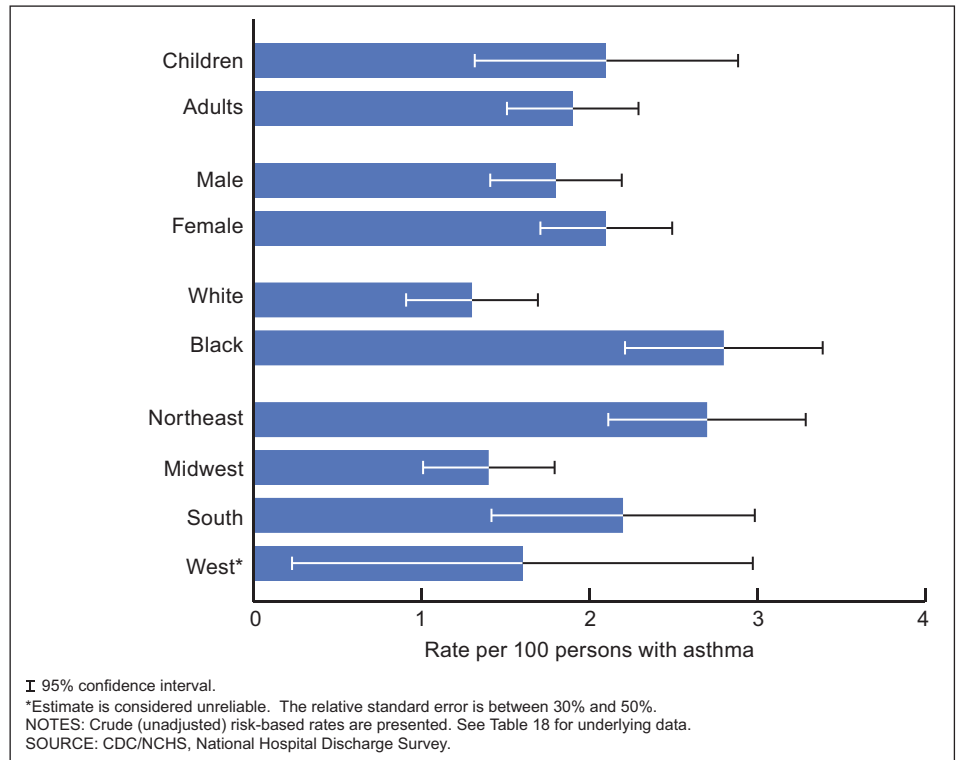


Figure 19. Asthma hospitalization rates (risk-based), by age group, sex, race, and geographic region: United States, average annual 2007–2009

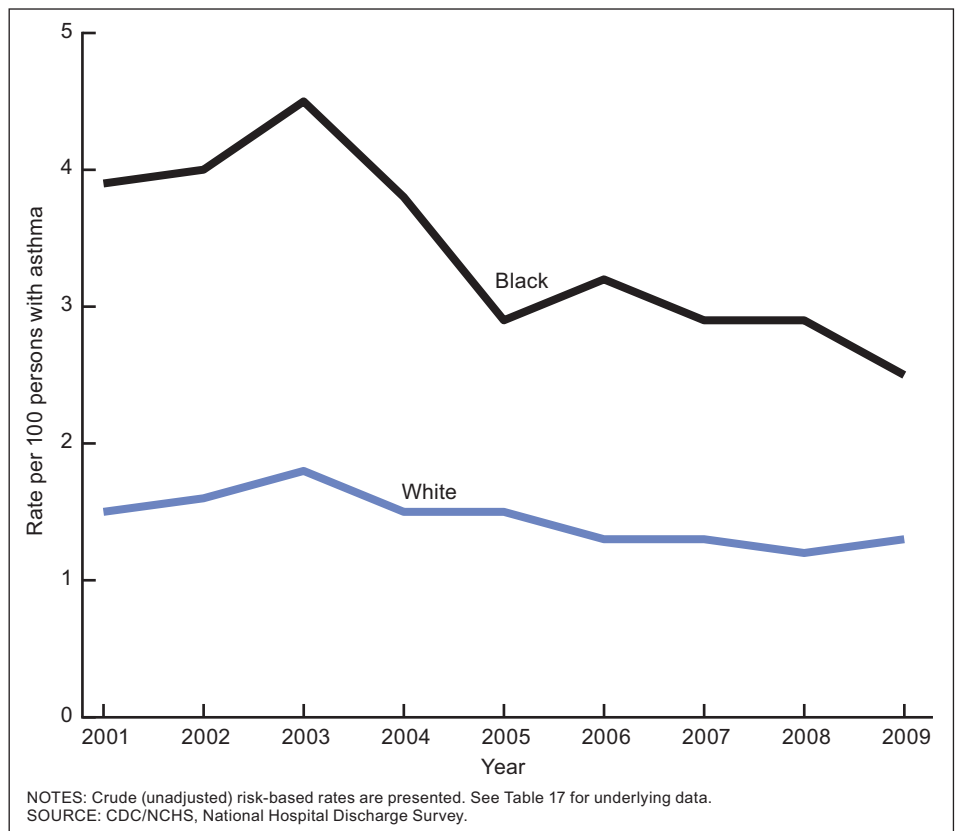


Figure 20. Asthma hospitalization rates (risk-based), by race: United States, 2001–2009

Hospitalizations by Age

Differences in risk-based rates of asthma hospitalizations, by detailed age group—Children aged 0–4 years and adults aged 65 or over had higher asthma hospitalization rates (5.2 and 3.7 per 100 persons with asthma) than all other age groups. Persons aged 15–19 and 20–24 had similar rates, and both these age groups had lower rates than all older age groups. (Figure 21, Table 18).

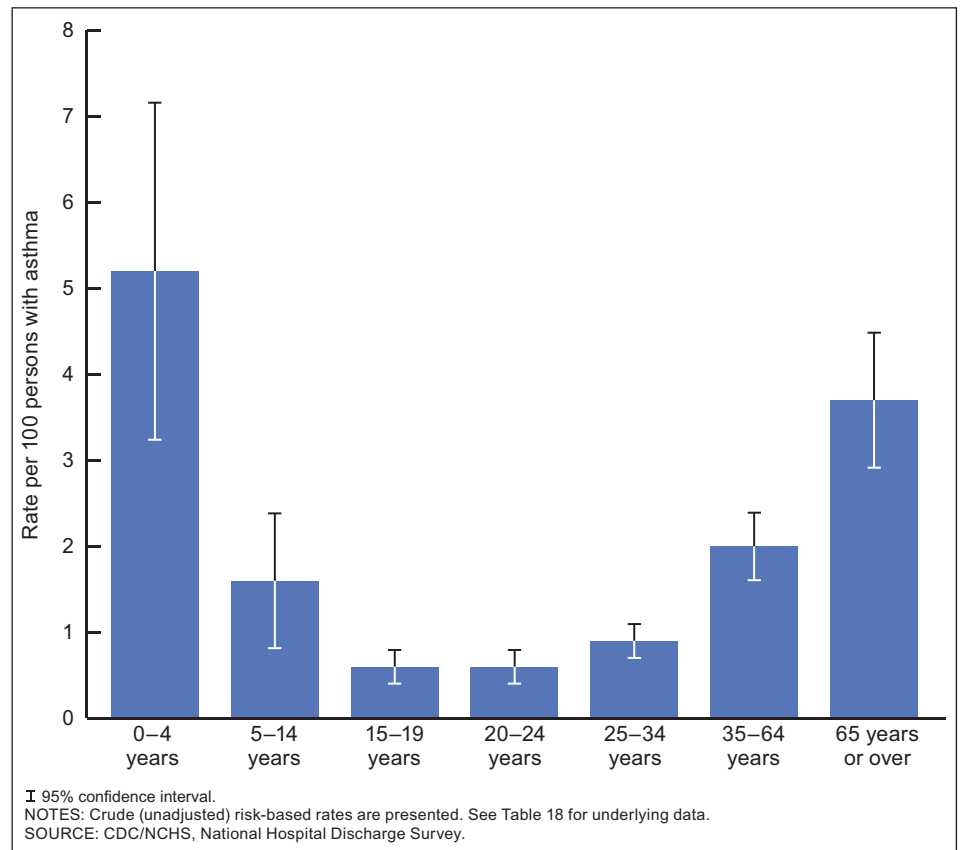


Figure 21. Asthma hospitalization rates (risk-based), by detailed age group: United States, average annual 2007–2009

Deaths

The number of asthma deaths and death rates (population-based rates and risk-based rates) are compiled from the complete set of death certificates filed in the 50 states and the District of Columbia. Asthma deaths are uncommon, especially among children and young adults, but they remain a focus of preventive efforts because high-quality health care and patient education should theoretically prevent asthma-related deaths (1). National asthma guidelines recommend early treatment and special attention to patients who are at high risk of asthma-related death (1). Predictors of death due to asthma include three or more ED visits for asthma in the past year, an asthma hospitalization or ED visit in the past month, overuse of short-acting beta agonist (short-term relief medication), a history of intubation or stay in an intensive care unit for asthma, difficulty perceiving asthma symptoms, lack of a written asthma action plan, certain patient characteristics (low socioeconomic status, female, nonwhite, current smoker, or major psychosocial problems), and the presence of other medical conditions such as cardiovascular disease (1).

This section presents 2001–2009 trends for asthma deaths for population-based rates, risk-based rates, and counts of deaths. Differences between population subgroups are assessed over this period and for additional demographic groups using the average annual estimates for the period 2007–2009. Additional detail not shown in the figures can be found in Tables 19–21.

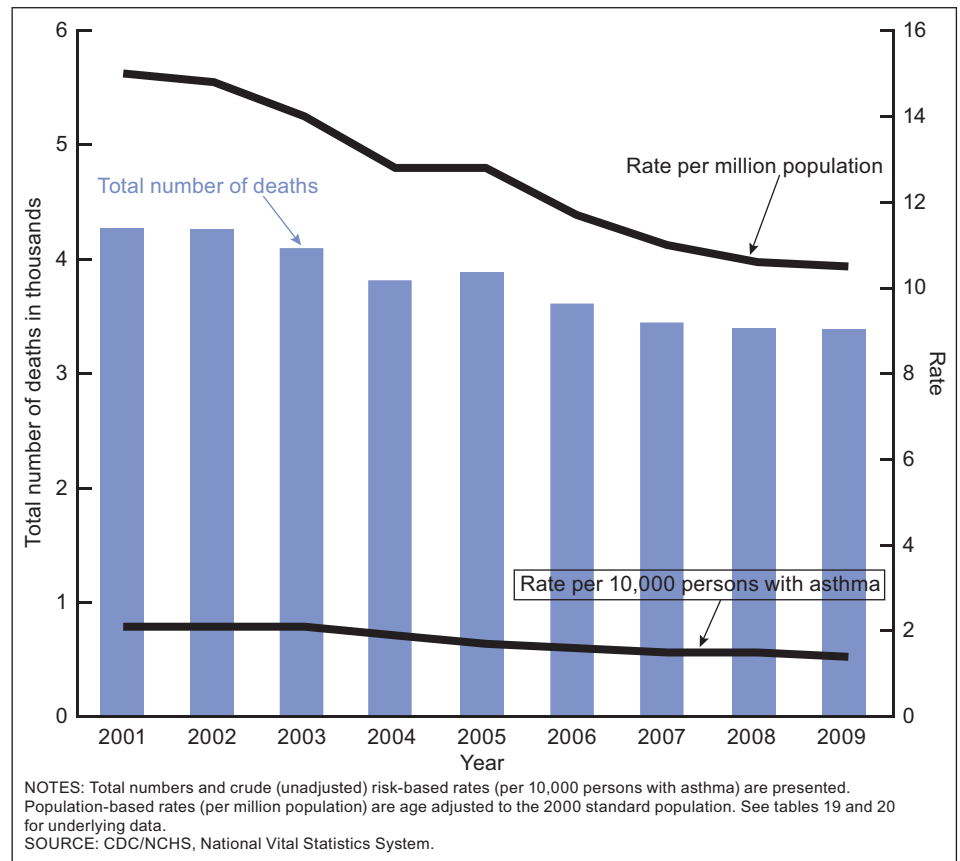


Figure 22. Asthma deaths: United States, 2001–2009

Trends in Deaths

Number of asthma deaths—The number of asthma deaths declined steadily from 2001 (4,269) to 2009 (3,388) at a rate of 3.3% per year (Figure 22).

Population-based rate of deaths—Asthma deaths per million population declined 4.9% per year from 15.0 deaths per million population in 2001 to 10.5 deaths per million population in 2009 (Figure 22, Table 19).

Risk-based rate of deaths—Asthma deaths per 10,000 persons with asthma declined at a rate of 5.6% per year from 2.1 per 10,000 persons with asthma in 2001 to 1.4 per 10,000 persons with asthma in 2009 (Figure 22, Table 20).

Deaths by Selected Characteristics

Differences in risk-based rates of asthma deaths, by age group—Adults aged 18 and over had a higher asthma death rate (1.9 per 10,000 persons with asthma) compared with children aged 0–17 years (0.3 per 10,000 persons with asthma) (Figure 23, Table 21).

Differences in risk-based rates of asthma deaths, by sex—The death rate for females (1.6 per 10,000 persons with asthma) was higher compared with males (1.2 per 10,000 persons with asthma). This difference is driven primarily by the higher death rate for women than men among adults aged 65 and over (6.6 compared with 4.4 per 10,000 persons with asthma). For younger age groups, death rates for males were similar to or higher than rates for females (Figure 23, Table 21).

Differences in risk-based rates of asthma deaths, by race and ethnicity—Black persons had a higher asthma death rate compared with white persons (2.3 compared with 1.3 per 10,000 persons with asthma). Non-Hispanic persons had a higher death rate compared with Hispanic persons (1.5 compared with 0.9 per 10,000 persons with asthma) (Figure 23, Table 21).

Differences in risk-based rates of asthma deaths, by geographic region—The asthma death rates in the West and the South (1.5 and 1.6 per 10,000 persons with asthma) were higher than the asthma death rate in the Midwest region (1.3 per 10,000 persons with asthma) (Figure 23, Table 21).

Deaths by Race and Ethnicity

Differences in annual risk-based rates of asthma deaths, by race and ethnicity

The death rate per 10,000 persons with asthma for black persons was 1.6 to 2.0 times higher than the rate for white persons during each year from 2001 to 2009. The asthma death rate for non-Hispanic persons was 1.3 to 2.0 times higher than the rate for Hispanic persons during each year (Figure 24, Table 20).

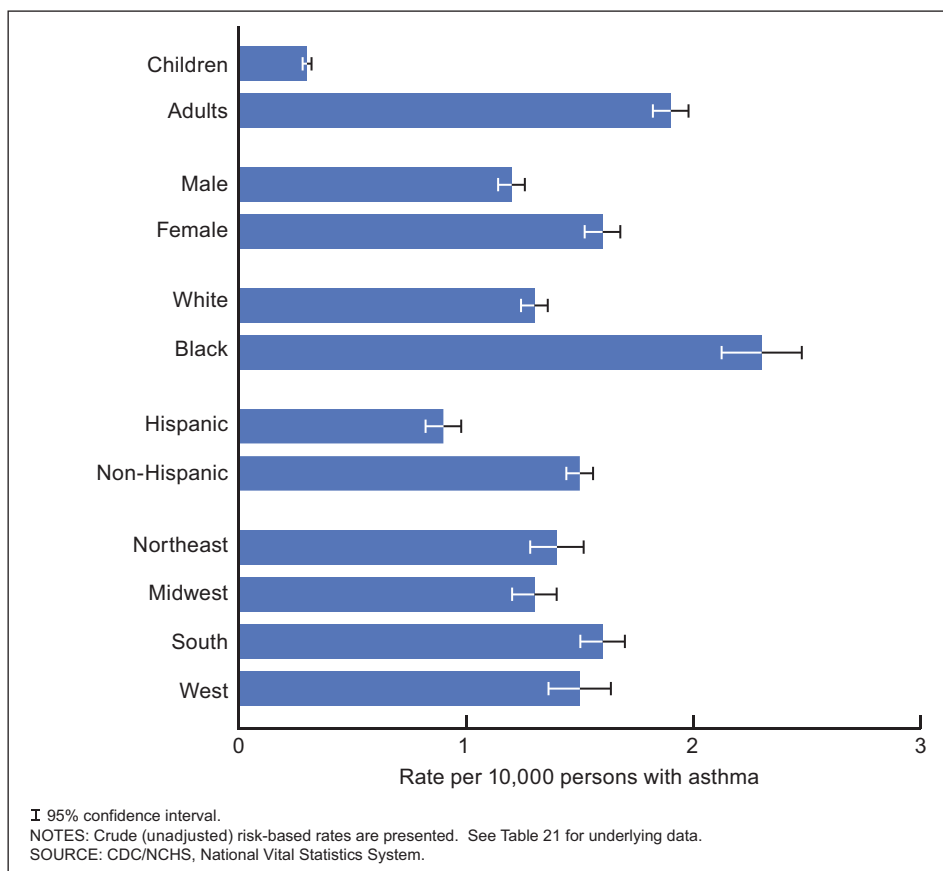


Figure 23. Asthma death rates (risk-based), by age group, sex, race and ethnicity, and geographic region: United States, average annual 2007–2009

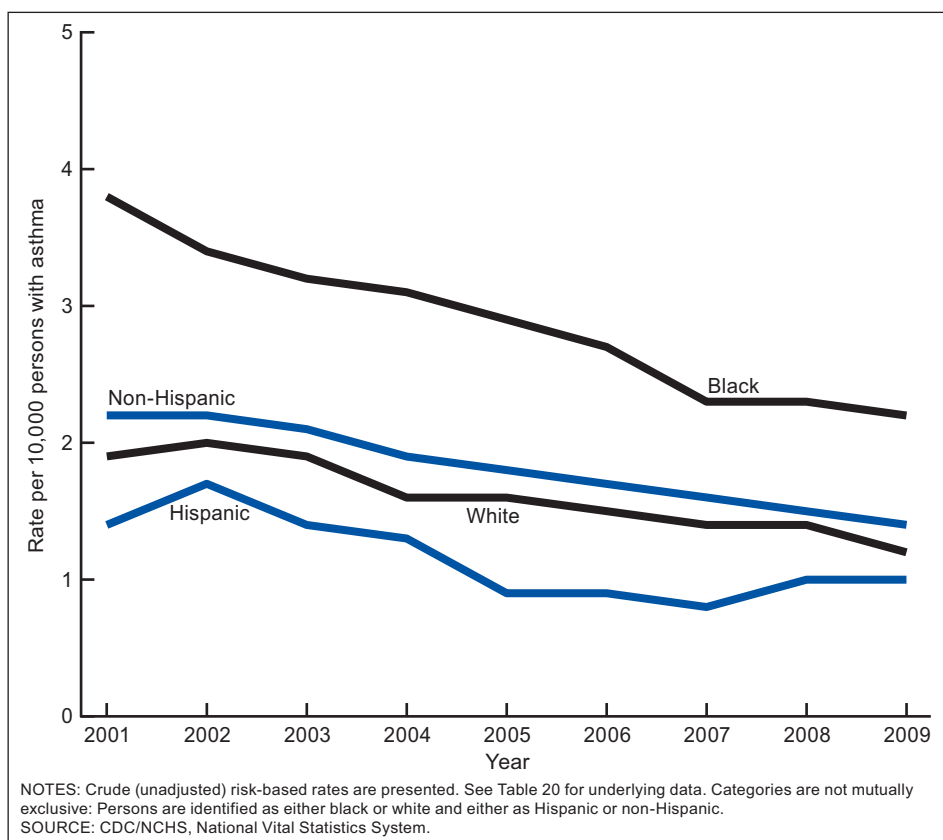


Figure 24. Asthma death rates (risk-based), by race and ethnicity: United States, 2001–2009

Trends in risk-based rates of asthma deaths, by race and ethnicity—From 2001 to 2009, asthma death rates per 10,000 persons with asthma declined at a rate of 6.7% per year for black persons, and at a rate of 5.6% per year for white persons. During this same period, death rates declined at a rate of 5.8% for non-Hispanic persons and 7.1% per year for Hispanic persons (Figure 24, Table 20).

Deaths by Age

Differences in risk-based rates of asthma deaths, by detailed age group—For the period 2007–2009, the average annual asthma death rates for the three youngest age groups (0–4, 5–14, and 15–19 years) were the same (0.3 per 10,000 persons with asthma). The asthma death rate for adults aged 65 or over was the highest at 5.8 per 10,000 persons with asthma. The rate for adults aged 35–64 (1.5 per 10,000 persons with asthma) was higher compared with all younger age groups, as were the rates for adults aged 25–34 (0.7 per 10,000 persons with asthma) and adults aged 20–24 (0.5 per 10,000 persons with asthma) (Figure 25, Table 21).

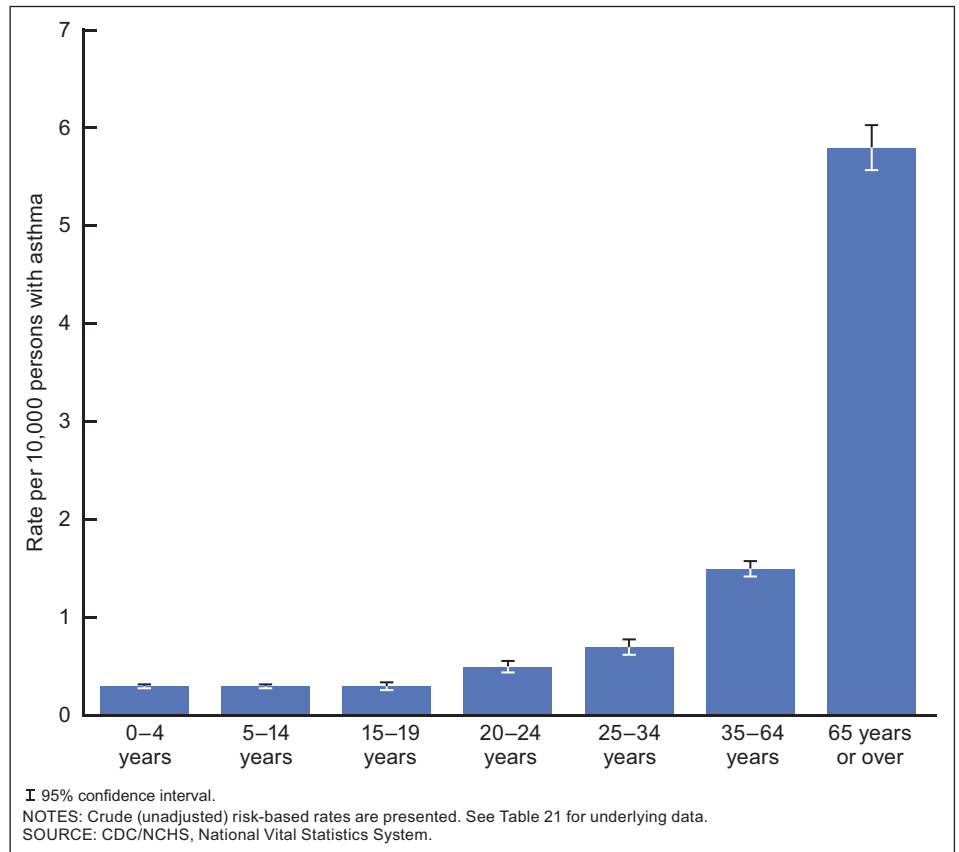


Figure 25. Asthma death rates (risk-based), by detailed age group: United States, average annual 2007–2009

Asthma Trends in the United States From 1980

Over the past two decades, advances in research, medications, treatment approach, public health interventions, and public awareness have all affected how asthma is diagnosed, managed, and perceived. This section presents trends from 1980 in asthma prevalence, hospitalizations, and deaths to provide greater context for the trends (since 2001) presented in the preceding sections. Disparities by sex and race are also shown for long-term trends for asthma hospitalizations and deaths. The most recent data for morbidity measures and asthma management strategies used to track Healthy People 2020 objectives are also discussed.

