

# 2011 Stroke Brief

## Introduction

Stroke is a cardiovascular disease that occurs as a result of decreased blood supply to the brain. This condition occurs when a vessel is obstructed by a clot or ruptures. Based on 2008 data, stroke moved from the third leading cause of death to fourth in Michigan; accounting for a total of 4,650 deaths. Stroke is also a major cause of long-term disability. It is estimated that stroke costs 1.4 billion dollars in Michigan due to medical costs and lost productivity due to morbidity and mortality.<sup>(1,2)</sup> According to the 2009 Michigan Behavioral Risk Factor Survey (MiBRFS), 2.7% of Michigan adults reported ever having a stroke.<sup>3</sup>

Major issues in stroke are: improving public awareness and response to acute stroke events, improving emergency response, documenting and enhancing quality care for patients with stroke, and better prevention. Rehabilitation also continues to be a challenging issue both for reimbursement and quality care.

## Risk Factors

Cardiovascular risk factors, especially high blood pressure and diabetes contribute to the development of a stroke. Table 1 displays the prevalence of stroke-specific cardiovascular risk factors among Michigan adults in selected years from 1990-2009 and compares these estimates to the 2009 national median prevalence and rankings.<sup>(3,4)</sup> All of these risk factors have increased over this time period with the exception of smoking. In addition, Michigan reported a higher prevalence for all stroke risk factors when compared to the 2009 United States median prevalence (Table 1). Based on the national rankings shown in Table 1, Michigan ranked among the top half of the worst states with the exception of no leisure time physical activity where it was 28th worst. High blood pressure is an important risk factor for stroke. A 12 point reduction in high blood pressure can reduce stroke by 37%.

Table 1. Stroke risk factor prevalence in Michigan compared to United States, 1990-2009 Selected Years

Risk Factor (%)	1990	2001	2009	US 2009	2009 Nat Rank
Current Smoking	29.2	26.1	19.8	17.9	18
Blood Pressure: Ever Told High	23.3	27.1	30.4	28.6	22
Cholesterol: Ever Told High	27.0	33.0	38.9	37.4	18 tied
Overweight (BMI>25)	47.4	60.4	66.6	63.2	17
Obese (BMI>30)	14.1	24.7	30.9	27.1	10
Fruits & Vegetables: <5 servings/day	NA	NA	77.8	76.5	20
No Leisure Time Physical Activity	NA	23.5	24.1	23.9	28
Diabetes	4.9	7.2	9.4	8.4	15

Table 2. Knowledge of stroke warning signs and symptoms, 2009 MiBRFS

## Signs and Symptoms

Table 2 shows 2009 MiBRFS results focusing on the knowledge of stroke warning signs among Michigan adults. The warning signs with the highest percent of correct responses were sudden numbness or weakness of face, arm, or leg (98.1%) as well as sudden confusion or trouble speaking (97.6%). In addition, sudden chest pain or discomfort was incorrectly identified as a stroke warning sign by 43.7% of respondents.

Stroke Warning Signs	%	95% CI
<b>Correct Responses</b>		
Sudden numbness or weakness of face, arm, or leg especially on one side	98.1	(97.3-98.6)
Sudden confusion or trouble speaking	97.6	(96.5-98.4)
Sudden trouble walking, dizziness, or loss of balance	94.4	(93.0-95.5)
Sudden trouble seeing in one or both eyes	88.4	(86.3-90.3)
Severe headache with no known cause	74.9	(72.3-77.4)
<b>Incorrect Responses</b>		
Sudden chest pain or discomfort	43.7	(40.8-46.6)

### Calling 9-1-1

MiBRFS results indicate a lack of association between having stroke symptom knowledge and intent to call 9-1-1 (Figure 1).<sup>3</sup>

