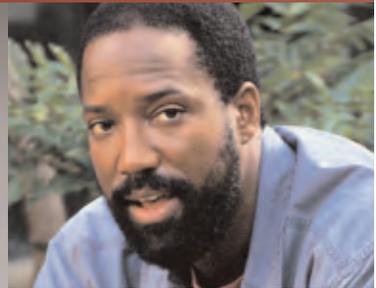
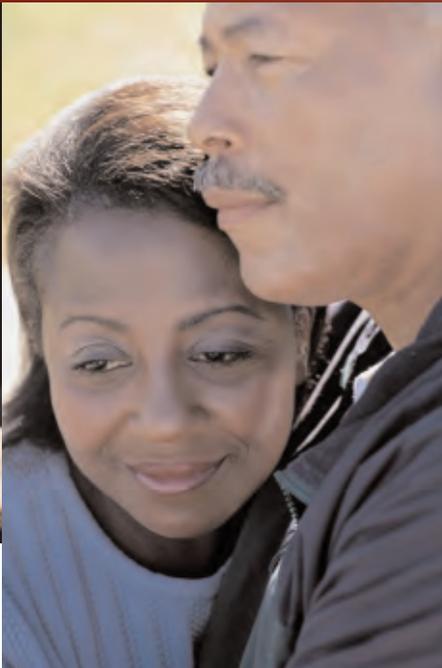


The Burden of

Heart Disease in Ohio 2009



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Introduction

Heart disease, which includes coronary heart disease, myocardial infarction and heart failure, is the leading cause of death in Ohio and the United States. Among the 50 states and the District of Columbia, Ohio ranks 14th highest for heart disease mortality. The estimated direct and indirect cost of heart disease for the United States in 2008 was \$287.3 billion.¹ This figure includes direct costs such as hospital, nursing home and physicians' care and prescriptions, as well as indirect cost from lost productivity related to morbidity and mortality. Heart disease is a major public health concern and economic burden for the United States and Ohio.

In 2005, heart disease caused 27 percent (28,995) of Ohio deaths. This includes 21,900 deaths attributed to coronary heart disease. Based on an average life expectancy of 75 years, in 2005, Ohioans lost more than 139,000 years of potential life due to heart disease. In addition, in 2003, there were more than 190,000 hospitalizations for heart disease, accounting for \$4.8 billion in charges. While the mean age for heart disease death among Ohioans is 77 years, 19 percent of these deaths occurred before age 65. The burden of heart disease is disproportionately greater for Ohio's black population. The mortality rate for black males was 21.8 percent higher than for white males and 26.1 percent higher for black females, compared to white females. Black Ohioans are also more likely to die prematurely from heart disease, compared to white Ohioans. On average, black males die seven years earlier from heart disease than white males and black females die nine years earlier than white females.

The *Burden of Heart Disease in Ohio* is a surveillance report that describes the impact of heart disease on Ohioans. Clinical and public health professionals can utilize the information in this report in several ways: 1) to document the magnitude of heart disease as a public health problem; 2) to monitor disease trends over time; 3) to detect changes in health care practices; 4) to educate the public, the community and policymakers about disease prevention; and, 5) to further develop and strengthen a system of care that will achieve the long-term goal of reducing death and disability from heart disease.

This report used the following existing data sources, each characterizing a different Ohio heart disease population group or system of care:

- Behavioral Risk Factor Surveillance System, which collects population-based statewide health data on Ohioans 18 years of age and older;
- Ohio's Emergency Medical Services data of transports of patients exhibiting signs and symptoms of heart disease, acute cardiac events and cardiac arrest;
- The Ohio Family Health Survey, which collected data on the health status of Ohioans, their access to care and health insurance;
- Ohio hospital discharge data, which provide information on Ohio residents who were admitted and discharged from the hospital;
- Ohio Medicare hospital claims, which provide information on Medicare recipients who were admitted and discharged from the hospital;
- Process of care measures, which provide information on inpatient care delivered to myocardial infarction and heart failure patients; and,
- Vital Statistics mortality data associated with heart disease.

Results from each data source are presented throughout the four chapters of the report. In addition, specific county-level data described in *The Burden of Heart Disease in Ohio* were published as a supplement available on the Ohio Department of Health Web site at <http://www.odh.ohio.gov>.

Key Findings

Chapter 1: Risk Factors, Prevalence and Access to Care

- Modifiable risk factors for heart disease include high blood pressure, diabetes, elevated blood cholesterol, physical inactivity, obesity and cigarette smoking. Many adult Ohioans report having these risk factors, and are at an increased risk for heart disease.
- In 2006, 5.6 percent of Ohio adults reported they had been told by a health care provider that they had coronary heart disease (CHD). Males (5.9 percent) had a slightly higher prevalence of CHD than females (5.3 percent).
- More males than females report having had a heart attack. In 2006, the prevalence for males was 6.7 percent and 4.0 percent for females.
- The average age of the first heart attack was 53.2 years for males and 60.0 years for females.
- The prevalence of coronary heart disease and heart attack varied by race/ethnicity and sex. In 2004-2006, Hispanic males (7.6 percent) and white males (5.3 percent) had the highest prevalence of coronary heart disease; Hispanic males (7.2 percent) and males of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) (7.4 percent) had the highest prevalence of heart attack, compared other racial/sex groups.
- More than half of adults with a history of heart attack (50.8 percent) or CHD (51.7 percent) reported limitations of daily activities compared to approximately 18 percent of those who did not report either condition.
- The majority of adults with cardiovascular disease (51.0 percent) reported Medicare as their primary insurance coverage.
- More than 80 percent (82.1) of adults with cardiovascular disease reported that they need or take medication for their chronic condition, in comparison to 38.4 percent of adults who did not have cardiovascular disease.
- Of adults who reported they had a heart attack, 39.2 percent reported receiving outpatient rehabilitation.

Chapter 2: Heart Attack Symptom Awareness and Emergency Medical Services

- In 2006, 33.8 percent of Ohio adults reported being able to recognize the symptoms of someone having a heart attack and the appropriate response of calling 911.
- Heart attack symptom awareness differed by race/ethnicity and sex. Black (22.5 percent), Hispanic (20.3 percent) and adults of other races (22.9 percent) were least likely to recognize the symptoms of a heart attack and appropriate response to call 911 when someone is having a heart attack, compared with white adults.
- In 2006, chest pain (95.2 percent) was the most recognized heart attack symptom; feeling weak, light-headed or faint (60.7 percent) and jaw, neck, or back pain (57.2 percent) were the least recognized symptoms.
- In 2005, there were 82,658 suspected cardiovascular/circulatory EMS transports in Ohio. The average transport time was 33.9 minutes.

- EMS transport times for suspected cardiovascular/circulatory events were longer in Ohio's Appalachian counties (38.4 minutes), compared with metropolitan counties (32.7 minutes).
- The availability of a hospital and the type of EMS service in a county impacted EMS transport times. Ohio counties without a hospital and with single EMS provider had longer transport times (55.4 minutes), compared with counties having at least one hospital and multiple EMS providers (33.2 minutes).
- There were 5,992 cardiac arrest transports in Ohio. The average EMS transport time from dispatch to hospital was 34.0 minutes.
- A 12-Lead ECG was used in 23 percent of suspected cardiovascular/circulatory EMS transports, and in 4.6 percent of cardiac arrest transports.

Chapter 3: Heart Disease Hospitalizations and Access to Care

- Heart disease is a leading cause of hospitalization in Ohio. In 2003, there were 528,637 discharges for heart disease, representing 37 percent of all hospitalizations.
- The majority of heart disease discharges were for persons over the age of 65. However, 30 percent of the discharges with heart disease as the principal diagnosis were for patients 45 to 64 years old.
- In 2003, total charges billed for discharges with heart disease listed as any diagnosis were more than \$11.4 billion. This figure represents the total amount billed and not actually collected.
- In 2003, the majority of patients with a principal diagnosis of heart disease were discharged to home (76.1 percent).
- In 2005, 12.4 percent of all Medicare beneficiaries had an inpatient hospitalization for heart disease.
- Between the years of 1999-2003, the number of discharges and the rate of discharges with coronary heart disease as the principal diagnosis decreased by 4.8 percent and 8.9 percent, respectively. Decreases in number of discharges and rates were also observed by sex. The age-adjusted rate for discharges decreased from 77.8 per 10,000 residents in 1999 to 70.9 per 10,000 residents in 2003. The number of discharges decreased from 90,871 in 1999 to 86,512 in 2003.
- In 2005, 7.6 percent (140,860) of Medicare beneficiaries had at least one hospitalization for coronary heart disease among the 1,843,322 total beneficiaries in Ohio. There were 272,826 hospital discharges among the 140,860 beneficiaries. This equates to an average of 1.9 hospitalizations for each beneficiary.
- In 2003, there were 30,624 discharges with myocardial infarction as the principal diagnosis among Ohio residents. Males (17,705 discharges) accounted for more discharges than females (12,919 discharges). The age-adjusted discharge rate for males (33.3 per 10,000 persons) was 83.0 percent higher, compared to the rate for females (18.2 per 10,000 discharges).
- Male Medicare beneficiaries had higher myocardial infarction hospital discharge rates than females. In 2005, white males had the highest myocardial infarction discharge rates (216.5 per 10,000 beneficiaries), followed by black males (182.9 per 10,000 beneficiaries), black females (164.6 per 10,000) and white females (165.2 per 10,000) had the lowest myocardial infarction discharge rates.

The Burden of Heart Disease in Ohio

- Heart failure was more often listed as a secondary diagnosis than a principal diagnosis. In 2003, there were 50,201 discharges with heart failure as the principal diagnosis and 200,105 with heart failure listed as any diagnosis.
- The prevalence of a heart failure hospital discharge was higher in beneficiaries aged 85 years and older. Nearly 18 percent of beneficiaries in this age group had a hospital discharge with a diagnosis of heart failure in their Medicare claims record.
- Hypertension was more commonly listed as a secondary diagnosis than a principal diagnosis. In 2003, 12,439 discharges had hypertension listed as the principal diagnosis, out of the 551,061 with any mention of hypertension.
- Black Medicare beneficiaries had the highest prevalence of a hypertension hospital discharge (16.5 percent), followed by Hispanic (14.8 percent) and white (13.2 percent) beneficiaries. Similar to trends observed with other forms of heart disease, beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) had the lowest prevalence of a hypertension hospital discharge (10.3 percent).
- In Ohio, 95.1 percent of patients sampled received the recommended inpatient hospital care for a heart attack. For six heart attack process measures with comparable national data, the percentage of Ohioans who received recommended care was higher than the average for all other states.
- In Ohio, 90.4 percent of patients sampled received the recommended inpatient hospital care for heart failure. For three process measures with comparable national data, the percentage for Ohio was higher than the average for all the other states. Two additional measures indicated that 68.0 percent of heart failure patients were given discharge instructions and 87.9 percent of patients sampled were given smoking cessation/advice counseling.

Chapter 4: Heart Disease Mortality

- Heart disease is the leading cause of death for both males and females. In 2005, heart disease accounted for 27 percent (28,995 deaths) of all deaths in Ohio.
- Since 1990, mortality from heart disease has declined significantly. From 1990 to 2005, heart disease mortality declined by 33 percent in Ohio.
- Black and white males have the highest mortality rates from heart disease. In 2005, the mortality rate was 344.4 deaths per 100,000 persons for black males and 282.6 deaths per 100,000 persons for white males. This compares to 227.2 for black females and 180.2 per 100,000 persons for white females.
- Heart disease is a cause of premature death for many Ohioans. In 2005, of those who died of heart disease, 19 percent died before age 65 and 33 percent died before the age of 75 (includes deaths before 65). Based on an average life expectancy of 75 years, Ohioans lost 139,393 years of potential life from heart disease.
- Coronary heart disease mortality rates in Ohio differ by race/sex. The highest mortality rate is among black males (267.0 per 100,000), followed by white males (221.2 per 100,000), then black females (166.9 per 10,000).
- In 2005, white males had the highest mortality rate (71.1 deaths per 100,000) for myocardial infarction followed by black males (56.5 per 100,000), compared with black and white females (45 and 40.5 per 100,000; respectively).
- In 2005, 2,076 Ohioans had heart failure listed as the underlying cause of death on their death certificate.

1

The Burden of Heart Disease in Ohio

Risk Factors, Prevalence and Access to Care



Introduction

Heart disease impacts the lives of many Ohioans. This section describes the prevalence of selected modifiable risk factors for heart disease and some of the actions Ohioans are taking to reduce their risk of a heart attack. It also illustrates how heart disease disproportionately affects certain segments of the population. The chapter also details the limitations on activities and access to health care for persons with heart disease.

The two data sources analyzed in this section are the Ohio Behavioral Risk Factor Surveillance System (BRFSS) and the Ohio Family Health Survey (OFHS). The BRFSS collects statewide, population-based health data on Ohioans 18 years of age and older. The 2004 OFHS was administered to more than 34,000 Ohioans, age 18 years and older. This survey was conducted to assess the access to and quality of health care for Ohioans.

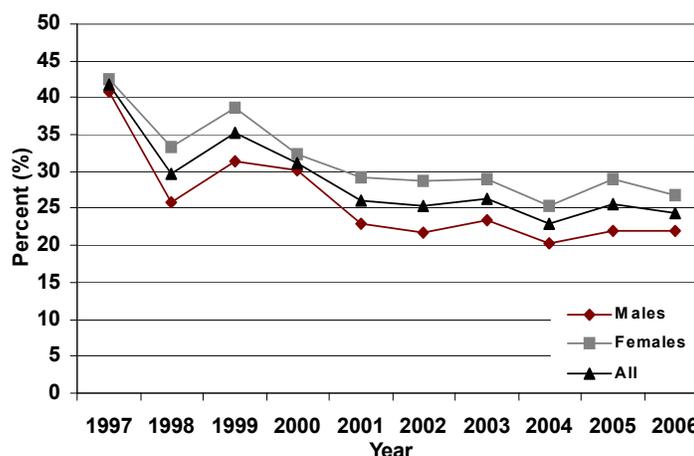
I. Risk Factors for Heart Disease

Risk factors are traits and lifestyle habits that increase the risk of disease. Nonmodifiable risk factors for heart disease include age, sex, family history and race. These risk factors cannot be changed but are important characteristics that should be considered when evaluating a person's total risk for heart disease. Modifiable risk factors for heart disease include high blood pressure, diabetes, elevated blood cholesterol, physical inactivity, obesity and cigarette smoking. These risk factors can be improved with lifestyle changes, medical monitoring and treatment, or both. All persons can reduce their risk of heart disease by addressing these risk factors. Control of risk factors is especially important for people who already have heart disease.²

Trends in Prevalence of Risk Factors

The percentage of adults who report having no physical activity during leisure time in the past month has decreased by 41 percent during the 10-year period of 1997 through 2006. More females report having no physical activity (26.8 percent in 2006), compared with males (22.1 percent) (Figure 1-1).

Figure 1-1. Prevalence of No Physical Activity in the Past Month by Sex and Year, Ohio 1997-2006.^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

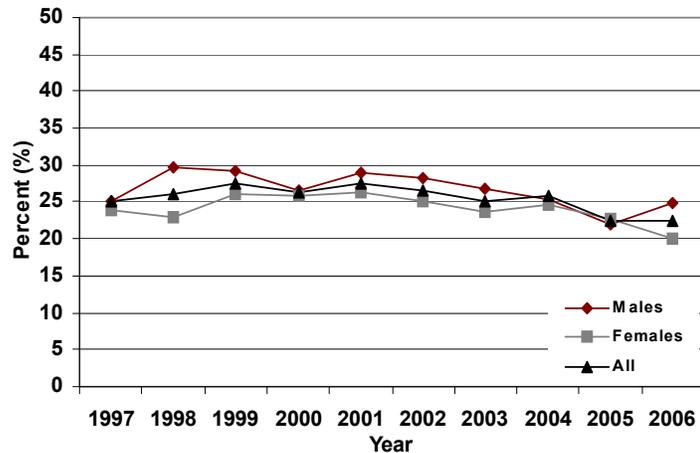
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²"Don't know/Not sure" and "Refused" were excluded from the denominator.

