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Asthma

Asthma is a chronic inflammatory disorder of the airways characterized by airway hyperresponsiveness to stimuli, variable airflow limitation, and respiratory symptoms, including wheezing, shortness of breath, tightness or discomfort in the chest and/or dry cough. Whether or not a person develops asthma depends on a complex interaction of genetics and environmental factors that are not fully understood. However, allergies, a family history of allergy, and perinatal exposure to tobacco smoke have been implicated as risk factors for developing asthma.

Factors that can exacerbate existing asthma (i.e. can cause or trigger an asthma attack) are much better understood. Exacerbations can result from exposure to viral upper respiratory infections, pollen, molds, pet dander, cockroaches, dust mites, tobacco smoke, wood smoke, household chemicals, workplace exposures and some types of air pollution. Exercise, aggravating conditions that are not properly treated (e.g. rhinitis, gastroesophageal reflux), and stress can also trigger or exacerbate existing asthma. The particular triggers that will exacerbate asthma vary by the individual. If not treated appropriately, asthma can cause long-term loss of lung function and severe outcomes, such as hospitalizations and even death.

Asthma cannot be cured, but it can be controlled. With appropriate disease management, people with asthma can prevent asthma symptoms, during the day and night, and maintain normal activity levels. People whose asthma is adequately managed should not experience sleep disruption or miss days of school or work because of their asthma. Finally, they should have minimal need for emergency department visits or hospitalizations because of their asthma. Box 1 describes asthma control—the goal of asthma therapy. Box 2 outlines the key clinical activities for the diagnosis and management of asthma, according to national experts.

**Box 1. Asthma Control**

- Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the daytime, in the night, or after exertion).
- Require infrequent use ( $\leq 2$  days a week) of inhaled rescue medication for quick relief of symptoms.
- Maintain (near) normal pulmonary function.
- Maintain normal activity levels (including exercise and attendance at school or work).
- Meet patients' and families' expectations of and satisfaction with asthma care.
- Prevent recurrent exacerbations of asthma and minimize the need for emergency department visits or hospital stays.
- Prevent loss of lung function; for children, prevent reduced lung growth.
- Provide optimal pharmacotherapy with minimal or no adverse effects of therapy.

National Heart, Lung, and Blood Institute. *Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report 3*. National Institutes of Health, Publication Number 09-5846. October 2007.

**Box 2. Key Clinical Activities for the Diagnosis and Management of Asthma**

- Establish the asthma diagnosis, using medical history, physical exam, and spirometry (age  $\geq 5$  Years).
- Assess asthma severity to initiate therapy.
- Assess asthma control to monitor and adjust therapy.
- Schedule periodic follow-up care, at least 2 times per year.
- Provide self-management education, including methods to assess asthma control and signs of worsening symptoms, how to correctly take asthma medication, and avoiding environmental factors that worsen asthma.
- Develop a written asthma action plan in partnership with the patient.
- Integrate education into all points of care.
- Recommend measures to control exposure to allergens, pollutants, or irritants that make asthma worse.
- Treat comorbid conditions.
- Select medication and delivery devices to meet patient's needs and circumstances.
- Adhere to a stepwise approach to the asthma therapy.
- Instruct patients how to properly manage an asthma exacerbation at home.
- Provide treatment that will properly manage an asthma exacerbation in the urgent or emergency care setting, including treatment of airflow obstruction, reduction of airway inflammation, and discharge with medication and patient education.

National Heart, Lung, and Blood Institute. *Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report 3*. National Institutes of Health, Publication Number 09-5846. October 2007.

