

9-8-2008

# The Burden of Asthma in Maine 2008

Maine Department of Health and Human Services

Maine Center for Disease Control and Prevention

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## Recommended Citation

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# The Burden of Asthma in Maine



2008

Maine Center for Disease Control and Prevention  
Division of Chronic Disease  
Maine Department of Health and Human Services

# Acknowledgements

## The Burden of Asthma in Maine, 2008

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# Table of Contents

## The Burden of Asthma in Maine, 2008

Acknowledgements	ii
Table of Contents	iii
Executive Summary	iv
Chapter 1: Introduction	1
Chapter 2: Prevalence: Who Suffers from Asthma?	7
Chapter 3: Management and Quality of Life	15
Chapter 4: Health Care Utilization	20
Chapter 5: Mortality	27
Chapter 6: Discussion and Conclusion	29
References	31
Appendix 1: Data Tables	32
Appendix 2: Glossary	51
Appendix 3: Data Sources	52

## Executive Summary

### **Asthma prevalence rates have been increasing nationally and in Maine.**

- The Behavioral Risk Factor Surveillance System (BRFSS) shows that, nationally, current asthma prevalence increased from 7.3% in 2000 to 8.0% in 2005.
- According to the 2005 BRFSS, 14.9% of Maine adults have had asthma at some time in their life, increasing from 12.4% in 2000. Current asthma was reported by 10.2% of adults in 2005, compared to 8.9% in 2000.
- According to the 2003 National Survey of Children's Health, 14.6% of Maine children have had asthma at some point in their life, and 10.7% had asthma at the time of the survey.

### **Data suggest that asthma is not optimally managed in Maine.**

- Each year nearly 50 percent of adults and children with current asthma have an asthma attack.
- Only 20 percent of Maine adults with current asthma reported having had the recommended 2 or more routine physician visits in the preceding 12 months.
- Forty percent of Maine's kindergarten and 3<sup>rd</sup> grade students with current asthma had not received a written asthma action plan, according to the Maine Child Health Survey.
- A high number of daytime and nighttime symptoms have been reported in both adults and children with current asthma.
- Over 8,000 emergency department visits and over 1,000 hospitalizations occur in Maine each year due to asthma.
  - Children under the age of 5 have higher rates of emergency department visits and hospitalizations than any other age groups.
  - Those 65 years and older have high hospitalization rates, relative to other age groups. In addition, between 1999 and 2005, hospitalization rates increased in this age group only; rates declined or remained stable in all other age groups.

### **There are disparities in asthma prevalence and outcomes.**

- Children are disproportionately affected by asthma—having higher prevalence, emergency department visit rates, and hospitalization rates.
- Adult women have a greater burden of asthma than men.
- Adults and children on MaineCare have higher asthma prevalence than individuals with other types of insurance.
- Adults with lower family income or educational attainment are more likely to report having current asthma.
- Emergency department visit and hospitalization rates are highest in northern Maine.
- Non-white adults had higher prevalence of current asthma than white adults.

# Chapter 1: Introduction

## *Understanding Asthma*

**A**sthma is a chronic inflammatory disorder of the airways. Airway inflammation contributes to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, especially at night or in the early morning. Asthma can differ among patients, and a patient can have varying symptoms over time. Treatment can, to a considerable extent, reverse some of the inflammation; however, successful therapy often requires weeks to achieve and, in some individuals, may be incomplete.<sup>1</sup>

**Asthma affects about 20 million people in the U.S., 9 million of whom are children.<sup>2</sup> In fact, the most common chronic disease in childhood is asthma.<sup>3</sup>**

## **The Causes of Asthma**

**Asthma is likely due to a combination of genetics and environmental exposures. A number of factors may increase the chances that someone will develop asthma, such as having a parent with asthma, living in an urban area, obesity, or exposure to secondhand smoke. Certain factors may trigger a person's asthma symptoms. Common triggers include allergens, dust mites, air pollutants, smoke, respiratory infections, physical activity, stress, cold air, and certain medications.<sup>3</sup>**

Asthma can affect a person's quality of life. Individuals with asthma in the U.S. experience over 100 million days each year when they must limit their normal activities due to asthma.<sup>4</sup> Asthma also accounts for millions of missed school and work days. Among children aged 5 – 17 years, asthma is the leading cause of school absenteeism due to chronic illness, accounting for more than 14 million lost school days each year or eight days for every student with asthma. For adults, asthma is the fourth leading cause of work absenteeism, accounting for nearly 15 million missed workdays each year.<sup>5</sup>

Proper management and control can largely prevent complications such as asthma attacks, activity limitations, emergency department visits, hospitalizations, and mortality. Proper management results from a partnership between individuals with asthma and their clinicians. For children, parents and school personnel can also be important participants in care management. An asthma management plan—tailored to the specific individual—documents the care plan for the person with asthma.

Appropriate management is best achieved when individuals with asthma understand the medication prescribed and instructions for their use, know triggers that must be avoided, and can recognize early warning signs of worsening asthma, including when to seek emergency care. It is recommended that persons with asthma maintain regular contact with their health care provider, including routine visits at least every six months. These visits provide an opportunity for the clinician to monitor the individual's asthma, to discuss self-management, provide additional education, or modify the action plan.<sup>4</sup>

### **The Costs Of Asthma**

**Nationally, asthma is estimated to cost \$16.1 billion annually: \$11.5 billion in direct costs and \$4.6 billion in indirect costs. Direct costs include prescription drugs (\$5.0 billion), hospital care (\$3.6 billion), and physicians' services (\$2.9 billion). Indirect costs include lost productivity due to missed work or school (\$2.9 billion) and premature mortality (\$1.7 billion).<sup>6</sup>**

### ***Why should we be concerned? - Asthma in the U.S. and in Maine***

In the U.S., asthma has become a major public health problem. Nationally, there are almost two million emergency department visits, almost 500,000 hospitalizations, and over 4,000 deaths due to asthma each year.<sup>7-9</sup>

#### **Maine Asthma Burden**

**In Maine, prevalence and emergency department visit rates have increased while hospitalization and mortality rates have decreased. Overall, Maine has a high burden of asthma relative to the nation.**

Nationally, prevalence increased 129% and physician office visit rates increased 74% from 1980 to 2004; emergency department visit rates increased 11% from 1992 to 2004.<sup>10</sup> In the Northeast from

1980 to 2004, prevalence increased 155%, physician office visit rates increased 56%, and hospitalization rates increased 21%. From 1992 to 2004, emergency department visit rates increased 33%.<sup>10</sup> Asthma prevalence estimates are higher in the Northeast than in two of the three other U.S. regions (the South and West). Physician office visits, emergency department visits, and hospitalization rates are higher in the Northeast than in all three other regions (the Midwest, South, and West). Mortality rates are lower in the Northeast than in the other regions.

### *What is being done to address asthma?*

Each decade a series of national health objectives called Healthy People is created that identifies significant, preventable risks to individuals' health and establishes national goals to reduce health risks. Healthy People 2010 (HP2010), the third in the Healthy People series, contains 28 focus areas and 467 national health objectives.<sup>11</sup> One focus area is respiratory diseases, which details eight objectives for asthma.

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## Healthy People 2010 Asthma Objectives

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### Objective (Section)

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Reduce asthma deaths (24-1)

Reduce hospitalizations for asthma (24-2)\*

Reduce emergency department visits for asthma (24-3)\*

Reduce activity limitations among persons with asthma (24-4)

Reduce the number of school or work days missed by persons with asthma due to asthma (24-5)\*

Increase the proportion of persons with asthma who receive formal patient education, including information about community and self-help resources, as an essential part of the management of their condition (24-6)\*

Increase the proportion of persons with asthma who receive appropriate asthma care according to the National Asthma Education Prevention Program Guidelines (24-7)

Establish in at least 25 states a surveillance system for tracking asthma death, illness, disability, impact of occupational and environmental factors on asthma, access to medical care, and asthma management (24-8)\*

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\* Healthy Maine 2010 asthma objective.



Following the lead of the national initiative, Maine established state-specific health objectives. Healthy Maine 2010 includes five of the Healthy People asthma objectives.

### **Healthy Maine 2010 Asthma Objectives**

- 1. Reduce the number of school or work days missed due to asthma**
- 2. Reduce the number of emergency department visits due to asthma**
- 3. Reduce the number of hospitalizations due to asthma**
- 4. Increase the proportion of persons with asthma who receive formal education**
- 5. Establish a surveillance system for tracking asthma**

**A**nother national organization, the National Heart, Lung, and Blood Institute (NHLBI), is working towards reducing the adverse effects of asthma. The NHLBI formed the National Asthma Education and Prevention Program (NAEPP) in 1989 to address the growing problem of asthma. The Program's goals include raising awareness that asthma is a serious chronic disease, ensuring the recognition of asthma symptoms by patients and families and the appropriate diagnosis by a clinician, and ensuring effective control of asthma by promoting a partnership among patients and clinicians.<sup>4</sup> The NAEPP charged the Expert Panel on the Management of Asthma with the task of creating national guidelines for the diagnosis and management of asthma. The Expert Panel completed this task with the release of its first report in 1991, entitled *Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma*. Since then, two more reports have followed, further updating these guidelines, with the latest report being published in 2007.

## **Guidelines for Asthma Care**

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Selected guidelines for both clinicians and patients regarding the four essential components of asthma care – assessment and monitoring, patient education, control of factors that affect severity, and pharmacologic therapy – are listed below.<sup>18</sup>

### **1) Assessment and monitoring**

- Routine follow-up asthma care is important: depending on the level of control, contact at 1- to 6-month intervals is recommended.
- Patient's adherence to treatment and its side effects should be monitored at each visit.

### **2) Patient education**

- Clinicians should demonstrate, evaluate, and correct inhaler technique and, if applicable, the use of a spacer at each visit, because patients can quickly lose these skills.
- Patients should be engaged with the clinician in the treatment decision-making process.
- All patients with asthma should be provided with a written asthma action plan that details daily management and instructions for recognizing and controlling worsening asthma, including self-adjustment of medication in response to sudden symptoms or changes in peak flow measures.  
Clinicians should encourage families to take a copy of the child's written asthma action plan to the school or childcare setting, or obtain permission to send a copy to the school nurse.
- Patients should be referred for follow-up asthma care within 1-4 weeks after an emergency department visit.

### **3) Control of factors that affect severity**

- Persons with asthma should reduce exposure to allergens and irritants as much as possible.
- Patients with asthma should be advised not to smoke or be exposed to secondhand smoke.

### **4) Pharmacologic therapy**

- In order to achieve and maintain control of persistent asthma, patients should take long-term control medications on a daily basis.

## *Purpose and Goals of this Document*

**P**ublic health surveillance data are essential for understanding the burden of asthma in the population and are useful for planning and evaluating interventions. Surveillance is defined as “the ongoing and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event.”<sup>12</sup> This report is a result of recent surveillance activities in the Maine Asthma Program, and summarizes available data on the burden of asthma in Maine.

The statistics we present were derived from seven data sources.

Prevalence and management and control measures were estimated from the Behavioral Risk Factor Surveillance System (BRFSS) for adults aged 18 years and older, the National Survey of Children’s Health (NSCH) for children 17 years and younger, and the Maine Child Health Survey (MCHS) for children in kindergarten, third, and fifth grades. Management and control measures were estimated from the BRFSS for adults and the. Health care utilization data were obtained from inpatient and outpatient hospitalization databases maintained by the Maine Health Data Organization. Mortality statistics were computed from death certificate records collected and compiled by the Maine CDC’s Offices of Vital Records and Data, Research, and Vital Statistics.

### **This document will address the following questions:**

- 1) Who suffers from asthma?**
- 2) Are Mainers properly managing and controlling their asthma?**
- 3) What is the health care utilization for asthma?**
- 4) How many deaths are caused by asthma?**

## Chapter 2: Prevalence- Who Suffers from Asthma?

**T**he term “prevalence” refers to the proportion of the population that has disease at a specific point or period in time. Prevalence is a function of both disease development and duration. For this report, prevalence was estimated based on survey responses—often self-reports of having received a diagnosis of asthma—and was not determined through direct clinical assessment. It is important to note that only those who have been told that they have asthma by a health care provider will likely be included as having asthma. The surveys used are administered at different times and in different age groups. We used the most current data available at the time of analysis.

We present two measures of asthma prevalence: lifetime and current. An individual will be included in the lifetime category if they report ever having had asthma, and will be included in the current asthma group if they additionally report having asthma at the time of the survey.