Historical Perspective

The long-term trend in asthma prevalence from 1980 to 2010 is shown in [Figure 26](#). Asthma period prevalence was the original measure of U.S. asthma prevalence and estimated the percentage of the population that had asthma in the previous 12 months. Estimates were based on the question, “In the past 12 months, did anyone in the family have asthma?” Estimates rose from 3.1% in 1980 to 5.5% in 1996. In 1997, a major redesign of NHIS resulted in a break in the trend data due to a change in the questions used to estimate asthma prevalence (14). Beginning in 1997, two questions were used to measure the percentage of the population affected by asthma. The first question asked if a physician had ever diagnosed asthma. The second question asked about the occurrence of an asthma attack in the past 12 months (asthma attack prevalence). From 1997 to 2000, the measure of asthma attack prevalence was the available estimate of recent, active asthma but it excluded persons with well-controlled asthma. In 2001, current asthma prevalence (measured by the question, “Do you still have asthma?” for those with an asthma diagnosis) was introduced to include all

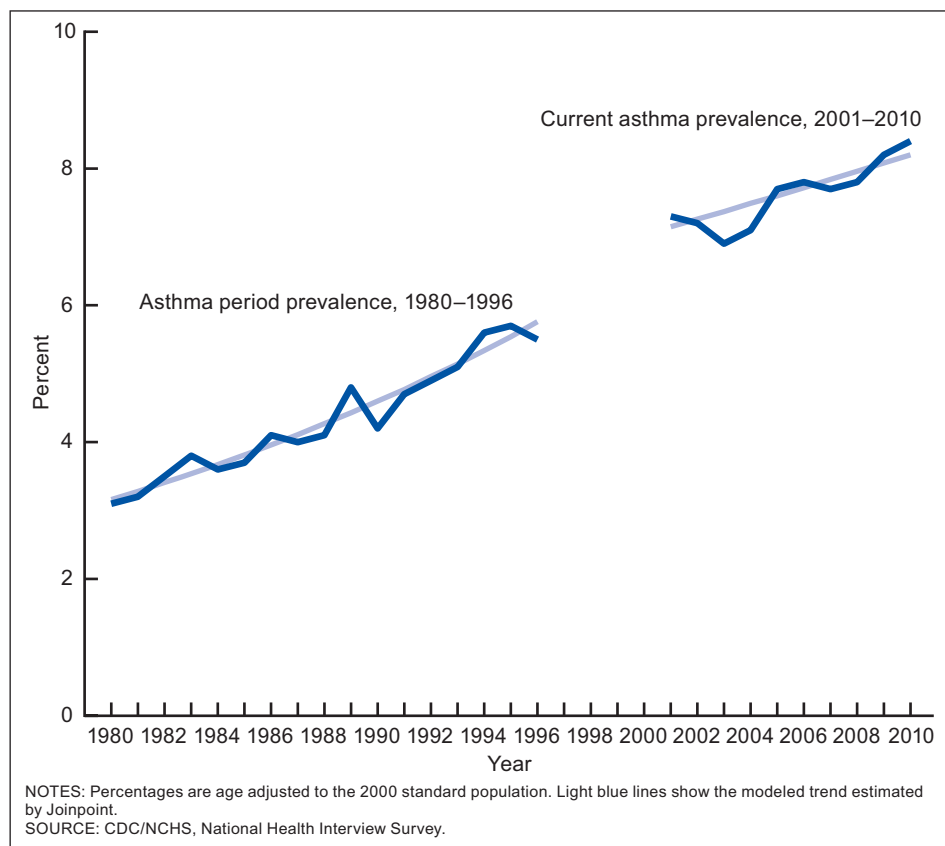


Figure 26. Asthma period prevalence and current asthma prevalence: United States, 1980–2010

persons with asthma. However, current asthma prevalence estimates from 2001 onward are point prevalence estimates and therefore are not directly comparable with asthma period prevalence estimates from 1980 to 1996 (see [table in Appendix III](#) for NHIS question wording for each type of prevalence estimate). Current asthma prevalence estimates are considered more valid than asthma period prevalence because they rely on receiving a diagnosis of asthma from a health professional. Current asthma prevalence increased from 7.3% in 2001 to 8.4% in 2010, an increase of 1.5% per year. This rate of increase was lower than the rate of increase for asthma period prevalence from 1980 to 1996 (3.8% per year).

Population-based outcome rates show the overall trend and impact on the general population. Risk-based rates are informative because they control for prevalence differences between groups. However, analyses of risk-based rates over longer periods are complicated by the change in asthma prevalence

measurement over time, as discussed above. These changes preclude direct comparison of risk-based rates over the period 1980–2009. Therefore, population-based rates are presented in the following discussion.

During the rise of asthma prevalence in the 1980s and 1990s, adverse outcomes were also increasing. The increase in asthma mortality in the 1980s led to a major public health response, including the formulation and dissemination of asthma treatment guidelines, asthma surveillance, and coordinated interventions on local and state levels (1,7,15,16). **Figure 27** shows the long-term trends in population-based rates of asthma hospitalizations and deaths. Asthma hospitalization rates increased at an average rate of 2.9% per year from 1980 to 1984 and then decreased by an average rate of 1.2% per year from 1984 to 2009. Asthma death rates increased by an average rate of 4.6% per year from 1980 to 1989 and then remained stable from 1989 to 1998. Asthma death rates decreased by an average rate of 4.9% per year from 1999 to 2009. Death rates from before and after 1999 are not directly comparable due to the transition from *International Classification of Diseases, Ninth Revision (ICD-9)* to *ICD-10* in 1999 (see **Appendix III: Definition of Terms**

for details). Analysis of the impact of the transition to ICD-10 indicated that an estimated 11% of the decline in deaths between 1998 and 1999 could be attributed to the coding change alone. The continuing decline after 1999 should not have been influenced by the change in the classification system.

Analyses of trends since 2001 in earlier sections of this report show that both population-based rates and risk-based rates for asthma hospitalizations, hospital outpatient department visits, and ED visits did not change significantly over this recent period, whereas both population-based rates and risk-based rates for asthma hospitalizations and deaths declined. These trends indicate that on a national level, earlier progress in reducing the impact of these serious asthma outcomes has continued. Reducing the less severe, but vastly more common morbidity associated with asthma remains a challenge. The Guidelines for the Diagnosis and Management of Asthma recommend routine visits every 6 months, regardless of asthma severity, as

a means to continually assess and improve asthma control (1).

Disparities in Asthma Hospitalization and Death Rates

Racial disparities in asthma hospitalizations and deaths have been historically large (two to three times higher among black persons compared with white persons) and remain so despite progress in lowering these adverse outcomes for the overall population. **Figure 28** shows trends by race in population-based hospitalization and death rates.

From 1980 to 1985, there was no significant trend in the asthma hospitalization rate for white persons. From 1985 to 2009, the rate for white persons decreased 2.7% per year. For black persons, the asthma hospitalization rate increased 2.6% per year from 1980 to 1990, and then decreased 1.2% per year from 1990 to 2009. At the end of the period in 2009, the rate ratio for

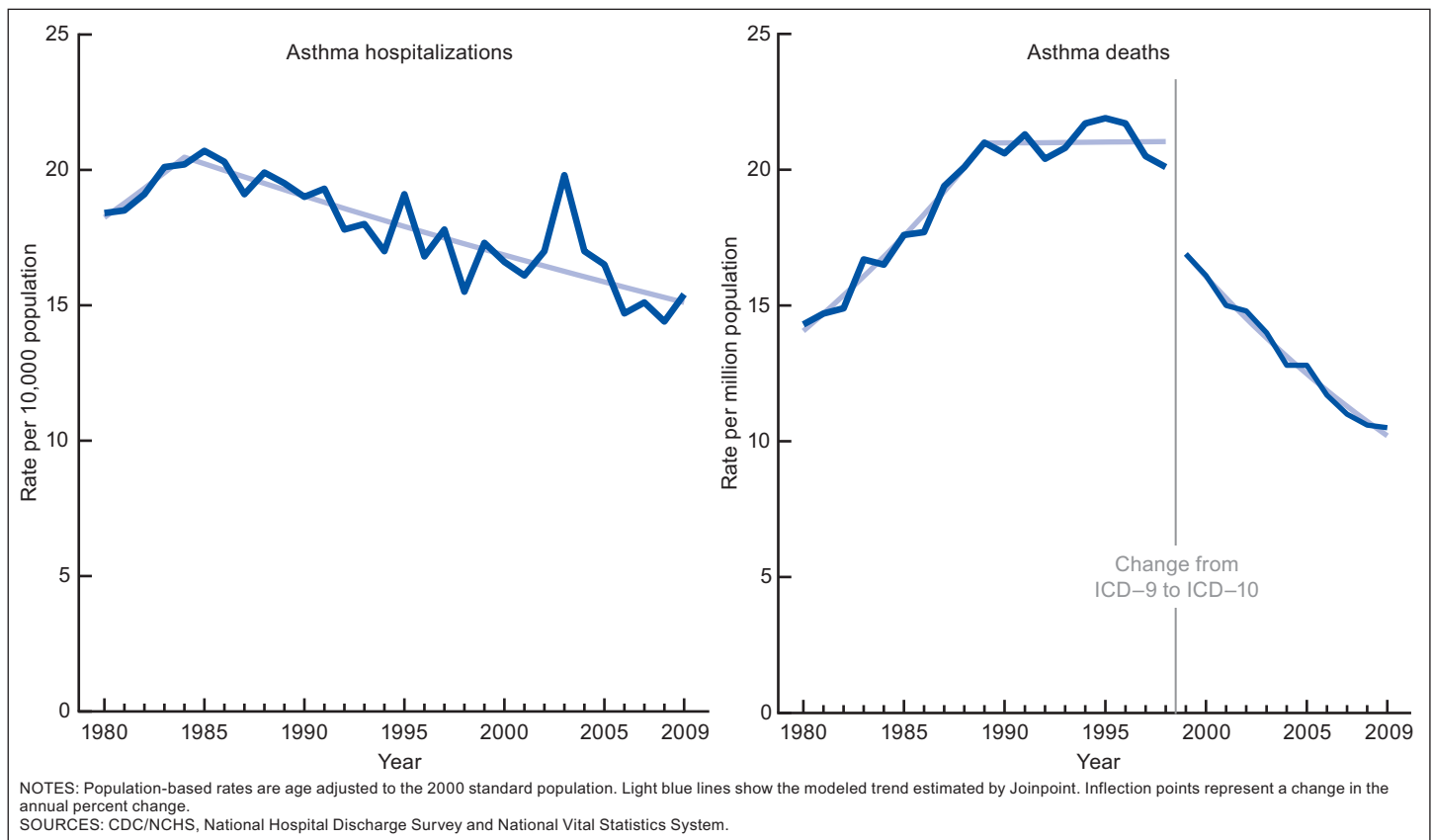


Figure 27. Asthma hospitalization rates and asthma death rates (population-based): United States, 1980–2009

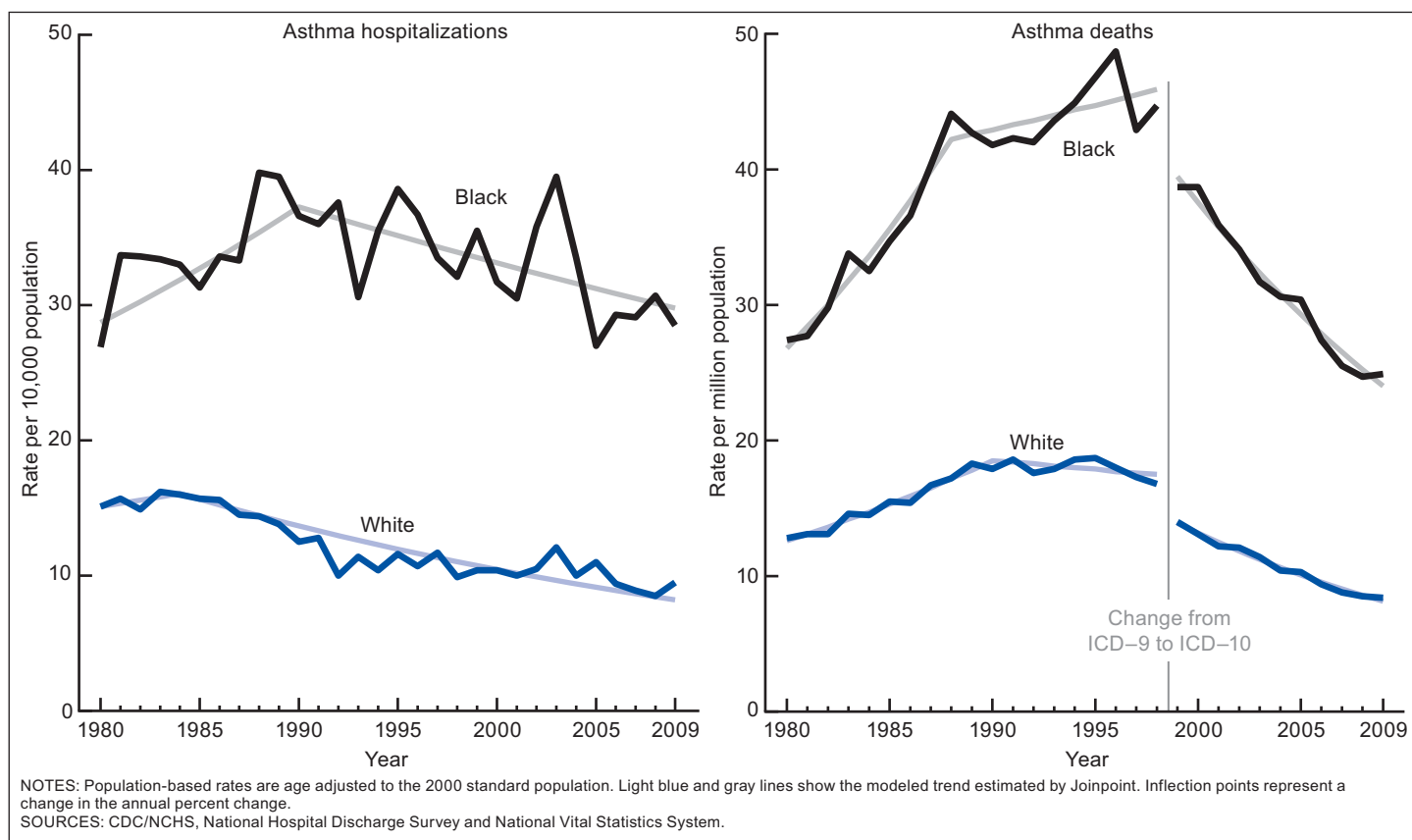


Figure 28. Asthma hospitalization rates and asthma death rates (population-based), by race: United States, 1980–2009

black to white hospitalization rates was 3.0 compared with a black to white rate ratio of 3.0 in 2000, 2.9 in 1990, and 1.8 in 1980. Although hospitalization rates decreased for both black and white persons after 1990, the relative difference in the rate for black persons compared with white persons was about the same in 2009 as it was in 2000 and in 1990. The absolute difference in 2009 was larger than it was in 1980 because of the increase in rates for black persons between 1980 and 1990.

Asthma death rates for black persons increased by an average rate of 5.8% per year from 1980 to 1988; the trend from 1988 to 1998 did not reach statistical significance. For white persons, asthma death rates increased by an average rate of 3.9% per year from 1980 to 1990, and remained stable from 1990 to 1998. After implementation of ICD–10 in 1999, asthma death rates for black persons decreased by an average rate of 4.9% per year, and decreased for white persons by 5.2% per year (note that although the absolute decline in the

asthma death rate for black persons was greater than for white persons, the average percent change was smaller). The asthma death rate was three times higher for black persons compared with white persons in 2009.

These patterns show that much progress has been made in lowering asthma death rates overall. However, black persons continue to have a much higher risk of hospitalization and death from asthma compared with white persons.

Differences also existed in rates for asthma outcomes by sex. Females had higher rates of asthma hospitalizations and deaths compared with males (Figure 29). Asthma hospitalization rates for females increased by an average rate of 4.9% per year from 1980 to 1983, then decreased by an average rate of 0.9% per year from 1983 to 2009. For males, the asthma hospitalization rate increased by an average rate of 1.0% per year from 1980 to 1986, and then decreased by an average rate of 1.6%

per year from 1986 to 2009. The hospitalization rate for females was 40% higher compared with the rate for males in 2009.

Prior to the 1999 implementation of ICD–10 for cause of death classification, asthma death rates increased by an average rate of 5.3% per year for females from 1980 to 1989, but there was no statistically significant change from 1989 to 1998. For males, asthma death rates increased by an average rate of 3.0% per year from 1980 to 1990, and then decreased by an average rate of 1.1% per year from 1990 to 1998. From 1999 to 2009, asthma death rates declined by an average rate of 4.9% per year for females, and by an average rate of 5.0% per year for males. In 2009, the ratio of female to male asthma death rates was 1.4. Thus, the relative disparity between females and males that developed in the 1980s remains, despite progress in reducing asthma death rates for both sexes over the past decade.

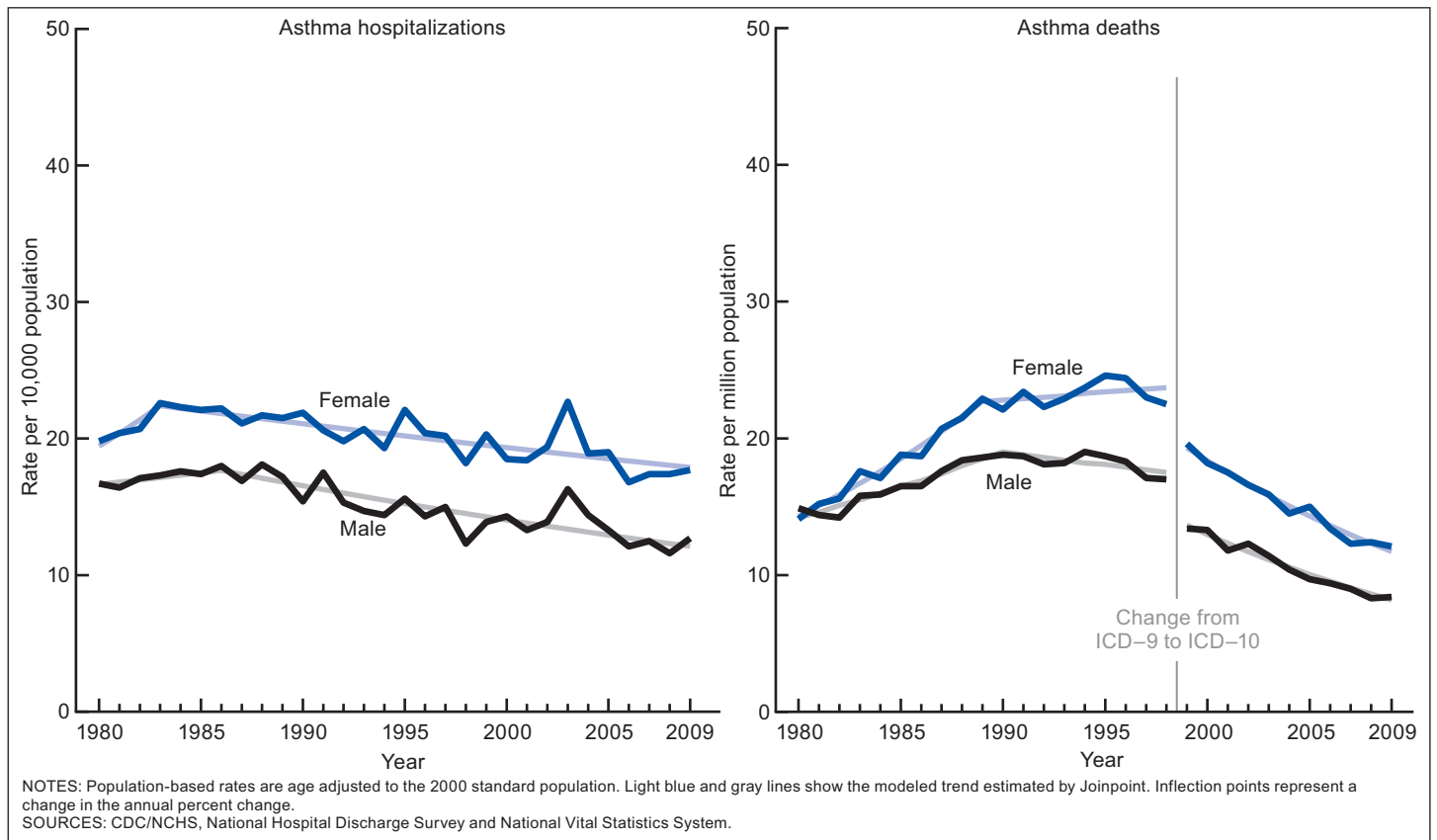


Figure 29. Asthma hospitalization rates and asthma death rates (population-based), by sex: United States, 1980–2009

Although progress has been made in decreasing rates for asthma hospitalizations and asthma deaths, and in decreasing absolute race and sex disparities, relative disparities persist. Some, but not all, of the disparities by race and sex are explained by higher current asthma prevalence among black persons and females. For example, for asthma hospitalization rates in 2008, the risk-based rate ratio of black to white persons with asthma was 2.4, compared with the population-based rate ratio of 3.6. For asthma death rates, the 2008 risk-based rate ratio of black to white persons with asthma was 2.3, compared with the population-based rate ratio of 2.9. Yet, even after accounting for differences in asthma prevalence between groups by assessing rate ratios for risk-based rates for the most recently available data, the relative disparities persist.

Risk-based rates for each type of asthma health care encounter for the three main disparate groups (adult and child, male and female, and white and black persons) provide a perspective on the relative burden for each type of encounter (Figure 30). Hospitalizations represent

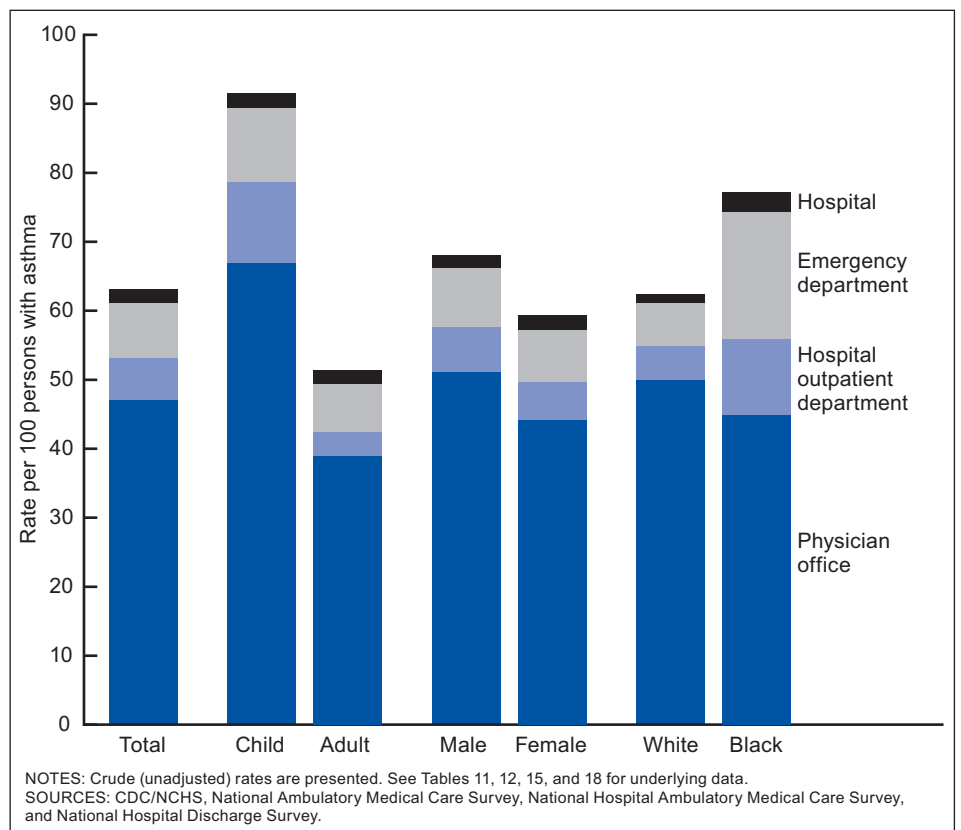


Figure 30. Asthma physician office visit rates, hospital outpatient department visit rates, emergency department visit rates, and hospitalization rates (risk-based), by age, sex, and race: United States, average annual 2007–2009

Table A. School and work absences and percentage with activity limitation caused by asthma, among persons with at least one asthma attack in the past year: United States, 2008

Population	Population in millions (weighted estimate)	Total days missed ¹ in millions (standard error)	Percentage with 1 or more asthma absence days in the past year ¹ (standard error)	Percentage with activity limitation caused by asthma or breathing problem (standard error)
Children aged 5–17 years	3.3	10.5 (1.3)	58.7 (3.6)	5.5 (1.2)
Adults aged 18 or over, currently employed	4.9	14.2 (4.7)	33.5 (2.8)	6.2 (1.3)
Adults aged 18 or over, not currently employed	3.8	22.0 (5.9)	29.1 (3.1)	26.5 (2.7)

¹Excludes records with missing responses for days of school (1.0% among children aged 5–17 years), work (0.4% among adults currently employed), or household or other activity missed due to asthma (25.1% among adults not currently employed).

SOURCE: CDC/NCHS National Health Interview Survey.

Table B. Percentage ever receiving asthma self-management education among persons with current asthma: percent (standard error): United States, 2003 and 2008

Management Strategy	2003	2008
Given an asthma action plan	33.6 (1.2)	34.2 (1.2)
Taken a class to learn how to manage asthma	12.4 (0.9)	12.2 (0.8)
Taught to recognize early signs and symptoms of an asthma attack.	55.1 (1.3)	59.9 (1.3) ¹
Taught to respond to an asthma attack	64.8 (1.3)	68.2 (1.3)
Taught how to use a peak flow meter.	45.1 (1.3)	42.2 (1.3)
Given advice on environmental control ²	48.3 (1.3)	50.9 (1.4)

¹Differs from 2003 value (chi square test *p* value < 0.05).

²Percentage reporting that a health professional gave them advice on how to change things in their home, school, or work environment to improve their asthma symptoms.