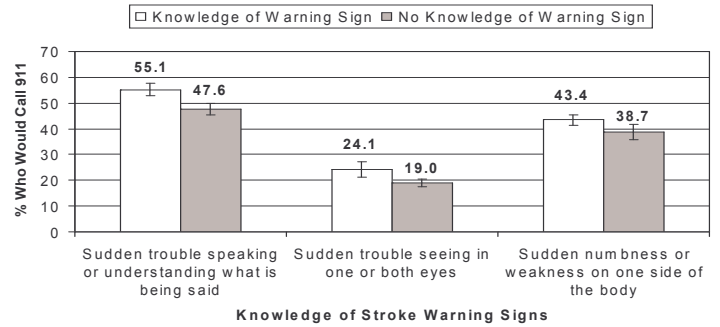
### Hospitalization

There was a 15.8% decrease in Michigan's age-adjusted\* stroke hospitalization rate from 2000 to 2008 (Figure 2).

In 2008, there were 27,719 hospital admissions for stroke in Michigan. Fifty-two percent of all hospitalized were female, 82% were white, and 67% were individuals 65 years of age and older.

\*Populations often differ in their distribution of age, which may in turn affect the overall rate of events in that population. Therefore, when comparing rates of events in populations of different age distributions, it is important to account for those differences by calculating an age-adjusted rate.

Figure 1. The percentage of respondents who reported that they would call 911 in response to each specific stroke-related medical scenario by knowledge of that specific warning sign



Source: 2004 BRFS, MDCH

Figure 2. Age-adjusted stroke hospitalization rates, Michigan, 2000-2008

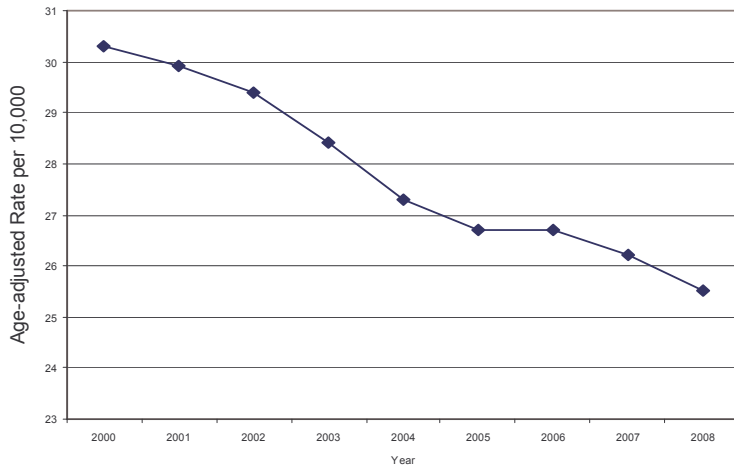
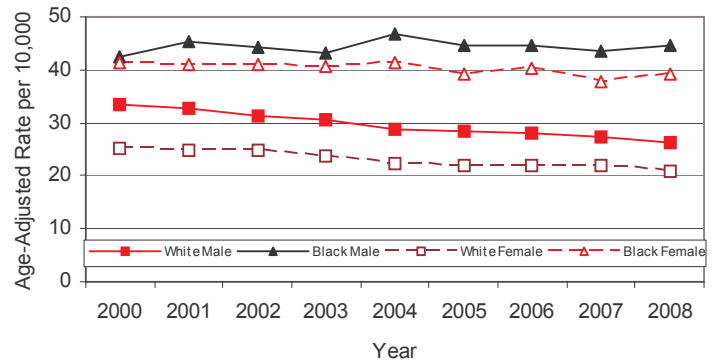


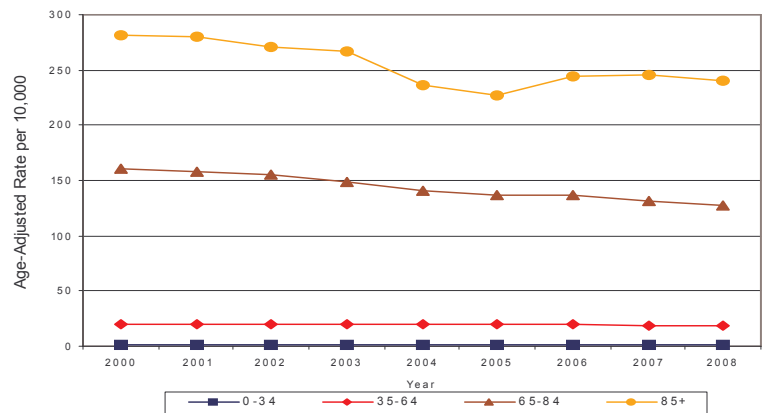
Figure 3. Age-adjusted stroke hospitalization rates by race and gender, Michigan, 2000-2008



