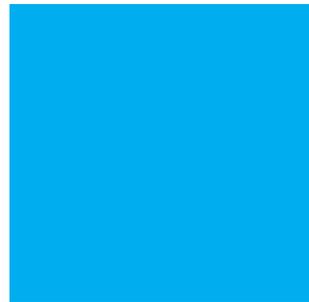


# Asthma Among Children in Massachusetts



RELEASED JANUARY 2017



## Acknowledgements

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# Asthma Among Children in Massachusetts

RELEASED JANUARY 2017



Charlie Baker, Governor  
Karyn Polito, Lieutenant Governor  
Marylou Sudders, MD, Secretary of Health and Human Services  
Monica Bharel, MD, MPH, Commissioner, Department of Public Health

Carlene Pavlow, Director, Bureau of Community Health Access and Promotion  
Erica Marshall, Director, Asthma Prevention and Control Program

Only two-thirds  
of children  
with asthma in  
Massachusetts  
have asthma  
that is well  
controlled.

# TABLE OF CONTENTS

<b>Data Highlights</b>	<b>4</b>
<b>Introduction</b>	<b>5</b>
<b>Asthma Prevalence</b>	<b>7</b>
<b>Characteristics of Children with Asthma</b>	<b>9</b>
<b>Asthma Treatment Guidelines</b>	<b>11</b>
<b>Asthma Hospital Utilizations</b>	<b>14</b>
<b>Asthma Mortality</b>	<b>16</b>
<b>Conclusion</b>	<b>23</b>
Technical Notes	28
References	31

# Data Highlights

- **During the period from 2011 through 2013, an estimated annual average of 208,000 (15.0%) children in Massachusetts had asthma.**
  - Current asthma was significantly higher among those aged 5–11 (12.8%) than those aged 4 and younger (4.7%);
  - Current asthma was also significantly higher among children living in a home with a household income of less than \$25,000 (17.1%) than those whose household incomes were \$75,000 or greater (8.1%).
- **Of children aged 18 and younger with asthma in Massachusetts, only one in three had well-controlled asthma; and fewer than half reported that they had ever been given an asthma action plan by a healthcare provider.**
- **There were an average of 9,640 hospitalizations and 34,695 emergency department (ED) visits for asthma each year in Massachusetts from 2010 through 2012. Nearly 30.5% of hospitalizations and 35.5% of ED visits were among children aged 19 and younger.**
  - The rate of asthma hospitalization among children aged 19 and younger in the Commonwealth reached 16.1 hospitalizations per 10,000 residents in 2012.
  - The three-year average hospitalization rates (CY2010–2012) for Hispanics and Black, non-Hispanics were 2.5 and 3.8 times the rate among Whites, respectively.
  - The rate of asthma ED visits among children aged 19 and younger in the Commonwealth was 76.3 per 10,000 in 2012. There was no statistically significant decrease in ED visits among this population.
  - The asthma rate for ED visits for male children aged 19 and younger was 1.5 times the rate for females in 2012; 19.2 vs 12.9 per 10,000 (see Figure 5, page 17). The definitive cause for this disparity is unknown, despite multiple studies.
  - The three-year average ED visit rates (CY2010–2012) for Hispanics and Black, non-Hispanics were 3.0 and 3.6 times the rate among Whites, respectively.
- **The asthma mortality rate among children aged 19 and younger is low, and has been in consistent decline since 2003. In 2012, the asthma mortality rate for children aged 19 and younger in Massachusetts was 6 per 1,000.**

# Introduction



Asthma is a chronic inflammatory disease of the airways characterized by episodic wheezing, breathlessness, chest tightness, and coughing.<sup>i</sup> Asthma affects people of all ages and is a significant public health problem both in Massachusetts and the United States as a whole. In 2009, the current asthma prevalence rate was 8.2%, affecting 24.6 million people in the United States, including 7.1 million children aged 0–17 years.<sup>ii</sup> National data shows that compared to adults, children are more likely to have one or more routine office visits, ED visit, or urgent care visit related to asthma.<sup>iii</sup>

Approximately, one out of ten children in Massachusetts currently has asthma. Recent surveillance findings from the Asthma Prevention and Control Program at the Massachusetts Department of Public Health reveal that, consistent with national findings, children have the highest rate of asthma ED visits and the second highest rate of asthma hospitalizations of any age group in the Commonwealth. Moreover, gender and racial/ethnic disparities exist across all age groups in MA. Based on these findings, the *Strategic Plan for Asthma in Massachusetts, 2015–2020* identified Black, non-Hispanic children and Hispanic children as priority populations for intervention. The purpose of this data brief and accompanying factsheets is to provide an epidemiologic overview of the asthma burden among children aged 19 and younger in Massachusetts.

**Children have the highest rate of asthma ED visits and the second highest rate of asthma hospitalizations of any age group in Massachusetts.**

Massachusetts estimates are based on data from the Behavioral Risk Factor Surveillance System, the Children Asthma Call-back Survey, the Massachusetts Acute Hospital Case Mix Database ([www.chiamass.gov/case-mix-data](http://www.chiamass.gov/case-mix-data)), and Massachusetts Registry of Vital Records and Statistics Data. Findings are compared to national estimates when possible. More information on data sources is included at the end of this report.

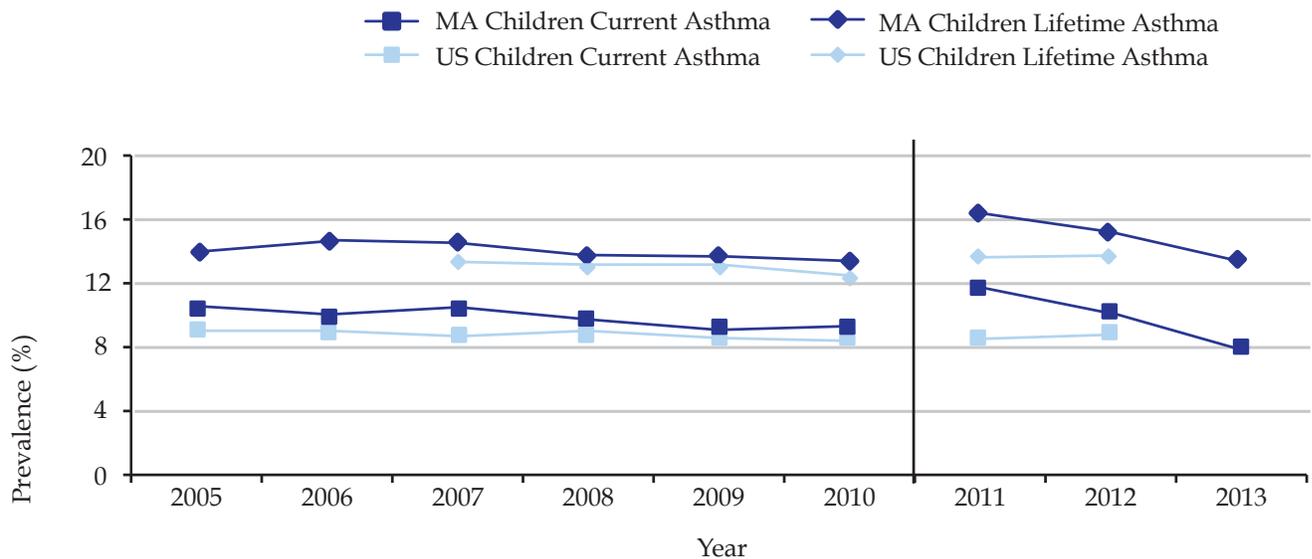
# Asthma Prevalence



In Massachusetts and the United States as a whole, the prevalence of asthma in children 0–18 years is high (Figure 1), though Massachusetts rates are slightly higher. In 2012, 13.7% of U.S. and 15.3% of Massachusetts children reported ever having been diagnosed with asthma, while 8.9% nationally and 10.3% of Massachusetts children reported still having asthma. This means that in 2012 an estimated 7.5 million U.S. and 210,000 Massachusetts children had asthma.