³For adults 18 years and older.

Figure 1-2. Prevalence of Cigarette Smoking by Sex and Year, Ohio 1997-2006.^{1,2,3}

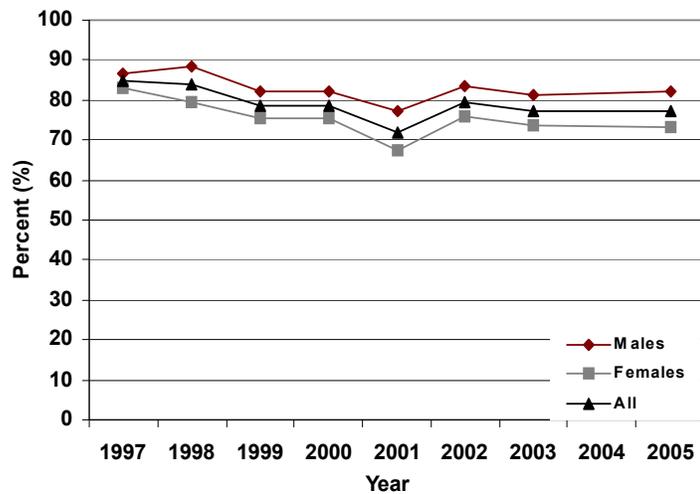
Cigarette smokers are not only two to four times more likely to develop coronary heart disease (CHD), compared with non-smokers, but they also are more likely to die from CHD.¹ Cigarette smoking increases the risk of dying from CHD by two to three times.¹ The prevalence of cigarette smoking among Ohio adults has decreased by nearly 11 percent from 25.1 percent in 1997 to 22.4 in 2006 (Figure 1-2).



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Figure 1-3. Prevalence of Adults Who Consumed Less Than Five Servings of Fruits and Vegetables per Day by Sex and Year, Ohio 1997-2005.^{1,2,3,4}

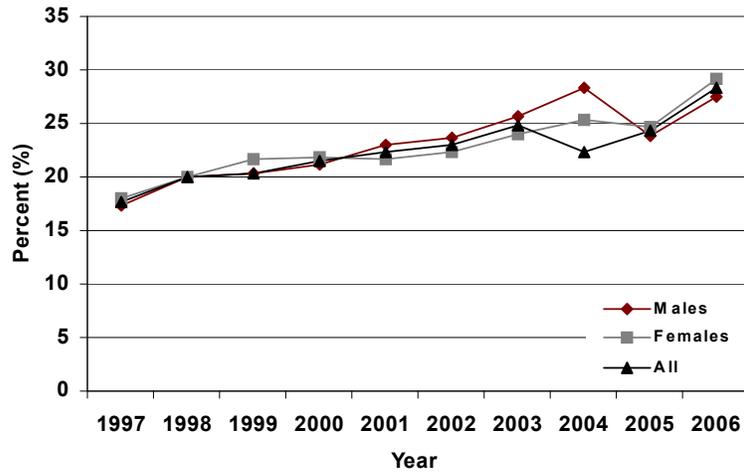
Eating a diet rich in fruits and vegetables can reduce a person's risk of developing heart disease.¹ The prevalence of adults who consumed less than five servings of fruits and vegetables per day has decreased by nearly 9 percent from 84.8 in 1997 to 77.4 percent in 2005 (Figure 1-3). However, this percentage (77.4 percent) has remained constant for the years 2003 and 2005 (not measured in 2004). A higher percentage of males report eating less than five servings of fruits and vegetables per day, compared with females. In 2005, the prevalence for males was 81.9 percent, compared with 73.3 percent for females (Figure 1-3).



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.
⁴Data not collected in 2004.

The prevalence of obesity, defined as a body mass index (BMI) greater than or equal to 30, has increased dramatically among Ohioans. Between 1997-2006, the prevalence of obesity has increased by 60 percent from 17.7 percent of adults classified as obese in 1997, to 28.4 percent in 2006 (Figure 1-4).

Figure 1-4. Prevalence of Obesity by Sex and Year, Ohio 1997-2006.^{1,2,3,4}

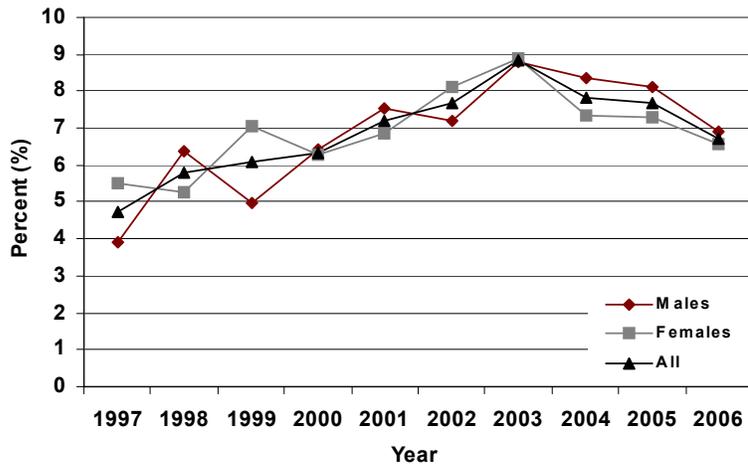


Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

- ¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
- ²"Don't know/Not sure" and "Refused" were excluded from the denominator.
- ³Obesity defined as BMI \geq 30.
- ⁴For adults 18 years and older.

Persons with diabetes are at an increased risk to develop heart disease and experience a cardiac event.¹ During the years 1997-2006, the prevalence of diabetes in adults increased by 43 percent (Figure 1-5).

Figure 1-5. Prevalence of Diabetes by Sex and Year, Ohio 1997-2006.^{1,2,3,4}

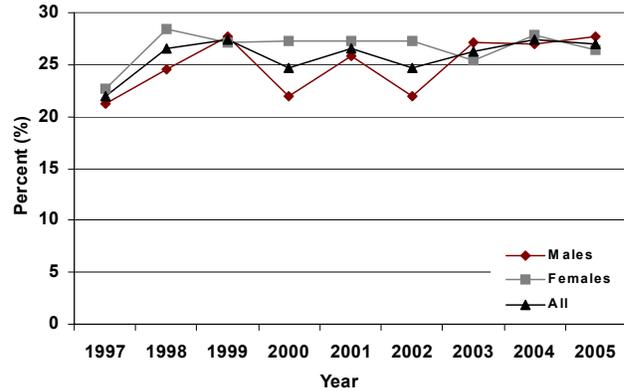


Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

- ¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
- ²"Don't know/Not sure" and "Refused" were excluded from the denominator.
- ³Female respondents who were told they had diabetes while pregnant were excluded from the numerator.
- ⁴For adults 18 years and older.

Hypertension, commonly referred to as high blood pressure, increases a person's risk of developing heart disease, stroke and other serious conditions.³ In 2005, nearly one-third of Ohio adults reported having high blood pressure. During the years of 1997-2005, the prevalence of high blood pressure in adults increased by 23 percent from 22.0 percent in 1997 to 27.1 percent in 2005 (Figure 1-6). High blood pressure can be controlled through lifestyle modification and medication. In 2005, more than 78 percent of adults who had high blood pressure reported taking medications to control it (data not shown).

Figure 1-6. Prevalence of High Blood Pressure by Sex and Year, Ohio 1997-2005.^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

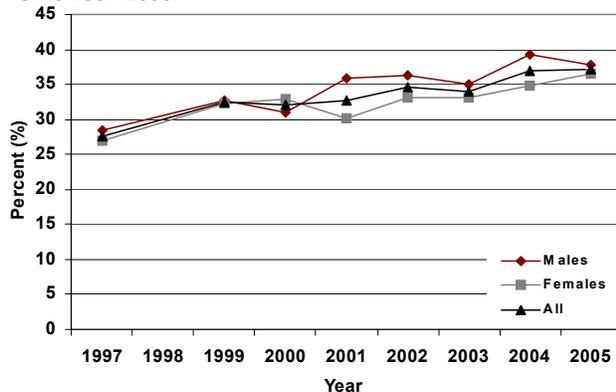
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²"Don't know/Not sure" and "Refused" were excluded from the denominator.

³Female respondents told only while they were pregnant were excluded from the numerator.

⁴For adults 18 years and older.

Figure 1-7. Prevalence of High Cholesterol by Sex and Year, Ohio 1997-2005.^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²"Don't know/Not sure" and "Refused" were excluded from the denominator.

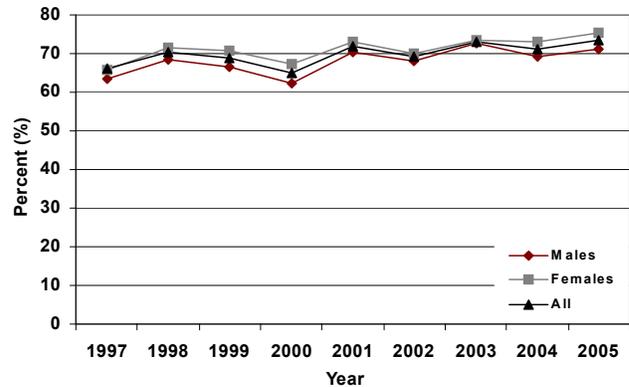
³Denominator includes only reported those who had their cholesterol checked.

⁴For adults 18 years and older.

During the same time period, the percentage of Ohioans who reported having their cholesterol checked within the past five years increased from 66.2 percent in 1997 to 73.5 percent in 2005. Though more Ohioans are being screened for high cholesterol, studies show that fewer than half of individuals who qualify for lipid-lowering treatment are actually receiving it, and only about a half of treated patients are achieving their LDL (low density lipoprotein) goal.¹

Cholesterol is a waxy substance produced by the liver or contained in certain foods. Accumulation of cholesterol in arteries can lead to narrowing of these vessels, heart disease and other complications.² During 1997-2005, the prevalence of adults reporting having high cholesterol increased by 34 percent from 27.7 percent in 1997 to 37.2 percent in 2005 (Figure 1-7).

Figure 1-8. Prevalence of Adults Reporting Having Their Cholesterol Checked in the Past Five Years by Sex and Year, Ohio 1997-2005.^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

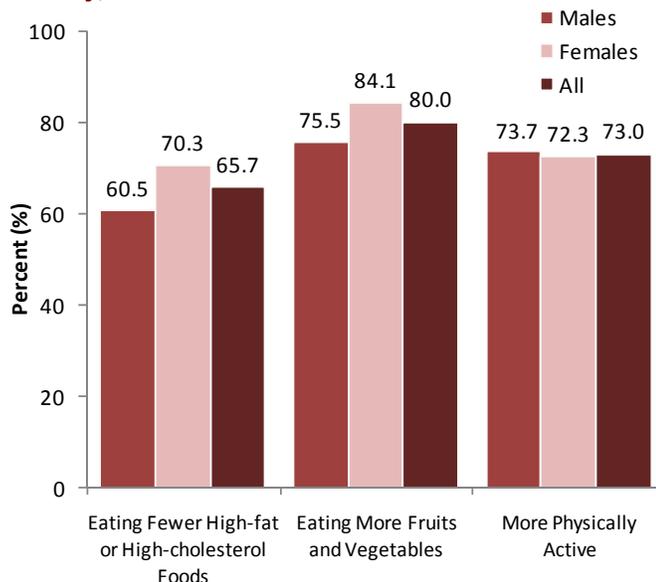
²"Don't know/Not sure" and "Refused" were excluded from the denominator.

³For adults 18 years and older.

II. Prevention of Heart Attack

According to the BRFSS, many adults are attempting to lower their risk for stroke and heart attack by improving their health behaviors. More than 65.0 percent of adults report that they are choosing to eat fewer high-fat and high-cholesterol foods. More women (70.3 percent) than men (60.5 percent) report this behavior. Eighty percent of adults are eating more fruits and vegetables. More women (84.1 percent) compared with men (75.5 percent) report this behavior. Seventy-three percent of adults participated in more physical activity in an effort to lower their risk of developing heart disease and stroke (Figure 1-9).

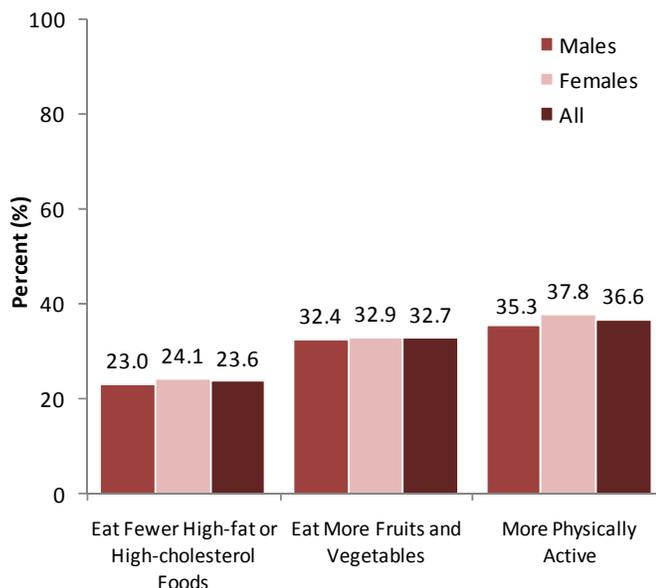
Figure 1-9. Percentage of Adults Attempting to Lower Their Risk of Heart Attack and Stroke with Diet and Physical Activity, Ohio 2004 and 2006.^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

More than 23.0 percent of adults have been advised by their doctor to eat fewer high-fat and high-cholesterol foods, and 32.7 percent have been advised by their doctor to eat more fruits and vegetables. More than one-third (36.6 percent) have been advised to become more physically active as a method to lower their risk of both heart disease and stroke (Figure 1-10). The percentage of males and females advised by a doctor to modify these behaviors differed only slightly.

Figure 1-10. Percentage of Adults Advised by a Doctor to Attempt to Lower Their Risk of Heart Attack and Stroke with Diet and Physical Activity, Ohio 2004 and 2006.^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Table 1-1. Percentage of Adults Taking Aspirin at Least Every Other Day, Ohio 2004-2006.^{1,2,3}

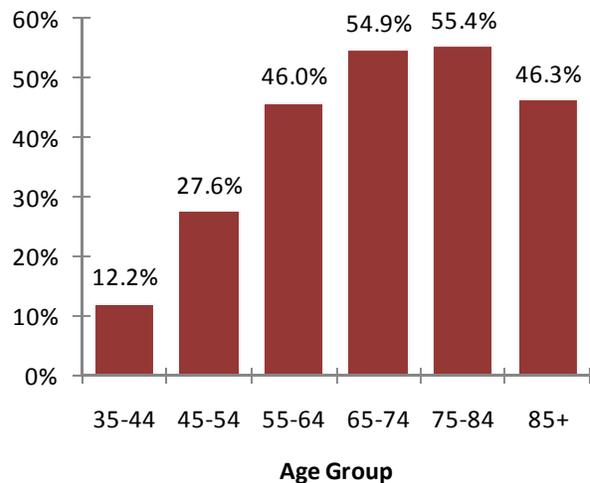
	Males	Females	All
Aspirin Usage for Adults 35 years and older	38.1%	29.8%	33.7%
Reason For Aspirin Use			
Relieve Pain	15.8%	18.5%	17.0%
Reduce Risk of Heart Attack	88.6%	84.2%	86.6%
Reduce Risk of Stroke	69.0%	69.7%	69.3%
Reason For Aspirin Non-use			
Health Reasons Related to Stomach Problems	6.1%	8.8%	7.6%
Health Reasons Other than Stomach Problems	4.6%	7.0%	6.0%

Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 35 years and older.