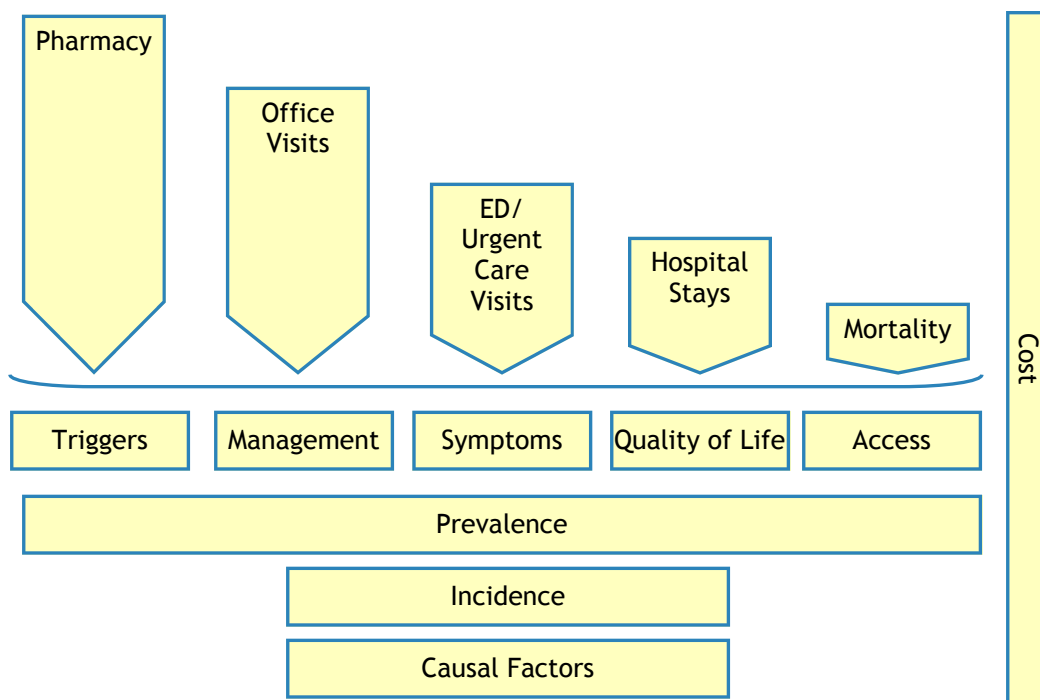
### Asthma Surveillance

Surveillance is the ongoing systematic collection, analysis, interpretation, and timely dissemination of health data. The purpose of a surveillance system is to monitor trends in the disease and its management in order to prevent disease or attain better control of the disease within the population. The purposes of asthma surveillance are to:

- Understand the impact of asthma, including the number of people affected, its severity in the population, and its cost,
- Monitor trends in treatment and management in the population,
- Monitor exposure to asthma triggers, and
- Assist in evaluating the effect of interventions designed to reduce the burden of asthma.

Surveillance of asthma is complicated by the lack of an accepted diagnostic “gold standard”, limited available data on the occurrence and management of asthma, a great deal of variation in disease severity within and between individuals, and varying levels of asthma control. Epidemiologic study is further complicated by the need to understand both the factors that cause the onset of the disease and the factors that trigger asthma attacks or exacerbations in persons with existing asthma. The following figure depicts the ideal surveillance system for asthma that would describe all aspects of asthma occurrence and management.

Figure. Asthma Surveillance Model



### Description of Asthma Surveillance Model

*Causal Factors* are factors that cause a person who does not have asthma to develop the disease. This might include surveillance of a family history of asthma or cigarette smoke exposure during pre-school age.

*Incidence* is the measure of new cases of asthma in a population that does not have asthma. This is also referred to as morbidity.

*Prevalence* describes the proportion of the population who currently has or has ever had asthma.

*Triggers* refer to those factors or substances that can cause asthma symptoms or exacerbations in people who already have asthma, as described above.

*Management* is an all-encompassing category that refers to efforts by patients and health care providers to control the disease. The category is meant to capture many aspects of disease management, both at the patient and provider level.

*Symptoms* refer to the symptoms experienced by persons with asthma. This would be measured using several indices, including day and nighttime symptom frequency.

*Quality of Life* represents the impact that asthma has on individuals with asthma, their caretakers, and their families. Quality of life indicators include the frequency of asthma-related symptoms, activity limitations, lost work and school time (or other activities), perception of health, and beliefs about ability to manage the disease.

### Description of Asthma Surveillance Model, Continued

*Access* encompasses a broad range of issues related to access to care. It refers to insurance coverage for all aspects of asthma clinical management, quality primary care for asthma, and appropriate referral to specialty care and services (skin prick testing, pulmonary function testing). Additionally, it also pertains to social, cultural, and economic conditions that limit access to care, such as transportation and literacy.

*Cost* refers to both the direct and indirect costs of asthma along this entire continuum of surveillance elements.

At the top are asthma-related outcome categories, from left to right in increasing severity and decreasing frequency.

*Pharmacy* refers to the prescription and use of asthma medications.

*Office Visits* are the number/rate of times primary and specialty care services are used to routinely manage asthma; and the number/rate at which assistance with exacerbations is required from a primary care office.

*Emergency Department/Urgent Care Visits* refers to the number/rate of visits to the emergency department (ED) for asthma care.

*Hospital Stays* refers to the number/rate of inpatient visits for asthma care.

*Mortality* refers to the number/rate of deaths due to asthma, the severest impact of asthma and an indicator of possible health care system failure.

