



# Atlas of Stroke Mortality in the Great Lakes Region



We are *the* regional resource for stroke  
information and interventions.

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For more information about this report or the Network, please contact:

Great Lakes Regional Stroke Network  
Center for Stroke Research  
University of Illinois at Chicago  
1645 West Jackson Boulevard, Suite 400  
Chicago, Illinois 60612  
Phone: (312) 355-5423  
Fax: (312) 355-5444

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Jolene Defiore-Hyrmer, BS  
Ohio Department of Health

Julie Doetsch, MA  
Illinois Department of Public Health

Elizabeth L. Hamilton-Byrd, MD  
Indiana State Department of Health

Eileen Worden, RN  
Michigan Department of Community Health

Albert Tsai, PhD, MPH  
Minnesota Department of Health

Herng-Leh "Mike" Yuan, MPH  
Wisconsin Department of Health and Family Services

## **Introduction**

The mission of the Great Lakes Regional Stroke Network (the Network) is to optimize collaboration and coordination among the Great Lakes regional states to reduce the burden of stroke and disparities. The Network works through a state advisory board, steering committee, work groups, and individual state stroke task forces/committees to share experiences and resources across six states to implement a common public health plan for stroke. The Network includes state health department heart disease and stroke prevention staff and state stroke task force/committee members in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. The Illinois Department of Public Health receives funds from the Centers for Disease Control and Prevention to serve as the administrative and fiscal agent for the Network. The Illinois Department of Public Health contracts with the University of Illinois at Chicago Department of Neurology and Rehabilitation's Center for Stroke Research to provide scientific and administrative support for the Network's activities.

*The Burden of Stroke in the Great Lakes* report was the first attempt to assess the burden of stroke in the Great Lakes region. It remains a critical source of information for the Network states and their partners in stroke prevention and treatment. For a complete picture of stroke in the Great Lakes region, please refer to *The Burden of Stroke in the Great Lakes* region at <http://glrsn.uic.edu/>.

*Atlas of Stroke Mortality in the Great Lakes Region* grew out of the requests for county level data. This report presents data on stroke mortality from 2000—2004 specifically for the Great lakes region. It also includes overlays of Joint Commission Primary Stroke Centers and counties without hospitals.

The data presented will guide Great Lakes states in public education and quality improvement interventions that address stroke.

### **When Viewing this Atlas**

The Centers for Disease Control and Prevention published a stroke atlas in 2003. If you compare this atlas to theirs, you will notice several differences. First of all, the data in the CDC atlas is based on years 1991-1998. The *Burden of Stroke in the Great Lakes* uses data from 2001-1004. Secondly, the CDC Stroke Atlas also smoothes data; the Great Lakes atlas does not. Finally, please keep in mind that we did not look at all strokes in the Great Lakes region, only strokes occurring in the population 35 and older as the incidence of stroke increases with age. It was also necessary for some data to be suppressed in counties where there were fewer than 20 strokes reported. This is a necessary measure for patient confidentiality.

## **Sharing Resources**

A key component of the Great Lakes Regional Stroke network is the sharing of resources. In order to create this regional map, each state had an epidemiologist obtain the mortality data on a county wide basis. This data was then shared with the Great Lakes Regional Stroke Network epidemiologist who created the maps using GIS software. The State Epidemiologists met several times over a year to discuss the data and make modifications to the maps. Jolene Defiore-Hyrmer then made final changes to the maps using GIS software. Without the Great Lakes Regional Stroke Network, this atlas would not exist. In-depth information about the methods can be found on page 5.

## **What These Maps Tell Us**

These maps show us that Illinois, Indiana, Michigan and Ohio have higher stroke mortality rates in adults over the age of 35. There also appears to be a "belt" of high stroke mortality that starts in Southeastern Illinois extends across Indiana, and into Southwest Ohio as well as higher mortality areas across Michigan and throughout the Upper Peninsula. It is interesting to note that areas that have higher stroke mortality do not have Joint Commission certified Primary Stroke Centers. Indeed in most cases, access to a Primary Stroke Center is limited to large, metropolitan areas.