SOURCE: CDC/NCHS, National Health Interview Survey.

the most costly encounter and indicate a severe exacerbation, but are the least common type of encounter. ED visits also represent potentially severe exacerbations but could include visits for primary care as well. Visits to primary care settings (physician offices and hospital outpatient departments) represent the vast majority of health care use for persons with asthma. There was an average of 63.2 health care encounters per 100 persons with asthma for the period 2007–2009. Of these, 47.1 were visits to physician offices, 6.0 were visits to hospital outpatient departments, 8.1 were visits to EDs, and 2.0 were hospitalizations. Children aged 0–17 years had more health care visits than adults aged 18 and over (91.5 and 51.4 per 100, respectively). Except for asthma hospitalizations, children aged 0–17 years had significantly higher risk-based visit rates in every setting compared with adults aged 18 and over. Males and females had a similar number of health care visits (68.1 and 59.4 per 100, respectively), and there were no differences in rates of health care encounters by sex for any setting. Black

and white persons had a similar overall number of health care visits (77.2 and 62.4 per 100, respectively), but black persons had higher ED visit and hospitalization rates per 100 persons with asthma compared with white persons. This pattern was also reported in the previous asthma surveillance report (2). Risk-based rates for visits in primary care settings overall (physician offices and hospital outpatient departments) were similar by race, but black persons had higher visit rates to hospital outpatient departments and lower visit rates to private physician offices compared with white persons. The recent pattern of similar primary care visit rates between races differs from patterns observed in earlier periods with higher primary care visit rates among white persons compared with black persons with asthma (2).

Other Measures of Asthma Morbidity

In addition to health care utilization rates, estimates of school and work

absences and activity limitations caused by asthma provide measures of the impact of asthma in the United States. **Table A** shows school and work absences among persons with at least one asthma attack in the previous 12 months for 2008. There were 10.5 million school days missed due to asthma among children aged 5–17 years, 14.2 million work days missed among currently employed adults aged 18 and over, and 22.0 million missed days of housework and other activity among adults not currently employed.

Recent Trends in Use of Asthma Management Tools

An important strategy to prevent asthma exacerbations and morbidity is asthma education. The percentage of persons with current asthma who reported receipt of asthma self-management education and tools for 2003 and 2008 is shown in **Table B**. These data are from periodic NHIS asthma supplements, which are used to measure progress meeting Healthy People respiratory health objectives. The 2008 supplement is the most recent. There was little change in these proportions between 2003 and 2008. The National Asthma Education and Prevention Program (NAEPP) guidelines recommend that all asthma patients have written instructions for daily management of asthma, for how to recognize and respond to worsening asthma symptoms, and for medication dosage and frequency of its administration, but only 34% of persons with current asthma reported receiving an asthma action plan (1). About 12% of persons with current asthma had taken a

class to learn how to manage asthma. Higher percentages were taught how to recognize (55%–60%) and respond (65%–68%) to signs and symptoms of an asthma attack, and these indicators of asthma education increased between 2003 and 2008. A lower percentage reported being taught how to use a peak flow meter (42%–45%) and receiving advice on environmental control at home, school, or work (48%–51%).

Data about use of evidence-based asthma management strategies were not collected in NHIS before the release of the 1991 NAEPP guidelines, which focused treatment on the central role of inflammation in asthma morbidity. Therefore, longer-term changes in treatment as reported by people with asthma cannot be directly analyzed with NHIS data.

Federal Efforts to Address Asthma

Asthma has been a focus for public health action after increasing asthma prevalence and mortality rates were recognized in the 1980s. Healthy People goals for asthma have been expanded over three decades. Asthma-specific Healthy People 2020 Objectives include: 1) reducing asthma deaths, 2) reducing hospitalizations for asthma, 3) reducing ED visits for asthma, 4) reducing activity limitations among persons with current asthma, 5) reducing the proportion of persons with asthma who miss school or work days, 6) increasing the proportion of persons with current asthma who receive formal patient education, 7) increasing the proportion of persons with current asthma who receive appropriate asthma care according to NAEPP, and 8) increasing the number of states and territories (including the District of Columbia) with a comprehensive surveillance system for tracking asthma cases, illness, and disability at the state level. Federal agencies have developed a collaborative approach to address these objectives.

NAEPP was established in 1989 by the National Heart, Lung and Blood Institute (NHLBI) as a collaborative effort between major scientific,

professional, governmental, and voluntary organizations. NAEPP was designed to increase awareness of asthma as a significant public health problem, to educate the public and health professionals about asthma, to develop clinical treatment guidelines, and to promote research. NAEPP guidelines have been periodically updated since their first publication in 1991, and most recently in 2007.

CDC's National Asthma Control Program (NACP) was created in 1999 to align public health initiatives with Healthy People objectives. NACP has three major activities: conducting surveillance, promoting evidence-based interventions, and building partnerships.

Surveillance activities include building systems to provide detailed and local data on asthma prevalence, impact, and management such as including asthma modules in the Behavioral Risk Factor Surveillance System (17); developing the National Asthma survey (<http://www.cdc.gov/asthma/ACBS.htm>) (18); and funding (with the NHLBI) the periodic inclusion of asthma questions in NHIS to monitor progress toward Healthy People goals (19). NACP works to establish and maintain a network of asthma public health partners, including state health departments, local entities (schools, city health departments, and hospitals), and other federal agencies to achieve asthma control objectives (6).

Conclusion

Over the past few decades, the prevalence of asthma in the United States has grown. Since 2001, the number of persons with asthma has continued to increase. There have not, however, been comparable increases in the number of health care encounters for asthma. Since rising asthma mortality was first recognized in the 1980s, the number and rate for this most severe adverse asthma outcome have declined dramatically. Population-based rates for asthma hospitalizations have declined since the mid-1980s and rates for deaths have declined since 1999.

However, for many outcomes, racial and gender disparities remain, and in some cases have increased. In addition to disparities in outcomes, there are other areas of asthma care that still require concerted public health attention. The prevalence of asthma attacks among persons with asthma, although declining, remains above 50%, with only one in eight persons reporting taking a formal asthma management education course and only one in three reporting having asthma management plans. There are an estimated 46.7 million lost school, work, and activity days per year. The more recent plateau in the uptake of effective asthma-management strategies highlights remaining challenges in addressing the burden of asthma in the United States.

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Table 1. Percentage with current asthma, by year and selected characteristics: United States, 2001–2010

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Percent (standard error) ¹									
Total	7.3 (0.1)	7.2 (0.2)	6.9 (0.2)	7.1 (0.2)	7.7 (0.2)	7.8 (0.2)	7.7 (0.2)	7.8 (0.2)	8.2 (0.2)	8.4 (0.2)
Sex										
Male	6.3 (0.2)	6.1 (0.2)	5.8 (0.2)	6.3 (0.2)	6.4 (0.2)	7.0 (0.3)	6.5 (0.2)	7.1 (0.3)	7.1 (0.3)	7.0 (0.2)
Female	8.3 (0.2)	8.1 (0.2)	7.9 (0.2)	7.8 (0.2)	8.8 (0.2)	8.6 (0.3)	8.8 (0.3)	8.5 (0.3)	9.2 (0.3)	9.8 (0.3)
Race ²										
White.	7.2 (0.2)	6.9 (0.2)	6.6 (0.2)	6.9 (0.2)	7.4 (0.2)	7.6 (0.2)	7.4 (0.2)	7.4 (0.2)	7.8 (0.2)	7.8 (0.2)
Black.	8.4 (0.4)	9.2 (0.4)	8.8 (0.4)	8.9 (0.5)	9.5 (0.4)	9.0 (0.4)	9.8 (0.5)	10.0 (0.5)	10.8 (0.6)	11.9 (0.5)
Other races.	7.2 (0.5)	6.3 (0.5)	6.4 (0.6)	6.3 (0.5)	7.1 (0.6)	8.3 (0.7)	6.9 (0.6)	7.9 (0.7)	7.6 (0.7)	8.1 (0.6)
Ethnicity ³										
Hispanic or Latino	5.8 (0.3)	4.7 (0.3)	5.4 (0.3)	5.2 (0.3)	6.2 (0.3)	6.2 (0.4)	6.9 (0.4)	5.9 (0.4)	6.4 (0.4)	7.2 (0.4)
Not Hispanic or Latino	7.6 (0.2)	7.5 (0.2)	7.2 (0.2)	7.5 (0.2)	7.9 (0.2)	8.1 (0.2)	7.9 (0.2)	8.2 (0.2)	8.6 (0.2)	8.7 (0.2)
Age										
Children (0–17)	8.7 (0.3)	8.3 (0.3)	8.5 (0.3)	8.5 (0.3)	8.9 (0.3)	9.3 (0.4)	9.1 (0.4)	9.4 (0.4)	9.6 (0.4)	9.3 (0.3)
Adults (18 or over)	6.9 (0.2)	6.8 (0.2)	6.4 (0.2)	6.7 (0.2)	7.2 (0.2)	7.3 (0.2)	7.3 (0.2)	7.3 (0.2)	7.7 (0.2)	8.2 (0.2)
Age group										
0–4 years	5.7 (0.4)	6.0 (0.5)	5.9 (0.5)	5.6 (0.4)	6.8 (0.5)	5.8 (0.6)	6.8 (0.6)	6.2 (0.6)	6.3 (0.6)	6.0 (0.6)
5–14 years	9.9 (0.4)	9.2 (0.4)	9.5 (0.4)	9.1 (0.4)	9.8 (0.4)	10.9 (0.6)	9.4 (0.5)	10.9 (0.6)	11.2 (0.5)	10.7 (0.5)
15–34 years	8.0 (0.3)	7.6 (0.3)	7.2 (0.3)	7.1 (0.3)	7.5 (0.3)	7.8 (0.4)	8.4 (0.4)	8.1 (0.4)	7.8 (0.4)	8.6 (0.3)
35–64 years	6.7 (0.2)	6.8 (0.2)	6.4 (0.2)	6.8 (0.2)	7.1 (0.2)	7.3 (0.3)	6.9 (0.3)	7.1 (0.3)	7.9 (0.3)	8.1 (0.3)
65 years or over	6.0 (0.4)	5.9 (0.4)	5.8 (0.3)	7.0 (0.4)	7.6 (0.4)	7.0 (0.5)	7.5 (0.5)	7.2 (0.4)	7.7 (0.5)	8.1 (0.4)
Region										
Northeast	8.3 (0.4)	8.2 (0.4)	7.7 (0.4)	7.4 (0.4)	8.7 (0.4)	9.1 (0.5)	8.5 (0.5)	8.2 (0.5)	9.4 (0.5)	8.8 (0.5)
Midwest	7.5 (0.3)	7.3 (0.3)	7.6 (0.3)	7.6 (0.3)	7.7 (0.3)	8.3 (0.5)	8.2 (0.5)	8.6 (0.4)	8.9 (0.5)	8.6 (0.4)
South	7.1 (0.2)	6.7 (0.2)	6.3 (0.2)	6.7 (0.2)	7.2 (0.2)	7.3 (0.3)	7.3 (0.3)	7.0 (0.3)	7.5 (0.3)	8.3 (0.3)
West	6.7 (0.3)	7.1 (0.3)	6.5 (0.3)	7.3 (0.3)	7.5 (0.3)	7.2 (0.4)	7.4 (0.4)	8.1 (0.4)	7.8 (0.4)	8.3 (0.4)
Federal poverty threshold ⁴										
Below 100%	9.9 (0.5)	10.2 (0.5)	9.4 (0.4)	9.5 (0.5)	10.4 (0.5)	11.8 (0.6)	10.8 (0.6)	11.0 (0.6)	11.7 (0.6)	11.2 (0.5)
100% to less than 250%.	7.7 (0.3)	7.4 (0.3)	7.5 (0.3)	7.4 (0.3)	8.2 (0.3)	8.0 (0.4)	8.4 (0.4)	8.2 (0.4)	8.5 (0.4)	8.7 (0.3)
250% to less than 450%.	6.8 (0.3)	6.4 (0.3)	6.4 (0.3)	6.6 (0.3)	7.3 (0.3)	7.3 (0.4)	7.0 (0.4)	7.6 (0.4)	7.5 (0.4)	8.2 (0.4)
450% or above.	6.6 (0.3)	6.4 (0.3)	6.0 (0.3)	6.5 (0.3)	6.6 (0.3)	6.1 (0.3)	6.6 (0.3)	6.8 (0.4)	7.2 (0.4)	7.1 (0.3)

¹Percentage is for the civilian noninstitutionalized population; except for age-specific estimates, percentages are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

⁴The federal poverty threshold includes persons with reported and missing family income based on imputed income values using multiple imputation.

SOURCE: CDC/NCHS, National Health Interview Survey.

Table 2. Percentage with current asthma, by detailed age group and selected characteristics: United States, average annual 2008–2010

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	15–19 years	20–24 years	25–34 years	35–64 years	65 years or over
	Percent (standard error) ¹										
Total	8.2 (0.1)	9.5 (0.2)	7.7 (0.1)	6.2 (0.4)	11.0 (0.3)	8.2 (0.2)	9.7 (0.4)	9.1 (0.5)	6.9 (0.3)	7.7 (0.2)	7.7 (0.3)
Sex											
Male	7.0 (0.1)	11.1 (0.3)	5.7 (0.2)	7.8 (0.5)	12.8 (0.5)	6.9 (0.3)	9.3 (0.7)	7.6 (0.6)	5.2 (0.4)	5.2 (0.2)	6.2 (0.4)
Female	9.2 (0.2)	7.8 (0.3)	9.7 (0.2)	4.4 (0.4)	9.0 (0.4)	9.5 (0.3)	10.2 (0.6)	10.7 (0.8)	8.5 (0.4)	10.1 (0.3)	8.8 (0.4)
Race ²											
White	7.7 (0.1)	8.2 (0.3)	7.5 (0.1)	4.7 (0.4)	9.4 (0.3)	8.0 (0.2)	9.4 (0.5)	8.6 (0.5)	6.8 (0.3)	7.5 (0.2)	7.7 (0.3)
Male	6.5 (0.2)	9.7 (0.4)	5.5 (0.2)	6.1 (0.5)	11.3 (0.6)	6.6 (0.3)	8.9 (0.8)	7.0 (0.7)	5.2 (0.4)	5.1 (0.2)	6.2 (0.4)
Female	8.8 (0.2)	6.5 (0.3)	9.5 (0.2)	3.2 (0.4)	7.4 (0.4)	9.4 (0.4)	10.1 (0.7)	10.3 (0.9)	8.6 (0.5)	9.8 (0.3)	8.8 (0.4)
Black	11.2 (0.3)	16.0 (0.7)	9.2 (0.4)	12.3 (1.2)	18.8 (0.8)	9.7 (0.5)	12.1 (0.9)	11.8 (1.2)	7.3 (0.6)	9.5 (0.5)	8.4 (0.7)
Male	10.4 (0.5)	18.3 (1.0)	6.8 (0.5)	15.1 (1.8)	21.4 (1.3)	8.7 (0.8)	11.6 (1.4)	11.8 (2.1)	5.3 (0.9)	6.2 (0.6)	6.5 (1.0)
Female	11.8 (0.4)	13.7 (0.8)	11.1 (0.5)	9.4 (1.5)	16.1 (1.2)	10.7 (0.7)	12.6 (1.4)	11.9 (1.8)	9.0 (0.8)	12.1 (0.7)	9.6 (1.0)
Other races	8.0 (0.4)	9.5 (0.7)	7.3 (0.4)	7.7 (1.1)	11.3 (1.1)	7.4 (0.7)	8.0 (1.2)	9.0 (1.9)	6.4 (0.8)	7.3 (0.6)	6.4 (1.0)
Male	7.0 (0.5)	10.7 (0.9)	5.3 (0.5)	9.5 (1.6)	12.1 (1.4)	6.7 (0.9)	9.1 (1.9)	6.1 (1.8)	5.7 (1.0)	4.5 (0.6)	5.6 (1.2)
Female	8.9 (0.6)	8.3 (1.0)	9.1 (0.7)	5.8 (1.3)	10.4 (1.6)	8.2 (1.1)	6.8 (1.6)	11.6 (3.0)	7.1 (1.3)	9.9 (1.0)	7.1 (1.5)
Ethnicity ³											
Hispanic or Latino	6.5 (0.2)	7.5 (0.4)	6.0 (0.3)	5.3 (0.6)	9.5 (0.6)	5.7 (0.3)	6.4 (0.6)	5.6 (0.7)	5.4 (0.5)	5.8 (0.3)	7.3 (0.9)
Male	5.9 (0.3)	8.7 (0.5)	4.4 (0.3)	6.6 (0.9)	10.8 (0.8)	4.9 (0.5)	6.7 (1.0)	4.1 (0.9)	4.5 (0.8)	3.8 (0.5)	6.2 (1.5)
Female	7.1 (0.3)	6.3 (0.5)	7.6 (0.4)	4.0 (0.7)	8.2 (0.8)	6.6 (0.5)	6.0 (0.9)	7.3 (1.3)	6.5 (0.6)	7.9 (0.5)	8.2 (1.0)
Puerto Rican	16.1 (1.0)	16.9 (1.8)	15.7 (1.3)	13.8 (2.7)	20.6 (2.6)	14.8 (1.7)	14.4 (3.8)	12.7 (3.2)	16.2 (3.1)	16.2 (1.7)	12.6 (2.9)
Male	15.6 (1.6)	21.5 (2.9)	12.2 (2.1)	17.1 (3.8)	27.0 (4.3)	15.1 (3.2)	*20.1 (7.8)	*13.2 (5.5)	*13.4 (5.4)	9.7 (2.5)	*10.6 (4.6)
Female	16.6 (1.1)	12.2 (1.6)	18.7 (1.7)	10.2 (2.9)	13.9 (2.7)	14.5 (1.7)	10.0 (2.1)	*12.4 (4.5)	19.0 (3.1)	22.0 (2.6)	14.4 (3.2)
Mexican	5.4 (0.2)	6.5 (0.5)	4.8 (0.3)	4.6 (0.7)	8.2 (0.7)	4.4 (0.3)	4.8 (0.6)	5.0 (0.8)	4.0 (0.5)	4.9 (0.4)	6.6 (1.3)
Male	4.7 (0.3)	7.2 (0.6)	3.3 (0.4)	5.7 (1.1)	8.6 (0.8)	3.3 (0.4)	5.1 (0.9)	3.1 (0.8)	2.5 (0.6)	3.3 (0.5)	*5.7 (1.8)
Female	6.2 (0.4)	5.7 (0.6)	6.5 (0.5)	3.4 (0.9)	7.7 (0.9)	5.7 (0.6)	4.5 (0.9)	7.0 (1.6)	5.7 (0.7)	6.7 (0.7)	7.4 (1.5)
Not Hispanic or Latino	8.5 (0.1)	10.0 (0.3)	8.0 (0.1)	6.4 (0.4)	11.4 (0.4)	8.8 (0.2)	10.5 (0.5)	9.9 (0.6)	7.2 (0.3)	8.0 (0.2)	7.7 (0.3)
Male	7.3 (0.2)	11.8 (0.4)	5.9 (0.2)	8.3 (0.6)	13.4 (0.6)	7.4 (0.3)	9.9 (0.8)	8.4 (0.8)	5.4 (0.4)	5.4 (0.2)	6.2 (0.4)
Female	9.6 (0.2)	8.2 (0.3)	10.0 (0.2)	4.5 (0.5)	9.2 (0.5)	10.1 (0.4)	11.2 (0.7)	11.3 (0.8)	9.0 (0.5)	10.4 (0.3)	8.8 (0.4)
Region											
Northeast	8.8 (0.3)	10.2 (0.5)	8.4 (0.3)	5.9 (0.7)	11.5 (0.6)	9.9 (0.5)	11.9 (1.0)	9.6 (1.4)	9.0 (0.7)	8.1 (0.4)	7.8 (0.6)
Midwest	8.7 (0.2)	10.4 (0.6)	8.1 (0.2)	7.4 (1.0)	11.5 (0.6)	9.2 (0.5)	10.9 (1.0)	10.4 (1.1)	7.7 (0.6)	8.2 (0.4)	6.8 (0.5)
South	7.6 (0.2)	10.0 (0.4)	6.8 (0.2)	6.9 (0.6)	11.7 (0.5)	6.9 (0.3)	8.8 (0.7)	8.1 (0.7)	5.4 (0.4)	6.9 (0.3)	7.4 (0.5)
West	8.0 (0.3)	7.4 (0.5)	8.2 (0.3)	4.1 (0.5)	8.9 (0.7)	7.9 (0.4)	8.4 (0.7)	9.1 (1.1)	7.0 (0.6)	8.3 (0.4)	9.0 (0.7)
Federal poverty threshold ⁴											
Below 100%	11.2 (0.3)	12.4 (0.5)	10.6 (0.4)	9.6 (1.0)	14.4 (0.8)	9.1 (0.5)	9.3 (0.9)	9.6 (0.8)	8.5 (0.7)	12.7 (0.6)	9.9 (0.8)
100% to less than 250%	8.5 (0.2)	9.4 (0.4)	8.2 (0.2)	5.5 (0.5)	11.0 (0.6)	8.3 (0.4)	9.9 (1.0)	9.0 (0.8)	7.0 (0.5)	8.3 (0.4)	8.4 (0.5)
250% to less than 450%	7.7 (0.2)	8.4 (0.4)	7.5 (0.3)	4.9 (0.7)	9.7 (0.6)	7.7 (0.4)	10.0 (0.9)	7.9 (0.9)	6.7 (0.6)	7.7 (0.4)	7.4 (0.6)
450% or above	6.7 (0.2)	8.1 (0.4)	6.4 (0.2)	4.5 (0.6)	9.2 (0.6)	7.8 (0.5)	9.6 (1.0)	10.6 (1.6)	6.1 (0.5)	6.2 (0.2)	6.1 (0.6)

* Estimate is considered unreliable. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Percent is for the civilian noninstitutionalized population; crude percents are shown.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

⁴The federal poverty threshold includes persons with reported and missing family income based on imputed income values using multiple imputation.

SOURCE: CDC/NCHS, National Health Interview Survey.

Table 3. Percentage with one or more asthma attacks in the past 12 months, by year and selected characteristics: United States, 2001–2010

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Percent (standard error) ¹									
Total	4.3 (0.1)	4.3 (0.1)	3.9 (0.1)	4.1 (0.1)	4.2 (0.1)	4.2 (0.1)	4.2 (0.2)	4.3 (0.1)	4.3 (0.1)	4.6 (0.1)
Sex										
Male	3.5 (0.1)	3.5 (0.1)	3.1 (0.1)	3.6 (0.2)	3.4 (0.2)	3.4 (0.2)	3.3 (0.2)	3.7 (0.2)	3.5 (0.2)	3.6 (0.2)
Female	5.0 (0.2)	5.0 (0.2)	4.5 (0.2)	4.4 (0.2)	5.0 (0.2)	5.0 (0.2)	4.9 (0.2)	4.8 (0.2)	5.0 (0.2)	5.4 (0.2)
Race ²										
White.	4.2 (0.1)	4.1 (0.1)	3.7 (0.1)	3.9 (0.1)	4.1 (0.1)	4.2 (0.2)	4.0 (0.2)	4.0 (0.2)	4.1 (0.2)	4.3 (0.1)
Black.	5.2 (0.3)	5.4 (0.3)	4.7 (0.3)	5.2 (0.3)	4.6 (0.3)	4.6 (0.3)	5.1 (0.4)	5.4 (0.4)	5.3 (0.4)	5.8 (0.4)
Other races.	4.2 (0.3)	4.1 (0.4)	4.0 (0.5)	3.3 (0.3)	4.5 (0.5)	4.5 (0.5)	3.8 (0.4)	4.9 (0.6)	4.4 (0.5)	5.0 (0.5)
Ethnicity ³										
Hispanic or Latino	3.4 (0.3)	2.9 (0.2)	3.3 (0.2)	3.1 (0.2)	3.5 (0.2)	3.6 (0.3)	4.1 (0.3)	3.2 (0.3)	3.5 (0.3)	4.0 (0.3)
Not Hispanic or Latino	4.5 (0.1)	4.5 (0.1)	4.0 (0.1)	4.3 (0.1)	4.3 (0.1)	4.4 (0.2)	4.2 (0.2)	4.5 (0.2)	4.5 (0.2)	4.7 (0.2)
Age										
Children (0–17)	5.7 (0.2)	5.8 (0.3)	5.5 (0.2)	5.5 (0.3)	5.2 (0.2)	5.6 (0.3)	5.2 (0.3)	5.6 (0.3)	5.5 (0.3)	5.7 (0.3)
Adults (18 or over)	3.8 (0.1)	3.8 (0.1)	3.3 (0.1)	3.6 (0.1)	3.9 (0.1)	3.8 (0.1)	3.8 (0.2)	3.8 (0.2)	3.9 (0.1)	4.2 (0.1)
Age group										
0–4 years	4.7 (0.4)	4.8 (0.4)	4.2 (0.4)	3.9 (0.4)	4.4 (0.5)	4.5 (0.5)	4.1 (0.5)	4.1 (0.5)	4.5 (0.5)	4.6 (0.6)
5–14 years	6.5 (0.4)	6.3 (0.4)	6.0 (0.4)	5.9 (0.3)	5.9 (0.3)	6.5 (0.5)	5.3 (0.4)	6.7 (0.5)	6.1 (0.4)	6.4 (0.4)
15–34 years	4.5 (0.2)	4.3 (0.2)	3.9 (0.2)	3.9 (0.2)	4.1 (0.2)	3.7 (0.2)	4.3 (0.3)	4.1 (0.3)	3.8 (0.2)	4.1 (0.2)
35–64 years	3.8 (0.2)	3.8 (0.2)	3.5 (0.2)	3.8 (0.2)	4.0 (0.2)	4.2 (0.2)	3.9 (0.2)	4.0 (0.2)	4.3 (0.2)	4.6 (0.2)
65 years or over	2.6 (0.2)	2.9 (0.3)	2.3 (0.2)	3.2 (0.3)	3.0 (0.3)	2.8 (0.3)	3.4 (0.3)	2.9 (0.3)	2.9 (0.3)	3.5 (0.3)
Region										
Northeast	4.7 (0.3)	4.7 (0.3)	4.3 (0.3)	4.4 (0.3)	4.9 (0.3)	4.5 (0.3)	4.5 (0.4)	4.1 (0.3)	4.7 (0.3)	4.2 (0.3)
Midwest	4.6 (0.2)	4.4 (0.2)	4.2 (0.3)	4.1 (0.2)	3.9 (0.2)	4.5 (0.3)	3.7 (0.3)	4.6 (0.3)	4.3 (0.3)	4.6 (0.3)
South	4.2 (0.2)	3.9 (0.2)	3.5 (0.2)	3.8 (0.2)	4.0 (0.2)	4.1 (0.2)	4.2 (0.3)	3.8 (0.2)	4.2 (0.3)	4.5 (0.2)
West	3.8 (0.2)	4.3 (0.3)	3.7 (0.2)	4.1 (0.2)	4.5 (0.3)	4.2 (0.3)	4.5 (0.3)	4.8 (0.3)	4.2 (0.3)	4.9 (0.3)
Federal poverty threshold ⁴										
Below 100%	6.0 (0.4)	6.1 (0.4)	5.7 (0.3)	5.9 (0.4)	6.4 (0.4)	6.9 (0.4)	5.8 (0.4)	6.6 (0.5)	6.3 (0.4)	6.6 (0.4)
100% to less than 250%.	4.5 (0.2)	4.4 (0.2)	4.1 (0.2)	4.4 (0.2)	4.4 (0.2)	4.5 (0.3)	4.7 (0.3)	4.4 (0.3)	4.7 (0.3)	4.7 (0.3)
250% to less than 450%.	4.2 (0.2)	3.9 (0.2)	3.7 (0.2)	3.6 (0.2)	4.1 (0.2)	3.8 (0.3)	3.6 (0.3)	3.9 (0.3)	3.6 (0.3)	4.1 (0.3)
450% or above.	3.8 (0.2)	3.8 (0.2)	3.2 (0.2)	3.5 (0.2)	3.5 (0.2)	3.2 (0.2)	3.6 (0.3)	3.7 (0.3)	4.0 (0.3)	3.9 (0.3)

¹Percentage is for the civilian noninstitutionalized population; except for age-specific estimates, percentages are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

⁴The federal poverty threshold includes persons with reported and missing family income based on imputed income values using multiple imputation.

