

7.2 Cardiovascular Disease

Heart disease and stroke are the first and fourth leading causes of death for both men and women in the United States, accounting for 30% of deaths in 2009.¹

Heart Disease

In the United States, someone has a heart attack every 34 seconds and someone dies of a heart disease-related event every minute. More than 910,000 Americans die of cardiovascular diseases each year, which is 1 death every 35 seconds.² In Kalamazoo County in 2009, heart disease accounted for 19.9% (396) of all deaths, and was the second leading cause of death.³

The economic impact of cardiovascular diseases on our nation's health care system continues to grow as the population ages.⁴ The cost of heart disease in the United States is projected to be \$316.4 billion in 2010, including health care expenditures and lost productivity from death and disability.⁵

Nine out of ten heart disease patients have at least one of the following risk factors for heart disease: high cholesterol, high blood pressure, diabetes, cigarette smoking, overweight or obesity, poor diet, physical inactivity, or alcohol use.⁶ These medical conditions and lifestyle choices increase the risk of developing heart disease.

Stroke

In the United States, someone has a stroke every 40 seconds and every three to four minutes someone dies of stroke.⁷ In Kalamazoo County in 2009, stroke caused 4.8% (96) of all deaths and was the fifth leading cause of death.

Stroke is a leading cause of long-term disability.⁸ It was projected that in 2009, stroke would cost the United States \$68.9 billion including health care expenditures and lost productivity.⁹

Risk factors for stroke include inactivity, obesity, high blood pressure, cigarette smoking, high cholesterol and diabetes.¹⁰

¹ Centers for Disease Control and Prevention, National Center for Health Statistics, Deaths: Final Data for 2009. Accessed at http://www.cdc.gov/nchs/data/dvs/deaths_2009_release.pdf.

² Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Heart Disease Fact Sheet. Accessed at http://www.cdc.gov/dhdsp/library/fs_heart_disease.htm.

³ Michigan Department of Community Health, Division for Vital Records and Health Data Development, Resident Death File. For more information about leading causes of death in Kalamazoo County, please refer to *Section 3: Life Expectancy and Leading Causes of Death* of the Kalamazoo County Health Surveillance Data Book.

⁴ Division for Heart Disease Prevention, Centers for Disease Control and Prevention, 2006, accessed at <http://www.cdc.gov/nccdphp/publications/aag/cvh.htm>

⁵ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Heart Disease Fact Sheet. Accessed at http://www.cdc.gov/dhdsp/library/fs_heart_disease.htm.

⁶ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Heart Disease Fact Sheet. Accessed at http://www.cdc.gov/dhdsp/library/fs_heart_disease.htm.

⁷ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Stroke Facts. Accessed at <http://www.cdc.gov/stroke/facts.htm>.

⁸ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Stroke Facts. Accessed at <http://www.cdc.gov/stroke/facts.htm>.

⁹ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Stroke Facts. Accessed at <http://www.cdc.gov/stroke/facts.htm>.

¹⁰ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, Stroke Facts. Accessed at <http://www.cdc.gov/stroke/facts.htm>.

7.2.1 Cardiovascular Disease Risk Factors and Screening

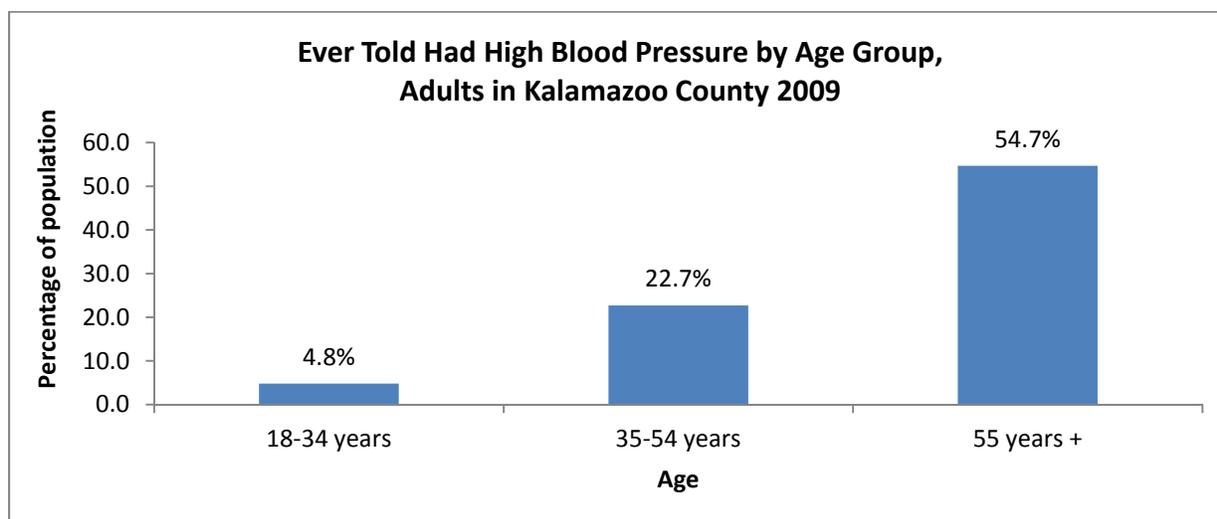
High Blood Pressure

It is estimated that 1 of 3 American adults has high blood pressure or hypertension. Having high blood pressure increases one's chance for developing heart disease, a stroke, and other serious conditions.¹¹

In Kalamazoo County in 2009, 20.8% of adults had ever been told by a health professional that they had high blood pressure. This proportion was lower than the proportion in Michigan in 2009 (30.4%) and was smaller than the proportion reporting this risk factor in 2004 in Kalamazoo County (23.4%).^{12,13}

Healthy People
2020 Goal
Reduce the proportion of
adults with high blood
pressure/hypertension to
26.9%.

The percentage of adults reporting that they had ever been told they had high blood pressure increased with increasing age in Kalamazoo County in 2009. Among adults age 55 and older, more than half had been told that they had high blood pressure.