**A**sthma impacts some population groups differentially. Nationally and

in Maine, children (aged 17 years and younger) have higher current asthma prevalence rates than adults.<sup>13,14</sup> The difference between self-reported lifetime and current asthma prevalence increases with age, perhaps due to remission. Studies have found that

### Technical note on determining difference between prevalence estimates

In this chapter we report asthma prevalence as estimated from responses to population-based surveys. Because surveys sample only a subset of the population, we must consider random sampling variability when interpreting the data we obtain. This variability means that we cannot assume that differences between two prevalence estimates across time or population necessarily represent true differences in the underlying population. We base our determination of such differences on whether the 95% confidence intervals for each estimate overlap: estimates with overlapping confidence intervals cannot be assumed to be different. The 95% confidence interval is a measure of sampling variability, and is similar to the margin of error often shown with polling data. The 95% confidence intervals for prevalence estimates are shown in data tables in the appendix that correspond to each figure. In this chapter, unless otherwise noted, any statements about differences between asthma prevalence estimates indicate that differences have been deemed statistically significant based on a comparison of the estimates' confidence intervals. Finally, it should be noted that small sample size hinders our ability to detect true differences. Thus, the absence of a statistically significant difference based on overlapping confidence intervals should not rule out the possibility of a true difference when samples are small—as many are in this report.

approximately half of adults who had asthma diagnosed in childhood no longer experience symptoms.<sup>15</sup>

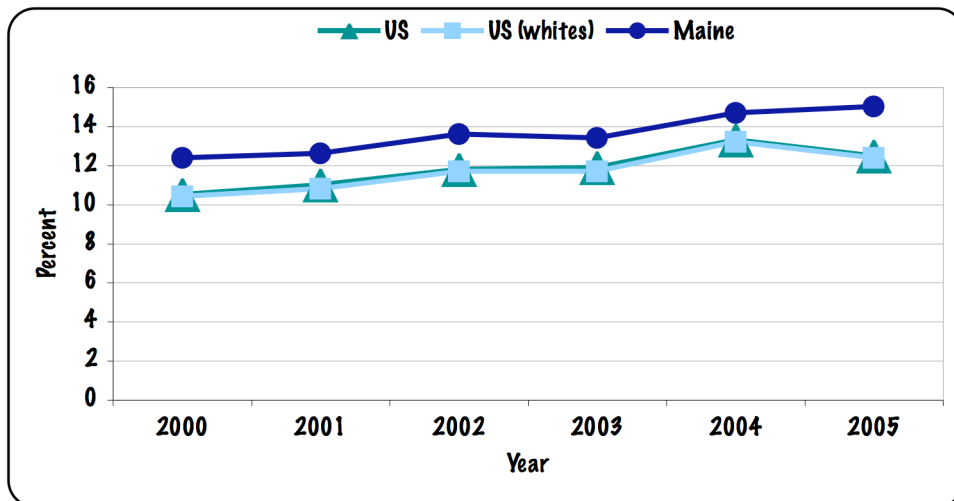
**Asthma affects some population groups differentially. For example, data indicate that children, females, and some racial/ethnic groups have higher current asthma prevalence rates than their counterparts.**

Females are disproportionately affected with higher asthma prevalence rates than males in adulthood, but males are disproportionately affected in childhood. Prospective studies show that females have a higher incidence of asthma after puberty. Possible explanations include

hormonal changes during puberty as well as gender-specific differences in environmental exposures.<sup>16</sup>

**S**everal racial/ethnic groups have higher current asthma prevalence rates than whites. The National Health Interview Survey (NHIS) estimated that 7.4% of whites had current asthma compared to 9.5% of blacks, 9.2% of American Indians/Alaskan Natives, and 17.0% of Puerto Ricans.<sup>17</sup> In contrast, Asians were found to have a current asthma prevalence of 4.9%.<sup>17</sup> In Maine, non-white groups comprise a relatively small proportion of the population (approximately 4%) and must be combined into one category to produce reliable estimates from survey data (which represent only a subset of the total population). This obscures meaningful differences among racial/ethnic populations and makes comparisons to national data difficult.

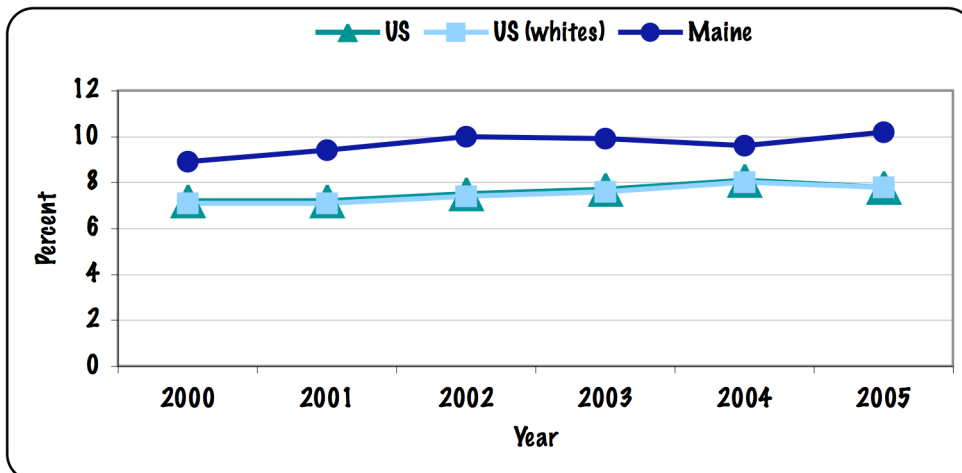
**Figure 2-1. Adult lifetime asthma prevalence, U.S. and Maine, 2000-2005**



*Data source: BRFSS*

- In 2005, the lifetime asthma prevalence in Maine was significantly higher than the national prevalence for all races and whites only. In 2005, Maine's lifetime asthma prevalence in adults was 15% compared to 12.5% in the U.S. populations.

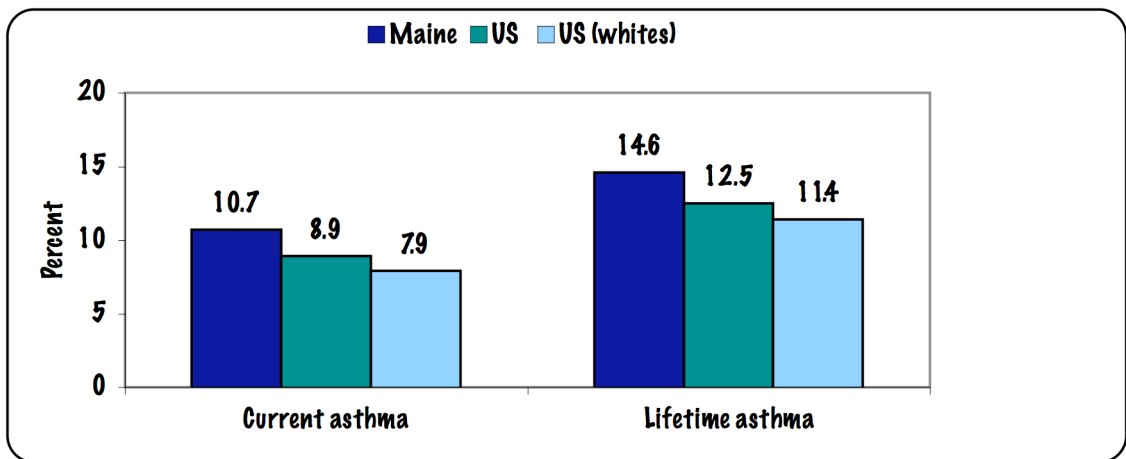
**Figure 2-2. Adult current asthma prevalence, U.S. and Maine, 2000-2005**



*Data source: BRFSS*

- From 2000 – 2005, the current asthma prevalence in Maine was significantly higher than the national prevalence for all races and whites only.
- During that time period, between 9-10% of Maine adults reported having asthma currently, compared to 7-8% nationally.

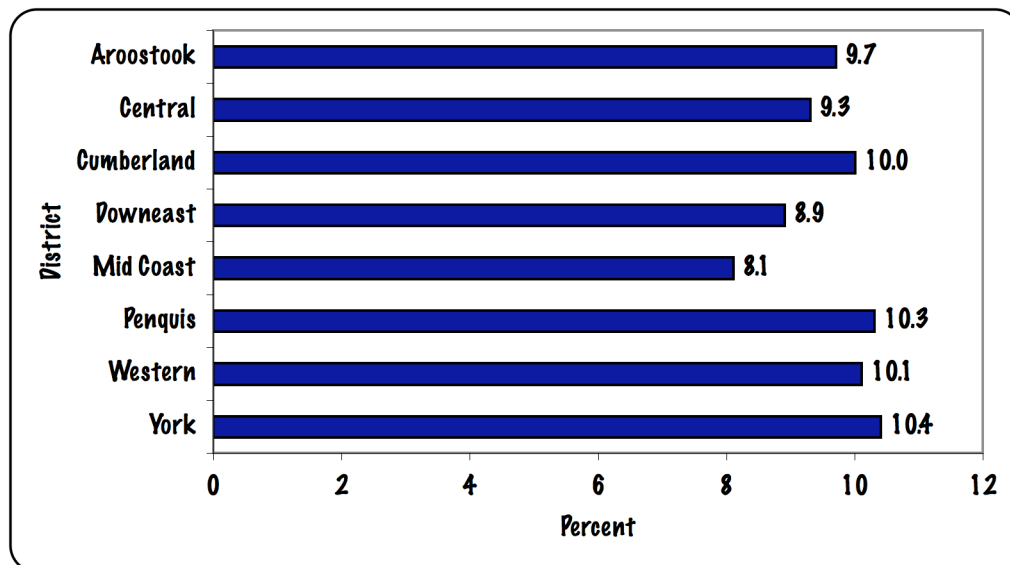
**Figure 2-3. Child lifetime and current asthma prevalence, U.S. and Maine, 2003**



*Data source: NSCH*

- In children aged 17 years and younger, the 2003 current and lifetime asthma prevalence estimates were significantly higher in Maine than nationally for all races and white only.

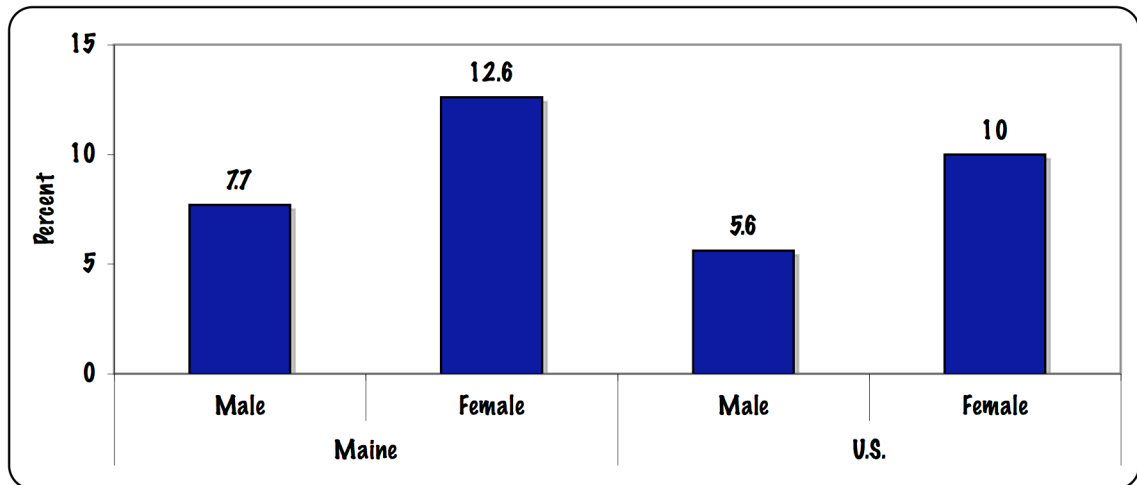
**Figure 2-4. Adult current asthma prevalence by public health district, Maine, 2000-2005**



*Data source: BRFSS*

- There were not statistically significant differences in adult current asthma prevalence among Maine's public health districts.

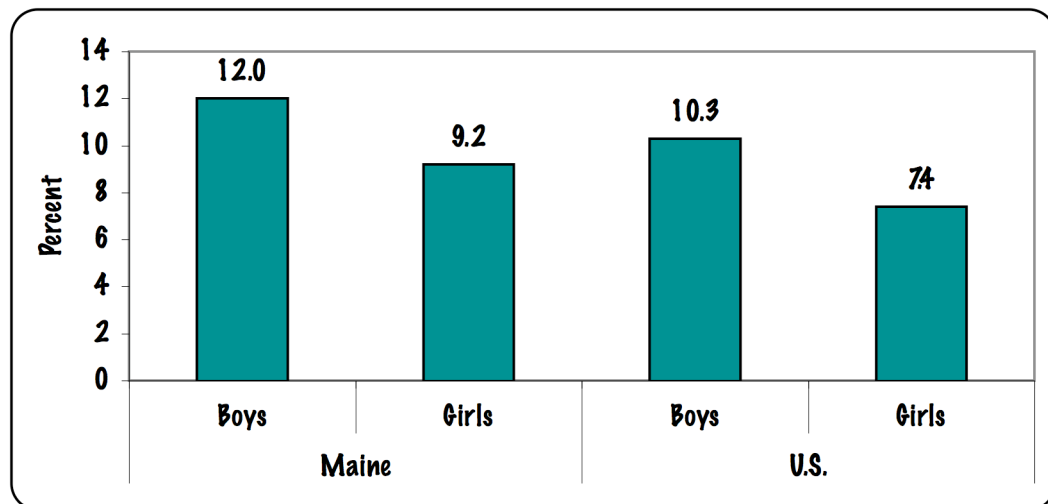
**Figure 2-5. Adult current asthma prevalence by gender, U.S. and Maine, 2005**



*Data source: BRFSS*

- Both nationally and in Maine, adult women had significantly higher current asthma prevalence than adult men.
  - In 2005, 12.6% of women in Maine reported current asthma compared to 7.7% of men in Maine.
  - Compared to their U.S. counterparts, Maine men and women had significantly higher current asthma prevalence rates.

**Figure 2-6. Child current asthma prevalence by gender, U.S. and Maine, 2003**

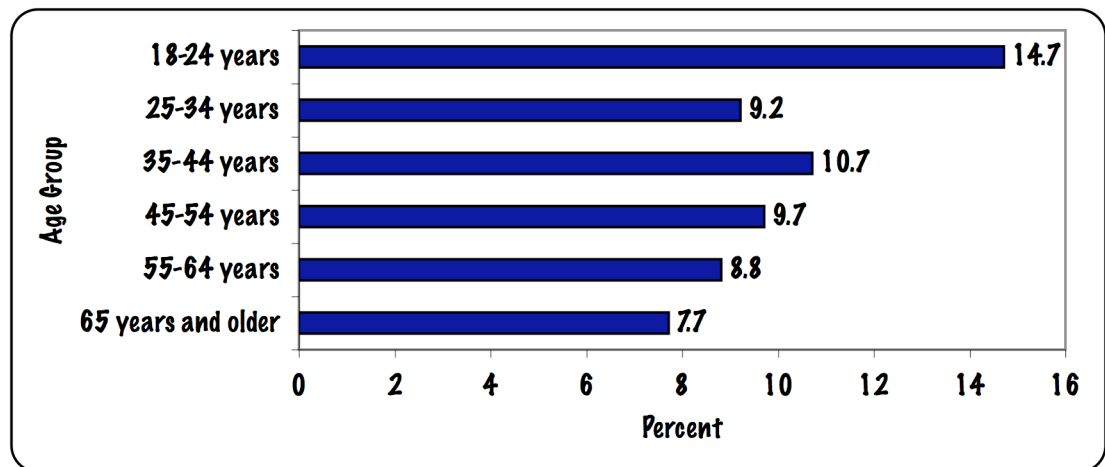


*Data source: NSCH*

- Although Maine's gender-specific prevalence estimates appeared higher than national estimates for children, differences between Maine and U.S. boys and Maine and U.S. girls were not statistically significant.