Taking low-dose aspirin as a strategy for both primary and secondary prevention of heart attack and stroke is recommended and proven effective.⁴ More than one-third of Ohio adults 35 years and older take an aspirin at least every other day. More males than females report using this strategy. Of adults reporting aspirin usage, more than 86 percent use aspirin as a strategy to reduce the risk of heart attack and nearly 70 percent (69.3 percent) report using it to reduce the risk for stroke. Of those who report aspirin non-use, 13.6 percent report non-use because of health reasons. Of this group, 7.6 percent did not use aspirin because of stomach problems (Table 1-1).

Figure 1-11. Percentage of Adults Taking Aspirin at Least Every Other Day by Age Group, Ohio 2004-2006.^{1,2,3}

Age-specific analysis of adults who report taking aspirin at least every other day shows that older persons are more likely to take aspirin. However, even among the age groups of 55-64 and 65-74 years only slightly more than half (54.9 percent and 55.4 percent, respectively) report aspirin usage. The percentage was lower among persons 85 years and older (46.3 percent), compared with other age groups (Figure 1-11).



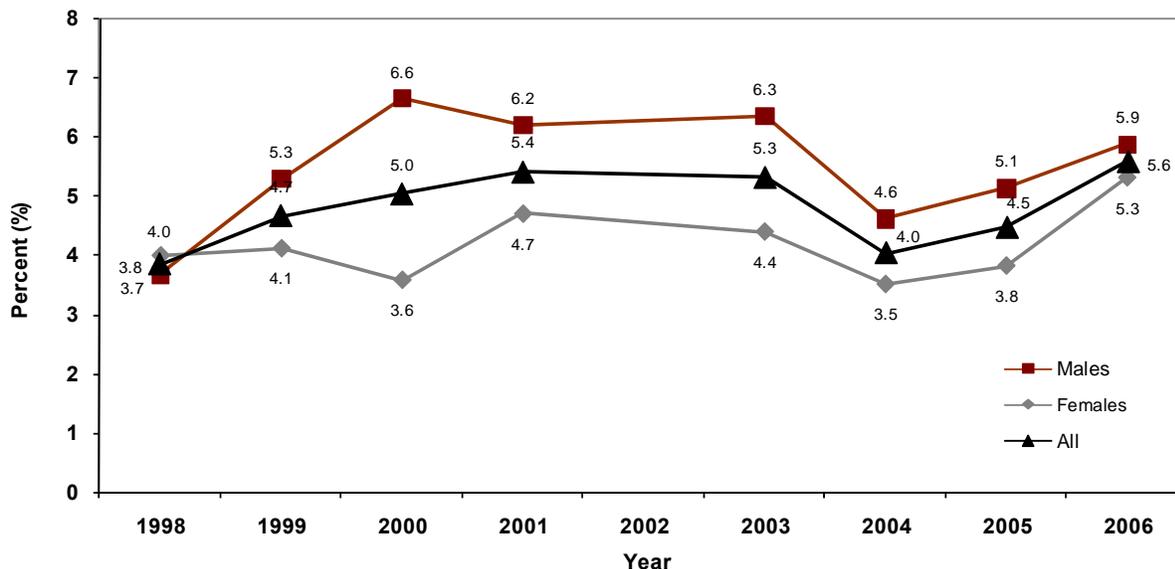
Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 35 years and older.

III. Prevalence of Coronary Heart Disease and Heart Attack

Heart disease is a term that includes several more specific heart conditions. The most common type of heart disease in the United States is coronary heart disease (CHD), which can lead to a myocardial infarction (MI), more commonly known as a heart attack. The BRFSS provides an estimate of the prevalence of CHD and the prevalence of heart attack among Ohio adults.

Trends in Prevalence

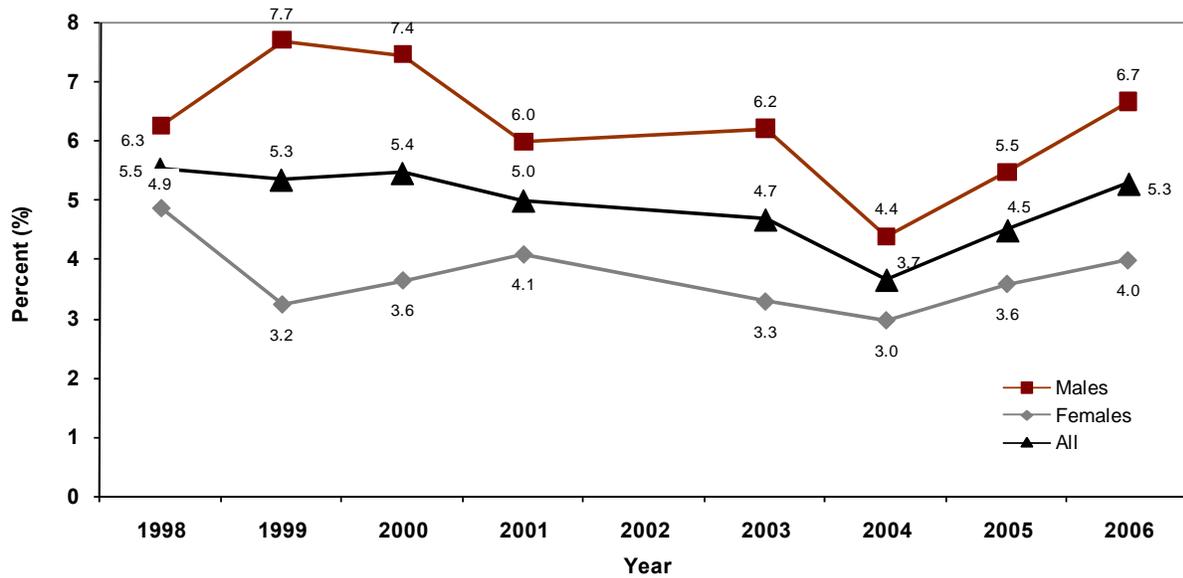
Figure 1-12. Prevalence of Coronary Heart Disease by Sex and Year, Ohio 1998-2006^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²“Don’t know/Not sure” and “Refused” were excluded from the denominator.
³For adults 18 years and older.
⁴Data Not collected in 2002.

In 2006, more than 487,600 adults (5.6 percent) reported they were told by their health care provider that they had CHD. Males have a higher prevalence of CHD, compared with females. During the time period of 1998-2006, the prevalence of CHD increased for both males and females. The prevalence for males increased nearly 60 percent from 3.7 percent in 1998 to 5.9 percent in 2006. The prevalence for females increased by 33 percent from 4.0 percent in 1998 to 5.3 percent in 2006. The overall population observed a 47 percent increase in CHD prevalence from 3.8 percent in 1998 to 5.6 percent in 2006 (Figure 1-12).

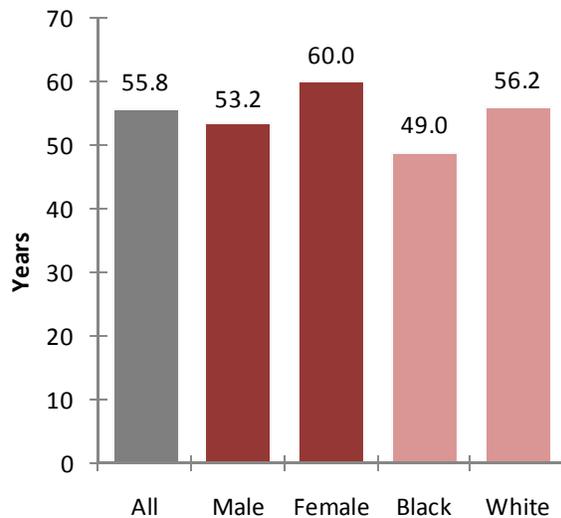
Figure 1-13. Prevalence of Heart Attack by Sex and Year, Ohio 1998-2006^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²“Don't know/Not sure” and “Refused” were excluded from the denominator.
³For adults 18 years and older.
⁴Data not collected in 2002.

While the prevalence of CHD increased (Figure 1-12), the prevalence of adults reporting that they had a heart attack decreased slightly from 5.5 percent in 1998 to 5.3 percent in 2006. There was a 20 percent decrease in prevalence among females during this period. The prevalence for males increased slightly by 6.0 percent. In 2006, more than 6.7 percent of males reported having a heart attack, compared with 4.0 percent of females (Figure 1-13).

Figure 1-14. Average Age at First Heart Attack For Adults by Sex and by Race, Ohio 2004 and 2006^{1,2,3}



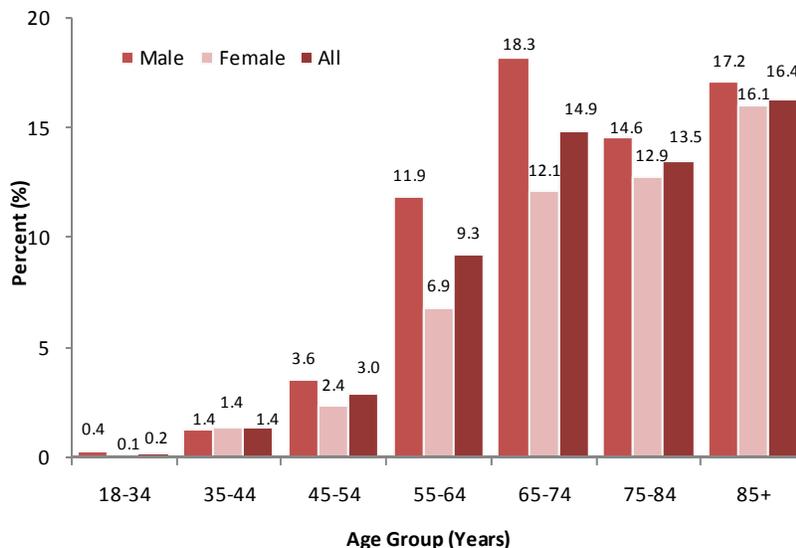
The average age at the time of the first heart attack was 55.8 years for Ohio adults. The average age for females was 60.0 years and 53.2 years for males. The average age at the first heart for black adults was 49 years, more than seven years younger than the average age reported for white adults (56.2 years) (Figure 1-14).

Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²“Don't know/Not sure” and “Refused” were excluded from the denominator.
³For adults 18 years and older.

Sex and Age Group

Figure 1-15. Prevalence of Coronary Heart Disease by Sex and Age Group, Ohio 2004-2006^{1,2,3}

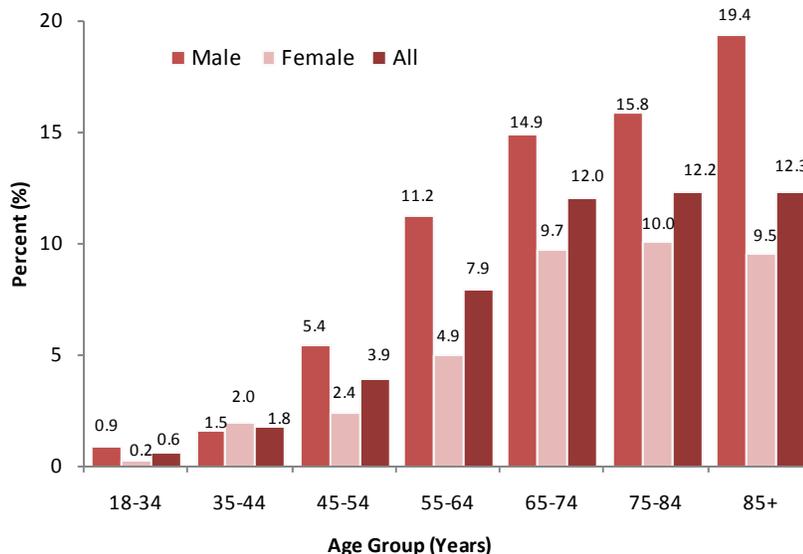
The prevalence of CHD increased as age increased. Persons 65 and older had the highest reported prevalence of disease. Males aged 65-74 years reported the highest prevalence (18.3 percent) of any age group (Figure 1-15).



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Figure 1-16. Prevalence of Heart Attack by Sex and Age Group, Ohio 2004-2006^{1,2,3}

Similar to CHD, the prevalence of heart attack increased with age. The disparity between males and females was evident in nearly every age grouping, the prevalence for males was more than double for adults in age groups 18-34, 45-54, 55-64 and 85 years and older (Figure 1-16).

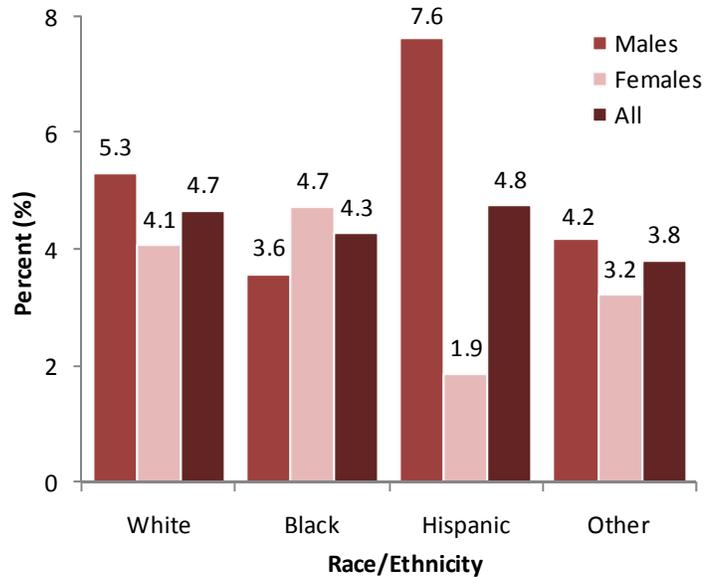


Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Race/Ethnicity and Sex

The prevalence of CHD varied by race/ethnicity and sex. For the years 2004-2006, Hispanic (7.6 percent) and white males (5.3 percent) reported the highest prevalence of diagnosed disease, while Hispanic females (1.9 percent) and females of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) (3.2 percent) reported the lowest prevalence of diagnosed disease (Figure 1-17).

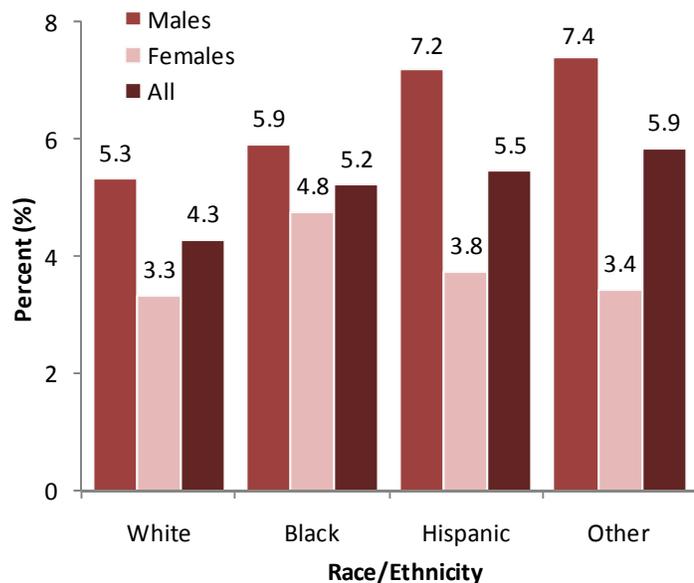
Figure 1-17. Prevalence of Coronary Heart Disease by Race/Ethnicity and Sex, Ohio 2004-2006^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

For the years 2004-2006, males of other races (7.4 percent) and Hispanic males (7.2 percent) reported the highest prevalence of heart attack (Figure 1-18). White females (3.3 percent) and females of other races (3.4 percent) reported the lowest prevalence of heart attack (Figure 1-18).