Source: Kalamazoo County 2009 Behavioral Risk Factor Survey

Among Kalamazoo County adults who had ever been told they had high blood pressure, 68.8% reported currently taking medication to control their high blood pressure. This was a slight drop from 2004 when 70.3% were currently taking medication. As reported in 2004, 82.4% were dieting to lose weight, using less salt in diet, drinking less alcohol, or exercising to control their high blood pressure.¹⁴

¹¹ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Accessed online at <http://www.cdc.gov/bloodpressure/>

¹² Michigan 2009 Behavioral Risk Factor Survey, accessed online at http://www.michigan.gov/documents/mdch/2009_MiBRFS_Standard_Tables_FINAL_318700_7.pdf

¹³ Kalamazoo County 2009 Behavioral Risk Factor Survey

¹⁴ Kalamazoo County 2004 Behavioral Risk Factor Survey

Hypertension Awareness among Adults Aged 18 Years and Older, Kalamazoo County 2009

Demographic Characteristics	Ever Told High Blood Pressure ^a		Taking Medication ^b	
	%	95% C.I.	%	95% C.I.
Total	20.8	(16.6 - 25.7)	68.8	(58.5 - 77.5)
Age				
18-34 years	4.8	(1.9 - 11.6)	25.4	(6.7 - 61.7)
35-54 years	22.7	(17.3 - 29.2)	61.2	(46.1 - 74.4)
55 years +	54.7	(46.8 - 62.3)	85.3	(74.4 - 92.0)
Gender				
Male	20.6	(14.6 - 28.2)	56.8	(41.3 - 71.1)
Female	21.5	(15.8 - 28.6)	78.7	(66.5 - 87.2)
Race				
White non-Hispanic	19.4	(14.9 - 24.9)	64.1	(52.2 - 74.4)
Black non-Hispanic	28.6	(16.0 - 45.7)	82.9	(60.0 - 94.0)
Education				
Less than HS or HS grad/GED	22.2	(14.7 - 32.1)	63.7	(47.2 - 77.5)
Some college or college degree	19.9	(15.2 - 25.6)	72.5	(58.8 - 83.0)
Income				
< \$35,000	27.7	(20.4 - 36.6)	62.0	(46.5 - 75.4)
\$35,000+	18.1	(12.9 - 24.8)	68.3	(51.2 - 81.5)
City/Out-County				
City of Kalamazoo	22.1	(15.9 - 29.9)	72.7	(56.8 - 84.4)
Rest of County	18.4	(12.8 - 25.8)	70.4	(55.6 - 81.9)
Within City of Kalamazoo				
White in City	16.0	(9.9 - 24.7)	63.4	(40.2 - 81.6)
Black in City	33.8	(18.9 - 52.7)	80.2	(55.1 - 93.1)
<p>^a Among all respondents, the proportion who reported that they were ever told by a doctor, nurse, or other health professional that they have high blood pressure. Women who had high blood pressure during pregnancy and adults who were borderline hypertensive were considered to have not been diagnosed.</p> <p>^b Among respondents who had ever been told they had high blood pressure, the proportion who were currently taking medication to control their high blood pressure. Women who had high blood pressure during pregnancy were excluded from this estimate.</p>				

Source: Kalamazoo County 2009 Behavioral Risk Factor Survey

**Hypertension Awareness among Adults Aged 18 Years and Older,
Kalamazoo County 2004**

Demographic Characteristics	Using Diet/Exercise to Control High Blood Pressure ^a	
	%	95% C.I.
Total	82.4	(77.0 - 87.8)
Age		
18-24 years	85.9	*
25-34 years	83.6	*
35-44 years	79.2	*
45-54 years	89.5	(80.3 - 98.8)
55-64 years	91.7	(84.5 - 98.8)
65-74 years	78.6	(65.6 - 91.7)
75 years +	66.0	(51.7 - 80.3)
Gender		
Male	82.0	(73.0 - 91.1)
Female	82.7	(76.3 - 89.1)
Race		
White	82.3	(76.6 - 88.1)
Black	81.6	(64.5 - 98.6)
Education		
Less than HS	58.0	(36.7 - 79.3)
HS Graduate	82.9	(74.5 - 91.2)
Some college	91.6	(84.8 - 98.3)
College graduate	85.5	(75.6 - 95.4)
Income		
< \$20,000	79.3	(67.0 - 91.7)
\$20-34,999	93.5	(87.5 - 99.5)
\$35-49,999	80.3	(66.2 - 94.5)
\$50-74,999	85.6	(71.3 - 99.9)
\$75,000+	88.6	(77.3 - 99.9)
City/Out-County		
City of Kalamazoo	75.9	(65.5 - 86.3)
Rest of County	86.0	(79.9 - 92.1)
Within City of Kalamazoo		
White in City	74.2	(61.7 - 86.6)
Black in City	79.0	(59.8 - 98.2)

^a Among those who were ever told that they had high blood pressure, the proportion who reported that they were currently doing any of the following to control high blood pressure: dieting to lose weight, using less salt in diet, drinking less alcohol, or exercising.

*Confidence interval exceeds possible limits

Source: Kalamazoo County 2004 Behavioral Risk Factor Survey

High Cholesterol

High blood cholesterol is a major risk factor for heart disease. Although cholesterol is needed for the body to function normally, when there is too much cholesterol it is deposited in the arteries and can lead to narrowing of the arteries and heart disease.¹⁵ Although high cholesterol does not cause symptoms, it can be easily checked and can be controlled.¹⁶