In Massachusetts, from 2005 through 2010, current asthma prevalence significantly decreased by an average of 2.3% per year, and lifetime asthma prevalence decreased by an average of 1.3% annually. Likewise, in the U.S. as a whole, the average annual percent decreases of current and lifetime asthma prevalence were 1.3% and 0.1%, respectively.

**Figure 1. United States and Massachusetts Prevalence Trends of Lifetime and Current Asthma among Children, 2005–2013**



Lifetime Asthma						Current Asthma				
Massachusetts						Massachusetts				
Year	N <sup>a</sup>	% <sup>b</sup>	95% CI <sup>c</sup>	Estimated Prevalence Number <sup>d</sup>	US % <sup>b</sup>	N <sup>a</sup>	% <sup>b</sup>	95% CI <sup>c</sup>	Estimated Prevalence Number <sup>d</sup>	US % <sup>b</sup>
2005	1,843	14.1	12.1–16.2	27,478	12.9	1,837	10.5	8.–12.3	20,274	9.0
2006	1,924	14.6	12.4–16.9	22,437	12.8	1,916	10.0	8.1–11.9	15,248	9.0
2007	1,186	14.6	12.2–17.4	209,137	13.5	1,181	10.5	8.5–12.9	149,038	8.9
2008	1,901	13.8	11.7–16.1	194,931	13.3	1,843	9.8	8.0–12.0	136,267	9.0
2009	1,424	13.7	11.5–16.3	192,204	13.2	1,419	9.2	7.4–11.5	128,894	8.6
2010	1,407	13.5	11.1–16.2	188,205	12.6	1,403	9.5	7.6–11.9	132,887	8.4
2011	1,462	16.4	13.4–19.4	228,674	13.6	1,457	11.8	9.1–14.6	164,776	8.7
2012	1,378	15.3	12.5–18.1	213,733	13.7	1,369	10.3	7.9–12.8	143,503	8.9
2013	816	13.4	9.8–17.0	181,337		811	7.9	5.1–10.7	106,723	

a. N is the number of respondents who answered the corresponding question(s).

b. Percent is weighted to population characteristics.

c. 95% Confidence Interval.

d. Prevalence numbers are population estimates.

Data Source: 2005–2013 MA Behavioral Risk Factor Surveillance System (BRFSS), Massachusetts Department of Public Health U.S. Data: 2005–2012 US Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention. States includes data from 32 states in 2012 and 16 states in 2011, in which cellphone and landline data combined exclude the territory Puerto Rico.

#### Definition:

##### Raking or Iterative Weighting

This was a new technique of weighting applied to BRFSS data starting in 2011. Raking the data allows more demographic variables into the statistical weighting process. These variables include but are not limited to: level of educational attainment; marital status; and home ownership. Including more variables reduces the potential for selection bias due to non-response and increases how well the data represents the population surveyed. Furthermore, raking the survey sample allows the telephone source by which respondents were reached (landline vs. cellular telephone) to be taken into consideration in weighting.<sup>14</sup>

Note: In tables below, pre- and post-raking weight are separated by a dashed line.

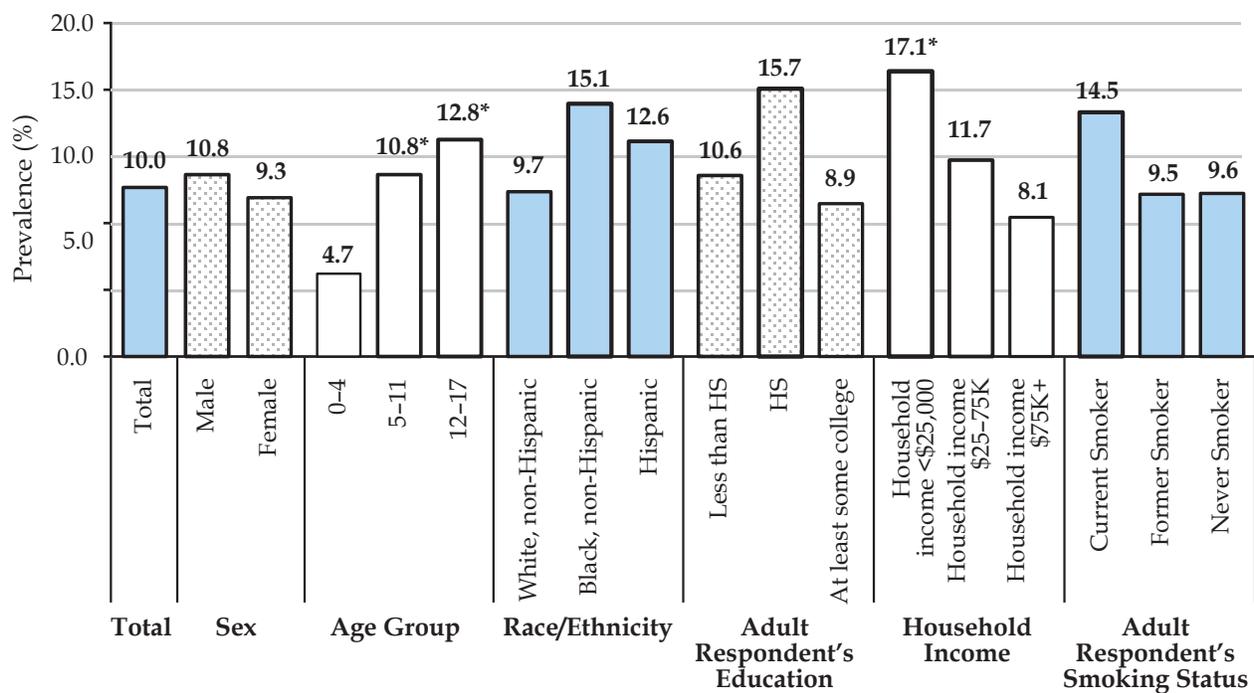
Lifetime Asthma: Ever having asthma; Classification for those answering “Yes” to the question “Have you ever been told by a doctor, nurse or health professional that you had asthma?” on BRFSS.

Current Asthma: Having asthma at the time of data collection; Classification for those answering “Yes” to both “Have you ever been told by a doctor, nurse or health professional that you had asthma?” and “Do you still have asthma?” on BRFSS.

From 2011 through 2013, there was an average of 140,000 (10.0%) children living with current asthma in Massachusetts each year. Differences in current asthma prevalence exist between certain population subgroups. Among Massachusetts children aged 18 and younger, prevalence of asthma was significantly higher among:

- Those aged 5–17, compared to those aged 4 and younger.
- Those who reported household incomes of less than \$25,000 per year compared to those with household incomes of \$75,000 or greater per year.

**Figure 2. Prevalence of Current Asthma among Massachusetts Children by Demographic and Socioeconomic Factors, 2011–2013**