A disparity remains among race and gender groups. Figure 3 shows an overall increase in stroke hospitalizations among black men while a decrease was observed in white men and white women. There were fluctuations over time among black women and most recently there was an increase from 2007 to 2008.

Although those in the oldest age groups have the highest burden of stroke hospitalizations, rates have decreased consistently in the 65-84 age group from 2000 to 2008, (Figure 4).

Figure 4. Stroke hospitalization rates by age, Michigan, 2000-2008



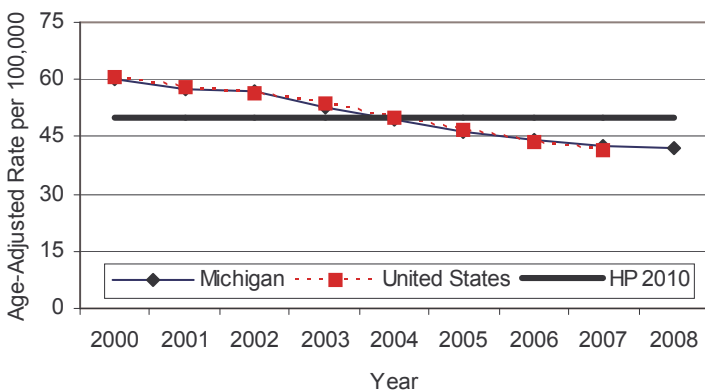
The overall age-adjusted hospitalization rate in Michigan from 2004 to 2008 was 26.6 per 10,000 people. Twenty-five counties were above the state rate (Figure 5).

**Mortality**

The stroke mortality rate in Michigan decreased from 60.3 per 100,000 in 2000 to 41.9 per 100,000 in 2008; a steady decrease of 30.5%. Figure 6 displays the age-adjusted mortality rates of stroke deaths in Michigan compared to the United States and the Healthy People 2010 target. In 2004,

Michigan reached and passed the Healthy People 2010 goal of 50 deaths per 100,000. However, Michigan currently ranks as the 23<sup>rd</sup> worst in the United States for stroke mortality.

Figure 6. Age-adjusted stroke mortality rates, 2000-2008



Sixty-four of Michigan's 83 counties had five-year age-adjusted mortality rates above the 2007 national average of 41.6 per 100,000, (Figure 7).<sup>5</sup>

In addition, there was an overall decline in age-adjusted stroke mortality rates among each race/gender and age group as shown in Figures 8 and 9.

Figure 5. Age-adjusted five-year hospitalization rates for stroke patients, by county residence, Michigan, 2004-2008

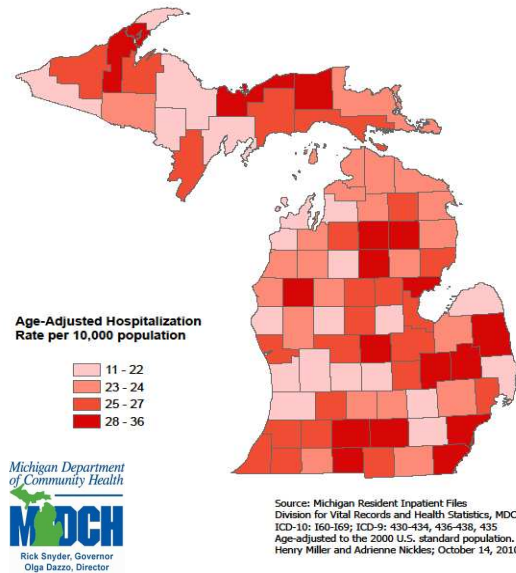


Figure 7. Age-adjusted five-year mortality rates for stroke patients, by county residence, Michigan, 2004-2008