For more current information about Primary Stroke Centers, please go to the Joint Commission website at <http://www.jointcommission.org/CertificationPrograms/Disease-SpecificCare/DSCOrgs/default.htm>. At the time of writing this document, there were 81 Primary Stroke Centers certified by the Joint Commission and listed on their website.

Healthcare Facilities Accreditation Program (HFAP) of the American Osteopathic Association also certifies Primary Stroke Centers based on the Brain Attack Coalition guidelines. At the time this was printed, there was not a listing of HFAP certified PSCs on their website. Therefore, HFAP certified primary stroke centers are not reflected on these maps. For more information about HFAP accreditation, please go to: [https://www.do-online.org/?PageID=acc\\_hfmain](https://www.do-online.org/?PageID=acc_hfmain)

## **Stroke: The Larger Picture**

Stroke is the third leading cause of death in the United States and in the Great Lakes Region accounting for over 25,000 deaths in the Great Lakes region in 2002. Stroke is also a leading cause of severe, long-term disability. Each year about 700,000 people experience a new or recurrent stroke – about 500,000 of these are first attacks, and 200,000 are recurrent. According to estimates from the Behavioral Risk Factor Surveillance System

survey and other state administered surveys, more than 880,000 persons are living with the aftermath of a stroke in the Great Lakes region. Black men have the highest age-adjusted stroke mortality rates in the Great Lakes Region. More than 122,000 stroke patients were discharged from hospitals in the region with total hospital charges over \$2.3 billion.<sup>1</sup>

## **Atlas of Stroke Mortality in the Great Lakes Region Executive Summary**

Stroke is the third leading cause of death in the Great Lakes region (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) and accounted for 5.7% of all deaths that occurred in the total population in the Great Lakes region in 2002.<sup>1</sup>

The age adjusted stroke mortality rate for the US in 2003 was 53.5 per 100,000.<sup>2</sup>

The stroke mortality rate for the Great Lakes Region in 2003 is 53.6 per 100,000.<sup>3</sup>

Three of the six states in the region have a 1.3 to 7.9% higher rate of stroke mortality than the US age adjusted mortality rate of 53.5 per 100,000 in 2003, exceeding Healthy People 2010 goal of an age-adjusted mortality rate of 50 per 100,000 persons.<sup>4,5</sup>

### Methods

Calculated stroke death rates (based on ICD10 codes I60 – I69) by county for five year period of 2000 – 2004, for adults age 35 years and older.

Used 2000 standard population age-adjustment and suppressed unstable data of counties with number of deaths <20 .

Created overlays of Joint Commission Primary Stroke Centers and counties without hospitals.

### Results

Illinois, Indiana and Ohio have higher stroke mortality rates than Michigan, Minnesota and Wisconsin.

