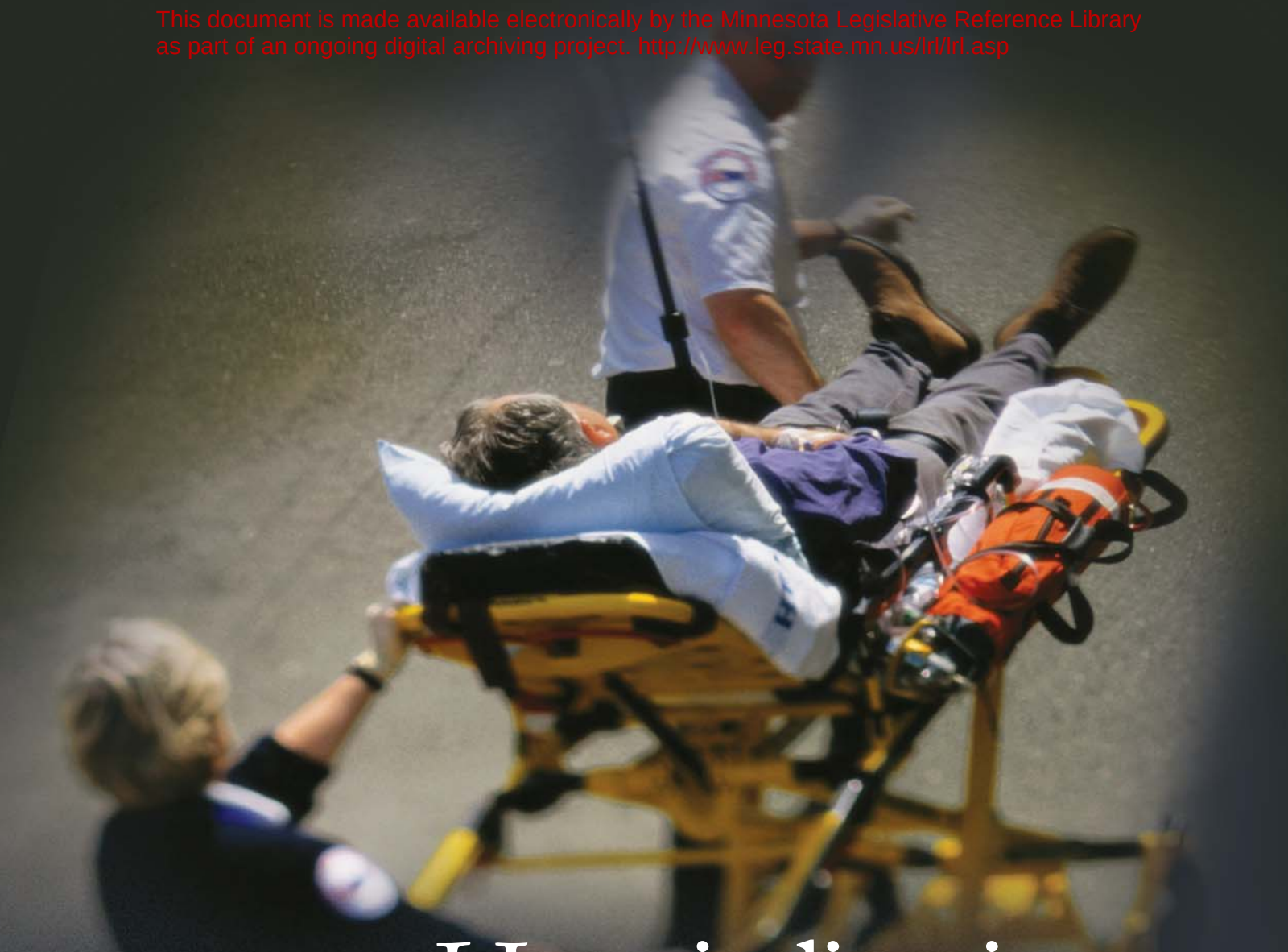


Hospitalizations

Asthma · Heart Attack · COPD

DATA & MEASURES 1999-2007

MN EPHT

Environment, Exposure & Health

Minnesota
Environmental
Public Health
Tracking

MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

December 2009

Dear Colleague:

The Minnesota Department of Health (MDH) is pleased to present the first series of reports of the Minnesota Environmental Public Health Tracking (MN EPHT) program. The purpose of the report is to share environmental and health tracking data with the public, in accordance with Minnesota Statutes, section 144.996, Subdivision 1.2.

Environmental public health tracking is a public health tool that uses a variety of existing data sources to provide information about environmental hazards, chemical exposures and population health in our state, as well as what preventative actions can be taken to protect the public. The value of environmental public health tracking increases with each year of data collection.

In 2009 MN EPHT became part of the National Environmental Public Health Tracking Network (Tracking Network) under a cooperative agreement grant, joining New York City and 21 other states in the Tracking Network. This grant from the Centers for Disease Control and Prevention (CDC) will help support ongoing data collection and the development of a web-based information system for the public to access MN EPHT data in the years ahead. Improved public access to current, accurate information will help inform individual decisions as well as public policy to prevent disease and promote health.

An electronic version of this report is available on the MN EPHT website: http://www.health.state.mn.us/tracking/. For more information about this report, please contact MN EPHT at 651-201-4987 (toll free: 1-800-205-4987) or health.tracking@state.mn.us.

Sincerely,

Sanne Magnan, M.D., Ph.D.
Commissioner
P.O. Box 64975
St. Paul, MN 55164-0975

[this page intentionally left blank]

Report on Hospitalizations Data & Measures: 2000-2007

MN EPHT Report | February 2010

Requests for more information about this report may be addressed to:

Minnesota Environmental Public Health Tracking
Minnesota Department of Health
651-201-5900
Toll Free: 1-800-205-4987
TDD phone number: 651-201-5797
health.tracking@state.mn.us

or

Report writer
Jeannette Sample, MPH
Minnesota Environmental Public Health Tracking
Minnesota Department of Health
651-201-3532
jeannette.sample@state.mn.us

Suggested Citation: Minnesota Environmental Public Health Tracking: Hospitalizations Data and Measures 2000-2007. Minnesota Department of Health, St. Paul, MN. February 2010.

[this page intentionally left blank]

Table of Contents

Introduction to MN EPHT

The environment can mean many things to many people. For Environmental Public Health Tracking (EPHT), the environment is defined as our air, our water, our food, and our surroundings. The environment plays an important role in health and human development. The Minnesota Environmental Public Health Tracking (MN EPHT) system brings together existing data in the state about environmental hazards, population exposure, and health outcomes.

EPHT data may be used to:

- Recognize patterns and evaluate trends in environmental conditions, population exposure and rates of disease
- Measure impacts of public health interventions
- Identify populations most affected or most vulnerable
- Identify opportunities for research and/or public health interventions to reduce exposures to potential environmental health hazards and prevent disease

Minnesota Statutes, section 144.996, directs the Minnesota Department of Health (MDH) to establish an environmental health tracking program. The goal of MN EPHT is to provide information that can be used to plan and evaluate actions to prevent diseases and promote healthy environments in Minnesota. By making data on environmental hazards, exposures and health available in one place and by systematically monitoring those data, an environmental public health tracking program can create new opportunities for learning about the risks of environmental exposures and for understanding the relationships between the environment and health.

National Tracking Network Data and Measures

MN EPHT works in partnership with other states as part of the Centers for Disease Control and Prevention's (CDC) National Environmental Public Health Tracking Network (Tracking Network). Since MN EPHT began in 2007, the program has been collecting and analyzing data in 8 content areas that the Tracking Network has identified as priorities shown in the table below.

Tracking Network Content Areas 2007		
Environmental Hazards Air quality Drinking water quality	Exposures Childhood blood lead exposure	Health Outcomes Hospitalizations Cancer Carbon monoxide poisoning Reproductive outcomes Birth defects

Within each content area, tracking measures are used as indicators of population health with respect to environmental factors. These measures are summary characteristics or a statistic, such as a sum, percentage, or rate. Tracking measures are used to assess health, or a factor associated with health, in a population through direct or indirect measures. For example, because the amount of lead in paint in older homes is difficult to measure, MN EPHT includes data on housing units built before 1950 since older homes are much more likely to contain leaded paint. Similarly, MN EPHT measures levels of a pollutant in the environment as an indicator of possible exposure.

Nationally consistent data and measures (NCDMs) were developed by CDC in collaboration with national, state, and local environmental health partners. NCDMs allow for data from any state's EPHT system to be integrated into the Tracking Network, a national database of environmental hazards, environmental exposures, and health effects. Except where noted, MN EPHT has prepared Minnesota data and measures according to the NCDM standards as of the time the data were collected.

Healthy People 2010

Healthy People 2010 is a set of disease prevention and health promotion objectives for the United States to achieve by the year 2010. Healthy People 2010 has two goals: increase quality and years of healthy life, and eliminate health disparities. These two goals are supported by 467 objectives in 28 focus areas. Healthy People 2010 is an instrument to improve health and a valuable tool for those who work to improve health.[1]

Several of the Tracking Network's measures align with Healthy People 2010 objectives. Where applicable, Healthy People 2010 objectives are provided in order to provide context for how Minnesota compares in reaching national health targets.

MN EPHT Data and Measures Reports

This report is one in a series of first reports produced in 2009 for MN EPHT and compiles available hospitalization data from 2000-2007. EPHT is a growing program, and the MN EPHT and the Tracking Network will be adding new content areas over time. Updates to the hospitalization content area as well as new content area data will be reported and made available on the MN EPHT website. For more information about MN EPHT or the Tracking Network, please visit:

MN EPHT: http://www.health.state.mn.us/tracking
National Tracking Network: http://ephtracking.cdc.gov

Asthma, Heart Attack, and COPD* Hospitalizations Data Highlights

- In Minnesota, asthma hospitalization rates follow seasonal patterns, with the greatest number of hospitalizations seen in the fall months. Seasonality is most pronounced in young people, and may be associated with children going back to school.
- Overall, the statewide rate of asthma hospitalizations decreased from 2000 to 2006, with increases in 2003 and 2007.
- In Minnesota, COPD hospitalization rates follow a subtle seasonal pattern, with a slightly greater number of hospitalizations seen in the fall and winter months, and are far less pronounced than that seen in asthma hospitalizations.
- The COPD hospitalization rate increases with increasing age.
- The rate of COPD hospitalizations remained constant over time from 2000 to 2007, with the exception of an increase in 2005.
- Minnesota heart attack hospitalization rates do not follow a strong seasonal pattern.
- The rate of heart attack hospitalizations has been decreasing since 2000.

* Chronic obstructive pulmonary disease

Data Source Acknowledgement: The MN EPHT Program gratefully acknowledges the Health Economics Program, part of the Minnesota Department of Health's Division of Health Policy, for managing the hospitalization data received from the Minnesota Hospital Association, and for providing data on hospitalizations due to asthma, heart attack, and respiratory disease in Minnesota as presented in this Tracking Report.

Asthma, COPD, and Heart Attack and the Environment

Asthma is a chronic disease of the airways characterized by episodes of bronchoconstriction (tightening of the muscles around the airways in the lungs) and inflammation (swelling of the bronchial tubes). Symptoms of asthma can include wheezing, breathlessness, chest tightness, and coughing. People with asthma have it all the time, but will have asthma episodes (attacks) only when something irritates their lungs.[2] An asthma attack can cause hospitalization and can be initiated by a variety of factors called asthma triggers. Common triggers include allergens, irritants or other factors, like exercise. Two key air pollutants, ozone and particulate matter, may trigger attacks and make asthma symptoms worse.

Figure 1: *Asthma*

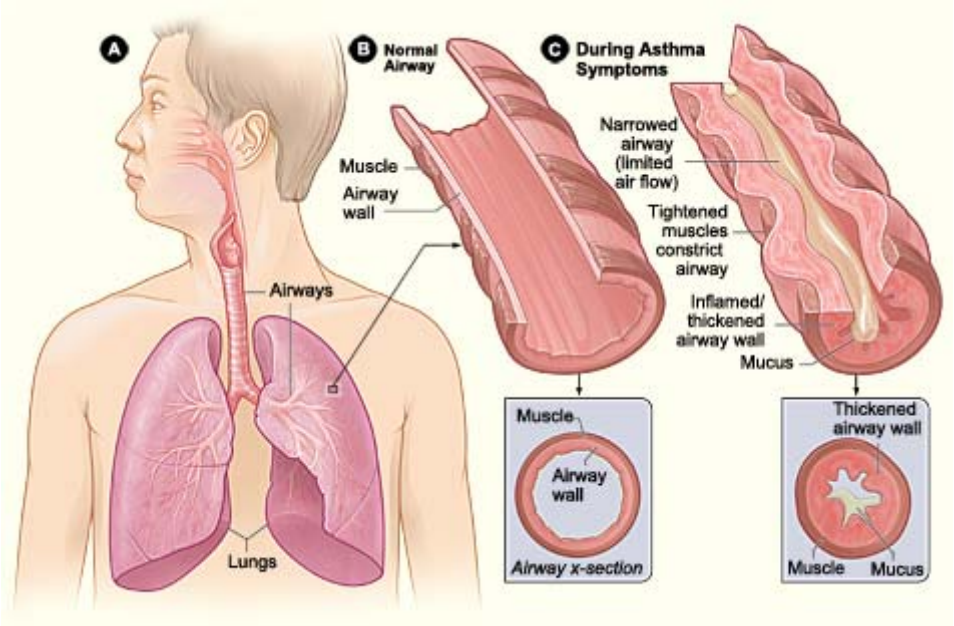
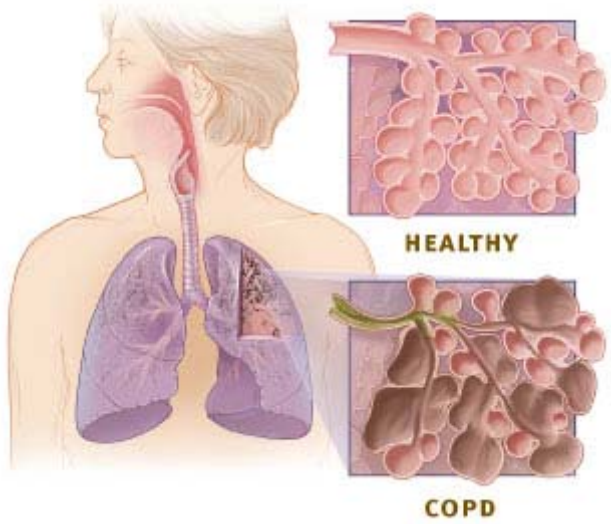


Figure 1-A shows the location of the lungs and airways in the body. Figure 1-B shows a cross-section of a normal airway. Figure 1-C shows a cross-section of an airway during asthma symptoms. Source: National Heart Lung and Blood Institute[3]

The majority of problems associated with asthma, including hospitalization, are preventable through control of exposure to factors that trigger exacerbations, appropriate medication use, continual monitoring of the disease, and patient education in asthma care. Hospitalizations due to asthma may be an indicator both of the severity of the disease and barriers to regular asthma care (e.g., lack of health insurance). Tracking asthma hospitalizations can aid in identifying populations vulnerable to asthma triggers and/or inadequate access to routine medical care.

Chronic obstructive pulmonary disease (COPD) is a group of slowly progressive lung diseases characterized by obstruction to air flow that interferes with normal breathing. Emphysema and chronic bronchitis are the most important conditions that compose COPD.[4] Between 80 and 90 percent of COPD is attributable to cigarette smoking.[1] However, not all smokers develop COPD, and not all patients with COPD are smokers or have previously smoked. Environmental tobacco smoke also contributes to respiratory symptoms.[5] Long-term exposure to other lung irritants, such as air pollution, chemical fumes, or dust, also may contribute to COPD.[6] COPD hospitalizations have been reported to be associated with exposure to particulate matter.[7]

Figure 2: *Healthy Alveoli and Damaged Alveoli*



The illustration shows the respiratory system and images of healthy alveoli and alveoli damaged by COPD. Source: National Heart Lung and Blood Institute [3]

COPD is not a Tracking Network NCDM. The MN EPHT program's COPD activity is the first routine COPD surveillance in Minnesota. Because there is significant overlap in symptoms and some risk factors between asthma and COPD, misdiagnosis is common, especially among the elderly. Tracking both COPD hospitalizations and asthma hospitalizations will monitor the occurrence of chronic respiratory disease hospitalizations in Minnesota over time and allow for evaluation of differences between populations and vulnerability to environmental triggers, risk factors, and access to health care.

Heart attack, also known as acute myocardial infarction or AMI, occurs when the blood supply to the heart is reduced or stopped. This usually happens when the blood vessels around the heart become blocked due to a buildup of plaque on the inside walls of the coronary arteries (the arteries that supply blood and oxygen to the heart) or when plaque breaks loose and travels through the blood until it becomes lodged, causing an obstruction. When blood flow is reduced or stopped for a significant amount of time, heart muscle tissue becomes deprived of oxygen, resulting in irreversible tissue death. In most cases, adults who experience a heart attack are hospitalized.

In addition to age, sex, race/ethnicity, and family history, there are modifiable risk factors for heart disease that increase a person's risk for heart attack. These modifiable risk factors for heart disease, which can be altered through lifestyle changes and clinical care, include: high cholesterol, high blood pressure, cigarette smoking, diabetes, obesity and physical inactivity. A number of epidemiologic studies have reported associations between air pollution and hospitalizations for AMI and other forms of heart disease, particularly in sensitive subpopulations such as the elderly, patients with pre-existing heart disease, those who are survivors of AMI or those with COPD.

Figure 3: *Heart with Muscle Damage and a Blocked Artery*

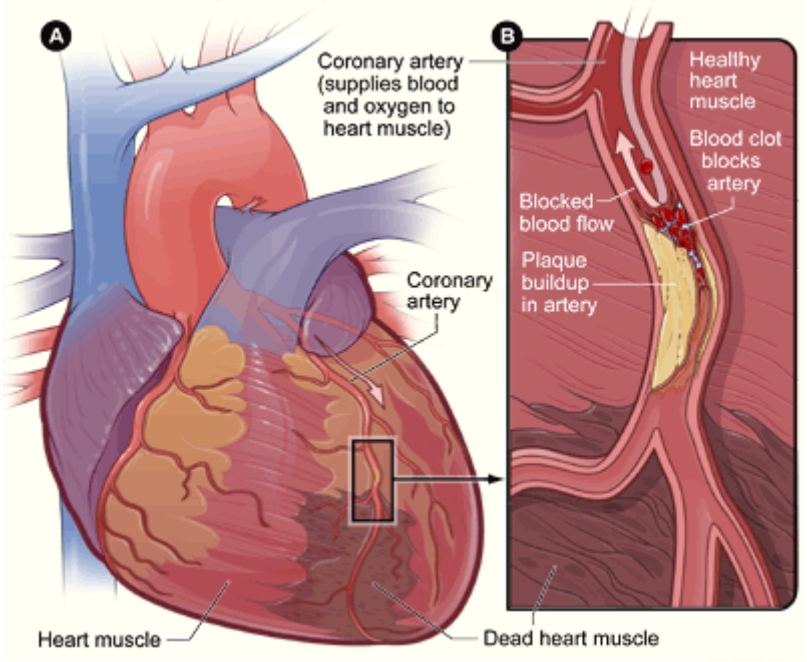


Figure A is an overview of a heart and coronary artery showing damage (dead heart muscle) caused by a heart attack. Figure B is a cross-section of the coronary artery with plaque buildup and a blood clot. Source: National Heart Lung and Blood Institute[8]

There is no single heart attack surveillance system in the United States. Death records are the sole national descriptor for heart attack mortality, and estimates of incidence and prevalence of heart attacks have been largely based on survey samples and not population-based surveillance systems. Tracking heart attack hospitalizations will allow examination of hospitalization trends over time and evaluation of differences between populations and vulnerability to air pollutants that can trigger an attack.

Preventing Environmental Triggers of Hospitalizations

Where to find more information:

An important application for MN EPHT data is to monitor the impacts of state and local public health programs and policies that are designed to reduce exposure and prevent disease.

Asthma
To achieve the vision that Minnesotans with asthma will have healthy environments and will be able to enjoy life not limited by their asthma, the MDH Asthma Program focuses on the seven goals of the 2007 Strategic Plan for Addressing Asthma in Minnesota. These goals include conducting surveillance, reducing environmental triggers of asthma, addressing work-related asthma, promoting asthma self management, promoting community approaches to asthma, promoting application of national guidelines among health professionals, and ensuring that health systems and their partners will use best practices through coordination for optimal asthma care. For more information about the MDH Asthma Program, go to http://www.health.state.mn.us/asthma/.

COPD
The American Lung Association of Minnesota sponsors COPD education, research and support groups, advocates for people who need to travel with oxygen, and trains medical professionals on the latest COPD treatment techniques and developments. The American Lung Association of Minnesota has launched the Minnesota COPD Coalition, of which MDH is a member. The Minnesota COPD Coalition vision is to improve the health outcomes of patients with COPD by working with patients, caregivers, and the health care community to increase awareness, increase early diagnosis, and improve treatment and management. For more information about the American Lung Association of Minnesota, go to http://www.alamn.org/.

Heart Attack
The Heart Disease and Stroke Prevention Unit at MDH is Minnesota's state-level public health resource for addressing heart disease and stroke prevention. The Heart Disease and Stroke Prevention Unit partners with other MDH programs and organizations statewide to prevent heart disease and stroke, with a special focus on preventing disability, recurrent cardiac events, and death from cardiovascular disease. In addition, the Heart Disease and Stroke Prevention Unit is committed to eliminating disparities in heart disease and stroke incidence and mortality between different populations in Minnesota. For more information about the MDH Heart Disease and Stroke Prevention Unit, go to www.health.state.mn.us/cvh/.

Air Quality
MN EPHT is working with the Minnesota Pollution Control Agency (MPCA) Air Quality Monitoring Program to track particulate matter and ozone pollution in Minnesota and to measure the public health impacts of these two pollutants. MPCA provides information on the quality of outdoor air, called the Air Quality Index (AQI). The MPCA uses four pollutants to calculate the AQI: ground level ozone, sulfur dioxide, carbon monoxide, and fine particulate matter. The AQI uses a number scale to tell Minnesotans how polluted the outdoor air is and possible effects on human health. Air quality alerts are issued when the AQI is elevated. An elevated AQI in Minnesota is commonly the result of high levels of either ozone or particulate matter. When an

air quality alert is issued, the MPCA also provides Minnesotans with protective steps. For more information on the AQI or to sign up for air pollution health alerts, go to http://aqi.pca.state.mn.us/.

The air inside homes, schools, and other buildings also may contain pollutants that enter from outdoors and those generated indoors. Mold, tobacco smoke, and chemical emissions from products and furnishings are some of the important pollutants that may be present in our homes and other indoor environments. The MDH Indoor Air Quality Program enforces the Minnesota Clean Indoor Air Act, which regulates smoking in indoor public places, tracks research about the health effects of air pollutants on an ongoing basis, and incorporates new methods and data into health risk assessments and best practices guidelines. For more information about the MDH Indoor Air Quality Program, go to http://www.health.state.mn.us/divs/eh/air/. The MDH Tobacco Prevention and Control Office works to improve the health of Minnesotans by promoting the reduction of tobacco use. For more information about the MDH Tobacco Prevention and Control Office, go to http://www.health.state.mn.us/divs/hpcd/tpc/.

Hospitalization Data and Measures

The Tracking Network hospitalization measures are asthma and heart attack hospitalization rates and counts. MN EPHT has added COPD hospitalization rates and counts as state-specific measures. Rates and counts are calculated for the years 2000 to 2007. Counts include the monthly (average, maximum, minimum) and annual number of hospitalizations, by state and county. Rates include annual crude, age-specific and age-adjusted hospitalization rates, by state and county.

MDH receives inpatient hospitalization discharge uniform billing data annually from the Minnesota Hospital Association (MHA). MHA represents Minnesota's hospitals and health systems. Currently 95% of all hospitals in the state report hospital discharge data to the MHA, representing 97% of all licensed beds in the state. Hospitals submit data to MHA using a standardized billing form.

Measures were calculated for Minnesota residents admitted to a Minnesota hospital as an inpatient with a primary discharge diagnosis of asthma (International Classification of Disease 9th Revision, Clinical Modification (ICD-9-CM) code 493), AMI (ICD-9-CM codes 410), or COPD (ICD-9-CM codes 490, 491, 492 and 496). Month and year measures were calculated using admission date information.

Rates were calculated using total Minnesota population estimates from the U.S. Census Bureau's annual population estimates. Crude and age-adjusted rates for heart attack hospitalizations are among adults age 35 and older because heart attacks are very rare among younger people. Crude and age-adjusted rates for COPD hospitalizations are among adults age 25 and older because COPD is a disease of older adults. Therefore, these younger age categories are excluded from analysis for the hospitalization measures related to heart attack (less than 35 years of age) or COPD (less than 25 years of age) because inclusion of these hospitalizations would likely represent a misdiagnosis of these conditions.

The crude rate is the actual number of cases per 10,000 or per 100,000 people in a given area or population. Comparison of crude rates between states or between counties may be misleading since asthma, COPD and heart attack are closely related to age and most populations differ from one another in their age-structure. Age-adjustment is a statistical method that is useful when comparing populations that have different age distributions Age-adjusted rates were calculated using the direct method with the year 2000 U.S. standard population.. Large difference between crude and age-adjusted rates may be due to small numbers or to populations that differ in age-structure from the standard population.

Calculations of 95% confidence intervals were based on the inverse gamma distribution when the number of events was fewer than 100 and the normal approximation when the number of events was 100 or greater.

Non-Minnesota residents are excluded in these measures, as are Minnesota residents seen out-of-state. Counts and rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low. Because Minnesota has data-sharing agreements with North Dakota, South Dakota, and Iowa, MN EPHT is able, upon request, to produce counts and rates that include county residents seeking care at out-of-state hospitals. Potential transfers and admission duplicates are also excluded. Multiple admissions by the same patient in a year are not excluded.

To maintain confidentiality, MHA provides de-identified data to MDH. When the number of cases within a group is small or the population from which the cases are determined is small, the risk of allowing a specific individual to be identified may be too large to be acceptable. MN EPHT suppresses hospitalization counts ≤ 5 and rates based on counts ≤ 5 for single years to protect an individual's privacy. To reduce the need for suppression, aggregated rates from years 2000-2007 are also presented in this report. However, some aggregated rates are suppressed to prevent back-calculation of years with small counts. Rates based on small counts (≤ 20) are flagged as unstable and should be interpreted with caution. These rates are unstable because they can change dramatically with the addition or subtraction of one case.

A. Asthma

Asthma is an increasing concern in Minnesota and across the country due to rising incidence rates, most notably in children, since the mid-1980s. There are indications that the rate of increase in asthma prevalence may be leveling off, but disparities in the burden of asthma persist. Asthma is one of the most common chronic diseases in the United States and a cause of missed days from school and work, interrupted sleep and limited physical activity. Anyone can get asthma, but asthma prevalence is higher in children compared with adults, females compared with males, blacks compared with whites, and those below the federal poverty level compared with those at or above the federal poverty level.[9]

In 2006, the estimated number of Americans who reported current asthma was 22.8 million people; 9.3% of all U.S. children under 18 had asthma and 7.3% of all U.S. adults had asthma.[10] Prevalence of asthma varies by economic status. Almost 11% of adults with family income below the poverty level reported having current asthma in 2004–2006 compared with 6% of adults with an income of 200% or more of the poverty level.[11]

Among Americans who reported current asthma, about 55.6% had at least one asthma attack in the previous year. Asthma attacks are more likely in children (63.1%) than adults (52.2%).[9] Nationally, asthma accounted for 497,000 hospitalizations and 1.8 million visits to the emergency room.[12]

In Minnesota, an estimated 7.7% of adults currently have asthma while approximately 7.0% of Minnesota children under the age of 18 have asthma.[13] Among Minnesotans with current asthma, 51.7% of adults and 40.7% of children had an asthma attack in the previous year.[13] In 2006, there were more than 4,200 asthma hospitalizations and 15,800 emergency department visits for asthma among Minnesota residents.[13]

The cause of asthma is unknown and there is no cure. To keep asthma under control, exposure to asthma triggers should be avoided. Triggers are different for each person with asthma, so it is important to know specific triggers to avoid. Asthma may be triggered by allergens and irritants found inside buildings and in outdoor air.

