



# Stroke in Michigan

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## WHAT IS A STROKE?

Stroke is a form of cardiovascular disease that occurs when a blood vessel bringing oxygen to the brain bursts (Hemorrhagic stroke) or is clogged (Ischemic stroke). Without oxygen, brain cells die (32,000 per second), and the part of the body controlled by that area of the brain loses function. Ischemic stroke accounts for about 4 out of 5 strokes, and hemorrhagic stroke, about 1 in 5. Hemorrhagic stroke, caused by ruptured blood vessels, has a much higher fatality rate and tends to occur in younger age groups.

## STROKE MORTALITY

In 2004, stroke was the third most common cause of death in Michigan: 5,282 deaths or 6.2% of all state deaths. Figure 1 displays the number of stroke deaths by age group, race and gender. One in four stroke deaths occurred in individuals under age 75. Stroke deaths occur across all ages, gender and races. Eighty-six percent of those dying from stroke were White and 13% were Black. One percent were of other race/ethnicities. As Figure 1 displays, on average Blacks die from stroke at an earlier age than Whites. Although males have a higher risk of dying of stroke than females, the number of females dying of stroke is larger than for males because women live to older ages, when stroke is more common. In 2004, 62% of all stroke deaths were among women, 38% men. State stroke death rates have trended down, as shown in Figure 2, from an age-adjusted mortality rate of 64.1 per 100,000 in 1996 to 49.8 per 100,000 in 2004. This is still higher than the Healthy People 2010 goal of 48 or less per 100,000, a national goal identified from the U.S Department of Health and Human Services, November 2000. Michigan stroke mortality rates are slightly higher than the national averages. In 2006 the journal *Circulation* compared state stroke mortality rates, ranking Michigan 24<sup>th</sup> worst, based on 2002 deaths. State rankings can vary from year to year and may not be exact. But the overall data from the last several decades show that stroke remains a very serious health issue in Michigan.

Figure 1  
Stroke Age-Adjusted Mortality Rates, Michigan  
2004

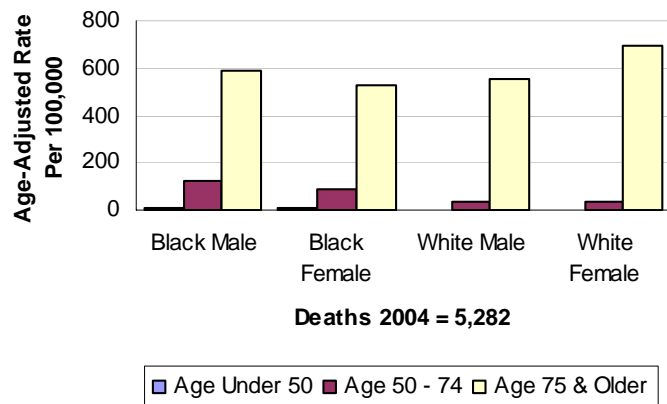
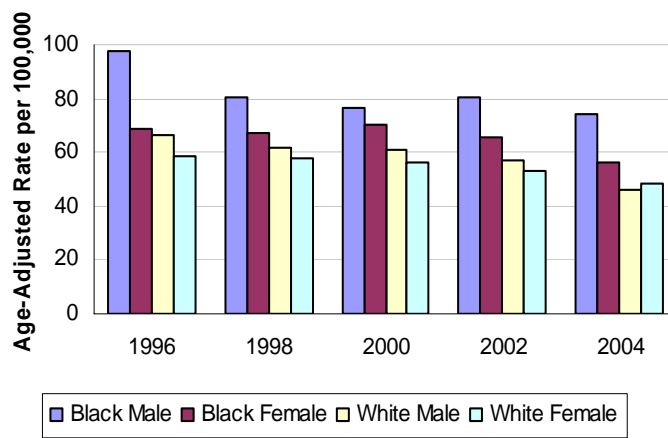


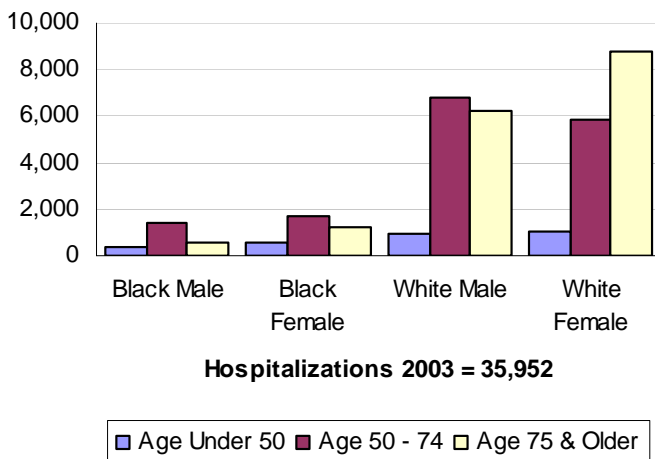
Figure 2  
Stroke, Age-Adjusted Mortality Rates, Michigan  
1996-2004