SOURCE: CDC/NCHS, National Health Interview Survey.

Table 4. Percentage with one or more asthma attacks in the past 12 months, by detailed age group and selected characteristics: United States, average annual 2008–2010

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	15–19 years	20–24 years	25–34 years	35–64 years	65 years or over
	Percent (standard error) ¹										
Total	4.4 (0.1)	5.6 (0.2)	4.0 (0.1)	4.4 (0.3)	6.4 (0.2)	4.0 (0.2)	4.3 (0.3)	4.3 (0.4)	3.7 (0.2)	4.3 (0.1)	3.1 (0.2)
Sex											
Male	3.6 (0.1)	6.5 (0.3)	2.6 (0.1)	5.6 (0.5)	7.5 (0.4)	3.0 (0.2)	3.8 (0.4)	2.9 (0.5)	2.6 (0.3)	2.7 (0.2)	2.4 (0.2)
Female	5.1 (0.1)	4.6 (0.2)	5.2 (0.1)	3.1 (0.4)	5.2 (0.3)	5.1 (0.2)	4.7 (0.4)	5.7 (0.6)	4.9 (0.3)	5.9 (0.2)	3.7 (0.2)
Race ²											
White	4.1 (0.1)	4.9 (0.2)	3.9 (0.1)	3.6 (0.3)	5.6 (0.3)	3.9 (0.2)	4.0 (0.3)	4.2 (0.4)	3.8 (0.2)	4.2 (0.1)	3.1 (0.2)
Male	3.4 (0.1)	5.9 (0.3)	2.6 (0.1)	5.0 (0.5)	6.8 (0.4)	2.8 (0.2)	3.5 (0.5)	2.7 (0.5)	2.6 (0.3)	2.6 (0.2)	2.4 (0.3)
Female	4.8 (0.1)	3.8 (0.2)	5.1 (0.2)	2.2 (0.3)	4.2 (0.3)	5.1 (0.3)	4.5 (0.5)	5.8 (0.7)	5.0 (0.3)	5.7 (0.2)	3.7 (0.2)
Black	5.6 (0.2)	8.7 (0.4)	4.4 (0.2)	6.8 (0.9)	10.5 (0.7)	4.4 (0.4)	5.0 (0.6)	4.9 (0.9)	3.8 (0.4)	4.9 (0.4)	3.2 (0.4)
Male	4.9 (0.3)	9.6 (0.7)	2.8 (0.3)	7.7 (1.2)	11.8 (1.0)	3.5 (0.5)	4.7 (1.0)	*4.6 (1.6)	2.2 (0.6)	2.8 (0.4)	2.2 (0.5)
Female	6.2 (0.3)	7.7 (0.6)	5.7 (0.4)	5.9 (1.3)	9.2 (1.0)	5.2 (0.5)	5.4 (1.0)	5.2 (1.0)	5.1 (0.6)	6.6 (0.6)	3.8 (0.6)
Other races	4.9 (0.3)	6.5 (0.6)	4.2 (0.3)	6.6 (1.3)	6.7 (0.8)	4.2 (0.5)	5.3 (1.1)	*4.2 (1.4)	3.6 (0.6)	4.8 (0.5)	2.8 (0.8)
Male	4.1 (0.4)	6.9 (0.9)	2.8 (0.3)	7.5 (2.0)	6.6 (1.0)	3.3 (0.6)	5.3 (1.5)	*	3.0 (0.7)	3.0 (0.5)	*2.0 (0.7)
Female	5.7 (0.5)	6.1 (0.9)	5.5 (0.6)	5.7 (1.4)	6.7 (1.3)	5.0 (0.8)	5.4 (1.6)	*6.4 (2.5)	4.1 (0.9)	6.4 (0.8)	*3.5 (1.2)
Ethnicity ³											
Hispanic or Latino	3.6 (0.2)	4.4 (0.3)	3.2 (0.2)	4.0 (0.5)	5.3 (0.4)	2.5 (0.2)	1.8 (0.3)	3.2 (0.5)	2.6 (0.3)	3.6 (0.2)	3.6 (0.6)
Male	3.1 (0.2)	5.2 (0.4)	2.0 (0.2)	5.1 (0.8)	5.9 (0.6)	1.9 (0.3)	1.9 (0.4)	*2.0 (0.6)	1.9 (0.5)	2.1 (0.3)	*2.9 (1.0)
Female	4.1 (0.2)	3.6 (0.4)	4.4 (0.3)	2.9 (0.6)	4.6 (0.6)	3.2 (0.3)	1.8 (0.4)	4.5 (0.9)	3.4 (0.4)	5.2 (0.4)	4.2 (0.7)
Puerto Rican	9.2 (0.9)	11.7 (1.6)	7.8 (0.9)	10.0 (2.5)	14.7 (2.2)	5.6 (0.8)	5.2 (1.5)	*7.7 (2.6)	4.7 (1.1)	9.9 (1.5)	*5.1 (1.7)
Male	8.9 (1.3)	15.9 (2.6)	5.1 (1.3)	12.9 (3.5)	20.4 (3.9)	*4.6 (1.5)	*8.2 (3.4)	*	*	*5.7 (2.2)	*
Female	9.4 (0.9)	7.4 (1.5)	10.3 (1.2)	*6.8 (2.7)	8.7 (2.1)	6.5 (1.1)	*	*7.4 (3.0)	8.4 (2.0)	13.6 (2.0)	*6.4 (2.2)
Mexican	2.9 (0.2)	3.4 (0.3)	2.6 (0.2)	3.3 (0.6)	4.0 (0.4)	2.1 (0.2)	1.0 (0.2)	2.8 (0.6)	2.3 (0.4)	2.9 (0.3)	3.7 (0.9)
Male	2.3 (0.2)	3.6 (0.4)	1.5 (0.3)	3.8 (0.9)	4.0 (0.5)	1.4 (0.3)	*1.1 (0.4)	*2.0 (0.8)	*1.3 (0.4)	1.5 (0.4)	*3.4 (1.6)
Female	3.6 (0.3)	3.2 (0.4)	3.8 (0.3)	2.8 (0.7)	3.9 (0.7)	2.9 (0.4)	1.0 (0.3)	3.6 (1.1)	3.5 (0.6)	4.4 (0.5)	3.9 (1.0)
Not Hispanic or Latino	4.5 (0.1)	5.9 (0.2)	4.1 (0.1)	4.5 (0.4)	6.7 (0.3)	4.4 (0.2)	4.8 (0.4)	4.6 (0.4)	4.0 (0.2)	4.4 (0.1)	3.1 (0.2)
Male	3.7 (0.1)	6.9 (0.3)	2.7 (0.1)	5.8 (0.6)	8.0 (0.4)	3.2 (0.2)	4.3 (0.5)	3.1 (0.5)	2.8 (0.3)	2.8 (0.2)	2.3 (0.2)
Female	5.2 (0.1)	4.9 (0.3)	5.3 (0.2)	3.2 (0.4)	5.4 (0.4)	5.5 (0.3)	5.4 (0.5)	6.0 (0.6)	5.3 (0.3)	5.9 (0.2)	3.7 (0.2)
Region											
Northeast	4.3 (0.2)	5.4 (0.4)	4.0 (0.2)	3.7 (0.6)	6.3 (0.6)	3.9 (0.4)	3.8 (0.6)	4.4 (1.0)	3.8 (0.5)	4.4 (0.3)	3.4 (0.4)
Midwest	4.5 (0.2)	6.2 (0.4)	3.9 (0.2)	5.1 (0.8)	6.8 (0.5)	4.9 (0.3)	5.3 (0.7)	5.0 (0.9)	4.6 (0.5)	4.0 (0.3)	2.4 (0.3)
South	4.1 (0.1)	6.0 (0.3)	3.5 (0.2)	5.0 (0.6)	7.0 (0.4)	3.2 (0.2)	3.9 (0.5)	3.4 (0.4)	2.8 (0.3)	4.0 (0.2)	3.2 (0.3)
West	4.6 (0.2)	4.6 (0.3)	4.6 (0.2)	3.3 (0.5)	5.4 (0.5)	4.4 (0.3)	4.0 (0.5)	5.0 (0.8)	4.3 (0.4)	5.0 (0.3)	3.6 (0.3)
Federal poverty threshold ⁴											
Below 100%	6.4 (0.2)	7.4 (0.4)	5.9 (0.3)	6.1 (0.8)	8.3 (0.7)	4.9 (0.4)	4.7 (0.6)	4.8 (0.6)	5.1 (0.6)	7.6 (0.5)	4.8 (0.6)
100% to less than 250%	4.5 (0.2)	5.5 (0.3)	4.2 (0.2)	4.0 (0.5)	6.4 (0.4)	4.2 (0.3)	4.2 (0.6)	4.0 (0.5)	4.3 (0.4)	4.7 (0.3)	3.5 (0.3)
250% & less than 450%	3.9 (0.2)	4.8 (0.3)	3.6 (0.2)	3.8 (0.6)	5.6 (0.5)	3.4 (0.3)	3.9 (0.6)	3.5 (0.7)	3.2 (0.4)	4.0 (0.3)	2.8 (0.3)
450% or above	3.6 (0.1)	5.0 (0.3)	3.3 (0.2)	3.7 (0.6)	5.7 (0.5)	3.8 (0.3)	4.3 (0.6)	5.3 (1.1)	3.1 (0.4)	3.4 (0.2)	2.4 (0.3)

* Figure does not meet standards of reliability or precision. Estimates with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Percent is for the civilian noninstitutionalized population; crude percents are shown.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

⁴The federal poverty threshold includes persons with reported and missing family income based on imputed income values using multiple imputation.

SOURCE: CDC/NCHS, National Health Interview Survey.

Table 5. Percentage with one or more asthma attacks in the past 12 months among those with current asthma, by year and selected characteristics: United States, 2001–2010

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Percent (standard error) ¹									
Total	55.8 (1.0)	56.5 (1.0)	53.2 (1.1)	54.2 (1.1)	53.5 (1.0)	52.1 (1.2)	52.3 (1.4)	52.9 (1.3)	49.9 (1.2)	51.9 (1.1)
Sex										
Male	51.2 (1.6)	52.2 (1.7)	48.5 (1.8)	53.0 (1.7)	50.5 (1.7)	45.7 (2.0)	49.0 (2.2)	49.1 (2.0)	47.5 (1.9)	48.6 (1.8)
Female	58.5 (1.3)	58.6 (1.3)	55.0 (1.4)	54.6 (1.4)	54.8 (1.3)	56.4 (1.5)	54.6 (1.7)	55.3 (1.7)	51.6 (1.6)	53.1 (1.5)
Race ²										
White.	55.4 (1.2)	56.5 (1.2)	53.1 (1.3)	54.3 (1.3)	54.4 (1.2)	52.7 (1.4)	52.8 (1.7)	52.7 (1.5)	50.4 (1.4)	52.7 (1.3)
Black.	59.2 (2.3)	57.0 (2.4)	50.4 (2.4)	55.4 (2.6)	46.8 (2.3)	47.3 (2.6)	51.1 (2.6)	51.9 (2.6)	47.2 (2.6)	47.3 (2.3)
Other races.	56.4 (3.6)	61.1 (3.7)	57.2 (4.4)	47.8 (3.8)	60.7 (4.3)	52.0 (4.2)	50.3 (4.1)	58.0 (4.2)	56.1 (3.8)	57.4 (3.4)
Ethnicity ³										
Hispanic or Latino.	56.0 (2.9)	54.8 (2.9)	57.4 (2.8)	55.2 (2.9)	56.2 (2.7)	57.2 (3.0)	57.8 (2.6)	53.9 (3.3)	51.2 (2.8)	52.2 (2.8)
Not Hispanic or Latino	56.2 (1.1)	56.7 (1.1)	53.1 (1.2)	54.4 (1.2)	53.3 (1.1)	52.0 (1.3)	51.4 (1.6)	52.8 (1.3)	49.8 (1.4)	52.2 (1.2)
Age										
Children (0–17)	61.7 (1.8)	64.9 (1.8)	62.7 (1.7)	61.2 (1.7)	56.7 (1.8)	56.1 (2.2)	54.8 (2.3)	57.2 (2.2)	53.9 (2.2)	58.3 (1.9)
Adults (18 or over)	53.8 (1.2)	53.0 (1.2)	49.8 (1.3)	51.3 (1.3)	51.8 (1.2)	50.3 (1.5)	50.4 (1.7)	50.7 (1.5)	47.7 (1.4)	49.1 (1.3)
Age group										
0–4 years	70.7 (3.5)	77.3 (3.2)	69.7 (3.7)	65.1 (3.7)	60.8 (3.6)	69.9 (4.7)	59.0 (4.7)	64.4 (4.9)	66.2 (4.8)	68.3 (4.4)
5–14 years	63.4 (2.2)	63.6 (2.3)	62.7 (2.2)	61.5 (2.3)	58.5 (2.3)	56.0 (2.7)	53.9 (3.0)	59.4 (2.8)	51.7 (2.8)	58.2 (2.5)
15–34 years	54.0 (1.9)	53.4 (2.0)	51.4 (2.1)	51.8 (2.2)	52.2 (2.2)	45.6 (2.3)	49.1 (2.8)	48.5 (2.6)	46.6 (2.2)	45.4 (2.3)
35–64 years	55.5 (1.7)	54.0 (1.7)	52.5 (1.7)	54.7 (1.7)	55.3 (1.7)	56.4 (2.0)	54.1 (2.1)	54.3 (2.1)	51.9 (2.0)	54.1 (1.7)
65 years or over.	43.2 (3.1)	49.9 (3.1)	38.8 (3.1)	42.5 (2.7)	37.7 (2.4)	37.5 (3.2)	44.3 (3.3)	40.5 (3.0)	36.9 (3.1)	41.6 (2.7)
Region										
Northeast	53.9 (2.2)	53.9 (2.2)	53.4 (2.2)	54.4 (2.5)	54.0 (2.2)	50.0 (2.7)	49.8 (2.9)	48.3 (2.8)	49.0 (2.5)	45.3 (2.8)
Midwest	58.4 (2.0)	58.2 (1.9)	51.9 (2.3)	53.7 (2.1)	48.2 (2.2)	52.4 (2.5)	43.3 (3.1)	52.3 (2.5)	47.6 (2.3)	50.6 (2.3)
South	56.1 (1.7)	55.6 (1.8)	53.5 (2.0)	54.9 (1.8)	54.1 (1.7)	51.8 (2.1)	56.8 (2.2)	52.2 (2.1)	52.0 (2.1)	52.4 (1.8)
West	54.1 (2.5)	59.0 (2.3)	55.0 (2.1)	53.1 (2.5)	58.3 (2.1)	54.9 (2.3)	57.1 (2.5)	56.6 (2.3)	50.5 (2.6)	56.5 (2.2)
Federal poverty threshold ⁴										
Below 100%	58.7 (2.3)	56.9 (2.5)	57.2 (2.2)	60.8 (2.3)	59.4 (2.2)	55.3 (2.4)	54.2 (2.5)	59.2 (2.8)	51.4 (2.5)	55.9 (2.1)
100% to less than 250%.	55.9 (2.0)	56.9 (2.2)	53.2 (2.0)	56.0 (2.0)	52.4 (2.1)	54.7 (2.3)	53.7 (2.5)	51.7 (2.7)	53.0 (2.4)	53.1 (2.1)
250% to less than 450%.	57.9 (2.2)	58.0 (2.3)	55.6 (2.3)	50.9 (2.5)	54.9 (2.3)	51.0 (2.5)	49.9 (2.8)	51.2 (2.5)	45.9 (2.5)	48.2 (2.3)
450% or above.	54.2 (2.2)	54.4 (2.2)	49.8 (2.4)	52.0 (2.3)	50.9 (2.1)	47.6 (2.7)	54.0 (2.4)	52.3 (2.6)	51.0 (2.4)	52.4 (2.5)

¹Percent is for the civilian noninstitutionalized population with current asthma; except for age-specific estimates, percentages are age adjusted to the 2000 U.S. standard population. Estimates for 2001–2004 may not match those in the 2007 Surveillance Summary for this indicator (Table 10 in that publication) due to minor programming differences.

²Race categories “White” and “Black” include only those with a single race. The category “Other races” includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

⁴The federal poverty threshold includes persons with reported and missing family income based on imputed income values using multiple imputation.

SOURCE: CDC/NCHS, National Health Interview Survey.

Table 6. Percentage with one or more asthma attack in the past 12 months among those with current asthma, by detailed age group and selected characteristics: United States, average annual 2008–2010

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	15–19 years	20–24 years	25–34 years	35–64 years	65 years or over
Percent (standard error) ¹											
Total	51.2 (0.7)	56.5 (1.1)	49.1 (0.9)	66.3 (2.8)	56.4 (1.5)	46.8 (1.4)	42.1 (2.6)	45.0 (2.8)	51.4 (1.9)	53.5 (1.1)	39.7 (1.7)
Sex											
Male	49.2 (1.1)	56.3 (1.7)	44.4 (1.5)	67.5 (3.5)	56.3 (2.0)	41.1 (2.2)	39.6 (3.9)	35.7 (4.6)	46.5 (3.5)	49.4 (2.0)	37.2 (3.1)
Female	52.7 (0.9)	56.7 (1.8)	51.7 (1.1)	64.2 (4.2)	56.5 (2.3)	51.0 (1.8)	44.4 (3.2)	51.7 (3.7)	54.4 (2.4)	55.5 (1.4)	41.0 (2.1)
Race ²											
White	51.0 (0.8)	56.9 (1.5)	49.1 (1.0)	69.5 (3.3)	57.2 (1.9)	46.9 (1.6)	41.0 (3.1)	45.9 (3.2)	51.7 (2.2)	53.4 (1.3)	39.7 (1.8)
Male	49.4 (1.3)	57.7 (2.0)	44.7 (1.7)	74.0 (4.0)	58.4 (2.5)	41.0 (2.7)	37.9 (4.7)	35.4 (5.3)	47.5 (4.1)	49.3 (2.3)	37.7 (3.4)
Female	52.2 (1.1)	55.5 (2.3)	51.6 (1.2)	60.6 (6.0)	55.4 (2.8)	51.2 (2.1)	43.7 (4.0)	53.5 (4.5)	54.3 (2.8)	55.5 (1.6)	40.9 (2.3)
Black	49.2 (1.3)	52.9 (1.9)	46.6 (1.9)	54.2 (4.9)	54.5 (2.8)	44.4 (2.8)	41.5 (3.9)	40.9 (6.7)	50.0 (4.6)	49.8 (2.7)	38.0 (4.1)
Male	46.4 (2.1)	51.4 (3.0)	40.0 (3.2)	49.4 (6.0)	53.5 (3.7)	39.7 (4.6)	40.8 (6.7)	39.3 (10.3)	38.5 (8.9)	43.7 (4.5)	33.5 (6.6)
Female	51.4 (1.7)	54.9 (3.1)	49.8 (2.3)	62.3 (7.8)	55.8 (4.5)	47.8 (3.3)	42.3 (5.3)	42.2 (7.0)	55.7 (4.8)	52.4 (3.1)	39.8 (5.3)
Other races	58.1 (2.4)	63.5 (3.7)	55.0 (3.0)	80.8 (7.8)	55.8 (4.8)	51.2 (4.6)	55.5 (8.5)	46.8 (11.2)	51.7 (5.9)	62.5 (3.9)	42.5 (8.5)
Male	54.2 (3.8)	60.0 (5.8)	48.8 (4.4)	79.6 (11.2)	48.7 (6.3)	45.4 (6.8)	51.4 (11.7)	*27.6 (13.3)	49.1 (9.2)	63.3 (6.1)	*33.7 (11.0)
Female	61.0 (2.8)	68.3 (5.1)	58.3 (3.7)	82.9 (7.2)	64.3 (7.1)	55.8 (6.1)	61.5 (11.7)	55.7 (13.4)	53.6 (8.2)	62.1 (4.7)	47.9 (11.1)
Ethnicity ³											
Hispanic or Latino	52.2 (1.7)	54.8 (2.5)	50.4 (2.4)	66.9 (4.7)	52.8 (2.9)	41.3 (3.3)	26.1 (4.2)	51.2 (6.7)	45.2 (4.9)	58.5 (3.3)	48.6 (5.6)
Male	50.0 (2.6)	55.2 (3.2)	44.7 (4.3)	69.9 (6.7)	51.8 (3.6)	36.6 (5.7)	26.3 (6.2)	42.5 (11.0)	41.0 (9.1)	53.3 (5.6)	50.8 (11.4)
Female	54.0 (2.1)	54.2 (3.7)	54.0 (2.5)	61.6 (6.7)	54.1 (4.7)	45.3 (3.9)	25.9 (5.6)	56.6 (8.3)	48.7 (5.1)	61.1 (3.9)	47.5 (6.9)
Puerto Rican	54.1 (4.0)	67.0 (5.0)	47.1 (5.2)	70.9 (9.9)	68.2 (6.4)	35.2 (5.8)	*29.7 (10.8)	56.7 (11.8)	28.5 (7.2)	57.8 (7.0)	38.0 (10.8)
Male	52.8 (6.0)	69.3 (6.9)	36.6 (9.1)	73.6 (13.8)	69.6 (8.5)	*24.0 (9.3)	*	*52.7 (20.3)	*	56.5 (13.8)	*
Female	55.3 (4.5)	62.5 (7.7)	53.1 (5.5)	66.1 (16.4)	65.4 (9.4)	45.1 (5.9)	*	59.6 (14.9)	44.8 (7.6)	58.3 (8.0)	44.1 (12.2)
Mexican	51.0 (2.2)	50.6 (3.3)	51.3 (3.0)	66.2 (6.4)	47.2 (3.7)	44.7 (4.4)	20.5 (4.8)	52.7 (9.2)	54.3 (6.3)	55.5 (4.8)	52.7 (8.2)
Male	47.6 (3.4)	48.9 (4.3)	46.0 (5.3)	65.1 (9.2)	44.7 (4.3)	41.1 (6.5)	*21.0 (7.0)	57.2 (13.1)	50.3 (10.8)	45.6 (8.3)	59.7 (13.8)
Female	53.7 (2.7)	52.8 (4.8)	54.2 (3.4)	68.0 (7.4)	50.3 (6.0)	47.1 (5.7)	20.0 (5.9)	50.4 (11.2)	56.5 (7.8)	60.7 (5.3)	48.2 (11.2)
Not Hispanic or Latino	51.1 (0.8)	56.8 (1.3)	49.0 (0.9)	66.2 (3.3)	57.2 (1.7)	47.6 (1.5)	44.3 (2.9)	44.3 (3.0)	52.6 (2.1)	52.9 (1.2)	39.1 (1.7)
Male	49.1 (1.2)	56.6 (1.9)	44.3 (1.5)	66.8 (4.1)	57.3 (2.3)	41.9 (2.4)	41.6 (4.4)	34.9 (4.9)	47.8 (3.7)	49.0 (2.2)	36.3 (3.1)
Female	52.6 (1.0)	57.2 (2.0)	51.5 (1.1)	64.9 (5.1)	57.0 (2.6)	51.8 (1.9)	46.7 (3.5)	51.0 (3.9)	55.4 (2.6)	54.9 (1.5)	40.6 (2.2)
Region											
Northeast	47.3 (1.7)	50.2 (2.8)	46.2 (2.1)	59.0 (7.5)	52.3 (3.8)	37.9 (3.5)	30.7 (5.6)	45.2 (7.8)	39.2 (4.6)	52.5 (2.5)	41.7 (3.7)
Midwest	50.2 (1.3)	57.5 (2.2)	47.1 (1.7)	67.8 (5.0)	56.3 (2.9)	51.1 (2.7)	48.4 (5.8)	47.2 (5.9)	56.0 (3.8)	47.9 (2.2)	34.5 (3.5)
South	52.2 (1.2)	57.6 (1.8)	49.7 (1.5)	65.0 (4.0)	58.1 (2.4)	44.9 (2.4)	43.2 (3.9)	39.6 (4.2)	50.4 (3.8)	54.9 (2.1)	42.6 (3.0)
West	54.1 (1.6)	58.6 (2.6)	52.7 (1.8)	73.1 (7.3)	56.8 (3.3)	51.4 (2.9)	43.0 (4.8)	49.7 (5.6)	57.5 (3.2)	58.0 (2.4)	38.5 (3.1)
Federal poverty threshold ⁴											
Below 100%	55.1 (1.4)	56.9 (2.4)	54.0 (1.7)	58.9 (5.3)	55.7 (3.2)	51.8 (2.5)	47.2 (4.9)	48.5 (4.6)	58.4 (4.1)	58.1 (2.4)	47.5 (4.6)
100% to less than 250%	51.4 (1.3)	56.3 (2.1)	49.2 (1.5)	67.0 (4.2)	56.0 (2.7)	48.0 (2.5)	41.1 (4.9)	41.4 (4.9)	58.7 (3.8)	54.7 (2.4)	40.2 (2.6)
250% to less than 450%	47.9 (1.5)	55.1 (2.5)	45.5 (1.8)	73.0 (5.3)	55.7 (3.0)	42.4 (3.1)	39.0 (5.0)	43.4 (5.9)	44.3 (4.1)	49.6 (2.4)	37.2 (3.3)
450% or above	51.3 (1.5)	57.8 (2.8)	49.5 (1.7)	75.6 (6.2)	58.9 (3.6)	45.6 (3.2)	42.7 (5.4)	48.6 (7.5)	46.0 (4.1)	53.4 (2.0)	37.7 (4.3)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Percentage is for the civilian noninstitutionalized population with current asthma; crude percents are shown.