The most effective ways of preventing asthma at home include minimizing dust, cleaning up mold, eliminating irritants like smoke, and controlling pet dander. Environmental tobacco smoke is known to exacerbate asthma and cause asthma in young children.[13] Minnesota students with current asthma are more likely than their peers who do not have asthma to live with someone who smokes.[13]

Other things that can trigger an asthma attack include: air pollution; strenuous physical exercise; breathing in cold air; respiratory infections; some medicines; some foods and food additives; strong fragrances or chemicals such as chlorine bleach; plant pollens; strong emotional states; and some behavioral factors. Adults with asthma are much more likely than those without asthma to be obese. In 2006, 30.7% of Minnesota adults with current asthma reported an obese body mass index (BMI), while only 23.6% of adults without asthma reported an obese BMI.[13]

Asthma is a key component of the respiratory disease focus area of Healthy People 2010. Objectives relating to asthma hospitalizations include objective 24-2: reducing hospitalizations for asthma.

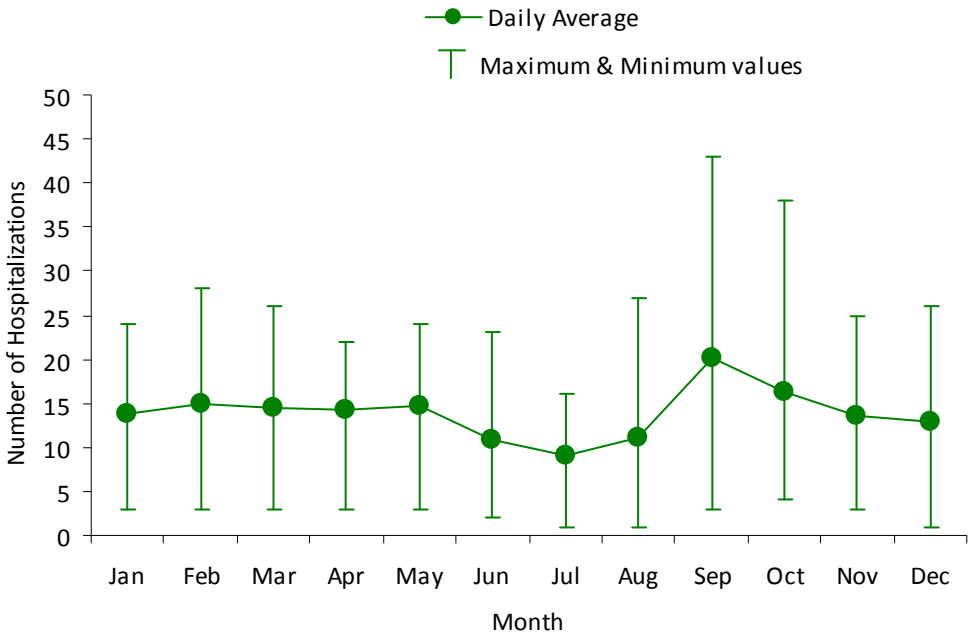
- Healthy People 2010 Objective 24-2a. Reduce asthma hospitalization rates among children under age 5 to 25.0 per 10,000.
- Healthy People 2010 Objective 24-2b. Reduce age-adjusted asthma hospitalization rates for children and adults aged 5 to 64 to 7.7 per 10,000.
- Healthy People 2010 Objective 24-2b. Reduce age-adjusted asthma hospitalization rates for adults aged 65 and older to 11.0 per 10,000.

Minnesota has met the Healthy People 2010 target for the 5-64 age group, with a rate of 5.9 asthma hospitalizations per 10,000 in 2006. Minnesota is moving toward the target rate for children under age 5. In 2006, there were more than 4,200 asthma hospitalizations among Minnesota residents, for an overall rate of 8.3 hospitalizations per 10,000 population. In comparison, the 2004 U.S. rate was nearly double that at 17.0 hospitalizations per 10,000 population.[9] Asthma hospitalization rates steadily declined in Minnesota from 1998 to 2006, then increased slightly in 2007.

A.1. Monthly average, maximum and minimum number of asthma hospitalizations, by state and county

Figure 4 shows the daily average, minimum, and maximum number of Minnesota residents admitted to a hospital as an inpatient with a primary discharge diagnosis of asthma, by month, aggregated over 2000-2007. In Minnesota, asthma hospitalization rates follow seasonal patterns. The greatest number of hospitalizations is seen in the fall months. The seasonal patterns are most pronounced in young people, who also show a smaller peak in hospitalizations in the spring. Other states including Michigan, Vermont, New Hampshire, and Nebraska have reported similar patterns. A major cause of the fall increase in asthma hospitalizations is thought to be increasing rates of respiratory infections associated with children going back to school.

Figure 4: *Average, maximum and minimum daily number of asthma hospitalizations by month, Minnesota, aggregated from 2000 to 2007.*



The seasonal pattern of asthma hospitalizations has been consistent over time. Table 1 shows the daily average, minimum, and maximum number of Minnesota residents admitted to a hospital as an inpatient with a primary discharge diagnosis of asthma, by month for years 2000-2007. Most years, the highest number of average daily asthma hospitalizations occurs in September. The lowest number of average daily asthma hospitalizations occurs in July.

Table 1: *Average, maximum and minimum daily number of asthma hospitalizations by month, Minnesota, 2000-2007.*

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	Average	11.7	12.2	12.2	11.5	12.6	11.8	7.8	11.3	22.2	15.1	11.2	10.2
	Maximum	20	20	24	18	22	20	14	19	43	25	24	16
	Minimum	5	6	4	5	5	7	3	3	11	7	4	3
2001	Average	11.2	12.8	12.3	14.2	12.3	9.7	7.1	8.6	15.4	14.8	12.7	11.4
	Maximum	18	21	21	21	22	19	13	19	29	30	25	19
	Minimum	4	4	8	7	7	3	2	3	3	4	4	7
2002	Average	10.1	14.9	10.9	10.8	12.3	9.3	7.7	8.7	15.8	15.1	13.3	11.7
	Maximum	19	28	17	17	20	16	13	16	32	34	22	18
	Minimum	3	8	5	6	5	3	3	1	7	6	7	6
2003	Average	12.7	14.5	12.9	12.3	13.3	10.9	8.6	9.1	18.8	13.7	10.5	14.5
	Maximum	22	24	26	20	22	18	14	15	32	26	20	26
	Minimum	7	8	5	4	4	3	3	3	4	6	5	7
2004	Average	11.4	13.1	12.3	12.9	14.2	9.2	7.4	8.7	16.6	15.4	12.9	12.2
	Maximum	20	24	22	21	24	23	15	17	30	38	20	26
	Minimum	5	6	5	3	7	2	3	2	8	5	5	5
2005	Average	16.0	13.4	14.4	15.0	12.5	9.7	6.7	7.6	14.1	13.6	11.8	9.7
	Maximum	24	20	25	21	20	17	13	13	23	21	17	16
	Minimum	8	6	8	7	4	3	1	2	6	7	4	2
2006	Average	11.0	11.0	13.3	10.9	13.4	7.0	7.9	8.7	17.3	14.2	11.7	12.0
	Maximum	21	20	24	22	21	12	14	17	30	24	23	22
	Minimum	6	3	3	6	4	3	2	4	3	8	3	4
2007	Average	12.9	12.2	13.4	12.6	12.1	8.9	10.1	15.1	20.1	12.7	11.4	9.2
	Maximum	20	20	22	19	19	17	16	27	34	22	19	20
	Minimum	5	5	8	5	3	3	5	7	12	6	3	1

A.2. Annual number of asthma hospitalizations, by state and county

Table 2 shows the number of hospitalizations due to asthma from 2000 to 2007 for all Minnesota and for each county. Counts ≤ 5 have been suppressed to maintain confidentiality and are marked with an asterisk. Because EPHT hospitalization measures include only discharges from Minnesota hospitals, counts for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

The number of hospitalizations due to asthma is dependent on many factors, including the size of the population. Because Minnesota has many counties with small population counts, many cells have been suppressed due to small asthma hospitalization counts. To account for differing population size by county, rates are used and are reported in the following section. Rates are the number of events that occur in a defined period of time, divided by the average population at risk of that event. Rates are often used instead of counts because they allow comparison of a health event in two different populations.

Table 2: *Annual number of asthma hospitalizations by county, 2000-2007.*

	2000	2001	2002	2003	2004	2005	2006	2007
Minnesota	**4550**	**4325**	**4267**	**4608**	**4445**	**4392**	**4212**	**4577**
Aitkin	7	16	12	11	14	23	15	7
Anoka	305	290	251	293	243	269	254	314
Becker	16	9	16	18	9	16	17	8
Beltrami	23	28	30	25	29	30	25	34
Benton	34	38	57	56	54	36	36	48
Big Stone	*	*	*	*	*	*	*	*
Blue Earth	24	20	17	20	20	27	17	22
Brown	16	16	18	16	22	13	25	19
Carlton	26	38	24	29	27	35	24	18
Carver	42	36	55	57	57	63	65	56
Cass	16	36	40	38	34	29	16	22
Chippewa	12	6	12	10	8	*	*	6
Chisago	11	35	40	48	45	55	42	48
Clay	*	*	*	*	*	*	*	*
Clearwater	*	*	*	*	10	*	6	*
Cook	*	*	*	*	*	6	*	*
Cottonwood	8	*	*	12	13	7	13	8
Crow Wing	37	37	58	51	55	58	50	53
Dakota	316	270	267	352	288	298	262	307
Dodge	15	15	16	17	13	11	17	12
Douglas	20	20	21	18	16	28	24	29
Faribault	12	7	*	7	7	*	*	11
Fillmore	14	10	6	8	13	9	9	13
Freeborn	*	*	*	*	*	6	19	26
Goodhue	16	24	27	31	23	36	36	47
Grant	*	*	*	7	7	*	6	*
Hennepin	1430	1318	1243	1291	1321	1216	1264	1336
Houston	*	*	*	*	*	*	*	*
Hubbard	14	11	12	14	8	6	6	9
Isanti	12	13	18	25	27	35	21	26
Itasca	41	35	28	47	34	46	42	42
Jackson	*	*	7	7	12	9	*	*
Kanabec	16	28	19	23	14	37	18	11
Kandiyohi	24	22	24	26	21	19	21	23
Kittson	*	*	*	*	*	*	*	*
Koochiching	*	10	8	21	11	31	22	11
Lac Qui Parle	*	9	7	10	*	15	12	6
Lake	*	*	8	9	*	6	6	13
Lake Of The Woods	6	6	*	7	*	*	*	*
Le Sueur	14	12	18	20	13	14	17	13
Lincoln	9	10	19	9	6	8	6	7
Lyon	13	8	15	17	20	15	16	13
Mahnomen	*	7	*	*	*	*	*	*
Marshall	*	*	*	*	*	*	*	*
Martin	14	8	11	23	20	24	14	26
McLeod	21	27	30	19	31	29	19	29

	2000	2001	2002	2003	2004	2005	2006	2007
Minnesota	**4550**	**4325**	**4267**	**4608**	**4445**	**4392**	**4212**	**4577**
Meeker	11	12	10	12	19	19	10	17
Mille Lacs	35	42	48	45	25	23	32	37
Morrison	19	27	14	21	24	26	18	28
Mower	9	9	*	6	38	29	30	46
Murray	6	6	11	15	16	12	13	7
Nicollet	9	10	10	12	16	13	15	18
Nobles	16	11	7	27	21	16	16	10
Norman	*	*	*	*	6	*	*	*
Olmsted	94	103	114	104	107	98	123	100
Otter Tail	7	29	41	32	35	48	45	51
Pennington	11	7	9	8	*	7	7	8
Pine	28	17	22	28	19	20	20	16
Pipestone	*	6	*	8	10	*	*	*
Polk	13	19	11	13	15	11	10	17
Pope	*	*	11	*	15	13	17	8
Ramsey	777	626	578	591	562	542	489	604
Red Lake	*	*	*	*	*	*	*	*
Redwood	14	15	13	11	15	6	8	9
Renville	16	13	14	22	13	6	6	9
Rice	37	36	32	42	56	55	30	50
Rock	*	*	*	*	*	*	*	*
Roseau	*	6	8	6	6	6	*	6
Scott	99	83	62	115	88	86	84	82
Sherburne	35	57	40	45	51	47	64	52
Sibley	10	10	16	16	7	6	15	10
Stearns	131	112	119	125	126	167	143	156
Steele	23	33	19	19	22	19	28	17
Stevens	*	8	10	8	14	6	10	6
St. Louis	211	232	221	227	199	197	187	183
Swift	18	19	16	12	16	8	7	7
Todd	6	9	13	7	13	12	15	10
Traverse	*	*	*	*	*	*	*	*
Wabasha	8	6	7	13	11	16	13	11
Wadena	16	15	24	8	25	17	20	22
Waseca	9	8	15	9	14	15	12	10
Washington	147	141	156	133	140	150	132	146
Watonwan	7	*	*	12	7	8	6	*
Wilkin	*	*	*	*	*	*	*	*
Winona	18	11	22	26	33	15	19	22
Wright	61	60	71	85	79	55	57	73
Yellow Medicine	8	7	14	17	12	17	7	11

* MN EPHT suppresses hospitalization counts ≤ 5 to protect an individual's privacy.

A.3. Annual crude, age-specific, and age-adjusted asthma hospitalization rates, by state and county

Figure 5 shows age-adjusted asthma hospitalization rates per 10,000 people from 2000 to 2007 for the state of Minnesota. Through 2006, the overall trend in asthma hospitalization rates in Minnesota had been one of steady decline since 1998. The rate of asthma hospitalization in Minnesota increased in 2007. It is too early to tell whether this is a new trend or just a one-year jump in rates in an overall downward trend, such as what happened in 2003.

Figure 5: *Annual age-adjusted asthma hospitalization rates per 10,000 people, Minnesota, 2000-2007.*

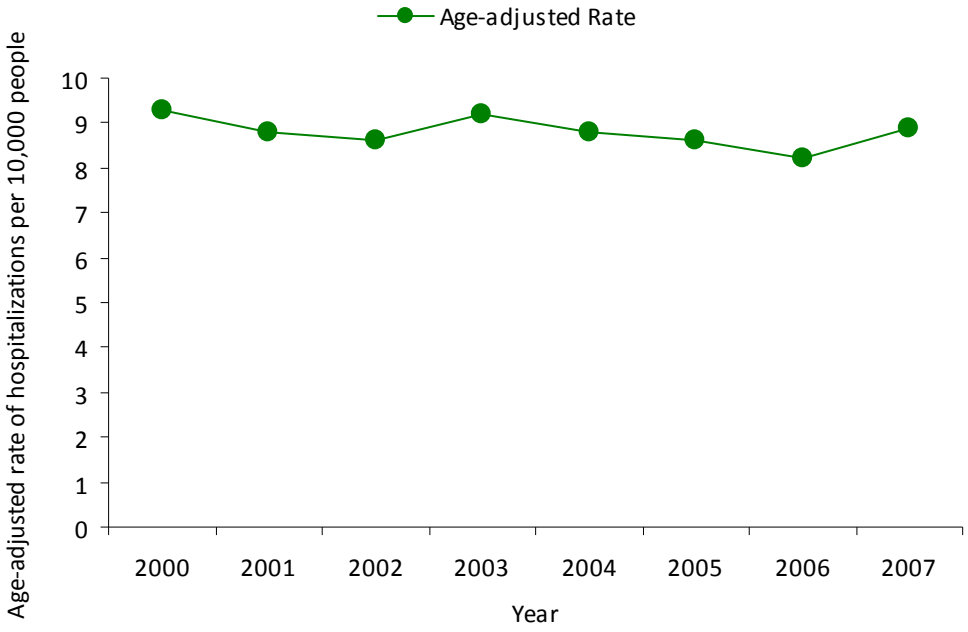


Table 3 shows crude and age-adjusted asthma hospitalization rates for all Minnesota and for each county from 2000-2007. Crude rates are in regular font followed by age-adjusted rates in italics. Rates based on counts ≤ 5 have been suppressed to maintain confidentiality and are marked with two asterisks. When a rate is based on a count ≤ 20 (marked with one asterisk), it may be unstable and should be interpreted with caution. These rates are unstable because they can change dramatically with the addition or subtraction of one case. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

Rates take into account the size of the population and allow for comparison of a health event in two different populations. Crude rates are the number of hospitalizations in a given area per 10,000 people in that area. Age-adjustment allows communities with different age structures to be compared. MN EPHT age-adjusted rate measures are calculated using the direct method of standardization using the U.S. 2000 population as the standard. A directly age-adjusted rate represents what the crude rate would have been in the community if that community's population had the same age distribution as the standard population. A large difference between crude and age-adjusted rates may be likely due to small numbers. Aggregated rates may be a more useful measure for these counties.

Table 3: *Annual crude and age-adjusted asthma hospitalization rates per 10,000 by county, 2000-2007.*

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**9.3**	***9.3***	**8.7**	***8.8***	**8.5**	***8.6***	**9.1**	***9.2***	**8.8**	***8.8***	**8.6**	***8.6***	**8.2**	***8.2***	**8.8**	***8.9***
Aitkin	11.9*	*3.9**	19.3*	*13.1**	17.6*	*7.4**	12.3*	*7.1**	15.3*	*7.4**	21.1	*11.5*	21.1*	*7.8**	12.0*	*4.6**
Anoka	10.2	*10.9*	9.5	*10.2*	8.1	*8.6*	9.4	*10.2*	7.7	*8.1*	8.4	*8.9*	7.9	*8.4*	9.7	*10.3*
Becker	9.6*	*5.7**	8.7*	*3.1**	9.7*	*5.2**	10.1*	*5.8**	7.4*	*2.9**	7.4*	*4.6**	7.9*	*5.2**	6.8*	*2.5**
Beltrami	10.5	*6.2*	10	*7.4*	9.9	*7.7*	12.7	*6.8*	8.0	*6.9*	9.7	*7.2*	7.5	*6.0*	10.7	*7.8*
Benton	13.8	*10.3*	13.5	*11.3*	19.2	*16.8*	17.6	*15.4*	21.5	*13.8*	12.6	*9.8*	13	*9.8*	15.2	*12.6*
Big Stone	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Blue Earth	6.9	*4.7*	6.7*	*4.1**	4.7*	*3.2**	4.5*	*3.7**	6.7*	*3.9**	8.5	*5.3*	5.5*	*3.5**	7.0	*4.2*
Brown	18.1*	*6.5**	11.9*	*6.0**	12.2*	*6.3**	20.4*	*6.0**	13.9	*8.3*	13.9*	*4.2**	16.6	*8.7*	16.5*	*6.7**
Carlton	13.6	*8.3*	13.6	*11.5*	13.4	*6.7*	13.1	*8.1*	14.9	*7.8*	14.9	*9.9*	10.9	*6.8*	8.2*	*5.1**
Carver	6.7	*6.5*	5.4	*4.9*	9.4	*7.6*	9.6	*7.1*	9.9	*7.6*	7.6	*7.8*	8.1	*7.7*	6.6	*6.7*
Cass	12.0*	*6.1**	17.8	*12.8*	16.4	*14.7*	17.7	*13.4*	15.6	*12.0*	15.5	*10.3*	11.6*	*5.3**	12.5	*8.3*
Chippewa	26.2*	*7.6**	15.7*	*4.7**	20.6*	*8.7**	33.8*	*7.8**	27.4*	*7.7**	**	**	**	**	19.9*	*5.9**
Chisago	6.8*	*2.4**	8.6	*8.3*	10.9	*9.6*	10.8	*10.9*	13.0	*9.8*	13.8	*11.7*	9.8	*8.6*	10.7	*9.8*
Clay	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Clearwater	**	**	**	**	**	**	**	**	43.5*	*10.8**	**	**	31.1*	*5.4**	**	**
Cook	**	**	**	**	**	**	**	**	**	**	35.3*	*10.1**	**	**	**	**
Cottonwood	35.9*	*3.8**	**	**	**	**	29.1*	*12.3**	24.7*	*10.1**	24.1*	*4.5**	20.5*	*9.7**	20.8*	*7.3**
Crow Wing	7.0	*6.6*	7.8	*6.5*	12.3	*9.5*	10.0	*8.2*	9.7	*9.0*	10.3	*9.2*	10.1	*8.0*	8.6	*8.3*
Dakota	8.9	*8.9*	7.4	*7.7*	7.3	*7.7*	9.5	*9.8*	7.7	*7.9*	7.8	*8.4*	6.8	*7.0*	7.9	*8.1*
Dodge	22.8*	*7.9**	19.3*	*7.8**	19.0*	*8.2**	16.7*	*9.0**	14.3*	*6.9**	11*	*5.9**	16.9*	*8.5**	13.7*	*6.2**
Douglas	10.0*	*6.0**	12.1*	*5.3**	10.8	*5.7*	8.2*	*4.6**	9.6*	*3.9**	9.3	*7.3*	13.2	*6.0*	12.2	*8.0*
Faribault	18.9*	*5.7**	19*	*3.9**	**	**	15.7*	*4.0**	16.4*	*4.4**	**	**	**	**	14.7*	*7.5**
Fillmore	16.5*	*6.1**	10.8*	*4.3**	11.4*	*2.3**	10.1*	*3.3**	13.5*	*5.5**	22.6*	*3.5**	11.7*	*4.6**	16.1*	*5.7**
Freeborn	**	**	**	**	**	**	**	**	**	**	7.4*	*1.6**	9.5*	*5.7**	10.5	*8.1*
Goodhue	7.8*	*3.8**	8.9	*5.6*	10.1	*6.5*	10.3	*7.3*	7.2	*5.1*	9.0	*7.9*	8.5	*7.7*	12.0	*9.8*
Grant	**	**	**	**	**	**	31.3*	*10.3**	36.4*	*9.5**	**	**	37.7*	*5.6**	**	**
Hennepin	12.8	*13.2*	11.7	*12.1*	11.1	*11.4*	11.5	*11.8*	11.8	*11.9*	10.8	*10.8*	11.2	*11.4*	11.8	*11.9*
Houston	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Hubbard	12.9*	*7.7**	13.9*	*5.7**	11.3*	*5.7**	17.8*	*6.0**	17.9*	*3.1**	9.7*	*2.8**	14.0*	*2.3**	10.4*	*4.6**
Isanti	9.1*	*3.8**	8.3*	*4.2**	8.6*	*5.5**	9.1	*7.4*	9.5	*7.6*	11.2	*9.9*	8.1	*5.9*	11.7	*6.8*
Itasca	12.6	*8.8*	12.0	*8.1*	8.4	*6.2*	12.2	*10.6*	10.3	*7.1*	13.0	*10.6*	15.3	*8.8*	11.7	*8.3*

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**9.3**	***9.3***	**8.7**	***8.8***	**8.5**	***8.6***	**9.1**	***9.2***	**8.8**	***8.8***	**8.6**	***8.6***	**8.2**	***8.2***	**8.8**	***8.9***
Jackson	**	**	**	**	19.1*	*6.4**	32.7*	*6.7**	34.3*	*12.9**	21.7*	*10.2**	**	**	**	**
Kanabec	16.6*	*10.6**	26.0	*17.5*	21.8*	*12.3**	19.7	*13.7*	19.5*	*8.4**	24.8	*22.7*	22.5*	*10.6**	25.3*	*5.7**
Kandiyohi	7.5	*5.5*	8.2	*5.4*	7.8	*5.8*	9.9	*6.1*	8.5	*5.5*	9.0*	*4.4**	6.4	*4.8*	11.4	*5.9*
Kittson	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Koochiching	**	**	22.5*	*6.1**	18.8*	*5.2**	26.4	*14.8*	17.7*	*6.9**	39.3	*18.9*	31.7	*13.0*	19.1*	*7.8**
Lac Qui Parle	**	**	33.6*	*12.0**	23.2*	*11.8**	33.5*	*11.9**	**	**	29.4*	*22.8**	47.1*	*19.8**	31.7*	*6.5**
Lake	**	**	**	**	20.9*	*7.1**	27.9*	*9.0**	**	**	14.4*	*4.6**	17.0*	*5.6**	34.9*	*12.0**
Lake Of The Woods	50.7*	*12.6**	45.3*	*12.9**	**	**	63.4*	*13.5**	**	**	**	**	**	**	**	**
Le Sueur	9.8*	*5.3**	8.2*	*4.8**	11.6*	*7.3**	11.4*	*7.3**	9.9*	*4.8**	7.6*	*5.1**	13.6*	*5.7**	10.2*	*4.8**
Lincoln	64.9*	*10.1**	61.7*	*9.8**	84.0*	*20.5**	29.5*	*12.0**	34.7*	*10.1**	40.7*	*9.6**	34.9*	*8.8**	43.6*	*10.6**
Lyon	9.7*	*4.9**	6.7*	*3.4**	14.1*	*5.5**	9.5*	*7.1**	16.3*	*8.2**	10.7*	*6.5**	15.2*	*6.1**	12.8*	*5.1**
Mahnomen	**	**	60.1*	*14.0**	**	**	**	**	**	**	**	**	**	**	**	**
Marshall	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Martin	10.8*	*6.5**	9.6*	*4.1**	11.4*	*6.0**	17	*11.3*	12.5*	*10.9**	20.9	*12.8*	10.9*	*7.4**	19.1	*13.4*
McLeod	8.7	*5.9*	13.6	*7.4*	11.8	*7.9*	9.0*	*5.0**	10.9	*8.2*	9.9	*7.7*	11.2*	*4.9**	13.3	*7.3*
Meeker	10.9*	*4.8**	12.1*	*5.4**	10.3*	*4.3**	10.7*	*5.2**	17.5*	*8.1**	12.9*	*7.9**	8.9*	*4.0**	12.2*	*7.4**
Mille Lacs	20.5	*15.9*	24.4	*18.2*	32.6	*19.7*	19.9	*18.6*	12.8	*9.5*	13.8	*9.1*	17.2	*12.0*	19.2	*14.0*
Morrison	12.5*	*6.2**	13.6	*8.4*	13.3*	*4.1**	11.2	*6.3*	11.9	*7.6*	12.5	*7.9*	8.3*	*5.2**	10.8	*8.8*
Mower	9.8*	*2.3**	6.8*	*2.3**	**	**	6.4*	*1.8**	11.7	*10.0*	9.2	*7.7*	10.1	*7.7*	13.9	*11.1*
Murray	54.8*	*7.9**	32*	*5.5**	30.8*	*9.3**	29.9*	*17.2**	55.8*	*17.8**	40.5*	*14.8**	31.1*	*16.2**	23.9*	*7.2**
Nicollet	7.0*	*2.9**	8.9*	*3.9**	10.2*	*3.3**	9.2*	*4.2**	8.8*	*5.8**	11.0*	*4.4**	7.2*	*5.0**	7.8*	*5.8**
Nobles	16.3*	*7.3**	23.1*	*5.2**	12.2*	*3.2**	22.5	*12.5*	25.1	*10.0*	16.6*	*7.1**	23.1*	*6.7**	13.8*	*4.2**
Norman	**	**	**	**	**	**	**	**	40.3*	*7.7**	**	**	**	**	**	**
Olmsted	7.9	*7.4*	8.1	*8.3*	8.8	*8.8*	8.3	*7.9*	8.2	*7.9*	7.3	*7.2*	9.0	*8.9*	7.2	*7.0*
Otter Tail	3.3*	*1.1**	7.2	*5.3*	8.6	*6.8*	6.2	*5.4*	8.1	*6.2*	8.8	*7.3*	9.4	*6.5*	10.1	*7.8*
Pennington	19.5*	*8.1**	17.6*	*4.3**	20.2*	*5.6**	20.9*	*5.0**	**	**	22.1*	*3.6**	13.4*	*5.0**	14.5*	*6.4**
Pine	14.9	*10.1*	11.5*	*6.3**	11.0	*7.7*	12.6	*9.9*	12.6*	*6.8**	9.8*	*6.5**	10.9*	*6.4**	12.0*	*6.2**
Pipestone	**	**	44.0*	*5.4**	**	**	25.1*	*6.7**	32.6*	*7.6**	**	**	**	**	**	**
Polk	18.5*	*3.5**	12.5*	*5.4**	6.5*	*3.5**	7.6*	*4.4**	10.2*	*5.0**	7.6*	*3.4**	11.1*	*3.0**	10.2*	*5.9**
Pope	**	**	**	**	28.9*	*9.9**	**	**	32.9*	*10.5**	31.1*	*9.9**	29.8*	*12.1**	24.4*	*5.6**
Ramsey	15.2	*15.3*	12.2	*12.3*	11.3	*11.5*	11.7	*11.9*	11.2	*11.4*	10.9	*10.9*	9.9	*9.8*	12.1	*12.1*
Red Lake	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Redwood	16.2*	*7.9**	17.2*	*8.2**	16.4*	*7.2**	18.1*	*6.1**	17.7*	*7.7**	25.6*	*4.2**	33.7*	*4.3**	18.3*	*5.5**