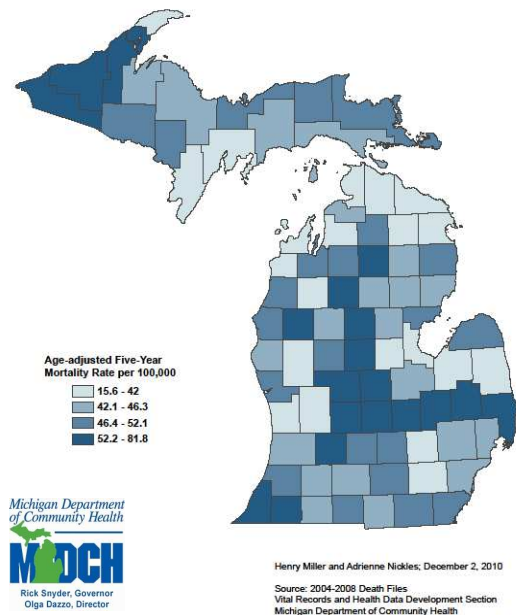


Figure 8. Age-adjusted stroke mortality rates by race and gender, MI, 2000-2008

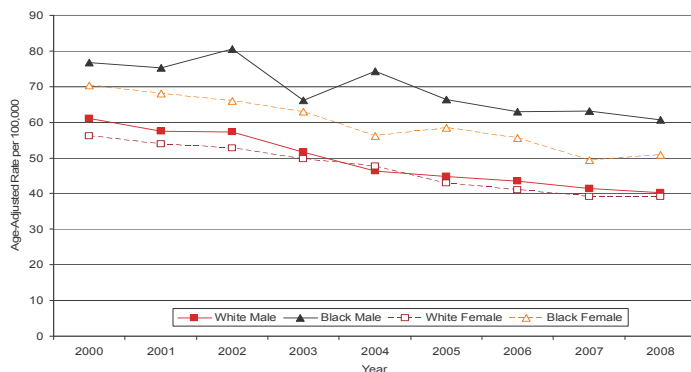
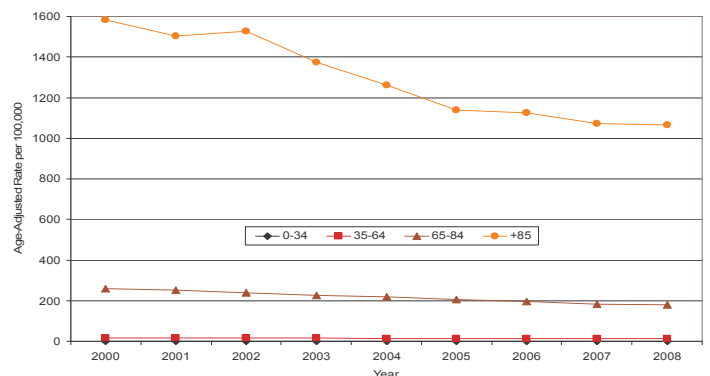