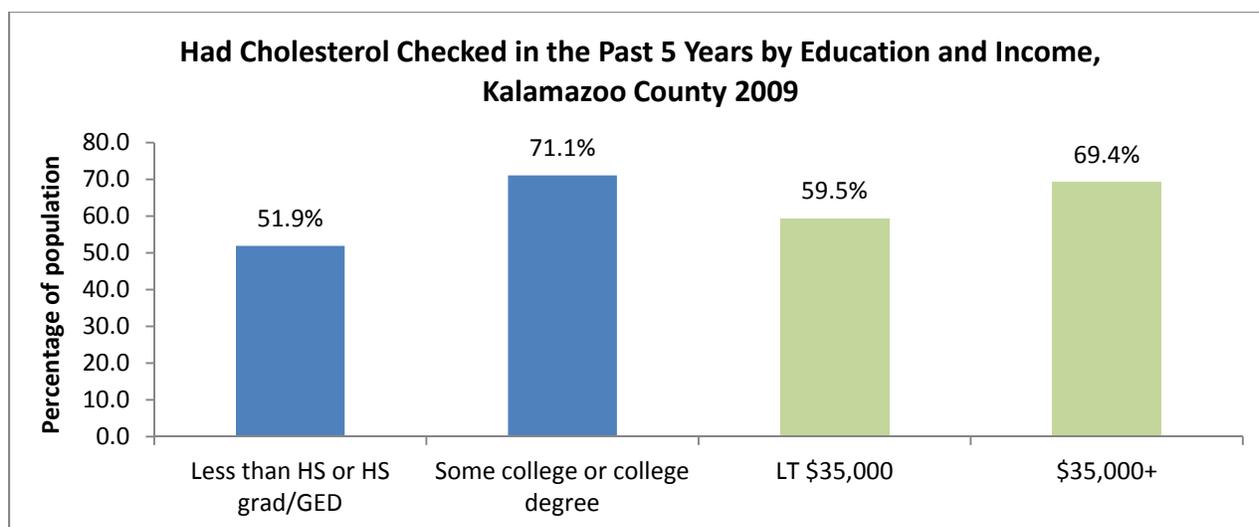
In 2009, 68.7% of Kalamazoo County adults reported that they had ever had their blood cholesterol checked, and 63.8% of adults had had their cholesterol checked within the past five years.

Healthy People 2020 Goal
Increase the proportion of adults who have had their blood cholesterol checked within the preceding 5 years to 82.1%.

Healthy People 2020 Goal
Reduce the proportion of adults with total high blood cholesterol levels to 13.5%.

Among Kalamazoo County adults who had ever had their cholesterol checked, in 2009 35.2% reported that they had been told that their cholesterol was high. This was similar to the proportion in 2004 in Kalamazoo County reporting high cholesterol (36.6%) and to the proportion in Michigan in 2009 with high cholesterol (38.9%).¹⁷

The percentage of adults who had their cholesterol checked within the previous five years increased with increasing educational levels and increasing income. White adults were more likely than black adults to have had their cholesterol checked in this timeframe (63.9% vs. 59.5%), and adults in the City of Kalamazoo were more likely than adults in the rest of Kalamazoo County to have had a timely cholesterol check (73.3% vs. 61.7%).



Source: Kalamazoo County 2009 Behavioral Risk Factor Survey

¹⁵ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Accessed online at <http://www.cdc.gov/cholesterol/>

¹⁶ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Accessed online at <http://www.cdc.gov/cholesterol/>

¹⁷ Kalamazoo County 2009 Behavioral Risk Factor Survey; Kalamazoo County 2004 Behavioral Risk Factor Survey; Michigan 2009 Behavioral Risk Factor Survey

**Cholesterol Screening and High Cholesterol Among
Adults Aged 18 Years and Older, Kalamazoo County 2009**

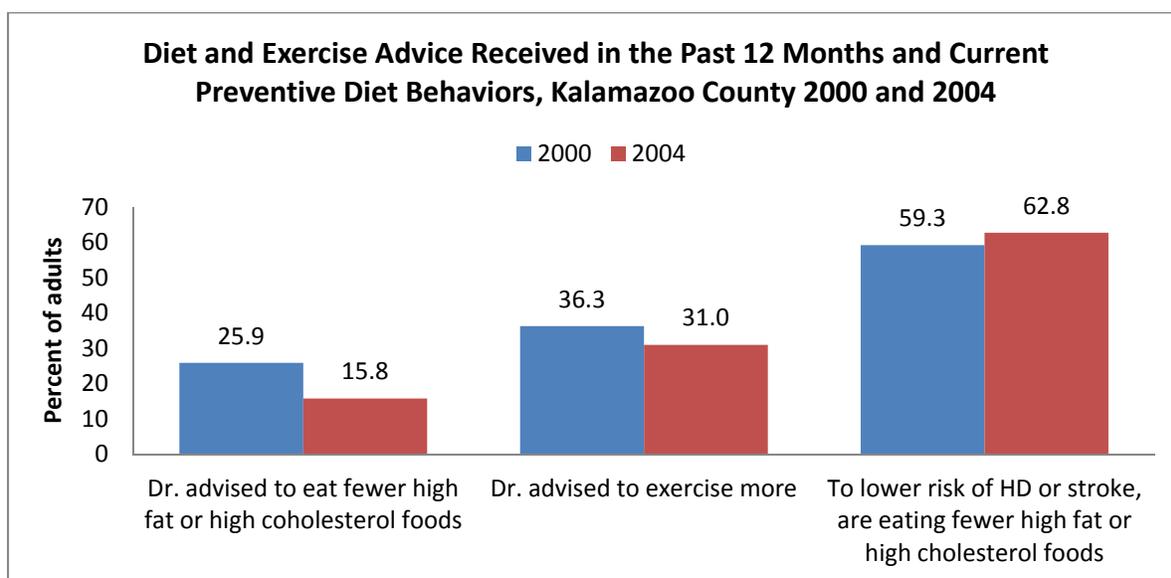
Demographic Characteristics	Cholesterol Ever Checked ^a		Cholesterol Checked in Past 5 Years ^b		Told had High Cholesterol ^c	
	%	95% C.I.	%	95% C.I.	%	95% C.I.
Total	68.7	(57.4 - 78.1)	63.8	(53.3 - 73.1)	35.2	(29.6 - 41.2)
Age						
18-34 years	38.4	(24.1 - 55.1)	38.1	(23.9 - 54.8)	14.9	(4.5 - 39.4)
35-54 years	86.9	(80.8 - 91.3)	77.2	(70.1 - 83.0)	35.2	(28.2 - 43.0)
55 years +	97.5	(95.6 - 98.6)	94.1	(90.8 - 96.2)	55.3	(46.9 - 63.4)
Gender						
Male	69.1	(52.8 - 81.8)	62.8	(48.1 - 75.4)	32.4	(25.0 - 41.0)
Female	69.5	(52.8 - 82.3)	65.8	(50.1 - 78.7)	37.6	(30.0 - 45.9)
Race						
White non-Hispanic	68.9	(56.2 - 79.4)	63.9	(52.2 - 74.2)	35.7	(29.5 - 42.3)
Black non-Hispanic	59.9	(32.8 - 82.1)	59.5	(32.6 - 81.7)	26.9	(15.1 - 43.0)
Education						
Less than HS or HS grad/GED	56.6	(39.1 - 72.6)	51.9	(35.8 - 67.6)	36.6	(27.1 - 47.2)
Some college or college degree	76.0	(61.6 - 86.2)	71.1	(57.9 - 81.5)	34.6	(27.9 - 42.0)
Income						
< \$35,000	66.5	(53.8 - 77.2)	59.5	(47.6 - 70.5)	32.4	(23.9 - 42.1)
\$35,000+	73.7	(56.2 - 86.0)	69.4	(53.3 - 81.8)	34.0	(27.3 - 41.3)
City/Out-County						
City of Kalamazoo	81.8	(68.4 - 90.4)	73.3	(60.5 - 83.1)	27.2	(19.5 - 36.6)
Rest of County	64.8	(47.3 - 79.1)	61.7	(45.2 - 75.9)	39.9	(31.3 - 49.0)
Within City of Kalamazoo						
White in City	87.1	(72.9 - 94.5)	76.9	(63.1 - 86.7)	25.2	(16.3 - 36.8)
Black in City	68.8	(38.7 - 88.6)	68.3	(38.4 - 88.2)	29.6	(16.1 - 48.1)
^a Among all respondents, the proportion who reported ever having had their blood cholesterol checked. ^b Among all respondents, the proportion who reported that they have had their blood cholesterol checked within the past five years. ^c Among those who ever had their blood cholesterol checked, the proportion who reported that a doctor, nurse, or other health professional had told them that their cholesterol was high.						