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**9.3**	***9.3***	**8.7**	***8.8***	**8.5**	***8.6***	**9.1**	***9.2***	**8.8**	***8.8***	**8.6**	***8.6***	**8.2**	***8.2***	**8.8**	***8.9***
Renville	20.9*	*9.7**	19.1*	*7.5**	25.5*	*8.7**	20.3	*13.0*	15.7*	*8.3**	13.4*	*2.8**	13.4*	*3.4**	12.3*	*6.3**
Rice	8.6	*7.0*	7.3	*6.4*	8.0	*5.8*	7.9	*7.6*	14.1	*10.0*	10.7	*9.5*	6.5	*5.1*	10.6	*8.5*
Rock	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Roseau	**	**	14.4*	*4.1**	12.0*	*4.8**	9.4*	*4.0**	14.6*	*3.7**	14.1*	*3.8**	**	**	12.1*	*3.7**
Scott	12.0	*10.4*	8.5	*9.1*	6.5	*6.2*	10.7	*11.3*	8.3	*7.8*	7.3	*7.5*	6.9	*7.4*	6.5	*7.1*
Sherburne	6.2	*5.4*	9.3	*9.0*	6.6	*5.6*	7.2	*6.7*	7.6	*7.3*	6.3	*6.3*	9.2	*7.9*	8.9	*6.0*
Sibley	31.2*	*7.0**	18.5*	*6.5**	21.5*	*10.2**	19.5*	*10.4**	15.0*	*4.7**	21.8*	*3.2**	16.6*	*9.8**	17.2*	*6.4**
Stearns	9.8	*10.6*	8.2	*8.8*	8.6	*9.3*	8.9	*9.6*	8.9	*9.5*	11.7	*12.2*	9.9	*10.4*	10.7	*11.2*
Steele	11.6	*6.8*	11.1	*9.5*	10.2*	*5.4**	10.7*	*5.3**	10.9	*6.2*	9.8*	*5.3**	8.9	*7.9*	7.4*	*4.6**
Stevens	**	**	21.9*	*7.4**	24.4*	*10.2**	21.8*	*8.7**	43.8*	*12.5**	18.9*	*5.4**	37.7*	*10.0**	19.6*	*6.2**
St. Louis	10.5	*10.5*	12.2	*11.6*	11.1	*10.8*	11.4	*11.8*	10.1	*10.4*	10.0	*10.3*	9.5	*9.5*	9.3	*10.1*
Swift	29.2*	*13.4**	38.7*	*15.9**	26.0*	*14.8**	35.3*	*11.1**	38.6*	*13.6**	29*	*7.3**	21.5*	*5.0**	22.1*	*6.2**
Todd	7.8*	*2.5**	10.5*	*3.8**	10.4*	*6.1**	7.7*	*2.7**	9.3*	*5.3**	13.3*	*5.5**	10.5*	*6.7**	12.4*	*4.2**
Traverse	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Wabasha	7.8*	*3.8**	11.3*	*2.4**	14.9*	*3.5**	13.3*	*5.8**	9.7*	*4.9**	13.5*	*6.5**	11.7*	*6.0**	15.5*	*4.8**
Wadena	20.2*	*11.4**	28.2*	*10.2**	27.2	*16.9*	21.7*	*5.6**	28.3	*18.8*	30.9*	*11.5**	22.6*	*14.8**	28.3	*15.7*
Waseca	10.8*	*4.6**	12.0*	*4.1**	15.2*	*7.7**	11.4*	*4.2**	15.4*	*7.1**	16.6*	*7.4**	12.7*	*6.5**	13.8*	*5.4**
Washington	7.3	*7.8*	7.2	*7.2*	7.5	*8.0*	6.3	*6.6*	6.6	*7.0*	6.9	*7.6*	6.0	*6.2*	6.5	*7.1*
Watonwan	19.2*	*5.6**	**	**	**	**	34.5*	*8.1**	25.6*	*5.5**	30.4*	*5.8**	24.6*	*4.3**	**	**
Wilkin	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Winona	6.6*	*4.1**	8.3*	*2.4**	6.0	*4.6*	8.7	*5.1*	8.9	*6.8*	7.8*	*3.2**	6.0*	*3.9**	5.6	*4.6*
Wright	7.6	*7.0*	7.2	*7.2*	7.7	*7.7*	8.9	*8.7*	7.4	*7.9*	5.2	*5.4*	5.0	*5.4*	7.2	*6.6*
Yellow Medicine	31.3*	*7.5**	20.1*	*6.1**	37.5*	*9.6**	46*	*10.1**	22.6*	*10.9**	34*	*15.9**	15.7*	*5.8**	31.7*	*12.5**

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Table 4 shows crude and age-adjusted asthma hospitalization rates for all Minnesota and for each county, aggregated from 2000-2007. Aggregating data over several years increases the number of counts which increases the stability of the rate, but hides trends over time. Ninety-five percent confidence intervals around the rates are shown in parentheses. The confidence interval is a measure of reliability. It is the interval within which the true value of the rate would be expected to fall 95 times out of 100. Counties with rates based on counts ≤ 20 are marked with an asterisk. Some rates are suppressed to prevent back-calculation of suppressed annual counts, and are marked with two asterisks. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

Table 4: *Annual crude and age-adjusted asthma hospitalization rates per 10,000 by state and county, aggregated from 2000 to 2007.*

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Minnesota	**8.7**	**(8.6-8.8)**	**8.8**	**(8.7-8.9)**
Aitkin	8.4	(6.8-10.0)	7.6	(6-9.2)
Anoka	8.8	(8.5-9.2)	9.4	(9-9.8)
Becker	4.4	(3.6-5.2)	4.3	(3.5-5.2)
Beltrami	6.7	(5.8-7.6)	7.0	(6.1-7.9)
Benton	12.0	(10.7-13.2)	12.5	(11.1-13.8)
Big Stone*	2.9	(1.6-5)	2.5	(1.3-4.4)
Blue Earth	3.6	(3.1-4.2)	4.1	(3.4-4.7)
Brown	6.8	(5.7-8.0	6.6	(5.5-7.7)
Carlton	8.4	(7.3-9.5)	8.0	(6.9-9.1)
Carver	6.8	(6.1-7.4)	7.0	(6.3-7.7)
Cass	10.3	(8.9-11.6)	10.4	(9-11.8)
Chippewa	6.1	(4.7-7.8)	5.9	(4.5-7.7)
Chisago	8.7	(7.8-9.7)	8.9	(7.9-9.9)
Clay*	0.2	(0.1-0.4)	0.2	(0.1-0.4)
Clearwater	6.0	(4.3-8.2)	5.5	(3.9-7.5)
Cook*	4.0	(2.3-6.4)	3.4	(1.9-5.6)
Cottonwood	7.0	(5.4-8.9)	6.5	(4.9-8.4)
Crow Wing	8.5	(7.7-9.4)	8.2	(7.4-9.0)
Dakota	7.9	(7.6-8.2)	8.2	(7.8-8.5)
Dodge	7.7	(6.3-9.1)	7.5	(6.2-8.9)
Douglas	6.4	(5.5-7.3)	5.9	(5.0-6.7)
Faribault	4.4	(3.3-5.8)	3.9	(2.8-5.2)
Fillmore	4.9	(3.9-6.0	4.4	(3.4-5.5)
Freeborn	2.3	(1.8-3)	2.2	(1.7-2.9)
Goodhue	6.7	(5.8-7.5)	6.7	(5.8-7.5)
Grant	7.5	(5.3-10.4)	6.1	(4.1-8.7)
Hennepin	11.6	(11.4-11.8)	11.8	(11.6-12)
Houston*	1.0	(0.5-1.6)	0.9	(0.5-1.4)
Hubbard	5.4	(4.3-6.7)	4.8	(3.8-6.0)
Isanti	6.2	(5.3-7.2)	6.4	(5.5-7.4)
Itasca	8.9	(8-9.9)	8.5	(7.6-9.5)
Jackson	5.6	(4.1-7.3)	6.1	(4.4-8.2)
Kanabec	13.2	(11.2-15.3)	12.8	(10.8-14.7)
Kandiyohi	5.5	(4.7-6.3)	5.4	(4.6-6.2)
Kittson*	1.0	(0.3-2.6)	1.1	(0.2-3.2)

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Koochiching	**	(**-**)	**	(**-**)
Lac Qui Parle	11.1	(8.6-14.1)	12.2	(9.2-15.8)
Lake	5.9	(4.4-7.8)	6.1	(4.5-8.1)
Lake Of The Woods	10.5	(7.3-14.5)	10.1	(6.9-14.3)
Le Sueur	5.7	(4.7-6.7)	5.7	(4.7-6.7)
Lincoln	15.1	(11.9-19)	11.7	(8.9-15.0)
Lyon	5.9	(4.8-6.9)	5.8	(4.7-6.9)
Mahnomen	**	(**-**)	**	(**-**)
Marshall*	1.4	(0.7-2.5)	1.3	(0.6-2.4)
Martin	8.3	(7.0-9.7)	8.8	(7.3-10.4)
McLeod	7.1	(6.2-8.1)	6.8	(5.9-7.8)
Meeker	6.0	(4.9-7.1)	5.9	(4.8-7.0)
Mille Lacs	14.7	(13-16.4)	14.5	(12.8-16.2)
Morrison	6.9	(5.8-7.9)	6.8	(5.8-7.8)
Mower	**	(**-**)	**	(**-**)
Murray	12.2	(9.7-15)	12.0	(9.4-15.0)
Nicollet	4.2	(3.4-5)	4.4	(3.5-5.3)
Nobles	7.6	(6.3-8.9)	7.0	(5.7-8.2)
Norman	5.5	(3.7-7.8)	5.4	(3.6-7.8)
Olmsted	8.0	(7.4-8.5)	7.9	(7.4-8.5)
Otter Tail	6.3	(5.6-7)	5.8	(5.1-6.5)
Pennington	**	(**-**)	**	(**-**)
Pine	7.7	(6.6-8.9)	7.4	(6.3-8.6)
Pipestone	5.5	(4.0-7.4)	4.4	(3.1-6.1)
Polk	4.4	(3.6-5.2)	4.3	(3.4-5.1)
Pope	8.5	(6.7-10.7)	7.3	(5.7-9.3)
Ramsey	11.8	(11.5-12.2)	11.9	(11.6-12.3)
Red Lake*	3.5	(1.8-6.2)	3.6	(1.8-6.3)
Redwood	7.1	(5.7-8.7)	6.3	(5.0-7.8)
Renville	7.4	(6.0-9.1)	7.4	(6.0-9.0)
Rice	7.1	(6.4-7.9)	7.5	(6.7-8.3)
Rock*	2.6	(1.6-4.0)	2.3	(1.4-3.7)
Roseau	3.5	(2.5-4.7)	3.5	(2.5-4.7)
Scott	8.0	(7.4-8.5)	8.3	(7.6-8.9)
Sherburne	6.4	(5.8-7.1)	6.7	(6.0-7.4)
Sibley	7.4	(6.0-9.1)	7.3	(5.9-9.0)
Stearns	9.6	(9-10.2)	10.2	(9.6-10.8)
Steele	6.4	(5.5-7.4)	6.4	(5.4-7.3)
Stevens	**	(**-**)	**	(**-**)
St. Louis	10.4	(9.9-10.9)	10.6	(10.1-11.1)
Swift	11.4	(9.2-13.6)	10.9	(8.7-13.2)
Todd	4.4	(3.5-5.4)	4.5	(3.6-5.6)
Traverse*	3.5	(1.8-6.3)	3.8	(1.8-7.1)
Wabasha	4.9	(3.9-6.0)	4.7	(3.7-5.8)
Wadena	13.6	(11.4-15.8)	13.1	(10.9-15.3)
Waseca	5.9	(4.8-7.3)	5.8	(4.7-7.2)
Washington	6.7	(6.3-7.1)	7.2	(6.7-7.6)
Watonwan	5.1	(3.8-6.8)	4.3	(3.1-5.8)
Wilkin	4.2	(2.7-6.4)	3.9	(2.5-5.9)

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Winona	4.2	(3.5-4.8)	4.3	(3.7-5.0)
Wright	6.5	(6.0-7.1)	6.9	(6.3-7.5)
Yellow Medicine	11.0	(8.9-13.5)	9.6	(7.7-12.0)

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.
** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Figure 6: *Age-adjusted asthma hospitalization rates per 10,000 people, Minnesota, aggregated from 2000 to 2007.*

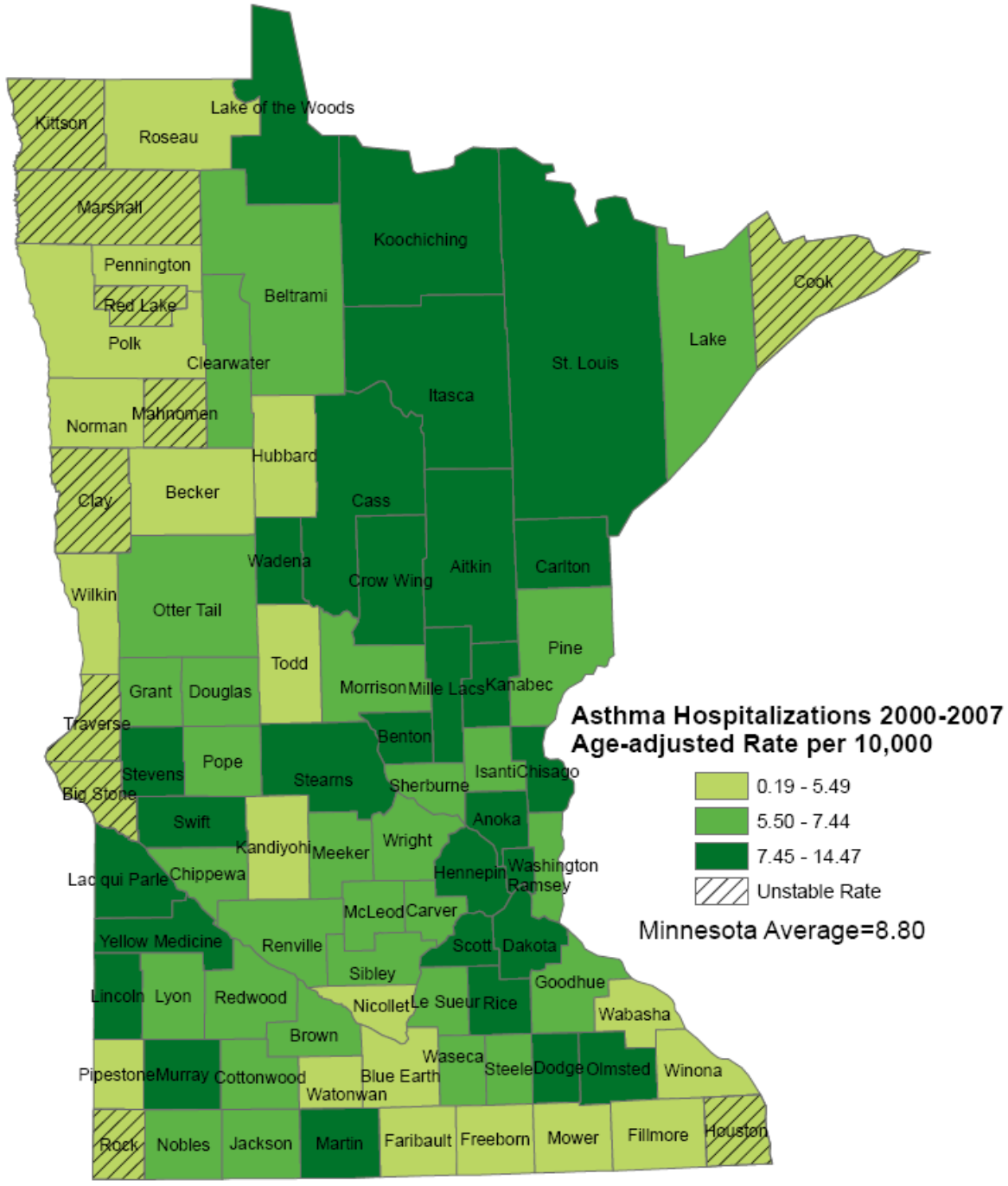


Figure 6 shows a map of age-adjusted asthma hospitalization rates, aggregated from 2000-2007. Counties marked with cross-hashing display rates based on counts ≤ 20 and are unstable. Rates are classified into three categories or quantiles. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low. The overall state aggregated rate is 8.83.

Figure 7 shows rates of asthma hospitalizations for eight age categories (age-specific rates) for Minnesota, aggregated from 2000-2007. The highest asthma hospitalization rates are seen among children under the age of 5 years. The rate decreases until middle age and then starts to increase for the older age groups.

Figure 7: *Age-specific asthma hospitalization rates per 10,000 people, Minnesota, aggregated from 2000 to 2007.*

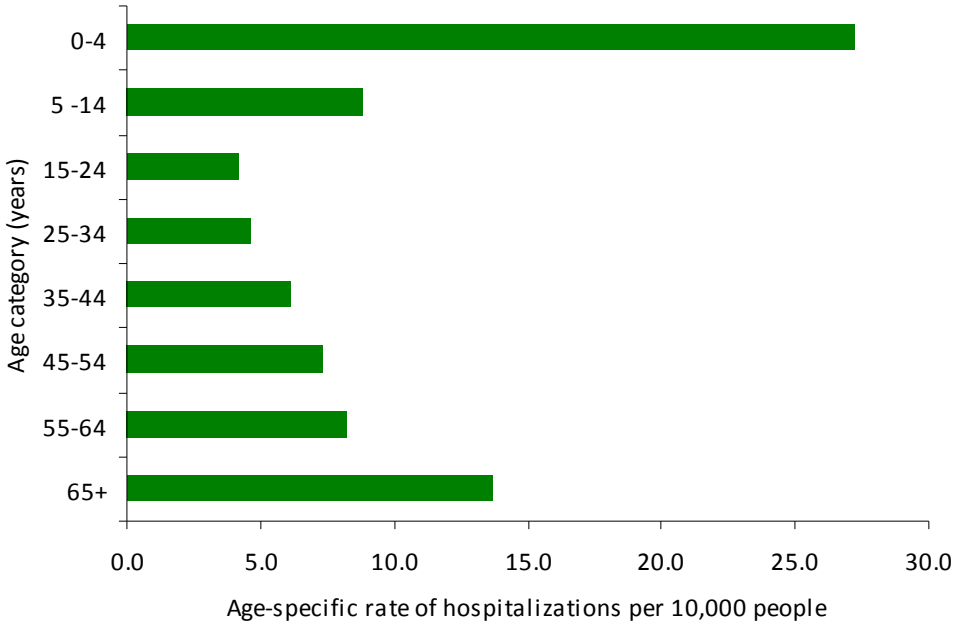


Table 5 shows age-specific asthma hospitalization rates for the state of Minnesota for years 2000-2007. The state met the Healthy People 2010 target asthma rate for children under 5 years (25 asthma hospitalizations per 10,000 children under age 5) in 2005 and 2006, but not in 2007.

Table 5: *Annual age-specific asthma hospitalization rates per 10,000, Minnesota, 2000-2007.*

	0-4	5 -14	15-24	25-34	35-44	45-54	55-64	65+
2000	30.2	11.3	5.5	6.0	6.2	7.1	6.8	11.5
2001	26.1	7.9	4.8	4.9	6.4	7.6	8.2	13.6
2002	25.1	8.0	4.3	4.5	6.3	6.8	8.4	14.4
2003	28.0	9.4	4.2	4.9	6.7	7.6	8.2	14.7
2004	30.8	8.7	3.9	4.4	6.0	6.9	8.8	13.0
2005	24.1	7.6	4.0	4.3	6.0	7.7	9.1	15.1
2006	24.9	7.9	3.4	3.6	5.6	6.9	8.9	14.0
2007	28.6	9.6	3.7	4.6	5.9	8.0	7.2	13.2

Table 6 shows age-specific asthma hospitalization rates for all Minnesota and for each county, aggregated from 2000-2007. Rates based on counts ≤ 20 are marked with one asterisk. Some rates are suppressed to prevent back-calculation of suppressed annual counts, and are marked with two asterisks. Most counties show the same pattern as the 2000-2007 aggregated state data: asthma hospitalization rates are highest among children under 5 years of age, followed by adults 65 and older. Using aggregated data, some counties have reached the Healthy People 2010 target rates of 25 per 10,000 for children under age 5.

Table 6: *Annual age-specific asthma hospitalization rates per 10,000 by state and county, aggregated from 2000 to 2007.*

	0-4	5 -14	15-24	25-34	35-44	45-54	55-64	65+
Minnesota	**27.2**	**8.8**	**4.2**	**4.6**	**6.1**	**7.3**	**8.2**	**13.7**
Aitkin	18.4*	4.3*	1.5*	8.1*	7.3*	7.3*	8.4*	12.7
Anoka	25.6	7.0	4.9	5.6	5.4	8.9	9.1	17.3
Becker	13.3	3.3*	3.6*	3.6*	2.7*	3*	3.6*	6.2
Beltrami	10.4	3.9*	2.0*	3.0*	8.0	8.0	7.3	16.5
Benton	45.8	11.4	4.0*	3.3*	8.2	9.0	12.8	23.4
Big Stone	4.8*	3.6*	0.0*	0.0*	1.8*	3.1*	3.9*	4.6*
Blue Earth	13.4	3.0*	0.6*	2.1*	4.3	4.4	3.8*	5.9
Brown	22.7	7.8	2.1*	3.3*	2.1*	3.2*	5.1*	15.2
Carlton	16.6	3.2*	1.6*	3.6*	7.1	6.0	12.0	21.2
Carver	28.3	6.6	2.8	1.3*	3.4	4.4	5.4	15.2
Cass	21.0	7.9	2.1*	3.0*	23.6	10.4	10.1	9.0
Chippewa	19.2*	5.9*	8.6*	4.1*	3.7*	0.6*	2.7*	9.5*
Chisago	28.9	7.5	4.4	4.1	6.3	7.1	8.4	15.1
Clay	0.4*	0.2*	0.3*	0.0*	0.2*	0.0*	0.0*	0.6*
Clearwater	19.1*	2.3*	2.3*	2.8*	2.4*	5.2*	5.3*	12.7*
Cook	5.5*	0.0*	0.0*	2.2*	1.7*	6.5*	0.0*	12.2*
Cottonwood	21.3*	5.5*	3.5*	5.6*	3.5*	5.3*	1.9*	12.3
Crow Wing	13.6	6.2	4.4	7.3	4.9	8.2	13.4	12.4
Dakota	28.3	9.1	4.6	4.7	3.7	5.0	8.3	12.1
Dodge	27.7	10.5	1.5*	6.2*	3.4*	7.6*	6.2*	7.4*
Douglas	14.9	4.5*	3.3*	2.7*	2.8*	5.5	4.8*	14.2
Faribault	12.6*	3.2*	0.0*	2.0*	3.2*	1.6*	5.7*	8.8
Fillmore	17.8*	3.9*	3.2*	0.6*	2.7*	2.1*	3.4*	9.5
Freeborn	4.8*	3.1*	1.9*	0.0*	1.4*	2.1*	3.8*	2.5*
Goodhue	18.3	4.1*	2.9*	6.4	6.7	3.1*	7.3	11.1
Grant	16.1*	3.3*	1.6*	2.2*	3.2*	5.8*	7.5*	16.8*
Hennepin	36.3	14.2	6.7	5.3	7.7	10.3	10.4	16.3
Houston	2.3*	0.4*	0.0*	0.6*	0.4*	2.0*	1.3*	1.2*
Hubbard	6.2*	4.3*	1.1*	2.8*	6.2*	2.3*	7.3*	10.6
Isanti	20.1	4.1*	3.2*	4.0*	7.0	4.2*	6.8*	9.1
Itasca	20.7	3.4*	2.5*	3.5*	11.5	5.7	13.1	15.6
Jackson	24.7*	7.1*	3.5*	7.9*	5.1*	0.7*	0.0*	6.8*
Kanabec	23.2*	11.2*	6.0*	2.6*	9.0*	9.1*	20.9	29.9
Kandiyohi	16.9	5.7	3.1*	3.0*	2.7*	4.8	2.1*	9.8
Kittson	0.0*	1.9*	0.0*	3.5*	0.0*	0.0*	0.0*	2.3*
Koochiching	**	**	**	**	**	**	**	**

	0-4	5 -14	15-24	25-34	35-44	45-54	55-64	65+
Minnesota	**27.2**	**8.8**	**4.2**	**4.6**	**6.1**	**7.3**	**8.2**	**13.7**
Lac Qui Parle	29.0*	5.1*	10.7*	24.8*	5.2*	11.2*	4.3*	13.5*
Lake	19.6*	2.0*	1.9*	12.7*	3.4*	3.5*	8.7*	6.1*
Lake Of The Woods	40.8*	9.0*	0.0*	3.4*	12.5*	1.7*	0.0*	27.4*
Le Sueur	16.3	5.9*	5.9*	2.0*	3.7*	3.5*	5*	8.4
Lincoln	34.6*	14.6*	1.8*	0.0*	3.2*	7.6*	5.7*	37
Lyon	16.4	6.2*	1.4*	4.4*	3.0*	1.9*	5.8*	14.1
Mahnomen	**	**	**	**	**	**	**	**
Marshall	0.0*	2.0*	0.0*	2.8*	0.0*	0.8*	1.1*	3.3*
Martin	19.7*	12.1	4.4*	8.0*	10.5	6.3*	3.2*	8.5
McLeod	25.7	5.7	1.9*	2.4*	5.1	2.6*	8.3	14.5
Meeker	16.8*	3.1*	4.5*	4.4*	5.1*	5.1*	5.4*	8.4
Mille Lacs	40.4	12.3	3.7*	9.9	7.5	19.2	13.5	22.8
Morrison	29.2	4.6*	6.1	0.7*	4.1*	4.9*	5.6*	10.0
Mower	**	**	**	**	**	**	**	**
Murray	49.1*	26.1	4.7*	6.6*	1.1*	2.8*	7.2*	17.0
Nicollet	12.0*	3.9*	1.7*	4.1*	2.1*	2.9*	5.0*	8.7
Nobles	38.3	13.8	2.4*	1.7*	1.8*	0.9*	1.2*	10.8
Norman	13.3*	2.6*	4.3*	2.1*	11.7*	3.7*	4.8*	5.1*
Olmsted	19.9	7.4	3.1	6.8	6.5	7.2	8.2	10.9
Otter Tail	12.1	5.4	2.8*	1.8*	4.4	4.8	6.9	12.0
Pennington	**	**	**	**	**	**	**	**
Pine	14.4*	5.6*	4.3*	4.7*	4.3*	6.9	10.0	15.1
Pipestone	4.5*	2.0*	2.1*	0.0*	1.0*	7.6*	9.2*	12.1*
Polk	12.0*	3.6*	0.5*	2.9*	1.5*	2.8*	6.9*	9.2
Pope	17.7*	9.1*	0.0*	3.6*	4.4*	3.7*	6.1*	20.7
Ramsey	35.8	12.8	6.5	6.3	10.8	11.2	8.9	14.1
Red Lake	10.4*	2.4*	0.0*	0.0*	6.9*	3.9*	0.0*	6.5*
Redwood	21.4*	6.8*	2.4*	4.8*	3.0*	2.7*	4.3*	14.2
Renville	25.0*	5.4*	3.5*	5.4*	2.8*	8.0*	9.6*	8.7
Rice	25.9	5.0	1.9*	2.6*	3.7	7.5	12.6	13.2
Rock	0.0*	3.8*	2.0*	1.3*	3.0*	1.9*	1.3*	4.7*
Roseau	8.1*	2.9*	1.8*	1.3*	2.9*	1.6*	2.4*	9.3*
Scott	26.5	8.4	3.8	4.0	4.3	3.1	11.1	15.9
Sherburne	20.0	7.0	2.9	2.8	4.0	5.4	6.0	13.1
Sibley	26.6	5.1*	1.9*	5.9*	6.7*	2.4*	7.6*	12.3
Stearns	35.7	8.8	3.1	5.1	6.0	9.2	6.9	19.7
Steele	24.5	8.5	4.5*	1.7*	6.6	2.5*	6.7*	5.1*
Stevens	**	**	**	**	**	**	**	**
St. Louis	35.9	8.0	2.9	5.4	9.5	8.8	11.4	17.2
Swift	30.1*	13.7*	5.4*	12.1*	1.4*	7.8*	5.7*	22.3
Todd	16.5*	3.3*	1.8*	4.6*	3.5*	6.3*	1.9*	3.8*
Traverse	20.4*	0.0*	0.0*	0.0*	5.5*	4.9*	3.1*	3.5*
Wabasha	10.9*	2.0*	3.0*	2.1*	3.9*	4.2*	8.5*	7.9
Wadena	20.8*	4.8*	14.5	8.3*	13.5*	17.1	14.4*	16.7
Waseca	17.8*	7.6*	2.9*	2.4*	3.0*	9.1	2.1*	7.4*
Washington	25.2	6.9	3.3	3.9	3.4	4.3	5.1	13.9
Watonwan	12.8*	4.4*	2.6*	0.0*	2.6*	0.8*	6.6*	11.5*
Wilkin	6.3*	1.3*	1.4*	1.9*	3.7*	4.8*	3.8*	10.2*

	0-4	5 -14	15-24	25-34	35-44	45-54	55-64	65+
Minnesota	**27.2**	**8.8**	**4.2**	**4.6**	**6.1**	**7.3**	**8.2**	**13.7**
Winona	3.8*	4.6	1.2*	2.0*	3.2*	3.2*	7.1	11.1
Wright	18.2	5.0	2.5	3.0	3.1	5.7	6.9	18.1
Yellow Medicine	16.4*	8.2*	3.5*	2.7*	10.8*	15.4*	6.8*	19.0

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

B. COPD

MN EPHT has added COPD hospitalization rates and counts as state-specific measures. COPD is the fourth-leading cause of death in the United States,[4] with the age-adjusted death rate for men higher than for women.[4] COPD is an important cause of hospitalization and mortality in our aged population. COPD occurs most often in older people and has a major impact on health care, illness, disability, and death in this population. Among Minnesota seniors over 85 years of age, the hospitalization rate where COPD was the primary or first secondary diagnosis nearly tripled between 1996 and 2007.[14] Nationally, the magnitude of the problem is also growing.[1]

In 2006, there were 9.5 million U.S. adults with chronic bronchitis (4.3%) and 4.1 million adults with emphysema (1.8%).[15] Adults in poor families had higher percentages of emphysema and chronic bronchitis than adults in families that were not poor.[15] Among adults under age 65, those insured by Medicaid had higher percentages of emphysema and chronic bronchitis than those with private insurance or who were uninsured.[15]

Nationally, the overall hospital discharge rate increased by 44.4 percent between 1992 and 2005. The hospitalization rate in 2005 was 24.4 per 10,000 population.[4] In the past, men had higher hospitalization rates than women, but since 1993, the rate in women has surpassed the rate for men. In 2005 the discharge rates among men and women were 22.6 per 10,000 and 26.1 per 10,000, respectively.[4] COPD increases with age, with the discharge rate for people over age 65 higher than the rate for any other age group.