²Race categories “White” and “Black” include only those with a single race. The category “Other races” includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

⁴The federal poverty threshold includes persons with reported and missing family income based on imputed income values using multiple imputation.

SOURCE: CDC/NCHS, National Health Interview Survey.

Table 7. Rate of physician office visits with asthma as the first-listed diagnosis per 10,000 population, by year and selected patient characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	409.7 (44.0)	457.4 (40.2)	448.5 (40.6)	470.2 (50.9)	440.3 (45.2)	361.3 (39.8)	475.3 (45.5)	298.6 (30.3)	351.2 (32.9)
Sex									
Male	405.5 (64.2)	344.9 (43.5)	409.9 (52.7)	418.9 (58.3)	449.6 (58.4)	282.2 (41.5)	487.8 (57.5)	262.1 (38.3)	309.4 (36.8)
Female.	405.9 (54.4)	549.3 (57.9)	484.1 (54.8)	514.7 (68.0)	423.2 (53.9)	429.4 (57.9)	452.9 (59.4)	325.8 (43.2)	386.2 (48.7)
Race ²									
White	434.2 (49.3)	473.2 (45.1)	468.8 (45.0)	476.6 (57.7)	445.7 (47.8)	358.7 (40.6)	481.5 (51.1)	285.9 (31.5)	354.1 (34.5)
Black	*299.5 (98.2)	368.7 (72.4)	349.2 (89.8)	477.1 (109.5)	411.5 (102.0)	314.5 (92.3)	594.9 (119.5)	342.4 (73.4)	410.7 (111.9)
Other races	*294.1 (93.4)	*576.7 (386.6)	*469.6 (171.7)	*420.8 (146.9)	*463.0 (166.9)	*383.7 (119.7)	*227.6 (87.4)	*370.0 (162.2)	123.7 (60.2)
Ethnicity ³									
Hispanic or Latino . . . . .	...	...	460.4 (130.9)	422.9 (99.4)	530.2 (169.7)	287.8 (93.2)	457.9 (93.1)	446.4 (84.8)	426.8 (81.0)
Not Hispanic or Latino . . . . .	...	...	456.9 (43.5)	472.3 (53.6)	414.0 (38.8)	371.8 (40.0)	475.6 (52.2)	271.2 (31.5)	343.2 (35.0)
Age									
Children (0–17).	605.7 (129.8)	597.7 (91.7)	738.9 (133.0)	895.1 (208.9)	743.7 (176.4)	465.9 (102.1)	902.3 (178.6)	481.8 (95.5)	884.2 (97.3)
Adults (18 or over).	337.5 (65.6)	404.8 (76.4)	350.3 (60.0)	328.4 (57.0)	338.3 (54.6)	325.4 (75.6)	323.5 (56.8)	237.5 (37.0)	310.8 (48.9)
Age group									
0–4 years	1,064.9 (303.7)	735.0 (161.6)	1,092.5 (296.0)	1,095.2 (293.4)	938.7 (236.3)	308.6 (102.8)	1,167.4 (249.7)	646.3 (169.9)	444.1 (129.2)
5–14 years	468.5 (105.1)	631.8 (116.5)	667.2 (130.4)	817.8 (222.4)	677.7 (192.9)	606.4 (148.7)	965.5 (196.3)	445.6 (104.2)	516.2 (108.9)
15–34 years.	251.2 (59.8)	250.4 (50.7)	218.4 (49.6)	332.0 (76.5)	286.5 (71.1)	186.7 (40.8)	*290.7 (92.0)	146.4 (34.7)	221.2 (41.9)
35–64 years.	292.8 (69.2)	355.3 (76.0)	389.6 (77.5)	361.5 (73.8)	392.5 (62.8)	341.8 (75.9)	315.7 (60.4)	261.2 (47.6)	329.7 (56.5)
65 years or over	675.9 (192.5)	870.4 (222.3)	545.6 (148.9)	389.7 (108.1)	387.7 (112.1)	*566.2 (261.1)	408.9 (115.1)	393.3 (134.8)	468.0 (164.5)
Region									
Northeast	431.1 (96.7)	625.4 (114.2)	377.9 (83.3)	689.7 (170.4)	320.5 (67.6)	600.7 (136.5)	604.9 (153.7)	509.2 (108.2)	454.0 (81.6)
Midwest	353.0 (101.5)	277.5 (56.9)	453.6 (78.0)	455.3 (71.3)	451.3 (81.2)	271.5 (54.3)	341.6 (64.6)	210.0 (39.0)	360.4 (62.2)
South.	392.1 (68.2)	455.1 (71.2)	428.0 (70.5)	455.5 (81.7)	528.5 (99.5)	385.3 (71.9)	610.1 (84.1)	245.2 (39.2)	370.4 (64.0)
West	483.6 (98.1)	524.7 (83.8)	551.9 (96.9)	324.4 (96.6)	390.0 (74.8)	218.7 (45.1)	302.6 (64.9)	306.7 (68.7)	224.7 (4.5)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

... Category not applicable.

¹Except for age-specific estimates, rates are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Ambulatory Medical Care Survey.

Table 8. Rate of physician office visits with asthma as the first-listed diagnosis per 100 persons with current asthma, by year and selected patient characteristics: United States, 2001–2009

	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	55.6 (9.7)	63.4 (9.6)	64.8 (10.2)	66.2 (11.3)	57.7 (10.1)	46.3 (8.3)	60.6 (10.3)	38.2 (5.0)	43.0 (5.9)
Sex									
Male	63.9 (14.3)	56.1 (8.7)	69.2 (11.1)	67.0 (11.3)	71.9 (16.7)	39.8 (6.8)	74.6 (12.7)	36.9 (7.0)	43.9 (6.9)
Female	49.6 (9.3)	68.7 (12.0)	61.7 (11.1)	65.7 (13.1)	47.8 (7.5)	51.4 (11.7)	50.7 (11.0)	39.2 (6.2)	42.4 (7.1)
Race ²									
White	60.9 (10.9)	69.1 (11.2)	71.0 (12.0)	69.3 (12.5)	60.0 (10.5)	48.3 (9.4)	63.9 (12.2)	39.4 (5.7)	46.5 (6.9)
Black	*32.9 (11.4)	42.4 (11.4)	37.1 (9.7)	53.3 (12.8)	*45.8 (17.4)	*39.6 (15.1)	61.5 (14.4)	34.5 (9.1)	39.7 (11.1)
Other races	*45.7 (16.0)	*51.3 (22.4)	*58.8 (23.2)	*59.8 (21.3)	*58.6 (25.4)	*38.6 (12.8)	*22.2 (8.3)	*	*14.0 (6.9)
Ethnicity ³									
Hispanic or Latino . . . . .	...	...	*74.8 (24.5)	93.8 (24.8)	*	*44.7 (15.8)	75.9 (18.2)	77.6 (17.5)	64.8 (15.0)
Not Hispanic or Latino . . . . .	...	...	63.6 (10.6)	63.0 (11.6)	52.5 (6.6)	46.5 (8.8)	58.2 (11.5)	33.0 (4.8)	40.0 (5.9)
Age									
Children (0–17)	69.6 (15.1)	71.9 (11.4)	86.8 (16.0)	105.7 (25.0)	83.6 (20.1)	50.2 (11.2)	99.3 (20.2)	51.2 (10.4)	51.9 (10.4)
Adults (18 or over)	49.3 (9.7)	59.7 (11.4)	54.8 (9.5)	49.2 (8.6)	46.9 (7.7)	44.6 (10.5)	44.6 (8.0)	32.7 (5.2)	39.4 (6.5)
Age group									
0–4 years	186.4 (55.1)	123.4 (29.2)	184.2 (52.1)	195.5 (54.7)	139.0 (36.7)	*53.4 (18.6)	171.8 (40.1)	105.9 (30.0)	*71.0 (21.8)
5–14 years	47.5 (10.9)	69.1 (13.2)	70.7 (14.3)	90.0 (24.8)	69.2 (20.0)	55.9 (14.1)	103.0 (21.9)	40.8 (9.8)	46.0 (10.0)
15–34 years	31.6 (7.6)	33.2 (6.9)	30.4 (7.0)	47.0 (11.0)	38.1 (9.6)	23.8 (5.4)	*34.8 (11.2)	18.2 (4.4)	28.5 (5.6)
35–64 years	44.0 (10.5)	52.1 (11.3)	61.1 (12.4)	53.4 (11.0)	55.1 (9.0)	46.9 (10.6)	45.6 (9.0)	36.9 (6.9)	41.8 (7.4)
65 years or over	113.5 (33.1)	148.8 (39.1)	94.8 (26.5)	55.5 (15.7)	50.9 (15.0)	*80.9 (37.8)	54.7 (15.8)	*54.8 (19.1)	*61.0 (21.9)
Region									
Northeast	51.9 (14.6)	74.9 (20.0)	*47.5 (14.4)	*93.1 (43.0)	*37.3 (11.4)	*67.8 (21.8)	*	63.7 (17.1)	*5.0 (16.1)
Midwest	*45.9 (21.5)	37.6 (9.7)	58.3 (15.6)	61.3 (13.7)	59.3 (14.7)	31.4 (7.7)	*38.8 (12.0)	23.2 (5.9)	39.8 (8.8)
South	*54.2 (16.6)	*67.3 (20.9)	*69.6 (21.3)	68.0 (17.1)	*71.4 (25.6)	*52.5 (18.6)	82.7 (17.4)	36.5 (7.6)	49.5 (12.5)
West	*75.6 (25.0)	76.0 (21.1)	*84.4 (26.9)	*46.1 (18.1)	53.5 (12.9)	31.2 (8.1)	42.2 (11.8)	*38.0 (12.0)	29.3 (8.2)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE greater than 50%.

... Category not applicable.

¹Crude rates are shown.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Ambulatory Medical Care Survey.

Table 9. Rate of hospital outpatient department visits with asthma as the first-listed diagnosis per 10,000 population, by year and selected patient characteristics: United States, 2001–2009

	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	46.4 (5.2)	43.5 (4.8)	52.9 (6.2)	36.6 (3.6)	44.6 (4.1)	37.5 (3.5)	48.0 (7.6)	55.8 (6.5)	39.6 (5.8)
Sex									
Male	34.9 (4.9)	41.4 (5.9)	43.4 (7.3)	32.2 (5.1)	36.6 (5.3)	32.3 (4.1)	44.5 (7.9)	48.0 (7.2)	41.5 (7.4)
Female	56.3 (8.4)	45.2 (5.9)	61.6 (7.2)	39.8 (4.5)	51.9 (6.3)	41.9 (5.3)	51.4 (9.0)	62.9 (8.4)	37.1 (5.7)
Race ²									
White	43.9 (5.8)	32.9 (4.4)	36.7 (5.2)	24.2 (2.9)	35.8 (3.8)	32.3 (3.8)	35.6 (6.2)	45.8 (6.5)	33.6 (4.5)
Black	76.1 (10.4)	115.7 (16.7)	152.1 (24.0)	116.4 (19.3)	111.3 (19.8)	65.0 (10.6)	128.4 (27.4)	105.2 (18.9)	*69.1 (20.8)
Other races	*15.4 (4.7)	*20.0 (7.4)	52.6 (15.7)	*46.1 (20.0)	*31.2 (10.2)	*42.2 (13.6)	*14.7 (4.8)	52.5 (13.6)	*43.9 (14.4)
Ethnicity ³									
Hispanic or Latino . . . . .	...	...	117.7 (29.8)	59.5 (14.5)	70.6 (14.0)	41.4 (8.6)	85.0 (20.0)	73.7 (17.9)	26.6 (6.1)
Not Hispanic or Latino . . . . .	...	...	47.8 (6.6)	35.2 (3.9)	40.5 (4.2)	36.2 (3.8)	41.5 (6.4)	55.4 (7.2)	44.5 (7.3)
Age									
Children (0–17)	78.5 (18.6)	87.0 (17.3)	102.8 (27.6)	63.2 (10.7)	85.6 (14.5)	64.7 (9.7)	*114.2 (39.5)	113.8 (27.9)	103.9 (27.9)
Adults (18 or over)	35.1 (8.4)	28.7 (4.9)	35.8 (9.5)	27.6 (5.1)	31.0 (5.4)	28.0 (5.0)	25.4 (6.0)	*36.5 (7.7)	17.8 (2.6)
Age group									
0–4 years	128.8 (33.9)	110.9 (25.2)	127.7 (38.3)	105.1 (25.9)	121.7 (29.0)	67.4 (14.8)	*154.4 (53.2)	140.2 (48.1)	123.1 (33.9)
5–14 years	71.5 (18.2)	95.1 (23.0)	106.6 (28.9)	48.4 (9.8)	77.3 (13.5)	73.1 (12.3)	*110.0 (42.3)	117.6 (27.0)	*105.2 (33.4)
15–34 years	31.8 (8.6)	35.4 (8.1)	37.7 (7.6)	28.3 (5.9)	31.6 (5.6)	26.5 (5.6)	33.5 (8.1)	*46.7 (12.2)	32.3 (6.2)
35–64 years	34.9 (9.4)	24.7 (4.9)	*35.6 (11.6)	28.1 (6.0)	36.1 (8.3)	30.8 (6.4)	25.3 (6.8)	30.5 (6.2)	16.1 (3.7)
65 years or over	*38.1 (15.7)	*23.4 (9.1)	*36.9 (14.0)	*29.9 (11.0)	*21.6 (8.0)	*24.4 (9.9)	*21.0 (10.1)	*40.9 (17.6)	*
Region									
Northeast	54.1 (9.4)	62.0 (9.0)	105.3 (17.4)	60.8 (9.1)	85.3 (12.8)	52.5 (9.2)	74.7 (13.6)	76.8 (13.6)	76.8 (14.1)
Midwest	67.0 (12.8)	45.2 (10.3)	32.3 (7.2)	42.2 (8.0)	53.4 (9.3)	57.0 (9.5)	31.3 (6.0)	82.3 (16.3)	50.3 (10.0)
South	44.8 (10.3)	44.8 (9.8)	54.2 (12.6)	24.3 (5.1)	26.7 (5.8)	26.5 (5.2)	*53.6 (16.7)	54.3 (12.9)	*32.3 (12.9)
West	19.2 (5.0)	23.4 (5.5)	25.5 (7.3)	31.1 (7.7)	30.0 (6.4)	24.2 (5.1)	*36.0 (15.4)	17.8 (4.7)	*14.7 (4.9)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE greater than 50%.

... Category not applicable.

¹Except for age-specific estimates, rates are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey.

Table 10. Rate of hospital outpatient department visits with asthma as the first-listed diagnosis per 100 persons with current asthma, by year and selected patient characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	6.3 (1.1)	6.1 (0.9)	7.6 (1.5)	5.1 (0.7)	5.9 (0.8)	4.8 (0.7)	6.2 (1.5)	7.1 (1.2)	4.8 (0.9)
Sex									
Male	5.7 (1.0)	7.0 (1.3)	7.5 (1.8)	5.2 (1.0)	5.9 (1.1)	4.7 (0.7)	6.8 (1.8)	6.8 (1.3)	5.9 (1.3)
Female	6.8 (1.5)	5.5 (0.9)	7.7 (1.6)	5.0 (0.9)	5.9 (0.9)	4.8 (0.8)	5.7 (1.4)	7.4 (1.3)	3.9 (0.7)
Race ²									
White	6.1 (1.4)	4.8 (1.0)	5.5 (1.2)	3.5 (0.6)	4.8 (0.8)	4.2 (0.7)	4.7 (1.3)	6.2 (1.2)	4.3 (0.7)
Black	10.0 (1.8)	14.0 (2.5)	18.1 (4.5)	12.9 (2.6)	11.8 (2.9)	8.0 (1.7)	*14.5 (4.6)	12.1 (3.2)	*7.1 (2.6)
Other races	*2.0 (0.7)	*2.9 (1.3)	*6.8 (2.6)	*6.4 (2.8)	*4.3 (1.5)	*4.2 (1.5)	*1.7 (0.7)	*5.2 (1.9)	*4.7 (1.7)
Ethnicity ³									
Hispanic or Latino . . . . .	...	...	*16.8 (8.0)	9.7 (2.8)	12.0 (3.3)	7.6 (1.9)	*13.6 (5.1)	11.9 (3.0)	4.4 (1.2)
Not Hispanic or Latino . . . . .	...	...	6.5 (1.3)	4.6 (0.7)	5.0 (0.7)	4.4 (0.7)	5.0 (1.1)	6.5 (1.2)	4.8 (1.0)
Age									
Children (0–17)	9.0 (2.2)	10.5 (2.1)	12.1 (3.3)	7.5 (1.3)	9.6 (1.7)	7.0 (1.1)	*12.5 (4.4)	12.1 (3.0)	10.8 (2.9)
Adults (18 or over)	5.1 (1.2)	4.2 (0.7)	5.6 (1.5)	4.1 (0.8)	4.3 (0.8)	3.8 (0.7)	3.5 (0.8)	5.0 (1.1)	2.3 (0.4)
Age group									
0–4 years	22.5 (6.2)	18.6 (4.5)	*21.5 (6.7)	18.8 (4.9)	18.0 (4.5)	11.7 (2.8)	*22.7 (8.1)	*23.0 (8.3)	19.6 (5.7)
5–14 years	7.2 (1.9)	10.4 (2.6)	11.3 (3.1)	5.3 (1.1)	7.9 (1.4)	6.7 (1.2)	*11.7 (4.6)	10.8 (2.6)	*9.4 (3.0)
15–34 years	4.0 (1.1)	4.7 (1.1)	5.2 (1.1)	4.0 (0.9)	4.2 (0.8)	3.4 (0.7)	4.0 (1.0)	5.8 (1.5)	4.2 (0.8)
35–64 years	5.2 (1.4)	3.6 (0.7)	*5.6 (1.8)	4.1 (0.9)	5.1 (1.2)	4.2 (0.9)	3.7 (1.0)	4.3 (0.9)	2.0 (0.5)
65 years or over	*6.4 (2.7)	*4.0 (1.6)	*6.4 (2.5)	*4.3 (1.6)	*2.8 (1.0)	*3.5 (1.4)	*2.8 (1.4)	*5.7 (2.5)	*
Region									
Northeast	*6.6 (2.0)	7.5 (1.4)	*13.6 (5.0)	8.3 (2.2)	10.1 (2.6)	5.9 (1.4)	*9.0 (3.3)	9.2 (1.8)	7.8 (1.8)
Midwest	*8.8 (3.1)	6.2 (1.5)	4.1 (1.0)	5.6 (1.5)	6.9 (1.6)	6.6 (1.8)	3.7 (0.9)	*9.3 (2.8)	5.5 (1.4)
South	*6.1 (2.0)	*6.6 (2.2)	*8.7 (3.2)	3.5 (0.9)	3.6 (1.0)	3.5 (0.9)	*7.1 (3.2)	*7.8 (2.7)	*
West	*3.2 (1.1)	*3.5 (1.1)	*4.0 (1.6)	*4.4 (1.8)	*4.2 (1.5)	*3.5 (1.2)	*	*2.3 (0.8)	*1.9 (0.7)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

... Category not applicable.

¹Crude rates are shown.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey.

Table 11. Rate of physician office visits with asthma as the first-listed diagnosis per 100 persons with current asthma, by detailed age group and selected patient characteristics: United States, average annual 2007–2009

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	35–64 years	65 years or over
		Rate (standard error) ¹						
Total	47.1 (4.8)	66.9 (8.5)	38.9 (4.4)	117.2 (18.5)	61.2 (8.5)	27.2 (4.7)	41.4 (4.9)	57.0 (12.2)
Sex								
Male	51.1 (5.4)	74.9 (9.5)	35.0 (4.6)	118.6 (19.7)	72.5 (10.6)	24.3 (4.8)	42.5 (7.1)	39.6 (10.8)
Female	44.1 (5.6)	55.5 (11.0)	41.1 (5.5)	114.5 (35.7)	44.5 (9.5)	29.4 (6.1)	40.9 (5.7)	66.5 (16.6)
Race ²								
White	49.9 (5.7)	80.5 (11.3)	39.7 (4.9)	156.9 (28.9)	72.0 (10.8)	30.6 (6.1)	42.0 (5.3)	54.7 (13.4)
Male	55.4 (6.3)	90.2 (12.4)	36.6 (5.0)	158.1 (30.0)	85.2 (13.4)	27.5 (5.9)	42.3 (7.1)	44.3 (12.3)
Female	45.8 (6.7)	66.0 (15.1)	41.6 (6.3)	*154.8 (56.9)	51.2 (12.8)	32.8 (7.9)	41.8 (6.3)	*60.5 (18.5)
Black	44.9 (7.0)	52.3 (10.7)	38.9 (8.5)	89.5 (26.4)	47.6 (13.6)	*19.0 (5.8)	43.4 (12.8)	*73.4 (36.6)
Male	48.0 (10.4)	55.3 (12.8)	*37.3 (17.0)	*90.0 (29.4)	*51.2 (15.5)	*21.2 (10.0)	*	*
Female	42.6 (7.9)	48.3 (14.0)	39.6 (9.0)	*88.8 (44.0)	*42.9 (16.1)	*17.6 (6.2)	39.7 (11.1)	*
Other races	*23.5 (7.5)	*16.4 (6.1)	*27.9 (11.6)	*	*25.4 (10.0)	*	*	68.7 (34.0)
Male	*16.3 (6.1)	*22.6 (10.1)	*	*	*37.8 (17.2)	*	*	*
Female	*29.3 (12.6)	*	38.0 (17.8)	*	*	*	*	*
Ethnicity ³								
Hispanic or Latino	72.6 (9.9)	95.6 (17.8)	55.5 (10.7)	183.1 (45.2)	67.3 (15.4)	*35.4 (11.1)	72.0 (15.7)	*71.4 (29.3)
Male	76.7 (14.7)	101.2 (23.7)	47.4 (14.1)	191.0 (56.1)	73.6 (21.3)	*33.9 (15.2)	*67.3 (25.1)	*
Female	69.1 (11.5)	87.5 (19.1)	60.1 (14.4)	169.1 (57.5)	59.0 (18.7)	*36.6 (15.9)	74.3 (19.6)	*99.3 (45.9)
Not Hispanic or Latino	43.5 (5.1)	60.6 (9.3)	37.0 (4.7)	97.6 (18.4)	59.8 (9.7)	26.1 (5.2)	38.1 (5.0)	55.9 (12.5)
Male	47.2 (5.5)	69.2 (9.7)	33.6 (4.9)	97.2 (18.6)	72.3 (11.9)	23.0 (5.1)	39.9 (7.3)	40.6 (11.6)
Female	40.8 (6.1)	48.3 (12.5)	39.0 (5.7)	98.2 (40.3)	40.8 (10.8)	28.4 (6.6)	37.2 (5.7)	64.2 (17.0)
Region								
Northeast	61.4 (16.5)	*76.3 (27.9)	55.2 (13.9)	*132.9 (45.6)	*70.0 (25.3)	*	49.5 (13.3)	*112.2 (40.7)
Midwest	33.9 (6.0)	38.5 (8.0)	32.0 (6.8)	*50.3 (23.1)	38.0 (8.3)	19.9 (4.8)	41.3 (10.4)	*35.5 (13.3)
South	56.6 (8.5)	86.3 (15.5)	42.2 (8.1)	156.2 (35.0)	72.4 (16.0)	35.9 (7.1)	39.7 (7.2)	*63.6 (26.2)
West	36.3 (7.6)	58.8 (15.3)	29.1 (7.5)	*98.4 (34.0)	62.5 (18.3)	*14.1 (5.3)	37.2 (9.8)	*30.1 (12.8)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Crude estimates are shown.