## HOSPITALIZATION

In 2003, there were 35,952 hospital admissions for stroke, which represents about 3% of all admissions. (Hospital admissions data may contain the same person more than once.) Figure 3 displays the number of hospitalizations by age group, race and gender. While about one in two admissions occurred in patients 75 years or older, about 30%, or 10,581 admissions, occurred in individuals under age 65, the traditional working age population. Stroke is a leading cause of long-term disability. Those who survive a stroke may suffer from various impairments, depending on what portion of the brain is damaged. However, rapid and appropriate treatment may substantially decrease the disability associated with stroke. Eighty-three percent of those hospitalized were White, 16% were Black. One percent were of other race/ethnicities. As Figure 3 displays, on average Blacks are hospitalized from stroke at an earlier age than Whites. Both the earlier deaths and earlier hospitalizations are associated with various elevated risks, such as higher rates of undetected, uncontrolled hypertension. Persons under the age of 45 had 1,660 hospitalizations; the youngest stroke patients were under age one. Fifty-four percent of all stroke hospitalizations were female; 46% male.

**Figure 3**  
**Stroke Hospitalizations, Michigan 2003**



### GENDER AND RACIAL DIFFERENCES IN FIGURES 1 AND 3

There are striking racial and gender differences in the pattern of age of hospitalization and death due to stroke, as seen in Figures 1 and 3, with Black males and females suffering death and hospitalization from stroke proportionately at younger ages than Whites.

## YEARS OF POTENTIAL LIFE LOST

Years of Potential Life Lost (YPLL) is a measurement used to highlight the toll that deaths among people under 75 can take; especially those years of raising a family and working. Years of potential life lost are calculated from the age at death to age 75. In 2004 stroke was one of the ten leading causes of YPLL in Michigan, and ranked ninth. At 182.8 YPLL per 100,000 state residents, stroke was responsible for three times the YPLL as AIDS and about the same as diabetes.

## GEOGRAPHIC AREA SPECIFIC MORTALITY

Some areas of Michigan have higher stroke mortality rates than others. Map 1, attached at the end of this report, shows Michigan counties classed by three levels of mortality rates, from low to high. The number of stroke deaths is highest in Wayne, Oakland and Macomb Counties. This three county area had over ten thousand stroke deaths from 2000 to 2004.

## PRIMARY PREVENTION

Table 1 describes selected risk factors for stroke. Controlling high blood pressure and high cholesterol, reducing smoking, being more physically active and avoiding excessive weight will reduce an individual's risk of stroke. Other non-modifiable risk factors include age, gender, race/ethnicity, family history, and low birth weight.

**While Michigan's current stroke mortality rate ranks 24<sup>th</sup> worse nationally, the current poor rankings for stroke risk factors warns that future state stroke rates may be worse. Stroke mortality rates are affected by the availability and quality of acute care treatment.**

### KNOWLEDGE OF STROKE RISK FACTORS, BRFS, 2004

Table 2, below, describes what percent of Michigan adults are aware of stroke risk factors. Since Michigan used a state specific surveying methodology, national comparisons are not available. Between 1999 and 2004 changes in awareness of stroke risk factors were mixed, and awareness levels remain low along with the warning signs of stroke. This remains a concern since bystander awareness and activation of the EMS system remains key to positive outcomes.

### KNOWLEDGE OF STROKE WARNING SIGNS, BRFS, 2004

Table 3, below, describes major stroke warning signs. Because Michigan used a state-specific surveying methodology, national comparisons are not available. Respondents to the telephone BRFS survey were asked open-ended questions about whether they knew the warning signs for stroke. This is a conservative methodology and tends to produce lower estimates than giving the respondents more information first. Knowledge of stroke warning signs is necessary if the public is to respond quickly and correctly to the onset of stroke, and increases the chances that stroke victims will receive appropriate and timely care, thereby minimizing the damage to the brain.