In 2005, 3.4% of Minnesotan adults reported having ever been diagnosed with COPD, emphysema, or chronic bronchitis. Among adults aged 65 years and older, 7.4% reported ever being diagnosed with these conditions.[14]

Between 80 and 90 percent of COPD is attributable to cigarette smoking.[1] It is estimated that approximately 19% of COPD may be attributable to occupational exposures in industries that pose a risk for these illnesses.[16] Other risk factors for COPD include:[5]

- Genetics
- Exposure to tobacco smoke, occupational dusts, and indoor and outdoor air pollution
- Lung growth and development
- Gender
- Age
- Respiratory infections
- Previous tuberculosis
- Socioeconomic status
- Nutrition

In 2009, Minnesota is one of a small number of states in the country to measure COPD prevalence statewide using the Minnesota Behavioral Risk Factor Surveillance System (BRFSS). This system will also help identify additional risk factors for COPD in Minnesotans.

Because COPD may be exacerbated by certain environmental exposures, measures can be taken to prevent, control and reduce the frequency of symptoms. To reduce environmental exposure to COPD hazards, avoid tobacco smoke and smoke from wood-burning stoves; reduce mold, dust mites, and cockroaches in the home; keep pets out of sleeping areas; annually check furnace and heating units; promptly fix water leaks; and reduce outdoor activity on poor air quality days.[17]

The Healthy People 2010 focus area of respiratory diseases contains one objective on COPD mortality.

- Healthy People 2010 Objective 24-10. Reduce deaths from COPD among adults aged 45 years and older to 62.3 deaths per 100,000 adults.

The COPD age-adjusted mortality rate among adults age 45 years and older per 100,000 population is lower in Minnesota (78.4) than for the United States (88.5).[18]

B.1. Monthly average, maximum and minimum number of COPD hospitalizations, by state and county

Figure 8 shows the daily average, minimum, and maximum number of Minnesota residents admitted to a hospital as an inpatient with a primary discharge diagnosis of COPD by month, aggregated over 2000-2007. In Minnesota, COPD hospitalization rates follow a subtle seasonal pattern, with a slightly greater number of hospitalizations seen in the fall and winter months. These seasonal increases in COPD hospitalizations are far less pronounced than that seen in either chronic lower respiratory disease (CLRD) or asthma hospitalizations.

Figure 8: *Average, maximum and minimum daily number of COPD hospitalizations by month, Minnesota, aggregated from 2000 to 2007.*

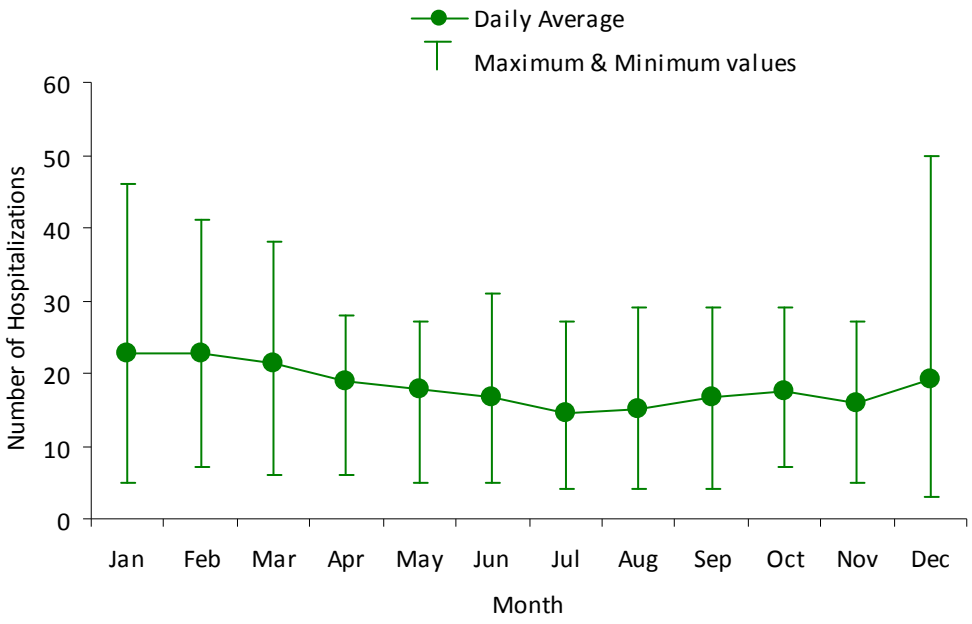


Table 7 shows the daily average, minimum, and maximum number of Minnesota residents admitted to a hospital as an inpatient with a primary discharge diagnosis of COPD by month for years 2000-2007. In many years, the highest maximum number of daily COPD hospitalizations occurs during the winter months. The lowest number of average daily COPD hospitalizations most often occurs in July.

Table 7: *Average, maximum and minimum daily number of COPD hospitalizations by month, Minnesota, 2000-2007.*

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	Average	21.0	17.0	14.3	13.2	14.2	15.0	12.8	12.9	13.6	14.5	13.4	15.4
	Maximum	40	25	26	26	20	23	20	21	22	25	21	29
	Minimum	9	7	6	7	5	7	5	6	5	8	6	9
2001	Average	16.7	19.3	20.7	18.8	14.9	15.5	13.1	13.7	15.1	16.6	13.8	15.6
	Maximum	25	33	33	27	27	21	19	22	24	29	25	28
	Minimum	8	10	13	8	6	9	6	7	8	7	5	7
2002	Average	18.4	22.6	17.6	16.5	15.1	14.8	14.7	13.0	14.4	15.4	14.4	17.9
	Maximum	26	32	27	24	21	22	22	23	21	25	23	25
	Minimum	13	12	11	9	9	9	9	5	6	8	10	11
2003	Average	15.2	19.9	20.4	16.3	15.6	14.8	11.8	12.6	13.5	14.0	13.5	21.0
	Maximum	24	30	29	26	23	24	22	19	22	24	23	50
	Minimum	5	11	11	8	9	5	4	6	4	7	7	7
2004	Average	19.3	16.5	15.1	16.2	15.7	15.5	12.2	12.2	16.1	15.4	13.4	16.9
	Maximum	34	22	25	24	25	31	21	18	29	28	21	30
	Minimum	10	9	6	11	7	8	6	4	9	7	6	5
2005	Average	28.6	26.7	21.9	19.0	17.5	15.5	13.1	13.7	13.6	16.0	15.4	14.1
	Maximum	46	41	38	27	26	27	23	29	27	23	26	28
	Minimum	17	14	12	8	11	7	7	7	4	9	8	9
2006	Average	18.2	19.1	21.1	15.8	16.9	12.5	11.3	13.6	14.6	14.0	12.0	17.9
	Maximum	27	33	34	28	25	20	19	25	25	24	19	34
	Minimum	9	7	12	6	11	5	5	5	7	9	7	9
2007	Average	20.9	18.6	19.1	16.6	15.2	13.3	13.1	13.9	16.5	16.5	16.3	15.5
	Maximum	30	29	30	27	21	25	27	28	26	29	27	29
	Minimum	7	7	10	10	9	5	5	5	7	9	6	3

B.2. Annual number of COPD hospitalizations, by state and county

Table 8 shows the number of hospitalizations due to COPD from 2000 to 2007 for all Minnesota and for each county. Counts ≤ 5 have been suppressed to maintain confidentiality and are marked with an asterisk. Because MN EPHT hospitalization measures include only discharges from Minnesota hospitals, counts for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

The number of hospitalizations due to COPD is dependent on many factors, including the size of the population. Because Minnesota has many counties with small population counts, many cells have been suppressed due to small COPD hospitalization counts. To account for differing population size by county, rates are used and are reported in the following section. Rates are the number of events that occur in a defined period of time, divided by the average population at risk of that event. As with asthma, rates are expressed as the number of hospitalizations per 10,000

people. Rates are often used instead of counts because they allow comparison of a health event in two different populations.

Table 8: *Annual number of COPD hospitalizations by county, 2000-2007.*

	2000	2001	2002	2003	2004	2005	2006	2007
Minnesota	**5391**	**5891**	**5909**	**5729**	**5609**	**6525**	**5686**	**5947**
Aitkin	24	30	27	29	36	43	47	53
Anoka	306	383	380	374	343	334	302	316
Becker	27	28	31	30	26	38	32	29
Beltrami	57	55	65	48	41	50	46	46
Benton	72	89	58	50	59	88	86	73
Big Stone	9	6	7	6	*	6	10	*
Blue Earth	53	59	56	66	55	46	55	46
Brown	26	33	25	22	32	34	35	40
Carlton	50	31	36	41	42	56	57	37
Carver	29	43	46	43	52	60	53	34
Cass	78	58	57	52	50	44	53	76
Chippewa	19	13	19	22	19	22	22	23
Chisago	24	76	78	86	68	80	74	83
Clay	*	*	*	*	*	*	*	*
Clearwater	*	*	8	10	31	28	28	31
Cook	*	*	*	*	*	14	15	7
Cottonwood	15	12	7	19	21	30	35	32
Crow Wing	174	162	145	170	141	139	117	136
Dakota	297	278	307	313	299	324	272	295
Dodge	24	30	22	19	19	14	23	28
Douglas	31	32	27	32	35	38	43	35
Faribault	18	19	15	16	19	19	32	24
Fillmore	22	26	24	21	28	42	29	27
Freeborn	*	*	7	7	7	16	35	32
Goodhue	26	41	42	54	40	53	50	58
Grant	12	10	15	9	13	13	9	18
Hennepin	1188	1251	1181	1088	1095	1186	999	1010
Houston	*	*	*	*	*	*	*	*
Hubbard	23	28	21	33	31	30	13	23
Isanti	41	33	53	56	66	71	62	52
Itasca	74	70	75	36	54	62	68	69
Jackson	15	23	26	22	15	11	12	15
Kanabec	36	51	51	49	49	41	30	52
Kandiyohi	48	47	55	60	59	68	63	53
Kittson	*	*	*	*	*	*	*	*
Koochiching	16	27	33	21	30	46	20	22
Lac Qui Parle	19	26	25	24	26	20	13	16
Lake	9	19	16	18	9	18	9	8
Lake Of The Woods	12	10	*	*	9	7	11	7
Le Sueur	18	31	24	22	18	17	19	18
Lincoln	21	16	16	11	11	14	7	20
Lyon	37	44	32	45	39	54	50	45
Mahnomen	*	21	*	*	*	*	*	6
Marshall	10	7	9	*	6	8	9	10

	2000	2001	2002	2003	2004	2005	2006	2007
Minnesota	**5391**	**5891**	**5909**	**5729**	**5609**	**6525**	**5686**	**5947**
Martin	23	9	32	35	39	32	37	46
McLeod	25	42	36	40	53	46	42	36
Meeker	29	25	22	20	23	34	31	35
Mille Lacs	58	59	57	54	38	56	42	60
Morrison	50	52	55	41	33	66	55	56
Mower	24	30	41	19	102	123	81	80
Murray	*	18	24	33	18	25	22	13
Nicollet	37	33	31	30	19	35	41	41
Nobles	29	29	29	26	22	28	27	38
Norman	19	14	15	15	16	39	6	*
Olmsted	130	134	160	163	173	152	186	198
Otter Tail	21	62	63	66	89	81	55	78
Pennington	29	24	24	17	22	30	25	19
Pine	51	58	85	57	50	70	63	63
Pipestone	11	12	13	23	24	15	16	15
Polk	28	22	34	39	32	50	46	48
Pope	12	7	6	6	11	15	10	17
Ramsey	612	610	620	594	569	590	567	536
Red Lake	9	7	8	*	7	9	9	8
Redwood	24	26	29	25	18	35	29	28
Renville	13	19	18	24	11	30	21	26
Rice	48	56	75	52	61	89	57	61
Rock	7	12	8	16	15	24	18	11
Roseau	12	24	18	31	19	17	19	13
Scott	71	390	76	82	83	84	79	101
Sherburne	43	77	54	55	61	60	42	53
Sibley	13	60	18	16	22	17	*	14
Stearns	190	15	209	187	175	216	180	212
Steele	37	191	33	30	31	30	43	34
Stevens	14	39	13	29	14	20	22	26
St. Louis	317	14	427	383	324	506	417	433
Swift	21	21	38	26	12	32	16	18
Todd	29	35	35	37	26	48	33	26
Traverse	*	7	6	6	*	7	*	*
Wabasha	10	9	8	19	14	31	26	30
Wadena	38	46	28	20	12	21	17	27
Waseca	36	19	23	19	13	17	10	15
Washington	111	160	155	174	169	216	160	168
Watonwan	*	*	17	8	20	39	27	27
Wilkin	13	7	7	11	7	*	11	*
Winona	53	58	37	49	40	63	48	79
Wright	81	100	72	97	101	95	72	102
Yellow Medicine	24	21	18	15	15	38	25	33

***** MN EPHT suppresses hospitalization counts ≤ 5 to protect an individual's privacy.

B.3. Annual crude, age-specific, and age-adjusted COPD hospitalization rates, by state and county

Figure 9 shows age-adjusted rates of COPD hospitalization from 2000 to 2007 for Minnesota residents age 25 and older. MN EPHT COPD crude and age-adjusted rates are only among adults age 25 and older, because COPD is very rare in younger age groups. Except for a brief increase in COPD hospitalization rates in 2005, rates appear to be on a downward trend in the state.

Figure 9: *Annual age-adjusted COPD hospitalization rates per 10,000 adults age 25 and older, Minnesota, 2000-2007.*

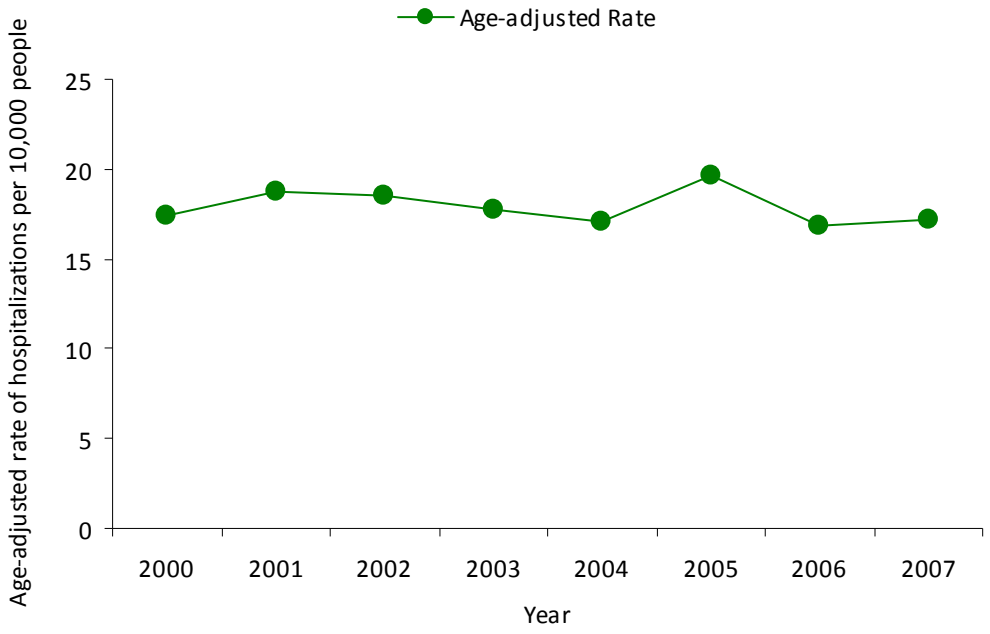


Table 9 shows crude and age-adjusted COPD hospitalization rates for all Minnesota and for each county from 2000-2007. Crude rates are in regular font followed by age-adjusted rates in italics. Rates based on counts ≤ 5 have been suppressed to maintain confidentiality and are marked with two asterisks. When a rate is based on a count ≤ 20 (marked with one asterisk), it may be unstable and should be interpreted with caution. These rates are unstable because they can change dramatically with the addition or subtraction of one case. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

Rates take into account the size of the population and allow for comparison of a health event in two different populations. Crude rates are the number of COPD hospitalizations in a given area per 10,000 people in that area. Age-adjustment allows communities with different age structures to be compared. MN EPHT age-adjusted rate measures are calculated using the direct method of standardization using the U.S. 2000 population as the standard. A directly age-adjusted rate represents what the crude rate would have been in the community if that community's population had the same distribution as the standard population.

Table 9: *Annual crude and age-adjusted COPD hospitalization rates per 10,000 adults age 25 and older, by state and county, 2000-2007.*

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**16.9**	***17.4***	**18.1**	***18.7***	**18**	***18.5***	**17.3**	***17.7***	**16.8**	***17.1***	**19.4**	***19.6***	**16.7**	***16.8***	**17.2**	***17.2***
Aitkin	32.2	*15.7*	51.4	*17.2*	38.7	*15.2*	43.5	*16.1*	50.5	*19.2*	51.7	*24.9*	50.6	*26.7*	56.5	*29.7*
Anoka	16.1	*24.4*	22.5	*29.7*	24.9	*28.5*	21.3	*26.6*	21.4	*22.5*	17.9	*22.2*	18.4	*20*	16.3	*19.4*
Becker	33.4	*10.7*	26.3	*11.7*	32.8	*11.5*	35.4	*11.6*	30.2	*10*	28.6	*14.4*	34.9	*11.7*	25.3	*10.6*
Beltrami	38.1	*24.2*	29.4	*21.8*	46.7	*24.7*	39.9	*17.9*	47.6	*16*	35.9	*18.8*	40.9	*17.2*	31.4	*17.1*
Benton	90	*37.9*	66	*46.1*	67.9	*29.8*	44.3	*25.2*	49.2	*30.5*	46.3	*42.5*	69.2	*40.3*	56.9	*33.6*
Big Stone	83.3*	*11.4**	80.5*	*7.6**	111.8*	*8.3**	42.3*	*9.7**	**	**	51.2*	*8.6**	72.9*	*15.5**	**	**
Blue Earth	25.1	*16*	32.9	*17.1*	30.3	*16.6*	26.1	*19.2*	24.7	*16.1*	19.9	*12.7*	28	*15.1*	22.7	*12.9*
Brown	27.2	*11.8*	37.3	*15.5*	26.7	*10.9*	37.3	*10*	34.5	*13.6*	54.3	*13.6*	31.4	*14.3*	34.4	*16.9*
Carlton	38.4	*20.3*	26.5	*13*	38.9	*14*	31.1	*15.9*	48.2	*15.8*	35.2	*21.1*	41.1	*22.4*	24.3	*13.4*
Carver	10.4	*9.9*	26.2	*14.9*	20.8	*15*	36.9	*14.1*	15.6	*15.6*	23.7	*17*	26.5	*14.4*	11.8	*9.3*
Cass	55.7	*31.8*	39.5	*24.6*	39.8	*23.4*	40	*21.2*	30.2	*20.7*	40.2	*17.4*	40	*20.7*	57.9	*29.2*
Chippewa	60.1*	*15.7**	54.6*	*9.8**	71.4*	*13.3**	53.9	*16*	39.8*	*15.3**	56.8	*18.2*	64	*18.1*	46.9	*19.4*
Chisago	18.2	*10.7*	44.5	*34.4*	30.9	*33*	56.9	*36.9*	55	*27.3*	51.3	*32.1*	45.7	*28.9*	49.5	*31.2*
Clay	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Clearwater	**	**	**	**	61.6*	*11.6**	68.6*	*13.5**	71.2	*40.7*	93	*36.8*	123.6	*34.5*	151.8	*39.1*
Cook	**	**	**	**	**	**	**	**	**	**	123.4*	*29.7**	63.9*	*31.4**	45*	*14.1**
Cottonwood	46.2*	*11.4**	35.8*	*9.6**	16.5*	*5.4**	55.6*	*16**	44.5	*16.5*	61.9	*23.5*	56.7	*30.6*	69.1	*28.8*
Crow Wing	52.6	*38.3*	57.6	*34.6*	49.8	*29.2*	52.1	*34*	48.6	*28.4*	55.3	*26.6*	38.9	*22.3*	38.3	*25.6*
Dakota	13	*19.6*	16.2	*18.2*	14.1	*19.1*	14.5	*18.6*	13.8	*18*	14.5	*18.5*	12.3	*15*	14.5	*15.6*
Dodge	57.3	*20.4*	65.6	*27.8*	40.9	*18.2*	31.4*	*16.2**	50.5*	*18.3**	23.4*	*12.7**	75.2	*20.5*	89.2	*24.3*
Douglas	22.6	*10.6*	26.8	*10.5*	23.2	*9.2*	26.7	*10.2*	20.3	*11.2*	21.7	*12.1*	33.6	*12.8*	25.8	*10.5*
Faribault	50*	*10.4**	53.5*	*10.3**	38.8*	*9.3**	33.4*	*8.9**	36.8*	*12.3**	37.2*	*11.3**	78.6	*19.5*	38.1	*16.5*
Fillmore	32.8*	*9.4**	39.5	*12.3*	35.9	*10.8*	32.8	*10.5*	49.9	*13.8*	65.9	*21.1*	53.9	*14.2*	28.9	*13.9*
Freeborn	**	**	**	**	14.6*	*2.2**	11.2*	*2.2**	12.5*	*2.2**	21.3*	*6.3**	27.8	*11.7*	21	*10.4*
Goodhue	16.1	*8.1*	22.6	*13*	22.3	*11.9*	34.5	*15.2*	23.2	*12.3*	28.1	*15.5*	21.5	*13.7*	29.5	*16.3*
Grant	83*	*17.6**	86.4*	*13.6**	80.6*	*21.2**	56.9*	*11.9**	118.3*	*17.2**	93.1*	*20.1**	70.6*	*14.9**	59.9*	*25.5**
Hennepin	16	*18.5*	16.5	*19.1*	15.6	*18*	14.3	*16.3*	14.4	*16.2*	17.2	*17.2*	12.9	*14.4*	16.3	*14.4*
Houston	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Hubbard	39.7	*13.6*	28.5	*17.7*	29.4*	*11.7**	45.7	*17.2*	51.8	*17*	47.7	*16*	25.8*	*7.5**	25.5	*12.4*
Isanti	36.9	*21*	30.8	*18*	59.2	*28.5*	36.7	*27.3*	44.4	*33.7*	45	*31.8*	32.8	*29.7*	37.1	*24.2*