²Race categories “White” and “Black” include only those with a single race. The category “Other races” includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

SOURCE: CDC/NCHS, National Ambulatory Medical Care Survey.

Table 12. Rate of hospital outpatient department visits with asthma as the first-listed diagnosis per 100 persons with current asthma, by detailed age group and selected patient characteristics: United States, average annual 2007–2009

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	35–64 years	65 years or over
		Rate (standard error) ¹						
Total	6.0 (0.8)	11.8 (2.4)	3.6 (0.5)	21.8 (4.8)	10.6 (2.2)	4.7 (0.7)	3.3 (0.5)	*3.1 (0.9)
Sex								
Male	6.5 (1.0)	11.7 (2.3)	2.9 (0.5)	21.0 (5.2)	10.1 (2.1)	4.2 (0.8)	2.5 (0.6)	*2.9 (1.2)
Female	5.6 (0.8)	11.9 (2.7)	4.0 (0.5)	23.0 (5.7)	11.2 (2.8)	5.0 (0.9)	3.7 (0.5)	*3.3 (1.3)
Race ²								
White.	5.1 (0.8)	10.4 (2.3)	3.3 (0.5)	23.1 (6.4)	8.8 (1.8)	4.0 (0.8)	3.2 (0.5)	*2.7 (1.0)
Male	5.3 (0.9)	10.2 (2.3)	2.7 (0.6)	*23.1 (7.1)	8.1 (1.8)	3.7 (0.8)	2.3 (0.7)	*2.5 (1.1)
Female	4.8 (0.7)	10.8 (2.6)	3.6 (0.6)	*23.2 (7.7)	9.9 (2.3)	4.3 (1.0)	3.6 (0.6)	*2.9 (1.4)
Black.	11.1 (2.4)	17.6 (4.6)	5.7 (1.3)	*23.9 (7.3)	17.4 (5.2)	7.8 (2.1)	*4.8 (1.5)	*
Male	12.4 (2.9)	18.4 (4.7)	*3.7 (1.6)	*21.8 (7.9)	18.3 (5.0)	*6.7 (2.6)	*3.6 (1.8)	*
Female	10.1 (2.3)	*16.6 (5.2)	6.6 (1.6)	*27.1 (9.5)	*16.3 (6.6)	8.6 (2.4)	*5.3 (1.8)	*
Other races.	4.0 (1.0)	*5.1 (1.6)	*3.2 (1.1)	*10.0 (4.9)	*4.1 (1.4)	*4.2 (2.0)	*1.6 (0.7)	*
Male	*4.2 (1.3)	*4.5 (1.9)	*3.9 (1.7)	*	*3.3 (1.1)	*	*1.6 (0.8)	*
Female	*3.7 (1.2)	*5.9 (2.6)	*2.8 (1.2)	*	*5.2 (2.4)	*	*	*
Ethnicity ³								
Hispanic or Latino.	9.9 (2.2)	13.4 (3.7)	7.4 (2.0)	*18.9 (5.8)	*12.3 (3.8)	*7.5 (2.3)	*5.8 (2.1)	*13.9 (6.9)
Male	8.3 (2.2)	13.0 (3.8)	*	*19.0 (7.3)	*11.5 (3.5)	*	*	*
Female	11.3 (2.6)	13.9 (4.1)	10.1 (2.7)	*18.7 (6.6)	*13.3 (5.2)	*10.9 (3.9)	*6.9 (2.6)	*
Not Hispanic or Latino	5.4 (0.8)	11.5 (2.5)	3.2 (0.4)	22.6 (5.5)	10.2 (2.3)	4.3 (0.7)	3.0 (0.4)	*2.3 (0.8)
Male	6.2 (1.0)	11.5 (2.5)	2.9 (0.5)	21.7 (5.9)	9.8 (2.3)	4.4 (0.8)	2.4 (0.6)	*2.9 (1.2)
Female	4.9 (0.7)	11.4 (2.8)	3.3 (0.5)	24.3 (6.8)	10.7 (2.8)	4.2 (0.8)	3.4 (0.5)	*
Region								
Northeast	8.6 (1.8)	*14.0 (4.4)	6.4 (1.4)	*29.2 (11.9)	13.7 (3.7)	7.6 (1.8)	5.2 (1.5)	*5.3 (2.5)
Midwest	6.2 (1.1)	10.3 (2.3)	4.5 (1.1)	*20.9 (6.5)	8.9 (2.2)	*4.8 (1.6)	4.8 (1.1)	*
South	*6.3 (2.0)	*13.3 (5.4)	3.0 (0.8)	*18.9 (8.4)	*12.6 (5.2)	4.7 (1.3)	2.4 (0.7)	*
West	*3.0 (1.2)	*	1.2 (0.3)	*	*	*1.8 (0.7)	1.3 (0.4)	*

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Crude estimates are shown.

²Race categories “White” and “Black” include only those with a single race. The category “Other races” includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey.

Table 13. Rate of emergency department visits with asthma as the first-listed diagnosis per 10,000 population, by year and selected patient characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	59.7 (3.4)	67.9 (3.8)	61.6 (3.5)	64.0 (4.0)	61.7 (3.8)	55.3 (3.4)	59.6 (3.9)	64.5 (4.3)	69.7 (4.6)
Sex									
Male	46.7 (4.0)	65.5 (5.3)	55.0 (4.9)	62.0 (5.4)	54.7 (4.9)	47.8 (4.5)	50.5 (4.8)	60.7 (6.0)	69.5 (6.7)
Female	71.7 (5.1)	69.6 (5.1)	67.9 (4.8)	65.3 (5.0)	68.3 (5.5)	62.2 (4.7)	67.7 (5.4)	67.0 (5.3)	69.2 (5.9)
Race ²									
White	48.2 (3.5)	46.9 (3.7)	48.9 (3.6)	43.6 (3.5)	44.4 (3.6)	39.1 (3.4)	43.7 (3.7)	44.0 (3.7)	51.0 (4.4)
Black	153.6 (14.7)	218.8 (18.2)	151.9 (13.1)	195.0 (18.7)	175.6 (17.7)	157.5 (14.6)	167.0 (16.5)	180.4 (17.7)	182.1 (19.3)
Other races	*22.2 (6.8)	23.8 (5.9)	26.6 (7.3)	39.1 (9.2)	42.1 (11.5)	45.4 (11.2)	26.2 (7.2)	55.0 (13.6)	70.5 (17.0)
Ethnicity ³									
Hispanic or Latino . . . . .	...	...	89.1 (11.8)	57.5 (7.8)	73.1 (10.8)	64.8 (9.7)	58.1 (10.2)	59.7 (9.7)	72.3 (10.2)
Not Hispanic or Latino . . . . .	...	...	58.4 (3.6)	65.2 (4.4)	59.0 (4.1)	55.0 (3.8)	61.2 (4.3)	66.7 (4.6)	68.7 (5.0)
Age									
Children (0–17)	91.6 (11.2)	99.7 (13.7)	95.6 (10.3)	103.2 (14.4)	102.4 (11.3)	80.7 (9.5)	87.2 (12.9)	103.1 (13.8)	111.5 (15.3)
Adults (18 or over)	49.0 (3.5)	56.9 (4.2)	49.6 (4.3)	50.4 (5.0)	46.8 (4.1)	45.3 (4.0)	49.8 (4.6)	50.7 (5.0)	54.8 (5.4)
Age group									
0–4 years	136.6 (24.1)	159.7 (31.0)	159.1 (26.3)	168.3 (28.2)	162.7 (23.4)	115.1 (17.5)	122.1 (25.1)	145.1 (32.6)	131.5 (25.9)
5–14 years	85.4 (11.7)	79.2 (11.1)	67.0 (8.0)	82.1 (12.9)	86.3 (12.9)	64.5 (9.1)	75.8 (13.9)	101.4 (12.8)	123.0 (19.1)
15–34 years	62.8 (6.2)	74.9 (7.6)	70.3 (7.0)	73.6 (8.8)	63.1 (7.1)	57.8 (7.0)	62.2 (7.2)	63.6 (9.5)	64.9 (8.5)
35–64 years	43.6 (4.2)	53.3 (4.9)	44.8 (4.7)	42.8 (5.5)	43.8 (5.2)	48.6 (5.6)	50.7 (6.1)	43.7 (5.1)	56.5 (6.8)
65 years or over	31.2 (6.5)	32.1 (7.8)	30.8 (7.3)	27.8 (6.1)	23.1 (5.3)	17.8 (4.3)	25.0 (5.5)	40.9 (8.5)	22.8 (5.2)
Region									
Northeast	86.6 (8.2)	78.2 (6.7)	94.6 (8.5)	93.7 (9.5)	81.5 (8.3)	73.4 (8.3)	73.1 (8.3)	89.0 (12.9)	102.1 (12.2)
Midwest	66.9 (7.8)	67.2 (8.3)	47.2 (7.1)	73.8 (9.5)	64.7 (9.0)	62.7 (8.7)	58.4 (8.2)	75.0 (10.6)	85.1 (11.4)
South	54.9 (5.7)	76.9 (7.4)	62.5 (5.9)	61.5 (7.0)	56.9 (6.3)	48.3 (5.1)	65.1 (7.2)	62.1 (6.3)	63.5 (7.6)
West	37.4 (6.2)	44.8 (6.7)	47.2 (6.8)	33.7 (5.4)	50.6 (7.3)	44.4 (7.5)	42.2 (7.2)	40.2 (6.1)	40.1 (6.7)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

... Category not applicable.

¹Except for age-specific estimates, rates are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey.

Table 14. Rate of emergency department visits with asthma as the first-listed diagnosis per 100 persons with current asthma, by year and selected patient characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	8.2 (0.6)	9.5 (0.8)	8.8 (0.7)	8.9 (0.8)	8.0 (0.6)	7.0 (0.6)	7.7 (0.7)	8.2 (0.8)	8.4 (0.8)
Sex									
Male	7.6 (0.8)	10.8 (1.1)	9.4 (1.1)	10.0 (1.2)	8.6 (0.9)	6.9 (0.8)	7.7 (0.9)	8.5 (1.0)	9.9 (1.2)
Female	8.6 (0.7)	8.5 (0.7)	8.4 (0.7)	8.1 (0.9)	7.5 (0.7)	7.0 (0.7)	7.6 (0.9)	7.8 (0.8)	7.4 (0.8)
Race ²									
White.	6.7 (0.6)	6.7 (0.7)	7.3 (0.7)	6.3 (0.7)	5.9 (0.5)	5.0 (0.5)	5.8 (0.7)	5.9 (0.6)	6.4 (0.7)
Black.	19.4 (2.5)	25.0 (3.0)	18.2 (2.3)	23.5 (3.3)	19.3 (2.6)	18.4 (2.3)	18.1 (2.6)	19.5 (2.7)	17.6 (2.7)
Other races.	*3.1 (1.2)	3.7 (1.0)	*3.6 (1.3)	5.0 (1.4)	*5.5 (1.7)	*4.1 (1.4)	*3.0 (0.9)	*5.5 (2.0)	*7.6 (3.0)
Ethnicity ³									
Hispanic or Latino. . . . .	...	...	16.1 (2.6)	12.7 (2.3)	13.7 (2.5)	10.1 (1.8)	8.6 (1.7)	10.6 (2.0)	13.3 (2.4)
Not Hispanic or Latino . . . . .	...	...	7.9 (0.7)	8.5 (0.8)	7.2 (0.6)	6.5 (0.6)	7.5 (0.7)	7.8 (0.7)	7.7 (0.8)
Age									
Children (0–17)	10.5 (1.3)	12.0 (1.7)	11.2 (1.3)	12.2 (1.8)	11.5 (1.3)	8.7 (1.1)	9.6 (1.5)	11.0 (1.6)	11.6 (1.7)
Adults (18 or over)	7.2 (0.5)	8.4 (0.7)	7.8 (0.7)	7.5 (0.8)	6.5 (0.6)	6.2 (0.6)	6.9 (0.7)	7.0 (0.7)	7.1 (0.7)
Age group									
0–4 years	23.9 (4.6)	26.8 (5.7)	26.8 (4.9)	30.0 (5.6)	24.1 (4.0)	19.9 (3.6)	18.0 (4.1)	23.8 (5.9)	20.9 (4.6)
5–4 years	8.6 (1.2)	8.7 (1.3)	7.1 (0.9)	9.0 (1.5)	8.8 (1.4)	5.9 (0.9)	8.1 (1.6)	9.3 (1.3)	11.0 (1.8)
15–34 years	7.9 (0.8)	9.9 (1.1)	9.8 (1.1)	10.4 (1.3)	8.4 (1.0)	7.4 (1.0)	7.4 (1.0)	7.9 (1.3)	8.4 (1.2)
35–64 years	6.5 (0.7)	7.8 (0.8)	7.0 (0.8)	6.3 (0.8)	6.2 (0.8)	6.7 (0.8)	7.3 (0.9)	6.2 (0.8)	7.2 (0.9)
65 years or over	5.2 (1.1)	5.5 (1.4)	5.4 (1.3)	4.0 (0.9)	3.0 (0.7)	2.5 (0.6)	3.3 (0.8)	5.7 (1.2)	3.0 (0.7)
Region									
Northeast	10.3 (1.3)	9.3 (1.1)	11.8 (1.6)	12.4 (2.0)	9.2 (1.2)	8.1 (1.4)	8.8 (1.5)	10.7 (2.1)	11.0 (2.0)
Midwest	8.8 (1.6)	9.4 (1.7)	6.1 (1.2)	9.8 (2.1)	8.1 (1.5)	7.2 (1.4)	6.7 (1.5)	8.3 (1.7)	9.0 (1.9)
South	7.7 (1.0)	11.3 (1.6)	10.0 (1.4)	9.1 (1.5)	7.7 (1.1)	6.5 (1.1)	8.7 (1.2)	8.9 (1.2)	8.6 (1.5)
West	5.9 (0.8)	6.7 (1.2)	7.4 (1.4)	4.7 (1.0)	6.9 (1.3)	6.2 (1.3)	6.2 (1.8)	5.1 (1.1)	5.2 (1.2)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE greater than 50%.

... Category not applicable.

¹Crude rates are shown.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race. Ethnicity was not imputed in 2001 or 2002. It is not shown for those years due to a high rate of missing data.

SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey.

Table 15. Rate of emergency department visits with asthma as the first-listed diagnosis per 100 persons with current asthma, by detailed age group and selected patient characteristics: United States, average annual 2007–2009

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	15–19 years	20–24 years	25–34 years	35–64 years	65 years or over
	Rate (standard error) ¹										
Total	8.1 (0.5)	10.7 (1.0)	7.0 (0.5)	20.8 (3.0)	9.5 (1.0)	7.9 (0.7)	6.5 (1.0)	9.1 (1.3)	8.2 (1.0)	6.9 (0.6)	4.0 (0.6)
Sex											
Male	8.7 (0.7)	11.8 (1.3)	6.7 (0.6)	22.6 (3.6)	10.4 (1.3)	6.9 (1.0)	5.7 (1.3)	7.5 (1.9)	7.7 (1.4)	7.0 (0.8)	2.6 (0.6)
Female	7.6 (0.6)	9.3 (1.1)	7.2 (0.6)	17.6 (3.3)	8.2 (1.2)	8.6 (0.9)	7.2 (1.3)	10.2 (1.7)	8.5 (1.2)	6.9 (0.6)	4.7 (0.8)
Race ²											
White	6.1 (0.5)	9.4 (1.0)	5.0 (0.4)	19.7 (3.5)	8.7 (1.1)	5.9 (0.6)	5.0 (1.0)	6.5 (1.1)	6.1 (0.9)	4.6 (0.5)	3.2 (0.5)
Male	6.6 (0.6)	10.7 (1.4)	4.4 (0.5)	22.3 (4.6)	10.0 (1.6)	4.7 (0.9)	*3.9 (1.4)	4.5 (1.3)	5.5 (1.4)	4.2 (0.7)	2.4 (0.6)
Female	5.7 (0.5)	7.4 (1.2)	5.3 (0.5)	14.6 (3.9)	6.7 (1.3)	6.8 (0.9)	6.0 (1.4)	8.2 (1.8)	6.4 (1.0)	4.9 (0.6)	3.7 (0.7)
Black	18.3 (1.9)	15.2 (2.1)	20.9 (2.4)	24.2 (4.6)	13.1 (2.1)	19.6 (3.3)	13.9 (3.2)	23.9 (5.9)	22.8 (5.1)	21.6 (3.0)	*10.2 (3.3)
Male	19.7 (2.4)	16.3 (2.5)	24.7 (3.9)	24.2 (5.3)	14.5 (2.6)	21.0 (4.8)	14.3 (4.3)	28.2 (13.0)	*27.7 (9.8)	26.1 (5.2)	*
Female	17.3 (1.9)	13.8 (2.6)	19.1 (2.5)	24.2 (6.3)	11.4 (2.9)	18.7 (3.5)	13.6 (4.3)	21.6 (5.9)	20.7 (5.2)	19.6 (2.9)	*11.2 (4.2)
Other races	5.4 (1.4)	7.6 (2.0)	4.0 (1.6)	*17.2 (6.4)	*5.2 (1.7)	*3.9 (1.7)	*	4.1 (2.0)	*	*3.1 (1.3)	*
Male	5.0 (1.5)	*7.1 (2.3)	*	*20.1 (8.5)	*2.9 (1.2)	*	*	*	*	*	*
Female	*5.7 (1.8)	*8.4 (2.6)	*4.6 (1.9)	*	*8.3 (3.3)	*5.2 (2.6)	*	*	*	*3.1 (1.3)	*
Ethnicity ³											
Hispanic or Latino	10.8 (1.3)	12.5 (2.1)	9.6 (1.3)	19.5 (4.9)	11.1 (2.4)	11.1 (2.0)	*7.2 (3.0)	*16.7 (5.6)	10.5 (2.6)	7.9 (1.4)	*7.8 (2.9)
Male	12.5 (2.0)	15.4 (2.9)	9.2 (2.1)	23.2 (6.1)	14.7 (3.9)	*9.6 (2.9)	*	*	*8.7 (3.8)	*7.5 (2.8)	*
Female	9.3 (1.5)	8.4 (2.2)	9.8 (1.7)	*12.9 (5.5)	6.4 (1.8)	12.2 (2.8)	*	*17.0 (6.7)	*11.7 (3.6)	8.1 (1.7)	*10.2 (4.5)
Not Hispanic or Latino	7.7 (0.5)	10.3 (1.1)	6.7 (0.5)	21.2 (3.6)	9.2 (1.0)	7.5 (0.7)	6.4 (1.0)	8.2 (1.2)	7.9 (1.0)	6.8 (0.6)	3.7 (0.5)
Male	8.1 (0.7)	11.0 (1.4)	6.4 (0.6)	22.4 (4.2)	9.5 (1.3)	6.5 (0.9)	5.6 (1.4)	6.5 (1.6)	7.5 (1.6)	6.9 (0.8)	2.5 (0.6)
Female	7.4 (0.6)	9.5 (1.2)	6.9 (0.6)	19.0 (4.0)	8.6 (1.4)	8.1 (0.9)	7.1 (1.4)	9.4 (1.7)	8.1 (1.2)	6.7 (0.6)	4.3 (0.7)
Region											
Northeast	10.2 (1.3)	12.5 (2.2)	9.2 (1.2)	*20.6 (6.3)	12.8 (2.4)	11.3 (2.2)	11.7 (2.7)	*15.1 (4.9)	9.0 (2.1)	8.1 (1.2)	*5.6 (1.7)
Midwest	8.0 (1.3)	10.9 (2.6)	6.8 (1.0)	*22.7 (8.7)	9.6 (2.1)	6.4 (1.4)	*3.7 (1.3)	5.4 (1.6)	9.4 (2.5)	7.8 (1.2)	3.2 (0.9)
South	8.7 (0.9)	11.5 (1.6)	7.4 (0.8)	20.9 (3.9)	9.5 (1.7)	8.9 (1.3)	7.5 (2.1)	11.2 (2.5)	8.3 (1.6)	7.2 (1.0)	4.1 (1.0)
West	5.5 (0.9)	7.3 (1.6)	4.9 (0.9)	17.7 (4.7)	6.4 (1.5)	5.4 (1.1)	*3.0 (1.5)	6.7 (2.0)	5.9 (1.6)	4.7 (1.0)	*3.3 (1.0)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Crude estimates are shown.

²Race categories “White” and “Black” include only those with a single race. The category “Other races” includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey.

Table 16. Rate of hospital discharges with asthma as the first-listed diagnosis per 10,000 population, by year and selected patient characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	16.1 (1.0)	17.0 (1.0)	19.8 (1.1)	17.0 (1.0)	16.5 (0.9)	14.7 (0.9)	15.1 (1.1)	14.4 (1.0)	15.4 (1.1)
Sex									
Male	13.3 (1.1)	13.9 (1.1)	16.3 (1.3)	14.4 (1.2)	13.3 (1.0)	12.1 (1.1)	12.5 (1.1)	11.6 (1.1)	12.7 (1.2)
Female	18.4 (1.1)	19.4 (1.2)	22.7 (1.3)	18.9 (1.1)	19.0 (1.1)	16.8 (1.0)	17.4 (1.2)	17.4 (1.3)	17.7 (1.1)
Race ²									
White.	10.0 (0.7)	10.5 (0.8)	12.1 (0.8)	10.0 (0.7)	11.0 (0.7)	9.4 (0.7)	8.9 (0.8)	8.5 (0.8)	9.5 (0.8)
Black.	30.5 (2.9)	35.8 (3.2)	39.5 (3.4)	33.5 (3.2)	27.0 (2.3)	29.3 (2.7)	29.1 (3.0)	30.7 (3.3)	28.5 (3.0)
Other races	13.3 (2.0)	10.0 (1.5)	17.5 (2.8)	18.8 (3.0)	13.6 (2.6)	7.0 (1.1)	10.5 (2.0)	13.2 (2.5)	16.3 (2.8)
Age									
Children (0–17)	26.2 (4.7)	26.9 (4.8)	31.2 (5.3)	27.0 (4.8)	22.4 (3.4)	21.0 (4.3)	21.3 (5.2)	18.1 (4.1)	19.1 (4.8)
Adults (18 or over)	12.5 (1.5)	13.4 (1.7)	16.0 (2.0)	13.6 (1.8)	14.6 (1.8)	12.9 (1.6)	13.2 (1.9)	13.9 (2.4)	14.6 (1.8)
Age group									
0–4 years	56.2 (10.9)	59.0 (11.0)	62.7 (11.5)	59.9 (11.1)	49.3 (8.0)	43.3 (9.7)	41.4 (9.7)	35.4 (7.9)	40.6 (11.6)
5–14 years	17.8 (3.2)	17.3 (3.1)	21.6 (3.5)	17.0 (3.1)	14.6 (2.4)	14.1 (3.0)	16.3 (4.5)	12.7 (3.3)	12.1 (2.9)
15–34 years	6.5 (0.9)	7.0 (1.2)	8.4 (1.3)	6.2 (1.0)	6.1 (1.0)	5.5 (0.8)	5.3 (0.9)	6.4 (1.2)	5.1 (0.9)
35–64 years	13.3 (1.7)	14.5 (1.8)	16.4 (1.9)	13.4 (1.7)	14.4 (1.9)	14.0 (1.8)	13.8 (2.1)	14.5 (2.6)	15.4 (1.9)
65 years or over	21.4 (2.6)	22.5 (3.2)	30.5 (4.5)	28.7 (4.5)	30.5 (4.8)	23.7 (3.4)	25.4 (4.0)	25.2 (5.0)	29.0 (4.3)
Region									
Northeast	19.3 (3.2)	20.5 (3.4)	31.0 (4.5)	23.5 (3.5)	22.0 (2.6)	22.1 (2.9)	24.7 (3.9)	18.9 (3.0)	21.0 (2.1)
Midwest	16.7 (2.1)	15.8 (2.1)	19.8 (2.4)	16.9 (2.2)	17.3 (2.2)	13.8 (1.7)	11.5 (1.4)	11.8 (1.6)	13.4 (1.6)
South	15.8 (1.3)	17.7 (1.4)	17.4 (1.3)	15.8 (1.3)	15.9 (1.3)	13.4 (1.1)	14.2 (1.2)	16.2 (1.7)	15.3 (1.7)
West	12.7 (2.2)	13.7 (2.1)	14.7 (2.2)	13.9 (2.4)	11.6 (2.1)	11.6 (2.6)	12.1 (2.7)	11.0 (2.1)	12.8 (2.6)

¹Except for age-specific estimates, rates are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned. Those with "unknown" race were excluded.