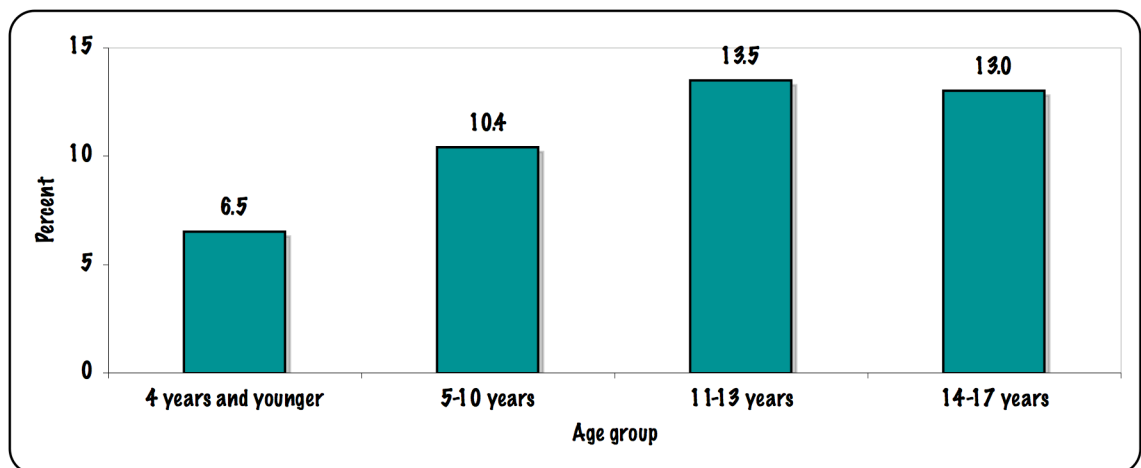
**Figure 2-7. Age-specific adult current asthma prevalence, Maine, 2004-2005**



*Data source: BRFSS*

- Maine adults aged 18 – 24 years had significantly higher current asthma prevalence than adults 55-64 years and adults 65 years and older.

**Figure 2-8. Age-specific current child asthma prevalence, Maine, 2003**



*Data source: NSCH*

- Although not statistically significant, asthma prevalence appeared to increase with age among children, until early adolescence.

## **Health Disparities and Asthma**

The National Institute of Health (NIH) defines health disparities as “differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States.”<sup>18</sup>

There are several factors that contribute to health disparities including (but not limited to): gender, race/ethnicity, social-economic status, sexual orientation, age, and disability.

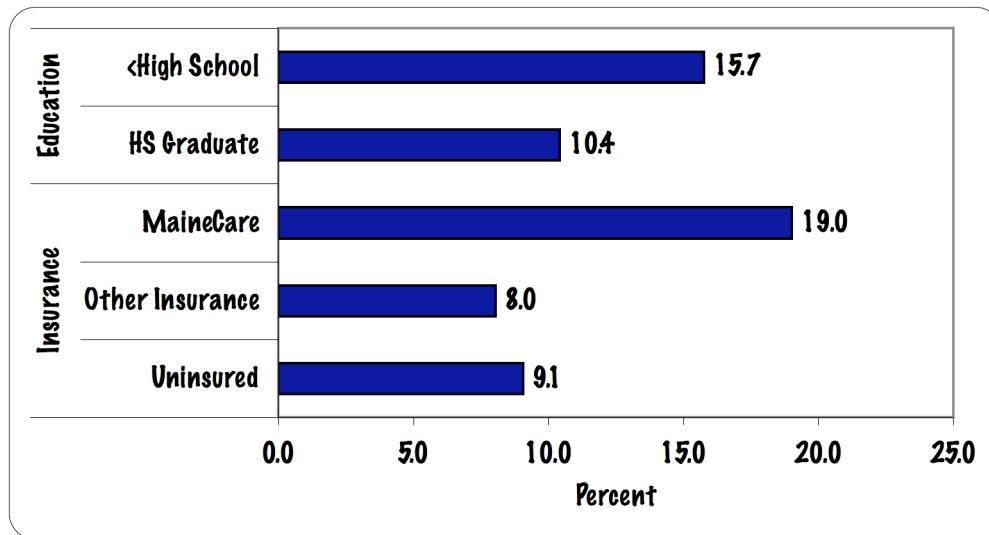
### **Socioeconomic disparities in people with current asthma in Maine**

- Individuals with less than a high school education were significantly more likely to have current asthma compared high school graduates.
- Individuals with a household income level less than \$25,000 were significantly more likely to report current asthma compared to those with higher household incomes.
- Adults and children on MaineCare were significantly more likely to have current asthma than those with another type of insurance.
- Adults who reported being unable to work had higher current asthma prevalence estimates than individuals who did not report being unable to work.

### **Race/Ethnicity disparities in people with current asthma in Maine**

- In 2004-2005, adults in non-white racial/ethnic groups had a significantly higher prevalence of current asthma than white adults (Table 2-A1).
- Small sample sizes did not allow us to further stratify, though we know from national data that appreciable differences in asthma prevalence exist among non-white racial/ethnic groups.
- Child data did not reveal significant differences in asthma prevalence when white was compared to a combined non-white group. The lack of statistical difference could be due to insufficient sample size or to the masking effect of combining non-white groups (Table 2-A2).

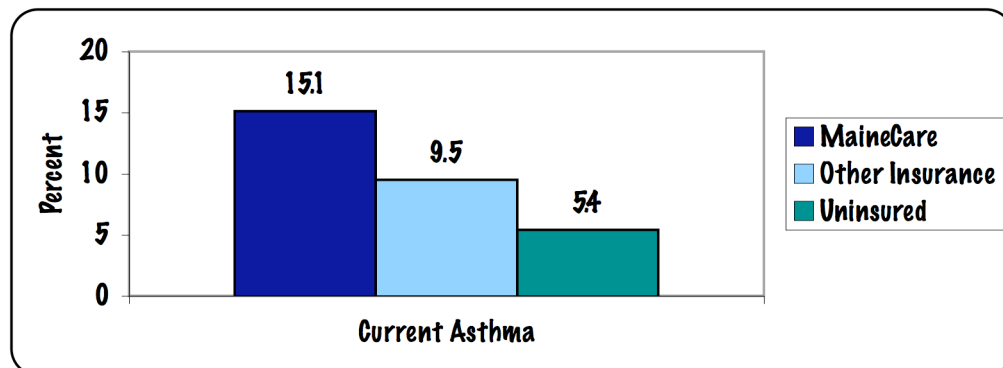
**Figure 2-9. Adult current asthma prevalence by educational attainment and insurance status, Maine, 2005**



Data source: BRFSS

- Adults who did not graduate from high school had a higher current asthma prevalence than those who graduated from high school.
- Adults on MaineCare were more likely to report current asthma than those with other insurance or those uninsured.

**Figure 2-10. Child current asthma prevalence by insurance status, Maine, 2005**



Data source: MCHS

- Children on MaineCare were more likely to have current asthma or current wheeze than those with other insurance or those uninsured.

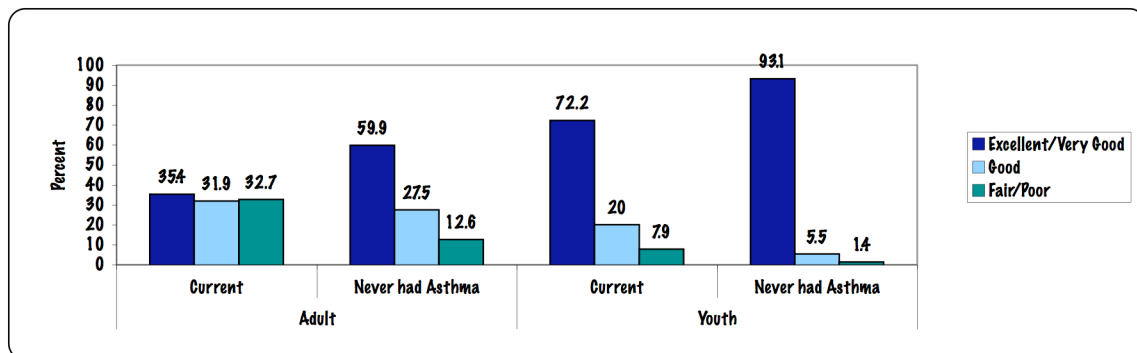
## Chapter 3: Management and Quality of Life

**T**he cause of asthma is not certain, thus limiting options for disease prevention. However, through proper management, asthma can be controlled. When an individual's asthma is not controlled, there are increased symptoms; decreased quality of life, and increased health care utilization.<sup>1</sup> Thus, management plays a crucial role in the prevention of asthma symptoms and attacks. As discussed in Chapter 1, management is most successful when health care providers and individuals with asthma work together to create and maintain a care plan that involves appropriate medication use, routine health care visits, and avoidance of known triggers. When asthma is controlled, an individual does not experience chronic symptoms, does not frequently use quick-relief/rescue medication, can maintain normal activity levels, and does not suffer from recurrent asthma attacks.<sup>1</sup>

**Proper management includes avoiding triggers; receiving appropriate routine medical care, receiving and adhering to appropriate medications, and understanding how to monitor one's condition for worsening symptoms and asthma attacks—all of which can be documented in a written asthma action plan.<sup>1,3</sup>**

In this chapter we present survey data that provide information on asthma management and quality of life in Maine adults and children with asthma.

**Figure 3-1. Health status among adults and children who have asthma currently and who have never had asthma, Maine**



Adult data source: BRFSS, 2005  
Youth data source: NSCH, 2003

- Adults with current asthma were significantly more likely to report fair or poor health compared to those who never had asthma, and were less likely to report excellent or very good health.
- Similarly for children, being in excellent or very good health those with current asthma were less likely to report and more likely to report being in fair or poor health, as compared to those who never had asthma.

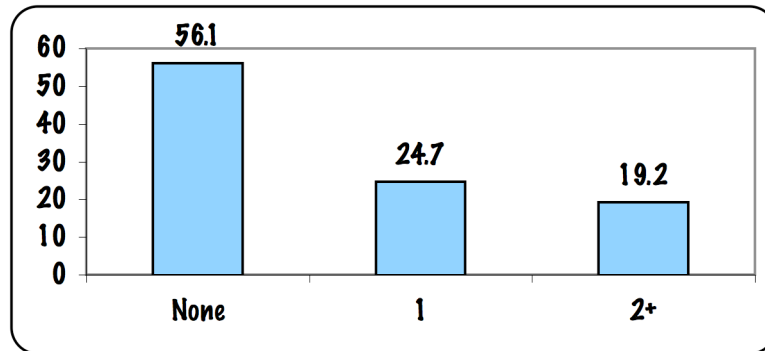
**Figure 3-2. Asthma symptoms, activity limitations, and ED/urgent care visits in adults with asthma, Maine, 2005**

		Percent
<b>Asthma symptoms in past month</b>		
	<1 day/week	50.5
	1-6 days/week	33.7
	Every day	15.8
<b>Activity limitations in past year due to asthma</b>		
	None	70.7
	1-10 days	13.6
	11+ days	15.7
<b>Problems staying asleep in past month</b>		
	None	55.7
	1-4 nights	31.6
	5+ nights	12.7
<b>ED/urgent treatment in past year due to asthma</b>		
	Yes	30.3

Data source: BRFSS

- Approximately 30% of adults with current asthma had to limit their normal activities during the past year due to asthma.
- Over three in ten adults with asthma reported at least one emergency room visit or urgent treatment by a health care professional due to asthma within the past year.
- Almost half of adults with current asthma reported having symptoms at least once per week in the past month.
  - Nearly 1 in 6 reported having symptoms every day in the past month.
- Nearly half who had symptoms had problems staying asleep due to symptoms.
  - One in eight reported that symptoms affected their sleep at least five nights during the past month and nearly a third reported problems staying asleep 1 – 4 nights during past month due to asthma symptoms.

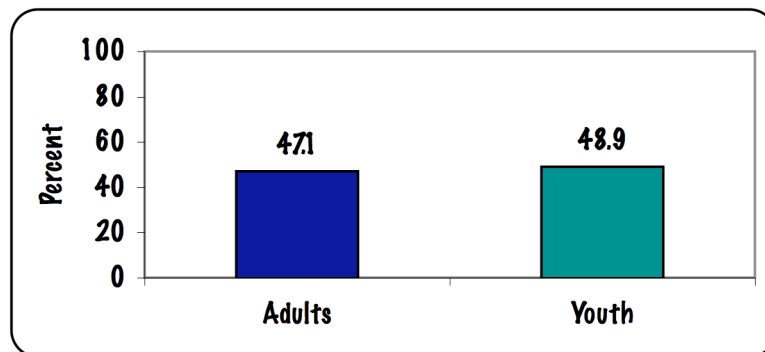
**Figure 3-3. Routine health care visits among adults with current asthma in the past year, Maine, 2005**



*Data source: BRFSS*

- Roughly 55% of Maine adults with current asthma reported not having had a single routine health care visit in the past year.
- Nearly 20% had the recommended two or more routine visits in the past year.