Source: Kalamazoo County 2009 Behavioral Risk Factor Survey

Lifestyle Risk Factors

Having normal cholesterol levels and blood pressure reduces the risk of heart disease. Maintaining a healthy diet, being at a healthy weight, being active, not using tobacco, and for some people the use of certain medications can reduce cholesterol levels, blood pressure, and the risk of heart disease.¹⁸ (Please refer to *Section 4: Lifestyles* and *Section 10: Substance Abuse* of the Kalamazoo County Health Surveillance Data Book for statistics on nutrition, physical activity, weight control, and tobacco use.) People with diabetes are at increased risk for high blood pressure, so preventing or controlling diabetes is also important in reducing the risk of heart disease.¹⁹ (Please refer to *Section 7.3 Diabetes* of the Kalamazoo County Health Surveillance Data Book for more information about diabetes risk and prevalence in Kalamazoo County.)

Between 2000 and 2004, the percentage of adults reporting having received advice to eat fewer high fat or high cholesterol foods and the percentage reporting having received advice to exercise more has declined in Kalamazoo County.²⁰ In 2004, 62.8% of adults in Kalamazoo County were currently eating fewer high fat and high cholesterol foods in order to reduce their risk of developing cardiovascular disease.²¹ In 2000, 59.3% of adults in Kalamazoo County reported this behavior.²²



Source: Kalamazoo County 2004 Behavioral Risk Factor Survey; Kalamazoo County 2000 Behavioral Risk Factor Survey

¹⁸ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Accessed online at <http://www.cdc.gov/cholesterol/prevention.htm> and <http://www.cdc.gov/bloodpressure/prevention.htm>

¹⁹ Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Accessed online at <http://www.cdc.gov/bloodpressure/prevention.htm>

²⁰ Kalamazoo County 2000 and 2004 Behavioral Risk Factor Surveys

²¹ Kalamazoo County 2004 Behavioral Risk Factor Survey

²² Kalamazoo County 2000 Behavioral Risk Factor Survey

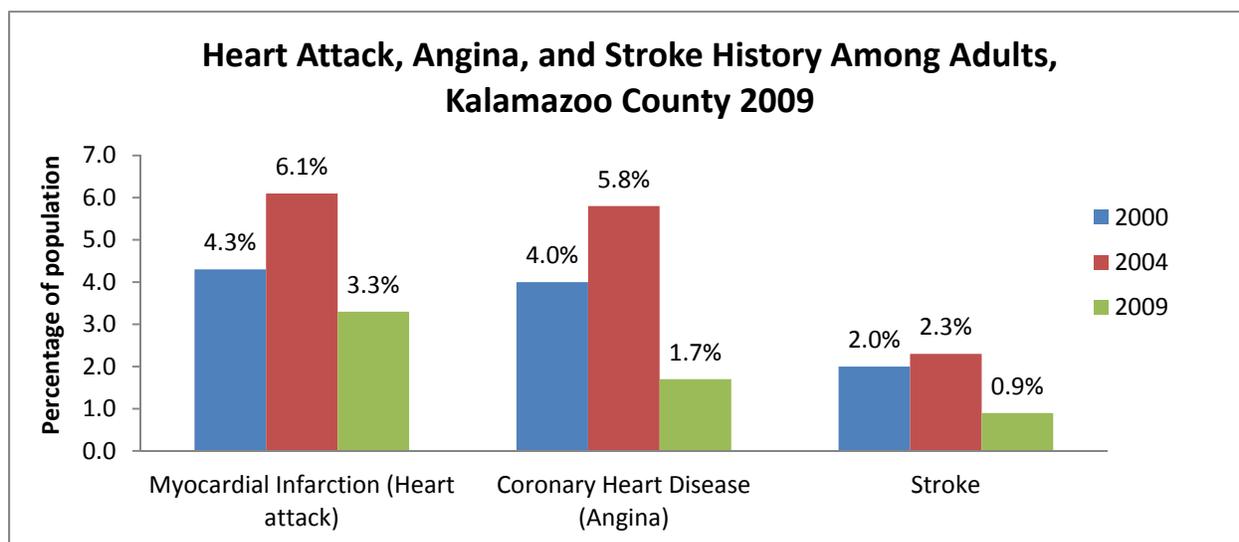
**Health Professional's Advice to Reduce Cardiovascular Disease Risk,
as Reported by Adults Aged 18 Years and Older, Kalamazoo County 2004**

