

# STROKE SYSTEMS OF CARE BRIEF, 2021

Michigan Stroke Program | MiSP

## Introduction

Stroke is a cardiovascular disease that affects arteries leading to and within the brain. It occurs as a result of a decreased blood supply to the brain due to an arterial blockage or rupture.<sup>1</sup> In 2018, stroke was the fifth leading cause of death in Michigan which accounted for a total of 5,180 deaths.<sup>2</sup> According to the 2019 Michigan Behavioral Risk Factor Survey (MiBRFS), 3.6% of Michigan adults reported ever having a stroke.

The Michigan Stroke Program (MiSP) has worked with partners to develop surveillance and quality improvement strategies across stroke systems of care. Strategies have focused on stroke prevention, acute stroke recognition and activation of emergency medical services, triage to appropriate facilities, designation of and treatment at stroke centers, secondary prevention at hospital discharge, and rehabilitation and recovery. This brief provides an overview of data currently collected to monitor stroke risk, incidence, care performance, and mortality.



## Risk Factors

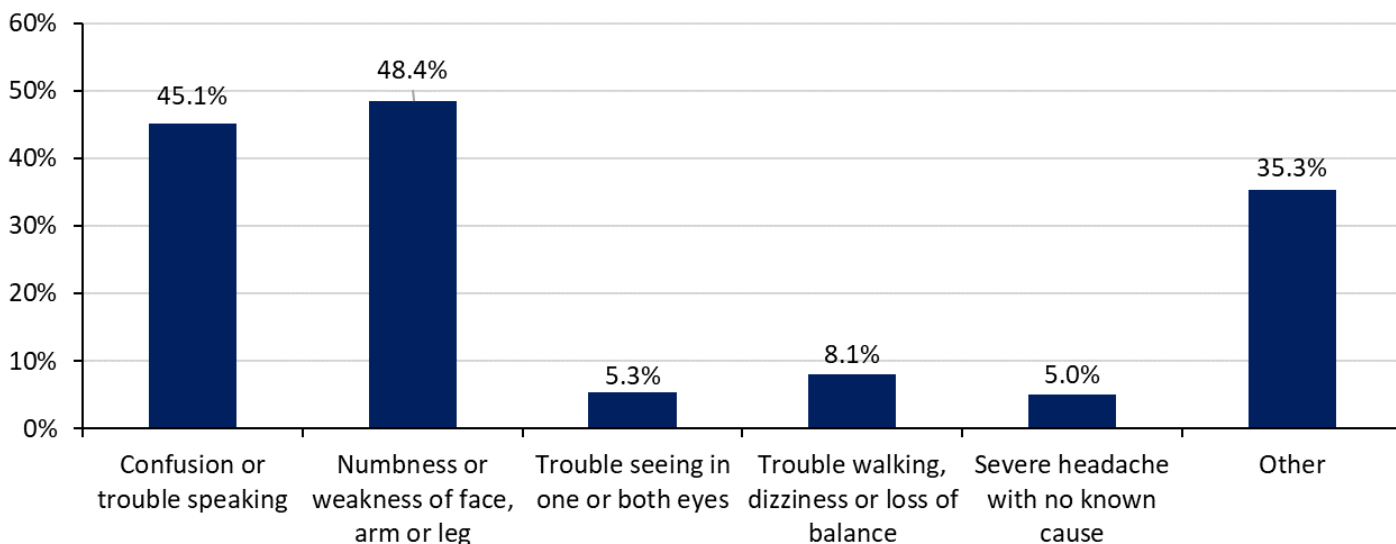
MiSP monitors the prevalence of several stroke risk factors in Michigan and in the United States. As displayed in Table 1, from 2015-2019, high blood pressure and obesity prevalence increased, while current smoking status, high cholesterol, and overweight status prevalence decreased. Despite declining trends among some stroke risk factors, Michigan continues to report a higher prevalence among all stroke risk factors except for overweight status when compared to the 2019 United States median prevalence.