Figure 1-18. Prevalence of Heart Attack by Race/Ethnicity and Sex, Ohio 2004-2006^{1,2,3}

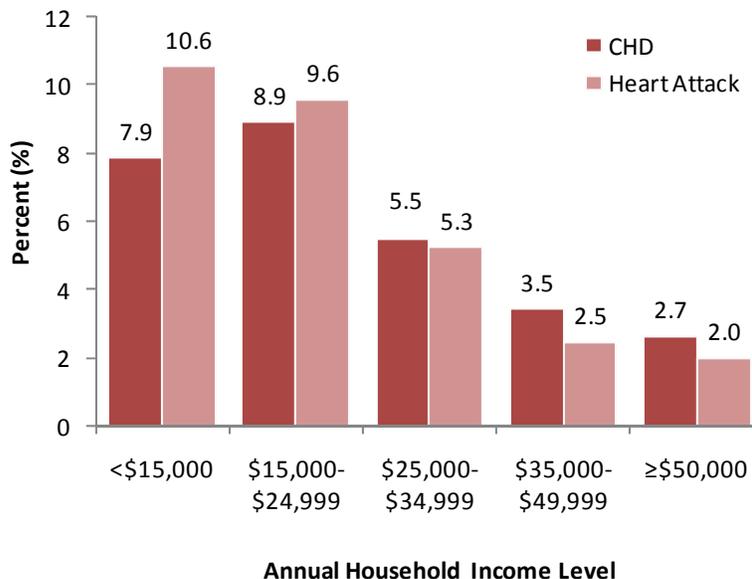


Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Income and Education

The prevalence of CHD and heart attack varied by socio-economic status (SES). Adults reporting lower SES had a higher prevalence of disease. Nearly 7.9 percent of adults with household incomes less than \$15,000 reported having diagnosed CHD, and 10.6 percent reported having a heart attack. These estimates are higher compared with a prevalence of 2.7 percent and 2.0 percent, respectively, for adults with annual household incomes of \$50,000 or more (Figure 1-19).

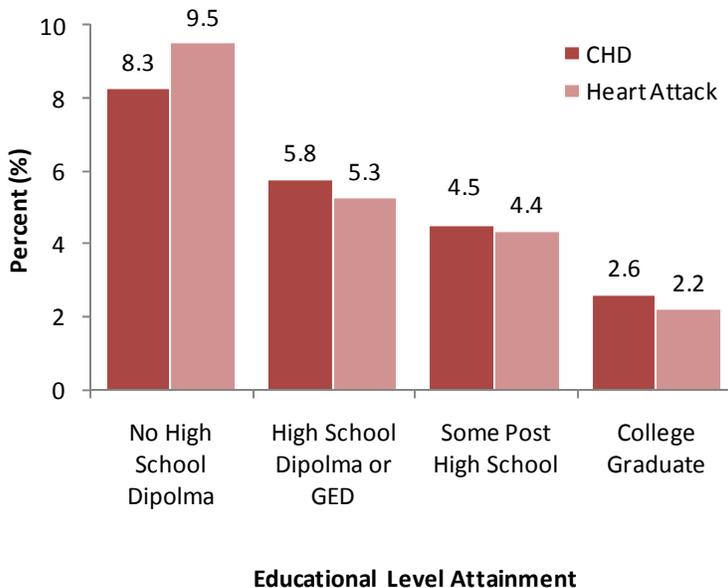
Figure 1-19. Prevalence of Coronary Heart Disease and Heart Attack by Annual Household Income, Ohio 2004-2006^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Figure 1-20. Prevalence of Coronary Heart Disease and Heart Attack by Education Level Attainment, Ohio 2004-2006^{1,2,3}

A similar trend existed for individuals with a lower level of educational attainment. Adults with the least education completed had the highest prevalence of heart disease (Figure 1-20).

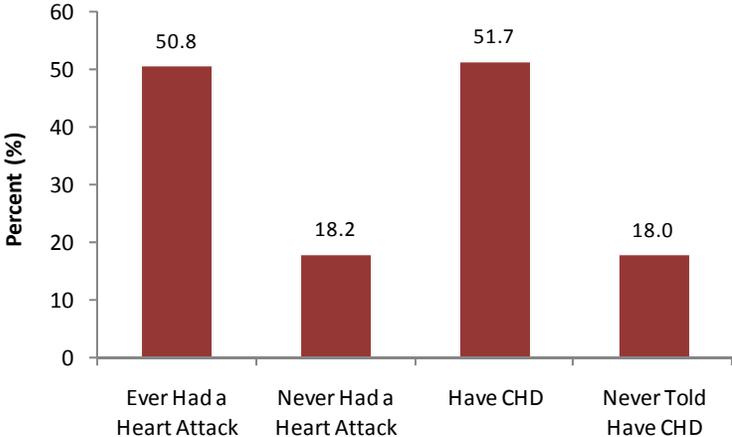


Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

Limitations of Activities

More adults who experienced a heart attack or were diagnosed with CHD reported limitations of their activities compared with adults who reported neither condition. More than half of adults with a history of a heart attack (50.8 percent) or CHD (51.7 percent) reported limitations, compared with approximately 18 percent of those who did not report either condition (Figure 1-21).

Figure 1-21. Percentage of Adults Who Reported Physical, Mental or Emotional Problems that Limited Any Activities by Heart Attack and Coronary Heart Disease Status Ohio 2004-2006.^{1,2,3}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Don't know/Not sure" and "Refused" were excluded from the denominator.
³For adults 18 years and older.

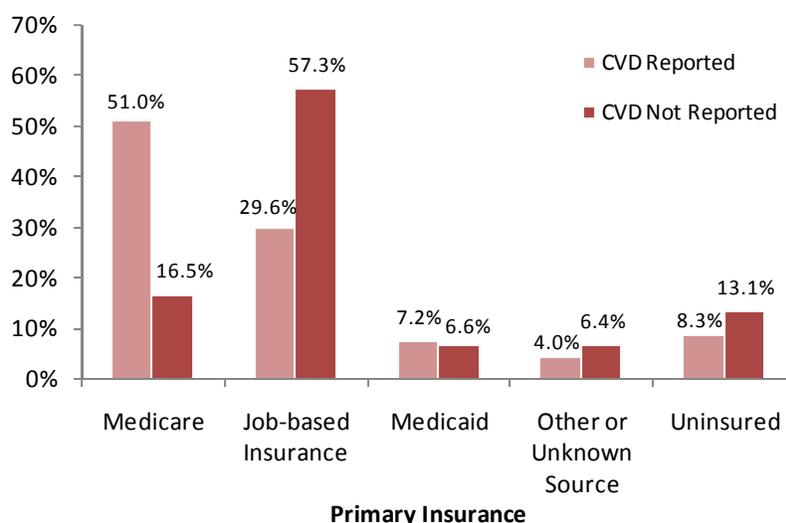
IV. Health Care Benefits and Accessibility

In 2004, the Ohio Family Health Survey (OFHS) was administered to more than 34,000 Ohioans. This survey was conducted to assess the access to and quality of healthcare for Ohioans. To determine the prevalence of cardiovascular disease (CVD), respondents were asked, if they had “ever been told by a doctor or any other health care professional that you had coronary artery disease, congestive heart disease, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.” Nearly 14 percent (13.9) percent of males and 12.3 percent of females reported having been diagnosed with CVD. Native Americans (19.7 percent) followed by white, non-Hispanic Ohioans (13.4 percent) reported the highest prevalence of disease. Asian, non-Hispanic Ohioans reported the lowest prevalence of disease (3.6 percent) (Data not shown).

Insurance Coverage and Benefits

The majority of adults (51.0 percent) with CVD indicated that Medicare was their primary insurance coverage. This compares with less than 16.5 percent of adults not reporting CVD. Employer-provided primary coverage was reported by 29.6 percent of adults with CVD, compared to 57.3 percent of those not reporting CVD. Slightly more than 8 percent of Ohioans with CVD reported not having any type of health care insurance coverage, while 7.2 percent reported receiving Medicaid benefits.

Figure 1-22. Primary Insurance Coverage Type by Cardiovascular¹ Disease Status, Ohio 2004

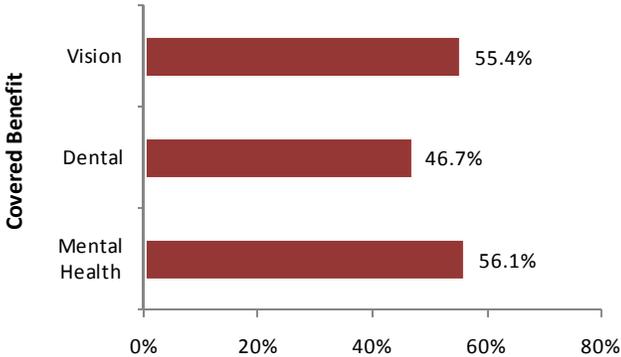


Source: Ohio Family Health Survey 2004.

¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

Figure 1-23. Covered Benefits for Insured Adults with Cardiovascular Disease¹, Ohio 2004.

Though the majority of Ohioans with CVD reported having some type of insurance to cover medical expenses, only 55.4 percent reported having benefits that covered the cost of vision care. Less than half of adults with CVD (46.7 percent) reported having coverage for dental care and 56.1 percent indicated that they had benefits that cover expenses for mental health.

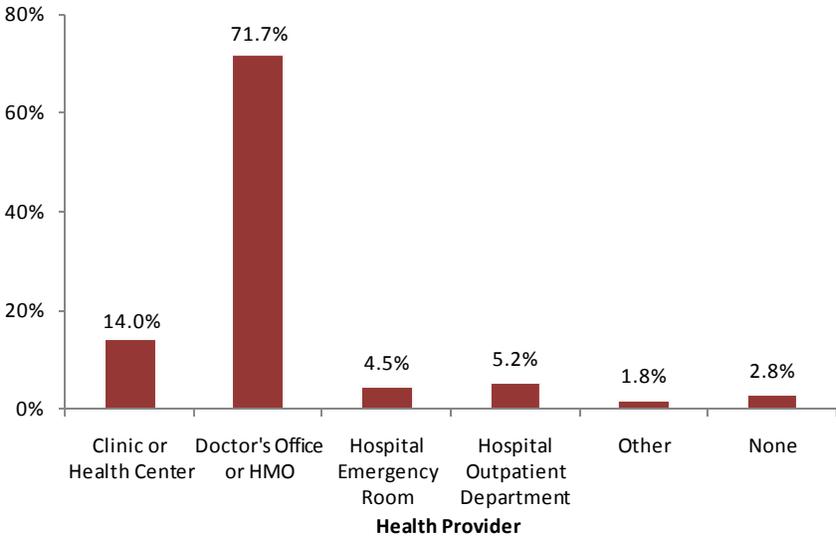


Source: Ohio Family Health Survey 2004.
¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

Source of Care

The majority of Ohioans with CVD go to a specific doctor’s office or health maintenance organization (HMO) (71.7 percent) as their usual source of care when they are in need of treatment or have questions regarding their health.

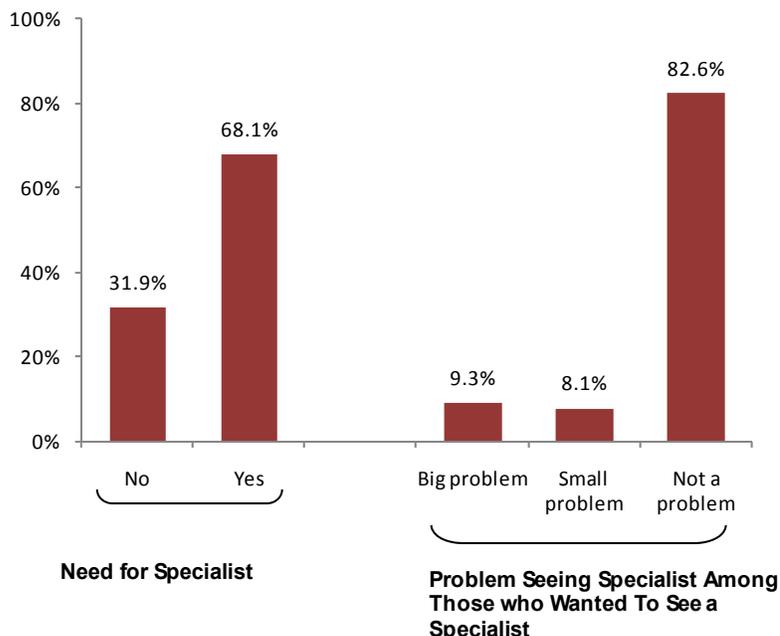
Figure 1-24. Usual Source of Care for Adults with Cardiovascular Disease¹, Ohio 2004.



Source: Ohio Family Health Survey 2004.
¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

Figure 1-25. Need to See a Specialist for Adults with Cardiovascular Disease¹, Ohio 2004.

The majority of respondents with CVD (68.1 percent) reported a need to see a specialist for medical treatment, and 82.6 percent with a specialist need reported it was not a problem to get an appointment with a specialist. However, 17.4 percent of Ohioans with CVD and a specialist need did report having some level of difficulty, with 9.3 percent indicating it was a big problem (Figure 1-25).

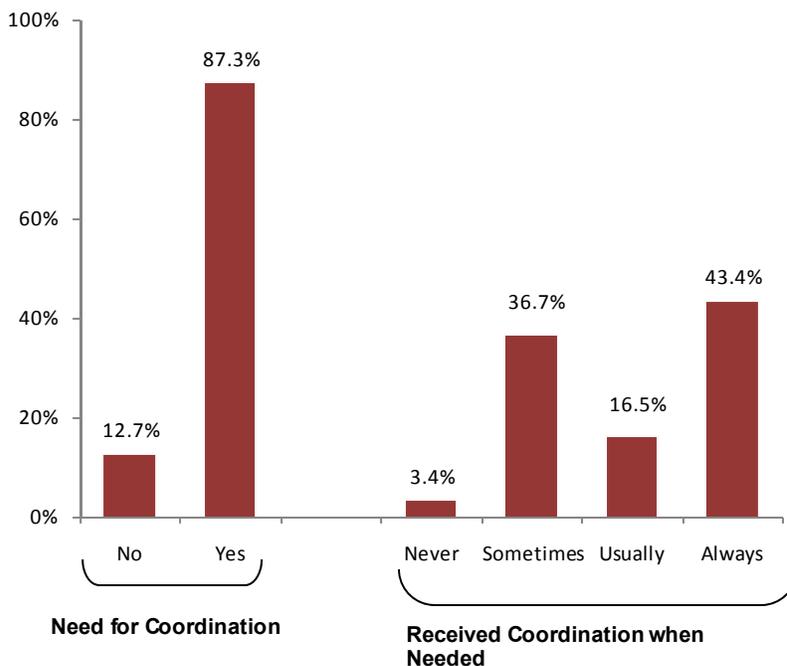


Source: Ohio Family Health Survey 2004.

¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

Figure 1-26. Coordination of Care for Adults with Cardiovascular Disease¹, Ohio 2004.