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**16.9**	***17.4***	**18.1**	***18.7***	**18**	***18.5***	**17.3**	***17.7***	**16.8**	***17.1***	**19.4**	***19.6***	**16.7**	***16.8***	**17.2**	***17.2***
Itasca	38.5	*19.9*	36.3	*18.7*	29	*20.5*	21.8	*9.5*	32.4	*14*	26.2	*16.1*	26.2	*17.8*	29	*17.4*
Jackson	42.9*	*13.8**	101.6	*18.4*	116.5	*21.4*	66.5	*19.3*	46.8*	*11.9**	31.2*	*10.3**	70.9*	*8.9**	38*	*11.7**
Kanabec	66.5	*34.9*	84.8	*45.4*	85.6	*44.9*	98.9	*42.9*	90.3	*39.7*	77	*33.1*	55	*24.4*	94.1	*40.8*
Kandiyohi	31.1	*16*	29.8	*15.4*	25.1	*18.1*	36.4	*19.1*	35.3	*18.6*	40.1	*21.2*	36.6	*19.7*	37.2	*16.4*
Kittson	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Koochiching	31.3*	*12.9**	51.9	*22.4*	42.5	*27*	36.6*	*15.5**	86.4	*22.6*	59.8	*35*	41.8*	*15.1**	42.9	*17*
Lac Qui Parle	58.3*	*25.5**	104.6	*26.8*	84	*27.3*	71.8	*27.1*	86.9	*35.6*	71.3*	*23.1**	77.8*	*14.7**	64.5*	*16.1**
Lake	29.9*	*7.8**	66.1*	*17.2**	39.8*	*14.6**	38.4*	*16.8**	53*	*7.5**	41.6*	*16.1**	53.6*	*7.6**	31.6*	*7.8**
Lake Of The Woods	136.4*	*28.6**	75.6*	*24.5**	**	**	**	**	98*	*26.5**	78.5*	*18.9**	108.7*	*35.2**	101.6*	*18**
Le Sueur	21.3*	*10.4**	38.1	*17.1*	28.1	*12.4*	34.4	*11.3*	21.3*	*9**	25.2*	*8.7**	34.1*	*9.7**	29.4*	*8.6**
Lincoln	93.7*	*23.3**	69*	*22.2**	131.4*	*23.4**	52.3*	*15.4**	51.2*	*18.1**	53.2*	*22**	45.5*	*13.3**	78*	*34.5**
Lyon	73.7	*17.2*	74.4	*23*	35.6	*18.2*	39.2	*23.2*	68.2	*22.5*	72.2	*29.2*	82.4	*25.9*	93.6	*23.9*
Mahnomen	**	**	66.9*	*17**	**	**	**	**	**	**	**	**	**	**	78.5*	*13.7**
Marshall	37.7*	*12.1**	41.4*	*10.4**	58.6*	*9.7**	**	**	38.8*	*6.1**	42.3*	*8.4**	39.3*	*9.8**	38.9*	*10.4**
Martin	27.3	*11.6*	61.8	*18.8*	26.8	*15.7*	40.5	*15.9*	47.4	*17.7*	37.3	*15*	36.1	*17.2*	37.3	*22.7*
McLeod	30.8	*9.8*	26.4	*8.3*	27.3	*13.7*	48.2	*16.1*	45.6	*20*	27.3	*17.6*	37	*15.7*	21.4	*13.7*
Meeker	32.6	*16.1*	45.3	*12.9*	28.3	*11.9*	25.7*	*11.2**	40.9	*12.3*	35.2	*18.7*	37.7	*16.7*	44.6	*18.4*
Mille Lacs	58.2	*33.4*	80.8	*32.3*	61.8	*31.1*	47.4	*28.3*	36.8	*19*	56.1	*29.4*	51	*21.8*	49.2	*30.4*
Morrison	42.3	*20.8*	53.3	*21.6*	69.1	*22.5*	40.6	*16.7*	32.5	*13.5*	51	*26.5*	53.7	*22.2*	43.9	*22.4*
Mower	14.5	*7*	18.9	*9.9*	31.6	*12.1*	19.7*	*5.9**	52.5	*29.4*	64.2	*34.7*	57.7	*22.4*	43	*23.4*
Murray	**	**	93.4*	*17.9**	81.6	*26.2*	100.3	*36.2*	68.3*	*17.6**	82.2	*25.4*	72.7	*23.6*	38.3*	*12.9**
Nicollet	50.3	*22.6*	36.6	*19.2*	29.5	*17*	48.4	*16.9*	22.7*	*10.5**	40.4	*18.5*	59.8	*20.7*	44.2	*18.5*
Nobles	53	*17.2*	42.2	*16.1*	41.6	*17.2*	57	*14.1*	107.5	*11.5*	39.5	*16*	46.5	*14.8*	53.4	*22.1*
Norman	48.9*	*28.6**	66.7*	*19**	98.1*	*18.4**	72.9*	*20.1**	110*	*20.9**	166.2	*56.6*	75.3*	*6.7**	**	**
Olmsted	20.7	*17.7*	18.1	*17.7*	24.5	*21.2*	24.3	*20.4*	25.4	*21.4*	25	*18.4*	37.1	*21.5*	27.3	*22.6*
Otter Tail	11.8	*4.1*	24	*11.7*	20.8	*11.4*	25.4	*12.2*	29.1	*16.6*	32.5	*15.1*	24.7	*9.7*	29.9	*14.7*
Pennington	102.2	*26.4*	62.9	*21.8*	40.6	*23*	31*	*15.6**	62.2	*19.9*	65.4	*27.3*	45.8	*22.3*	52*	*16.8**
Pine	49.4	*25.3*	54.5	*28.1*	78.5	*40.4*	44.1	*25.9*	43.6	*23.1*	65	*32.7*	47.9	*29.3*	46.3	*28.5*
Pipestone	37.9*	*12.2**	38.4*	*12.1**	51.8*	*13.3**	72.8	*22.9*	69.5	*19.3*	39.7*	*15.9**	47.3*	*16.6**	45.1*	*16**
Polk	32.6	*10*	26.6	*7.9*	30.6	*13*	29.9	*14.7*	48.3	*12.1*	40.2	*20.1*	35.5	*19*	25.9	*17.7*
Pope	38.4*	*10.3**	44.9*	*6.5**	**	**	23.8*	*5.3**	42.5*	*9.9**	47.8*	*12.7**	31.8*	*8.5**	37.6*	*15.8**
Ramsey	21.4	*20.1*	21	*19.8*	24.3	*19.6*	18.1	*18.8*	19.5	*17.6*	20.1	*18*	19.2	*16.7*	20.4	*15.4*
Red Lake	109.9*	*20**	99.6*	*17.9**	131.4*	*21.1**	**	**	86.1*	*18.3**	111.8*	*20.3**	113.2*	*22**	135.6*	*18.3**

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**16.9**	***17.4***	**18.1**	***18.7***	**18**	***18.5***	**17.3**	***17.7***	**16.8**	***17.1***	**19.4**	***19.6***	**16.7**	***16.8***	**17.2**	***17.2***
Redwood	59.5	*14.7*	51	*14.1*	47.8	*18*	50.8	*16.5*	31.4*	*12.6**	55.2	*24.9*	51	*17.8*	46.5	*19.4*
Renville	46.3*	*7.8**	44.6*	*11.2**	68.3*	*11.4**	37.7	*15.7*	21.6*	*7.7**	55.3	*22.2*	38.7	*14.4*	31.4	*18.6*
Rice	32.6	*14.3*	24.2	*16.4*	38.9	*21.4*	44.2	*15.2*	30.1	*17*	42.7	*24.4*	31.6	*15.6*	27.9	*15.3*
Rock	31.9*	*8.6**	74.2*	*12**	47.3*	*8.5**	58.9*	*15.8**	46*	*16.1**	105.5	*24.1*	87.6*	*18.7**	56.4*	*12.6**
Roseau	32.7*	*10.8**	45.4	*22.7*	44.7*	*16.5**	94.6	*28.6*	40.8*	*15.3**	61.4*	*18.4**	35*	*17.8**	28.4*	*12**
Scott	19.4	*20.3*	20.9	*21.7*	24.9	*19.9*	21.1	*22.4*	23.7	*21.5*	26.3	*20.4*	12.1	*18.2*	20.9	*21.4*
Sherburne	14.5	*15.4*	24.8	*22.5*	26.6	*19.4*	20.2	*18*	20.1	*21*	19.6	*17.6*	16.8	*12.4*	16.3	*14*
Sibley	51.4*	*10.7**	50.5*	*13.2**	28.8*	*14.1**	44.5*	*13.3**	69.8	*18*	54.8*	*13.9**	**	**	36.7*	*12.8**
Stearns	24.3	*25.3*	30.1	*24.6*	28.7	*26.2*	33	*22.6*	30.6	*20.7*	31.1	*24.9*	22.9	*20.1*	34.8	*22.9*
Steele	24.8	*16*	32.2	*16.8*	54.1	*13.4*	19.6	*11.6*	30.1	*12.9*	32.2	*11.4*	24.9	*17.3*	28.5	*13.8*
Stevens	42.6*	*19**	52.7*	*18.3**	47.3*	*16.5**	125.3	*29*	71.5*	*14.2**	115.9*	*20.8**	70.5	*31.6*	83.8	*29.3*
St. Louis	26.5	*20.1*	34.9	*24.9*	34.9	*27*	29.2	*24.9*	26.5	*20.9*	41.9	*33*	31.6	*26.6*	36	*26.9*
Swift	57.2*	*18.2**	44.9	*21*	95.8	*34.1*	70.2	*22*	34.2*	*11.7**	82.6	*31.8*	39.6*	*17**	49.5*	*18**
Todd	25.1	*13.6*	29.7	*19*	29.4	*18.6*	42.5	*17.7*	22.4	*13.9*	39.4	*24.5*	33.9	*17.5*	29.4	*14.2*
Traverse	**	**	129.6*	*7.4**	56.8*	*11.7**	72.9*	*9.2**	**	**	81.4*	*14.3**	**	**	**	**
Wabasha	17.3*	*5.6**	17.9*	*5.3**	11.9*	*5**	29.7*	*11**	19.3*	*8.3**	33.8	*18*	38.6	*14.2*	44.5	*16.5*
Wadena	63.6	*29.7*	77.9	*37.3*	37.3	*20.1*	37.6*	*16.1**	31.7*	*9**	45.3*	*14.5**	41.8*	*14**	52.4	*20.5*
Waseca	57.2	*27.3*	39.7*	*13.7**	64.1	*16*	26.6*	*14.1**	19.5*	*9.4**	21.2*	*10.7**	22*	*6.6**	24.5*	*9.5**
Washington	10.9	*12.8*	13.1	*17.4*	14.2	*16.5*	14.7	*17.1*	13.2	*16.9*	22.6	*21.3*	19.7	*15.6*	16.4	*16*
Watonwan	**	**	**	**	66.4*	*14.3**	57.9*	*7.1**	40.4*	*19.6**	118.8	*37.5*	101.3	*26.1*	73	*22.5*
Wilkin	89.7*	*22.1**	74.7*	*12.6**	79.3*	*11.5**	59.8*	*17.8**	106.2*	*10.6**	**	**	99.6*	*19.2**	**	**
Winona	49.8	*15*	32.8	*17.5*	34.7	*10.6*	35	*15.2*	23.5	*11.7*	34.7	*17.8*	23	*14.2*	42.2	*22.6*
Wright	30.7	*18.4*	27.5	*21.5*	19.1	*15.8*	31.6	*20.4*	17.4	*21*	28	*18.8*	20.1	*13.4*	22.6	*19.5*
Yellow Medicine	102.7	*18.9*	56.8	*18.8*	53.9*	*17.8**	35.9*	*15.2**	38.3*	*14.4**	78.1	*37.7*	64.5	*23.3*	69.7	*35.5*

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Table 10 shows crude and age-adjusted COPD hospitalization rates for all Minnesota and for each county, aggregated from 2000-2007. Aggregating data over several years increases the number of counts which increases the stability of the rate, but hides trends over time. Ninety-five percent confidence intervals around the rates are shown in parentheses. The confidence interval is a measure of reliability. It is the interval within which the true value of the rate would be expected to fall 95 times out of 100. Counties with rates based on counts ≤ 20 are marked with one asterisk. Some rates are suppressed to prevent back-calculation of suppressed annual counts, and are marked with two asterisks. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

Table 10: *Annual crude and age-adjusted COPD hospitalization rates per 10,000 adults age 25 and older by state and county, aggregated from 2000 to 2007.*

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Minnesota	**17.5**	**(17.4-17.7)**	**17.9**	**(17.7-18)**
Aitkin	31.5	(27.9-35.1)	20.6	(18.2-23.1)
Anoka	16.9	(16.3-17.5)	23.9	(23-24.9)
Becker	14.4	(12.6-16.2)	11.5	(10.1-13)
Beltrami	20.6	(18.6-22.7)	19.5	(17.6-21.5)
Benton	30.4	(27.9-32.8)	35.6	(32.7-38.6)
Big Stone	16.3	(12.1-21.5)	9.3	(6.8-12.4)
Blue Earth	16.0	(14.5-17.5)	15.6	(14.1-17.1)
Brown	17.3	(15.2-19.5)	13.2	(11.5-14.9)
Carlton	19.6	(17.5-21.6)	17.1	(15.3-18.9)
Carver	9.0	(8.1-10)	13.8	(12.3-15.3)
Cass	29.9	(27.2-32.7)	23.6	(21.4-25.8)
Chippewa	22.7	(19.1-26.2)	15.7	(13.2-18.2)
Chisago	24.2	(22.2-26.2)	29.5	(27.1-31.9)
Clay*	0.5	(0.3-0.9)	0.5	(0.2-0.8)
Clearwater	31.7	(26.5-36.9)	23.5	(19.6-27.5)
Cook	12.7	(9-17.2)	10.4	(7.4-14.2)
Cottonwood	26.1	(22.2-30.1)	17.4	(14.7-20.2)
Crow Wing	37.1	(35-39.2)	29.7	(28-31.4)
Dakota	12.2	(11.7-12.7)	17.8	(17-18.5)
Dodge	18.6	(15.8-21.3)	19.6	(16.7-22.6)
Douglas	14.5	(12.8-16.2)	10.9	(9.6-12.2)
Faribault	18.6	(15.7-21.5)	12.3	(10.3-14.2)
Fillmore	18.7	(16.2-21.2)	13.2	(11.4-15)
Freeborn	6.3	(5.1-7.5)	4.8	(3.9-5.7)
Goodhue	14.9	(13.3-16.4)	13.2	(11.9-14.6)
Grant	28.8	(23.4-35)	17.7	(14.2-21.8)
Hennepin	14.8	(14.5-15.1)	16.7	(16.3-17)
Houston*	0.6	(0.2-1.2)	0.5	(0.2-1.1)
Hubbard	19.2	(16.5-21.9)	14.2	(12.2-16.2)
Isanti	23.4	(21.2-25.6)	26.9	(24.3-29.5)
Itasca	21.0	(19.2-22.9)	16.7	(15.3-18.2)
Jackson	22.8	(19-26.6)	14.6	(12.1-17.1)
Kanabec	42.5	(38.1-46.9)	38.1	(34.1-42)
Kandiyohi	21.3	(19.3-23.2)	18.1	(16.4-19.7)
Kittson*	5.1	(2.8-8.6)	3.1	(1.6-5.3)

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Minnesota	**17.5**	**(17.4-17.7)**	**17.9**	**(17.7-18)**
Koochiching	27.4	(23.7-31)	20.8	(18-23.6)
Lac Qui Parle	38.3	(32.5-44.2)	24.5	(20.5-28.5)
Lake	16.5	(13.3-19.6)	11.8	(9.5-14.1)
Lake Of The Woods	26.1	(20.1-33.3)	20.8	(15.9-26.7)
Le Sueur	11.8	(10-13.6)	10.8	(9.2-12.5)
Lincoln	32.4	(26.4-38.4)	21.4	(17-25.8)
Lyon	27.5	(24.6-30.5)	22.8	(20.3-25.3)
Mahnomen	10.0	(6.5-14.6)	7.8	(5.1-11.5)
Marshall	**	(**-**)	**	(**-**)
Martin	23.8	(21-26.6)	16.8	(14.8-18.9)
McLeod	15.7	(13.9-17.5)	14.4	(12.8-16.1)
Meeker	18.0	(15.6-20.3)	14.8	(12.8-16.7)
Mille Lacs	32.5	(29.4-35.6)	28.1	(25.4-30.8)
Morrison	24.3	(21.9-26.6)	20.7	(18.7-22.7)
Mower	24.3	(22.1-26.4)	18	(16.3-19.6)
Murray	**	(**-**)	**	(**-**)
Nicollet	17.9	(15.7-20)	18	(15.9-20.2)
Nobles	21.4	(18.6-24.1)	16.1	(13.9-18.2)
Norman	**	(**-**)	**	(**-**)
Olmsted	18.6	(17.6-19.7)	20.2	(19.1-21.3)
Otter Tail	16.4	(14.9-17.8)	11.9	(10.9-13)
Pennington	26.4	(22.7-30.2)	21.8	(18.6-25)
Pine	33.1	(30.2-36)	29.1	(26.5-31.7)
Pipestone	24.3	(20.1-28.6)	15.9	(12.9-18.8)
Polk	18.2	(16.1-20.3)	14.2	(12.5-15.8)
Pope	**	(**-**)	**	(**-**)
Ramsey	17.9	(17.4-18.4)	18.2	(17.7-18.7)
Red Lake	**	(**-**)	**	(**-**)
Redwood	24.2	(20.9-27.4)	17.1	(14.7-19.5)
Renville	17.9	(15.1-20.6)	13.7	(11.5-15.8)
Rice	17.5	(15.9-19)	17.4	(15.9-19)
Rock	21.7	(17.7-25.8)	14.4	(11.6-17.2)
Roseau	18.3	(15.4-21.2)	17.8	(14.9-20.7)
Scott	11.8	(10.8-12.7)	20.6	(19-22.3)
Sherburne	11.4	(10.3-12.5)	17.3	(15.6-19)
Sibley	**	(**-**)	**	(**-**)
Stearns	23.1	(21.9-24.2)	23.4	(22.2-24.5)
Steele	14.8	(13-16.6)	14	(12.3-15.7)
Stevens	33.0	(27.7-38.2)	22.2	(18.5-26)
St. Louis	30.2	(29.1-31.2)	25.5	(24.6-26.4)
Swift	28.5	(24.4-32.6)	21.8	(18.5-25.1)
Todd	20.9	(18.4-23.4)	17.3	(15.2-19.4)
Traverse	15.2	(10.5-21.4)	6.7	(4.5-9.6)
Wabasha	12.6	(10.5-14.6)	10.6	(8.9-12.3)
Wadena	28.4	(24.5-32.3)	20	(17.2-22.9)
Waseca	14.2	(11.9-16.5)	13.4	(11.2-15.6)
Washington	11.8	(11.2-12.5)	16.7	(15.8-17.7)
Watonwan	24.1	(20.1-28)	16.8	(14-19.6)

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Minnesota	**17.5**	**(17.4-17.7)**	**17.9**	**(17.7-18)**
Wilkin	18.5	(14.3-23.5)	14.2	(10.9-18.1)
Winona	18.0	(16.3-19.7)	15.6	(14.1-17.1)
Wright	13.8	(12.8-14.8)	18.5	(17.1-19.8)
Yellow Medicine	33.0	(28.2-37.7)	22.8	(19.4-26.2)

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.
** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Figure 10: *Age-adjusted COPD hospitalization rates per 10,000 adults age 25 and older, Minnesota, aggregated from 2000 to 2007.*

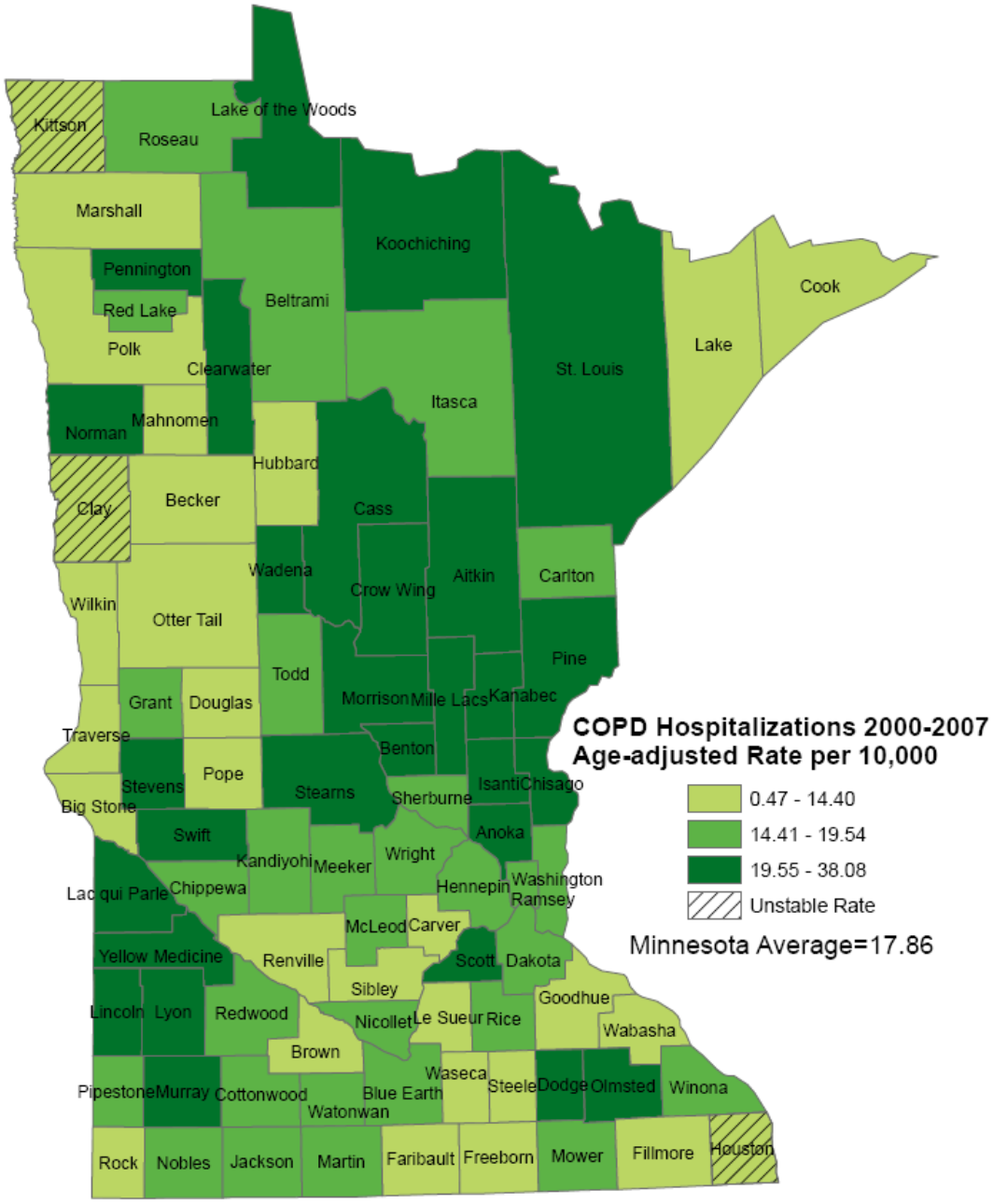


Figure 10 shows a map of age-adjusted COPD hospitalization rates, aggregated from 2000-2007. Rates are classified into three categories or quantiles. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low. The overall state aggregated rate is 17.86.

Figure 11 shows COPD hospitalization rates for Minnesota for eight age categories (age-specific rates), aggregated from 2000-2007. The highest COPD hospitalization rates are seen among adults age 65 and older. Among the elderly, those aged 75-84 have the highest COPD hospitalization rates.

Figure 11: *Age-specific COPD hospitalization rates per 10,000 adults age 25 and older, Minnesota, aggregated from 2000 to 2007.*

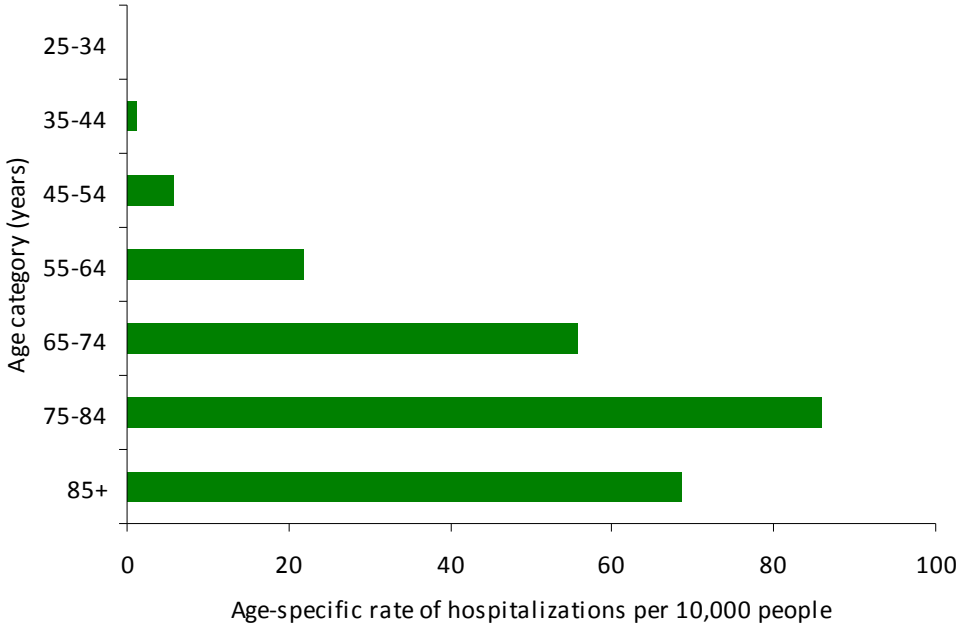


Table 11 shows age-specific COPD hospitalization rates for Minnesota for years 2000-2007. COPD hospitalization rates are much higher among older age groups, as this condition mostly affects older populations. Among adults age 65 and older, the highest COPD hospitalization rates are seen in those aged 75-84 each year.

Table 11: *Annual age-specific COPD hospitalization rates per 10,000 adults, Minnesota, 2000-2007.*

	25-34	35-44	45-54	55-64	65-74	75-84	85+
2000	0.5	1.3	5.4	22.9	56.7	78.4	64.0
2001	0.3	1.1	6.0	23.3	62.3	86.7	68.1
2002	0.3	1.3	4.9	23.6	57.1	89.7	74.9
2003	0.4	1.2	5.0	22.7	57.6	82.8	65.0
2004	0.3	1.1	5.1	21.2	54.4	82.5	63.2
2005	0.2	1.4	6.6	23.1	57.9	98.8	74.3
2006	0.3	1.1	5.9	17.7	52.2	84.3	67.4
2007	0.3	1.3	6.7	20.5	48.9	84.4	70.5

Table 12 shows age-specific COPD hospitalization rates for all Minnesota and for each county, aggregated from 2000-2007. Rates based on counts ≤ 20 are marked with one asterisk. Some rates are suppressed to prevent back-calculation of suppressed annual counts, and are marked with two asterisks. Most counties show the same pattern as the 2000-2007 aggregated state data: COPD hospitalization rates are highest among adults over age 65, with the greatest burden among the 75-84 age group.