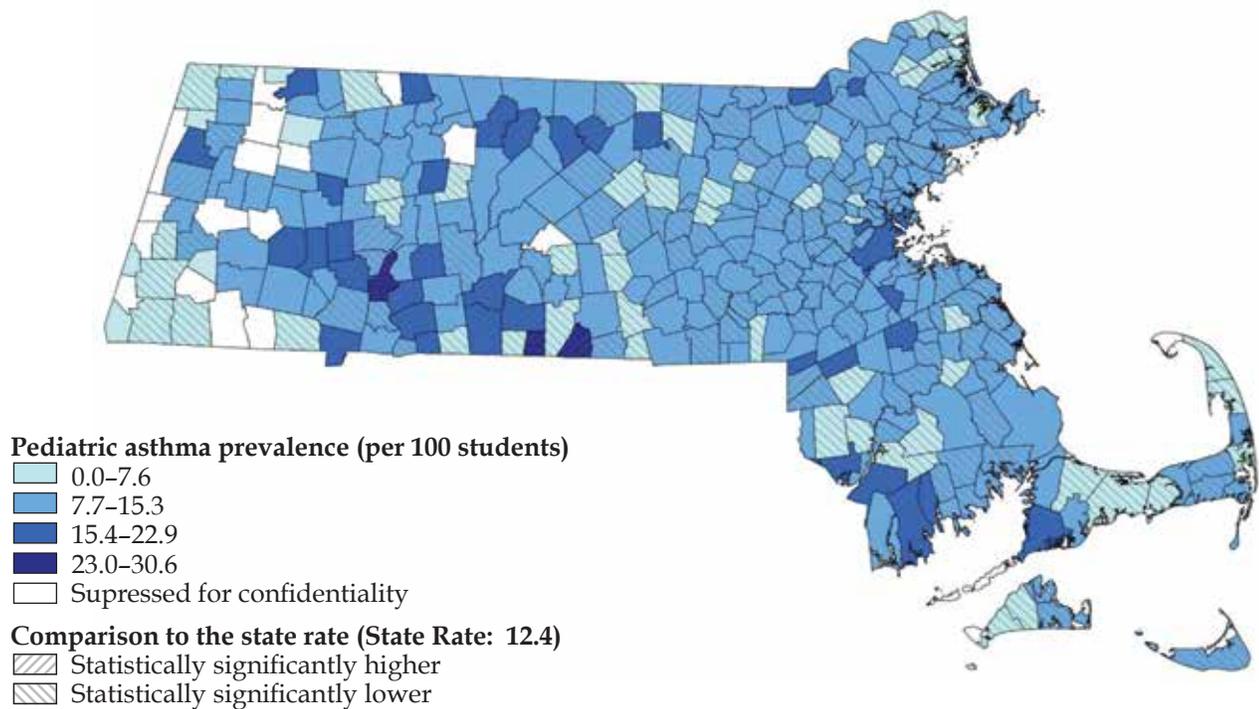


Data Source: 2011–2013 MA Behavioral Risk Factor Surveillance System, Massachusetts Department of Public Health

Note: \* indicates a statistically significant difference.

Additionally, according to the Massachusetts Environmental Public Health Tracking Program, asthma prevalence was 12.4% among Massachusetts children enrolled in kindergarten through 8th grade during the 2013–2014 school year. The asthma prevalence among this population varied by community, ranging from a high of 30.6% in the town of Holland to a low of 0.0% in Alford, Chilmark, Hawley, Mount Washington, and New Ashford; 39 communities had a prevalence of asthma that was significantly higher than the overall Massachusetts prevalence among the same population.

**Map 1. Prevalence of Lifetime Asthma among Elementary and Middle School (Grades kindergarten through 8th) Children by Community of Residence in Massachusetts, 2013–2014 School Year**



Data Source: Environmental Public Health Tracking Program, Bureau of Environmental Health, Massachusetts Department of Public Health. Map created by BEHOGIS, MDPH. Geographic data courtesy of Mass GIS, Commonwealth of Massachusetts, MassIT

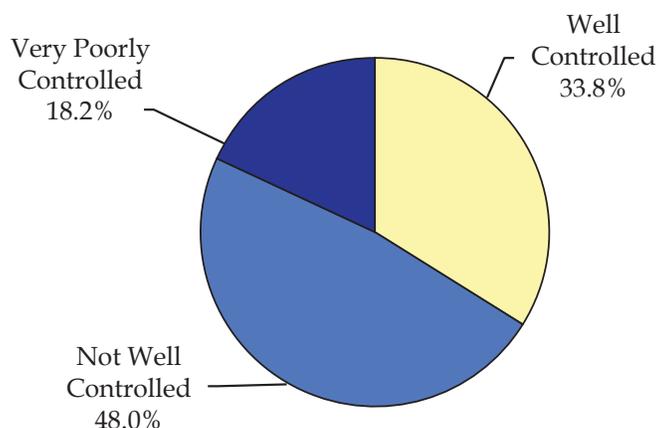
# Characteristics of Children with Asthma



In most cases of asthma, the cause of the disease is unknown. However, while the cause may not be known and no cure exists, asthma can be controlled. Expert guidelines define asthma control as having minimal symptoms and functional impairment.<sup>1</sup> According to recent survey findings; only 33.8% of Massachusetts children with asthma have control of their disease (Figure 3).

**According to recent survey findings, only 33.8% of Massachusetts children with asthma have good control of their disease.**

**Figure 3. Level of Control among Massachusetts Children with Current Asthma, 2006–2010**



Note: Percentages are weighted to population characteristics. The algorithm used to classify asthma control was derived from criteria set forth by the EPR-3 Report<sup>1</sup> and involves responses to survey questions including: daytime symptoms, nighttime awakenings, use of an inhaled short-acting beta agonist, and interference with normal activities. For more information, refer to the *Burden of Asthma in Massachusetts* report.

Data Source: 2006–2010 BRFSS Children Asthma Call-Back Survey

Among Massachusetts children aged 18 and younger with current asthma:

- 66.5% of children with asthma were diagnosed before age 5.
- 45.0% experienced symptoms of asthma at least once within the past 30 days.
- 55.2% limited usual activities because of their asthma in the past year.
- 21.6% had sleep disrupted due to asthma symptoms in the past 14 days.
- 52.3% reported having at least one asthma attack in the last 12 months.
- 41.1% reported having missed school or daycare in the past 12 months due to asthma (average of approximately 2.1 days).
- 18.5% visited the emergency room or urgent care centers in the past 12 months due to their asthma.

Exposure asthma triggers (i.e., things in the environment that make asthma symptoms worse) at home can affect people with asthma. In Massachusetts,

- About 54.3% children aged 18 and younger with asthma reported the trigger in their homes was the presence of gas used for cooking (Table 1)

**Table 1. Environmental Asthma Triggers in Home among Massachusetts Children with Current Asthma, 2006–2010**

<b>Environmental Triggers<sup>a</sup></b>	<b>%<sup>b</sup></b>	<b>95% CI<sup>c</sup></b>
Gas used for cooking	54.3	45.4–63.1
Pets inside the home	53.3	44.5–62.1
Carpeting or rugs in bedroom	53.0	44.2–61.9
Wood-burning fireplace/stove	28.4	19.8–36.9
Pets allowed in bedroom	27.1	19.2–35.0
Mice or rats inside the home, past 30 days	11.9	6.4–17.5
Mold inside the home, past 30 days	11.3	6.0–16.6
Smoking inside the home, past week	4.7	2.3–7.2

a. Estimates for presence of gas fireplace or unvented gas stove and cockroaches were unstable (relative standard error > 30%) and are not presented.

b. Percentages are weighted to population characteristics.

c. 95% Confidence Interval.

Data Source: 2006–2010 BRFSS Children Asthma Call-back Survey.



# Asthma Treatment Guidelines

**Adoption by providers of the NIH asthma guidelines for making appropriate clinical decisions about asthma care would standardize care and improve patient outcomes.**

Recent survey findings indicate that recommended treatment guidelines are often not followed in the care of many children with asthma in Massachusetts. Provider implementation of the following guidelines, from the *NIH Guidelines for the Diagnosis and Management of Asthma*, would standardize care and improve patient outcomes:

**Persons with asthma should have two or more visits per year with a healthcare professional for routine asthma care.** In Massachusetts, only 42.1% of children with asthma aged 18 and younger reported having the recommended number of routine checkups in the past year. Another 37.1% reported one visit, while 20.7% reported no routine visits for asthma in the past year.

- **Treatment should result in minimal-to-no ED visits due to asthma.** In Massachusetts, 18.5% of children with asthma aged 18 and younger reported one or more emergency department visits due to asthma in the past 12 months.
- **Children with asthma should receive an influenza vaccination annually by virtue of their age and asthma status.** In Massachusetts, 61.9% of children with asthma aged 18 and younger reported having an influenza vaccination in the past 12 months.
- **Persons with asthma should have an Asthma Action Plan.** In Massachusetts, only 49.6% of children with asthma aged 18 and younger reported ever having been given an Asthma Action Plan by their healthcare provider.