### Michigan's Approach to Reporting Asthma Burden

The Michigan Asthma Surveillance System is comprehensive, utilizing many data sets and focusing on several subpopulations of interest. The first full report of the Michigan Asthma Surveillance System is entitled, "*Epidemiology of Asthma in Michigan: 2004 Surveillance Report*" (2004) and is available on the Asthma Initiative of Michigan website, [www.GetAsthmaHelp.org](http://www.GetAsthmaHelp.org). Fact sheets related to specific subpopulations and asthma topics are also available on this website.

Each component data set of the Michigan Asthma Surveillance System releases updates on a different schedule, making a revision to the system-wide surveillance report a challenge. We have chosen a modular approach in publishing updates to the asthma surveillance report, where topic specific chapters are published as they are completed. This approach allows the asthma surveillance staff the ability to update data for specific topics in a more timely fashion and to easily expand the report as additional data sources or analytic methods become available. Additionally, creating separate chapters improves access for the reader interested in specific aspects of the asthma burden in Michigan.

As chapters of this document are completed, they are published to the internet (<http://www.getastmahelp.org/reports.asp>) and can be used as stand-alone documents for active distribution. Each includes key findings and recommendations, detailed methodology, graphical presentation of data with accompanying interpretation, and supporting data tables. Table 1 describes the planned and completed chapters of this asthma surveillance report revision.

Although not all planned surveillance report chapters are yet available, the completed chapters utilize most of the data sets currently available to the Michigan Asthma Surveillance System and highlight important disparities and trends in Michigan's asthma burden that are informative to the program activities of the Asthma Initiative of Michigan and our partners. Current data and interpretations for topics not yet published are also available on the Asthma Initiative of Michigan website, [http://www.getastmahelp.org/main\\_statistics.asp](http://www.getastmahelp.org/main_statistics.asp).

Table 1. Chapters of *Epidemiology of Asthma in Michigan, A Comprehensive Asthma Surveillance Report*<sup>1</sup>

Chapter Title	Planned/ Completed	Date Last Published
Introduction and Report Summary	Completed	April, 2009
Asthma Prevalence	Completed	April, 2009
Health Behaviors for Persons with Asthma	Planned	-
Asthma and the Environment	Planned	-
Asthma Control and Clinical Management	Completed	April, 2009
Work-Related Asthma	Planned <sup>2</sup>	-
Emergency Department Visits for Asthma	Planned	-
Asthma Hospitalization	Completed	April, 2009
Asthma Burden for Children in Medicaid	Completed	November, 2007
Asthma Mortality	Completed <sup>3</sup>	April, 2009
Targeting Asthma in Michigan—The Healthy People 2010 Objectives for Asthma	Planned <sup>4</sup>	-
Detroit—the Epicenter of Asthma in Michigan	Completed	November, 2008

<sup>1</sup>In addition to the publication of chapters of this report, updates to data and interpretations of data are published to the Asthma Initiative of Michigan website annually, [http://www.getastmahelp.org/main\\_statistics.asp](http://www.getastmahelp.org/main_statistics.asp).

<sup>2</sup>Detailed, current information about work-related asthma is available in the annual reports of the Sentinel Event Notification System of Occupational Risk (SENSOR) - an ongoing surveillance system that identifies index cases of work-related asthma in Michigan. These annual reports can be accessed at: <http://oem.msu.edu/annualreports.asp>

<sup>3</sup>For additional information on asthma related deaths, review the results published in the annual reports of the Michigan Asthma Mortality Review Project. These annual reports can be accessed at: <http://oem.msu.edu/annualreports.asp>

<sup>4</sup>Although not yet available as a surveillance report chapter, the asthma surveillance system has previously published fact sheets detailing Michigan's progress in meeting the *Healthy People 2010* targets for asthma objectives. These fact sheets can be accessed at: [http://www.getastmahelp.org/main\\_stats\\_11.asp](http://www.getastmahelp.org/main_stats_11.asp)

## Key Findings and Recommendations

Table 2 provides the key findings and recommendations from the published chapters of this report. For more detailed data and interpretations, please review the published chapters. In addition to these topic specific recommendations, the following activities are advised:

- The Michigan Asthma Surveillance staff should continue to evaluate the surveillance system, its component data sources, analytic approach, and dissemination of findings. They should also continue to collaborate with partners and stakeholders to improve existing data sources used for asthma surveillance.
- The Michigan Asthma Surveillance System should continue to pursue new data sources that would fill gaps in the system for specific purposes, specifically understanding asthma control for the privately insured population, estimating the costs of asthma burden, and understanding patterns and trends in emergency department visits for asthma in the general population.
- Since many disparities in asthma burden are identified in the chapters of this report, the Asthma Initiative of Michigan should gather information to understanding the reasons for these disparities and direct public health activities toward eliminating them.