**Table 1  
PREVALENCE OF STROKE RISK FACTORS, BRFSS, 2005**

Risk Factor	Michigan	U.S.	State Rank(1= worse)
High Blood Pressure	27.8%	25.5%	13
Cigarette Smoking	22.0%	20.6%	18
No Physical Activity	22.5%	23.8%	36
Obesity (BMI > 30)	26.2%	24.4%	15
Diabetes	8.1%	7.3%	15
High Cholesterol	38.9%	35.6%	4

**Table 2  
PREVALENCE OF MICHIGAN ADULTS AWARE OF STROKE RISK FACTORS, BRFS, 2004**

Risk Factor	Michigan 1999	Michigan 2004
High Blood Pressure	32.3%	32.8%
Cigarette Smoking	29.2%	26.8%
Physical inactivity	25.9%	18.5%
Overweight	18.1%	19.4%
Diabetes	2.4%	3.5%
Diet	24.5%	27.0%
Heredity	8.8%	12.5%
High Cholesterol	18.4%	13.1%

**Table 3  
PREVALENCE OF KNOWLEDGE OF STROKE WARNING SIGNS, BRFS, 2004**

Warning Signs	Michigan 1999	Michigan 2004
Any weakness or numbness	45.7%	65.6%
Confusion, or trouble speaking or understanding speech	29.9%	4.5%
Trouble seeing	14.1%	23.3%
Trouble walking, dizziness or loss of balance	23.5%	15.2%
Severe headache	14.7%	10.2%

### PREVALENCE OF STROKE AMONG ADULTS AGE 35 AND OLDER: SURVIVORS, BRFS, 2005

Table 4, below, describes the prevalence of stroke among Michigan adults age 35 and older, by age group and by household income. This data does not include those who did not survive a stroke or those who were so incapacitated that they ended up in an extended care facility. The 2005 data is preliminary. Blacks were more likely than Whites to report having been told by a doctor that they had had a stroke, 5.4% to 3.6%; and females more likely than males, 4.3% to 3.4 %, but the really noticeable differences was the higher prevalence among those with lower income and /or lower education. Only household income is listed below, but education levels showed a similar pattern. Not including those residents who are institutionalized, approximately 200,000 Michigan adults age 35+ have had a stroke. Many of these individuals live with serious impairments and have an elevated risk of a second stroke.

### SECONDARY PREVENTION – ACUTE STROKE CARE TREATMENT

Effective acute stroke care is dependant on the rapid recognition and follow up care of stroke symptoms, the immediate activation of the EMS system and delivering the stroke victim to an institution capable of assessing the type of stroke and instituting the appropriate treatment. Treatment may include thrombolytic therapy or t-PA, (clot buster) given intravenous or interarterial carotid stenting (inserting a wire mesh in to the open artery) or endarterectomy (surgically removing the clot.) Most of these treatments are time dependant to ensure more brain tissue is not lost. Prevention of a stroke in individuals with risk factors, involves the use of anti-platelet and anticoagulant therapies (e.g. aspirin, coumadin, ticlopidine, etc.), statins (cholesterol lowering agents) and ace inhibitors or blood pressure lowering agents. The aggressive management of modifiable stroke risk factors is vitally important in secondary prevention.

### STROKE COSTS

Estimated total stroke costs for Michigan in 2006 are approximately 2 billion dollars. Direct costs are estimated at 1.28 billion: hospital, nursing home, physicians, other professionals, drugs, medical durables and home health care. Indirect costs are estimated at 709 million: lost productivity from disability and premature death. The American Heart Association estimates national total stroke costs at 57.9 billion dollars. (Michigan costs based on U.S. census estimates for Michigan and American Heart Association national estimates, state costs estimated at 3.44% of national costs.)

### The DATA

The data used for this report comes from different years; however, it represents the most current information available. Mortality data is available for 2004; hospitalization data is from 2003, and Behavioral Risk Factor Survey data, 2005 (preliminary). More information on data sources and citations is available on request.

Table 4

### Prevalence of Stroke: Survivors, by Age Group and by Household Income, BRFS, 2005

Ever had a Stroke – By Age Group	Michigan 2002	Michigan 2005
35-44	1.5%	1.8%
45-54	1.6%	2.4%
55-64	4.7%	3.1%
65-74	6.7%	6.1%
75+	11.6%	11.2%
Total population, age 35+	3.9%	3.9%

Ever had a Stroke – By Income	Michigan 2002	Michigan 2005
<\$20,000	7.0%	10.0%
\$20,000 - 34,999	5.9%	4.0%
\$35,000 - 49,999	4.1%	2.9%
\$50,000 - 74,999	2.4%	2.5%
\$75,000+	0.6%	1.1%
Total population, age 35+	3.9%	3.9%

### GUIDELINES TO REDUCE STROKE – ADAPTED FROM THE NATIONAL STROKE ASSOCIATION

1. Know your blood pressure; have it checked regularly; and keep high blood pressure under control.
2. Find out if you have atrial fibrillation and take the prescribed medications if you do.
3. If you smoke, stop.
4. If you drink alcohol, do so in moderation.
5. Know your cholesterol level; follow your doctor's recommendations to keep high cholesterol under control.
6. If you are diabetic, follow your doctor's recommendations.
7. Include exercise in the activities you enjoy in your daily routine.
8. Enjoy a lower sodium and lower fat diet.
9. Find out if you have circulation problems and take the prescribed medications if you do.

## Stroke Age-adjusted Death Rates, Michigan 2000-2004