**Figure 3-4. Percent of adults and children with current asthma who had an asthma attack in the past 12 months, Maine**



*Adult data source: BRFSS, 2005  
Youth data source: NSCH, 2003*

- Almost half of all adults and children with current asthma had an asthma attack within the past year.

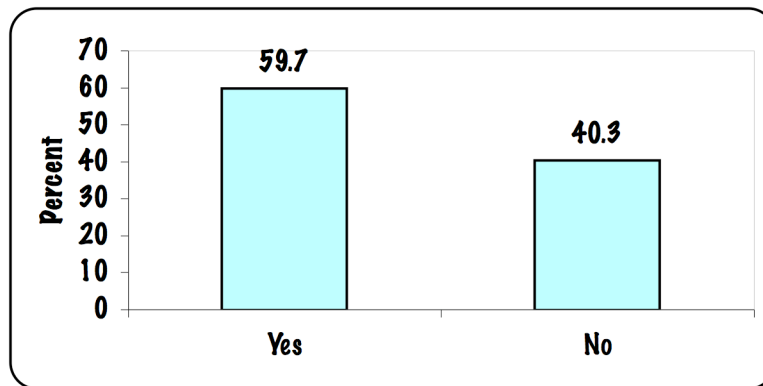
**Figure 3-5. Past year symptoms and activity limitation among children with asthma, Maine, 2004 and 2005**

	Percent
<b>Any days of normal activity limitation due to asthma</b>	
Kindergarten-Third grade	65.6
Fifth grade	46.9
<b>Sleep disturbances due to wheezing</b>	
Kindergarten-Third grade	58.3
Fifth grade	40.4
<b>Sleep disturbances due to dry cough</b>	
Kindergarten-Third grade	60.8
Fifth grade	44.2

*Data source: MCHS*

- About 60% of kindergarteners and third graders with current asthma had to limit normal activities due to asthma in the past year; 47% of fifth graders with current asthma had to limit normal activities due to asthma in the past year.
- Sleep disturbances due to wheezing were reported for nearly 60% of kindergarteners and third graders with current asthma and 40% of fifth graders with current asthma.
- 60% of children with current asthma in kindergarten and third grade and 44% of fifth graders with current asthma reported sleep disturbances due to dry cough.

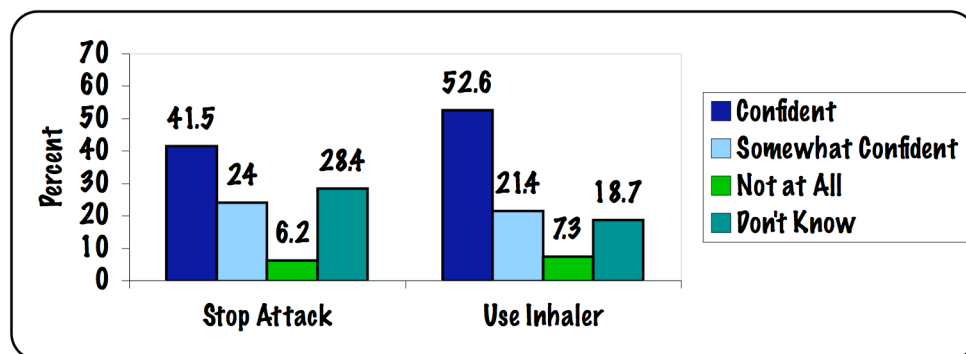
**Figure 3-6. Percentage of Maine kindergarten and third grade students who have a written asthma plan at their school**



*Data source: MCHS*

- Based on parental/guardian reports, 60% of Maine kindergarteners and third graders with current asthma have a written asthma plan at their school.

**Figure 3-7. Maine Fifth graders' self-reported confidence levels at stopping as asthma attack at school and using their inhaler at school**



*Data source: MCHS*

- Roughly 40% of Maine fifth graders with current asthma reported being “confident” that they could stop an asthma attack at school. Although only 6% reported being not at all confident, 28% responded that they “didn’t know.”
- Among those with current asthma, just over 50% of Maine fifth graders reported being “confident” of their abilities using their inhaler at school. Nearly 20% responded that they didn’t know how confident they felt using their inhaler at school.



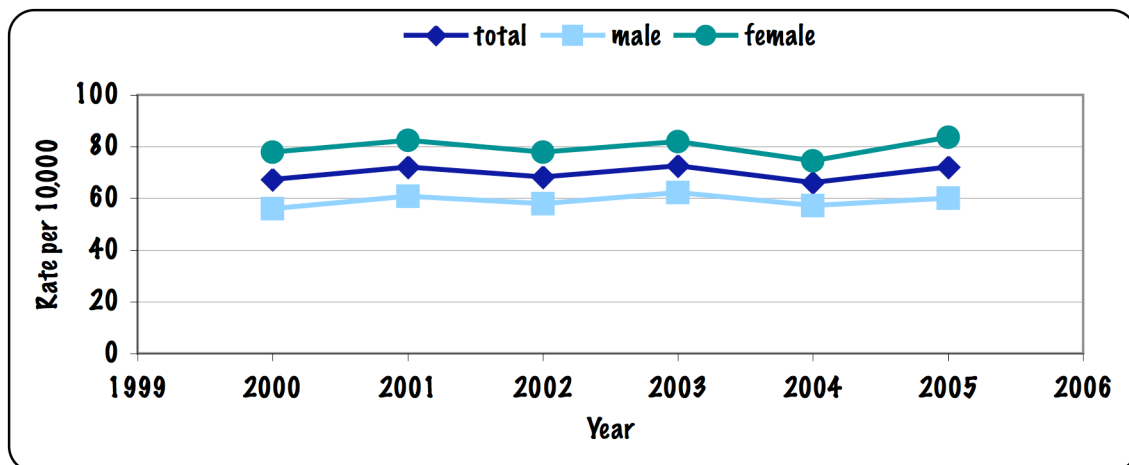
## Chapter 4: Health care Utilization

In this chapter we present data on emergency department visits and hospitalizations for asthma in Maine. These data are collected and maintained by the Maine Health Data Organization and include data from all non-federal hospitals in the state; we restricted our analysis to Maine residents. Event rates are per 10,000 population.

Proper management and control of asthma can largely prevent emergency department visits and hospitalizations. Despite this, nationally there are almost 2 million emergency department visits and almost 500,000 hospitalizations due to asthma each year.<sup>8,9</sup>

Emergency department visits and hospitalizations represent serious complications due to asthma, and well-managed asthma should result in little, if any, need for emergency care. However, even with the best treatment, some patients may still have poorly controlled asthma, thereby leading to some unpreventable health care utilization.<sup>9</sup>

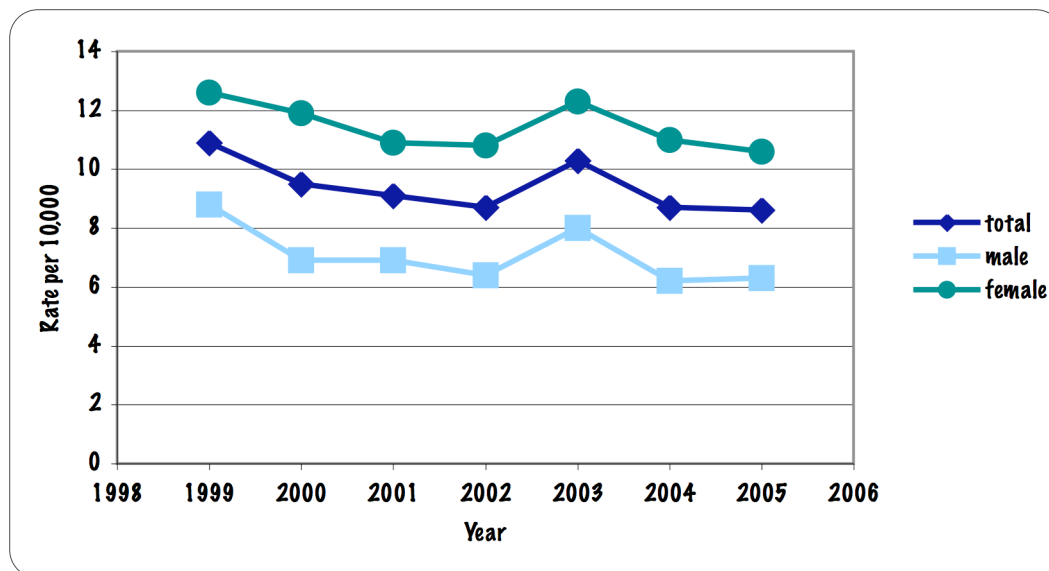
Figure 4-1. Age-adjusted asthma emergency department visit rate by gender, Maine, 2000 - 2005



Data source: MHDO  
Age-adjusted to year 2000 standard population

- Compared to year 2000, the emergency department visit rate was significantly higher in 2005 (66.1 per 10,000 compared to 72.1 per 10,000). However, there was much variability from year to year and a consistent trend was not apparent in emergency department visit rates over time.
  - Females had higher emergency department visit rates than males.
    - In 2005, the asthma emergency department visit rate was 83.6 per 10,000 for females compared to 60.0 per 10,000 for males.

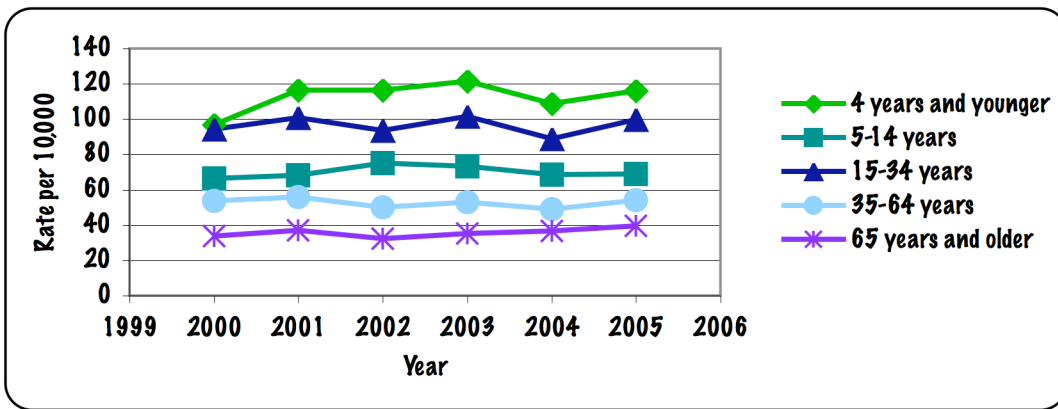
**Figure 4-2. Age-adjusted asthma hospitalization rate by gender, Maine, 1999 – 2005**



*Data source: MHD0  
Age-adjusted to year 2000 standard population*

- There was a significant decrease in hospitalization rates from 1999 to 2005, though the trend was somewhat uneven over time.
  - As of 2005, Maine had not reached the Healthy Maine 2010 goal of 6.5 per 10,000.
  - Females had higher asthma hospitalization rates than males.
    - In 2005, the hospitalization rate for females was 10.6 per 10,000 compared to 6.3 per 10,000 for males.

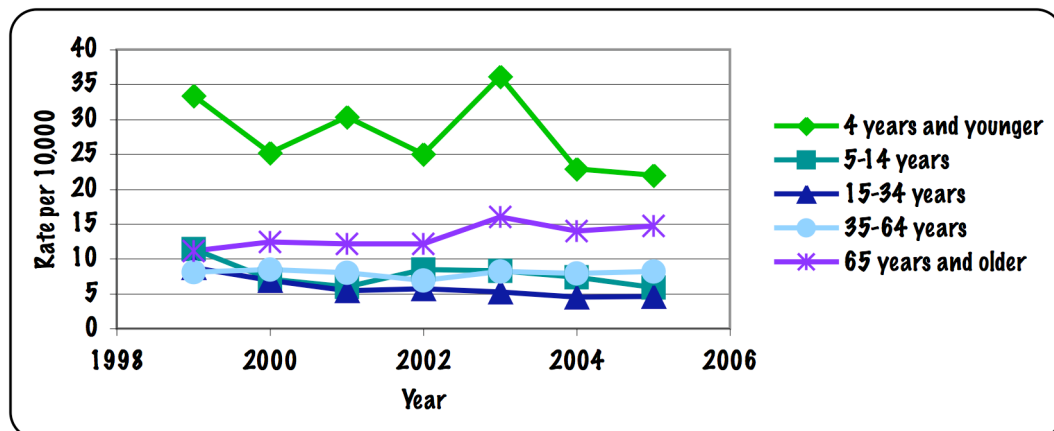
**Figure 4-3. Age-specific asthma emergency department visit rate, Maine, 2000 – 2005**



Data source: MHDO

- Emergency department visit rates were highest in the youngest age group, 4 years and younger, and were generally lower in older age groups.
- Over the six-year period, asthma emergency department visit rates significantly increased for the youngest and oldest age groups while remaining relatively stable for other ages .
- Rates for children under 5 years of age significantly increased from 96.9 to 115.9 per 10,000 from 2000 – 2005.
- Rates for those 65 years and older significantly increased from 33.9 to 39.4 per 10,000 over the same time period.