Persons with a chronic disease such as CVD often have the need for care by multiple providers. Assistance with coordination of their health care was identified as a need by most Ohioans with CVD. More than 87 percent (87.3 percent) reported that they had a need for coordination of care; however, only 43.4 percent with a need for coordination reported always receiving it (Figure 1-26).

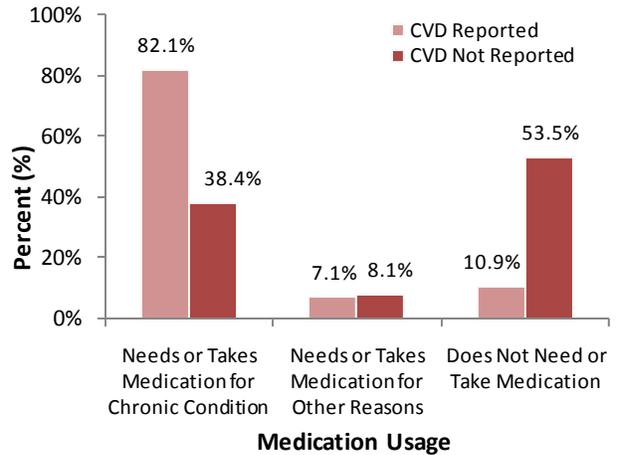


Source: Ohio Family Health Survey 2004.

¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

The majority of adults with CVD (82.1 percent) reported a need to or were currently taking medications for their chronic condition, compared with less than 40 percent (38.4) of adults who did not have CVD (Figure 1-27).

Figure 1-27. Medication Usage for Adults by Cardiovascular Disease¹ Status, Ohio 2004.

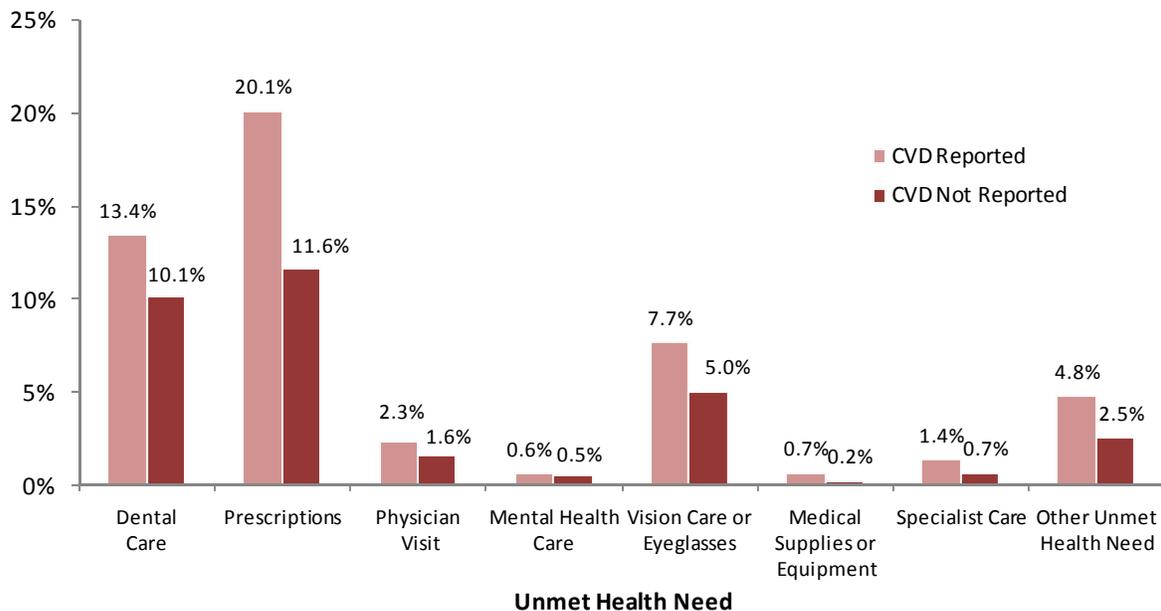


Source: Ohio Family Health Survey 2004.
¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

Unmet Health Care Needs

Though the majority of adults with CVD reported having some type of insurance to cover medical expenses, many still identified unmet health needs. More than 20 percent of respondents diagnosed with CVD noted that prescription drugs were their largest unmet health need. This was nearly double compared with adults without CVD. The second- and third-most identified unmet health needs were in the area of dental and vision care (Figure 1-28).

Figure 1-28. Unmet Health Care Needs for Adults by Cardiovascular Disease¹ Status, Ohio 2004.

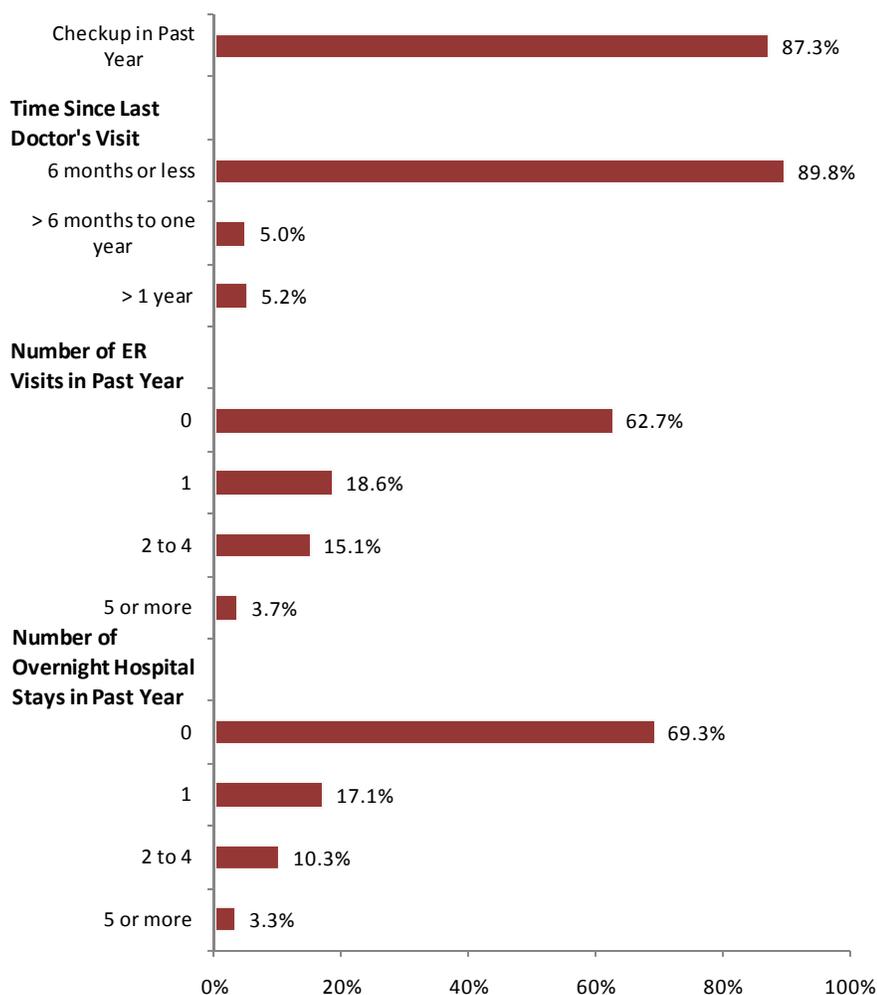


Source: Ohio Family Health Survey 2004.
¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

Utilization of Health Care

As illustrated in Figure 1-29, more than 87 percent of adults with CVD reported receiving a annual checkup in the past year. Nearly 90 percent reported that their last doctor's visit was in the past six months or less. Of adults with CVD, 37.4 percent reported visiting the emergency room for care within the past year. More than 30 percent reported having an overnight hospital stay within the past year.

Figure 1-29. Utilization of Health Care for Adults with Cardiovascular Disease¹, Ohio 2004.



Source: Ohio Family Health Survey 2004.

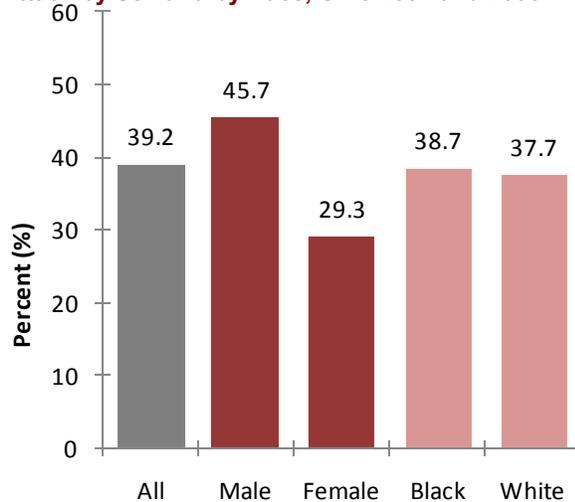
¹Cardiovascular Related Disease defined as: respondent told by a doctor or any other health care professional that you had coronary artery disease, congestive heart failure, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem.

V. Rehabilitation Therapy for Heart Attack Survivors

Data on adult heart attack survivors who responded to the BRFSS indicated participation in an outpatient rehabilitation program was relatively low.

Of the adults surveyed who reported they had a heart attack, 39.2 percent said they received outpatient rehabilitation. More men (45.7 percent) than women (29.3 percent) reported receiving rehabilitation therapy after discharge from the hospital. Both black and white adults reported similar percentages of rehabilitation therapy (Figure 1-30).

Figure 1-30. Percentage of Adults Who Reported Receiving Outpatient Rehabilitation After Having a Heart Attack by Sex and by Race, Ohio 2004 and 2006.^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

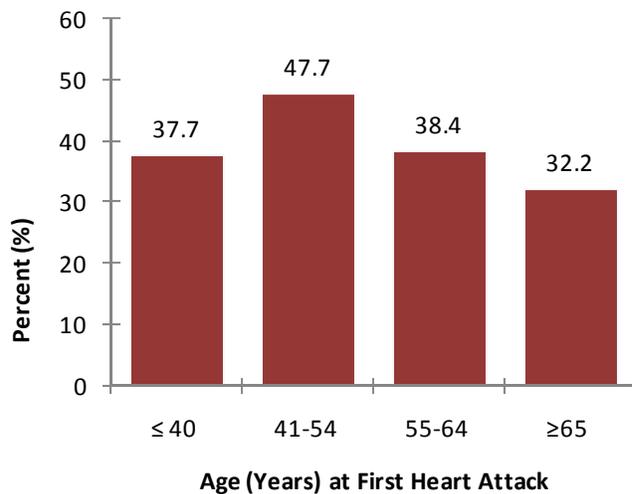
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²“Don’t know/Not sure” and “Refused” were excluded from the denominator.

³For adults 18 years and older.

⁴Respondents who reported being told by a doctor, nurse or other health care professional that they had a heart attack.

Figure 1-31. Percentage of Adults Who Reported Receiving Outpatient Rehabilitation Therapy After Having a Heart Attack by Age at First Heart Attack, Ohio 2004 and 2006.^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²“Don’t know/Not sure” and “Refused” were excluded from the denominator.

³For adults 18 years and older.

⁴Respondents reported being told by a doctor, nurse or other health care professional that they had a heart attack.

Receiving outpatient rehabilitation therapy after a heart attack varied by the age of the person at the time of their first heart attack. Among persons who reported having their heart attack at 40 years of age or younger, 37.7 percent reported receiving outpatient therapy. This compares with 47.7 percent of adults who reported having their first heart attack between the ages 41-54 years. Adults who reported having their first heart attack at 65 years of age or older had the lowest percentage of receiving outpatient therapy (32.2 percent) (Figure 1-31). However, rehabilitation therapy was relatively underutilized for all age groups despite recommendation that heart attack patients receive therapy.⁵

VI. Summary

In the years between 1997 to 2006, prevalence rates for modifiable CVD risk factors such as high blood pressure, high blood cholesterol, obesity and diabetes have been increasing steadily among Ohio residents. During this same period, the prevalence of coronary heart disease increased by 47 percent, while the number of adults who had a heart attack decreased only slightly. Overall, men are more likely than women to be diagnosed with CHD or have a heart attack and the prevalence of heart attack for men in all age groups was more than double compared with women. Large disparities also exist related to race, ethnicity, age, gender and socioeconomic status. Hispanic men and men of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native and other races than white or black) have heart attack prevalence rates greater than all other groups and black adults had first heart attacks more than seven years younger than white adults. Heart disease and heart attacks occurred more frequently in adults with yearly incomes below \$25,000 and adults lacking a high school education, compared with adults with incomes greater than \$50,000 or with college degrees.

Ohioans are improving some health behaviors including increasing leisure time physical activity and reducing cigarette smoking; however, less than 23 percent of adults report eating five or more servings of fruits and vegetables daily. More adults also are taking preventive actions to lower heart attack risk by reducing dietary fat and cholesterol, increasing physical activity and taking low-dose aspirin. Even greater health improvements would occur if all Ohioans followed current guidelines to maintain or achieve a healthy weight, be physically active, avoid tobacco use and exposure, consume a healthy diet and keep blood pressure and blood lipids at recommended levels.

Adequate health insurance and access to care are more often identified as problems by adults with CVD. Less than 30 percent of adults with CVD reported having job-based health insurance, almost 90 percent reported a need for coordination of care and 20 percent reported that prescription drugs were their largest unmet health need. Outpatient cardiac rehabilitation was very underutilized with less than 40 percent of heart attack survivors participating. Opportunities exist for improving secondary prevention efforts aimed at reducing the risk for recurrent CVD events. Wider access to adequate health insurance and prescription drug coverage, and increased participation in cardiac rehabilitation are important improvements to the health care system that could further reduce disability and death from cardiovascular disease.

2

The Burden of Heart Disease in Ohio

Heart Attack Symptom Awareness and Emergency Medical Services



Introduction

The early identification and management of a cardiac event begins in the prehospital setting. Prehospital Emergency Medical Services (EMS) consists of three major components: emergency medical dispatch, first responders (fire and law enforcement) and ambulance response.⁶ These components function within a broader emergency care system, which includes acute care facilities and regionalized health care services.⁶ Patients who arrive at the hospital by EMS receive treatment more quickly, compared to patients who arrive using private transportation.⁷ The less time that elapses from the cardiac event to medical intervention, the better the outcome of the patient. Even though calling 911 and activating the EMS response system is considered the ideal response, only 50 to 60 percent of patients treated for chest pain initiate care by using EMS.⁷

The first step to activating the EMS system begins with a person recognizing heart attack symptoms and calling 911. This chapter not only describes EMS transports but also describes heart attack symptom awareness among Ohioans and Ohio 911 coverage.