- **Children with asthma and their caregivers should receive instruction on how to recognize signs and symptoms of an attack.** In Massachusetts, 85.9% of children aged 18 and younger with asthma were taught how to recognize early signs and symptoms of an asthma attack. **It is also essential that children with asthma and their caregivers understand how to deal with exacerbation of children's asthma.** In Massachusetts, 91.7% were taught by a health professional what to do in response to an asthma attack. **The guidelines also suggest that the use of peak flow monitoring at home may be important for some patients with asthma.** In Massachusetts, 50.8% of children with asthma or their caregivers were taught how to use a peak flow meter to adjust daily medication.
- **Children with asthma or their parents should have a discussion with their healthcare provider about environmental exposures at their home or school.** In Massachusetts, 45.0% children with asthma or their caregivers were advised by a provider to change aspects of their home or school to improve their asthma.
- **Smoking or exposure to tobacco smoke should be avoided.** In Massachusetts, 15.3% caregivers of children aged 18 and younger with asthma reported that they were characterized as current smokers. In addition, 4.7% of children with asthma reported exposure to environmental tobacco smoke at home in the past week.



# Asthma Hospitalizations

**Poor asthma outcomes, such as hospitalizations, are considered largely preventable with access to high quality healthcare, appropriate asthma management, and adequate education about the disease.**

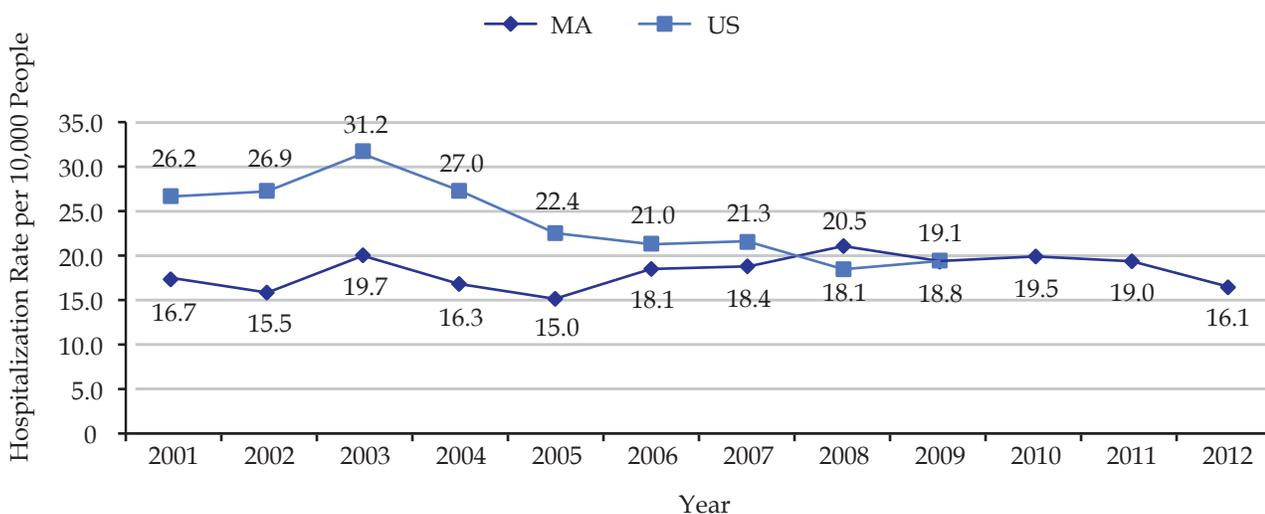
Poor asthma outcomes, such as hospitalization and ED visits, are considered largely preventable with access to high-quality health-care, appropriate asthma management, and adequate education about the disease. From 2010 through 2012, there was an average of 9,640 hospitalizations and 34,695 ED visits for asthma each year in Massachusetts. Nearly 30.5% of hospitalizations and 35.5% of ED visits were among children aged 19 and younger.

Thirty-five percent of asthma hospitalization, and 32% of asthma ED visits among children occurred during September through November, and the overall seasonal pattern was distinct from that observed among adults.

The mean total hospitalization charge for children is \$8,408; significantly lower than adults aged 20–64 and older adults aged 65 and older, whose charges were \$11,763 and \$13,762, respectively. Children also had a shorter average length of stay per asthma hospitalization at 2.0 days, compared to 3.3 days for adults and 4.1 days for older adults.

The mean total charge per asthma ED visit varied significantly across

Figure 4. Rate of Hospitalization for Asthma Among Children Ages 19 and Younger, 2000–2008



Data Sources: MA: CY2001–2012 Massachusetts Acute Hospital Case Mix Database. Access at MassCHIP v.3.00, r331. Massachusetts Department of Public Health. Aged 0–19.

US: CY2001–2009 National Hospital Discharge Survey, Aged 0–15.

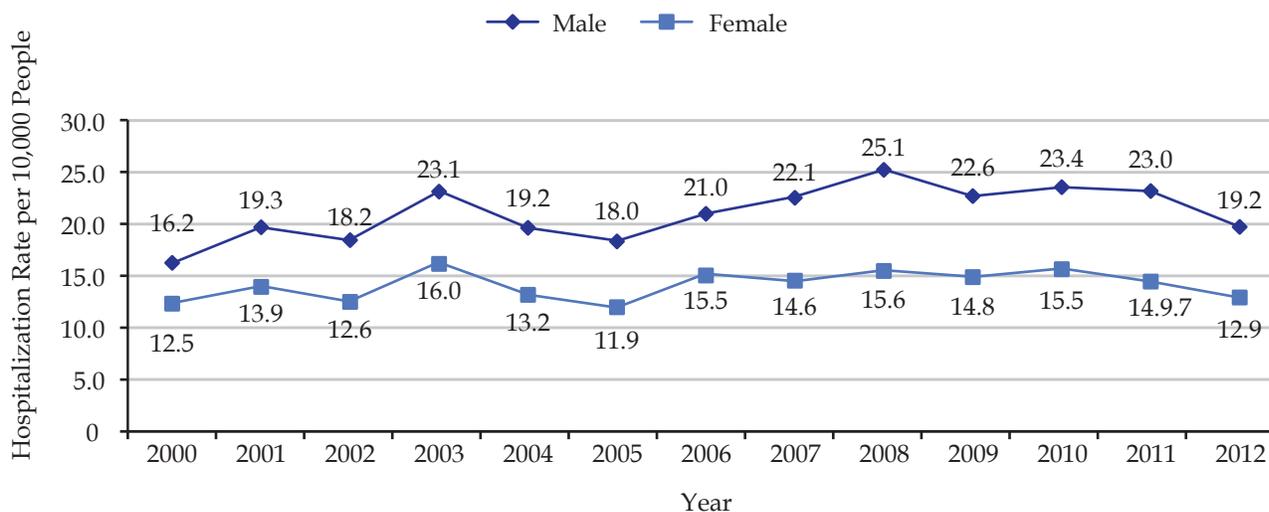
age groups, at \$1,436 for adults, \$1,813 for older adults, and \$1,260 for children. Medicaid was the expected payer for 51% of asthma hospitalizations and 54.1 % of asthma ED visits among children.

## Hospitalization

The rate of asthma hospitalization among children aged 19 and younger in the Commonwealth is increasing. From 2001 through 2012, the rate increased by an average of 1.1% per year. Prior to 2008, rates of hospitalization for asthma among children in Massachusetts were significantly lower than in the U.S. The rates of hospitalization for asthma among children in Massachusetts and in the U.S. did not differ significantly in 2008 and 2009.

Disparities in asthma hospitalization exist by gender and race/ethnicity. From 2000 through 2012, the asthma hospitalization rates for children both males and females significantly increased (average annual percentage increase = 2.0% and 0.9% respectively). For each year, the rate for male children aged 19 and younger was significantly higher than the rate for females (Figure 5). In 2012, the rate among males was 1.5 times the rate for females (19.2 vs 12.9 per 10,000).