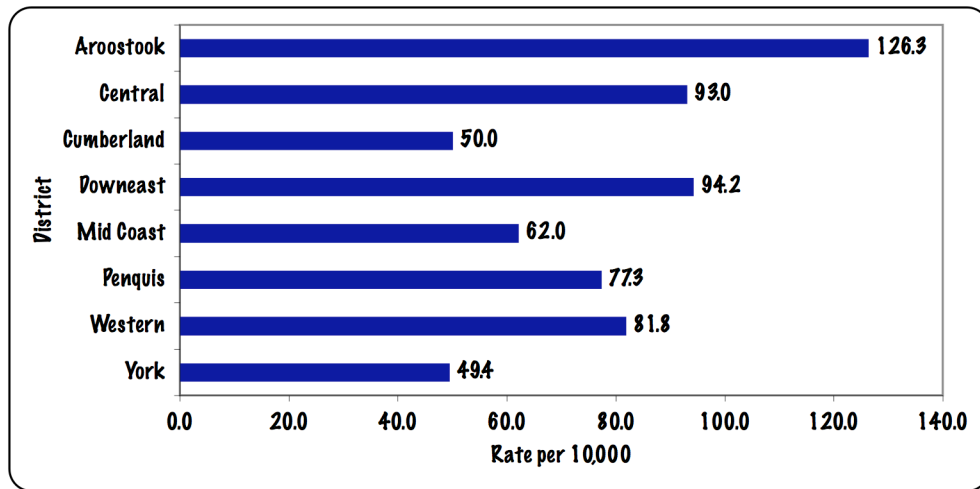
**Figure 4-4. Age-specific asthma hospitalization rate, Maine, 1999-2005**



Data source: MHDO

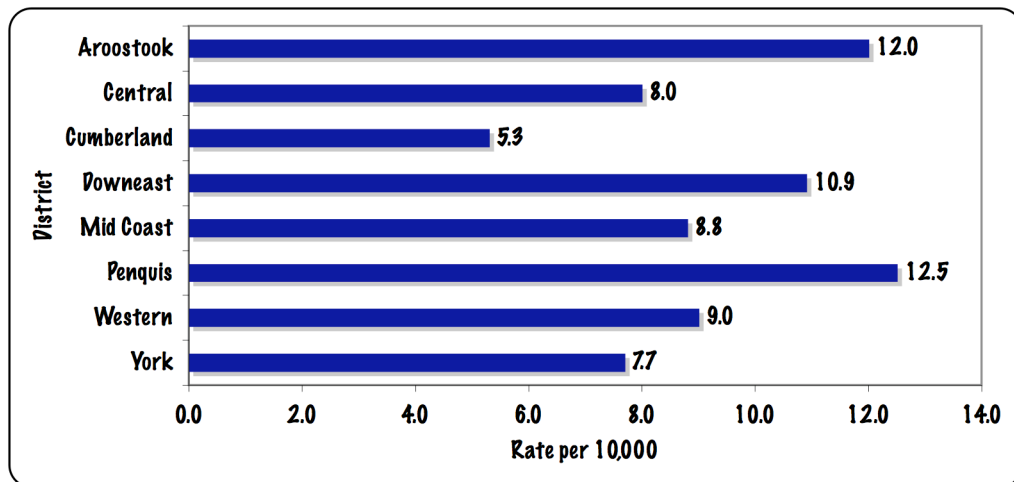
- In Maine, between 1999 and 2005, the highest burden of asthma hospitalization was in those age 4 years and younger.
  - A significant decrease was observed in the asthma hospitalization rate among age groups less than 35 years from 1999 to 2005.
  - Over the same time period, a significant increase in the asthma hospitalization rate occurred among adults 65 years and older.

**Figure 4-5. Age-adjusted asthma emergency department visit rate by Public Health District, Maine, 2005**



*Data source: MHDO Age-adjusted to year 2000 standard population*

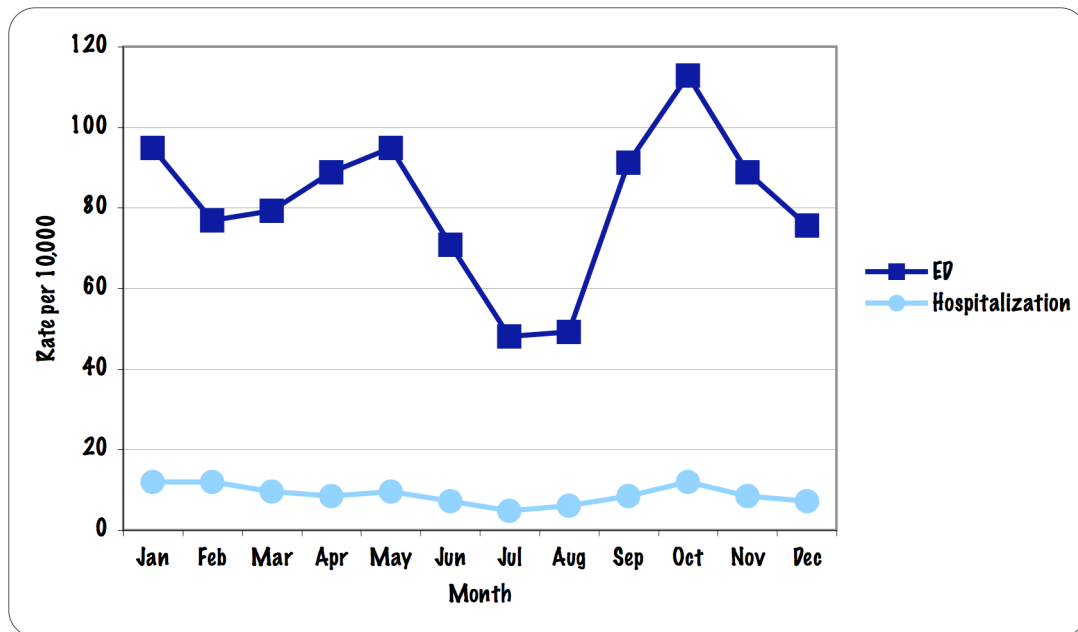
**Figure 4-6. Age-adjusted asthma hospitalizations rate by Public Health District, Maine, 2005**



*Data source: MHDO Age-adjusted to year 2000 standard population*

- Asthma emergency department visit rates and hospitalization rates varied by Maine Public Health District.
  - Southern Maine (York and Cumberland Districts) had the lowest rates.
    - York District had the lowest emergency department visit rate, which was significantly lower than all other districts except Cumberland District.
    - Cumberland District had the lowest hospitalization rate, which was significantly lower than all other districts.
  - Northern Maine (Aroostook and Penquis Districts) had the highest rates.
    - Aroostook District had the highest emergency department visit rate, which was significantly higher than all other districts.
    - Penquis District had the highest hospitalization rate, which was significantly higher than all other districts except Aroostook.

**Figure 4-7. Asthma emergency department visits and hospitalizations by month, Maine, 2005**

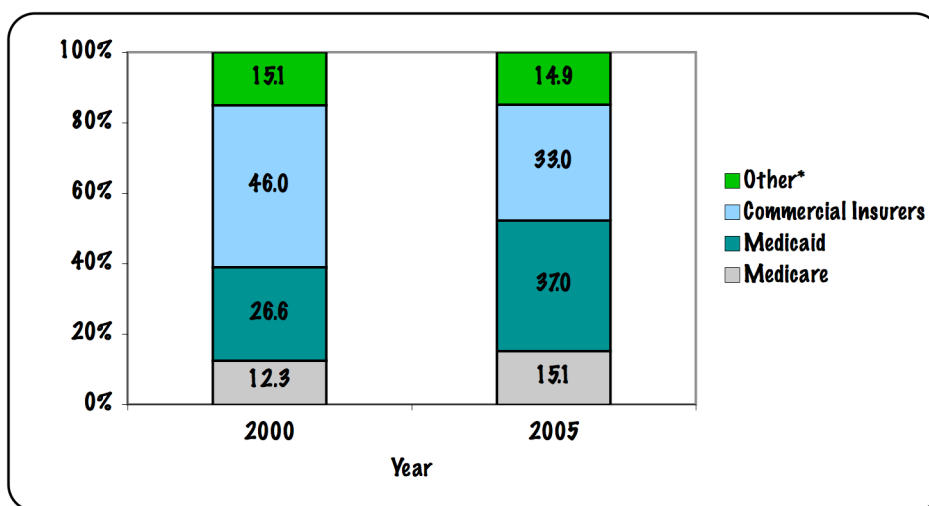


*Data source: MHDO*

*Age-adjusted to year 2000 standard*

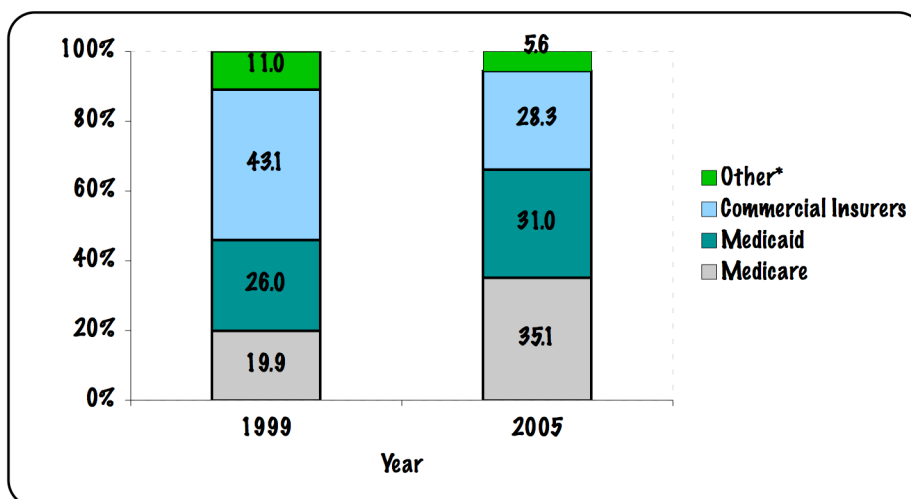
- Asthma emergency department visit rates and hospitalization rates varied by month.
  - Both rates were the lowest in the summer months; higher rates were observed in fall, winter, and spring months.
  - Many common asthma triggers display seasonal variability, including outdoor allergens, poor outdoor air quality, and respiratory infections.

**Figure 4-8. Asthma emergency department visits by primary payer source, Maine, 2000 and 2005**



*Data source: MHDO*

**Figure 4-9. Age-adjusted asthma hospitalizations by primary payer source, Maine, 1999 and 2005**



*Data source: MHDO*

- There have been changes in the distribution of expected payers for both emergency department visits and hospitalizations for asthma.
- Between 2000 and 2005, the proportion of asthma emergency department visits that had MaineCare (Medicaid) listed as the expected payer increased by roughly 40%, while commercial insurance was listed as the expected payer on about 28% fewer. Medicare also increased by 23%.
- For hospital discharges, the proportion that had Medicaid listed as expected primary payer increased by 19% between 1999 and 2005. The proportion with Medicare listed increased by about 75%. Over the same time period, commercial insurers declined by 34%.

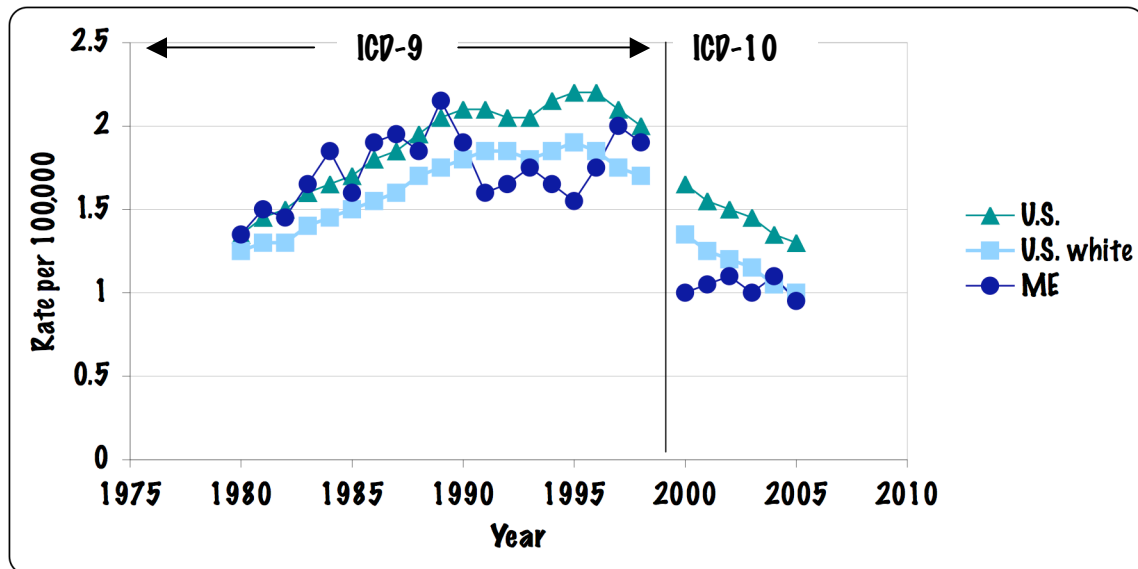
### Healthy People 2010 National and Maine Goals

- Since 2004, Maine has reached 2 of the 3 age-specific Healthy People 2010 (HP2010) goals for asthma hospitalizations.
  - In 2005, children under 5 years had a rate of 22.0 per 10,000 (goal: 25.0 per 10,000); persons aged 5 – 64 years had a rate of 6.5 per 10,000 (goal: 7.7 per 10,000); persons aged 65 years and older had a rate of 14.6 per 10,000 (goal: 11.0 per 10,000).
- Maine has not yet reached any of the 3 age-specific Healthy People 2010 (HP2010) goals for asthma emergency department visits.
  - In 2005, children under 5 years had a rate of 115.9 per 10,000 (goal: 80.0 per 10,000); persons aged 5 – 64 years had a rate of 70.2 per 10,000 (goal: 50.0 per 10,000); and persons aged 65 years and older had a rate of 39.4 per 10,000 (goal: 15.0 per 10,000).

## Chapter 5: Mortality

Over the past two decades, between 10 and 30 people died per year from asthma in Maine. Nationally, there are roughly 4,000 deaths per year from asthma, on average. Death due to asthma represents the most severe outcome due to asthma. These deaths could largely be eliminated through appropriate management.