Table 1. Stroke Risk Factor Prevalence in Michigan Compared to United States, 2015-2019, MiBRFS

Risk Factor (%)	2015	2017	2019	US 2019
Current Smoking	20.7	19.3	18.7	16.0
High Blood Pressure	33.1	34.7	35.1	32.3
High Cholesterol	38.2	35.1	35.0	33.1
Overweight (BMI>25)	35.1	34.9	34.3	34.6
Obesity (BMI≥30)	32.3	33.0	36.0	32.1

## Signs & Symptoms

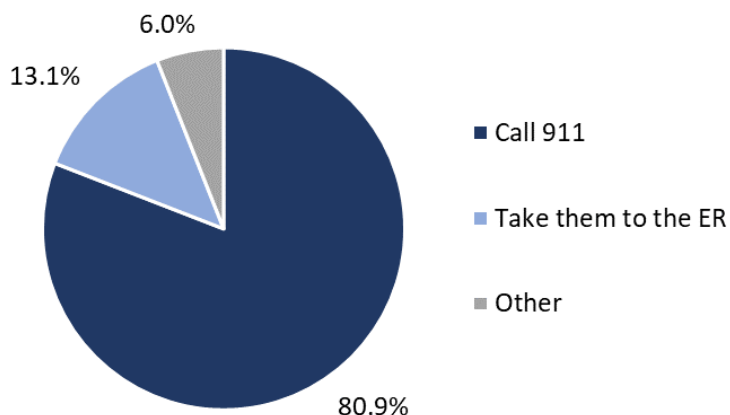
Respondents of the 2019 MiBRFS were asked to list the three most important signs and/or symptoms of stroke (Figure 1). Respondents reported a sudden onset of confusion/trouble speaking (45.1%) and a sudden onset of numbness/weakness of the face, arms, or legs (48.4%) as the most important signs of stroke, followed by trouble walking/dizziness or loss of balance (8.1%). In addition, a sudden onset of chest pain or discomfort was incorrectly identified as a stroke warning sign by 7.0% of respondent (*data not shown*).



**Figure 1. Awareness of Stroke Signs and Symptoms Among Adults Aged 18 and Older, 2019 MiBRFS**

## Stroke Response

Respondents were asked what their initial response would be if they observed someone exhibiting stroke warning signs. A total of 80.9% of respondents reported that they would call 9-1-1 as their initial response, while 13.1% would have used personal transportation to deliver the stroke patient to the emergency department. The remaining 6.0% of respondents reported that they would take medication, call their doctor, or wait it out depending on the severity of symptoms.



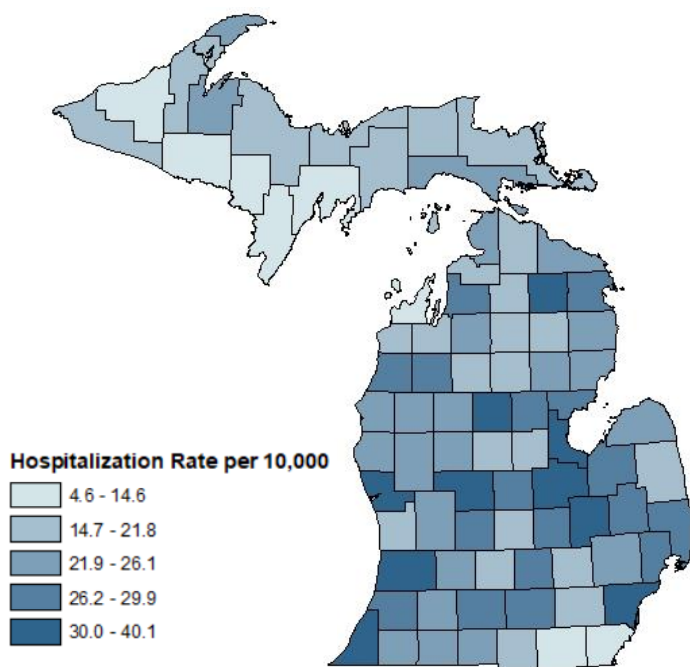
**Figure 2. Reported Stroke Response Among Adults Aged 18 and Older, 2019 MiBRFS**