**Figure 5. Rate of Hospitalization for Asthma Among Children Ages 19 and Younger by Sex, Massachusetts and United States, 2000–2012**



Data Sources: MA: CY2000–2012 Massachusetts Acute Hospital Case Mix Database. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health. Aged 0–19.

For each year from 2000 through 2012, the rates for Hispanic and Black, non-Hispanic children were significantly higher than the rate for White, non-Hispanic children. In 2012, the rates for Hispanics and Black, non-Hispanic children were 2.5 and 3.5 times higher than the rate for White children, respectively (data not shown). Among children, Black, non-Hispanic males had a significantly higher average annual rate of hospitalization for asthma compared to any other sex and race/ethnicity group examined (Table 2).

**Table 2. Number and Three-Year Average Annual Rate of Hospitalization for Asthma Among Children Ages 19 and Younger by Race/Ethnicity and Sex, Massachusetts and United States, 2010–2012**

Race / Ethnicity	Total			Male			Female		
	# <sup>a</sup>	Rate <sup>b</sup>	95% CI	#	Rate	95% CI	#	Rate	95% CI
Hispanic	2,087	28.7	27.5–30.0	1,250	33.7	31.8–35.6	837	23.5	21.9 – 25.2
Black, Non-Hispanic	1,773	43.2	41.1–45.2	1,038	49.5	46.5–52.5	735	36.5	33.9 – 39.2
White, Non-Hispanic	3,873	11.4	11.1–11.8	2,439	14.1	13.5–14.7	1,434	8.7	8.2 – 9.1
<b>Total</b>	<b>8,819</b>	<b>17.8</b>	<b>17.8–18.06</b>	<b>5,396</b>	<b>21.9</b>	<b>21.3–22.5</b>	<b>3,423</b>	<b>14.4</b>	<b>13.9 – 14.9</b>

a. Total # of hospitalizations for asthma during the three-year time period (2010–2012) among children aged 19 years and younger.

b. Three-year average annual rate per 10,000 MA residents.

Note: There were 740 asthma hospitalizations among those classified as ‘Other, Non-Hispanic’ and 412 among those with ‘Unknown’ race/ethnicity.

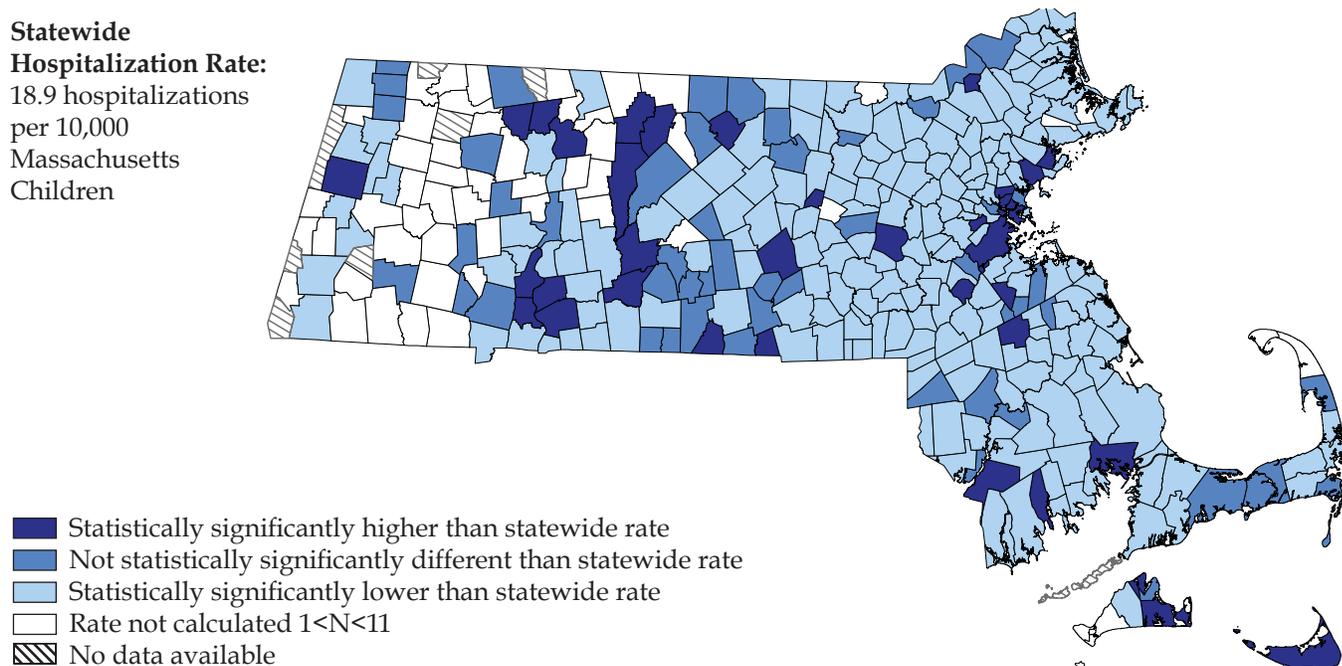
Data Sources: MA: CY2010–2012 Massachusetts Acute Hospital Case Mix Database. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health. Aged 0–19.

**Map 2. Five-year Average Annual Rate of Emergency Department Visits for Asthma Children Aged 19 and Younger by City/Town of Residence, Massachusetts, 2008–2012**

**Statewide**

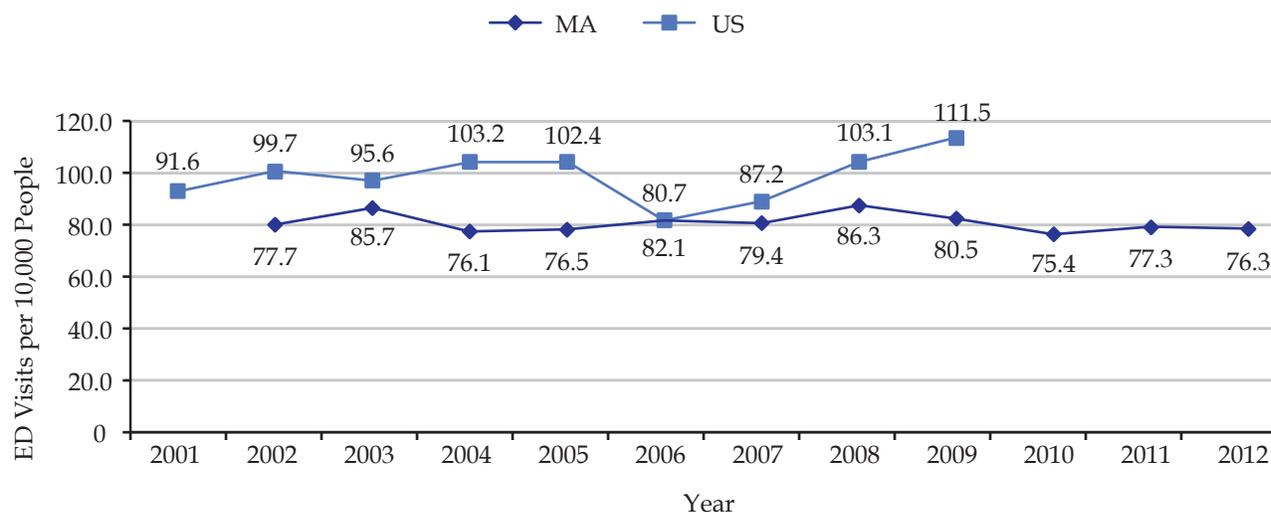
**Hospitalization Rate:**

18.9 hospitalizations per 10,000 Massachusetts Children



## Emergency Department Visits

**Figure 6. Rate of Emergency Department Visits for Asthma Among Children Ages 19 and Younger, Massachusetts and United States, 2001–2012**