Figure 5-1. Age-adjusted asthma death rate, U.S. and Maine, 1980-2005

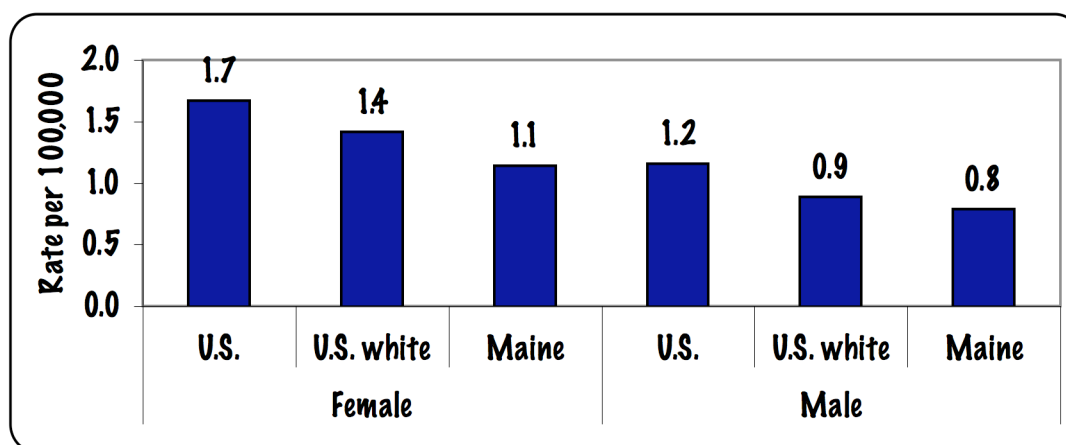


Data source: CDC Wonder  
Age-adjusted to year 2000 standard population  
Rates are presented as trailing 2 year averages.  
The 1998-1999 average is not shown.

- The asthma mortality rate has declined both nationally and in Maine since the mid-1990s.
  - In 1999, mortality classification converted from ICD-9 to ICD-10 codes. Under ICD-10, fewer deaths are identified as being caused by asthma<sup>19</sup>.
- Maine's asthma death rate is lower than the nation- both overall and white-only rates.



**Figure 5-2. Age-adjusted asthma death rate by gender, U.S. and Maine, 1999-2005**



*Data source: CDC Wonder  
Age-adjusted to year 2000 standard population*

- During the period 1999 – 2005, asthma mortality rates for both males and females were lower in Maine than the national rate for all races and white only.
  - Both in Maine and nationally, females have higher asthma mortality rates than males.

#### Asthma Deaths in Public Health Districts

- The age-adjusted mortality rate due to asthma (1997-2004) varied across Maine's public health districts.
  - Two districts – Downeast (1.6 per 100,000) and Central (1.5 per 100,000) – had significantly higher asthma mortality rate than four other districts – Aroostook (0.8 per 100,000), Cumberland (1.1 per 100,000), Penquis (1.0 per 100,000) and York (1.1 per 100,000).

#### Healthy Maine 2010

- We were unable to obtain reliable estimates for asthma mortality rates by age group and therefore were unable to track our progress towards the age-specific Healthy People 2010 (HP2010) asthma mortality goals.

## Chapter 6: Conclusion

**T**his report presents data from comprehensive asthma surveillance activities ongoing in Maine. These data can contribute to improved awareness of the burden of asthma in Maine and to increased understanding of specific areas in need of focused attention.

**The data included in this report inform about the status of asthma in the state of Maine, illustrate the importance of proper management, and can be used to guide public health program activities.**

### **Asthma Prevalence and Management in Maine: Findings from Population-Based Surveys**

Maine's asthma prevalence continues to exceed the national prevalence for both adults and children. Maine-specific analysis reveals the same age and gender disparities observed nationally. Both current and lifetime asthma prevalence were higher for children than adults. Adult women have higher self-reported current asthma prevalence than males, while boys have higher rates of current asthma prevalence than girls.

Individuals – both children and adults – with current asthma were significantly more likely to report fair or poor health status and significantly less likely to report excellent or very good health status compared to those who never had asthma.

The Adult Asthma History Module, included in the 2005 Maine BRFSS, provided data on asthma management and control. Nearly half of those with asthma reported at least weekly symptoms. The data also indicated that many individuals with asthma are not meeting care recommendations outlined in clinical guidelines. Fewer than 1 in 5 individuals with current asthma reported the recommended 2 or more routine asthma check-ups within the past year. In addition, just over one-third of those who reported frequent asthma symptoms reported taking daily medication. These findings reflect that asthma management can be improved in Maine.

### **Emergency Department Visits and Hospitalizations for Asthma in Maine**

Worsening asthma symptoms and exacerbations can lead to emergency department visits, hospitalizations, and deaths; however, these events could largely be prevented if asthma is controlled through proper management. Compared to 2005, emergency department visit rates have significantly increased since 2000 while hospitalization rates have significantly decreased since 1999.

Children under the age of 5 had the highest burden of asthma emergency department visits and hospitalizations of all age groups. These findings mirror those observed at the national level.<sup>20</sup> Hospitalization rates declined between 1999 and 2005 for every age

group under 35 years, while those 65 years and older showed a significant increase in hospitalization rates over the same time period.

Emergency department visit and hospitalization rates revealed geographic disparity. For both emergency department visits and hospitalizations, rates were lowest in York and Cumberland Districts of southern Maine and generally higher in northern Maine's Aroostook District. This pattern is not unique to asthma. Northern Maine is frequently recognized as having disparities in health status, health care access, and socioeconomic measures.

Emergency department visit and hospitalization rates showed a seasonal pattern. Both rates were lowest in the summer months and higher in the fall, spring, and winter. We can only speculate on causes, but it is possible that higher rates in the spring and fall may be due to outdoor allergens – including spores, mold, and pollen – while indoor triggers, such as wood-burning stoves, and respiratory infections may contribute to higher rates in the winter.

### **Socioeconomic and Racial/Ethnic Disparities in Asthma**

We documented socioeconomic disparities in asthma prevalence and outcomes. Asthma prevalence was significantly higher among adults and children who were insured under MaineCare. Lower family income and educational attainment were reported by Maine adults with current asthma compared to those who reported never having had asthma.

We did not present data for racial/ethnic groups because the numbers of non-white persons in Maine prohibit reliable and meaningful analysis. Combining all non-white individuals into a “non-white” category masks differences among groups and can lead to the interpretation that there are not racial/ethnic disparities in Maine if, for example, lower prevalence or rate estimates in some groups balance higher estimates in other groups. In addition, race/ethnicity is not yet reliably collected on hospital, emergency department, or death records. Nationally, disparities have been observed in asthma prevalence and outcomes, and there is not a compelling reason to assume that such relations would not hold in Maine. Maine's population is changing, with growing numbers of non-white individuals, individuals who likely experience the same health disparities that have been documented nationally.

### **Progress Towards Healthy People 2010 Goals**

Maine has reached two of the three age-specific Healthy People 2010 goals for asthma hospitalizations—for children under 5 years and individuals 5 – 64 years of age. However, Maine has not yet met any of the three age-specific Healthy People 2010 (HP2010) goals for asthma emergency department visit rates. We were unable to track our progress towards HP2010 goals for asthma mortality due to the low number of deaths in the state.

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## Appendix 1: Data Tables

### Chapter 2: Prevalence- Who Suffers from Asthma?

Table 2-1. Adult lifetime asthma prevalence, U.S. and Maine, 2000 – 2005

Year	Number	Percent	95% CI
<b><i>U.S. (all races)</i></b>			
2000	NA	10.5	10.3 – 10.7
2001	NA	11.0	10.8 – 11.2
2002	NA	11.8	11.6 – 12.0
2003	NA	11.9	11.6 – 12.1
2004	NA	13.3	13.1 – 13.6
2005	NA	12.5	12.3 – 12.7
<b><i>U.S. (white)</i></b>			
2000	NA	10.4	10.1 – 10.6
2001	NA	10.8	10.5 – 11.0
2002	NA	11.7	11.4 – 11.9
2003	NA	11.7	11.5 – 12.0
2004	NA	13.2	13.0 – 13.5
2005	NA	12.4	12.2 – 12.7
<b><i>Maine</i></b>			
2000	556	12.4	10.7 – 14.1
2001	304	12.6	11.1 – 14.2
2002	340	13.6	12.1 – 15.1
2003	312	13.4	11.8 – 15.0
2004	504	14.7	13.3 – 16.1
2005	534	15.0	13.5 – 16.5

Data source: BRFSS

Table 2-2. Adult current asthma prevalence, U.S. and Maine, 2000 – 2005

Year	Number	Percent	95% CI
<b><i>U.S. (all races)</i></b>			
2000	NA	7.2	7.0 – 7.4
2001	NA	7.2	7.0 – 7.4
2002	NA	7.5	7.3 – 7.7
2003	NA	7.7	7.5 – 7.9
2004	NA	8.1	7.9 – 8.3
2005	NA	7.8	7.7 – 8.0
U.S. (white)			
2000	NA	7.1	6.9 – 7.4
2001	NA	7.1	6.9 – 7.3
2002	NA	7.4	7.2 – 7.6
2003	NA	7.6	7.4 – 7.9
2004	NA	8.0	7.8 – 8.3
2005	NA	7.8	7.6 – 8.0
Maine			
2000	413	8.9	7.5 – 10.3
2001	228	9.4	8.1 – 10.7
2002	255	10.0	8.7 – 11.3
2003	235	9.9	8.5 – 11.3
2004	346	9.6	8.4 – 10.8
2005	390	10.2	8.9 – 11.5

Data source: BRFSS

Table 2-3. Child lifetime and current asthma prevalence, U.S. and Maine, 2003

Asthma Status	Number	Percent	95% CI
U.S. (all races)			
Current	8,689	8.9	8.6 – 9.2
Lifetime	12,202	12.5	12.1 – 12.8
U.S. (white)			
Current	5,926	7.9	7.6 – 8.2
Lifetime	8,395	11.4	11.0 – 11.8
Maine			
Current	201	10.7	9.2 – 12.4
Lifetime	282	14.6	12.9 – 16.6

Asthma Status	Number	Percent	95% CI
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Data source: NSCH

Table 2-4. Adult current asthma prevalence by Public Health District, Maine, 2000 – 2005

District	Number	Percent	95% CI
Aroostook	91	9.7	7.6 – 12.4
Central	232	9.3	8.0 – 10.7
Cumberland	297	10.0	8.8 – 11.4
Downeast	122	8.9	7.1 – 11.0
Mid Coast	341	8.1	7.0 – 9.4
Penquis	195	10.3	8.7 – 12.1
Western	318	10.1	8.8 – 11.6
York	216	10.4	9.0 – 12.1

Data source: BRFSS

Table 2-5. Adult current asthma prevalence by gender, U.S. and Maine, 2000 – 2005

Year	Males			Females		
	Number	Percent	95% CI	Number	Percent	95% CI
U.S.						
2000	NA	5.1	4.9 – 5.4	NA	9.1	8.8 – 9.4
2001	NA	5.3	5.1 – 5.6	NA	8.9	8.6 – 9.2
2002	NA	5.5	5.3 – 5.8	NA	9.4	9.1 – 9.6
2003	NA	5.8	5.5 – 6.1	NA	9.5	9.2 – 9.7
2004	NA	6.1	5.8 – 6.4	NA	10.0	9.7 – 10.3
2005	NA	5.6	5.4 – 5.8	NA	10.0	9.7 – 10.2
Maine						
2000	116	6.9	5.0 – 8.7	297	10.8	8.9 – 12.8
2001	66	7.3	5.3 – 9.2	162	11.4	9.5 – 13.2
2002	70	7.7	5.8 – 9.6	185	12.2	10.4 – 14.0
2003	66	7.5	5.5 – 9.5	169	12.0	10.1 – 13.9
2004	87	7.3	5.6 – 9.0	259	11.8	10.2 – 13.4
2005	108	7.7	6.0 – 9.4	282	12.6	10.8 – 14.4

Data source: BRFSS

Table 2-6. Child current and lifetime asthma prevalence by gender, U.S. and Maine, 2003

Sex	Asthma Status	Number	Percent	95% CI
<b><i>U.S.</i></b>				
Males	Current	4,960	10.3	9.8 – 10.7
	Lifetime	7,144	14.6	14.0 – 15.1
Females	Current	3,723	7.4	7.0 – 7.9
	Lifetime	5,049	10.3	9.8 – 10.8
<b>Maine</b>				
Males	Current	118	12.0	9.8 – 14.6
	Lifetime	171	16.7	14.2 – 19.6
Females	Current	82	9.2	7.2 – 11.7
	Lifetime	110	12.3	9.9 – 15.1

Data source: NSCH

Table 2-7. Age-specific adult current asthma prevalence, Maine, 2000 – 2005

Year	Age Group	Number	Percent	95% CI
2000 – 2001	18 – 24 years	59	13.4	9.8 – 18.0
	25 – 34 years	113	9.6	7.5 – 12.2
	35 – 44 years	132	8.3	6.7 – 10.3
	45 – 54 years	126	8.4	6.6 – 10.7
	55 – 64 years	92	7.5	5.8 – 9.7
	65 years and older	117	8.9	6.9 – 11.2
2002 – 2003	18 – 24 years	34	11.7	8.2 – 16.5
	25 – 34 years	73	10.0	7.8 – 12.7
	35 – 44 years	89	8.4	6.7 – 10.5
	45 – 54 years	113	10.9	8.9 – 13.2
	55 – 64 years	85	10.7	8.6 – 13.3
	65 years and older	93	9.2	7.4 – 11.3
2004 – 2005	18 – 24 years	50	14.7	10.8 – 19.7
	25 – 34 years	94	9.2	7.3 – 11.4
	35 – 44 years	147	10.7	8.9 – 12.7
	45 – 54 years	172	9.7	8.2 – 11.4
	55 – 64 years	124	8.8	7.3 – 10.7
	65 years and older	142	7.7	6.4 – 9.3