## Stroke Hospitalization

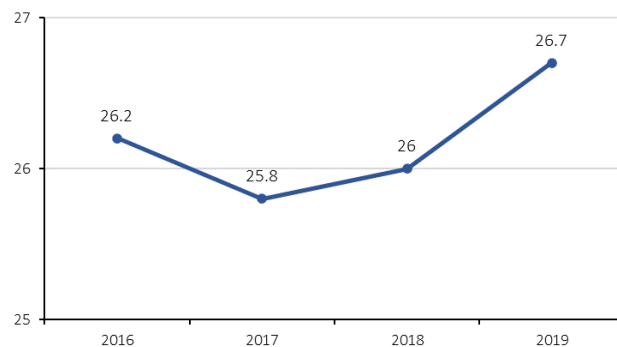
There was a 0.7% increase in Michigan's age-adjusted stroke hospitalization rate from 2018-2019 (Figure 3). However, disparities among race and gender groups have persisted for decades.

Figure 4 displays a slight increase in stroke hospitalizations among each race and sex category except for white women, which remained the same. From 2016-2019, the highest burden of stroke hospitalization was experienced by the 65–84 age group at 12.9% followed by the 35–64 age group at 10.7% (Figure 5).

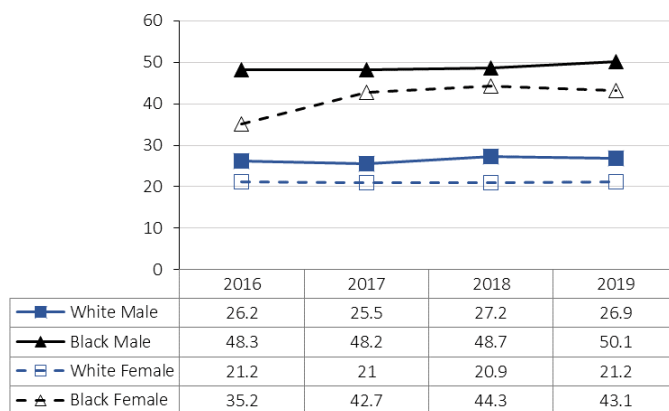
The overall age-adjusted stroke hospitalization rate in Michigan in 2019 was 26.7 per 10,000 people. Twenty-three counties experienced hospitalization rates above the state rate, the highest being Montmorency County (40.1 per 10,000) (Figure 6). Dickinson County experienced the lowest hospitalization rate in Michigan at 4.6 per 10,000.



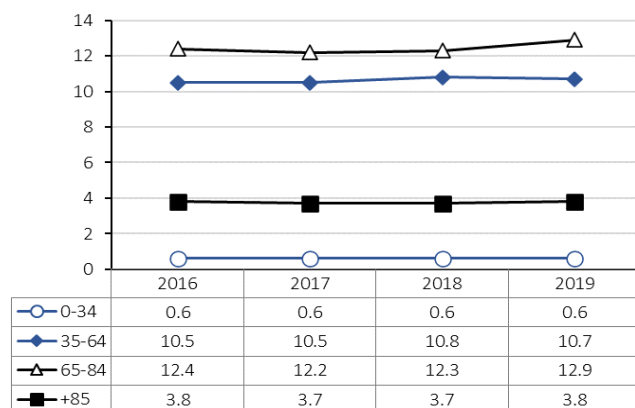
**Figure 6. Stroke Hospitalization Rate (per 10,000) by Michigan County of Residence, 2019**