I. Heart Attack Symptom Awareness

A heart attack (myocardial infarction) results when the blood supply to the heart is insufficient or obstructed. Heart muscle cells that do not receive enough oxygen-carrying blood begin to die.⁸ The more time that passes without treatment to restore blood flow, the greater damage to the heart. It is important to recognize the signs of a heart attack and to act immediately by calling 911. A person's chance of surviving a heart attack is increased if emergency treatment is administered as soon as possible.⁸

The signs of a heart attack include:

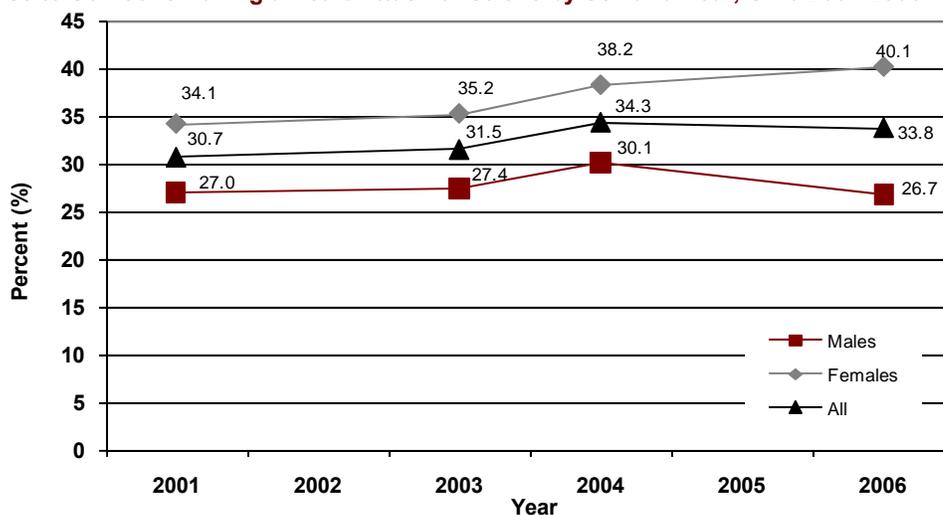
- ♥ Chest discomfort; most heart attacks involve discomfort in the center of the chest that lasts for more than a few minutes, or goes away and comes back. The discomfort can feel like uncomfortable pressure, squeezing, fullness or pain.
- ♥ Discomfort in other areas of the upper body; this can include pain or discomfort in one or both arms, the back, neck, jaw or stomach.
- ♥ Shortness of breath; this is often accompanied by chest discomfort, but it can occur before chest discomfort.
- ♥ Other symptoms; may include breaking out in a cold sweat and feeling nauseous or lightheaded.⁸

Many adults do not know all symptoms of a heart attack and the importance of calling 911 when someone appears to be having a heart attack or stroke.

Trends in Heart Attack Symptom Awareness

In 2006, 33.8 percent of Ohio adults reported being able to recognize all symptoms of someone having a heart attack and the appropriate response to call 911. From 2001 through 2006, the percentage increased slightly for females from 34.1 percent to 40.1 percent, while symptom recognition among males remained relatively constant (Figure 2-1).

Figure 2-1. Percentage of Adults Who Recognized All Heart Attack Symptoms and to Call 911 as the First Response to Someone Having a Heart Attack or Stroke by Sex and Year, Ohio 2001-2006.^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²"Refused" were excluded from the denominator.

³For adults 18 years and older.

⁴Data not collected in 2002 and 2005.

Figure 2-2. Percentage of Adults Who Recognized Symptoms of Heart Attack by Symptom and Year, Ohio 2001-2006.^{1,2,3,4}

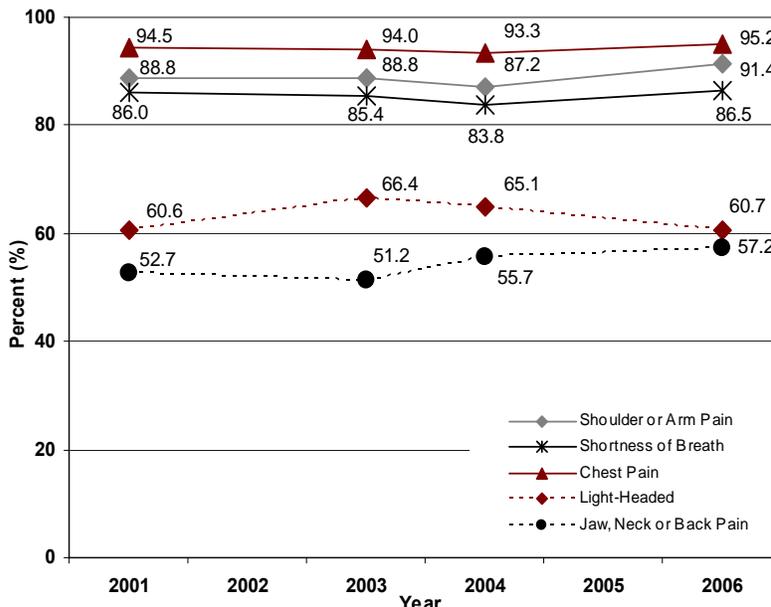
Awareness of selected symptoms of a heart attack among the adult population in Ohio did not differ significantly between 2001 and 2006 (Figure 2-2).

Chest pain was the most recognized symptom of heart attack among adult Ohioans. More than 95 percent (95.2) of adults recognized chest pain as a symptom of a heart attack (Figure 2-2).

Arm or shoulder pain was the second-most recognized symptom of heart attack among adult Ohioans. More than 91 percent (91.4) of adults reported arm or shoulder pain as a symptom of a heart attack (Figure 2-2).

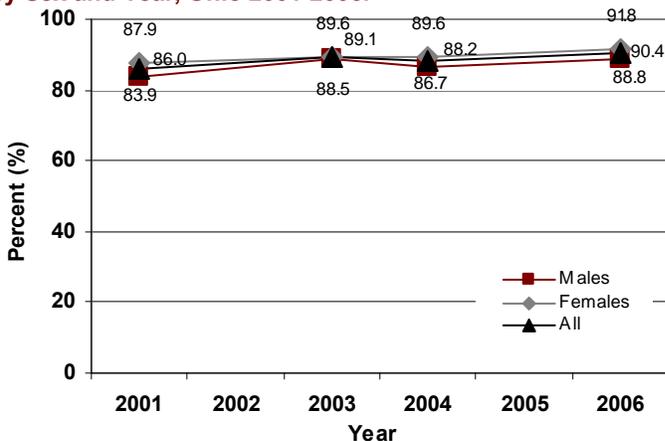
Shortness of breath was recognized by 86.5 percent of adults as a symptom of a heart attack (Figure 2-2).

The least recognized symptoms of a heart attack were feeling weak, lightheaded or faint (60.7 percent) and jaw, neck or back pain or discomfort (57.2 percent) (Figure 2-2).



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Refused" were excluded from the denominator.
³For adults 18 years and older.
⁴Data not collected in 2002 and 2005.

Figure 2-3. Percentage of Adults Who Recognized Calling 911 as the First Response to Someone Having a Heart Attack or Stroke by Sex and Year, Ohio 2001-2006.^{1,2,3,4}



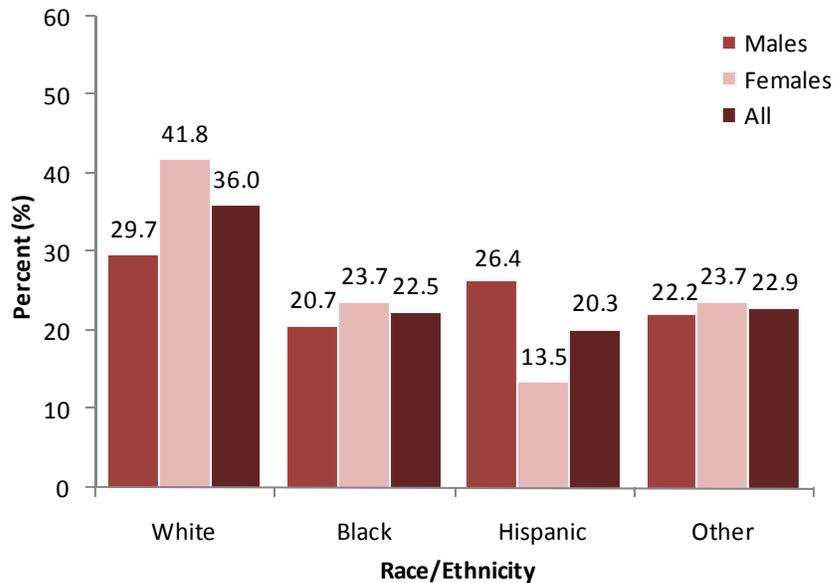
The earlier a person having a heart attack receives emergency treatment, the greater the chance of survival. Part of the emergency response is calling 911 for fast medical intervention.⁸ In Ohio, the percentage of adults who identified calling 911 as the appropriate response to someone having a heart attack or stroke increased slightly from 86.0 percent in 2001 to 90.4 percent in 2006 (Figure 2-3).

Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Refused" were excluded from the denominator.
³For adults 18 years and older.
⁴Data not collected in 2002 and 2005.

Race/Ethnicity and Sex

Recognition of heart attack symptoms differed by race and sex. Blacks, Hispanics and adults of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) were least likely to identify the symptoms of a heart attack and the appropriate response of calling 911, compared with white adults (Figure 2-4). White females reported the highest recognition of symptoms. This trend existed for recognition of each individual symptom as well as all symptoms combined.

Figure 2-4. Percentage of Adults Who Recognize All Heart Attack Symptoms and to Call 911 as the First Response to Someone Having a Heart Attack or Stroke, by Race/Ethnicity and Sex, Ohio 2004 and 2006.^{1,2,3,4}



Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.
¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.
²"Refused" were excluded from the denominator.
³For adults 18 years and older.
⁴Other races include: Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native and other races.

The Burden of Heart Disease in Ohio

Chest pain or discomfort was the most recognizable symptom by all racial-sex groups, followed by pain or discomfort in the shoulder or arm. The least recognized symptoms included feeling weak or lightheaded and pain in the jaw, neck or back. Less than one-third of black males (30.6 percent) were able to identify jaw, neck or back pain as symptom of a heart attack. Low recognition of this symptom was also observed among Hispanic females (32.4 percent). Less than half of white males, black females, Hispanic males and males of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native and other races than white or black) identified this as symptom of a heart attack (Figure 2-5).

Figure 2-5. Heart Attack Symptom Recognition by Race/Ethnicity and Sex, Ohio 2004 and 2006.^{1,2,3}

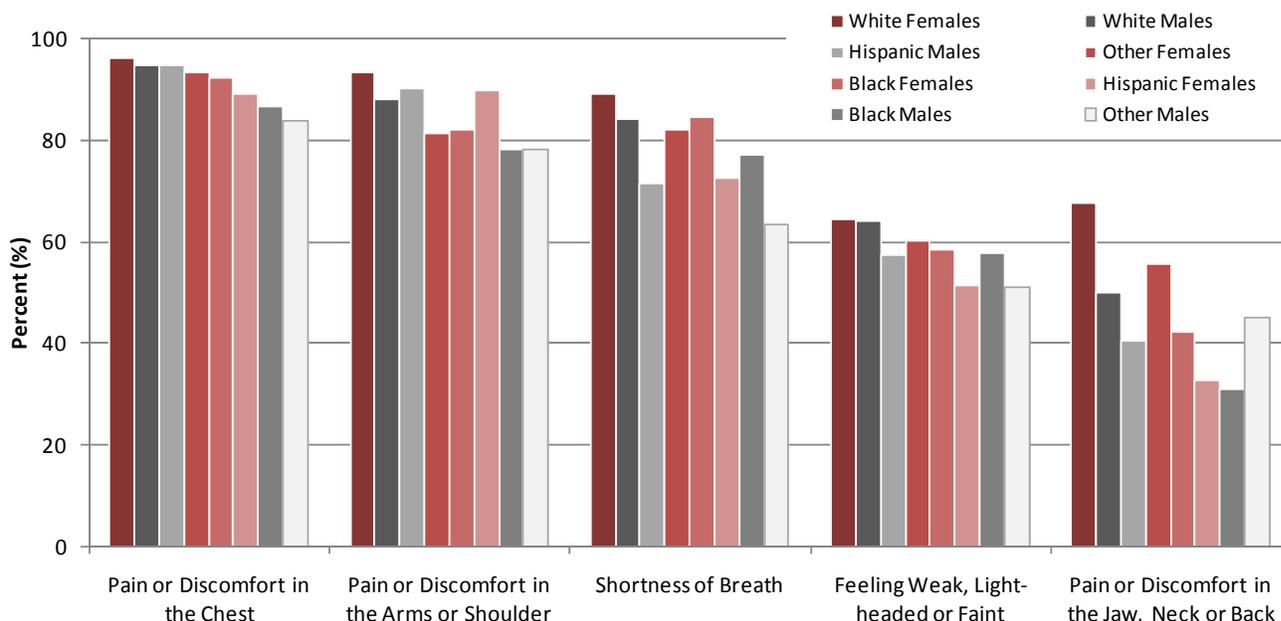
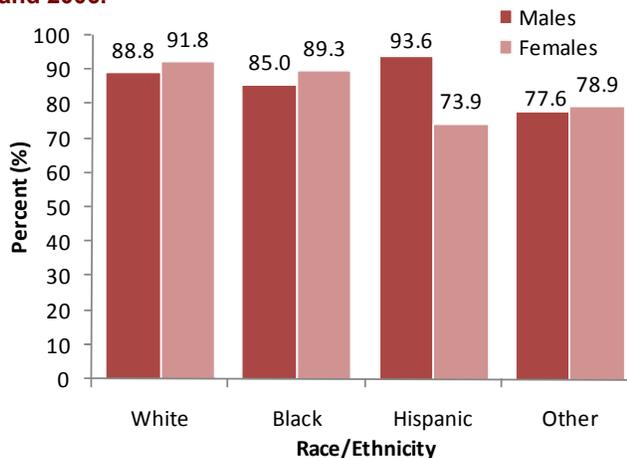


Figure 2-6. Percentage of Adults Who Recognized Calling 911 as the First Response to Someone Having a Heart Attack or Stroke by Race/Ethnicity and Sex, Ohio 2004 and 2006.^{1,2,3,4}



Although a high percentage of adults identified calling 911 as the first response to a person having a heart attack, there were disparities between race/ethnicity and sex. Hispanic males (93.6 percent) and white females (91.8 percent) were most likely to identify this action as the first response, while Hispanic females (73.9 percent) and males and females of other races (77.6 percent and 78.9 percent, respectively) were least likely to identify calling 911 as the first response to someone having a heart attack (Figure 2-6).

Source: Ohio Behavioral Risk Factor Surveillance System, Center for Public Health Statistics and Informatics, Ohio Department of Health.

¹The weighted percentage was adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reached the household, the number of adults in each household and the number of completed interviews in each cluster; 2) demographic distribution, i.e. age, sex and race.

²"Refused" were excluded from the denominator.

³For adults 18 years and older.

⁴Other races include: Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native and other races.

II. 911 Availability in Ohio

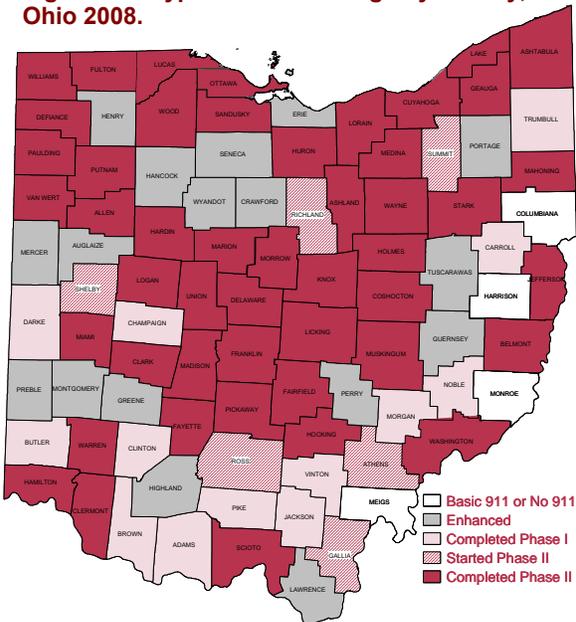
The three-digit 9-1-1 telephone number has been designated as the Universal Emergency Number to request emergency assistance. This number was chosen because it is brief, easily remembered and can be dialed quickly. Easy access to 911 allows prompt notification of EMS and increases the likelihood that a person suffering a cardiac event will be transported to a hospital as quickly as possible. In Ohio, 87 of the 88 counties have 911 service available. The type of service varies from county to county, from enhanced 911, which displays the caller's phone number and address to the dispatcher, to wireless 911, which displays the phone number and location of the cell phone used to place the call (Table 2-1).⁹

Table 2-1. Definitions of 911 Coverage Type	
Basic	Basic 911 means that when the three-digit number is dialed, a dispatcher in the local public safety answering point (PSAP) or 911 call center answers the call. The emergency and its location are communicated by voice (or TTY) between the caller and the dispatcher.
Enhanced	In areas serviced by enhanced 911, the call is selectively routed to the proper PSAP for the caller's location and the PSAP has equipment and database information that display the caller's phone number and address to the call taker.
Wireless Phase I	Phase I allows the dispatcher to automatically receive the wireless phone number. This is important in the event the wireless phone call is dropped and it may allow PSAP employees to work with the wireless company to identify the wireless subscriber. Phase I also delivers the location of the cell tower handling the call. The call is routed to a PSAP based on cell site/sector information.
Wireless Phase II	Phase II allows call takers to receive both the caller's wireless phone number and their location information. The call is routed to a PSAP either based on cell site/sector information or on caller location information.