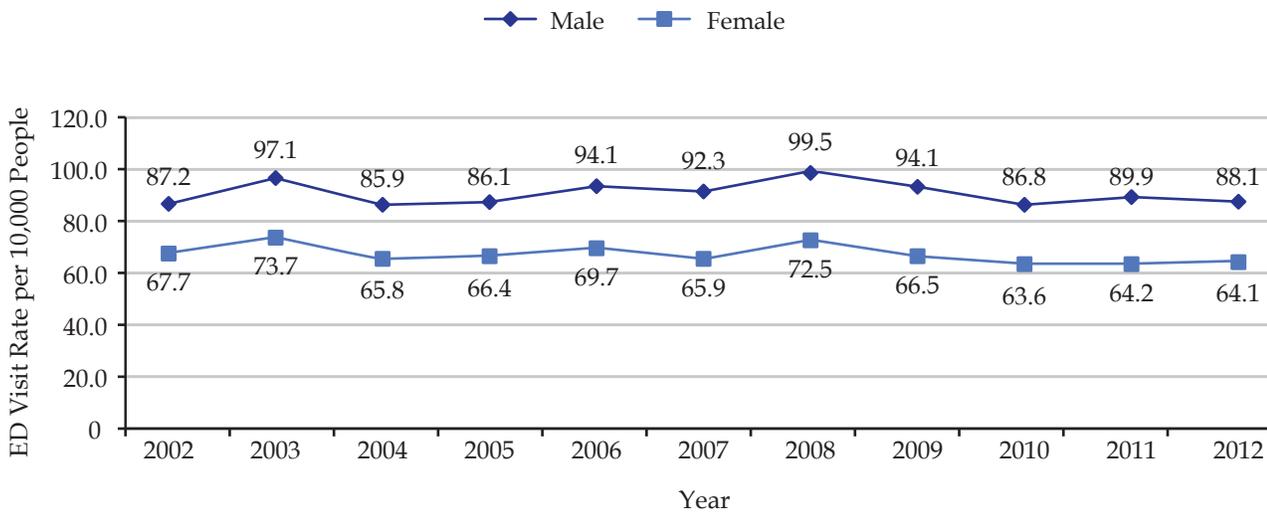


Data Sources: MA: CY2002–2012 Massachusetts Acute Hospital Case Mix Database. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health. Aged 0–19. US: CY2001–2009 National Hospital Ambulatory Medical Care Survey, Aged 0–17.

The rate of asthma ED visits among children aged 19 and younger in the Commonwealth has remained steady from 2002 through 2012. Overall, the rate decreased 1.8% from 77.7 ED visits per 10,000 residents in 2002 to 76.3 visits per 10,000 residents in 2012 (Figure 6). With the exception of 2006, rates of ED visits for asthma among children in Massachusetts were significantly lower than national rates from 2002 through 2012.

Disparities in asthma ED visits exist by gender and race/ethnicity. From 2000 to 2012, the asthma ED visits rates remained stable among male children, but decreased significantly among female children (annual percentage increase = 0.0% and -0.8%, respectively). For each year, the rate for male children aged 19 and younger was significantly higher than the rate for females (Figure 7). In 2012, the rate among males was 1.4 times the rate for females (88.1 per 10,000 vs 64.1 per 10,000).

**Figure 7. Rate of Emergency Department Visits for Asthma Among Children Ages 19 and Younger by Sex, Massachusetts and United States, 2002–2012**



Data Sources: MA: CY2002–2012 Massachusetts Acute Hospital Case Mix Database. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health. Aged 0–19.

For each year 2000 through 2012, the rates of ED visits for Hispanic and Black, non-Hispanic children were significantly higher than the rates for White, non-Hispanic children. In 2012, the rates for Hispanic and Black, non-Hispanic children were 3.0 times higher and 3.3 times higher than the rate for white children, respectively (data not shown). Among children, Black, non-Hispanic males had a significantly higher average annual rate of ED visits for asthma compared to any other sex and race/ethnicity group examined (Table 3) during 2010–2012.

**Table 3. Number and Three-Year Average Annual Rate of ED visits for Asthma Among Children Ages 19 and Younger by Race/Ethnicity and Sex, Massachusetts and United States, 2010–2012**

Race / Ethnicity	Total			Male			Female		
	# <sup>a</sup>	Rate <sup>b</sup>	95% CI	#	Rate	95% CI	#	Rate	95% CI
Hispanic	10,337	142.3	139.6–145.0	6,171	166.4	162.2–170.5	4,166	117.1	113.6–120.6
Black, Non-Hispanic	7,114	173.1	169.2–177.1	4,056	193.4	187.5–199.3	3,058	152.1	146.7–157.4
White, Non-Hispanic	16,209	47.9	47.1–48.6	9,447	54.6	53.5–55.7	6,762	40.8	39.8–41.8
<b>Total</b>	<b>36,951</b>	<b>76.3</b>	<b>75.5 - 77.1</b>	<b>21,765</b>	<b>88.2</b>	<b>87.1 - 89.4</b>	<b>15,186</b>	<b>64.0</b>	<b>62.9 - 65.0</b>

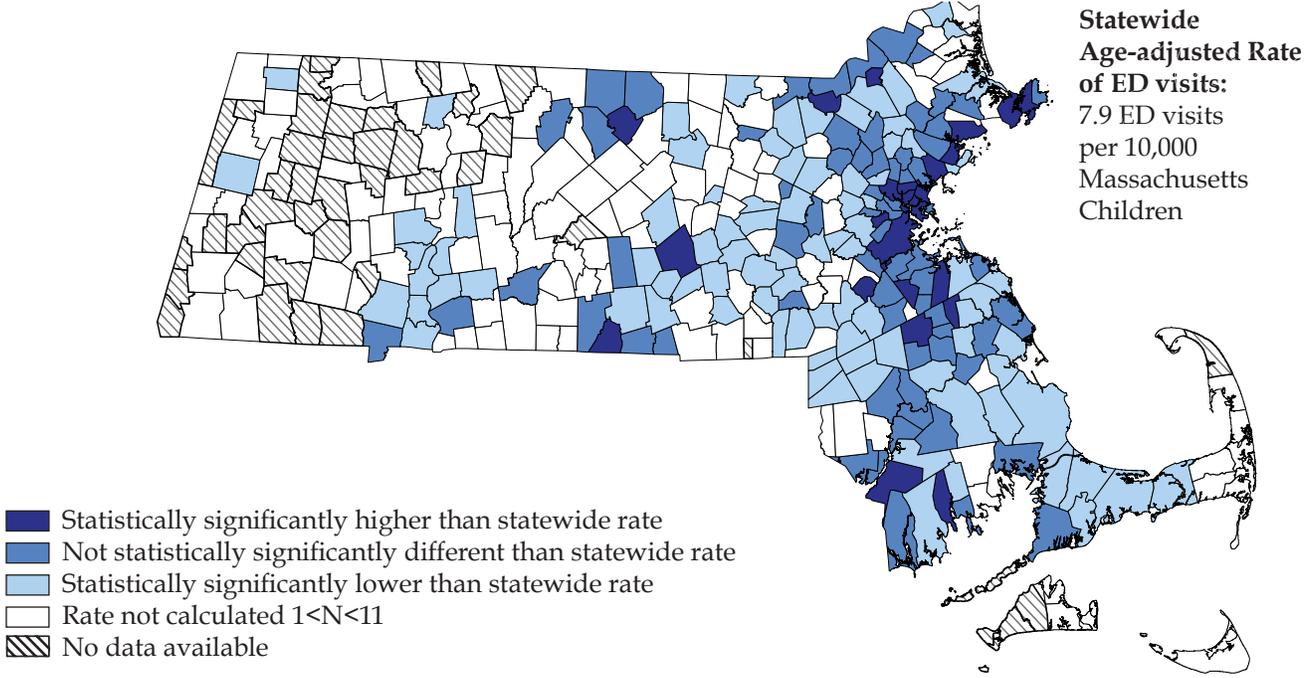
a. Total # of EDs for asthma during the three-year time period (2010–2012) among children aged 19 years and younger.

b. Three-year average annual rate per 10,000 MA residents.