**Figure 3. Michigan Age-Adjusted Hospitalization Rate by Year (per 10,000) 2016-2019**



**Figure 4. Michigan Age-Adjusted Hospitalization Rate (per 10,000) by Sex and Race 2016-2019**



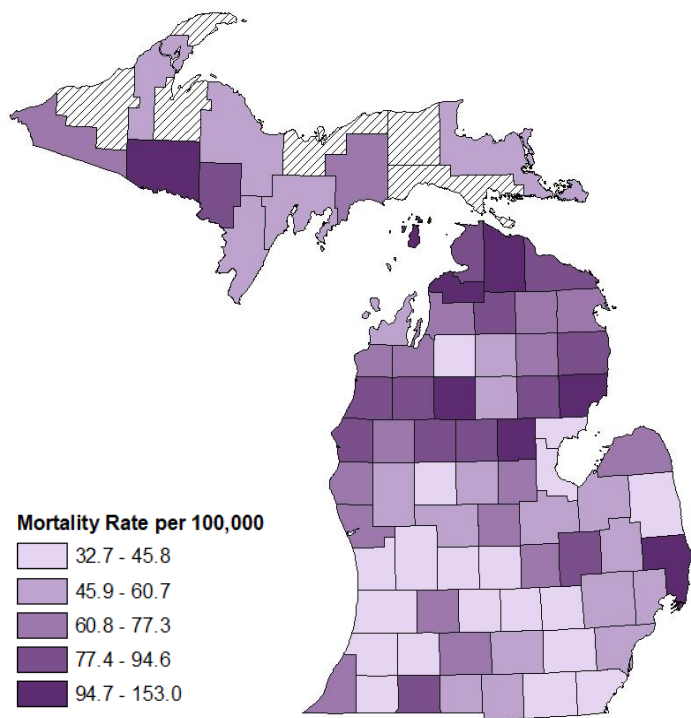
**Figure 5. Michigan Age-Adjusted Hospitalization Rate (per 10,000) by Age Group 2016-2019**

## Mortality

The age-adjusted stroke mortality rate in Michigan increased by 1.8% from 2017-2018. Figure 7 shows rates in Michigan compared to the United States and the Healthy People 2030 target goal of 33.4 per 100,000.

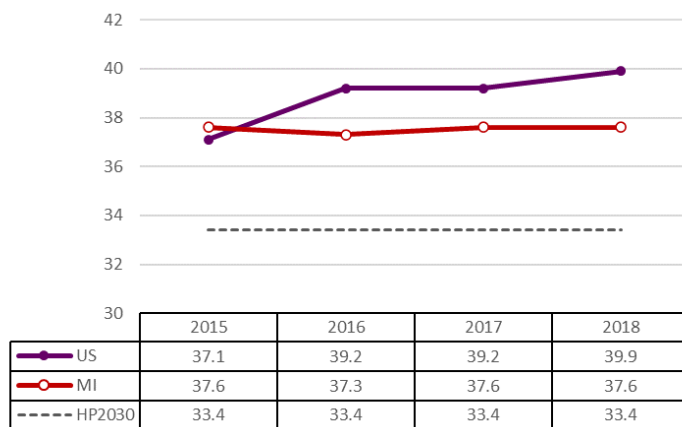
In 2018, Michigan was ranked as having the 15<sup>th</sup> highest stroke mortality rate in the United States.<sup>3</sup> Fifty-two counties experienced stroke mortality rates above the state rate of 39.9 per 100,000. Iron County experienced the highest stroke mortality rate (152.9 per 100,000) while Ionia County experienced the lowest (32.7 per 100,000), Figure 8.

Disparities in stroke mortality have persisted among sex and race groups. White males experienced the largest increase in stroke mortality since 2015, from 34.6 per 100,000 to 38.4 per 100,000. Black males continued to experience the highest stroke mortality rate from 2015-2018, followed by Black females, Figure 9.