Table 12: *Annual age-specific COPD hospitalization rates per 10,000 adults age 25 and older by state and county, aggregated from 2000 to 2007.*

	25-34	35-44	45-54	55-64	65-74	75-84	85+
Minnesota	**0.3**	**1.2**	**5.7**	**21.7**	**55.8**	**86**	**68.5**
Aitkin	2.7*	1.3*	10.1*	29.2	66.9	72.9	87.8
Anoka	0.3*	1.3	6.3	28.4	70.1	124.2	96.8
Becker	0*	1.5*	3*	10.4	31.1	62.2	72.8
Beltrami	0.5*	1.5*	3.7*	26.6	62.9	89.5	83.8
Benton	0.2*	0.9*	9.3	44.9	114.7	182.8	109.8
Big Stone	0*	0*	3.1*	11.8*	20.9*	50*	63.9*
Blue Earth	0*	1.2*	4.4	20.5	54.6	67.2	55.2
Brown	0.5*	1*	3.2*	19.9	34.2	71.7	41.8
Carlton	0.6*	1*	7.2	17.6	46.8	91.4	75.9
Carver	0.4*	0.4*	1.9*	10.6	43.3	92.1	35.1
Cass	1.3*	2.8*	12.2	27.9	50.9	135	82.1
Chippewa	1*	0.7*	1.3*	21.9	47.9	82.4	65.4
Chisago	0.4*	1.6*	6.1	38.9	104.9	135.2	90.5
Clay	0*	0.2*	0.2*	1.2*	1.6*	0.5*	1*
Clearwater	0*	1.2*	6.3*	17.2*	92	100	136.6
Cook	0*	0*	18.1*	8.1*	30.6*	25.1*	28.6*
Cottonwood	0*	2.6*	11.3*	16.3*	44.7	91.3	60.9
Crow Wing	0.7*	2.7*	13.1	33.4	86.3	138.6	137.1
Dakota	0.3*	0.7	3.2	17	55.8	91.9	95.3
Dodge	0.5*	0*	3.3*	17	79.5	90.9	76.5
Douglas	0*	0.8*	3.6*	13.7	29.5	54.8	54.6
Faribault	0*	0*	0.5*	13.5*	53.1	61.9	28*
Fillmore	0.6*	0*	1.6*	9.6*	45.2	75.2	65.4
Freeborn	0*	0.3*	5.4*	4.8*	12.9	17.6	18.7*
Goodhue	0.2*	1.1*	4.1	19.6	39.7	61.1	40.4
Grant	0*	1.6*	8.6*	15.1*	31.5*	116.8	83.7*
Hennepin	0.2	1	5.4	20.7	53.9	76.8	65
Houston	0*	0*	0.4*	1.3*	1.7*	1.1*	0*
Hubbard	0*	3.1*	2.3*	16.8	51.6	63	46.1*
Isanti	1.5*	0.7*	9.1	38.1	98	111.1	54.7
Itasca	0*	2.8*	6.4	19.3	46.7	89.5	46.3
Jackson	0*	0*	2.9*	10*	33	103.5	90.8
Kanabec	0.6*	0.6*	11.8	73.3	107.5	147.4	176
Kandiyohi	0*	0.7*	9.1	23.9	49.4	85.9	66.4
Kittson	0*	0*	3.2*	2.2*	2.6*	19.6*	21.3*
Koochiching	0*	2.6*	9.3*	28.2	59.3	97.9	65.1*
Lac Qui Parle	4.5*	0*	10.2*	37.1	65.5	111.2	99.3

	25-34	35-44	45-54	55-64	65-74	75-84	85+
Minnesota	**0.3**	**1.2**	**5.7**	**21.7**	**55.8**	**86**	**68.5**
Lake	0*	1.7*	4.9*	14.4*	33.2	53.7	62.4*
Lake Of The Woods	0*	24.9*	0*	23.4*	69.1	57.2*	61.9*
Le Sueur	0.4*	0.9*	1.9*	13.1	26.2	68.6	36.3*
Lincoln	6.9*	8*	10.6*	17.1*	31.3*	119.9	70.9*
Lyon	0*	0.8*	2.6*	22	77.9	122.3	107.6
Mahnomen	0*	1.9*	1.9*	26*	11.8*	34.2*	0*
Marshall	**	**	**	**	**	**	**
Martin	0.7*	2.7*	7.8	22.5	48.1	73.7	62
McLeod	0.5*	0.7*	2.8*	18.1	48.9	70.6	51.2
Meeker	0*	1.2*	5.5*	17.7	46.9	66.7	61.8
Mille Lacs	0.4*	1.4*	9.4	44.2	91.2	125.9	69.8
Morrison	0.7*	1.1*	5.5*	20.4	60.6	128.5	49.4
Mower	0.9*	3.4*	5	20.1	58.1	85.1	59.2
Murray	**	**	**	**	**	**	**
Nicollet	0*	0.9*	5.2*	23.5	48.9	96	79.8
Nobles	0*	0*	3.5*	16.1	50.9	81	91.3
Norman	**	**	**	**	**	**	**
Olmsted	0.3*	1.3	7.7	19.3	57.7	103.8	103.1
Otter Tail	0.2*	1*	4.1	13.2	30.5	71.1	41.4
Pennington	0*	4.2*	5.1*	22.2	75.1	88.8	121.1
Pine	1.8*	0*	12	42	106.8	107	89.5
Pipestone	4.3*	3*	5.7*	9.2*	53	55.5	105.9
Polk	0.4*	1.2*	2.2*	19.5	59.5	48.7	54.7
Pope	**	**	**	**	**	**	**
Ramsey	0.3*	1.3	7.9	25.6	59.2	75.3	58
Red Lake	**	**	**	**	**	**	**
Redwood	0*	0.6*	3.3*	20.7	57.6	88.8	56.8
Renville	0.8*	0.6*	3.5*	17.8	47.8	64.4	28.8*
Rice	0*	0.1*	5.3	17.4	55.3	86	93.7
Rock	0*	1*	3.8*	12.7*	34.4	101.4	47.7*
Roseau	0*	1.4*	7*	13.8*	45.8	105.7	82.3
Scott	0.1*	0.8*	3.9	19	63.9	113.5	104.8
Sherburne	0*	1.4*	4.1	17.9	57.6	92.8	46.6
Sibley	**	**	**	**	**	**	**
Stearns	0.3*	1.6	5.9	27.7	65.2	121.7	116.9
Steele	0.3*	0.9*	3.4*	11.4	43.3	79.6	62.2
Stevens	0*	4.5*	4.9*	24*	64	106.6	138.5
St. Louis	1.1*	4.9	11.7	38.7	74.7	103.2	67.9
Swift	1.9*	1.4*	12.4*	27.5	57.1	108.2	77.8
Todd	0.5*	5*	8.7	20.5	45.2	81.1	45.8
Traverse	0*	0*	0*	3.1*	22.5*	33.1*	73.5*
Wabasha	0*	0.4*	5.4*	12.2	28.3	53.3	48
Wadena	0*	3*	13*	23.3	62.4	79.8	71
Waseca	0*	2.5*	5.6*	9.1*	45.8	67.6	42*
Washington	0.2*	0.5*	3.4	14.1	47.9	95.2	96.7
Watonwan	0*	0.9*	2.3*	24	44.4	94.9	72.8
Wilkin	0*	0*	1.2*	15*	37.5*	92.7	84.1*
Winona	0.2*	0.6*	2.8*	18.3	43.9	91.4	61.3

	25-34	35-44	45-54	55-64	65-74	75-84	85+
Minnesota	**0.3**	**1.2**	**5.7**	**21.7**	**55.8**	**86**	**68.5**
Wright	0.2*	0.9*	4.5	16.4	72.5	83.4	62.2
Yellow Medicine	0*	5.4*	16.2*	22.5*	57.8	96.6	102.8

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

C. Acute Myocardial Infarction (Heart Attack)

Heart attacks result from coronary heart disease, a disease of the blood vessels that feed the heart muscle. Coronary heart disease caused about 1 of every 5 deaths in the United States in 2005, and it is the largest single killer of American males and females.[19] An estimated 7.9 million American adults have had a heart attack, with more men than women reporting heart attack prevalence.[19] Deaths and disability from heart disease are influenced by modifiable risk factors such as cigarette smoking, physical inactivity, poor nutrition, high blood pressure, high cholesterol, and related conditions such as diabetes, overweight, and obesity – all of which are highly prevalent in Minnesota.

In 2006, the estimated prevalence of heart attack (acute myocardial infarction, or AMI) among American adults, age 20 years or older, was 3.6% or 7.9 million people (4.7 million men and 3.2 million women).[19] Corresponding percentages by race and ethnicity are 4.9% for white males, 3.0% for white females, 5.1% for black males, and 2.2% for black females. The estimated annual incidence of new and recurrent AMI in 2006 was 935,000 persons age 35 and over.[19] The estimated number of inpatient hospital discharges in 2006 due to AMI was 647,000.[19] In 2006, approximately 3.4% of adults (5.0% of males, 2.0% of females) living in Minnesota reported ever having had a heart attack – approximately 129,000 people.[20]

Risk factors for a heart attack are often categorized as either inherited or acquired. Inherited (or genetic) risk factors are characteristics that we are born with that cannot be changed. Acquired (or modifiable) risk factors are caused by activities that we choose that can be altered through lifestyle changes and clinical care.

Risk factors for heart disease that cannot be changed:[21]

- **Age**: About 4 out of 5 heart disease deaths are in people older than 65 years of age.
- **Sex:** Heart disease is more prevalent in men than in women, and men are at greater risk before age 65. After age 65, there is little difference in risk between men and women.
- **Race/Ethnicity**: In the United States, African Americans die from coronary heart disease at 30% higher rate than whites. Among African Americans, American Indians and Alaska Natives, and Hispanics, heart disease is the leading cause of death.[22]
- **Family History**: Several studies have shown that heart disease risk is increased for families with one or more members who have heart disease. This risk factor of "family history" includes not only the genetic inheritance of heart disease risk factors, but also the sharing of cultural, environmental, and lifestyle factors within families that increase the risk of heart disease.

Risk factors for heart disease that are modifiable:[21]

- **High Blood Cholesterol:** Increasing levels of total cholesterol are associated with higher rates of reduced blood flow to heart muscle. However, low HDL cholesterol is also an important risk factor for heart disease, particularly for men.
- **High Blood Pressure**: High blood pressure (hypertension) is a major risk factor for heart disease. About 69% of people with a first heart attack have high blood pressure.[19]

- **Cigarette Smoke**: Cigarette smoking doubles to triples the risk of dying from heart disease. Smokers are 2 to 4 times more likely to develop heart disease than are nonsmokers.[19]
- **Diabetes:** The risk for heart disease is 2 to 4 times higher among people with diabetes.[19]
- **Overweight and Obesity:** A growing body of evidence is showing that heart disease risk increases with increased weight.
- **Physical Inactivity:** Several studies have shown that physical inactivity increases the risk of heart disease anywhere from 1.5 to 2.4 times – comparable to the risk observed in high blood cholesterol, high blood pressure, or cigarette smoking.

A number of epidemiologic studies have reported associations between air pollution (ozone, particulate matter, carbon monoxide, sulfur dioxide) and hospitalizations for AMI and other forms of coronary heart disease. Some epidemiological models have demonstrated increases in AMI hospitalization rate in relation to fine particulate matter, particularly in sensitive subpopulations such as the elderly, patients with pre-existing heart disease, those who are survivors of AMI, or those with COPD.

Non-modifiable risk factors cannot be prevented, but most modifiable risk factors have a targeted solution to decrease the risk of AMI hospitalization. Controlling high blood pressure (through increased physical activity, improved diet and nutrition, quitting smoking, and using blood pressure medications) is associated with a significant reduction in heart disease incidence. The increased risk of AMI due to diabetes can be reduced through weight loss and regular exercise, and by controlling blood sugar. The risk of obesity on heart disease can be reduced by incorporating weight loss, regular exercise, and a diet high in fruits and vegetables and low in fat.

Although there is a heart disease and stroke focus area of Healthy People 2010, no objectives specifically address reducing heart attack hospitalizations. Objectives within Healthy People 2010 relating to risk factors for heart attack include:

- Healthy People 2010 Objective 27-1. Reduce by 20% the proportion of adults aged 18 years and older who smoke cigarettes.
- Healthy People 2010 Objective 22-1. Reduce by 10% the proportion of persons who engage in no leisure-time physical activity.
- Healthy People 2010 Objective 19-5: Increase the proportion of persons aged 2 years and older who consume at least two daily servings of fruit to 75%.
- Healthy People 2010 Objective 19-6: Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables to 50%.
- Healthy People 2010 Objective 12-12: Increase by 5% the proportion of adults who have had their blood pressure measured within the preceding 2 years.
- Healthy People 2010 Objective 12-14: Reduce by 5% the proportion of adults with high total blood cholesterol levels.
- Healthy People 2010 Objective 5-3: Reduce the overall rate of diabetes that is clinically diagnosed to 25 per 1000 population.
- Healthy People 2010 Objective 19-1. Reduce by 10% the proportion of adults aged 18 years and older who have a BMI>25.

Prevalence of the major modifiable risk factors among adults in the United States and Minnesota are noted in Table 13.[20]

Table 13. *Prevalence of cardiovascular disease risk factors, U.S. and Minnesota, 2005-2006.*

Risk Factor*	United States	Minnesota
Cigarette Smoking	19.5%	18.3%
Physical Inactivity	24.1	14.2
Less than 5 fruits/veggies daily	73.7	75.2
High Blood Pressure	26.1	21.9
High Blood Cholesterol	35.7	32.4
Diabetes	8.1	5.7
Overweight or Obese	58.4	60.9
Obese	23.9	24.0

* Current cigarette smoking, physical inactivity, diabetes, overweight, and obesity data are from the 2006 BRFSS Survey. Fruits and vegetable consumption, high blood pressure awareness, and high blood cholesterol awareness data are from the 2005 BRFSS Survey.

C.1. Monthly average, maximum and minimum number of heart attack hospitalizations, by state and county

Figure 12 shows the daily average, minimum, and maximum number of Minnesota residents admitted to a hospital as an inpatient with a primary discharge diagnosis of heart attack by month, aggregated over 2000-2007. Although some studies have found seasonal variation in the frequency of heart attacks due to factors related to cold weather, in Minnesota heart attack hospitalization rates do not follow a seasonal pattern.

Figure 12: *Average, maximum and minimum daily number of heart attack hospitalizations by month, Minnesota, aggregated from 2000 to 2007.*

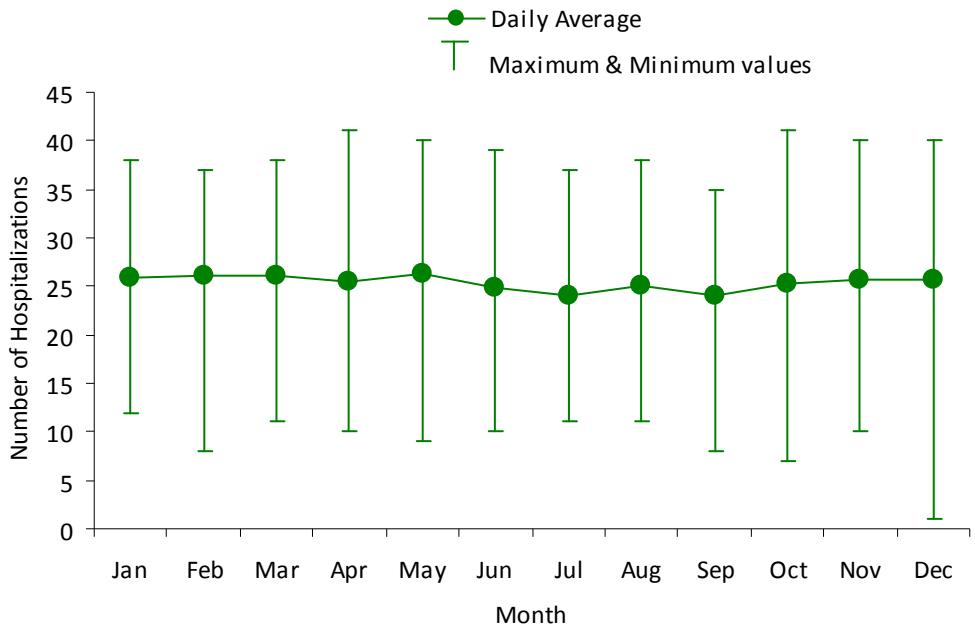


Table 14 shows the daily average, minimum, and maximum number of Minnesota residents admitted to a hospital as an inpatient with a primary discharge diagnosis of heart attack by month for years 2000-2007.

Table 14: *Average, maximum and minimum daily number of heart attack hospitalizations by month, Minnesota, 2000-2007.*

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	Average	23.6	23.6	22.2	23.5	25.5	22.6	23.9	23.2	24.2	24.8	26.2	24.8
	Maximum	35	34	35	37	37	30	37	30	32	41	37	35
	Minimum	13	12	14	15	18	11	15	14	13	12	16	9
2001	Average	24.0	24.8	25.5	27.2	24.5	24.5	23.2	23.0	22.3	24.0	25.0	26.1
	Maximum	38	34	37	41	34	32	35	32	35	32	36	34
	Minimum	12	12	15	21	12	14	17	15	13	14	13	14
2002	Average	24.8	23.6	25.3	23.4	25.9	23.2	21.2	24.3	21.5	23.5	22.8	23.1
	Maximum	36	34	38	35	40	39	28	38	33	33	33	40
	Minimum	15	14	15	15	13	15	13	16	8	10	12	15
2003	Average	23.8	23.1	22.7	21.8	23.1	23	20.9	20.9	20.9	21.1	23.5	23.2
	Maximum	36	32	34	31	36	34	26	33	31	33	34	34
	Minimum	14	16	12	10	12	14	15	12	12	7	12	11
2004	Average	21.4	23.3	21.7	20.9	22.3	20.8	20.6	21.9	20.4	21.5	21.7	23.6
	Maximum	31	33	32	35	33	29	26	32	34	36	29	32
	Minimum	13	15	17	11	9	13	12	14	11	12	13	14
2005	Average	22.4	20.8	22.2	21.1	22.5	20.8	19.4	20.0	18.4	20.8	21.2	22.4
	Maximum	33	29	38	29	37	36	31	31	27	30	40	35
	Minimum	13	14	13	10	15	12	12	11	10	13	13	10
2006	Average	21.1	23.1	21.3	21.9	21.7	19.8	20.5	21.0	20.1	21.1	19.7	21.1
	Maximum	30	32	30	31	35	28	28	31	29	36	34	29
	Minimum	12	16	11	13	13	13	11	11	13	15	12	13
2007	Average	20.4	21.0	21.7	19.2	18.5	19.8	19.0	20.7	20.8	19.8	19.9	16.2
	Maximum	30	37	35	28	26	29	30	34	28	30	30	24
	Minimum	12	8	16	10	11	10	11	13	9	10	10	1

C.2. Annual number of heart attack hospitalizations, by state and county

Table 15 shows the number of hospitalizations due to heart attack from 2000 to 2007 for Minnesota and for each county. Counts ≤ 5 have been suppressed to maintain confidentiality and are marked with an asterisk. Because MN EPHT hospitalization measures include only discharges from Minnesota hospitals, counts for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

The number of hospitalizations due to heart attack is dependent on many factors, including the size of the population. To account for differing population size by county, rates are used and are reported in the following section. Rates are the number of events that occur in a defined period of time, divided by the average population at risk of that event. Rates are often used instead of counts because they allow comparison of a health event in two different populations.

Table 15: *Annual number of heart attack hospitalizations by county, 2000-2007.*

	2000	2001	2002	2003	2004	2005	2006	2007
Minnesota	**8764**	**8941**	**8598**	**8146**	**7912**	**7671**	**7678**	**7200**
Aitkin	73	67	75	74	70	54	65	47
Anoka	488	486	491	457	448	441	423	383
Becker	56	50	54	54	37	91	47	56
Beltrami	76	75	89	60	64	33	31	38
Benton	69	64	84	80	76	53	50	66
Big Stone	24	20	8	8	*	24	18	13
Blue Earth	116	76	95	83	83	73	91	100
Brown	73	73	89	75	62	64	64	63
Carlton	109	116	110	70	93	91	66	60
Carver	88	76	106	108	75	87	78	72
Cass	96	72	81	82	89	64	78	68
Chippewa	23	27	36	25	19	16	25	22
Chisago	44	110	114	102	91	88	89	78
Clay	*	*	*	8	*	*	*	*
Clearwater	17	13	8	7	16	14	6	8
Cook	*	*	*	*	*	8	*	9
Cottonwood	22	13	11	10	21	12	14	10
Crow Wing	229	220	216	185	131	137	171	167
Dakota	473	486	454	466	470	426	449	452
Dodge	31	30	41	36	36	45	39	31
Douglas	64	82	64	47	33	32	59	63
Faribault	48	34	47	35	39	30	55	39
Fillmore	34	37	36	29	40	40	45	41
Freeborn	39	57	44	30	42	41	89	73
Goodhue	115	81	69	90	87	87	82	78
Grant	19	24	32	22	20	12	18	15
Hennepin	1830	1760	1758	1663	1640	1613	1527	1403
Houston	*	*	11	*	*	*	*	7
Hubbard	43	34	39	30	24	23	18	12
Isanti	45	52	34	53	62	56	49	28
Itasca	148	109	92	117	120	172	161	143
Jackson	8	15	*	9	8	6	9	9
Kanabec	39	47	33	56	58	30	43	37
Kandiyohi	78	89	80	52	38	33	48	54
Kittson	*	*	*	*	*	*	*	*
Koochiching	26	42	26	22	29	44	47	39
Lac Qui Parle	15	25	13	11	12	13	18	9
Lake	19	16	15	16	16	20	27	18
Lake Of The Woods	7	7	6	*	*	*	6	*
Le Sueur	59	51	60	56	48	35	37	31
Lincoln	16	12	*	12	8	*	7	*
Lyon	48	38	36	20	28	16	15	12
Mahnomen	6	*	*	*	*	6	*	*
Marshall	7	13	10	17	11	*	*	*
Martin	83	76	78	58	80	78	76	83
McLeod	70	73	70	72	80	79	57	67

	2000	2001	2002	2003	2004	2005	2006	2007
Minnesota	**8764**	**8941**	**8598**	**8146**	**7912**	**7671**	**7678**	**7200**
Meeker	47	40	48	43	36	37	47	34
Mille Lacs	77	70	67	57	69	60	79	73
Morrison	54	59	43	49	44	30	71	48
Mower	50	86	49	64	117	114	119	110
Murray	8	14	10	8	10	*	7	9
Nicollet	46	45	49	40	37	45	48	55
Nobles	29	29	29	21	18	11	12	8
Norman	10	7	10	10	*	9	*	*
Olmsted	186	203	193	204	197	211	206	181
Otter Tail	46	132	111	131	110	83	96	79
Pennington	21	20	17	24	16	12	14	15
Pine	41	59	63	76	70	68	54	61
Pipestone	8	12	6	13	11	*	6	11
Polk	41	40	55	49	33	38	36	16
Pope	14	20	13	9	11	14	20	30
Ramsey	1044	996	862	833	814	763	698	669
Red Lake	*	11	7	9	11	*	*	*
Redwood	52	40	24	40	43	45	21	40
Renville	35	57	52	48	33	32	38	30
Rice	70	122	78	115	83	106	109	82
Rock	*	17	13	7	*	9	*	6
Roseau	54	29	37	35	17	21	12	6
Scott	122	139	153	119	124	117	105	100
Sherburne	56	88	97	97	93	93	92	95
Sibley	31	27	28	42	28	29	26	27
Stearns	225	216	212	163	192	149	181	171
Steele	90	95	100	75	89	57	48	58
Stevens	28	22	37	25	16	6	20	15
St. Louis	512	525	515	486	455	494	460	446
Swift	31	31	28	22	20	19	32	15
Todd	29	45	48	25	22	27	23	40
Traverse	*	13	6	12	7	*	8	*
Wabasha	22	29	27	42	38	56	61	42
Wadena	35	44	38	34	27	14	24	20
Waseca	47	44	33	38	24	39	44	41
Washington	275	314	305	279	282	267	272	266
Watonwan	26	34	30	30	43	34	33	21
Wilkin	14	17	19	12	14	19	12	13
Winona	93	96	66	67	63	45	57	63
Wright	172	158	155	162	147	160	151	157
Yellow Medicine	28	32	27	12	14	22	20	20

***** MN EPHT suppresses hospitalization counts ≤ 5 to protect an individual's privacy.

C.3. Annual crude, age-specific, and age-adjusted heart attack hospitalization rates, by state and county

MN EPHT heart attack crude and age-adjusted rates are only shown for adults age 35 and older, because heart attacks are very rare in younger age groups. Figure 13 shows age-adjusted rates of heart attack hospitalization from 2000 to 2007 for Minnesota, among adults age 35 and older. Heart attack hospitalization rates have been decreasing since 2000. Heart disease mortality rates have also been declining in Minnesota and the US.

Figure 13: *Annual age-adjusted heart attack hospitalization rates per 10,000 adults age 35 and older, Minnesota, 2000-2007.*

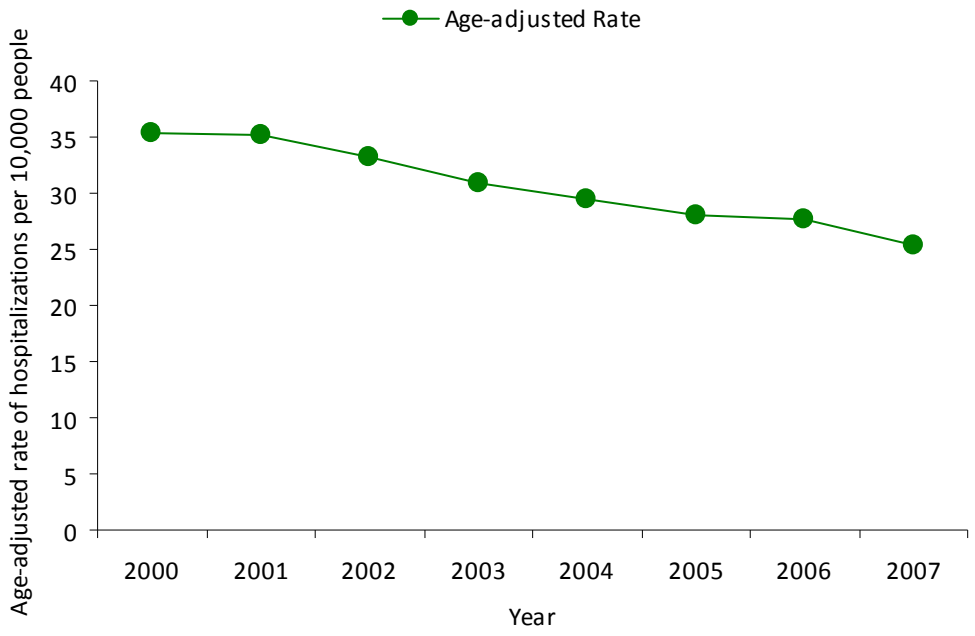


Table 16 shows crude and age-adjusted heart attack hospitalization rates among adults age 35 and older for all Minnesota and for each county from 2000-2007. Crude rates are in regular font followed by age-adjusted rates in italics. Rates based on counts ≤ 5 have been suppressed to maintain confidentiality and are marked with two asterisks. When a rate is based on a count ≤ 20 (marked with one asterisk), it may be unstable and should be interpreted with caution. These rates are unstable because they can change dramatically with the addition or subtraction of one case. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low. Age-adjusted heart attack hospitalization rates have declined over time in most Minnesota counties.