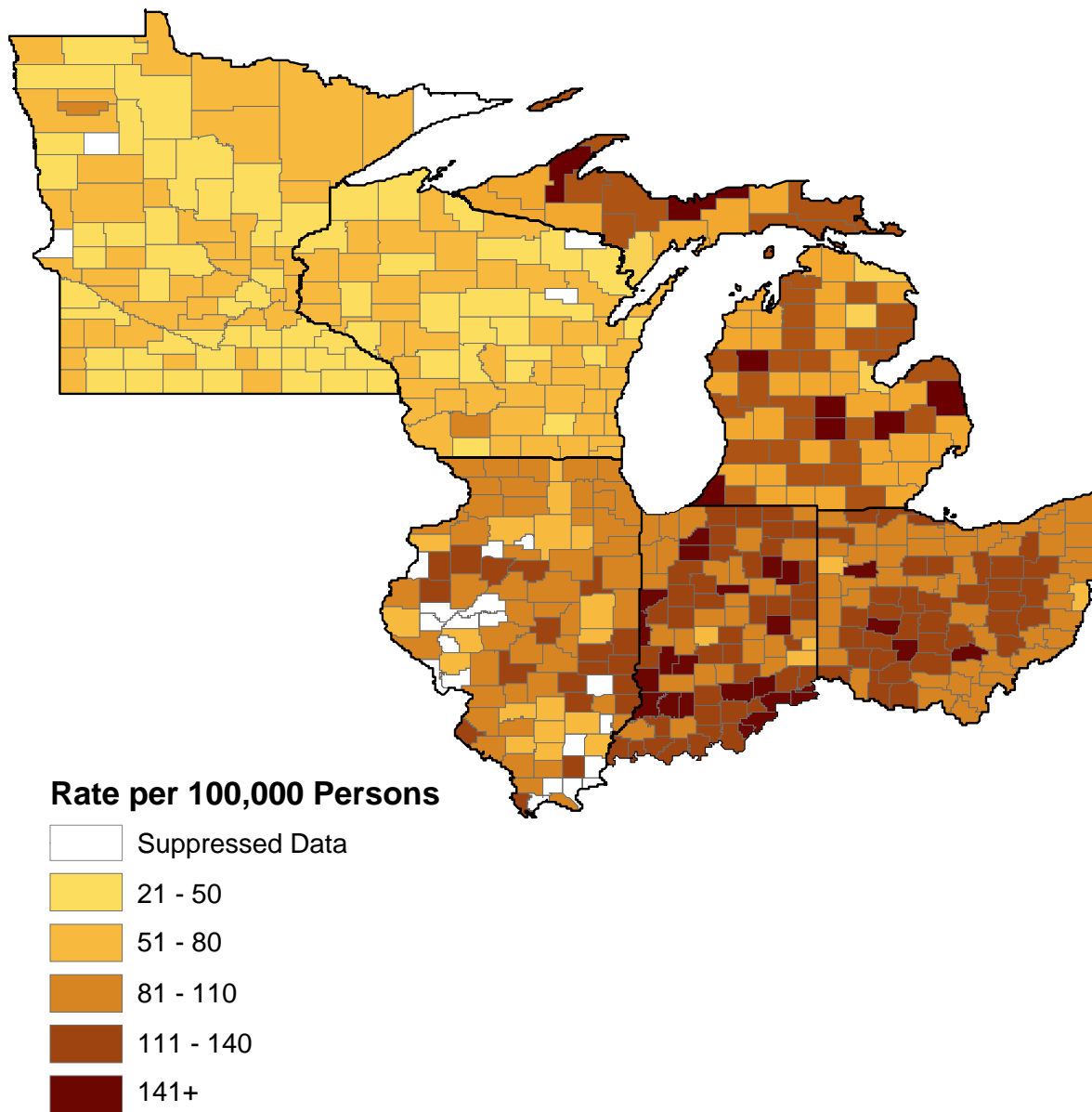
Pattern of higher stroke mortality appears in Southeastern Illinois, across Indiana, and in Southwest Ohio as well as across the Upper Peninsula of Michigan compared to the whole region.

Indication of fewer Primary Stroke Centers in higher mortality area (belt) in Great Lakes region.

Counties in Southeastern Illinois & Southwestern Indiana with high stroke mortality rates and no hospitals or Joint Commission Primary Stroke Centers, may be areas to target interventions.

Figure 1.