Demographic Characteristics	In the Past 12 Months, Has a Health Professional Told You To:						To lower your risk of developing heart disease or stroke, are you eating fewer high fat or high cholesterol foods?	
	Eat fewer high fat or high cholesterol foods?		Eat more fruits and vegetables?		Be more physically active?		% Yes	95% C.I.
	% Yes	95% C.I.	% Yes	95% C.I.	% Yes	95% C.I.		
Total	15.8	(13.2 - 18.5)	31.0	(27.4 - 34.5)	31.0	(27.5 - 34.4)	62.8	(59.0 - 66.6)
Age								
18-24 years	7.0	(1.0 - 13.0)	26.1	(15.3 - 36.9)	30.1	(19.0 - 41.1)	50.9	(38.2 - 63.5)
25-34 years	11.2	(5.7 - 16.6)	27.6	(19.2 - 35.9)	25.9	(17.8 - 34.0)	56.1	(46.6 - 65.6)
35-44 years	18.1	(11.1 - 25.0)	28.6	(20.7 - 36.5)	32.7	(24.8 - 40.6)	64.0	(56.2 - 71.7)
45-54 years	24.0	(16.9 - 31.0)	34.6	(26.5 - 42.6)	34.4	(26.5 - 42.3)	66.8	(58.5 - 75.1)
55-64 years	20.1	(13.3 - 27.0)	32.0	(24.0 - 40.1)	35.8	(27.6 - 44.1)	69.8	(61.4 - 78.3)
65-74 years	14.6	(8.2 - 21.0)	41.0	(31.0 - 51.0)	32.6	(23.5 - 41.8)	76.1	(67.4 - 84.9)
75 years +	12.1	(5.3 - 18.8)	29.8	(18.3 - 41.3)	20.8	(11.5 - 30.1)	63.4	(51.3 - 75.6)
Gender								
Male	15.7	(11.5 - 19.9)	29.3	(23.9 - 34.7)	28.4	(23.1 - 33.7)	63.4	(57.4 - 69.3)
Female	15.9	(12.6 - 19.2)	32.5	(27.9 - 37.1)	33.4	(28.9 - 37.9)	62.2	(57.4 - 67.1)
Race								
White	15.4	(12.6 - 18.2)	28.7	(25.0 - 32.4)	29.5	(25.8 - 33.1)	63.6	(59.6 - 67.7)
Black	22.1	(11.5 - 32.8)	43.0	(29.8 - 56.1)	33.6	(21.8 - 45.5)	61.3	(48.1 - 74.6)
Education								
Less than HS	17.4	(8.8 - 26.0)	40.9	(28.2 - 53.6)	27.3	(16.2 - 38.5)	56.0	(43.2 - 68.9)
HS Graduate	11.6	(7.5 - 15.7)	33.3	(26.3 - 40.3)	26.5	(20.4 - 32.6)	56.3	(48.5 - 64.0)
Some college	20.2	(14.5 - 26.0)	32.9	(26.1 - 39.7)	39.1	(31.9 - 46.2)	65.9	(58.9 - 73.0)
College graduate	14.4	(10.5 - 18.3)	22.6	(18.1 - 27.2)	27.7	(22.8 - 32.6)	68.1	(62.7 - 73.5)
Income								
< \$20,000	15.8	(9.6 - 22.0)	38.7	(29.2 - 48.2)	31.0	(22.7 - 39.2)	56.9	(47.1 - 66.7)
\$20-34,999	20.7	(14.0 - 27.4)	38.6	(30.0 - 47.1)	37.0	(28.6 - 45.4)	63.4	(54.9 - 71.9)
\$35-49,999	15.2	(8.3 - 22.2)	24.8	(16.4 - 33.2)	28.1	(19.4 - 36.8)	56.6	(46.1 - 67.1)
\$50-74,999	20.3	(12.8 - 27.8)	29.7	(21.3 - 38.2)	25.6	(17.8 - 33.3)	77.2	(69.4 - 85.0)
\$75,000+	11.9	(6.4 - 17.4)	22.4	(15.4 - 29.3)	29.0	(21.5 - 36.5)	65.2	(57.3 - 73.1)
City/Out-County								
City of Kalamazoo	17.1	(12.4 - 21.7)	33.4	(27.3 - 39.4)	32.5	(26.6 - 38.4)	61.4	(55.1 - 67.6)
Rest of County	15.1	(11.9 - 18.3)	29.6	(25.2 - 34.0)	30.1	(25.8 - 34.4)	63.7	(58.9 - 68.5)
Within City of Kalamazoo								
White in City	15.0	(10.2 - 19.8)	28.3	(21.7 - 35.0)	29.6	(23.0 - 36.2)	62.5	(55.2 - 69.8)
Black in City	25.0	(12.8 - 37.3)	45.0	(31.1 - 58.8)	37.5	(24.4 - 50.5)	59.4	(45.7 - 73.1)

Source: Kalamazoo County 2004 Behavioral Risk Factor Survey

7.2.2 Cardiovascular Disease Prevalence

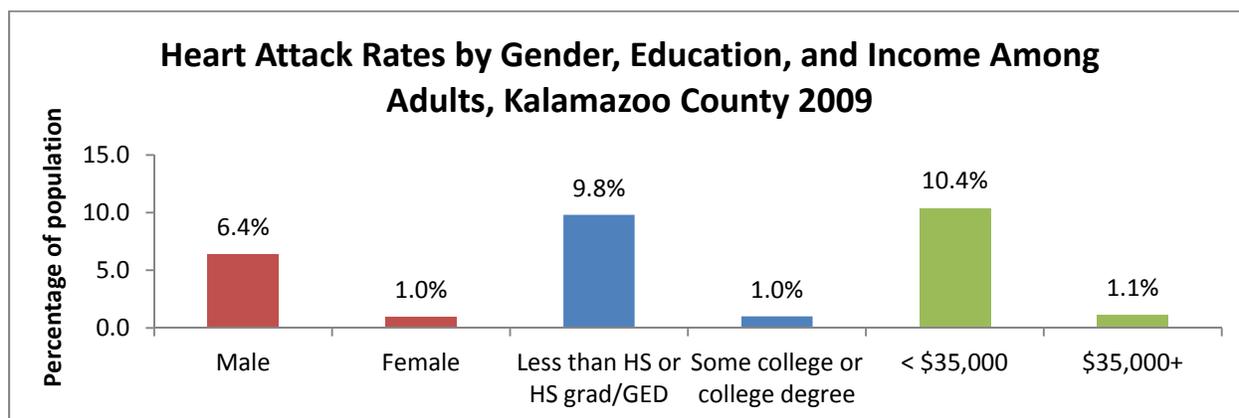
Estimates for the prevalence of cardiovascular disease among Kalamazoo County adults come from self-reported history of heart attack, angina and stroke. In 2009, 3.3% of adults reported that they had ever been told by a health professional that they had a heart attack (or myocardial infarction). This was slightly lower than the proportion reporting this in Kalamazoo County in 2004 and 2000, although the difference was not statistically significant.²³ The proportion of adults reporting having been told they had angina and the percentage that were told they had a stroke was also slightly lower in Kalamazoo County in 2009 than in 2004 and 2000. All rates were highest for heart attack, heart disease, and stroke in 2004.