Table 16: *Annual crude and age-adjusted heart attack hospitalization rates per 10,000 adults age 35 and older, by county, 2000-2007.*

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**35.0**	***35.4***	**34.9**	***35.2***	**33.2**	***33.2***	**31.1**	***30.9***	**29.7**	***29.5***	**28.5**	***28.1***	**28.2**	***27.7***	**26.1**	***25.3***
Aitkin	80.5	*56.7*	83.6	*50.0*	81.3	*59.1*	78.6	*55.5*	77.5	*52.5*	53.5	*41.3*	71.4	*47.3*	47.1	*38.1*
Anoka	34	*48.7*	32.7	*45.9*	31.7	*4.02*	29.3	*39.2*	27.8	*34.9*	27.2	*33.9*	25.4	*31.3*	22.7	*27.9*
Becker	45.2	*29.4*	33.5	*26.1*	36.6	*27.5*	45.8	*26.0*	23.8	*18.1*	57.4	*42.5*	26.8	*23.1*	35.4	*25.7*
Beltrami	41.0	*40.0*	40.2	*38.5*	46.1	*44.0*	31.4	*29.2*	37.6	*31.2*	22.5	*15.4*	22.9	*14.1*	24.8	*16.0*
Benton	43.9	*43.1*	39.7	*39.3*	61.0	*49.2*	47.1	*46.6*	43.3	*46.4*	30.1	*29.4*	33.0	*28.6*	35.9	*36.9*
Big Stone	93.0	*48.1*	80.5*	*49.6**	73.6*	*14.5**	47.5*	*18.4**	**	**	84.9	*45.7*	75.1*	*35**	86.8*	*24.6**
Blue Earth	46.6	*44.1*	30.6	*27.7*	37.2	*33.8*	37.8	*29.8*	37.2	*29.7*	28.3	*27.0*	47.2	*31.7*	42.7	*31.1*
Brown	57.0	*42.9*	67.5	*44.0*	59.7	*49.6*	58.0	*41.1*	45.4	*32.5*	47.3	*33.1*	56.0	*34*	47.7	*31.4*
Carlton	72.9	*58.0*	65.0	*60.0*	60.6	*56.7*	53.2	*34.6*	50.1	*45.9*	48.6	*45.2*	34.5	*30.9*	36.7	*29.4*
Carver	25.9	*36.2*	21.0	*28.0*	36.3	*38.4*	28.0	*38.1*	22.7	*24.2*	25.2	*27.8*	18.5	*23.1*	16.5	*21.0*
Cass	76.2	*49.2*	49.1	*39.9*	55.5	*42.9*	55.2	*43.3*	58.7	*45.1*	38.2	*32.1*	46.8	*39.9*	45.7	*34.9*
Chippewa	51.2	*23.1*	60.3	*25.5*	75.3	*33.9*	48.8	*24.5*	33.5*	*20.1**	51.7*	*14.2**	57.4	*25.5*	40.5	*22.5*
Chisago	26.0	*23.8*	51.3	*59.5*	63.8	*57.7*	44	*50.2*	38.9	*44.7*	36.7	*40.4*	36.8	*40.5*	37.4	*33.6*
Clay	**	**	**	**	**	**	7.6*	*3.1**	**	**	**	**	**	**	**	**
Clearwater	70.9*	*27.5**	47.2*	*23.6**	29.9*	*15.1**	61.8*	*12.1**	56.4*	*23.9**	60.2*	*20.2**	42.2*	*8.9**	37.9*	*15.3**
Cook	**	**	**	**	**	**	**	**	**	**	62.1*	*20.9**	**	**	75.3*	*22.3**
Cottonwood	63.9	*20.4*	30.5*	*11.9**	30.0*	*11.0**	61.5*	*8.8**	51.1	*17.1*	37.3*	*10.3**	41.7*	*13.3**	33.7*	*8.6**
Crow Wing	73.0	*64.2*	69.3	*59.8*	67.3	*57.8*	57.1	*48.6*	44.4	*32.9*	41.7	*34.1*	51.1	*43.0*	49.7	*42.0*
Dakota	27.6	*37.3*	27.2	*36.7*	25.0	*34.0*	25.2	*33.7*	24.7	*32.0*	21.9	*28.7*	22.4	*28.3*	22.2	*28.3*
Dodge	48.9	*34.6*	33.2	*34.1*	43.2	*44.1*	38.3	*38.8*	44.1	*37.5*	46.5	*47.9*	55.9	*39.2*	35.8	*31.3*
Douglas	39.3	*29.4*	49.4	*35.4*	44.8	*27.4*	33.7	*18.6*	22.2	*12.9*	18.3	*13.1*	32.3	*23.3*	39.5	*23.7*
Faribault	49.2	*42.6*	65.4	*26.2*	60.5	*35.8*	40.3	*30.4*	60.2	*29.1*	35.8	*26.0*	75.7	*43.5*	56.4	*29.8*
Fillmore	36.2	*21.2*	49.6	*24.0*	34.4	*24.5*	30.2	*19.1*	42.7	*25.5*	37.1	*25.2*	50.1	*28.3*	39.8	*29.0*
Freeborn	20.7	*19.2*	34.2	*25.8*	26.3	*20.2*	18.3	*14.1*	21.8	*19.5*	22.0	*19.5*	48.0	*38.3*	43.4	*30.8*
Goodhue	54.3	*41.4*	32.5	*29.2*	27.8	*26.2*	42.4	*33.0*	34.5	*30.6*	34.4	*31.2*	35.6	*26.6*	30.5	*25.7*
Grant	119.8*	*30.0**	130.4	*40.2*	108.7	*59.4*	120.8	*35.4*	85.2*	*34.7**	65.6*	*23.9**	98.4*	*26.4**	60.4*	*25.6**
Hennepin	32.6	*34.7*	30.8	*32.7*	30.4	*32.2*	28.5	*30.1*	27.7	*29.3*	26.9	*28.5*	24.9	*26.2*	22.6	*23.8*
Houston	**	**	**	**	17.6*	*9.3**	**	**	**	**	**	**	**	**	12.9*	*5.7**
Hubbard	51.4	*34.0*	40.5	*25.8*	39.3	*30.1*	30.7	*23.7*	27.3	*17.5*	26.0	*16.4*	24.1*	*12.5**	17.2*	*8.0**
Isanti	28.1	*29.9*	36.8	*32.9*	24.1	*21.3*	35.3	*32.2*	40.0	*37.0*	29.7	*32.4*	26.5	*26.9*	18.4	*17.0*

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**35.0**	***35.4***	**34.9**	***35.2***	**33.2**	***33.2***	**31.1**	***30.9***	**29.7**	***29.5***	**28.5**	***28.1***	**28.2**	***27.7***	**26.1**	***25.3***
Itasca	65.1	*51.2*	47.4	*36.9*	46.0	*30.1*	45.1	*39.0*	45.9	*39.5*	72.2	*56.3*	62.0	*53.9*	60.1	*45.8*
Jackson	22.8*	*10.2**	46.7*	*15.3**	**	**	32.2*	*10.4**	62.4*	*7.4**	34.2*	*5.7**	53.2*	*8.4**	104.9*	*6.3**
Kanabec	61.9	*48.4*	55.7	*53.0*	43.7	*37.4*	72.2	*60.4*	65.4	*62.1*	46.0	*31.3*	49.3	*46.4*	42.3	*39.3*
Kandiyohi	50.6	*31.9*	40.8	*36.4*	42.7	*33.3*	27.4	*19.7*	19.3	*15.0*	19.4	*11.8*	27.3	*17.9*	27.2	*20.6*
Kittson	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Koochiching	50.8	*26.0*	66.1	*42.1*	58.1	*24.8*	47.2	*20.8*	52.7	*25.9*	58.3	*42.2*	61.5	*47.6*	59.5	*39.9*
Lac Qui Parle	64.4*	*18.9**	82.8	*32.6*	47.1*	*16.7**	47.6*	*14.4**	54.4*	*15.0**	88.7*	*16.9**	78.0*	*24.1**	129.7*	*7.9**
Lake	39.4*	*23.5**	34.3*	*19.0**	32.5*	*17.7**	41.1*	*18.5**	60.0*	*17.3**	35.1*	*22.0**	49.9	*32.8*	31.5*	*19.6**
Lake Of The Woods	78.2*	*22.1**	86.3*	*20.2**	144.2*	*17.1**	**	**	**	**	**	**	70.1*	*16.1**	**	**
Le Sueur	43.3	*40.2*	65.4	*34.4*	58.9	*39.3*	46.3	*36.9*	33.1	*31.2*	34.4	*22.5*	24.2	*22.4*	27.4	*18.0*
Lincoln	126.7*	*22.5**	62.2*	*19.1**	**	**	75.9*	*18.3**	66.2*	*11.8**	**	**	47.5*	*10.3**	**	**
Lyon	38.8	*32.7*	51.7	*22.6*	44.8	*20.8*	25.1*	*12.7**	71.3	*16.4*	20.5*	*10.2**	25.9*	*9.1**	22.3*	*6.7**
Mahnomen	56.8*	*18.2**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Marshall	27.5*	*11.0**	38.9*	*19.9**	44*	*13.4**	56.6*	*21.4**	43.1*	*13.6**	**	**	**	**	**	**
Martin	72.8	*49.5*	86.8	*40.3*	60.3	*46.2*	50.3	*36.9*	68.4	*46.6*	67.5	*44.2*	65.9	*44.0*	71.9	*45.1*
McLeod	39.4	*36.2*	47.7	*36.4*	44.7	*35.7*	44.6	*33.1*	42.6	*38.7*	41.0	*36.8*	29.5	*26.2*	34.2	*31.0*
Meeker	44.0	*32.6*	36.6	*28.7*	48.6	*32.5*	39.7	*28.5*	31.6	*23.1*	37.4	*23.8*	46.9	*31.8*	30.3	*20.9*
Mille Lacs	63.2	*55.7*	56.0	*49.6*	60.4	*46.8*	43.8	*37.5*	71.3	*44.5*	49.8	*38.6*	65.5	*51.2*	52.3	*44.4*
Morrison	43.1	*27.4*	48.6	*28.8*	50.4	*21.2*	32.4	*25.0*	34.5	*21.4*	23.2	*14.1*	47.1	*35.4*	35.8	*23.3*
Mower	31.1	*18.1*	45.1	*32.3*	22.4	*19.8*	29.9	*25.2*	54.6	*42.7*	53.4	*41.6*	62.3	*42.3*	52.1	*41.3*
Murray	32.5*	*10.8**	45.9*	*18.6**	40.4*	*12.7**	35.1*	*10.2**	34.8*	*13.3**	**	**	41.8*	*8.8**	138*	*8.7**
Nicollet	33.9	*34.6*	31.6	*32.7*	36.6	*33.8*	30.8	*26.5*	30.4	*23.7*	33.9	*29.8*	31.1	*29.9*	39.0	*32.0*
Nobles	26.1	*22.6*	42.2	*19.7*	31.9	*21.3*	29.7	*14.1*	22.9*	*12.1**	21.3*	*7.0**	27.4*	*7.5**	22*	*4.5**
Norman	58.2*	*15.8**	85.1*	*9.4**	62.7*	*14.8**	63.9*	*15.3**	**	**	56*	*15**	**	**	**	**
Olmsted	29.9	*31.6*	31.3	*32.9*	29.4	*30.6*	30.1	*31.7*	28.8	*29.7*	30.1	*30.7*	28.7	*29.2*	24.4	*23.9*
Otter Tail	18.4	*10.7*	44.0	*30.4*	32.8	*25.9*	38.7	*30.2*	35.6	*25.2*	30.8	*18.4*	30.9	*22.0*	23.4	*18.1*
Pennington	33.0	*27.2*	44.2*	*22.8**	35.2*	*19.4**	42.9	*27.0*	46.0*	*16.6**	36.2*	*13.2**	43.6*	*15.4**	45.4*	*15.7**
Pine	32.1	*25.5*	39.3	*36.4*	47.3	*38.3*	58.2	*45.7*	62.2	*41.0*	49.9	*40.3*	39.6	*31.9*	44.6	*34.9*
Pipestone	28.8*	*10.0**	100.6*	*11.4**	31.2*	*7.8**	60.4*	*14.1**	67.9*	*11.5**	**	**	78.1*	*7.9**	50.7*	*13.1**
Polk	33.0	*18.2*	37.6	*17.9*	32.2	*24.5*	38.2	*22.2*	31.5	*13.8*	29.5	*16.8*	40.2	*14.2*	19.8*	*5.8**
Pope	56.8*	*15.9**	39.1*	*23.8**	43.3*	*13.4**	25.0*	*9.3**	33.1*	*11.5**	57.9*	*12.3**	53.2*	*20.7**	73.5	*30.2*
Ramsey	42.2	*42.1*	39.6	*39.5*	34.0	*33.6*	32.8	*32.0*	31.9	*30.8*	29.4	*28.1*	26.7	*25.5*	25.3	*23.6*
Red Lake	**	**	79.6*	*35.4**	98.9*	*19.3**	143.5*	*23.3**	135*	*29.0**	**	**	**	**	**	**

	2000		2001		2002		2003		2004		2005		2006		2007	
	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*	Crude	*Adj*
Minnesota	**35.0**	***35.4***	**34.9**	***35.2***	**33.2**	***33.2***	**31.1**	***30.9***	**29.7**	***29.5***	**28.5**	***28.1***	**28.2**	***27.7***	**26.1**	***25.3***
Redwood	61.9	*42.7*	55.5	*33.5*	39.6	*18.8*	62.2	*33.2*	59.3	*34.3*	54.0	*38.4*	43.9	*18.0*	65.3	*32.0*
Renville	49.1	*26.3*	67.0	*47.9*	53.9	*44.7*	55.5	*38.4*	34.4	*31.3*	37.1	*26.5*	52.3	*35.8*	38.6	*28.8*
Rice	26.1	*26.3*	52.2	*43.6*	33.7	*27.1*	40.7	*39.4*	32.7	*26.9*	36.5	*36.1*	36.9	*35.2*	31.5	*26.3*
Rock	**	**	60.1*	*21.9**	46.0*	*15.9**	33.0*	*9.6**	**	**	61.8*	*10.7**	**	**	82.1*	*6.2**
Roseau	93.2	*60.6*	51.9	*34.5*	65.1	*40.5*	59.9	*41.0*	22.9*	*18.4**	35.0	*22.3*	46.4*	*13.2**	25.5*	*5.9**
Scott	29.1	*42.1*	31.1	*45.6*	32.8	*49.2*	24.1	*35.9*	23.6	*35.4*	21.3	*29.9*	18.7	*25.3*	16.9	*23.7*
Sherburne	19.1	*23.5*	28.8	*35.3*	30.2	*37.7*	28.6	*36.2*	26.2	*32.5*	25.4	*30.5*	23.9	*28.7*	24.5	*29.0*
Sibley	44.4	*33.3*	44.9	*28.7*	66.5	*30.9*	57.9	*40.1*	54.0	*28.1*	47.6	*30.9*	35.9	*27.9*	41.3	*31.0*
Stearns	37.3	*38.3*	34.3	*35.1*	32.7	*33.2*	24.8	*25.0*	28.7	*28.5*	21.7	*21.1*	26.2	*25.5*	24.3	*23.2*
Steele	51.1	*48.8*	61.8	*50.2*	65.9	*53.1*	48.5	*39.4*	56.3	*46.2*	35.3	*27.9*	25.4	*24.1*	34.6	*27.3*
Stevens	95.0	*41.0*	94.8	*32.4*	85.1	*55.7*	79.5	*36.0*	50.5*	*25.0**	33.0*	*9.3**	64.0*	*31.3**	51.6*	*21.2**
St. Louis	45.7	*40.7*	46.5	*41.1*	46.3	*41.0*	43.5	*37.6*	41.0	*35.7*	44.9	*38.8*	41.8	*36.6*	40.7	*34.9*
Swift	80.2	*34.4*	50.1	*37.2*	80.0	*28.7*	54.2	*24.1*	48.7*	*20.6**	78.0*	*21.7**	65.0	*39.9*	41.3*	*18.6**
Todd	24.9	*19.5*	37.7	*29.1*	48.0	*30.7*	30.5	*15.6*	21.4	*13.4*	24.3	*16.5*	21.6	*13.5*	46.1	*23.9*
Traverse	**	**	86.7*	*39.4**	74.0*	*19.1**	105.3*	*33.8**	98.5*	*13.3**	**	**	74.8*	*18.2**	**	**
Wabasha	25.9	*17.1*	28.0	*22.7*	43.3	*18.9*	39.4	*30.6*	31.0	*27.9*	61.0	*41.3*	49.3	*41.7*	38.7	*32.1*
Wadena	60.1	*33.5*	63.7	*41.0*	128.6	*31.8*	56.8	*33.7*	59.5	*23.2*	39.8*	*12.6**	36.2	*29.0*	40.0*	*20.4**
Waseca	55.0	*43.3*	46.7	*38.4*	46.7	*29.6*	36.9	*35.8*	29.5	*21.7*	51.6	*32.6*	49.1	*39.8*	42.3	*30.8*
Washington	27.3	*38.2*	29.8	*40.3*	28.2	*40.4*	25.3	*34.8*	25.1	*33.7*	23.5	*30.5*	23.3	*31.5*	22.5	*29.3*
Watonwan	54.4	*31.5*	72.7	*40.1*	52.0	*36.2*	53.7	*37.9*	107.3	*49.3*	75.7	*41.7*	63.6	*38.7*	49.7	*24.6*
Wilkin	68.6*	*32.0**	91.3*	*37.8**	68.4*	*42.4**	55.3*	*27.0**	45.6*	*32.6**	79.6*	*39.3**	70.6*	*26.0**	67.6*	*26.8**
Winona	39.2	*34.9*	39.9	*34.6*	27.8	*23.9*	32.0	*25.3*	26.1	*23.1*	24.8	*14.8*	38.1	*18.3*	29.1	*21.8*
Wright	40.7	*48.1*	35.7	*43.0*	33.3	*40.1*	32.9	*39.8*	29.4	*34.5*	30.8	*36.8*	33.8	*33.9*	28.6	*32.3*
Yellow Medicine	62.9	*31.4*	64.3	*36.8*	68.0	*31.3*	32.2*	*16.7**	34.8*	*17.6**	54.0	*26.3*	42.0*	*24.6**	43.8*	*26.9**

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Table 17 shows crude and age-adjusted heart attack hospitalization rates among adults age 35 and older for all Minnesota and for each county, aggregated from 2000-2007. Aggregating data over several years increases the number of counts which increases the stability of the rate, but hides trends over time. Ninety-five percent confidence intervals around the rates are shown in parentheses. The confidence interval is a measure of reliability. It is the interval within which the true value of the rate would be expected to fall 95 times out of 100. Counties with rates based on counts ≤ 20 are marked with an asterisk. Some rates are suppressed to prevent back-calculation of suppressed annual counts, and are marked with two asterisks. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low.

Table 17: *Annual crude and age-adjusted heart attack hospitalization rates per 10,000 adults age 35 and older by county, aggregated from 2000 to 2007.*

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Minnesota	**30.7**	**(30.5-31.0)**	**30.5**	**(30.3-30.7)**
Aitkin	65.0	(59.5-70.6)	49.6	(45.2-54.0)
Anoka	28.7	(27.7-29.6)	37.4	(36.1-38.7)
Becker	32.1	(29.1-35.1)	27.2	(24.7-29.8)
Beltrami	30.1	(27.4-32.9)	28	(25.4-30.5)
Benton	39.6	(36.2-42.9)	39.8	(36.4-43.2)
Big Stone	**	(**-**)	**	(**-**)
Blue Earth	35.0	(32.4-37.5)	31.8	(29.4-34.2)
Brown	47.1	(43.2-51.0)	38.4	(35.2-41.7)
Carlton	48.8	(45.2-52.4)	44.7	(41.4-48.0)
Carver	22.0	(20.4-23.7)	29	(26.8-31.3)
Cass	47.6	(43.9-51.4)	40.7	(37.4-43.9)
Chippewa	32.2	(27.7-36.8)	23.9	(20.4-27.4)
Chisago	39.1	(36.2-42.0)	43.6	(40.4-46.9)
Clay	1.2	(0.8-1.8)	1.1	(0.7-1.7)
Clearwater	23.8	(19.1-29.3)	18.3	(14.6-22.7)
Cook	13.3	(9.3-18.4)	11.9	(8.3-16.5)
Cottonwood	20.3	(16.5-24.0)	12.8	(10.3-15.3)
Crow Wing	55.9	(53.0-58.8)	47.3	(44.8-49.7)
Dakota	24.4	(23.6-25.2)	32.1	(31.0-33.2)
Dodge	38.2	(33.8-42.6)	38.6	(34.1-43.1)
Douglas	28.8	(26.1-31.4)	22.8	(20.6-25.0)
Faribault	43.2	(38.5-47.8)	32.8	(29.1-36.5)
Fillmore	31.1	(27.6-34.6)	24.3	(21.5-27.2)
Freeborn	27.6	(25.0-30.3)	23.4	(21.1-25.7)
Goodhue	34.2	(31.6-36.7)	30.4	(28.1-32.7)
Grant	54.3	(45.9-62.6)	34.3	(28.7-40.0)
Hennepin	27.9	(27.5-28.4)	29.6	(29.1-30.1)
Houston	3.5	(2.4-4.9)	3.2	(2.2-4.6)
Hubbard	25.1	(21.8-28.4)	20.7	(17.9-23.4)
Isanti	26.4	(23.8-29.1)	28.6	(25.7-31.6)
Itasca	51.1	(48.0-54.2)	44.1	(41.4-46.8)
Jackson	**	(**-**)	**	(**-**)
Kanabec	49.6	(44.3-54.9)	47	(42.0-52.1)
Kandiyohi	26.8	(24.4-29.2)	23.2	(21.1-25.3)
Kittson	9.7	(6.2-14.5)	7.2	(4.6-10.9)

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Koochiching	40.5	(35.7-45.3)	33.4	(29.4-37.4)
Lac Qui Parle	30.1	(24.6-35.5)	18.2	(14.7-21.7)
Lake	26.6	(22.3-30.9)	21.3	(17.8-24.8)
Lake Of The Woods	16.7	(11.7-23.1)	12.8	(8.9-17.7)
Le Sueur	32.7	(29.4-36.0)	30.4	(27.3-33.5)
Lincoln	21.8	(16.9-27.8)	12.8	(9.6-16.6)
Lyon	21.3	(18.5-24.2)	16.4	(14.1-18.7)
Mahnomen	**	(**-**)	**	(**-**)
Marshall	13.6	(10.5-17.4)	10.8	(8.3-13.9)
Martin	60.0	(55.3-64.8)	44.2	(40.5-47.9)
McLeod	37.9	(34.8-41.0)	34.2	(31.4-37.1)
Meeker	32.7	(29.1-36.2)	27.6	(24.6-30.7)
Mille Lacs	52.7	(48.3-57.1)	45.9	(42.0-49.8)
Morrison	28.9	(26.0-31.7)	24.6	(22.2-27.0)
Mower	41.3	(38.3-44.4)	33	(30.4-35.5)
Murray	**	(**-**)	**	(**-**)
Nicollet	30.6	(27.5-33.8)	30.4	(27.3-33.6)
Nobles	17.6	(14.9-20.4)	13.8	(11.5-16.0)
Norman	16.5	(12.4-21.4)	10.6	(7.9-13.8)
Olmsted	29.0	(27.6-30.5)	29.9	(28.4-31.4)
Otter Tail	29.1	(27.0-31.1)	22.5	(20.9-24.2)
Pennington	23.9	(19.9-27.9)	19.6	(16.3-23.0)
Pine	40.2	(36.7-43.8)	36.8	(33.5-40.1)
Pipestone	**	(**-**)	**	(**-**)
Polk	22.6	(20.0-25.1)	16.7	(14.8-18.6)
Pope	24.5	(20.3-28.7)	17	(14.0-20.0)
Ramsey	32.6	(31.9-33.4)	31.7	(30.9-32.4)
Red Lake	**	(**-**)	**	(**-**)
Redwood	40.9	(36.3-45.4)	31.4	(27.7-35.0)
Renville	42.4	(37.8-47.1)	34.9	(31.0-38.9)
Rice	33.5	(31.2-35.9)	32.6	(30.2-34.9)
Rock	15.0	(11.6-19.1)	9.6	(7.4-12.4)
Roseau	30.9	(26.8-35.1)	29.8	(25.7-33.9)
Scott	24.1	(22.6-25.6)	34.9	(32.6-37.2)
Sherburne	25.8	(23.9-27.7)	31.7	(29.2-34.1)
Sibley	36.1	(31.5-40.7)	31.6	(27.5-35.7)
Stearns	28.5	(27.1-30.0)	28.3	(26.9-29.7)
Steele	41.7	(38.4-45.0)	39.3	(36.2-42.5)
Stevens	43.5	(36.9-50.1)	31.3	(26.4-36.3)
St. Louis	43.8	(42.4-45.2)	38.1	(36.9-39.3)
Swift	36.9	(31.7-42.1)	28	(23.9-32.1)
Todd	24.0	(21.1-27.0)	20.3	(17.8-22.8)
Traverse	29.8	(22.6-38.6)	19.3	(14.2-25.8)
Wabasha	32.6	(29.0-36.2)	29	(25.7-32.2)
Wadena	38.2	(33.3-43.1)	27.9	(24.2-31.6)
Waseca	37.1	(32.9-41.2)	33.9	(30.0-37.7)
Washington	25.5	(24.5-26.6)	34.4	(33.0-35.9)
Watonwan	49.4	(43.3-55.5)	37.7	(32.8-42.5)
Wilkin	39.2	(32.2-46.2)	32.9	(26.8-38.9)

	Crude Rate	95% Confidence Interval	Age-Adjusted Rate	95% Confidence Interval
Winona	28.7	(26.3-31.1)	24.5	(22.4-26.6)
Wright	32.2	(30.4-33.9)	38.3	(36.1-40.4)
Yellow Medicine	35.2	(30.0-40.4)	26.5	(22.3-30.7)

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Figure 14: *Age-adjusted heart attack hospitalization rates per 10,000 adults age 35 and over, Minnesota, aggregated from 2000 to 2007.*

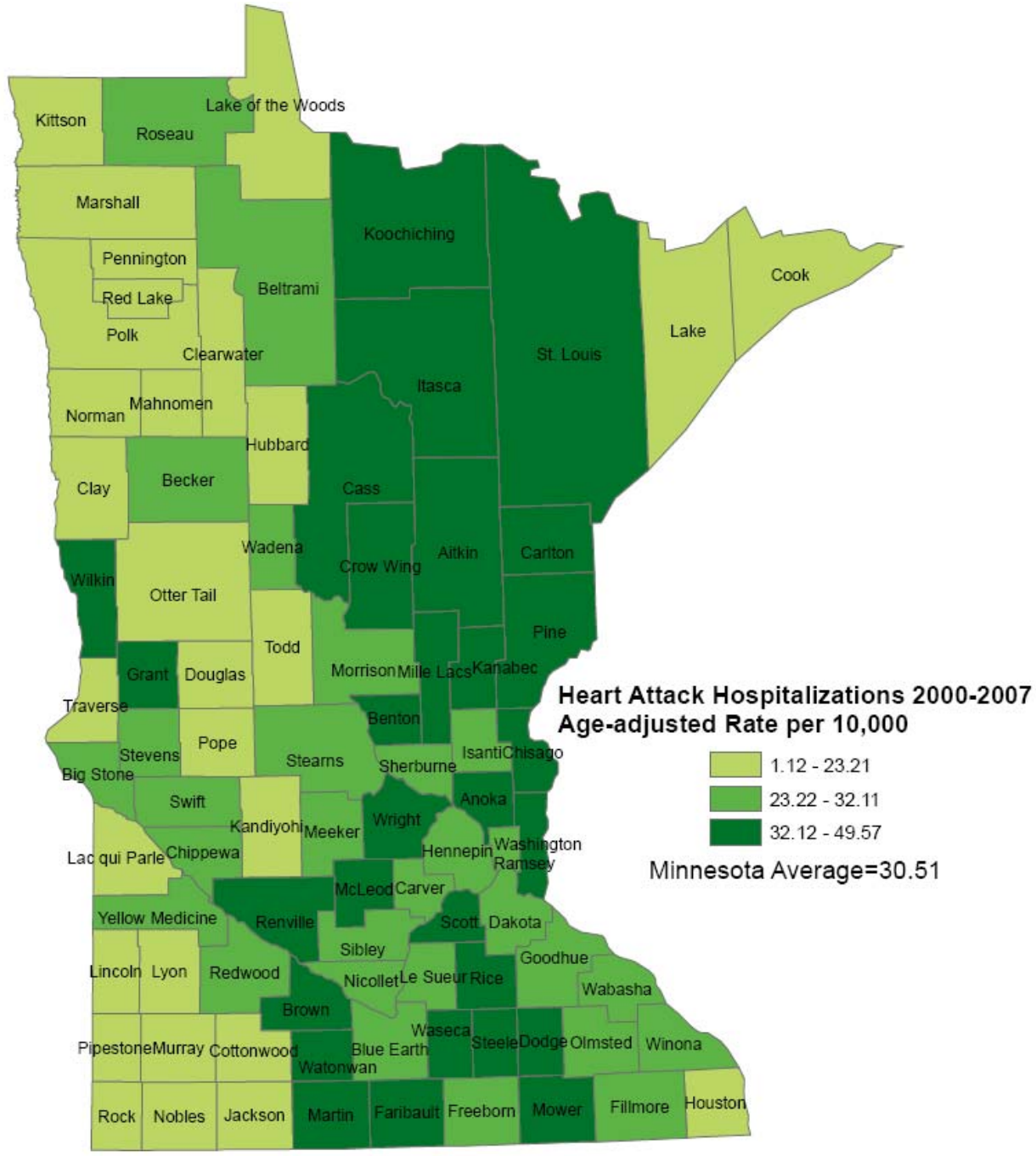


Figure 14 shows a map of age-adjusted heart attack hospitalization rates, aggregated from 2000-2007. Rates are classified into three categories or quantiles. Rates for counties in which residents are likely to visit out-of-state hospitals for care may be artificially low. The overall state aggregated rate is 30.97.

Figure 15 shows heart attack hospitalization rates in Minnesota for six age categories (age-specific categories), aggregated from 2000-2007. The rate of heart attacks increase dramatically as age increases. Heart attacks are very rare under age 35. The highest rates are seen among adults age 85 and older.

Figure 15: *Age-specific heart attack hospitalization rates per 10,000, Minnesota, aggregated from 2000 to 2007.*

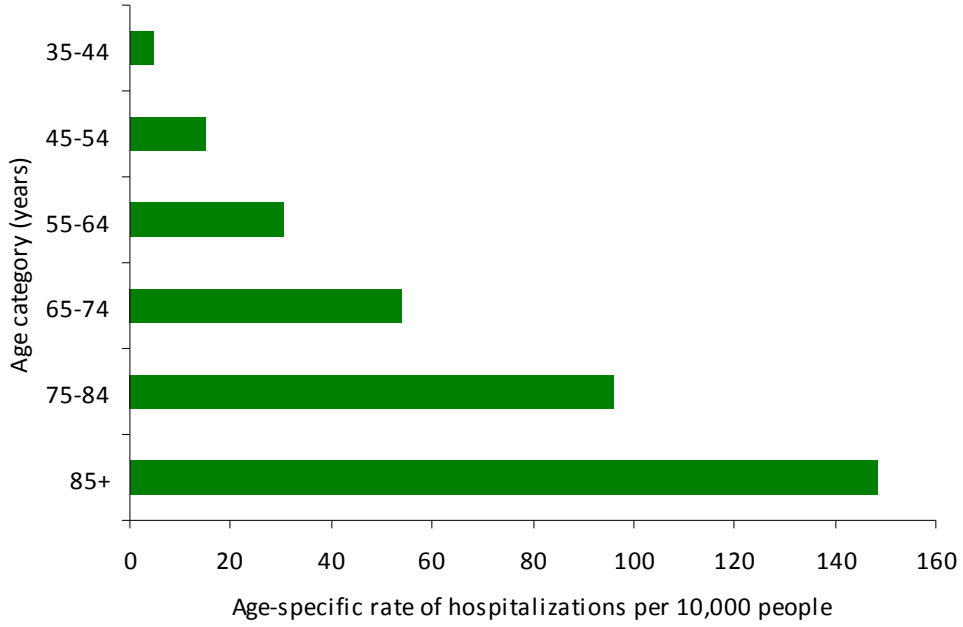


Table 18 and Figure 16 show age-specific heart attack hospitalization rates for Minnesota for years 2000-2007. In younger age groups, heart attacks are rare and rates have remained stable over time. Rates increase as age increases. Older age groups have seen declines in heart attack hospitalization rates over time, with the most dramatic decreases in the oldest age groups.