Data source: BRFSS



Table 2-8. Age-specific child current asthma prevalence, Maine, 2003

Grade	Number	Percent	95% CI
4 years and younger	23	6.5	4.1 – 10.2
5 – 10 years	67	10.4	8.0 – 13.3
11 – 13 years	43	13.5	9.7 – 18.5
14 – 17 years	68	13.0	9.9 – 17.0

Data source: NSCH

Table 2-A1. Adult current asthma prevalence by race, Maine, 2000 – 2005

Race	Number	Percent	95% CI
<b>White</b>			
2000 – 2001	207	9.0	7.8 – 10.5
2002 – 2003	461	10.0	9.0 – 11.0
2004 – 2005	672	9.6	8.8 – 10.5
<b>Non-white</b>			
2000 – 2001	21	14.8	9.6 – 22.2
2002 – 2003	29	9.5	6.3 – 14.2
2004 – 2005	64	16.5	12.5 – 21.3

Data source: BRFSS

Table 2-A2. Child current and lifetime asthma prevalence by race, Maine, 2003

Race	Asthma Status	Number	Percent	95% CI
White	Current	192	11.0	9.4 – 12.9
	Lifetime	267	15.0	13.1 – 17.0
Non-white	Current	6	4.6	2.0 – 10.3
	Lifetime	8	7.3	3.2 – 15.6

Data source: NSCH

Table 2-9a. Adult asthma status by education level, Maine, 2005

Asthma Status	Education Level	Number	Percent	95% CI
Current	Less than high school	50	16.0	11.2 – 22.4
	High school or GED	128	9.5	7.7 – 11.8
	Some college	108	11.7	9.2 – 14.8
	College graduate	104	8.3	6.7 – 10.3
Former	Less than high school	8	3.7	1.6 – 8.7
	High school or GED	33	2.5	1.7 – 3.8
	Some college	53	6.5	4.6 – 9.1
	College graduate	59	4.9	3.6 – 6.5
Never had	Less than high school	233	80.3	73.3 – 85.8
	High school or GED	1,182	87.9	85.5 – 90.0
	Some college	837	81.8	78.2 – 84.9
	College graduate	1,135	86.9	84.5 – 88.9

Data source: BRFSS

Table 2-9b. Adult asthma status by insurance status, Maine, 2005

Asthma Status	Health Insurance	Number	Percent	95% CI
Current	Medicaid	135	19.8	16.0-24.4
	Other insurance	216	8.0	6.9-9.4
	Uninsured	35	9.1	6.0-13.4
Former	Medicaid	24	3.6	2.2-5.8
	Other insurance	112	4.7	3.8-6.0
	Uninsured	16	3.5	2.0-6.1
Never had	Medicaid	546	76.6	71-9-80.6
	Other insurance	2,419	87.3	85.6-88.8
	Uninsured	396	87.4	82.9-90.9

Data source: BRFSS

Table 2-10. Child current asthma status by insurance status, Maine, 2005

Asthma Status	Health Insurance	Number	Percent	95% CI
Current	Medicaid	121	15.1	12.8-17.7
	Commercial Insurance	166	9.5	8.2-10.9
	Uninsured	7	7.0	2.6-10.9

Data source: MCHS

### Chapter 3: Management and Quality of Life

Table 3-1a Adult asthma status by health status, Maine, 2005

Asthma Status	Health Status	Number	Percent	95% CI
Current	Excellent or very good	130	35.4	29.1 – 41.8
	Good	120	31.9	25.7 – 38.1
	Fair or poor	139	32.7	26.8 – 38.6
Former	Excellent or very good	91	63.2	53.8 – 72.7
	Good	40	23.7	15.6 – 31.8
	Fair or poor	20	13.1	6.4 – 19.7
Never had	Excellent or very good	2,002	59.9	57.9 – 62.0
	Good	919	27.5	25.7 – 29.4
	Fair or poor	450	12.6	11.2 – 13.9

Data source: BRFSS

Table 3-1b. Child health status by asthma status, Maine, 2003

Asthma Status	Health Status	Number	Percent	95% CI
Current	Excellent or very good	153	72.2	64.1 – 79.0
	Good	37	20.0	14.3 – 27.3
	Fair or poor	10	7.8	4.0 – 14.8
Never had	Excellent or very good	1,529	93.1	91.5 – 94.5
	Good	86	5.5	4.3 – 7.1
	Fair or poor	19	1.4	0.8 – 2.2

Data source: NSCH

Table 3-2a. Asthma symptoms per week in the past month among adults, Maine, 2005

Frequency of Symptoms	Number	Percent	95% CI
Less than once per week	178	50.5	43.6 – 57.4
Once to less than 7 times per week	115	33.7	26.9 – 40.5
Every day	67	15.8	11.5 – 20.1

Data source: BRFSS

Table 3-2b. Activity limitations in the past year due to asthma among adults, Maine, 2005

Number of Days Asthma Limited Normal Activities	Number	Percent	95% CI
None	256	70.7	64.2 – 77.1
1 – 3 days	27	8.8	4.2 – 13.4
4 – 10 days	21	4.8	2.2 – 7.5
At least 11 days	48	15.7	10.5 – 20.9

Data source: BRFSS

Table 3-2c. Problems staying asleep due to symptoms in the past month among adults, Maine, 2005

Frequency of Problems Staying Asleep	Number	Percent	95% CI
None	161	55.7	47.5 – 63.8
1 – 4 nights	74	31.6	23.3 – 39.9
At least 5 nights	38	12.7	7.7 – 17.8

Data source: BRFSS

Table 3-2d. Emergency room (ER) or urgent treatment in the past year due to asthma among adults, Maine, 2005

Past Year ER or Urgent Treatment	Number	Percent	95% CI
Yes	105	30.3	23.7 – 36.8
No	261	69.7	63.2 – 76.3

Data source: BRFSS

Table 3-3. Number of routine physician visits for asthma in the past year among adults, Maine, 2005

Number of Routine Asthma Physical Exams	Number	Percent	95% CI
None	176	56.1	49.6 – 62.6
One	98	24.7	19.5 – 29.9
Two or more	86	19.2	14.5 – 23.9

Data source: BRFSS

Table 3-4a. Asthma attack in the past year among adults, Maine, 2005

Past Year Attack	Number	Percent	95% CI
Yes	180	47.1	40.3 – 53.9
No	189	52.9	46.1 – 59.7

Data source: BRFSS

Table 3-4b. Asthma attack in the past year among children, U.S. and Maine, 2003

Past Year Asthma Attack	Number	Percent	95% CI
U.S. (all races)	5,503	46.4	44.8 – 47.9
U.S. (white)	3,879	47.4	45.6 – 49.2
Maine	128	48.9	42.0 – 55.8

Data source: NSCH

Table 3-5a. Any days of normal activity limitation in the past year due to asthma among children with current asthma, Maine, 2004, 2005

Any Days Asthma Limited Normal Activities	Number	Percent	95% CI
K/3 <sup>rd</sup> grade	206	65.6	60.2 – 70.6
5 <sup>th</sup> grade	249	46.9	42.7 – 51.1

Data source: MCHS

Table 3-b & c. Sleep disturbances due to wheezing and dry cough in the past year among children with current asthma, Maine, 2004, 2005

Past Year Sleep Disturbances	Number	Percent	95% CI
Due to wheezing			
K/3 <sup>rd</sup> grade	161	58.3	52.4 – 64.0
5 <sup>th</sup> grade	207	40.4	36.3 – 44.7
Due to dry cough			
K/3 <sup>rd</sup> grade	191	60.8	55.3 – 66.1
5 <sup>th</sup> grade	233	44.2	40.0 – 48.5

Data source: MCHS

Table 3-6. Written plan for asthma among children with current asthma, Maine, 2004

Written Plan	Number	Percent	95% CI
Yes	185	59.7	54.2 – 65.0
No	125	40.3	35.1 – 45.8

Data source: MCHS

Table 3-7a. Confidence in ability to stop an asthma attack at school, Maine, 2005

Level of Confidence	Number	Percent	95% CI
Confident	161	41.5	36.7 – 46.4
Somewhat confident	93	24.0	20.0 – 28.5
Not at all	24	6.2	4.2 – 9.1
Don't know	110	28.4	24.1 – 33.0

Data source: MCHS

Table 3-7b. Confidence in ability to use inhaler at school, Maine, 2005

Level of Confidence	Number	Percent	95% CI
Confident	194	52.6	47.5 – 57.6
Somewhat confident	79	21.4	17.5 – 25.9
Not at all	27	7.3	5.1 – 10.5
Don't know	69	18.7	15.1 – 23.0

Data source: MCHS

## Chapter 4: Healthcare Utilization

Table 4-1. Age-adjusted asthma emergency department visit rate per 10,000 population by sex, Maine, 2000 – 2005

Year	Number	Crude Rate	Age-Adjusted Rate
Total			
2000	8,293	65.0	67.3
2001	8,941	69.5	72.1
2002	8,394	64.8	68.3
2003	8,950	68.5	72.5
2004	8,228	62.5	66.1
2005	8,988	68.0	72.1
Males			
2000	3,350	54.0	55.9
2001	3,683	58.8	60.9
2002	3,429	54.4	58.0
2003	3,718	58.4	62.3
2004	3,424	53.2	57.1
2005	3,606	55.9	60.0
Females			
2000	4,943	75.5	78.0
2001	5,258	79.7	82.4
2002	4,965	74.7	77.8
2003	5,231	78.2	82.0
2004	4,804	71.3	74.6
2005	5,381	79.6	83.6

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2000 – 2005

Table 4-2. Age-adjusted asthma hospitalization rate per 10,000 population by sex, Maine, 1999 – 2005

Year	Number	Crude Rate	Age-Adjusted Rate
Total			
1999	1,340	10.6	10.9
2000	1,197	9.4	9.5
2001	1,148	8.9	9.1
2002	1,093	8.4	8.7
2003	1,307	10.0	10.3
2004	1,140	8.7	8.7
2005	1,147	8.7	8.6
Males			
1999	517	8.4	8.8
2000	398	6.4	6.9
2001	404	6.4	6.9
2002	367	5.8	6.4
2003	462	7.3	8.0
2004	365	5.7	6.2
2005	382	5.9	6.3
Females			
1999	823	12.6	12.6
2000	799	12.2	11.9
2001	744	11.3	10.9
2002	726	10.9	10.8
2003	845	12.6	12.3
2004	775	11.5	11.0
2005	765	11.3	10.6

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 1999 – 2005

Table 4-3. Age-specific asthma emergency department visit rate per 10,000 population, Maine, 2000 – 2005

Year	Age	Number	Crude Rate
2000	4 years and younger	685	96.9
	5-14 years	1,166	66.5
	15-34 years	2,983	94.2
	35-64 years	2,840	53.7
	65 years and older	619	33.8
2001	4 years and younger	832	116.6
	5-14 years	1,210	68.3
	15-34 years	3,225	101.0
	35-64 years	2,992	56.0
	65 years and older	682	36.9
2002	4 years and younger	758	116.4
	5-14 years	1,197	75.2
	15-34 years	3,050	93.4
	35-64 years	2,788	50.0
	65 years and older	601	32.2
2003	4 years and younger	819	121.6
	5-14 years	1,190	73.4
	15-34 years	3,289	101.7
	35-64 years	2,992	53.0
	65 years and older	660	35.2
2004	4 years and younger	735	108.7
	5-14 years	1,090	68.7
	15-34 years	2,896	88.8
	35-64 years	2,815	48.9
	65 years and older	692	36.5
2005	4 years and younger	784	115.9
	5-14 years	1,056	68.8
	15-34 years	3,249	99.7
	35-64 years	3,140	54.0
	65 years and older	759	39.4

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2000 – 2005



Table 4-4. Age-specific asthma hospitalization rate per 10,000 population, Maine, 1999 – 2005

Year	Age	Number	Crude Rate
1999	4 years and younger	240	33.4
	5-14 years	199	11.4
	15-34 years	278	8.7
	35-64 years	421	8.1
	65 years and older	202	11.1
2000	4 years and younger	178	25.2
	5-14 years	124	7.1
	15-34 years	219	6.9
	35-64 years	449	8.5
	65 years and older	227	12.4
2001	4 years and younger	216	30.3
	5-14 years	107	6.0
	15-34 years	172	5.4
	35-64 years	429	8.0
	35 – 64 years	429	8.0
	65 years and older	224	12.1
2002	4 years and younger	163	25.0
	5-14 years	136	8.5
	15-34 years	186	5.7
	35-64 years	383	6.9
	65 years and older	225	12.1
2003	4 years and younger	243	36.1
	5-14 years	134	8.3
	15-34 years	169	5.2
	35-64 years	461	8.2
	65 years and older	300	16.0
2004	4 years and younger	155	22.9
	5-14 years	118	7.4
	15-34 years	147	4.5
	35-64 years	455	7.9
	65 years and older	265	14.0
2005	4 years and younger	149	22.0
	5-14 years	91	5.9
	15-34 years	149	4.6
	35-64 years	475	8.2
	65 years and older	283	14.7

Year	Age	Number	Crude Rate
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Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 1999 – 2005

Table 4-5. Age-adjusted asthma emergency department visit rate per 10,000 population by public health district, Maine, 2005

District	Number	Crude Rate	Age-Adjusted Rate
Aroostook	855	116.7	126.3
Central	1,499	86.8	93.0
Cumberland	1,303	47.4	50.0
Downeast	785	90.1	94.2
Mid Coast	878	57.7	62.0
Penquis	1,234	74.9	77.3
Western	1,502	77.3	81.8
York	932	46.1	49.4

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2005

Table 4-6. Age-adjusted asthma hospitalization rate per 10,000 population by public health district, Maine, 2005