Note: There were 1,639 asthma hospitalizations among those classified as 'Other, Non-Hispanic' and 681 among those with 'Unknown' race/ethnicity.

Data Sources: MA: CY2010–2012 Massachusetts Acute Hospital Case Mix Database. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health. Aged 0–19.

Map 3. Five-year Average Annual Rate of Emergency Department Visits for Asthma Children Aged 19 and Younger by City/Town of Residence, Massachusetts, 2008–2012



# Asthma Mortality

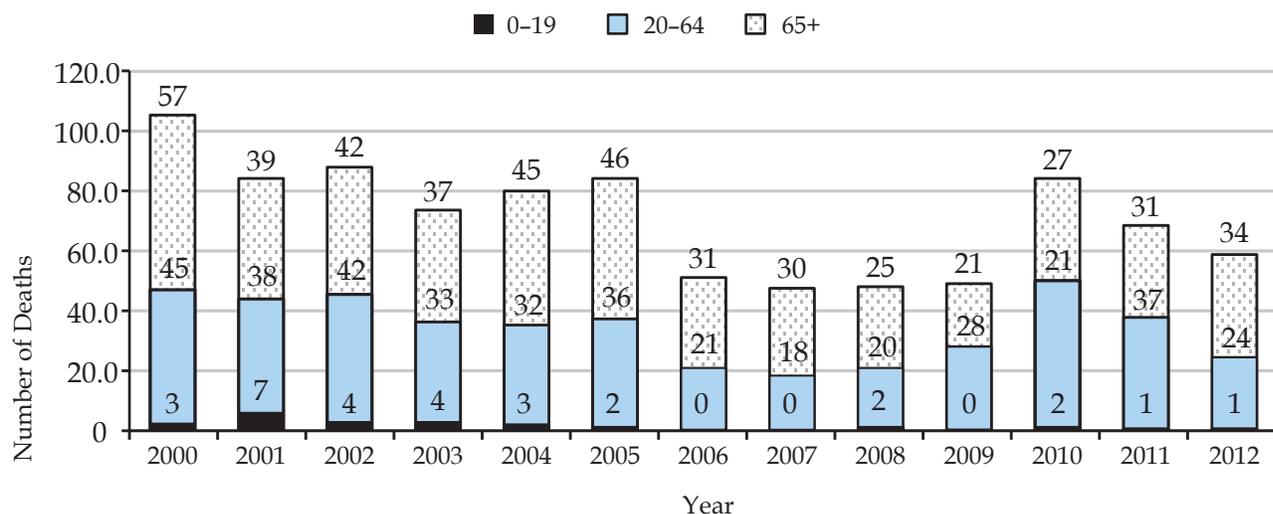


Deaths due to asthma are rare in Massachusetts, especially among children. From 2000 through 2012, there were 889 deaths due to asthma in the Commonwealth; 3.3% were among children aged 19 and younger. However, they remain a focus of preventive efforts as high-quality health care and patient caregiver education should theoretically prevent asthma-related deaths. A death due to asthma is often indicative of missed opportunities for appropriate asthma diagnosis, management, and treatment.

**A death due to asthma is often indicative of missed opportunities for appropriate asthma diagnosis, management and treatment.**

National asthma guidelines recommend early treatment and special attention to patients who are at high risk of asthma-related death — this applies to all age groups. Predictors of death due to asthma include: three or more ED visits for asthma in the past year, or asthma hospitalization or ED visit in the past month; overuse of short-acting beta agonist (short-term relief medication) or rescue medication; a history of intubation; a stay in an intensive care unit for asthma; difficulty perceiving asthma symptoms; and other risk factors (e.g., low socioeconomic status, comorbidities such as cardiovascular disease, other chronic lung disease)<sup>i</sup>

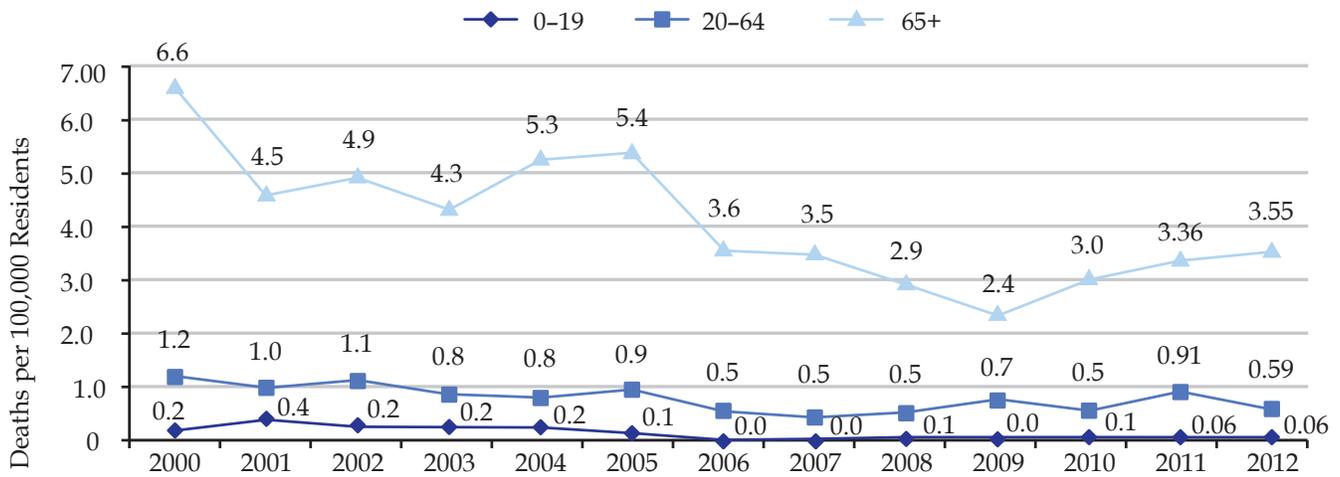
Figure 8. Number of Deaths Due to Asthma by Age, Massachusetts and United States, 2000–2012



Data Sources: MA: CY2000–2012 Massachusetts Registry of Vital Records and Statistics. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health.

The asthma mortality rate among children aged 19 and younger is low, and has consistently declined from 2000 through 2012. During this time, the average annual asthma mortality rate for children aged 19 and younger in Massachusetts was 0.17 per 100,000 population (Figure 9), which was significantly lower than the national rate (2.6 per 100,000). The numbers were too small to allow for stratified comparisons of mortality by patient characteristics.

**Figure 9. Asthma Mortality Rate by Age, Massachusetts, 2000–2012**



Data Sources: MA: CY2000–2012 Massachusetts Registry of Vital Records and Statistics. Accessed at MassCHIP v.3.00, r331. Massachusetts Department of Public Health.

# Conclusion



The information presented in this data brief highlights the burden of asthma experienced by children in Massachusetts. Not only is the prevalence of pediatric asthma high in Massachusetts, but two out of every three Massachusetts children with asthma had asthma that was not well controlled, or was very poorly controlled. The rate of asthma hospitalizations among children aged 19 and younger in the Commonwealth is increasing, and children had the highest rate of asthma emergency department visits compared to other age groups. Additionally, disparities exist in poor asthma outcomes, with statistically significantly higher rates of ED visits and hospitalizations for asthma found among Black, non-Hispanic and Hispanic children in the Commonwealth compared to White, non-Hispanic children.

Effective interventions are urgently needed for this population. Currently, the Asthma Prevention and Control Program (APCP) at the Massachusetts Department of Public Health (DPH) is working with partners and stakeholders across Massachusetts to meet this need, through both environmental (e.g., working with families to reduce asthma triggers in their homes) and clinical approaches (e.g., supporting clinicians in providing guidelines-based care for all patients with asthma). The APCP, in collaboration with other state agencies and community partners, is working to improve the quality of life for all Massachusetts residents with asthma, and to reduce disparities in asthma outcomes.