Table 18: *Annual age-specific heart attack hospitalization rates per 10,000 adults age 35 and older, Minnesota, 2000-2007.*

	35-44	45-54	55-64	65-74	75-84	85+
2000	4.8	16.6	36.6	65.6	113.8	157.9
2001	4.5	17.5	35.4	63.5	109.9	175.1
2002	4.9	16.5	33.7	59.9	101.1	165.0
2003	4.7	14.7	30.6	53.4	99.5	155.6
2004	4.6	14.3	29.2	50.8	95.6	143.8
2005	4.9	14.2	27.9	47.0	90.3	136.0
2006	5.4	14.1	28.4	48.6	82.6	127.8
2007	4.4	13.5	24.9	42.5	76.0	132.0

Figure 16: *Annual age-specific heart attack hospitalization rates per 10,000 adults age 35 and older, Minnesota, 2000-2007.*

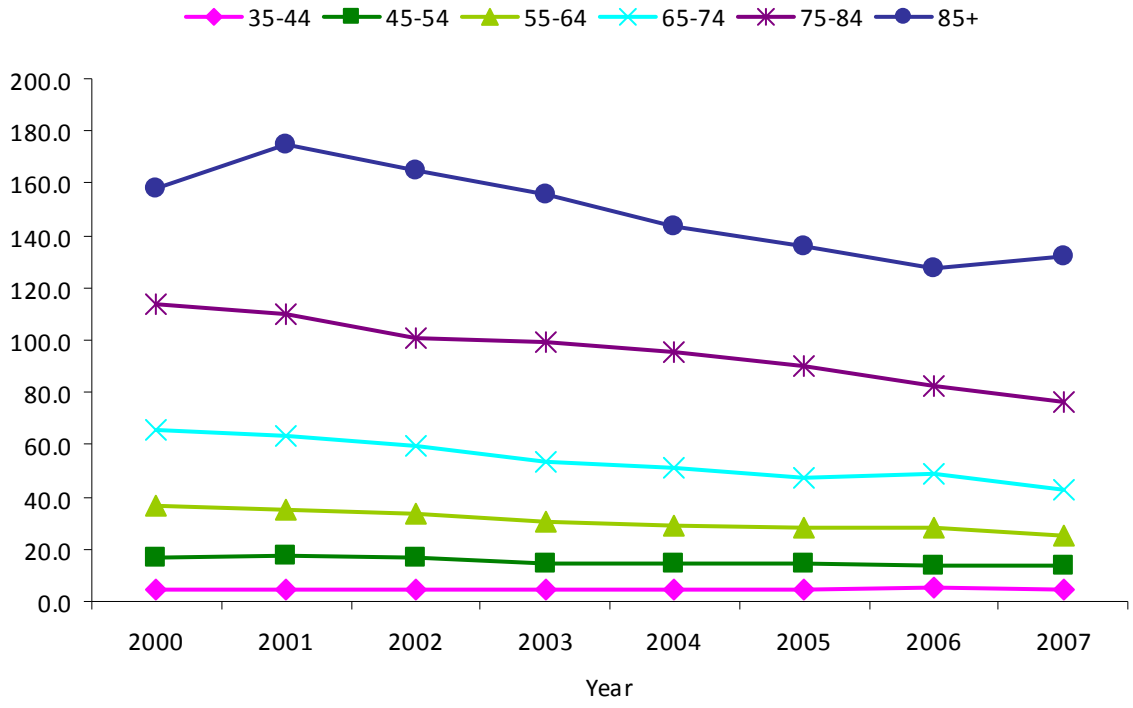


Table 19 shows age-specific heart attack hospitalization rates for all Minnesota and for each county, aggregated from 2000-2007. Rates based on counts ≤ 20 are marked with one asterisk. Some rates are suppressed to prevent back-calculation of suppressed annual counts, and are marked with two asterisks. Minnesota counties display the same pattern as the state, with rates increasing with increasing age.

Table 19: *Annual age-specific heart attack hospitalization rates per 10,000 by county, aggregated from 2000 to 2007.*

	0-34	35 -44	45-54	55-64	65-74	75-84	85+
Minnesota	**0.2**	**4.8**	**15.4**	**31**	**54.7**	**97.3**	**150.2**
Aitkin	0.2*	9.3*	28.7	52.7	77.9	147.9	244.9
Anoka	0.3	5.5	18.1	36.2	63.5	122.3	183.9
Becker	0.3*	4.3*	13.6	31.2	44.1	107.9	183.6
Beltrami	0.3*	5.1	15.1	40.1	56.0	93.8	167.6
Benton	0.1*	7.3	20.8	40.5	75.3	115.3	176.6
Big Stone	**	**	**	**	**	**	**
Blue Earth	0.2*	3.2*	18.8	42.2	55.0	91.0	115.3
Brown	0.2*	4.8*	22.2	43.0	64.2	113.6	179.4
Carlton	0.4*	6.1	21.6	45.8	85.8	144.6	189.9
Carver	0.2*	3.6	13.6	27.4	48.4	97.8	152.2
Cass	0.4*	7.6	25.4	34.2	79.4	115.5	250.5
Chippewa	0.0*	1.5*	13.6	23.7	44.2	77.3	116.2
Chisago	0.5*	6.6	25.2	49.2	78.9	119.3	189.3
Clay	0.0*	1.3*	4.6	12.4	22.5	29.6	75.0
Clearwater	0.0*	3.5*	11.5*	33.2	46.0	50.0*	136.6
Cook	0.0*	1.7*	5.2*	6.5*	38.3*	29.3*	47.6*
Cottonwood	0.0*	0.9*	6.0*	7.7*	16.9*	52.2	94.7
Crow Wing	0.2*	8.7	25.5	42.7	77.8	146.0	256.7
Dakota	0.2	4.1	13.6	29.6	53.9	104.3	194
Dodge	0.1*	6.7*	17.0	37.9	79.5	113.2	170.5
Douglas	0.2*	2.5*	11.5	24.2	44.3	66.6	111.6
Faribault	0.0*	6.4*	19.7	38.4	49.6	108.2	108.2
Fillmore	0.4*	5.4*	12.4	24.3	43.8	71.8	114
Freeborn	0.1*	7.5	16.1	27.1	40.5	58.8	63.7
Goodhue	0.3*	4.3	17.8	31.6	50.3	91.7	149.9
Grant	0.0*	6.4*	13.0*	22.6*	52.5	135.5	238
Hennepin	0.3	4.6	14.3	28.5	53.1	94.5	144.4
Houston	0.0*	0.0*	3.2*	5.7*	6.8*	6.4*	0*
Hubbard	0.0*	2.1*	13.6	21.0	42.6	79.0	98.0
Isanti	0.1*	4.1*	13.5	27.1	53.9	92.0	125.7
Itasca	0.2*	7.6	23.5	45.1	78.8	134.4	207.9
Jackson	**	**	**	**	**	**	**
Kanabec	1.0*	11.8	24.6	47.1	78.9	126.6	249.3
Kandiyohi	0.1*	2.3*	9.9	28.2	47.3	72.1	94.8
Kittson	0.0*	0.0*	8.0*	13.2*	21.1*	29.3*	26.6*
Koochiching	0.0*	5.3*	16.9	34.1	53.5	96.6	204.9
Lac Qui Parle	0.0*	0.0*	6.1*	14.3*	23*	83.4	142.4
Lake	0.6*	1.7*	14.1*	17.3*	36.4	69.5	112.3
Lake Of The Woods	0.0*	0.0*	6.7*	21.1*	21.0*	48.4*	154.8*
Le Sueur	0.1*	3.4*	13.2	23.4	68.8	91.5	162.1
Lincoln	0.0*	3.2*	1.5*	5.7*	23.5*	53.3	94.5
Lyon	0.0*	2.3*	5.2*	10.4*	21.7	68.6	128.5
Mahnomen	0.5*	3.9*	14.9*	15.1*	29.6*	55.6*	47.0*
Marshall	0.0*	4.7*	9.8*	18.9*	31.5	58.9	120
Martin	0.3*	8.7*	23.5	37.5	65.7	155.3	243.5

	0-34	35 -44	45-54	55-64	65-74	75-84	85+
Minnesota	**0.2**	**4.8**	**15.4**	**31**	**54.7**	**97.3**	**150.2**
McLeod	0.1*	5.6	18.5	29.7	64.1	108.3	165.6
Meeker	0.1*	5.5*	13.9	28.4	49.1	82.1	132.6
Mille Lacs	0.2*	10.4	28.7	42.6	76.7	135.3	211.5
Morrison	0.0*	1.4*	10.1	19.2	55.4	78.6	141.9
Mower	0.1*	7.0	19.0	40.8	54.4	95.3	119.4
Murray	**	**	**	**	**	**	**
Nicollet	0.2*	4.4*	17.5	29.4	41.9	102.4	167.0
Nobles	0.0*	2.3*	5.7*	14.9	23.4	37.5	89.5
Norman	**	**	**	**	**	**	**
Olmsted	0.2*	5.1	13.4	33.5	48.5	87.2	166.9
Otter Tail	0.2*	3.8	11.4	26.8	44.2	86.7	128.0
Pennington	0.0*	3.5*	12.8*	24	41.6	72.6	109.0
Pine	0.3*	4.0*	22.7	45.9	67.9	110.6	114.8
Pipestone	**	**	**	**	**	**	**
Polk	0.1*	2.4*	12.2	19.9	44.4	90.2	134.3
Pope	0.0*	0.0*	6.0*	18.2*	29.6	62.0	102.7
Ramsey	0.2	5	15.9	32.6	58.2	95.6	147.4
Red Lake	0.0*	0.0*	5.9*	27.7*	21.2*	62.6*	202.4
Redwood	0.2*	3.6*	14.3	35.6	66.9	95.3	117.3
Renville	0.0*	14.0	21.1	34.9	57.7	97.7	115.1
Rice	0.1*	5.8	16.0	33.1	52.4	100.7	177.3
Rock	0.0*	0.0*	2.8*	3.8*	13.1*	47.4	80.8
Roseau	0.3*	3.4*	14.0	29.3	63.4	135.7	181.0
Scott	0.3*	4.3	17.7	31.2	60.3	111.1	188.9
Sherburne	0.3*	5.9	18.1	38.9	52.8	90.0	119.0
Sibley	0.0*	7.8*	16.2	32.2	50.9	109.0	111.7
Stearns	0.2*	5.2	13.2	27.5	47.2	89.6	150.8
Steele	0.4*	6.3	21.1	42.8	67.5	113.7	193.2
Stevens	0.0*	3.4*	11.8*	31.5	53	118.2	173.1
St. Louis	0.3*	7.0	22.0	38.2	70.1	117.0	148.3
Swift	0.5*	3.5*	15.5*	26.3	31.4	106.7	161.4
Todd	0.1*	1.6*	10.1	21	33.1	62.2	133.1
Traverse	**	**	**	**	**	**	**
Wabasha	0.0*	5.4*	17.3	35.5	44.8	75.2	141.6
Wadena	0.4*	4.5*	9.6*	30.5	58.4	96.4	131.0
Waseca	0.5*	6.8*	11.2	31.6	61.5	118	170.7
Washington	0.1*	3.9	11.9	29.2	56.3	123.3	224.1
Watonwan	0.0*	3.5*	20.0	41.5	64.7	118.6	180.4
Wilkin	0.0*	4.9*	16.9*	24.4*	74.9	113.2	228.4
Winona	0.1*	4.7	10.5	17.8	44.3	78.2	157.5
Wright	0.2*	5.1	18.5	35.0	62.8	128.4	205.9
Yellow Medicine	0.0*	9.9*	9.7*	31.6	44.0	63.9	138.0

* Rate based on counts ≤ 20 and should be interpreted with caution; the rate may be unstable because it can change dramatically with the addition or subtraction of one case.

** MN EPHT suppresses rates based on counts ≤ 5 to protect an individual's privacy.

Strengths and Limitations of Data Source and Measures

Hospital discharge data offer several strengths or advantages as a data source for tracking health outcomes. Discharge data systems typically include all patient and payer encounter records from all acute-care hospitals in a state. For example, in Minnesota 95% of all hospitals in the state report hospital discharge data to the MHA, representing 97% of all licensed beds in the state. Additionally, data are usually available for multiple years and can be used in time trend analyses. Because hospital discharge data are based on the national billing standard (Uniform Bill-02), core data formats and data elements are similar across providers and states. Since discharge data are routinely collected and computerized for billing purposes, discharge databases are generally readily available at minimal cost for research and surveillance purposes and offer an important resource for monitoring conditions in which hospitalizations are an important health indicator.

Hospitalization discharge data also have some limitations as an environmental public health tracking data source, including problems with data quality, excluded populations and missing data elements.[23] Although all states use a standard billing format, there are variations in data across time and space due to differences or changes in diagnostic techniques and criteria, or variation in provider coding practices. Hospital discharge data only capture events that are serious enough to result in a hospitalization. Individuals who receive care at home, as an outpatient, in an emergency room, or in a federal or sovereign hospital (e.g., Veteran's Administration, Indian Health Service), will not be included. Although Minnesota has data-sharing agreements with North Dakota, South Dakota and Iowa, EPHT hospitalization measures exclude Minnesota residents who are hospitalized outside the state. However, if MN EPHT were to begin producing hospitalization measures including out-of-state admissions, counties bordering Wisconsin may be underestimated because of the lack of data-sharing agreements between Minnesota and Wisconsin.

Another limitation of the hospital discharge data is the lack of some patient information that would be useful for environmental public health tracking. Minnesota data is missing information on patient race/ethnicity that would allow for examination of disparities in health status. Hospital discharge data from all states does not contain information on sociodemographic characteristics or non-environmental/behavioral factors (such as smoking history) which represent significant risk factors for asthma, heart attack or COPD hospitalization and would have a much greater impact than environmental factors (such as outdoor air pollutants) on hospitalization rates.

To protect patient privacy, Minnesota hospital discharge data is not received by MDH with identifying information such as name or address. Minnesota hospital discharge data does contain patient residential zip code, but this may or may not be the location where the health event occurred. MDH uses zip code to assign a county in order to generate counts and rates by county. Rates at the state and/or county level may not be geographically resolved enough to be linked with many types of environmental data. Census data, available every 10 years, and post-censal estimates are used when calculating rates by state and county each year. Census data by zip code is only available every 10 years.

Acronyms

AMI	Acute Myocardial Infarction
AQI	Air Quality Index
BMI	Body Mass Index
BRFSS	Behavior Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CLRD	Chronic Lower Respiratory Disease
COPD	Chronic Obstructive Pulmonary Disease
EPHT	Environmental Public Health Tracking
HDL	High Density Lipoprotein
ICD-9	International Classification of Disease, 9th Revision
ICD-9-CM	International Classification of Disease, 9th Revision, Clinical Modification
MDH	Minnesota Department of Health
MHA	Minnesota Hospital Association
MN EPHT	Minnesota Environmental Public Health Tracking
MPCA	Minnesota Pollution Control Agency
NCDM	Nationally Consistent Data and Measures

Glossary

Acute Myocardial Infarction (AMI): see heart attack

Age-adjusted rate: a measure of some event, disease, or condition with some specification of time with age adjustment, used to compare risks of two or more age categories of the population; age-adjusted rates are typically presented per 100,000 people and calculated by a direct method using a standard age distribution (typically the 2000 U.S. population in MN EPHT materials); an age-adjusted rate is a weighted average of the age-specific rates for an age group

Age-specific rate: a measure of some event, disease, or condition with some specification of time within an age category; similar to a crude rate but is calculated within an age category (e.g. an age-specific rate of asthma hospitalizations in adults 35 to 44 years of age)

Air Quality Index (AQI): an index for reporting daily air quality, ranging from 0 to 500, focusing on how clean or polluted the air is and the health effects that might result within a few hours or days after breathing; EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act (ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide)

Alveoli: tiny air sacs needed for gas exchange in the lungs, located at the end of the airways or bronchial tubes

Asthma: a disease that affects the lungs; asthma causes repeated episodes of wheezing, breathlessness, chest tightness, and nighttime or early morning coughing; the most common long-term disease of children but also occurs in adults; can be controlled by taking medicine and avoiding the triggers that cause an attack, including triggers in the environment

Asthma attack (asthma episode): an asthma attack is sometimes called an "episode"; children and adults that have asthma have it all the time but only have an asthma attack when something bothers the lungs; an asthma attack happens in the body's airways, which carry air to the lungs; during an asthma attack, the sides of the airways in the lungs swell and the airways shrink, allowing less air in and out of the lungs, with excess mucus production clogging up the airways even more; an attack may include coughing, chest tightness, wheezing, and trouble breathing

BMI: body mass index, a number calculated from a person's weight and height; provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems. More information about BMI, including a BMI calculator, can be found at the CDC web site: http://www.cdc.gov/healthyweight/assessing/bmi/

CDC: the Centers for Disease Control and Prevention, a part of the U.S. Department of Health and Human Services, is the nation's public health agency that works to ensure health protection through promotion, prevention, and preparedness

Chronic bronchitis: chronic inflammation of the large airways

Chronic lower respiratory disease (CLRD): includes chronic bronchitis, emphysema, asthma, and other chronic lower respiratory diseases

Chronic obstructive pulmonary disease (COPD): a group of diseases that cause airflow blockage and breathing-related problems; includes emphysema, chronic bronchitis, and in some cases asthma

Crude rate: a measure of some event, disease, or condition in relation to a unit of population, along with some specification of time without respect to age category, often presented per 1,000, per 10,000 or per 100,000 people

Duplicate: a repeated record for the admission of a hospital patient

Emphysema: one of the group of diseases called COPD that cause airflow blockage and breathing-related problems, emphysema involves the abnormal enlargement of the air sacs

Environmental Public Health Tracking (EPHT): the ongoing collection, integration, analysis, interpretation, and dissemination of data from environmental hazard monitoring, and from human exposure and health effects surveillance

Environmental tobacco smoke: also known as secondhand smoke; includes smoke from burning cigarettes, cigars, or pipes and exhaled mainstream smoke; contains at least 250 chemicals known to be toxic and more than 50 possible carcinogens

Healthy People 2010: launched by the Department of Health and Human Services in January 2000 as a comprehensive, nationwide health promotion and disease prevention agenda; contains 467 objectives within 28 focus areas designed to serve as a framework for improving the health of all people in the U.S. during the first decade of the 21st century

Heart Attack: acute myocardial infarction; usually an acute event that is mainly caused by a blockage that prevents flowing of blood to the heart, often caused by a build-up of fatty deposits on the inner walls of the blood vessels that supply blood to the heart

HDL: high density lipoprotein, or "good" cholesterol

Hospitalization: a subject is admitted to a hospital for treatment of a disease or condition

Incidence: the number of new cases of a condition, symptom, death, or injury that arise during a specific period of time, often expressed as a percentage of a population; shows the likelihood that a person in that population will be affected by the condition

International Classification of Disease 9th Revision, Clinical Modification (ICD-9-CM): an extension of ICD-9, an international classification of diseases designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics; the Clinical Modification was created by the National Center for Health Statistics as the official system of assigning codes to diagnoses and procedures associated with hospital utilization in the U.S., and is updated annually

Measure: for tracking, a measure is a specific way to calculate a value from the data describing population health, hazard or exposure; measures should be clearly and uniquely defined such that, given the appropriate data, the value of the measure could be calculated in a consistent fashion (like a statistic)

Minnesota Department of Health (MDH): an organization focusing on protecting, maintaining and improving the health of all Minnesotans; consists of seven major divisions, including Community and Family Health, Compliance Monitoring, Environmental Health, Health Policy, Health Promotion and Chronic Disease, Infectious Disease Epidemiology Prevention and Control, and Public Health Laboratory

Minnesota Environmental Public Health Tracking Program (MN EPHT): As defined in Minnesota Statutes, section 144.995, a state program for the ongoing collection, integration, interpretation, and dissemination of environmental hazard, exposure, and health effects data. MN EPHT produces a network or system of integrated data in the state about environmental hazards, population exposure, and health outcomes; MN EPHT works in partnership with other states as part of CDC's National Environmental Public Health Tracking Network (Tracking Network)

Minnesota Hospitalization Association (MHA): an organization representing 147 hospitals in Minnesota that works to develop, promote, and implement progressive health policy in the state and nation that benefits hospitals' employees, patients and communities; provides data resources for members, policy-makers, researchers and others

Minnesota Pollution Control Agency (MPCA): monitors environmental quality, offers technical and financial assistance, and enforces environmental regulations to continue moving Minnesota toward environmental excellence, consists of offices in eight cities across Minnesota

National Environmental Public Health Tracking Network (Tracking Network): a web-based, secure network of standardized health and environmental data; the Tracking Network is a product of CDC's National Environmental Public Tracking Program, drawing data and information from state and local tracking networks as well as national-level and other data systems; it provides the means to identify, access, and organize hazard, exposure, and health data from these various sources and to examine and analyze those data on the basis of their spatial and temporal characteristics: (http://ephtracking.cdc.gov/)

Nationally Consistent Data and Measures (NCDM): adaptation of a single set of national standards for data collection, analysis and reporting to enable CDC to compile a core set of nationally consistent data and measures across multiple states

Ozone: a gas made up of three atoms of oxygen with a strong odor. Ozone found many miles above the earth's surface (stratospheric ozone) provides a natural shield from UV rays. Ground-level ozone (tropospheric ozone) is a pollutant with a significant health risk and a main ingredient of urban smog

Particulate matter: also known as particle pollution or PM, a complex mixture of extremely small particles and liquid droplets; the EPA groups particle pollution into "inhalable coarse particles," larger than 2.5 micrometers and smaller than 10 micrometers in diameter, and "fine particles," 2.5 micrometers in diameter and smaller

Prevalence: the number of new and pre-existing cases of a condition, symptom, death, or injury among persons alive on a certain date; a function of both the incidence of the condition and survival

Socioeconomic status: descriptive term for a person's position in society; can be expressed using such criteria as income, educational level attained, occupation, etc.

Sociodemographic characteristics: a group of social and demographic characteristics of an individual; often includes race, ethnicity, age, gender, occupation, etc.

Transfer: the movement of a patient from one hospital to another

Sources:
Health, U.S. 2008 Appendix II: Definitions and Methods
Last, John M. 2001. *A Dictionary of Epidemiology 4th ed.* Oxford: Oxford University Press.
SEER: http://seer.cancer.gov
AIRNow: http://airnow.gov
NIH: http://www.nhlbi.nih.gov and http://www.nlm.nih.gov
EPA: http://www.epa.gov
NCI: http://srab.cancer.gov
MHA: http://www.mnhospitals.org

Respiratory Disease and Heart Attack Resources

Minnesota Environmental Public Health Tracking
http://www.health.state.mn.us/tracking

Minnesota Department of Health, Asthma Program
http://www.health.state.mn.us/asthma

Minnesota Department of Health, Heart Disease and Stroke Prevention Unit
http://www.health.state.mn.us/cvh

The Minnesota Department of Health does not necessarily endorse any opinion, report, product or service described in the following external Web sites.

National Environmental Public Health Tracking Network
http://ephtracking.cdc.gov

CDC Asthma
http://www.cdc.gov/asthma

CDC Heart Disease
http://www.cdc.gov/heartdisease/index.htm
http://www.cdc.gov/dhdsp

American Lung Association
http://www.lungusa.org

American Lung Association of Minnesota
http://alamn.org

American Heart Association
http://www.americanheart.org

National Heart Lung and Blood Institute
http://www.nhlbi.nih.gov

Minnesota Pollution Control Agency, Air Quality Index
http://aqi.pca.state.mn.us

Bibliography

1. U.S. Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health, 2nd ed.* Washington, DC: U.S. Government Printing Office; November 2000.

2. CDC. Asthma: Basic Information. May 5, 2009; http://www.cdc.gov/asthma/faqs.htm.

3. National Heart Lung and Blood Institute. What Is Asthma? September 2008; http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html.

4. American Lung Association's Epidemiology & Statistics Unit. *Trends in COPD (Chronic Bronchitis and Emphysema): Morbidity and Mortality.* Dallas, TX: American Lung Association; December 2007.

5. GOLD: Global Initiative for Chronic Obstructive Lung Disease. *Global Strategy for the Diagnosis, Management, and Prevention of COPD*: GOLD; 2008.

6. National Heart Lung and Blood Institute. What is COPD? March 2009; http://www.nhlbi.nih.gov/health/dci/Diseases/Copd/Copd_WhatIs.html.

7. Dominici F, Peng R, Bell M, et al. Fine Particulate Air Pollution and Hospital Admission for Cardiovascular and Respiratory Diseases. *JAMA.* 8 March 2006;295(10):1127-1134.

8. National Heart Lung and Blood Institute. What is a Heart Attack? March 2008; http://www.nhlbi.nih.gov/health/dci/Diseases/HeartAttack/HeartAttack_WhatIs.html.

9. Moorman J, Rudd R, Johnson C, et al. National Surveillance for Asthma --- United States, 1980-2004. *MMWR.* 19 October 2007;56(SS08):1-14; 18-54.

10. CDC. Asthma: National Health Interview Survey (NHIS) Data. April 27, 2009; http://www.cdc.gov/asthma/nhis/default.htm.

11. National Center for Health Statistics. *Health, United States, 2008, With Chartbook on Trends in the Health of Americans.* Hyattsville, MD: National Center for Health Statistics; 2009.

12. National Center for Health Statistics. Asthma Prevalence, Health Care Use and Mortality: United States, 2003-05. October 15, 2008; http://www.cdc.gov/nchs/products/pubs/pubd/hestats/ashtma03-05/asthma03-05.htm.

13. *Asthma in Minnesota: 2008 Epidemiology Report.* St. Paul, MN: Minnesota Department of Health; 2008.

14. American Lung Association of Minnesota. *Minnesota and COPD: Leading the way for the nation.* St. Paul, MN: American Lung Association of Minnesota; 2008.

15. Pleis J, Lethbridge-Çejku M. Summary health statistics for U.S. adults: National Health Interview Survey, 2006. *Vital Health Statistics.* 2007;10(235).

16. Hnizdo E, Sullivan P, Bang K, Wagner G. Association between chronic obstructive pulmonary disease and employment by industry and occupation in the US population: a study of data from the Third National Health and Nutrition Examination Survey. *American Journal of Epidemiology.* 2002;156:738-746.

17. U.S. E.P.A. *Fact Sheet: Age Healthier, Breathe Easier*: United States Environmental Protection Agency; April 2004.

18. Centers for Disease Control and Prevention (CDC). *BRFSS Chronic Disease Indicators: State Profile comparison. Minnesota; United States.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 4 Feb 2009 2008.

19. Lloyd-Jones D, Adams R, Carnethon M, et al. Heart Disease and Stroke Statistics 2009 Update: A Report From the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation 2009: Journal of the American Heart Association.* 2009;119:e21-e181.

20. Heart Disease and Stroke Prevention Unit. *Heart Disease and Stroke in Minnesota: 2007 Burden Report.* St. Paul, MN 2007.

21. Heart Disease and Stroke Prevention Unit. *Minnesota Department of Health Fact Sheet: Heart Disease in Minnesota.* St. Paul, MN: Minnesota Department of Health; 29 May 2007.

22. Anderson RN, Smith BL. Deaths: Leading Causes for 2002. *National Vital Statistics Reports.* 7 March 2005;53(17):1-90.

23. Schoenman J, Sutton J, Kintala S, et al. *The Value of Hospital Discharge Databases.* Bethesda, MA: NORC at the University of Chicago; 2005.

For more information about the MN EPHT Program call:
651-201-5900
Toll Free: 1-800-205-4987
TDD phone number: 651-201-5797

If you require this report in another format, such as large print or cassette tape, call 651-201-5909

Printed on Recycled paper

February 2010