Table 2. Key Findings and Recommendations

Chapter Title	Key Findings	Recommendations
Asthma Prevalence	<ul style="list-style-type: none"> <li>• In 2007, 9.5% (232,500) of children had current asthma.</li> <li>• In 2007, 9.5% (724,400) of adults had current asthma. This has not demonstrated a significant trend over seven years of measurement.</li> <li>• Prevalence of current asthma increases with age group among children but decreases with age group among adults.</li> <li>• Current asthma is more common among female adults than male adults, but more common among male children than female children.</li> <li>• In 2007, current asthma prevalence was significantly higher for black adults compared to white adults.</li> <li>• Current asthma is more common among adults of low educational attainment and low income.</li> <li>• The prevalence of current asthma among adults is not equally distributed across Michigan's local public health regions.</li> </ul>	<ul style="list-style-type: none"> <li>• Michigan should improve its ability to collect information on the number of people with asthma in all populations, particularly for young children, race/ethnicity groups, and small geographic areas.</li> </ul>

Table 2. Key Findings and Recommendations, Continued

Chapter Title	Key Findings	Recommendations
Asthma Control and Clinical Management	<ul style="list-style-type: none"> <li>• 21.2% of children with current asthma and 38.7% of adults with current asthma had asthma symptoms on <math>\geq 9</math> days in the past 30 days.</li> <li>• For adults with current asthma, the prevalence of frequent asthma symptoms, difficulty sleeping due to asthma symptoms, activity limitations due to asthma, frequent asthma emergency department visits, and having an asthma hospitalization were all significantly higher among those with a household income <math>&lt; \\$50,000</math> compared to those with a household income <math>\geq \\$50,000</math>.</li> <li>• The prevalence of having an asthma hospitalization during the past 12 months was 13.8 times higher for children less than 10 years compared to children 10-17 years—a statistically significant difference.</li> <li>• Only 40.2% of children with current asthma and 27.0% of adults with current asthma have ever received an asthma action plan.</li> <li>• Only 40.4% of children with current asthma and 33.8% of adults with current asthma met the national treatment guideline recommendation of at least 2 routine asthma care visits during 12 months.</li> <li>• Only 35.0% of children with current asthma and 42.8% of adults with current asthma met the national treatment guideline recommendation of receiving an annual influenza vaccination.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to administer the Asthma Call-back Survey in Michigan for children and adults with asthma to gain precision in estimates of asthma control and clinical management and evaluate trends in these measures.</li> <li>• Direct public health efforts toward improving asthma control and clinical management for children and adults of lower socioeconomic status living in Michigan.</li> </ul>
Asthma Hospitalization	<ul style="list-style-type: none"> <li>• The annual asthma hospitalization rate in Michigan, all ages, is 16.6 per 10,000. (2004-2006)</li> <li>• The rate of asthma hospitalizations for black persons is at least four times the rate for white persons, regardless of age group.</li> <li>• The degree of disparity in asthma hospitalization rates between black persons and white persons has remained unchanged over recent years.</li> <li>• Between 2000 and 2006, rates of asthma hospitalization for adults age 35-64 years and adults age 65 years and older are significantly increasing.</li> <li>• In 2006, the average length of stay for an asthma hospitalization was 3.3 days. This has been significantly increasing over recent years.</li> <li>• Michigan counties with rates of asthma hospitalization significantly higher than the rate for the state as a whole are Bay, Ingham, Saginaw, and Wayne Counties. Genesee County, with a historically high asthma burden, is no longer significantly higher than the state rate for asthma hospitalizations.</li> </ul>	<ul style="list-style-type: none"> <li>• Michigan should develop projects aimed to understand the reasons for the dramatic racial and geographic disparities in asthma hospitalization rates. This knowledge could be used to develop programs that effectively address these disparities.</li> <li>• Michigan should focus efforts to reduce the asthma burden to those communities or populations with the highest asthma hospitalization rates.</li> </ul>