**Effective interventions are urgently needed for children in Massachusetts with asthma that is not well-controlled.**

The scope of the APCP's activities includes conducting asthma surveillance, supporting and promoting state and regional partnerships, evaluating and sustaining effective interventions to reduce asthma disparities, promoting policies that improve asthma outcomes, supporting the primary prevention of asthma, and promoting tobacco cessation and reducing exposure to secondhand tobacco smoke. Several strategies undertaken by the APCP to meet the program's mission include:

- Supporting DPH's Prevention and Wellness Trust Fund (PWTF), a first-in-the-nation competitive grant program to reduce healthcare costs in the Commonwealth with evidence-based community and clinical prevention strategies, and providing activities that will simultaneously decrease preventable risk factors and illness, and improve the management of existing chronic disease. APCP provides technical assistance for grantees that implement initiatives that address pediatric asthma. The grantees utilize a variety of mechanisms, including improvements in asthma management in the primary care settings, asthma management and indoor air quality initiatives in schools and early childcare settings, and provide home-based community health worker-led asthma interventions in funded communities.
- Conducting asthma surveillance.
- Supporting the Massachusetts Asthma Action Partnership (MAAP), a statewide coalition made up of over 80 member organizations, which produced the *Strategic Plan for Asthma in Massachusetts 2015–2020*, with APCP and other stakeholders.
- Collaborating with other health promotion and disease prevention programs and other state agencies to develop and sustain an infrastructure that supports programmatic integration to help Massachusetts residents manage their chronic diseases.
- Providing Asthma Action Plans for children and adults in seven languages (<http://massclearinghouse.ehs.state.ma.us/ASTHMA/AS901kit.html>).
- Administering and promoting the Reducing Ethnic/Racial Asthma Disparities in Youth (READY) study. READY uses Community Health Workers (CHWs) to deliver a home-based, multi-trigger, multi-component intervention for children with asthma and their families that is based in the medical home.
- Supporting the expansion of evidence-based CHW-led asthma home visiting programs in Massachusetts through the development of a standardized Toolkit and Training Program.

For more information about the Massachusetts Asthma Prevention and Control Program and our work, please call 617-624-5070; email us at [prevention.wellness@state.ma.us](mailto:prevention.wellness@state.ma.us) or visit [www.mass.gov/dph/asthma](http://www.mass.gov/dph/asthma).



# Appendices

# TECHNICAL NOTES

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## Prevalence

**Behavioral Risk Factor Surveillance System (BRFSS)** — This population-based random telephone survey is a commonly accepted source for information on a variety of health topics. Beginning in 2005, the Random Child Selection module and Childhood Asthma Prevalence modules were added to BRFSS as optional modules for states. Child asthma prevalence data are produced from the responses to questions on BRFSS Random Child Selection and Childhood Asthma optional modules. A randomly selected adult provided responses to the child asthma questions. If the adult reported that one or more children aged 17 years or younger lived in the household, then one of the children was randomly selected as the “Xth” child. Questions on the BRFSS Random Child Selection and Childhood Asthma optional modules were asked related to the “Xth” child. U.S. estimates presented here include states and territories that used both the BRFSS Random Child Selection and Childhood Asthma optional modules. State results can be compared with national estimates. In Massachusetts the survey is conducted in English, Spanish, and Portuguese. Children with current asthma were defined as those respondents who had reported that in their lifetime a healthcare provider told them that their children have asthma and those who answered “Yes” to: Do you still have asthma?

**The BRFSS Asthma Call-back Survey** is a standardized questionnaire on asthma developed by the CDC. Respondents to the BRFSS who reported that their children have ever been diagnosed with asthma and agreed to participate were called back within two weeks to administer the survey. Percentages were weighted to the total Massachusetts population for the corresponding year in order to reflect both the probability that an individual is selected to participate in the survey and the differential participation by sex, age, and race/ethnicity.

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## Acute Hospital Case Mix Data

**Massachusetts Acute Hospital Case Mix Database**, maintained by the Massachusetts Center for Health Information and Analysis (CHIA). Acute Hospital Case Mix data includes case specific, diagnostic discharge data that describe socio-demographic characteristics of the patient, the medical reason for the admission, treatment and services provided to the patient, the duration and status of the patient's stay in the hospital, and the full, undiscounted total and service-specific charges billed by the hospital to the general public.

Case Mix data includes hospital inpatient data, outpatient observation data, and hospital outpatient emergency department data.

An asthma hospitalization was defined as any case having an International Classification of Disease, (ICD-9-CM) diagnosis code of 493.0-493.9 assigned to the primary diagnosis field. Data consideration: In FY2007, the Center for Health Information and Analysis (CHIA) implemented new regulations for the collection and coding of race and ethnicity data in hospital records. Due to issues related to the introduction of these new methods in Massachusetts hospitals, the numbers (and therefore the rates) of hospitalizations among Hispanics for the last quarter of CY2006 and the first quarter of CY2007 are likely underestimates. This should be taken into consideration when interpreting the individual year rates, as well as the three-year average annual rates.

An asthma emergency department discharge was defined as any case having an International Classification of Disease, Ninth Revision for Clinical Modification (ICD-9-CM) diagnosis code of 493.0-493.9 assigned to the primary diagnosis field.<sup>1</sup> The emergency room visit data in this report are for a calendar year (January 1–December 31), from 2002 through 2012. Rates are reported per 10,000 residents. See below for additional data considerations.

**National Hospital Discharge Survey (NHDS)** National data on hospitalizations due to asthma were available from the NHDS annual data reports. The NHDS is a national probability survey conducted annually which collects information on inpatients from a sample of non-federal, short-stay hospitals in the United States. Hospitalizations due to asthma are defined as discharges of inpatients by first-listed ICD9-CM diagnosis code of 493. Counts and rates by age were available for each year 2000-2009. Rates were calculated using U.S. Census Bureau estimates of the civilian population based on the 2000 census. NHDS annual data reports available from the National Center for Health Statistics at: [http://www.cdc.gov/nchs/nhds/nhds\\_products.htm](http://www.cdc.gov/nchs/nhds/nhds_products.htm).

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## Mortality

**Massachusetts Registry of Vital Records and Statistics Data** on deaths due to asthma were from records maintained by the Registry of Vital Records and Statistics at the Massachusetts Department of Public Health. An asthma death was defined as any case with an ICD-10 code between J45-J46 in the underlying cause of death field. Data were obtained using MDPH's Massachusetts Community Health Information Profile (MassCHIP), v.3.00, r331, 08/2015.

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## Population

**National Center for Health Statistics (NCHS)** NCHS releases bridged-race population estimates of the resident population of the United States, based on Census 2000 counts, these are used in calculating vital rates including stratification by: modified age, race, and sex (MARS). These estimates result from bridging the 31 race categories used in Census 2000, as specified in the 1997 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity, to the four race categories specified under the 1977 standards. The bridged-race population estimates are produced under a collaborative arrangement with the U.S. Census Bureau. Each year, the Massachusetts Department of Public Health downloads the MARS file from NCHS and customizes it for the needs of the Department. In this report, these files were used as denominators of hospitalization and death rates. MARS files are available at [http://www.cdc.gov/nchs/nvss/bridged\\_race.htm](http://www.cdc.gov/nchs/nvss/bridged_race.htm).

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## Statistical Significance

In this bulletin, the term 'significant' is used to describe statistically significant differences when comparing two estimates or examining trends over time. Because the data presented are estimates, there is some margin of error associated with these estimates; confidence intervals (CI) provide a measure of how large that margin of error is. In this bulletin, 95% CIs are presented; this means that the true value of the estimate falls within the range given by the confidence interval 95% of the time. CIs help determine whether a difference between two groups is statistically significant. When comparing two estimates, if the 95% CIs for the two estimates do not overlap, the difference between the estimates is considered to be statistically significant. For examining the statistical significance of trends over time, regression analysis was performed and annual percent change was calculated. A p-value of <0.05 was considered statistically significant. Analyses were performed using SAS v. 9.3.

# REFERENCES

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