Source: Kalamazoo County 2009 Behavioral Risk Factor Survey; Kalamazoo County 2004 Behavioral Risk Factor Survey; Kalamazoo County 2000 Behavioral Risk Factor Survey

²³ Kalamazoo County 2009 Behavioral Risk Factor Survey; Kalamazoo County 2004 Behavioral Risk Factor Survey; Kalamazoo County 2000 Behavioral Risk Factor Survey

In Kalamazoo County in 2009, adults with lower income, lower levels of education, and males were more likely to report having been told they had a heart attack. Michigan in 2010 reported having the same trends of adults with lower income, lower levels of education and males as more likely to have been told they had a heart attack. Taking gender specifically, in Michigan in 2010 among adults, 6.3% of males and 3.6% of females reported having ever been told they had a heart attack compared to 6.4% and 1.0% in Kalamazoo County.²⁴



Source: Kalamazoo County 2009 Behavioral Risk Factor Survey

²⁴ Michigan 2010 Behavioral Risk Factor Survey

**Heart Attack, Coronary Heart Disease, and Stroke Among
Adults Aged 18 Years and Older, Kalamazoo County 2009**

Demographic Characteristics	Has a Health Professional Ever Told You That You Had Any of the Following:					
	A heart attack (or myocardial infarction)		Angina (or coronary heart disease)		A stroke	
	% Yes	95% C.I.	% Yes	95% C.I.	% Yes	95% C.I.
Total	3.3	(1.1 - 9.8)	1.7	(0.7 - 3.7)	0.9	(0.3 - 2.6)
Age						
18-34 years	3.9	(0.5 - 23.7)	0.0	(0.0 - 0.0)	0.0	(0.0 - 0.0)
35-54 years	1.3	(0.2 - 8.6)	0.0	(0.0 - 0.0)	0.0	(0.0 - 0.0)
55 years +	6.4	(3.3 - 12.0)	10.0	(4.7 - 20.0)	5.2	(1.9 - 13.7)
Gender						
Male	6.4	(1.7 - 21.2)	2.1	(0.7 - 6.1)	1.8	(0.5 - 5.9)
Female	1.0	(0.4 - 2.5)	1.3	(0.4 - 4.4)	0.2	(0.1 - 0.9)
Race						
White non-Hispanic	4.0	(1.3 - 11.4)	0.9	(0.4 - 1.9)	0.5	(0.2 - 1.5)
Black non-Hispanic	0.0	(0.0 - 0.0)	4.0	(0.3 - 35.7)	0.5	(0.0 - 5.7)
Education						
Less than HS or HS grad/GED	9.8	(2.5 - 31.6)	0.8	(0.2 - 3.1)	0.2	(0.0 - 1.7)
Some college or college degree	1.0	(0.4 - 2.2)	2.0	(0.8 - 4.9)	1.2	(0.4 - 3.5)
Income						
< \$35,000	10.4	(2.7 - 32.8)	1.9	(0.8 - 4.4)	0.2	(0.0 - 1.8)
\$35,000+	1.1	(0.4 - 3.2)	1.3	(0.3 - 5.1)	0.6	(0.2 - 2.3)

Source: Kalamazoo County 2009 Behavioral Risk Factor Survey

7.2.3 Cardiovascular Disease Hospitalizations

All Hospitalizations

Hospitalizations are defined as inpatient hospital stays completed during a specified year. The number of hospitalizations is often greater than the number of persons hospitalized since some persons are hospitalized more than once during a year.²⁵

Hospitalizations due to cardiovascular disease include hospitalizations for heart diseases and cerebrovascular diseases. In Kalamazoo County in 2009, 10.1% of all hospitalizations were due to heart diseases (2,877) and 2.7% were due to cerebrovascular diseases (768). The rate of hospitalizations due to heart diseases in Kalamazoo County decreased in 2009 from the average rate between 2004 and 2008, and the rate remained lower than the rate in Michigan. The rate of hospitalizations due to cerebrovascular diseases was similar in 2009 to the average rate between 2004 and 2008 in Kalamazoo County, and the 2009 county rate was slightly lower than the rate in Michigan.²⁶

Hospitalizations and Rates per 10,000 Population for Heart Diseases, Cerebrovascular Diseases, and All Causes, Kalamazoo County and Michigan 2004-2008 vs. 2009

Disease	Area	Hospitalizations		Rate per 10,000	
		Average number 2004-2008	2009	Average annual rate 2004-2008 (+/- 95% CI)	2009 (+/- 95% CI)
Heart Diseases	Kalamazoo County	3,373	2,877	139.0 ± 2.1	115.8 ± 4.2
	Michigan	157,491	143,249	156.2 ± 0.4	143.7 ± 0.7
Cerebrovascular Diseases	Kalamazoo County	772	768	31.8 ± 1.0	30.9 ± 2.2
	Michigan	34,878	34,670	34.6 ± 0.2	34.8 ± 0.4
All Hospitalizations	Kalamazoo County	28,422	28,528	1,171.3 ± 6.1	1,148.4 ± 13.3
	Michigan	1,326,194	1,318,741	1,315.6 ± 1.0	1,322.7 ± 2.3

Source: Michigan Department of Community Health, Division for Vital Records and Health Data Development, Michigan Resident Inpatient Files

²⁵ Michigan Department of Community Health, Division for Vital Records and Health Data Development accessed online at <http://www.mdch.state.mi.us/pha/osr/chi/hospdx/frame.html>

²⁶ Michigan Department of Community Health, Division for Vital Records and Health Data Development, Michigan Resident Inpatient Files