District	Number	Crude Rate	Age-Adjusted Rate
Aroostook	90	12.3	12.0
Central	139	8.1	8.0
Cumberland	148	5.4	5.3
Downeast	95	10.9	10.9
Mid Coast	142	9.3	8.8
Penquis	212	12.9	12.5
Western	167	8.6	9.0
York	154	7.6	7.7

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2005

Table 4-7a. Age-adjusted asthma emergency department visit rates per 10,000 population by month, Maine, 2005

Month	Number	Crude Rate	Age-Adjusted Rate
January	880	80.4	82.8
February	697	63.6	64.8
March	736	67.2	69.6
April	830	75.6	80.4
May	880	80.4	85.2
June	663	60.0	63.6
July	461	42.0	43.2
August	458	42.0	43.2
September	834	75.6	82.8
October	1,022	92.4	100.8
November	829	75.6	80.4
December	698	63.6	68.4

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2005

Table 4-7b. Age-adjusted asthma hospitalization rates per 10,000 population by month, Maine, 2005

Month	Number	Crude Rate	Age-Adjusted Rate
January	131	12.0	12.0
February	135	12.0	12.0
March	110	9.6	9.6
April	93	8.4	8.4
May	102	9.6	9.6
June	77	7.2	7.2
July	58	4.8	4.8
August	65	6.0	6.0
September	81	7.2	8.4
October	122	10.8	12.0
November	89	8.4	8.4
December	84	7.2	7.2

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2005

Table 4-8. Asthma emergency department visits by primary payer source, Maine, 2000 and 2005

Payer Source	2000		2005	
	Number	Percent	Number	Percent
Medicare	1,020	12.3	1,357	15.1
Medicaid	2,207	26.6	3,323	37.0
Commercial Insurers	3,812	46.0	2,965	33.0
Other*	1,254	15.1	1,343	14.9

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2000, 2005

\*Other includes USVA, self-pay/charity, worker's compensation, and other/unknown

Table 4-9. Asthma hospitalizations by primary payer source, Maine, 1999 and 2005

Primary Payer Source	1999		2005	
	Number	Percent	Number	Percent
Medicare	267	19.9	403	35.1
Medicaid	348	26.0	355	31.0
Commercial Insurers	577	43.1	325	28.3
Other*	148	11.0	64	5.6

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 1999, 2005

\*Other includes USVA, self-pay/charity, worker's compensation, and other/unknown

Table 4-HP1. Comparison of asthma emergency department visit rate per 10,000 population versus Healthy People 2010 (HP2010) goals, Maine, 2002 – 2005

	Children under 5*		Persons 5 – 64*		Persons 65 and older*	
	Number	Rate	Number	Rate	Number	Rate
2002	758	116.4	7,035	67.5	601	32.2
2003	819	121.6	7,471	71.1	660	35.2
2004	735	108.7	6,801	64.2	692	36.5
2005	784	115.9	7,445	70.2	759	39.4
HP2010 Goal		80.0		50.0		15.0

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2002 – 2005

\*Crude rates, not adjusted for age

Table 4-HP2. Comparison of asthma hospitalization rate per 10,000 population versus Healthy People 2010 (HP2010) goals, Maine, 2002 – 2005

Year	Children under 5*		Persons 5 – 64†		Persons 65 and older†	
	Number	Rate	Number	Rate	Number	Rate
2002	163	25.0	705	6.8	225	12.0
2003	243	36.1	764	7.2	300	15.9
2004	155	22.9	720	6.7	265	13.9
2005	149	22.0	715	6.5	283	14.6
HP2010 Goal		25.0		7.7		11.0

Data source: MHDO

ICD9-CM Code: 493.0 – 493.9, Primary Diagnosis, 2002 – 2005

\*Crude rates, not adjusted for age

†Age-adjusted rates, year 2000 standard population

## Chapter 5: Mortality

Table 5-1. Age-adjusted asthma mortality rate per 100,000 population, U.S. and Maine, 1979 – 2005

Year	U.S. (all races)		U.S. (whites)		Maine	
	Number	Age-adjusted rate	Number	Age-adjusted rate	Number	Age-adjusted rate
1979	2,598	1.3	2,095	1.2	13	1.2
1980	2,891	1.4	2,291	1.3	16	1.5
1981	3,054	1.5	2,426	1.3	16	1.5
1982	3,154	1.5	2,450	1.3	15	1.4
1983	3,561	1.7	2,751	1.5	22	1.9
1984	3,564	1.6	2,779	1.4	21	1.8
1985	3,880	1.8	3,026	1.6	17	1.4
1986	3,955	1.8	3,036	1.5	27	2.4
1987	4,360	1.9	3,327	1.7	17	1.5
1988	4,597	2.0	3,473	1.7	26	2.2
1989	4,869	2.1	3,761	1.8	25	2.1
1990	4,819	2.1	3,696	1.8	20	1.7
1991	5,106	2.1	3,915	1.9	19	1.5
1992	4,964	2.0	3,789	1.8	22	1.8
1993	5,167	2.1	3,910	1.8	22	1.7
1994	5,487	2.2	4,134	1.9	21	1.6
1995	5,637	2.2	4,208	1.9	20	1.5
1996	5,667	2.2	4,110	1.8	27	2.0
1997	5,434	2.0	4,002	1.7	27	2.0
1998	5,438	2.0	3,947	1.7	25	1.8
1999	4,657	1.7	3,328	1.4	18	1.3
2000	4,487	1.6	3,144	1.3	10	0.7
2001	4,269	1.5	2,990	1.2	20	1.4
2002	4,261	1.5	3,014	1.2	12	0.8
2003	4,099	1.4	2,888	1.1	18	1.2
2004	3,816	1.3	2,658	1.0	14	1.0
2005	3,884	1.3	2,714	1.0	14	0.9

Data source: CDC Wonder

ICD-9 Code: 493, Underlying Cause of Death, 1979 – 1998

ICD-10 Code: J45 – J46, Underlying Cause of Death, 1999 – 2005

Table 5-2. Average age-adjusted asthma mortality rate per 100,000 population by gender, U.S. and Maine, 1999 – 2004

Sex	Number	Crude Rate	Age-Adjusted Rate
U.S. (all races)			
Male	9,190	1.1	1.2
Female	16,399	1.9	1.7
U.S. (white)			
Male	5,869	0.8	0.9
Female	12,153	1.7	1.4
Maine			
Male	26	0.7	0.7
Female	64	1.6	1.2

Data source: ODRVS, State of Maine & CDC Wonder

ICD-10 Code: J45 – J46, Underlying Cause of Death, 1999 – 2004

Table 5-3. Average age-adjusted asthma mortality rate per 100,000 population by district, Maine, 1997 – 2004

District	Number	Crude Rate	Age-Adjusted Rate
Aroostook	6	1.0	0.8
Central	23	1.7	1.5
Cumberland	25	1.2	1.1
Downeast	14	2.0	1.6
Mid Coast	17	1.5	1.2
Penquis	14	1.1	1.0
Western	23	1.5	1.3
York	17	1.1	1.1

Data source: ODRVS, State of Maine

ICD-9 Code: 493, Underlying Cause of Death, 1997 – 1998

ICD-10 Code: J45 – J46, Underlying Cause of Death, 1999 – 2004

## Appendix 2: Glossary

**Age-adjustment** – Age-adjustment is a statistical technique that allows rates to be compared across populations with different age distributions—accounting for differences in age. The age distribution can differ geographically and over time. In addition, many health conditions vary by age. For example, Maine tends to have an age distribution skewed toward older ages, compared to the rest of the nation. Asthma tends to disproportionately affect younger individuals. Age-adjusted rates will enable a comparison of asthma rates in Maine and the U.S. that is independent of differences in age structure—that is, the age-adjusted rates allow us to compare rates that would be expected if Maine and the U.S. had the same age distributions. A rate is age-adjusted by multiplying age-specific crude rates by weights that represent the proportion of a standard population within each age group; the products are then summed over age groups. Additional information on age-adjustment is available at: <http://www.cdc.gov/nchs/data/statnt/statnt06rv.pdf>.

**Age-adjusted rates** – Rates that have been age-adjusted. See “age-adjustment.”

**Confidence interval** – The confidence interval is a measure of sampling variability. We present measures of disease burden (specifically, prevalence) calculated with data from survey samples. Survey samples include only a sub-set of the population. It is assumed that repeated samples, using the same methodology, would yield slightly different estimates of burden, say, prevalence. Therefore, we call our calculated prevalence an “estimate” to reflect the uncertainty in its true underlying value in the population. The confidence interval provides a range of values within which we believe it is likely that the true prevalence lies. See also “significant difference.”

**Crude rate, rate** – The crude rate is the number of events in the population divided by the total population. Rates are time and population specific.

**Healthy Maine 2010** – A State of Maine-sponsored activity, modeled after Healthy People 2010, to reduce morbidity and mortality of Mainers. Additional information on Healthy Maine 2010 can be found at: <http://www.maine.gov/dhhs/boh/healthyme2k/hm2010a.htm>

**Healthy People 2010** – A United States Department of Health and Human Services-sponsored activity to reduce morbidity and mortality as well as improve the quality of life. Additional information on Healthy People 2010 can be found at: <http://www.healthypeople.gov/>

**Prevalence** – The proportion, or percentage, of a population that has disease at a specific point or period in time.

**Public Health Districts** – Regions created for the purposes of data, planning, administration, funding allocation, and the effective and efficient delivery of public health services.

Aroostook District = Aroostook County

Central District = Kennebec and Somerset Counties

Cumberland District = Cumberland County

Downeast District = Hancock and Washington Counties

Mid Coast District = Knox, Lincoln, Waldo, and Sagadahoc Counties

Penquis District = Penobscot and Piscataquis Counties

Western District = Androscoggin, Franklin, and Oxford Counties

York District = York County

**Significant differences** – In this report, an assessment of significant difference between two estimates, also called statistically significant difference, is based on whether the estimates’ 95% confidence intervals (95% CIs) overlap. Overlapping confidence intervals means that the margin of errors of each estimate overlap—thus, the estimates cannot be assumed to differ. Confidence intervals that do not overlap means that each estimates’ margin of error lies outside the margin of error of the other estimate(s)—thus, estimates are assumed to differ.



## Appendix 3: Data Sources

Behavioral Risk Factor Surveillance System (BRFSS) – The BRFSS is an annual, statewide telephone survey of a random sample of non-institutionalized Maine residents, 18 years and older. The BRFSS is conducted and coordinated by individual states through federal CDC financial support. Survey data are weighted to be representative of the Maine’s resident adult population. More information on the BRFSS may be found on the website: <http://www.cdc.gov/brfss>.

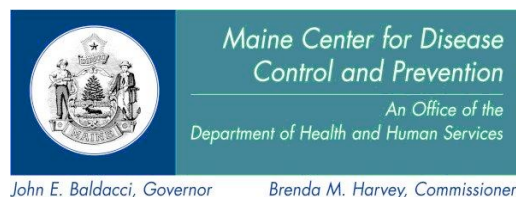
Centers for Disease Control and Prevention Wide-ranging OnLine Data for Epidemiologic Research (CDC WONDER) – CDC WONDER was developed by the federal CDC as an integrated information and communication system made available to public health professionals and the general public. The system allows for individuals to query datasets, including the mortality data included in this report, and receive analyzed and summarized data.<sup>7</sup> State and national death data are derived from death certificates collected and compiled by states using standardized collection forms and analysis and reporting systems. In Maine, the Offices of Vital Records and Data, Research, and Vital Statistics collect, compile, and submit death certificate data. More information on CDC WONDER may be found on the website: <http://wonder.cdc.gov>.

Maine Child Health Survey (MCHS) – The MCHS was funded through the federal CDC cooperative agreement with the Maine Asthma Program. The MCHS has two components: 1) a questionnaire completed by the parent (for children in kindergarten and Third grades) or the student (Fifth grade) and 2) physical exam.<sup>23</sup> The kindergarten and Third survey was last administered in the 2003 – 2004 school year, referred to here as 2004. The Fifth grade survey was last administered in the 2004 – 2005 school year, referred to as 2005. Survey data were unable to be weighted due to the low response rate. Therefore, the data are only representative of those children in kindergarten, Third, and Fifth grades surveyed. More information on the MCHS may be found on the website: [http://www.maine.gov/dhhs/bohdcfh/mat/plans\\_and\\_pubs/reports.html](http://www.maine.gov/dhhs/bohdcfh/mat/plans_and_pubs/reports.html).

Maine Health Data Organization (MHDO) – In 1996, the Maine Legislature established MHDO as an independent organization to collect and maintain “clinical and financial health care information and to exercise stewardship in making this information accessible to the public.”<sup>14</sup> The MHDO is responsible for the emergency department and inpatient hospitalization data utilized in this report.

National Survey of Children’s Health (NSCH) – The NSCH, sponsored by the Maternal and Child Health Bureau of the Health Resources and Services Administration, was first conducted in 2003; it is anticipated that the survey will be conducted every 4 years. The survey samples children under the age of 18 from every state and the District of Columbia with an adult in the household, normally a parent, serving as a self-report proxy for the child. Survey data for estimates are weighted to be representative of the state child population. More information on the NSCH may be found on the website: <http://nschdata.org/Content/Default.aspx>.

Youth Risk Behavior Survey (YRBS) – The Maine YRBS is conducted and coordinated by the Maine Department of Education, with funding from the federal CDC. Surveys are administered in classrooms of Ninth through Twelfth grade students nationally and in Seventh through Twelfth grade students in Maine. The Maine YRBS consists of two separate surveys: one for middle school students (Seventh- Eighth grades) and one for high school students (Ninth – Twelfth grades). Survey data for estimates are weighted to be representative of the state youth population. More information on the YRBS may be found on the website: <http://www.cdc.gov/healthyyouth/yrbs/>.



John E. Baldacci, Governor

Brenda M. Harvey, Commissioner

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