## Age-adjusted Stroke Mortality by County, for Adults 35 Years and Older, Great Lake States, 2000-2004.<sup>1,2,3</sup>



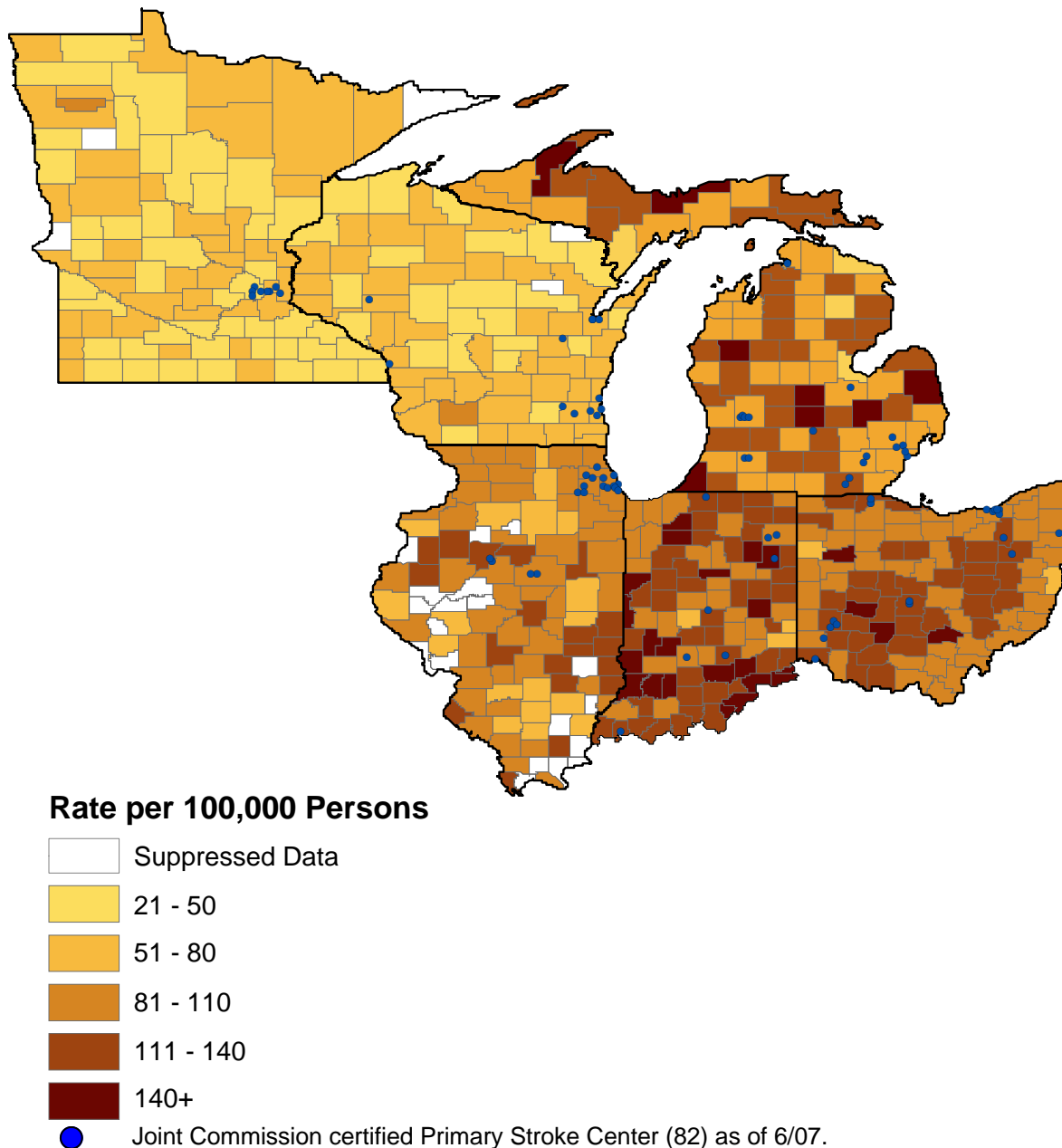
<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

Figure 2.

### Age-adjusted Stroke Mortality by County, for Adults 35 Years and Older and Joint Commission Primary Stroke Centers, Great Lakes States, 2000-2004.<sup>1,2,3</sup>



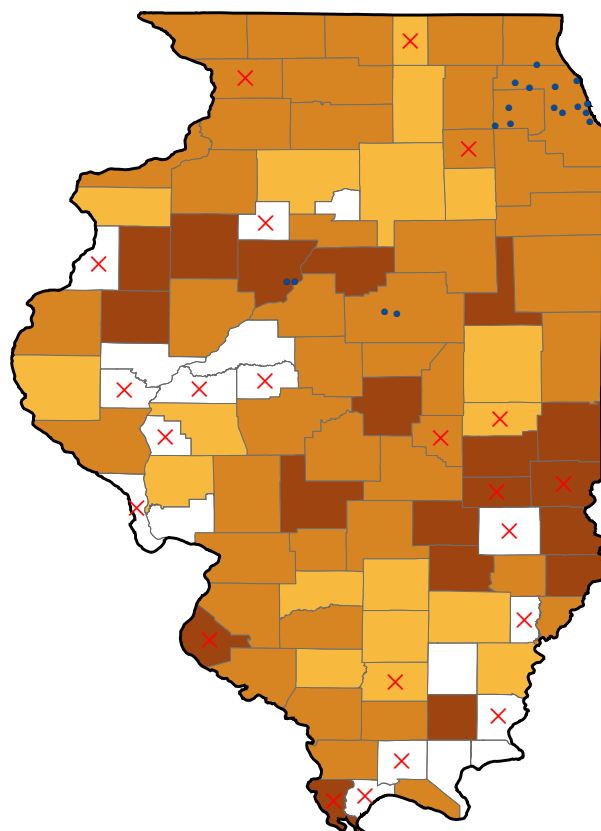
<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

Figure 4.