Source: National Emergency Number Association (NENA).

The majority of Ohio's counties have completed wireless Phase II 911 coverage. Four Ohio counties do not have 911 or have only basic 911 coverage (Figure 2-7).⁹ According to the Public Utilities Commission of Ohio, all 88 counties have been approved for wireless enhanced 911 funding; however Harrison and Monroe counties do not have land line 911 coverage (not shown on map).¹⁰

Figure 2-7. Type of 911 Coverage by County, Ohio 2008.



Source: National Emergency Number Association (NENA), map re-created by Center for Public Health Statistics and Informatics, Ohio Department of Health (updated 12/09/2008).

III. Emergency Medical Services (EMS) Suspected Cardiovascular/Circulatory Transports

In 2005, there were 82,658 suspected cardiovascular/circulatory (CV) transports by Ohio's EMS. This accounted for 8.5 percent of all EMS transports. The average time from dispatch to the scene was 6.3 minutes. The average time from scene to the hospital was 12.5 minutes. The total average time from dispatch to hospital (including time at scene) was 33.9 minutes. The percentage of CV transports of all emergency transports ranged from 1.6 percent for patients aged 0-19 to 13.4 percent for patients aged 55-64 (Table 2-2).

Table 2-2. Suspected Cardiovascular/Circulatory EMS Transports by Age Group, Ohio 2005.^{1,2,3}

Age Group	Number of Suspected CV Transports	Total Number of Transports	Percentage of Total Transports	Average Time Dispatch to Scene	Average Time at Scene	Average Time Scene to Hospital	Average Total Time Dispatch to Hospital
0-19	1,715	109,279	1.6%	6.1	13.1	12.7	31.9
20-34	6,855	135,498	5.1%	5.9	13.6	11.9	31.4
35-44	10,041	97,288	10.3%	6.1	14.6	12.3	33.0
45-54	14,662	111,384	13.2%	6.1	15.0	12.2	33.3
55-64	12,622	94,399	13.4%	6.4	15.3	13.0	34.6
65-74	11,200	96,286	11.6%	6.5	15.4	13.2	35.2
75-84	13,587	133,325	10.2%	6.5	16.1	12.7	35.2
85+	6,666	81,754	8.2%	6.3	16.1	11.8	34.2
All	82,658	969,841	8.5%	6.3	15.1	12.5	33.9

Source: Ohio EMS.

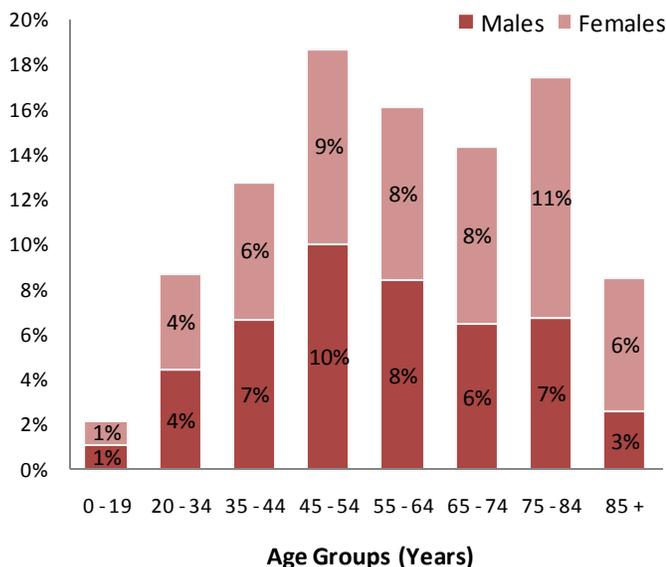
¹Average time in Minutes.

²Numbers may not add up because of unreported age.

³Time at Scene was calculated by subtracting the sum of the average time of dispatch to scene and average time of scene to hospital from the Total Average Time (Dispatch to Hospital).

Persons aged 45-54 years accounted for the largest proportion of CV transports (19 percent), followed by persons 75-84 (18 percent). Females aged 75-84 had the greatest proportion of transports (11 percent), followed by males aged 45-54 years (10 percent) (Figure 2-8).

Figure 2-8. Percentage of Suspected Cardiovascular/Circulatory EMS Transports by Sex and Age Group, Ohio 2005.¹



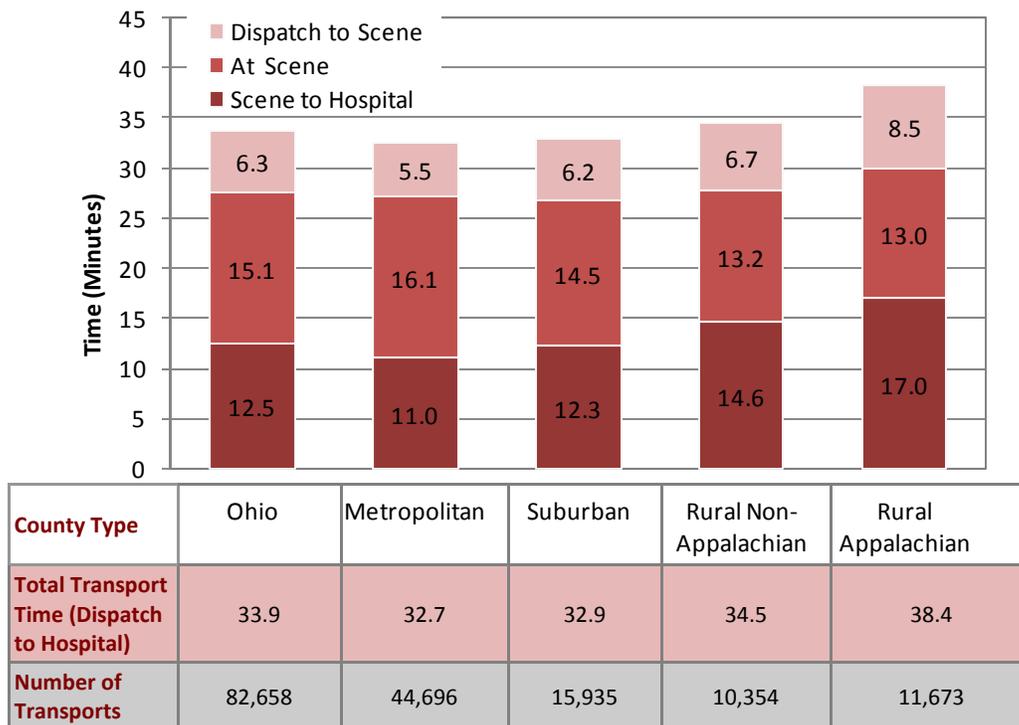
Source: Ohio EMS.

¹Percentages calculated using cardiovascular/circulatory transports with reported age (77,348) as the denominator.

Counties Grouped as Urban/Rural

The average EMS transport time for patients exhibiting CV symptoms varied by the type of county throughout the state. Grouping Ohio’s counties by type into metropolitan, suburban, rural non-Appalachian and rural Appalachian indicated that metropolitan counties had the lowest average transport time of 32.7 minutes. In comparison, rural Appalachian counties had the longest average transport time of 38.4 minutes. The average time from dispatch to scene and average time from scene to hospital also followed the same trend, with metropolitan counties having the lowest times, followed by suburban and rural non-Appalachian counties, respectively. Rural Appalachian counties had the longest average total transport time (38.4 minutes); the longest average transport time dispatch to scene (8.5 minutes) and scene to hospital (17.0 minutes). However, metropolitan counties reported the longest time at the scene (16.1 minutes) and rural Appalachian Counties (13.0 minutes) reported the shortest time

Figure 2-9. Average Transport Time¹ for Suspected Cardiovascular/Circulatory EMS Transports by County Type, Ohio 2005.²



Source: Ohio EMS.

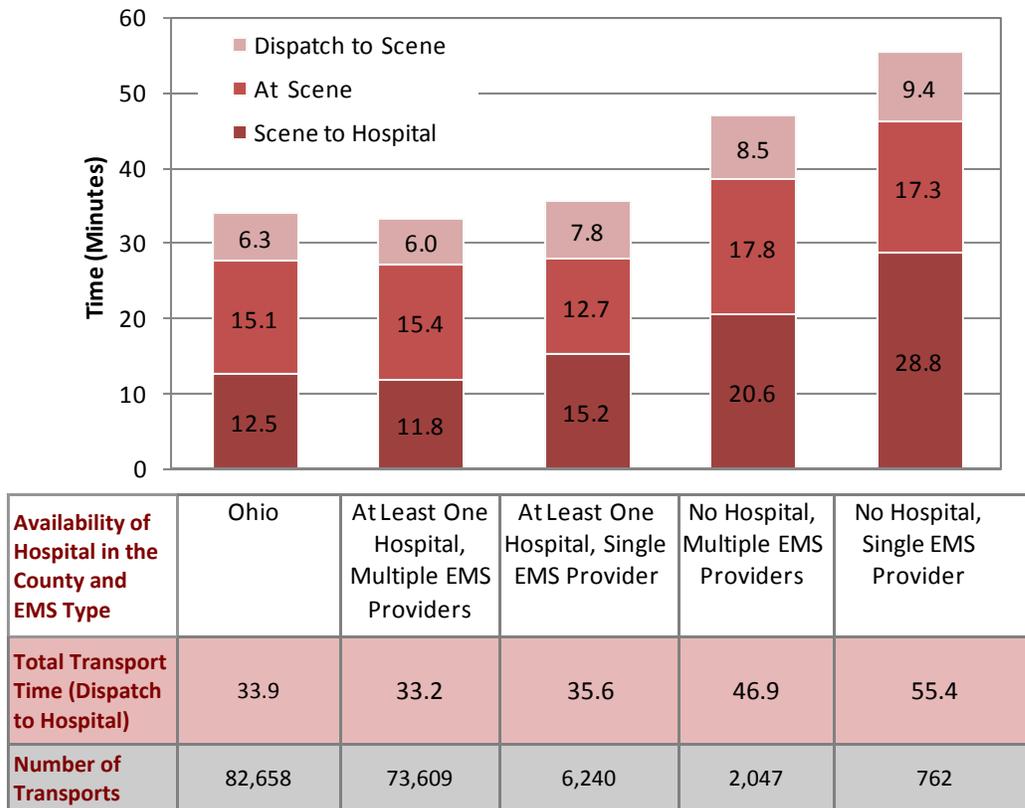
¹Average Time in Minutes.

²Time at Scene was calculated by subtracting the sum of the Average Time of Dispatch to Scene and Average Time of Scene to Hospital from the Total Average Time (Dispatch to Hospital).

EMS transport times were also impacted by resources available in the counties. The longest average transport time from dispatch to hospital occurred in counties with the least amount of resources. Transport time in counties with at least one hospital and more than one EMS provider were shorter than in all other types of counties (33.2 minutes). At the other end of the continuum, counties with no hospital and a single EMS provider had the longest transport times (55.4 minutes) (Figure 2-11).

Counties with no hospitals had longer average transport times from scene to hospital, compared with counties with hospitals. Counties with a single EMS provider and no hospital had an average transport time from scene to hospital of 28.8 minutes; counties without a hospital and multiple EMS providers had transport times of 20.6 minutes. In comparison, counties with at least one hospital and multiple EMS providers had the shortest transport time from scene to hospital at 11.8, minutes followed by counties without a hospital and one EMS providers (15.2 minutes) (Figure 2-11).

Figure 2-11. Average Transport Time¹ for Suspected Cardiovascular/Circulatory EMS Transports by Availability of a Hospital in the County and EMS Provider Type, Ohio 2005.^{1,2,3}



Source: Ohio EMS.

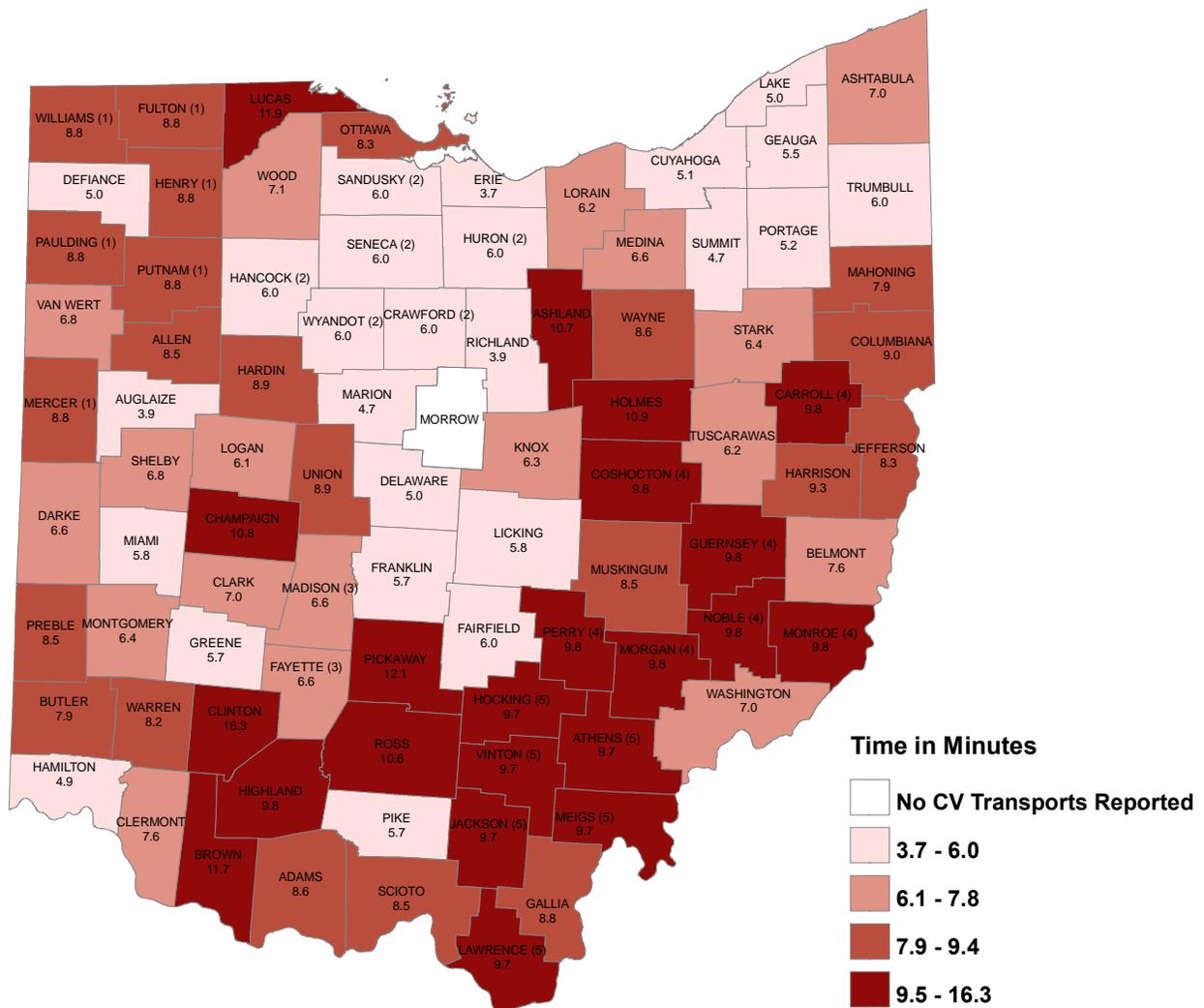
¹Average Time in Minutes.