Ambulatory Care Sensitive Hospitalizations

The Michigan Department of Community Health defines ambulatory care sensitive (ACS) hospitalizations as those hospitalizations “for conditions where timely and effective ambulatory care can decrease hospitalizations by preventing the onset of an illness or condition, controlling an acute episode of an illness or managing a chronic disease or condition.” A hospitalization is further defined as a continuous stay of one or more days; therefore a patient who was hospitalized on more than one separate occasion during the time period would be counted as more than one hospitalization.²⁷

Ambulatory care sensitive hospitalizations may reflect a lack of or failure of prevention efforts, a primary care resource shortage, poor performance of primary health care delivery systems, or other factors that create barriers to obtaining timely and effective care.²⁸ In 2009, 18.6% (5,297) of all hospitalizations in Kalamazoo County were categorized as ACS hospitalizations (20.5% of all hospitalizations in Michigan were ACS hospitalizations).²⁹

Ambulatory care sensitive hospitalizations related to cardiovascular disease are a combination of ACS hospitalizations related to congestive heart failure, hypertension and angina. Combined, these reasons for hospitalization represented 16.1% of all ACS hospitalizations, and 42.4% of ACS hospitalizations for chronic conditions in Kalamazoo County in 2009.³⁰

Congestive Heart Failure

Ambulatory care sensitive hospitalizations related to congestive heart failure are any related to hypertensive heart disease with heart failure and heart failure with acute pulmonary edema. They exclude heart failure resulting from a variety of procedures.

In 2009, there were 769 ACS hospitalizations due to congestive heart failure in Kalamazoo County, ranking it as the most common cause of ACS hospitalization. In 2009, congestive heart failure was the cause of 14.5% of ACS hospitalizations in Kalamazoo County and 14.1% of ACS hospitalizations in Michigan.³¹

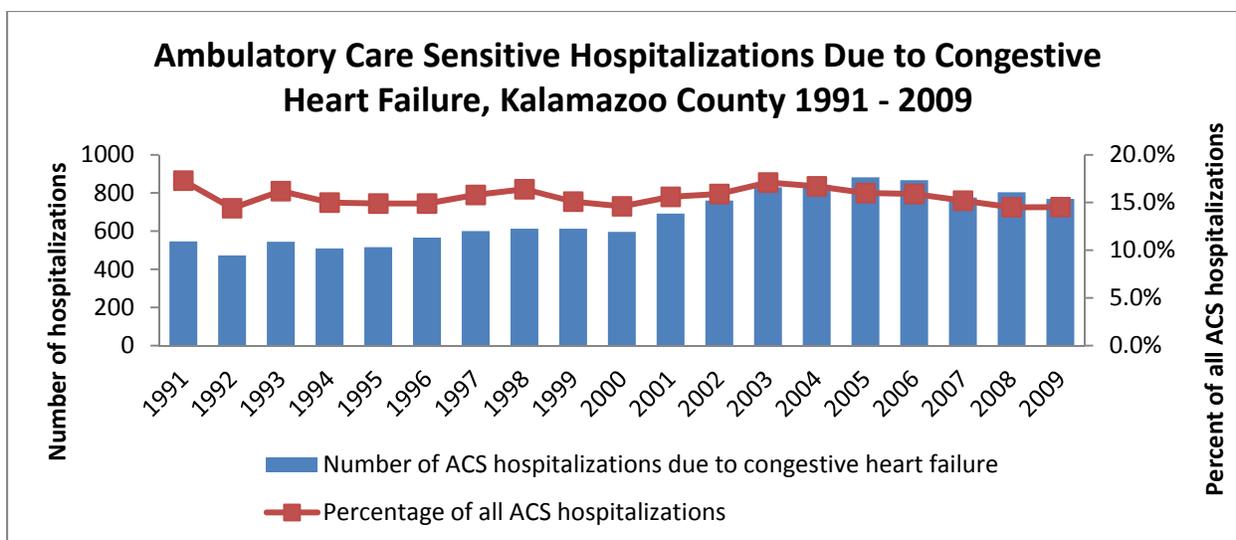
²⁷ Michigan Department of Community Health, Division for Vital Records and Health Data Development, accessed online at <http://www.mdch.state.mi.us/pha/osr/chi/hosp/frame.html>

²⁸ Michigan Department of Community Health, Division for Vital Records and Health Data Development, accessed online at <http://www.mdch.state.mi.us/pha/osr/chi/hosp/frame.html>

²⁹ Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files.

³⁰ Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files.

³¹ Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files.



Source: Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files

Ambulatory Care Sensitive (ACS) Hospitalizations due to Congestive Heart Failure in Kalamazoo County and Michigan

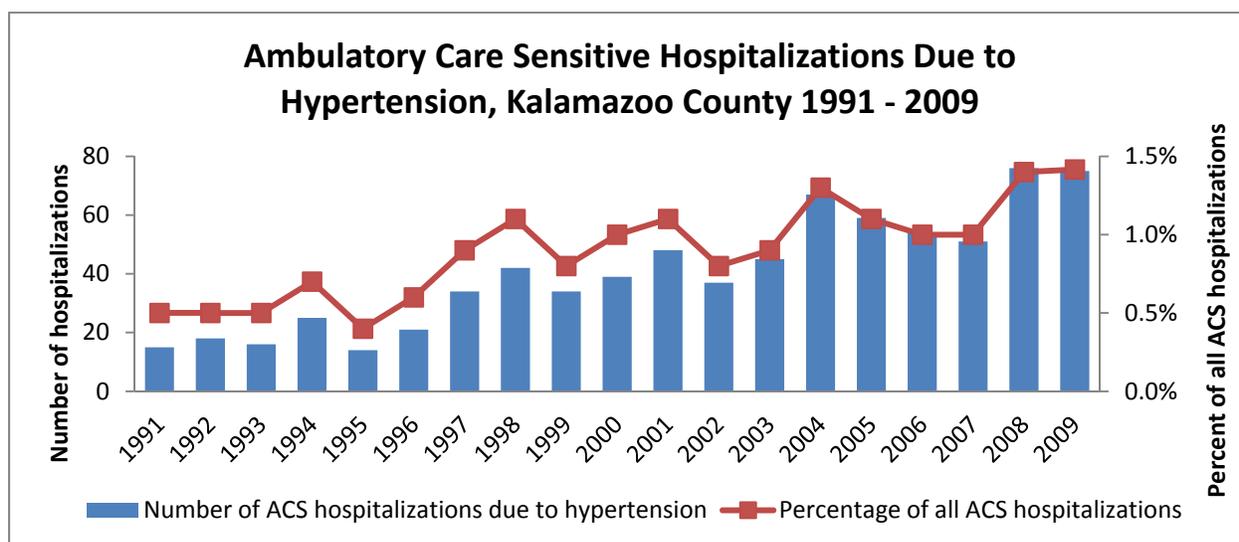
Year	Number	Percent of ACS hospitalizations	
	Kalamazoo County	Kalamazoo County	Percent in Michigan
1991	546	17.3%	14.9%
1992	473	14.4%	15.5%
1993	544	16.2%	15.7%
1994	509	15.0%	15.7%
1995	516	14.9%	15.9%
1996	566	14.9%	16.3%
1997	600	15.8%	17.0%
1998	613	16.4%	17.2%
1999	613	15.1%	16.6%
2000	596	14.6%	17.0%
2001	692	15.6%	16.7%
2002	760	15.9%	16.2%
2003	830	17.1%	16.7%
2004	843	16.7%	16.5%
2005	882	16.0%	15.7%
2006	867	15.9%	15.9%
2007	776	15.2%	15.0%
2008	804	14.5%	14.2%
2009	769	14.5%	14.1%