### Age-adjusted Stroke Mortality Rates by County, for Adults 35 Years and Older, Joint Commission Primary Stroke Centers and Counties with No Hospital, Illinois 2000-2004.<sup>1,2,3</sup>



#### Rate per 100,000 Persons

Suppressed Data

21 - 50

51 - 80

81 - 110

111 - 140

141+

× County with No Hospital

● Joint Commission certified Primary Stroke Center (n=18) as of 6/07.

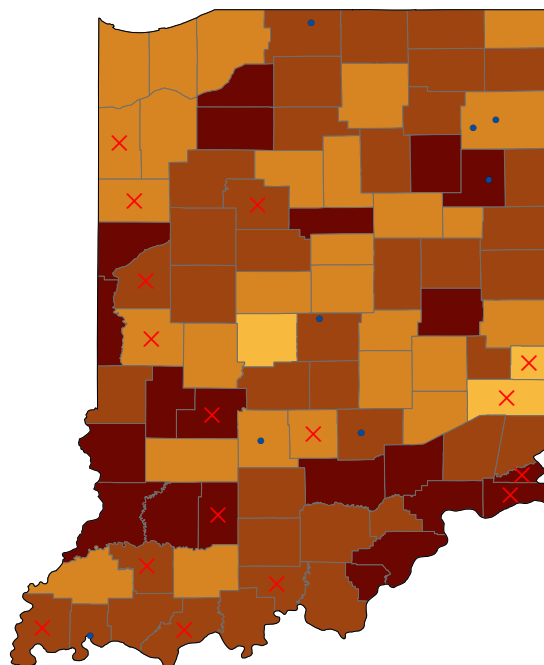
<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

Figure 5.

### Age-adjusted Stroke Mortality Rates by County, for Adults 35 Years and Older, Joint Commission Primary Stroke Centers and Counties with No Hospital, Indiana 2000-2004.<sup>1,2,3</sup>



#### Rate per 100,000 Persons

Suppressed Data

21 - 50

51 - 80

81 - 110

111 - 140

141+

× County with No Hospital

● Joint Commission certified Primary Stroke Center (n=8) as of 6/07.