Table 2. Key Findings and Recommendations, Continued

Chapter Title	Key Findings	Recommendations
Asthma Burden for Children in Medicaid	<ul style="list-style-type: none"> <li>• The prevalence of persistent asthma among children in Medicaid is increasing over time.</li> <li>• Rates of asthma emergency department visits are increasing over time among children in Medicaid.</li> <li>• Black children in Medicaid experience the greatest burden in asthma prevalence and rates of asthma emergency department visits compared to other children in Medicaid.</li> <li>• Recent data suggests that <u>only</u> 30% of children with persistent asthma are filling prescriptions for inhaled corticosteroids - the preferred, first-line medication to manage asthma. This measure has been dramatically <u>decreasing</u> from 2001-2005.</li> <li>• The goals of asthma therapy are not being met for the pediatric Medicaid population in Michigan, especially for black children and those living in urban areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to evaluate trends in these indicators over time for this population.</li> <li>• In light of these data, Michigan should strengthen current efforts to reduce asthma burden and improve asthma management by targeting interventions to the pediatric Medicaid population.</li> </ul>
Asthma Mortality	<ul style="list-style-type: none"> <li>• From 2004 through 2006, there were 393 asthma deaths in Michigan, for a rate of 12.6 deaths per 1,000,000 people.</li> <li>• Rates of asthma mortality for white persons increased by age group. Rates of asthma mortality for black persons were not significantly different between age groups.</li> <li>• Between 2000 and 2006, rates of asthma mortality for children 5 to 14 years were significantly increasing while rates for adults 65 years and older were significantly decreasing.</li> <li>• Asthma deaths for residents of Wayne County (197 deaths) during 2002-2006 account for 30% of all deaths for Michigan residents. Michigan counties with rates of asthma death significantly higher than the Michigan rate were Iosco, Saginaw, and Wayne Counties.</li> <li>• For asthma deaths investigated by the Asthma Mortality Review Project:               <ul style="list-style-type: none"> <li>⇒ 71% of children and over 40% of adults were enrolled in Medicaid at the time of their death.</li> <li>⇒ Only 33% of children and less than 10% of adults had an asthma action plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Michigan should develop projects aimed to implement recommendations made by the Asthma Mortality Review expert panels, including:               <ul style="list-style-type: none"> <li>⇒ Provider education on asthma risk and control, including the importance of the prescription of adequate levels of inhaled corticosteroid medication.</li> <li>⇒ Case management for high-risk patients.</li> <li>⇒ Pharmacy notification to health care providers for patients who repeatedly fill prescriptions for short-acting <math>\beta</math>-agonist medications.</li> <li>⇒ Referral to specialty care for patients with a hospitalization or emergency department visit or who use short-acting <math>\beta</math>-agonist medication daily.</li> </ul> </li> <li>• Michigan should continue to investigate asthma deaths to identify causal factors, especially in geographic areas of high asthma mortality.</li> </ul>

Table 2. Key Findings and Recommendations, Continued

Chapter Title	Key Findings	Recommendations
Detroit—the Epicenter of Asthma in Michigan	<ul style="list-style-type: none"> <li>The prevalence of current asthma among Detroit adults is 50% higher than that of Michigan as a whole.</li> <li>Rates of asthma hospitalization in Detroit are three times higher than that of Michigan as a whole.</li> <li>The rate of asthma hospitalizations for Detroit children is 50% higher than that of Detroit adults.</li> <li>In Detroit, recent hospitalization rates for black persons are over two times higher than those for white persons.</li> <li>The prevalence of persistent asthma among children covered by Medicaid is consistently 10% higher in Detroit compared to Michigan as a whole.</li> <li>Reliance on the emergency department for asthma care is about 50% higher for Detroit children covered by Medicaid compared to the state as a whole.</li> <li>Rates of asthma death are over two times higher in Detroit compared to the state as a whole.</li> </ul>	<ul style="list-style-type: none"> <li>The severity of the asthma burden in Detroit warrants immediate attention. Public health efforts should be directed to persons with asthma in Detroit to improve asthma control and prevent severe outcomes.</li> </ul>

### Conclusion

Asthma presents a significant burden and challenge in Michigan. Poor asthma control and severe asthma outcomes that could be prevented still occur among Michigan residents. It is clear that the goals of asthma therapy are not being met for many with asthma in Michigan, and that dramatic racial, socio-economic, and geographic disparities persist. The Michigan Department of Community Health, a leading partner in the Asthma Initiative of Michigan, is committed to reducing the burden of asthma documented in this report. For information about the priorities and interventions of this initiative, please review the strategic plan : *Asthma in Michigan 2010: A Blueprint for Action*. (<http://www.getastmahelp.org/reports.asp>)

Copies of chapters of this report and other publications from the Michigan Asthma Surveillance System can be found on the Asthma Initiative of Michigan website:  
[http://www.getastmahelp.org/main\\_statistics.asp](http://www.getastmahelp.org/main_statistics.asp).

Any additional questions or concerns about this report should be directed to:

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For more information about the Asthma Initiative of Michigan, visit: [www.getastmahelp.org](http://www.getastmahelp.org) or call 1.866.EZLUNGS (1.866.395.8647).

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