Source: Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files

Hypertension

Ambulatory care sensitive hospitalizations related to hypertension are any related to essential hypertension or hypertensive heart disease. They exclude any hypertension related to heart failure or hypertension resulting from a variety of procedures.

In 2008, there were 75 ACS hospitalizations due to hypertension in Kalamazoo County. In 2009, hypertension was the cause of 1.4% of the ACS hospitalizations in Kalamazoo County and 1.3% of ACS hospitalizations in Michigan.³²



Source: Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files.

³² Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files.

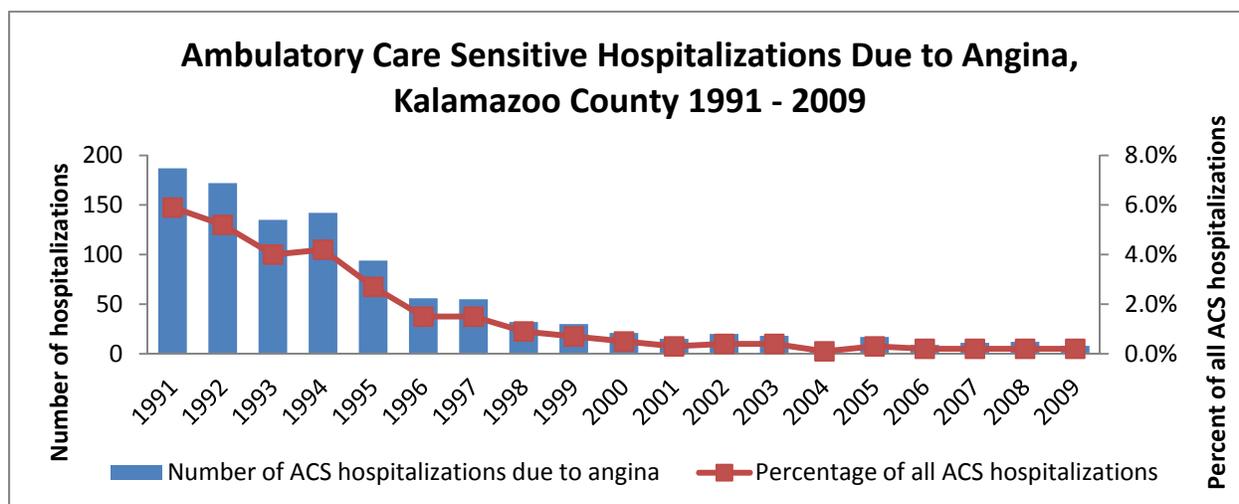
**Ambulatory Care Sensitive (ACS) Hospitalizations due to
Hypertension in Kalamazoo County and Michigan**

Year	Number	Percent of ACS hospitalizations	
	Kalamazoo County	Kalamazoo County	Percent in Michigan
1991	15	0.5%	0.8%
1992	18	0.5%	0.9%
1993	16	0.5%	0.9%
1994	25	0.7%	1.0%
1995	14	0.4%	1.0%
1996	21	0.6%	1.0%
1997	34	0.9%	1.1%
1998	42	1.1%	1.0%
1999	34	0.8%	1.1%
2000	39	1.0%	1.1%
2001	48	1.1%	1.2%
2002	37	0.8%	1.3%
2003	45	0.9%	1.3%
2004	67	1.3%	1.3%
2005	59	1.1%	1.1%
2006	54	1.0%	1.2%
2007	51	1.0%	1.1%
2008	76	1.4%	1.2%
2009	75	1.4%	1.3%

Source: Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files

Angina

Angina ambulatory care sensitive hospitalizations exclude any angina related to surgical procedures. In 2009, there were twelve ACS hospitalizations due to angina in Kalamazoo County. Angina was the cause of 0.2% of all ACS hospitalizations and 0.5% of ACS hospitalizations due to chronic conditions in Kalamazoo County.³³



Source: Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files

Ambulatory Care Sensitive (ACS) Hospitalizations due to Angina in Kalamazoo County and Michigan

Year	Number	Percent of ACS hospitalizations	
	Kalamazoo County	Kalamazoo County	Percent in Michigan
1991	187	5.9%	11.9%
1992	172	5.2%	12.1%
1993	135	4.0%	10.6%
1994	142	4.2%	8.4%
1995	94	2.7%	5.8%
1996	56	1.5%	4.7%
1997	55	1.5%	3.9%
1998	32	0.9%	3.2%
1999	30	0.7%	2.7%
2000	21	0.5%	2.5%
2001	15	0.3%	2.3%
2002	20	0.4%	2.0%
2003	18	0.4%	1.6%
2004	5	0.1%	1.1%
2005	17	0.3%	1.0%
2006	9	0.2%	0.8%
2007	11	0.2%	0.7%
2008	12	0.2%	0.6%
2009	8	0.2%	0.5%

Source: Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files

³³ Michigan Department of Community Health, Division for Vital Records and Health Statistics, Michigan Resident Inpatient Files.