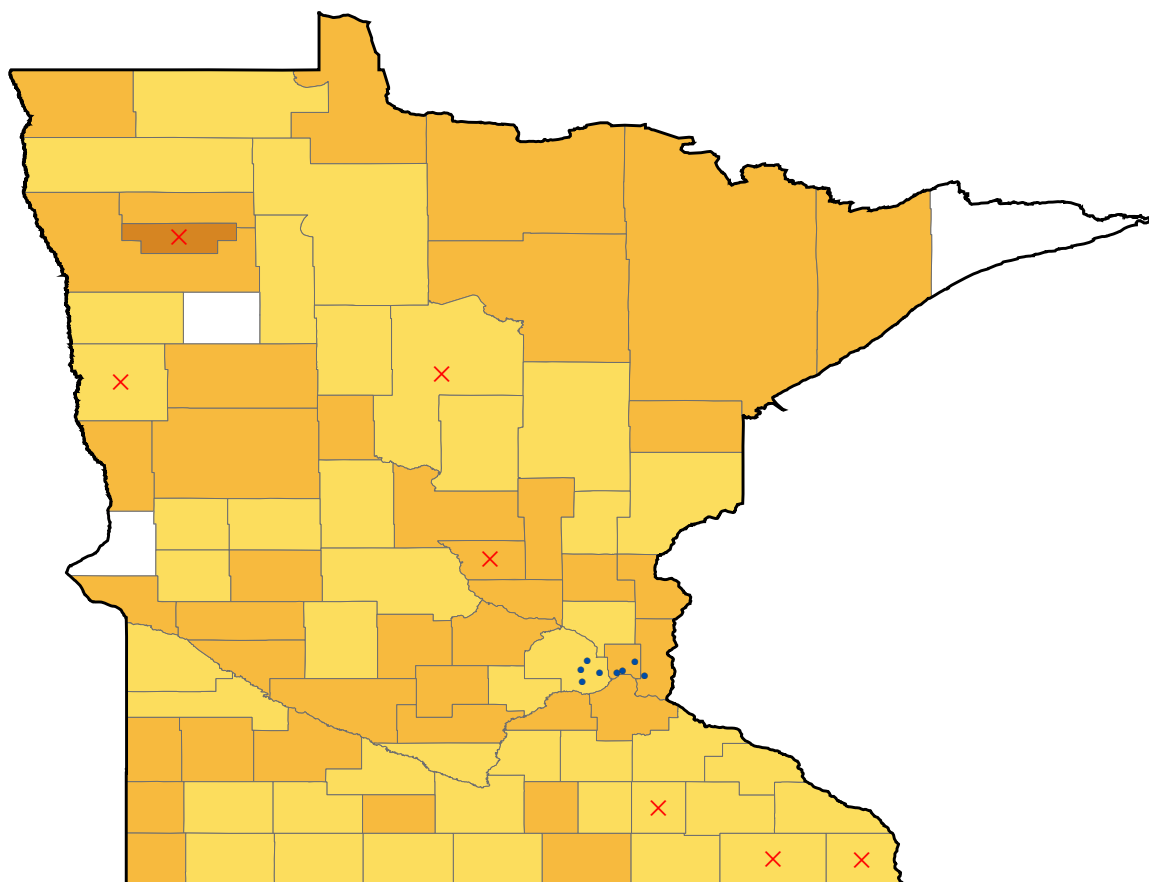
<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

Figure 7.

### Age-adjusted Stroke Mortality Rates by County, for Adults 35 Years and Older, Joint Commission Primary Stroke Centers and Counties with No Hospital, Minnesota 2000-2004.<sup>1,2,3</sup>



#### Rate per 100,000 Persons

Suppressed Data

21 - 50

51 - 80

81 - 110

111 - 140

141+

× County with No Hospital



Joint Commission certified Primary Stroke Center (n=8) as of 6/07.

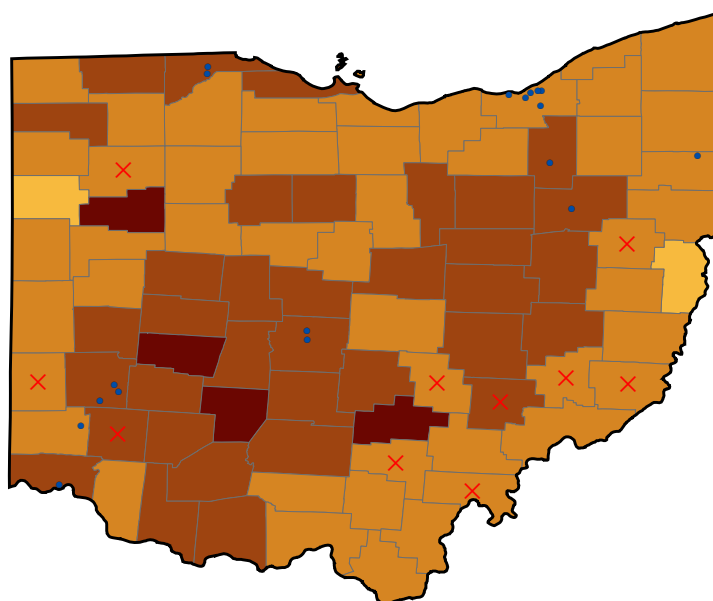
<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

Figure 8.

### Age-adjusted Stroke Mortality Rates by County, for Adults 35 Years and, Joint Commission Primary Stroke Centers and Counties with No Hospital, Ohio 2000-2004.<sup>1,2,3</sup>



#### Rate per 100,000 Persons

Suppressed Data

21 - 50

51 - 80

81 - 110

111 - 140

141+

× County with No Hospital

● Joint Commission certified Primary Stroke Center (n=18) as of 6/07.