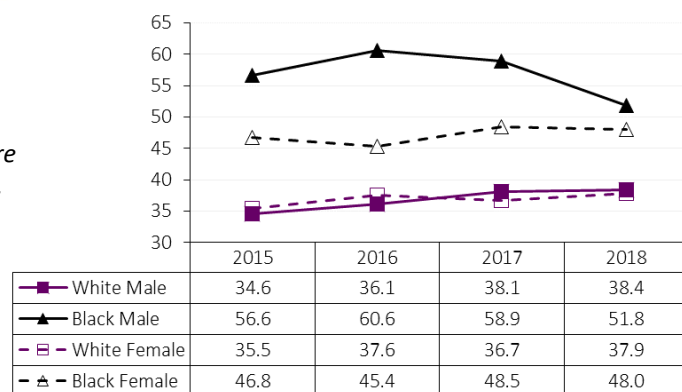


**\*\* Counties filled with grey hatch are the result of data that were suppressed due to experiencing 5 or less stroke deaths in 2018.**

**Figure 8. Stroke Mortality Rates per 100,000 by Michigan County of Residence, 2018**



**Figure 7. Michigan Age-Adjusted Stroke Mortality Rate by Year (per 100,000) 2015-2018**



**Figure 9. Michigan Age-Adjusted Mortality Rate (per 100,000) by Sex and Race 2015-2018**

## MiSP Compliance Measures

MiSP works with over 50 hospitals and 13 Medical Control Authorities representing 175 EMS agencies in Michigan to improve stroke care quality and patient outcomes statewide. Hospital stroke care is measured across 10 consensus performance measures and a defect-free care composite measure endorsed by the American Heart Association. Table 2 displays aggregate performance measures for hospitals participating in MiSP. Hospital performance measure reports are provided regularly to identify measures that require focused quality improvement efforts.

Table 2. Hospital Performance Measure Compliance, 2020

Performance Measure	Compliance (%)
PM1: VTE Prophylaxis	95.9%
PM2: Antithrombotics at Discharge	97.8%
PM3: Anticoag for AFib/AFlutter	95.0%
PM4: t-PA Initiated	90.9%
PM5: Early Antithrombotics	96.1%
PM6: Statin at Discharge	96.7%
PM7: Dysphagia Screen	78.9%
PM8: Stroke Education	95.1%
PM9: Smoking Cessation	99.0%
PM10: Assessed for Rehab	97.6%
Defect-Free	74.9%

## Program Implications

The Michigan Department of Health and Human Services has recognized the growing need to implement a statewide system of stroke care. MiSP is committed to implementing stroke quality improvement initiatives to increase stroke education and improve patient care and outcomes. The MiSP team has collaborated with EMS, hospital, and other care providers to improve the response and treatment of acute stroke events as well as host statewide professional conferences and numerous educational programs. Quarterly and annual surveillance data from participating EMS and hospital partners are used to identify quality improvement opportunities and target high burden populations. The funding provided by the Centers for Disease Control and Prevention (CDC) has strengthened the development of stroke systems of care in Michigan. Ongoing initiatives are needed to maintain progress and expand the translation of science into practice.

For more information about MiSP, please visit: [Michigan.gov/stroke](https://Michigan.gov/stroke)

## Reference

<sup>1</sup>American Stroke Association. (2021). About Stroke. *American Heart Association*.

<sup>2</sup>1970-2018 Michigan Resident Death Files, Division for Vital Records & Health Statistics, Michigan Department of Health & Human Services; Population Estimate (latest update 7/2019), National Center for Health Statistics, U.S. Census Populations With Bridged Race Categories ; National Vital Statistics Reports, National Center for Health Statistics.

<sup>3</sup>Centers for Disease Control and Prevention. (2020). Stroke Mortality by State. *National Center for Health Statistics*.

## Suggested Citation

Miesen, K. & Nickles, A. Stroke Systems of Care Brief. Michigan Department of Health and Human Services, Lifecourse Epidemiology and Genomics Division. Lansing, MI. April 2021.

This publication was supported by the Paul Coverdell National Acute Stroke Registry Program Cooperative Agreement Number 6 NU58DP006076-06-01, funded by the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or the Department of Health and Human Services.

The Michigan Department of Health and Human Services will not exclude from participation in, deny benefits of, or discriminate against any individual or group because of race, sex, religion, age, national origin, color, height, weight, marital status, gender identification or expression, sexual orientation, partisan considerations, or a disability or genetic information that is unrelated to the person's eligibility.