SOURCE: CDC/NCHS, National Hospital Discharge Survey.

Table 17. Rate of hospital discharges with asthma as the first-listed diagnosis per 100 persons with current asthma, by year and selected patient characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	2.2 (0.3)	2.4 (0.3)	2.9 (0.4)	2.4 (0.3)	2.2 (0.3)	1.9 (0.3)	2.0 (0.3)	1.9 (0.3)	2.0 (0.3)
Sex									
Male	2.2 (0.3)	2.3 (0.4)	2.8 (0.4)	2.3 (0.4)	2.1 (0.3)	1.8 (0.3)	1.9 (0.4)	1.7 (0.3)	1.9 (0.3)
Female	2.3 (0.3)	2.5 (0.3)	2.9 (0.4)	2.5 (0.3)	2.3 (0.3)	2.1 (0.3)	2.0 (0.3)	2.2 (0.4)	2.0 (0.3)
Race ²									
White	1.5 (0.2)	1.6 (0.2)	1.8 (0.2)	1.5 (0.2)	1.5 (0.2)	1.3 (0.2)	1.3 (0.2)	1.2 (0.2)	1.3 (0.2)
Black	3.9 (0.8)	4.0 (0.8)	4.5 (0.8)	3.8 (0.8)	2.9 (0.5)	3.2 (0.6)	2.9 (0.6)	2.9 (0.7)	2.5 (0.6)
Other races	1.3 (0.3)	1.2 (0.3)	*3.0 (1.0)	3.1 (0.9)	1.9 (0.5)	0.8 (0.2)	*1.3 (0.5)	1.5 (0.4)	1.9 (0.5)
Age									
Children (0–17)	3.0 (0.6)	3.2 (0.6)	3.7 (0.6)	3.2 (0.6)	2.5 (0.4)	2.3 (0.5)	2.3 (0.6)	1.9 (0.4)	2.0 (0.5)
Adults (18 or over)	1.9 (0.2)	2.1 (0.3)	2.5 (0.3)	2.1 (0.3)	2.1 (0.3)	1.8 (0.2)	1.8 (0.3)	1.9 (0.3)	1.9 (0.2)
Age group									
0–4 years	9.7 (2.0)	9.8 (2.0)	10.5 (2.1)	10.7 (2.2)	7.3 (1.3)	7.5 (1.8)	6.1 (1.5)	5.8 (1.4)	*6.5 (2.0)
5–14 years	1.8 (0.3)	1.9 (0.4)	2.3 (0.4)	1.9 (0.4)	1.5 (0.3)	1.3 (0.3)	1.7 (0.5)	1.2 (0.3)	1.1 (0.3)
15–34 years	0.8 (0.1)	1.0 (0.2)	1.2 (0.2)	0.9 (0.2)	0.8 (0.1)	0.7 (0.1)	0.6 (0.1)	0.8 (0.2)	0.7 (0.1)
35–64 years	2.0 (0.3)	2.2 (0.3)	2.6 (0.3)	2.0 (0.3)	2.0 (0.3)	1.9 (0.3)	2.0 (0.3)	2.1 (0.4)	2.0 (0.3)
65 years or over	3.9 (0.5)	4.1 (0.6)	5.5 (0.9)	4.3 (0.7)	4.2 (0.7)	3.5 (0.6)	3.6 (0.6)	3.7 (0.8)	3.9 (0.6)
Region									
Northeast	*2.3 (0.9)	*2.5 (1.1)	*4.0 (1.5)	*3.3 (1.2)	*2.7 (0.9)	*2.6 (0.9)	*3.2 (1.3)	*2.6 (1.1)	2.5 (0.5)
Midwest	2.2 (0.6)	2.1 (0.6)	2.4 (0.6)	2.1 (0.6)	2.1 (0.5)	1.7 (0.5)	1.3 (0.4)	*1.3 (0.5)	1.4 (0.4)
South	2.2 (0.4)	2.6 (0.5)	2.7 (0.5)	2.4 (0.5)	2.3 (0.4)	1.8 (0.3)	2.0 (0.4)	2.5 (0.6)	2.2 (0.5)
West	*2.2 (0.8)	*2.3 (0.7)	*2.6 (0.9)	*2.0 (0.7)	*1.7 (0.6)	*1.8 (0.7)	*1.7 (0.7)	*1.4 (0.6)	*

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Crude rates are shown.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned. Those with "unknown" race were excluded.

SOURCE: CDC/NCHS, National Hospital Discharge Survey.

Table 18. Rate of hospital discharges with asthma as the first-listed diagnosis per 100 persons with current asthma, by detailed age group and selected patient characteristics: United States, average annual 2007–2009

Characteristic	Total	0–17 years	18 years or over	0–4 years	5–14 years	15–34 years	15–19 years	20–24 years	25–34 years	35–64 years	65 years or over
		Rate (standard error) ¹									
Total	2.0 (0.2)	2.1 (0.4)	1.9 (0.2)	5.2 (1.0)	1.6 (0.4)	0.7 (0.1)	0.6 (0.1)	0.6 (0.1)	0.9 (0.1)	2.0 (0.2)	3.7 (0.4)
Sex											
Male	1.8 (0.2)	2.2 (0.5)	1.5 (0.2)	5.3 (1.1)	1.6 (0.4)	0.6 (0.1)	0.5 (0.1)	0.5 (0.1)	0.8 (0.2)	1.8 (0.2)	2.8 (0.4)
Female	2.1 (0.2)	1.9 (0.4)	2.1 (0.2)	5.0 (1.1)	1.6 (0.3)	0.8 (0.1)	0.6 (0.1)	0.7 (0.1)	1.0 (0.1)	2.1 (0.2)	4.2 (0.5)
Race ²											
White	1.3 (0.2)	1.4 (0.3)	1.2 (0.1)	4.2 (0.9)	1.1 (0.3)	0.4 (0.1)	0.3 (0.1)	0.4 (0.1)	0.5 (0.1)	1.3 (0.2)	2.3 (0.3)
Male	1.1 (0.2)	1.4 (0.4)	0.9 (0.1)	4.0 (0.9)	*1.1 (0.4)	0.3 (0.1)	*0.2 (0.1)	*0.2 (0.1)	0.4 (0.1)	1.1 (0.2)	1.7 (0.3)
Female	1.4 (0.2)	*	1.4 (0.2)	4.6 (1.3)	1.1 (0.2)	0.5 (0.1)	*0.4 (0.1)	0.6 (0.1)	0.6 (0.1)	1.4 (0.2)	2.6 (0.4)
Black	2.8 (0.3)	2.2 (0.4)	3.3 (0.4)	3.8 (0.8)	1.9 (0.4)	1.3 (0.2)	1.0 (0.3)	0.8 (0.2)	2.1 (0.5)	3.7 (0.5)	6.2 (1.2)
Male	2.6 (0.4)	2.2 (0.5)	3.1 (0.5)	3.8 (0.9)	1.9 (0.5)	1.4 (0.3)	*0.7 (0.3)	*1.2 (0.5)	*3.0 (1.2)	3.5 (0.6)	5.8 (1.7)
Female	2.9 (0.4)	2.1 (0.4)	3.4 (0.4)	3.9 (1.0)	1.7 (0.5)	1.3 (0.2)	*1.4 (0.4)	*0.7 (0.2)	1.7 (0.4)	3.9 (0.5)	6.3 (1.3)
Other races	1.6 (0.3)	1.3 (0.3)	1.7 (0.3)	2.4 (0.7)	*1.1 (0.3)	*0.4 (0.2)	*0.2 (0.1)	*	*0.8 (0.4)	1.7 (0.4)	5.7 (1.5)
Male	1.5 (0.3)	1.4 (0.4)	1.5 (0.4)	*2.2 (0.7)	*1.4 (0.5)	*0.4 (0.2)	*	*	*	1.7 (0.5)	*4.6 (2.3)
Female	1.6 (0.3)	*1.1 (0.3)	1.9 (0.4)	*2.8 (1.2)	*0.8 (0.4)	*	*	*	*	1.8 (0.5)	*6.6 (2.2)
Region											
Northeast	2.7 (0.3)	2.4 (0.5)	2.9 (0.4)	6.4 (1.6)	2.0 (0.4)	1.0 (0.2)	0.9 (0.2)	*1.0 (0.3)	1.1 (0.3)	2.9 (0.4)	6.1 (0.8)
Midwest	1.4 (0.2)	1.0 (0.2)	1.5 (0.2)	3.0 (0.7)	0.7 (0.2)	0.5 (0.1)	0.3 (0.1)	0.7 (0.2)	0.6 (0.1)	1.7 (0.3)	3.0 (0.6)
South	2.2 (0.4)	*2.1 (0.6)	2.3 (0.4)	4.3 (1.3)	*1.7 (0.5)	0.8 (0.2)	0.7 (0.2)	0.5 (0.1)	1.2 (0.2)	2.4 (0.4)	4.2 (0.9)
West	*1.6 (0.7)	*	1.1 (0.3)	*	*	*0.5 (0.2)	*0.4 (0.2)	*0.4 (0.2)	*0.7 (0.2)	1.2 (0.3)	*2.1 (0.7)

* Figure does not meet standards of reliability or precision. Estimates presented with an asterisk have a relative standard error (RSE) of 30%–50%. Estimates that are not shown have an RSE over 50%.

¹Crude estimates are shown.

²Race categories “White” and “Black” include only those with a single race. The category “Other races” includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned. Those with “unknown” race were excluded.

SOURCE: CDC/NCHS, National Hospital Discharge Survey.

Table 19. Rate of deaths with asthma as the underlying cause per million population, by year and selected characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	15.0 (0.2)	14.8 (0.2)	14.0 (0.2)	12.8 (0.2)	12.8 (0.2)	11.7 (0.2)	11.0 (0.2)	10.6 (0.2)	10.5 (0.2)
Sex									
Male	11.8 (0.3)	12.3 (0.3)	11.4 (0.3)	10.4 (0.3)	9.7 (0.3)	9.4 (0.3)	9.0 (0.3)	8.3 (0.3)	8.4 (0.2)
Female	17.5 (0.3)	16.6 (0.3)	15.9 (0.3)	14.5 (0.3)	15.0 (0.3)	13.4 (0.3)	12.3 (0.3)	12.4 (0.3)	12.1 (0.3)
Race ²									
White	12.2 (0.2)	12.1 (0.2)	11.4 (0.2)	10.4 (0.2)	10.4 (0.2)	9.4 (0.2)	8.8 (0.2)	8.5 (0.2)	8.4 (0.2)
Black	35.9 (1.1)	34.1 (1.1)	31.7 (1.1)	30.6 (1.0)	30.4 (1.0)	27.4 (1.0)	25.5 (0.9)	24.7 (0.9)	24.9 (0.8)
Other races	17.4 (0.9)	14.9 (0.8)	16.1 (0.8)	13.2 (0.7)	12.9 (0.7)	12.4 (0.7)	12.5 (0.7)	10.9 (0.6)	11.2 (0.9)
Ethnicity ³									
Hispanic or Latino	13.9 (0.7)	13.2 (0.6)	13.0 (0.6)	11.4 (0.6)	10.1 (0.5)	9.9 (0.5)	8.3 (0.4)	9.4 (0.5)	6.0 (0.4)
Not Hispanic or Latino	15.2 (0.2)	15.0 (0.2)	14.1 (0.2)	13.0 (0.2)	13.1 (0.2)	12.0 (0.2)	11.4 (0.2)	10.9 (0.2)	10.7 (0.2)
Age									
Children (0–17)	2.6 (0.2)	3.0 (0.2)	2.7 (0.2)	2.5 (0.2)	2.3 (0.2)	2.3 (0.2)	2.5 (0.2)	2.6 (0.2)	2.8 (0.2)
Adults (18 or over)	19.2 (0.3)	18.8 (0.3)	18.0 (0.3)	16.5 (0.3)	16.7 (0.3)	15.3 (0.3)	14.4 (0.3)	14.0 (0.3)	14.0 (0.3)
Age group									
0–4 years	2.1 (0.3)	2.4 (0.4)	2.2 (0.3)	1.8 (0.3)	2.0 (0.3)	1.6 (0.3)	2.2 (0.3)	2.0 (0.3)	2.0 (0.3)
5–14 years	2.4 (0.2)	3.0 (0.3)	2.7 (0.3)	2.6 (0.3)	2.4 (0.2)	2.5 (0.2)	2.7 (0.3)	2.8 (0.3)	2.8 (0.3)
15–34 years	4.7 (0.2)	5.0 (0.3)	4.8 (0.2)	4.4 (0.2)	4.1 (0.2)	4.0 (0.2)	4.0 (0.2)	3.9 (0.2)	4.5 (0.2)
35–64 years	14.7 (0.4)	14.5 (0.4)	14.2 (0.4)	12.7 (0.3)	12.7 (0.3)	12.1 (0.3)	11.0 (0.3)	10.6 (0.3)	10.9 (0.3)
65 years or over	60.7 (1.3)	58.2 (1.3)	54.4 (1.2)	51.3 (1.2)	52.4 (1.2)	46.3 (1.1)	43.4 (1.1)	42.4 (1.0)	38.8 (1.0)
Region									
Northeast	14.4 (0.5)	13.8 (0.5)	13.8 (0.5)	12.3 (0.5)	12.2 (0.5)	10.5 (0.5)	9.8 (0.4)	10.4 (0.5)	9.9 (0.4)
Midwest	15.1 (0.5)	15.7 (0.5)	13.5 (0.5)	12.9 (0.5)	13.1 (0.4)	11.5 (0.4)	11.5 (0.4)	11.1 (0.4)	11.2 (0.4)
South	14.9 (0.4)	14.2 (0.4)	13.8 (0.4)	12.6 (0.4)	12.9 (0.3)	11.4 (0.3)	10.9 (0.3)	10.3 (0.3)	10.2 (0.3)
West	16.2 (0.5)	15.9 (0.5)	15.1 (0.4)	13.8 (0.4)	13.0 (0.4)	13.5 (0.4)	11.6 (0.4)	11.1 (0.4)	11.1 (0.4)

¹Except for age-specific estimates, rates are age adjusted to the 2000 U.S. standard population.

²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.

³Persons of Hispanic and non-Hispanic origin may be of any race.

SOURCE: CDC/NCHS, National Vital Statistics System.

Table 20. Rate of deaths with asthma as the underlying cause per 10,000 persons with current asthma, by year and selected characteristics: United States, 2001–2009

Characteristic	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rate (standard error) ¹								
Total	2.1 (0.06)	2.1 (0.06)	2.1 (0.06)	1.9 (0.05)	1.7 (0.05)	1.6 (0.05)	1.5 (0.05)	1.5 (0.05)	1.4 (0.04)
Sex									
Male	1.7 (0.07)	1.9 (0.08)	1.8 (0.08)	1.6 (0.07)	1.4 (0.06)	1.3 (0.07)	1.3 (0.07)	1.1 (0.06)	1.2 (0.06)
Female	2.4 (0.08)	2.3 (0.08)	2.2 (0.08)	2.1 (0.07)	2.0 (0.07)	1.8 (0.07)	1.6 (0.07)	1.7 (0.07)	1.5 (0.06)
Race ²									
White.	1.9 (0.06)	2.0 (0.07)	1.9 (0.06)	1.6 (0.05)	1.6 (0.05)	1.5 (0.06)	1.4 (0.06)	1.4 (0.05)	1.2 (0.05)
Black.	3.8 (0.25)	3.4 (0.21)	3.2 (0.20)	3.1 (0.20)	2.9 (0.18)	2.7 (0.18)	2.3 (0.16)	2.3 (0.16)	2.2 (0.15)
Other races.	1.0 (0.11)	1.0 (0.11)	1.7 (0.22)	1.3 (0.16)	1.2 (0.15)	0.7 (0.12)	0.8 (0.13)	0.7 (0.11)	0.9 (0.12)
Ethnicity ³									
Hispanic or Latino	1.4 (0.11)	1.7 (0.15)	1.4 (0.11)	1.3 (0.11)	0.9 (0.08)	0.9 (0.09)	0.8 (0.07)	1.0 (0.09)	1.0 (0.09)
Not Hispanic or Latino	2.2 (0.06)	2.2 (0.06)	2.1 (0.07)	1.9 (0.06)	1.8 (0.05)	1.7 (0.06)	1.6 (0.06)	1.5 (0.06)	1.4 (0.05)
Age									
Children (0–17)	0.3 (0.02)	0.4 (0.03)	0.3 (0.03)	0.3 (0.02)	0.3 (0.02)	0.2 (0.02)	0.3 (0.02)	0.3 (0.02)	0.3 (0.02)
Adults (18 or over)	2.9 (0.09)	2.9 (0.09)	2.9 (0.09)	2.5 (0.08)	2.4 (0.07)	2.1 (0.08)	2.0 (0.08)	2.0 (0.07)	1.8 (0.06)
Age group									
0–4 years	0.4 (0.06)	0.4 (0.07)	0.4 (0.06)	0.3 (0.06)	0.3 (0.05)	0.3 (0.06)	0.3 (0.06)	0.3 (0.06)	0.3 (0.06)
5–14 years	0.2 (0.03)	0.3 (0.03)	0.3 (0.03)	0.3 (0.03)	0.2 (0.03)	0.2 (0.03)	0.3 (0.03)	0.3 (0.03)	0.3 (0.03)
15–34 years	0.6 (0.04)	0.7 (0.05)	0.7 (0.05)	0.6 (0.04)	0.6 (0.04)	0.5 (0.04)	0.5 (0.04)	0.5 (0.04)	0.6 (0.04)
35–64 years	2.3 (0.10)	2.2 (0.09)	2.2 (0.10)	1.9 (0.08)	1.8 (0.08)	1.7 (0.08)	1.6 (0.08)	1.5 (0.08)	1.4 (0.07)
65 years or over	11.0 (0.71)	10.7 (0.70)	9.9 (0.66)	7.7 (0.48)	7.2 (0.42)	6.9 (0.53)	6.1 (0.42)	6.2 (0.44)	5.3 (0.39)
Region									
Northeast	1.9 (0.12)	1.8 (0.11)	1.9 (0.12)	1.9 (0.12)	1.6 (0.10)	1.3 (0.11)	1.4 (0.11)	1.5 (0.12)	1.2 (0.09)
Midwest	2.0 (0.11)	2.1 (0.13)	1.7 (0.11)	1.7 (0.09)	1.6 (0.09)	1.4 (0.11)	1.4 (0.11)	1.3 (0.09)	1.2 (0.08)
South	2.1 (0.10)	2.1 (0.11)	2.2 (0.11)	1.9 (0.09)	1.9 (0.09)	1.6 (0.08)	1.6 (0.08)	1.6 (0.09)	1.5 (0.08)
West	2.5 (0.15)	2.4 (0.14)	2.5 (0.15)	1.9 (0.11)	1.9 (0.11)	2.0 (0.14)	1.6 (0.12)	1.4 (0.11)	1.5 (0.10)

¹Crude rates are shown.²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.³Persons of Hispanic and non-Hispanic origin may be of any race.

SOURCE: CDC/NCHS, National Vital Statistics System.

Table 21. Rate of deaths with asthma as the underlying cause per 10,000 persons with current asthma, by detailed age group and selected characteristics: United States, average annual 2007–2009

Characteristic	Total	0–17 years	18 years or over	0–14 years	5–14 years	15–34 years	15–19 years	20–24 years	25–34 years	35–64 years	65 years or over
	Rate (standard error) ¹										
Total	1.4 (0.03)	0.3 (0.01)	1.9 (0.05)	0.3 (0.03)	0.3 (0.02)	0.5 (0.02)	0.3 (0.03)	0.5 (0.04)	0.7 (0.05)	1.5 (0.05)	5.8 (0.24)
Sex											
Male	1.2 (0.04)	0.3 (0.02)	1.9 (0.07)	0.3 (0.04)	0.3 (0.02)	0.7 (0.05)	0.4 (0.04)	0.7 (0.09)	1.1 (0.11)	1.7 (0.09)	4.4 (0.32)
Female	1.6 (0.04)	0.3 (0.02)	2.0 (0.05)	0.4 (0.07)	0.2 (0.03)	0.4 (0.02)	0.3 (0.04)	0.3 (0.04)	0.5 (0.04)	1.4 (0.05)	6.6 (0.33)
Race ²											
White	1.3 (0.03)	0.2 (0.01)	1.7 (0.04)	0.2 (0.04)	0.1 (0.01)	0.3 (0.02)	0.2 (0.03)	0.3 (0.03)	0.5 (0.04)	1.1 (0.04)	5.5 (0.25)
Male	1.0 (0.04)	0.2 (0.02)	1.5 (0.06)	0.2 (0.04)	0.1 (0.02)	0.4 (0.04)	0.2 (0.04)	0.4 (0.06)	0.7 (0.08)	1.2 (0.07)	4.0 (0.32)
Female	1.5 (0.04)	0.2 (0.02)	1.8 (0.05)	0.3 (0.07)	0.1 (0.02)	0.3 (0.02)	0.2 (0.03)	0.2 (0.03)	0.4 (0.04)	1.1 (0.05)	6.4 (0.35)
Black	2.3 (0.10)	0.6 (0.05)	3.6 (0.18)	0.6 (0.09)	0.6 (0.06)	1.5 (0.12)	0.8 (0.11)	1.5 (0.23)	2.4 (0.28)	3.8 (0.27)	8.0 (0.81)
Male	2.3 (0.14)	0.7 (0.06)	4.7 (0.41)	0.5 (0.10)	0.7 (0.09)	2.3 (0.27)	0.8 (0.16)	2.8 (0.72)	4.6 (1.08)	5.0 (0.60)	8.8 (1.73)
Female	2.3 (0.11)	0.6 (0.07)	3.1 (0.18)	0.7 (0.17)	0.5 (0.07)	1.0 (0.11)	0.7 (0.15)	0.8 (0.16)	1.4 (0.20)	3.3 (0.25)	7.7 (0.91)
Other races	0.9 (0.08)	0.1 (0.03)	1.4 (0.13)	*	*	0.3 (0.05)	*	*	0.4 (0.09)	0.9 (0.12)	7.6 (1.39)
Male	0.8 (0.10)	*	1.6 (0.21)	*	*	0.3 (0.09)	*	*	*	1.4 (0.29)	5.9 (1.56)
Female	1.0 (0.11)	*	1.4 (0.15)	*	*	*	*	*	*	0.7 (0.11)	8.8 (2.11)
Ethnicity ³											
Hispanic or Latino	0.9 (0.05)	0.2 (0.03)	1.5 (0.09)	*	0.2 (0.03)	0.6 (0.07)	0.4 (0.08)	0.5 (0.13)	0.7 (0.11)	1.2 (0.10)	5.2 (0.69)
Male	0.9 (0.07)	0.2 (0.03)	1.7 (0.18)	*	0.2 (0.04)	0.8 (0.13)	*	*	1.1 (0.28)	1.7 (0.26)	4.0 (0.97)
Female	1.0 (0.06)	0.2 (0.04)	1.3 (0.10)	*	*	0.4 (0.07)	*	*	0.5 (0.10)	0.9 (0.10)	6.0 (0.91)
Not Hispanic or Latino	1.5 (0.03)	0.3 (0.02)	2.0 (0.05)	0.4 (0.04)	0.3 (0.02)	0.5 (0.03)	0.3 (0.03)	0.4 (0.04)	0.7 (0.05)	1.5 (0.05)	5.9 (0.26)
Male	1.3 (0.04)	0.3 (0.02)	1.9 (0.07)	0.3 (0.05)	0.3 (0.03)	0.7 (0.05)	0.4 (0.05)	0.6 (0.09)	1.1 (0.12)	1.7 (0.09)	4.4 (0.34)
Female	1.7 (0.04)	0.3 (0.01)	2.0 (0.05)	0.5 (0.05)	0.3 (0.02)	0.4 (0.02)	0.3 (0.02)	0.3 (0.02)	0.2 (0.01)	1.4 (0.04)	6.6 (0.33)
Region											
Northeast	1.4 (0.06)	0.2 (0.03)	1.9 (0.10)	*	0.3 (0.04)	0.5 (0.05)	0.2 (0.05)	0.5 (0.12)	0.8 (0.11)	1.5 (0.10)	5.4 (0.46)
Midwest	1.3 (0.06)	0.3 (0.03)	1.7 (0.08)	0.3 (0.07)	0.3 (0.04)	0.5 (0.05)	0.3 (0.05)	0.4 (0.07)	0.7 (0.10)	1.3 (0.08)	5.9 (0.51)
South	1.6 (0.06)	0.3 (0.02)	2.2 (0.08)	0.4 (0.06)	0.3 (0.03)	0.6 (0.04)	0.3 (0.05)	0.5 (0.08)	0.8 (0.08)	1.8 (0.09)	5.9 (0.43)
West	1.5 (0.07)	0.3 (0.03)	1.9 (0.10)	*	0.3 (0.04)	0.5 (0.05)	0.4 (0.08)	0.3 (0.06)	0.6 (0.08)	1.3 (0.08)	6.0 (0.53)

* Figure does not meet standards of reliability or precision. Estimates are not shown if there were fewer than 20 deaths.

¹Crude estimates are shown.²Race categories "White" and "Black" include only those with a single race. The category "Other races" includes Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, those with more than one race, and those with a race other than the groups mentioned.³Persons of Hispanic and non-Hispanic origin may be of any race.

SOURCE: CDC/NCHS, National Vital Statistics System.