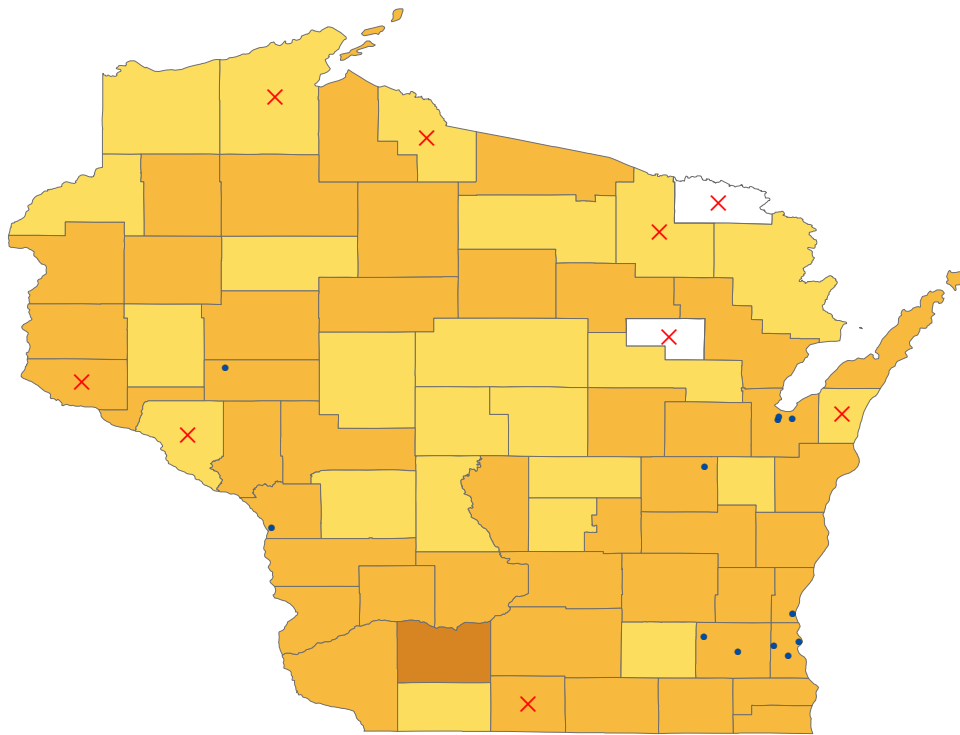
<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

Figure 9.

### Age-adjusted Stroke Mortality Rates by County, for Adults 35 Years and, Joint Commission Primary Stroke Centers and Counties with No Hospital, Wisconsin 2000-2004.<sup>1,2,3</sup>



#### Rate per 100,000 Persons

Suppressed Data

21 - 50

51 - 80

81 - 110

111 - 140

141+

X County with No Hospital

● Joint Commission certified Primary Stroke Center (n=12) as of 6/07.

<sup>1</sup>Stroke defined as ICD-10 codes I60-I69.

<sup>2</sup>Rates adjusted to the US 2000 standard population.

<sup>3</sup>Rates for counties with less than 20 deaths in the five year time period were suppressed.

## References

<sup>1</sup> Great Lakes Regional Stroke Network, The Burden of Stroke in the Great Lakes States, January 2006.

<sup>2</sup> United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Office of Analysis and Epidemiology(OAE), Compressed Mortality File (CMF) compiled from CMF 1999-2003, Series 20, No. 2I 2006 on CDC WONDER On-line Database.

<sup>3</sup> United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Office of Analysis and Epidemiology(OAE), Compressed Mortality File (CMF) compiled from CMF 1999-2003, Series 20, No. 2I 2006 on CDC WONDER On-line Database.

<sup>4</sup> United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Office of Analysis and Epidemiology(OAE), Compressed Mortality File (CMF) compiled from CMF 1999-2003, Series 20, No. 2I 2006 on CDC WONDER On-line Database.

<sup>5</sup> Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services. Healthy People 2010. <http://www.healthypeople.gov/document/html/objectives/12-07.htm>