Figure 9. Stroke mortality rates by age group, MI, 2000-2008

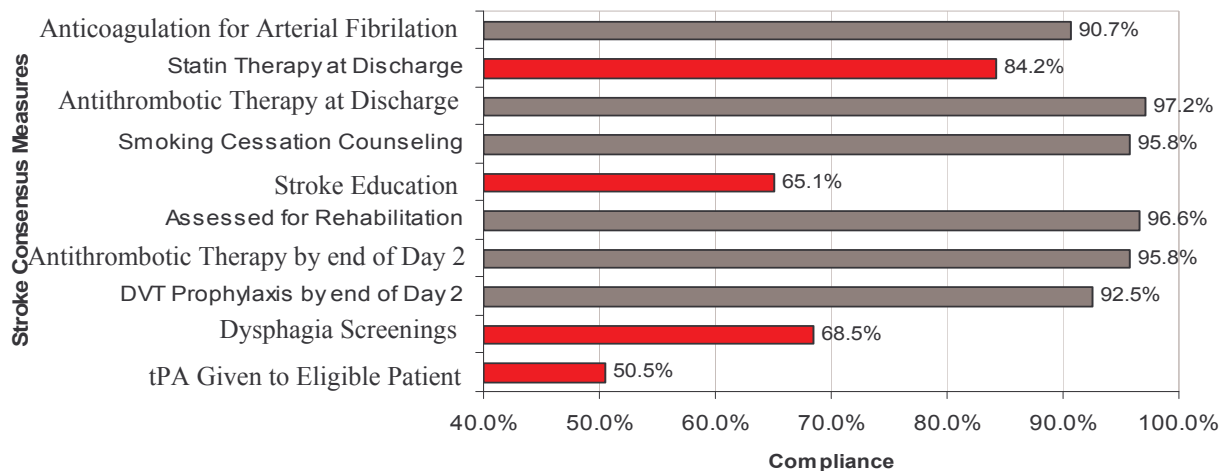


## Program Implications

The data in this “Stroke Brief” indicate improvement in stroke death rates, awareness of signs and symptoms/emergency response and stroke care of hospitalized patients, but challenges still remain. The Michigan Department of Community Health has been committed to improving stroke care since the first strategic planning group, the Michigan Stroke Initiative, was convened in 1997. Since that time many initiatives have been implemented. These initiatives include registries and continuous quality improvement; improving awareness of signs and symptoms of stroke as well as the need to treat it as a medical emergency and call 9-1-1; collaborating with EMS partners to improve the response and treatment of acute stroke events; five statewide professional conferences, numerous educational programs; surveillance updates and funding projects targeting special populations. The Michigan Stroke Initiative, the statewide partnership of experts, has been a key component to guiding public health initiatives. Funding from the Centers for Disease Control and Prevention has strengthened the stroke program capacity and services. Ongoing initiatives are needed to maintain progress and to expand the translation of science into practice. For more information about stroke initiatives in Michigan see [www.michigan.gov/cvh](http://www.michigan.gov/cvh) or [www.michiganstrokeinitiative.org](http://www.michiganstrokeinitiative.org).

The Michigan Stroke Registry and Quality Improvement Program (MiSRQIP) recruited 36 hospitals representative of stroke care in Michigan in an effort to improve the quality of stroke care that they provide. MiSRQIP began collecting data on stroke hospitalizations in 2008. Hospital care is measured across 10 consensus performance measures. Initial quality improvement efforts in those hospitals focused on new/updated measures and those needing significant improvement: prescribing statin therapy on discharge to patients with LDL >100, stroke education, dysphagia screening, and tPA delivery with the goal of reaching 100% compliance. At the conclusion of 2009, hospitals showed the following performance on these key measures: statins on discharge 84.2%, stroke education 65.1%, dysphagia screening 68.5%, and tPA delivery to eligible patients 50.5%. Figure 10 displays hospital performance across all ten measures and clearly shows the potential for improvement in those measures receiving more focused quality improvement efforts.

Figure 10. MiSRQIP hospital compliance with performance measures, 2009



## References

1. Michigan Health Statistics. Division for Vital Records and Health Statistics - Michigan Department of Community Health. April 2010
2. American Heart Association. Heart and Stroke Statistics – 2011 Update. Dallas, Texas: American Heart Association; 2011 \*Cost estimated from report using MI % of U.S. pop [3.34%].
3. Michigan Behavioral Risk Factor Surveillance System. Michigan Department of Community Health. [www.michigan.gov/brfs](http://www.michigan.gov/brfs)
4. Behavioral Risk Factor Surveillance System. Centers for Disease Control and Prevention. [www.cdc.gov/brfss](http://www.cdc.gov/brfss)
5. American Heart Association. Heart and Stroke Statistics – 2010 Update. Dallas, Texas: American Heart Association; 2010