Appendix I. Data Sources and Limitations

This report presents data on asthma from ongoing data collection systems of the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). For an overview of NCHS data systems, see "Surveys and Data Collection Systems," available from <http://www.cdc.gov/nchs/surveys.htm>.

National Health Interview Survey

Asthma prevalence data (1980–1996, 2001–2009) and asthma attack prevalence data (1997–2009) were obtained from the National Health Interview Survey (NHIS).

Sample design

NHIS is a cross-sectional household interview survey of the U.S. civilian noninstitutionalized population. Data are collected continuously throughout the year in all 50 states and the District of Columbia. NHIS uses a multistage, clustered sample design to produce national estimates for a variety of health indicators. Information on basic health topics is collected for all household members. Interviews are conducted in the home by field staff from the U.S. Census Bureau using a computer-assisted personal interview, with telephone interviewing permitted for follow-up, if necessary. During 2001–2005, households with black and Hispanic persons were oversampled; starting in 2006, the NHIS sample design also oversampled Asian persons. From 2001 to 2009, the final response rate for each survey component, which takes household nonresponse into account, ranged from 81.6%–88.1% for the family questionnaire, 72.3%–81.3% for the sample child, and 62.6%–74.3% for the sample adult. More information can be found at <http://www.cdc.gov/nchs/nhis.htm>.

Item nonresponse

From 2001 through 2009, item nonresponse for each of the

demographic indicators shown in this report was generally less than 1%, with the exception of poverty status, which is based on detailed family income ascertained from the family component of the questionnaire. Because the weighted percentages of persons with unknown family income were relatively high (24%–34% from 1997 through 2009), family income data were imputed using multiple imputation, with five sets of values created to allow the assessment of variability due to imputation. The ratio of family income to the applicable federal poverty thresholds were derived for families with missing incomes based on imputed income values (21). The denominators for asthma prevalence exclude persons with unknown information about asthma status (less than 0.8% for all years 1997–2009).

National Ambulatory Medical Care Survey

Physician office visit data (2001–2009) were obtained from the National Ambulatory Medical Care Survey (NAMCS).

Sample design

NAMCS is an annual probability survey of nonfederal, office-based physicians who provide direct patient care in the 50 states and the District of Columbia, excluding radiologists, anesthesiologists, and pathologists. NAMCS collects data from a national sample of over 2,000 physicians each year who provide information on nearly 30,000 visits. Because persons with multiple visits during the year may be sampled more than once, NAMCS estimates are for visits, not persons. NAMCS uses a multistage sample design procedure and sampling weights applied to each record to provide nationally representative estimates. Visits to private, nonhospital-based clinics, and health maintenance organizations (HMOs) were within the scope of the survey, but those that

occurred in federally operated facilities and hospital-based outpatient departments were excluded. A sample of office-based physicians who reported that they were in direct patient care was taken from the master files of the American Medical Association and the American Osteopathic Association. Between 2001 and 2009, the overall unweighted physician response rate ranged from 58.9% to 70.4%. More information can be found at <http://www.cdc.gov/nchs/ahcd.htm>.

Item nonresponse

Item nonresponse rates in NAMCS were generally low (5% or less) with some exceptions. Sex was imputed for 0.8%–4.5% of records with missing values, and birth year was imputed for 1.9%–4.1% of records in survey years 2001–2008. During this period, race was imputed for 16.9%–32.9% of records. For 2003–2009, ethnicity was imputed for 19.4%–35.0% of records, but was not imputed in 2001–2002 when between 20.5% and 25.8% of records were missing ethnicity. In contrast to the imputation method used for race and ethnicity in 2005 and previous years (random assignment of a value from a patient record form with similar characteristics based on physician specialty, geographic region, and three-digit ICD–9–CM code for primary diagnosis), a hierarchical procedure was used beginning in 2006. Records missing race (or ethnicity) were initially assigned the race from a donor record after matching donor and recipient by three-digit ICD–9–CM codes for primary diagnosis and the ZIP code of the patient making the sampled visit. If no donor was found after several matching rounds of increasing geographic size (county, state, geographic region), standard imputation procedures used in 2005 and previous years were applied. If both race and ethnicity were missing, both were imputed from the same donor. Standard errors may be underestimated because single imputation was used.

National Hospital Ambulatory Medical Care Survey

Hospital outpatient visit data (2001–2009) and hospital emergency department (ED) visit data (2001–2009) were obtained from the National Hospital Ambulatory Medical Care Survey (NHAMCS).

Sample design

NHAMCS is a national probability sample survey of in-person visits made in the United States to EDs and outpatient departments (OPDs) of nonfederal, short-stay hospitals (hospitals with an average stay of fewer than 30 days) and those whose specialty is general (medical or surgical) or children's general. EDs that operate 24 hours a day are considered within the scope of the ED component; EDs that operate fewer than 24 hours are included in the OPD component of NHAMCS. The hospital sampling frame for 2006 consisted of hospitals listed in the 1991 Verispan Hospital Database (formerly known as the SMG Hospital Database), and updated using hospital data from Verispan, L.L.C. About 500 hospitals are included in the sample from which about 1,200 outpatient clinics and 400 ED departments are selected. Because persons with multiple visits during the year may be sampled more than once, estimates are for visits, not persons. NHAMCS uses a multistage probability sample and sampling weights applied to each record to produce nationally representative estimates. Between 2001 and 2009, the overall unweighted hospital response rate ranged from 88.9% to 93.9%. More information can be found at <http://www.cdc.gov/nchs/ahcd.htm>.

Item nonresponse

Item nonresponse rates in NHAMCS were generally low (5% or less) with some exceptions. For survey years 2001–2009, sex was missing and imputed for 0.3%–3.1% of OPD records and birth year was imputed for 0.7%–2.1% of OPD records; sex was

missing and imputed for 0.4%–1.6% of ED records and birth year was imputed for 0.8%–2.7% of ED records. During this period, race was imputed for 9.4%–15.4% of OPD records and imputed for 10.4%–15.3% of ED records. Ethnicity was imputed for 11.8%–21.5% of OPD records and imputed for 15.1%–23.8% of ED records from 2003–2008. For 2001–2002, ethnicity was not imputed and was missing for 13.3%–18.6% of OPD records and for 17.0%–17.8% of ED records. In contrast to imputation methods used for race and ethnicity in 2005 and previous years (random assignment of a value from a patient record form with similar characteristics based on physician specialty, geographic region, and three-digit ICD–9–CM code for primary diagnosis), in 2006, cases missing race or ethnicity were initially assigned a donor's value after matching the donor and recipient by three-digit ICD–9–CM codes for primary diagnosis and the ZIP code of the patient making the sampled visit. If no donor was found after several matching rounds, imputation procedures based on geographic region, OPD volume by clinic type, and three-digit ICD–9–CM codes for primary diagnosis were applied. If both race and ethnicity were missing, both were imputed from the same donor. Beginning in 2007, a new method was used to impute race and ethnicity. Race and ethnicity assignments were based, where possible, on diagnosis and patient's locality (ZIP code, state, or county of residence). A hot deck approach (i.e., filling in missing values on incomplete records using values from similar but complete records of the same dataset) was employed rather than the previously used cold deck strategy (i.e., filling in missing values on incomplete records using values from similar but complete records of the dataset from the previous year), except in cases where a matching record could not be obtained from the current data. When race or ethnicity data could not be assigned using patient locality, the new method attempted to impute within the same facility wherever possible. Failing that, imputation was based on diagnosis, hospital, type of emergency service area,

immediacy, and, as a last resort, on a randomly selected record.

National Hospital Discharge Survey

Hospitalization data (1980–2009) were obtained from the National Hospital Discharge Survey (NHDS).

Sample design

NHDS collects data from a sample of inpatient records acquired from a national sample of hospitals. Because persons with multiple discharges during the year may be sampled more than once, estimates are for discharges, not persons. Only hospitals with an average length of stay of fewer than 30 days for all patients, general hospitals, and children's general hospitals are included in the survey. Federal, military, and Department of Veterans Affairs hospitals, as well as hospital units of institutions, such as prison hospitals, and hospitals with fewer than six beds staffed for patient use, are excluded. NHDS collects data from a sample of approximately 270,000 inpatient records acquired from a national sample of about 500 hospitals. Between 2001 and 2009, the overall unweighted hospital response rate ranged from 86.0% to 93.9%. More information is available at <http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm>.

Item nonresponse

Less than 1% of records were missing the sex, age, or date of birth of the patient. If the hospital record did not state either the age or sex of patient, it was imputed by assigning an age or sex value that still maintained the known distribution of these variables according to the categories of the first-listed diagnosis. In a very few cases (less than 1% of the records), the age or sex was edited because it was inconsistent with the diagnosis. For the period 2001–2009, data for race were missing for 19% to 31% of all discharges, and no attempt was made to impute for these missing values. Among asthma discharges, the percentage of records missing data for race was lower than for

all discharges, 19% to 21% for the period 2001–2009. A study on NHDS race data determined that hospitals that did not report race were likely to have a higher proportion of white discharges than hospitals that did report race, resulting in underestimation of hospital discharges for white patients (22). Consequently, the differences between racial groups are likely to be smaller than the estimates in this report indicate. For example, using crude 2009 population-based rates, when records for unknown race are excluded, black persons had a hospitalization rate 2.8 times higher compared with white persons. If all records with unknown race are assumed to be for patients of white race, the ratio of black-to-white asthma hospitalization rates decreased to 2.0. Whereas 2.8 is likely to be an overestimation of the black-white disparity, 2.0 is likely to be an underestimation given that not all records with unknown race represent white patients. Nonresponse for ethnicity is generally higher than nonresponse for race, and was not imputed, and is not reported in this analysis.

Mortality Component of the National Vital Statistics System

Death data (1980–2009) were obtained from the National Vital Statistics System (NVSS) mortality files.

Data are based on information about underlying cause of death from all death certificates filed in the 50 states and the District of Columbia, and are processed by NCHS. Mortality statistics are based on information coded by the states and provided to NCHS through the Vital Statistics Cooperative Program and from copies of original certificates received by NCHS from state registration offices. More information is available at <http://www.cdc.gov/nchs/deaths.htm>.

Item nonresponse

Age was not imputed for death certificates with age not recorded or unknown (between 0.01% and 0.02% of the total deaths in 2001–2009). Records with unknown age were not included in estimates by age group, but were included in overall estimates. All records coded as “other races” (between 0.03% and 0.40% of the total deaths in 2001–2009) or as unknown, not stated, or not classifiable (between 0.07% and 0.22% of the total deaths in 2001–2009) were assigned the racial designation of the previous record. All records with Hispanic origin not stated (between 0.15% and 0.33% of the total deaths in 2001–2009) were not included in estimates by Hispanic origin, but were included in the estimates by race and for overall estimates.

Appendix II. Technical Notes

In this report, data are presented for both individual years and for the most recent 3 years combined (2007–2009 or 2008–2010) for each data source. Three years of data were aggregated to provide average annual estimates for detailed demographic subgroups. Combining 3 years of data provided more stable estimates by increasing the sample size, and consequently, reducing the standard errors. Consequently, more information about detailed demographic subgroups is provided than could have been presented if using only 1 year of data.

Counts of persons, visits, deaths, and rates are provided in this report. The counts give insight into the magnitude of the disease burden on the health care system and society. The rates control for population size differences among the demographic groups and give additional insight into varying levels of the disease, asthma severity, management, and control. Rates were calculated using two methods: population-based estimates using the estimated number of persons in the U.S. population as denominators, and risk-based estimates using the estimated number of persons with current asthma from the National Health Interview Survey (NHIS) as denominators.

Population-based Rates

The type of U.S. census population estimate for each health care use and mortality data source reflects the U.S. population potentially “exposed” to each of these outcomes. Ambulatory health care visit rates (Tables 7, 9, and 13) are based on the civilian noninstitutionalized population; hospitalization rates (Table 16) are based on the civilian population; and mortality rates (Table 19) are based on the resident population. All population-based rates are age adjusted using the 2000 U.S. population distribution in 11 age categories (see “Age Adjustment” below) when the sample size allowed (23). Population-based rates are used to measure the risk of disease in the U.S. population overall and in demographic groups.

Risk-based Rates

The average annual risk-based rate tables (Tables 6, 11, 12, 15, 18, and 21) are expressed relative to the estimate of the number of people with current asthma from NHIS for the appropriate 3-year period. The risk-based trend tables (Tables 5, 8, 10, 14, 17, and 20) are expressed relative to the estimate of the number of people with current asthma for the appropriate survey year from NHIS. Risk-based rates account for prevalence differences over time and between subgroups. They provide additional insight into understanding the time trends for outcomes during a period of increasing prevalence by restricting the denominator of the rate to the population at risk for the outcome. Risk-based rates can be used to directly compare the risk of an outcome (e.g., hospitalizations or deaths) among subgroups due to factors other than a difference in current asthma prevalence. The population reference group for the prevalence estimates (civilian noninstitutionalized population) is different than the reference groups for hospital data (civilian population) and for mortality data (residential population). Therefore, the rates per 100 persons with asthma for these two outcomes may be slight overestimates. Standard errors for the asthma-specific rates, which use the number with asthma in the denominator, rather than a population constant, were calculated using formulae for ratios assuming that covariance equals zero (24).

Age Adjustment

Except for estimates for specific age groups, data shown in Figures 1, 3, 7, 8, 14, 18, 22, 26, 27, 29, and 30, and in Tables 1, 3, 5, 7, 9, 13, 16, and 19 were age adjusted using the 2000 U.S. population provided by the U.S. Census Bureau as the standard population (23). Age adjustment was used to allow comparison among various population subgroups that have different age structures. The following age groups were used for age adjustment: under age

1, 1–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85 years and over. Risk-based rates are not age adjusted. Because these rates are based on the population with asthma, prevalence differences between subgroups are already taken into account. In addition, age adjusting is used to eliminate changes in the age distribution. There have been no changes in the age distribution for those with current asthma over the past 10 years.

Estimation of Counts

The estimated national counts of persons with asthma (NHIS), number of office visits for asthma to private physicians’ offices (National Ambulatory Medical Care Survey), hospital outpatient departments and emergency rooms (National Hospital Ambulatory Medical Care Survey), and asthma hospitalizations (National Hospital Discharge Survey) are calculated by weighting the number of respondents or visits by the survey weights. Asthma deaths are not based on estimates but actual counts obtained from all death certificates filed in the 50 states and the District of Columbia.

Standard Error

With the exception of asthma hospitalization rates for 1980–1987 and all asthma death rates, standard errors were calculated using SUDAAN to account for each survey’s complex sample design (9).

For asthma hospitalization rates for 1980–1987, the Division of Health Care Statistics makes available tables for generalized variances curves. The curves are approximations of the relative standard errors (RSEs) that are applicable to estimates of discharges by selected patient or hospital characteristics. Because exact standard errors are not provided for every size estimate, linear arithmetic interpolation was used to obtain RSE and standard

errors for estimate sizes not included in the hospitalization RSE tables (11).

For asthma deaths compiled from a complete count of death certificate data rather than from a sample, the random variation associated with mortality statistics is assumed to follow a Poisson probability distribution (10). Therefore, the standard error is associated with the number of deaths (D):

$$SE(D) = \sqrt{\text{var}(D)} = \sqrt{D}$$

where $\text{var}(D)$ is the variance of D . The standard error associated with crude and age-specific death rates (R) assumes that the population denominator (P) is a constant and is:

$$SE(R) = \sqrt{\text{var}(D/P)} = R/\sqrt{D}$$

For risk-based asthma death rates, the standard error of the denominator (the NHIS estimate of the number of persons with current asthma) was accounted for by using the formula for ratios and assumed independent observations (covariance equals zero) (24).

Relative Standard Error

The RSE of an estimate is calculated as:

$$\text{RSE (percent)} = (S_{Est}/Est) \cdot 100$$

where S_{Est} is the standard error of the estimate and Est is the estimate. Estimates with an RSE less than or equal to 30% are considered reliable. RSEs between 30% and 50% were used to indicate unreliable estimates in the accompanying tables. Estimates with an RSE more than 50% were not reported.

Tests of Significance

Standard errors were used in significance tests. Statistical tests performed to assess the significance of differences in estimates were two-tailed with no adjustments for multiple comparisons. The test statistic used to determine statistical significance of differences between two percentages was:

$$Z = \frac{|X_a - X_b|}{\sqrt{S_a^2 + S_b^2}}$$

where X_a and X_b are the two percentages being compared, and S_a and S_b are the standard errors of those percentages. The critical value used for two-sided tests at the 0.05 level of significance was 1.96. Terms such as “higher than” and “less than” indicate statistically significant differences. Terms such as “similar” and “no difference” indicate that the statistics being compared were not significantly different. Lack of comment regarding the difference between any two statistics does not necessarily suggest that the difference was tested and found to be not significant.

Test of significance of trends was conducted using Joinpoint software to test if an apparent change over time is statistically significant, taking into account the standard error for each data point (12). The weighted least squares regression models produce an annual percentage rate change when the log of the outcome is analyzed.

Stated Comparisons

All stated comparisons used a nondirectional, two-tailed test and were significant at the $\alpha \leq 0.05$ level. Only selected comparisons among the shown demographic groups were tested.

Analysis of Trends

Significance testing for trends over time was performed with Joinpoint software from the National Cancer Institute (NCI) (12). The software fits the simplest model to trend data while allowing “joinpoints,” or points marking a change in trend over the period being analyzed. The program starts with the minimum number of joinpoints (i.e., zero, which is a straight line) and tests whether more joinpoints are statistically significant and should be added to the model up to a maximum, which was specified as two for all models included in this report. Significance tests use a Monte Carlo Permutation method. More information is available on the NCI Joinpoint website at <http://surveillance.cancer.gov/joinpoint/>.

Joinpoint calculates the average annual percent change for each trend segment using the underlying Joinpoint regression model. Annual percent change assumes a change at a constant rate, and is calculated as the natural log of the percent of the rate of the previous year. More information can be found at <http://surveillance.cancer.gov/joinpoint/aapc.html>.

For some trends, the Joinpoint software identified optimal models with more than one joinpoint. A simpler model with fewer joinpoints was chosen for presentation if the difference between the two models conveyed the same overall message (i.e., the trend segment with a statistically significant annual percent change began and ended with the same years, and the annual percent change was within 5% of that identified by the more complex model).

Appendix III. Definition of Terms

Definition of General Terms

Age—Age in years is recorded for each person. Estimates are shown for age groups under age 18, 18 or over, 0–4, 5–14, 15–34 (with subcategories 15–19, 20–24, 25–34 where sample size was sufficient), 35–64, and 65 or over.

Race—The race and ethnicity categories in this report follow the 1997 U.S. Office of Management and Budget’s *Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity* to the extent possible, given the multiple demographic subcategories, respective sample sizes, and consistency across the multiple data sources used in this report. The 1997 standards specify five racial groups as the minimum for data collection on race in federal statistics: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White (25). The standards also offer respondents the opportunity to select more than one of the five groups. Hispanic or Latino origin includes persons of Mexican, Puerto Rican, Cuban, Central and South American, and other or unknown Latin American or Spanish origin. Persons of Hispanic origin may be of any race. Race categories “white” and “black” are comprised of persons who indicated only a single race group. “Other races” includes Asian, American Indian and Alaskan Native, Native Hawaiian and Other Pacific Islander, persons reporting more than one race, and persons reporting their race as something other than those listed here or above. The National Vital Statistics System (NVSS) Mortality Component conformed to the 1997 standard in 21 states in 2005, and increased to 27 states and the District of Columbia in 2007. To provide uniformity and comparability of NVSS mortality data during the transition period, before all or most of the data become available in the new multiple-race format, the responses of those for whom more than one race was reported

(multiple race) were bridged to a single race (10).

Ethnicity: Hispanic or Latino—Hispanic or Latino ethnicity includes persons of Mexican, Puerto Rican, Cuban, Central and South American, or Spanish origins. Persons of Hispanic or Latino origin may be of any race. In this report, the ethnicity category includes only “Hispanic or Latino” and “Not Hispanic or Latino” because subgroups of Hispanic ethnicity are not available from most data sources. The National Health Interview Survey (NHIS) ethnicity reporting, however, includes Mexican and Puerto Rican subgroups for which estimates are included in this report. The 1997 revision of Statistical Policy Directive No. 15, *Race and Ethnic Standards for Federal Statistics and Administrative Reporting*, changed the ethnicity category name from “Hispanic” to “Hispanic or Latino,” but the definition of persons in that category remained the same (25). Ethnicity information is not available in hospitalization data and detailed Hispanic subgroup information is not available in ambulatory health care use or death data.

Geographic region—In the geographic classification of the U.S. population, states are grouped into the four regions used by the U.S. Census Bureau: The northeast region includes the states of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. The Midwest region includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. The southern region includes Alabama, Arkansas, Delaware, the District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. The western region includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Poverty status—The average annual NHIS tables for 2008–2010 include asthma prevalence estimates by poverty status, which is not available from National Center for Health Statistics data sources on health care use or mortality. Poverty status is based on family income and family size, and is calculated using the U.S. Census Bureau’s poverty thresholds for the previous calendar year. Because of the different income questions used in the 2007 NHIS and beyond, poverty ratio estimates may not be comparable with those from earlier years. For more information, see “Income and Assets Section” on page 37 of the “2009 National Health Interview Survey (NHIS) Public Use Data Release: NHIS Survey Description,” available at (ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2009/srvydesc.pdf).

Definition of Asthma Terms

Prevalence and attacks—There are four different prevalence measures that can be estimated from NHIS, as shown in the table below. Before 1997, data from NHIS was used to estimate asthma 12-month period prevalence. As the result of the 1997 survey redesign, 12-month asthma period prevalence has not been measured since 1996. Beginning in 1997, two new asthma prevalence measures were introduced, lifetime asthma prevalence and asthma attack prevalence. In 2001, an additional measure, current asthma prevalence, was introduced to more completely capture asthma prevalence. None of the three asthma prevalence measures collected in 1997 and afterward are directly comparable with the pre-1997 12-month period prevalence measure.

Physician office visits—Physician office visits for asthma collected from the National Ambulatory Medical Care Survey were defined as those with an *International Classification of Diseases, Ninth Revision (ICD–9–CM)* code 493 as the first-listed diagnosis.

Table. Summary of definitions for asthma items

Definitions for National Health Interview Survey (NHIS)		
Estimate	NHIS question	Questionnaire
Asthma period prevalence	During the past 12 months, did anyone in the family have asthma?	Pre-1997 NHIS respiratory conditions questionnaire
Lifetime asthma prevalence	Has a doctor or other professional ever told you that (you/your child) had asthma?	1997 forward NHIS sample child and sample adult core questionnaires
Current asthma prevalence	Has a doctor or other professional ever told you that (you/your child) had asthma? AND (Do you/does your child) still have asthma?	2001 forward NHIS sample child and sample adult core questionnaires
Asthma attack prevalence	Has a doctor or other professional ever told you that (you/your child) had asthma? AND During the past 12 months, (have you/has your child) had an episode of asthma or an asthma attack?	1997 forward NHIS sample child and sample adult core questionnaires

Definitions for National Ambulatory Medical Care Survey (NAMCS)		
Estimate	ICD-9-CM code	Listed position
Asthma office visit	493	First-listed diagnosis

Definitions for National Hospital Ambulatory Medical Care Survey (NHAMCS)		
Estimate	ICD-9-CM code	Listed position
Asthma outpatient visit	493	First-listed diagnosis
Asthma emergency department visit	493	First-listed diagnosis

Definitions for National Discharge Survey		
Estimate	ICD-9-CM code	Listed position
Hospitalization for asthma	493	First-listed diagnosis

Definitions for Mortality Component of the National Vital Statistics System		
Estimate	ICD code	Listed position
Asthma death	ICD-9 code 493	1980-1998: underlying cause of death
Asthma death	ICD-10 codes J45 and J46	1999 onward: underlying cause of death

NOTE: ICD is International Classification of Diseases.

Hospital outpatient visits and emergency department visits—An outpatient or emergency department visit for asthma based on National Hospital Ambulatory Medical Care Survey data was defined as an ICD-9-CM code 493 as a first-listed diagnosis.

Hospital discharges—A hospitalization for asthma was estimated from the National Hospital Discharge Survey and defined as a discharge record with ICD-9-CM code 493 as a first-listed diagnosis.

Mortality—Asthma deaths are reported using data from the Mortality Component of the National Vital

Statistics System. Under ICD-9, which was used from 1979 through 1998, asthma deaths were defined as those with an underlying cause code 493. Under ICD-10, which has been used since 1999, asthma deaths are defined as those with underlying cause codes J45 and J46. Changes in ICD affected the comparability of data coded according to the different revisions. The asthma comparability ratio for the entire population was 0.89, which indicated that 11% of the decline in asthma mortality between 1998 and 1999 was a consequence of the ICD revision (26).

List of Abbreviations

BRFSS: Behavioral Risk Factor Surveillance System

ED: Emergency department

ICD: International Classification of Diseases

NACP: National Asthma Control Program

NAEPP: National Asthma Education and Prevention Program

NAMCS: National Ambulatory Medical Care Survey

NCEH: National Center for
Environmental Health

NCHS: National Center for Health
Statistics

NHAMCS: National Hospital
Ambulatory Medical Care Survey

NHDS: National Hospital Discharge
Survey

NHIS: National Health Interview Survey

NVSS: National Vital Statistics System

OPD: Outpatient department

SLAITS: State and Local Area
Integrated Telephone Survey

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