²Time at Scene was calculated by subtracting the sum of the Average Time of Dispatch to Scene and Average Time of Scene to Hospital from the Total Average Time (Dispatch to Hospital).

Transport Time by County

Analysis of transport times by county indicated that counties in the southeast region of the state have the longest transport time for CV from dispatch to scene, time at the scene (Figures 2-12 and 2-13) and time from scene to hospital (Figure 2-14). Many of these counties also have limited resources to provide the full range of acute care interventions care CV patients require.

Figure 2-12. Average EMS Transport Time From Dispatch to Scene for Suspected Cardiovascular/Circulatory Transports by County, Ohio 2005.^{1,2,3,4,5}



Source: Ohio EMS.

¹Northwest #1: Fulton, Henry, Mercer, Paulding, Putnam and Williams.

²Northwest #2: Crawford, Hancock, Huron, Sandusky, Seneca and Wyandot.

³Central: Fayette and Madison.

⁴Southeast #1: Carroll, Coshocton, Guernsey, Monroe, Morgan, Noble and Perry.

⁵Southeast #2: Athens, Hocking, Jackson, Lawrence, Meigs and Vinton.

Note: The above counties were grouped together because there was only a single EMS provider in the respective county. The remaining counties are reported individually.

Figure 2-13. Average EMS Transport Time at Scene for Suspected Cardiovascular/Circulatory Transports by County, Ohio 2005.^{1,2,3,4,5}

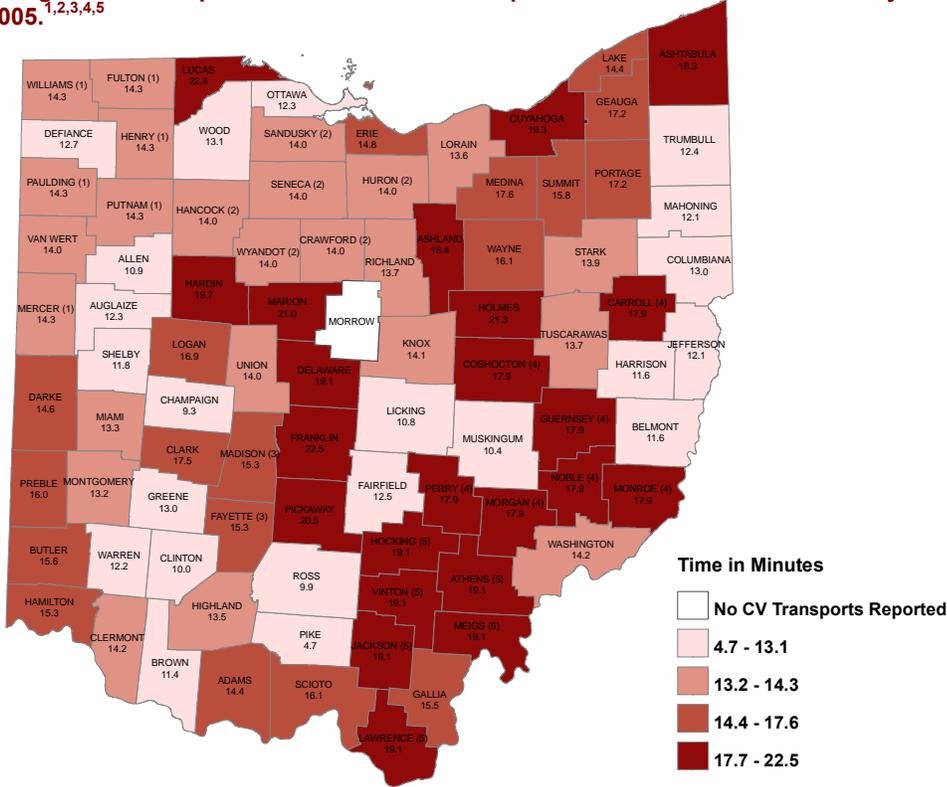
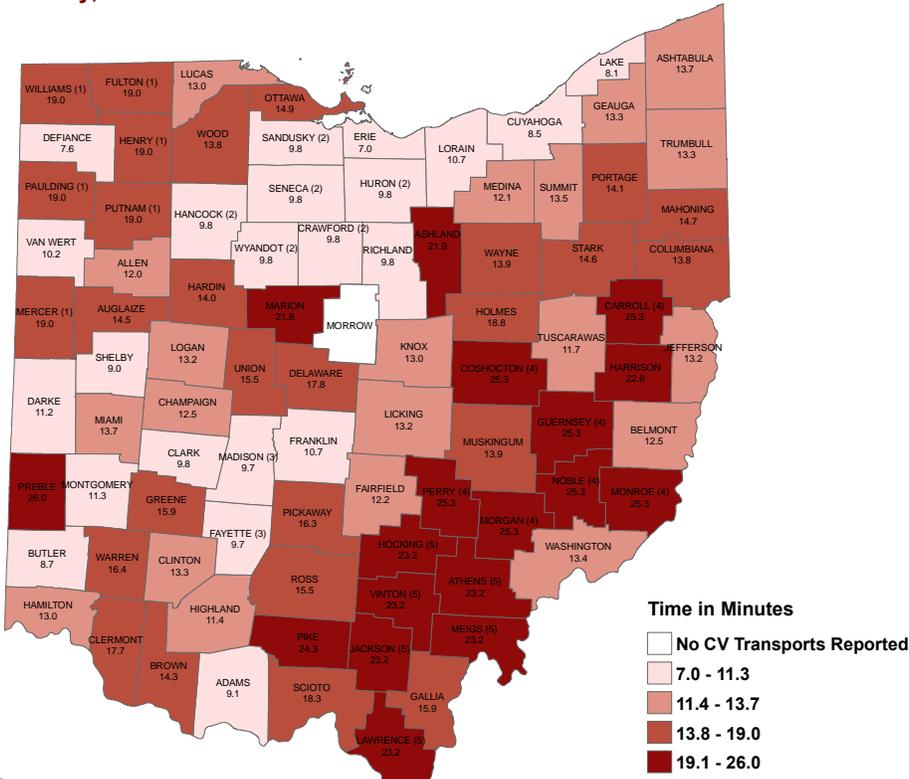


Figure 2-14 Average EMS Transport Time from Scene to Hospital for Suspected Cardiovascular/Circulatory Transports by County, Ohio 2005.^{1,2,3,4,5}



Source: Ohio EMS.

¹Northwest #1: Fulton, Henry, Mercer, Paulding, Putnam and Williams.

²Northwest #2: Crawford, Hancock, Huron, Sandusky, Seneca and Wyandot.

³Central: Fayette and Madison.

⁴Southeast #1: Carroll, Coshocton, Guernsey, Monroe, Morgan, Noble and Perry.

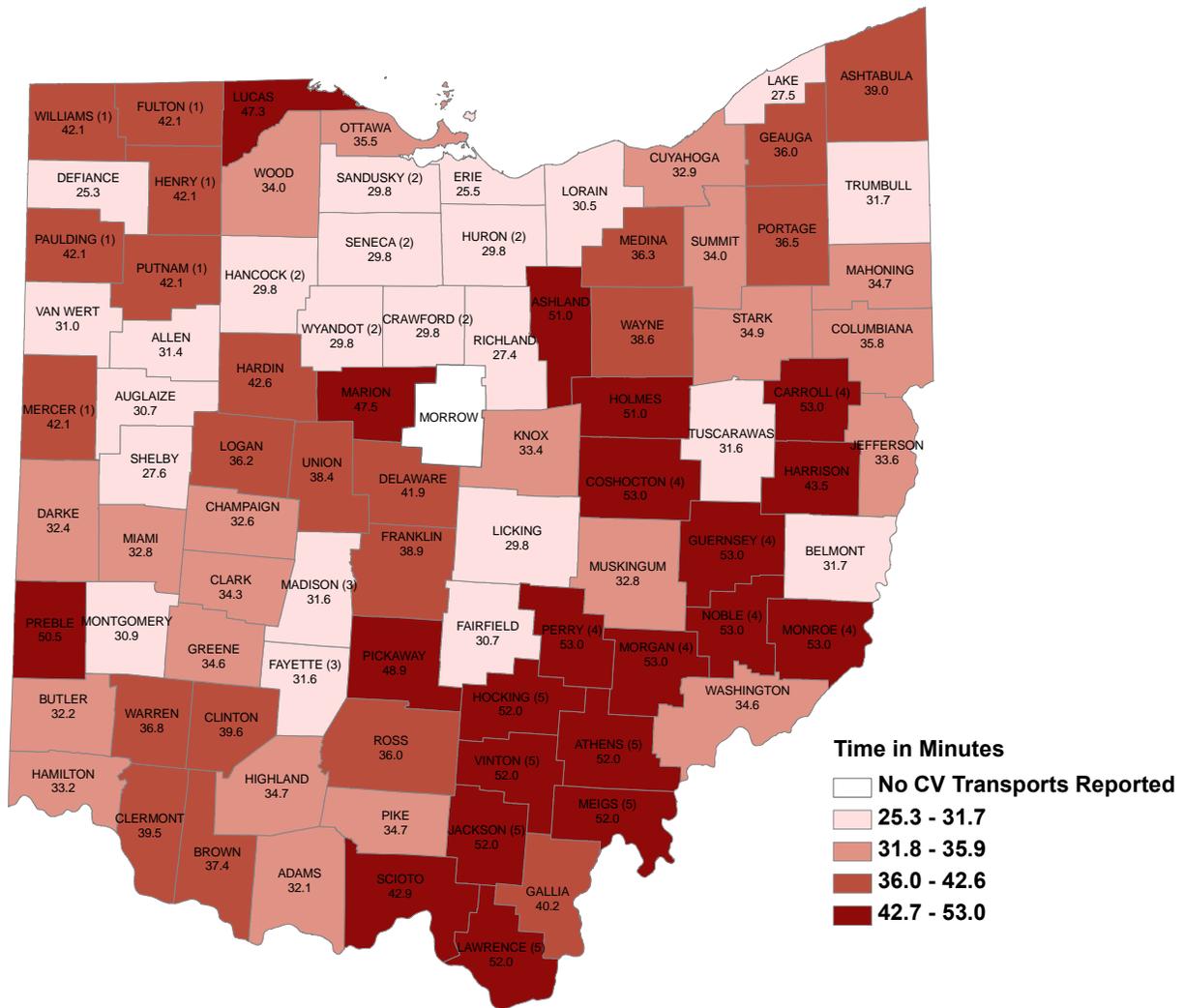
⁵Southeast #2: Athens, Hocking, Jackson, Lawrence, Meigs and Vinton.

Note: The above counties were grouped together because there was only a single EMS provider in the respective county. The remaining counties are reported individually.

The Burden of Heart Disease in Ohio

The total average CV transport time by county for Ohio ranged from 25.3 minutes in Defiance County to 53.0 minutes in the Southeast Region that included Carroll, Coshocton, Guernsey, Monroe, Morgan, Noble and Perry counties (Figure 2-15).

Figure 2-15. Average EMS Total Transport Time for Suspected Cardiovascular/Circulatory Transports by County, Ohio 2005.^{1,2,3,4,5}



Source: Ohio EMS.

¹Northwest #1: Fulton, Henry, Mercer, Paulding, Putnam and Williams.

²Northwest #2: Crawford, Hancock, Huron, Sandusky, Seneca and Wyandot.

³Central: Fayette and Madison.

⁴Southeast #1: Carroll, Coshocton, Guernsey, Monroe, Morgan, Noble and Perry.

⁵Southeast #2: Athens, Hocking, Jackson, Lawrence, Meigs and Vinton.

Note: The above counties were grouped together because there was only a single EMS provider in the respective county. All other counties are reported individually.

IV. Emergency Medical Service (EMS) Cardiac Arrest Transports

Cardiac arrest, or sudden cardiac death, is the sudden abrupt loss of heart function in a person who may or may not have diagnosed heart disease. The time and manner of death are unexpected and death occurs instantly or shortly after symptoms appear.¹¹ The most common reason for a person to die suddenly of cardiac arrest is cardiovascular disease, particularly coronary heart disease.¹² In 2005, there were 5,992 cardiac arrest transports in Ohio. This represented less than 1 percent of all EMS transports in the state. The average transport time from dispatch to hospital was 34 minutes (Table 2-3).

Table 2-3. Cardiac Arrest EMS Transports by Age Group, Ohio 2005.^{1,2,3}

Age Group	Number of Cardiac Arrest Transports	Total Number of Transports	Percentage of Total Transports	Average Time Dispatch to Scene	Average Time at Scene	Average Time Scene to Hospital	Average Total Time Dispatch to Hospital
0-19	179	109,279	0.2%	6.8	9.3	12.7	28.3
20-34	172	135,498	0.1%	6.4	8.3	11.9	35.9
35-44	329	97,288	0.3%	5.8	8.4	12.3	32.9
45-54	803	111,384	0.7%	6.1	8.7	12.2	35.5
55-64	936	94,399	1.0%	6.0	8.6	13.0	35.1
65-74	1,081	96,286	1.1%	5.8	8.0	13.2	33.2
75-84	1,191	133,325	0.9%	5.6	8.0	12.7	33.4
85+	596	81,754	0.7%	5.3	6.8	11.8	34.4
All	5,992	969,841	0.6%	5.8	8.3	12.5	34.0

Source: Ohio EMS.

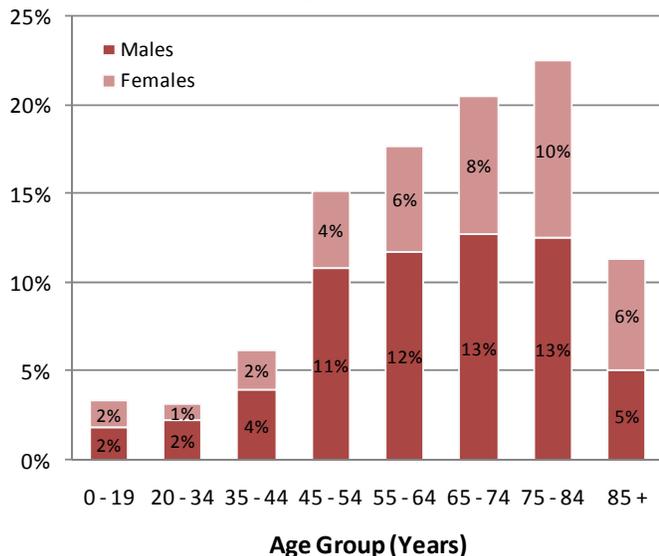
¹Average Time in Minutes.

²Numbers may not add up because of unreported age.

³Time at Scene was calculated by subtracting the sum of the Average Time of Dispatch to Scene and Average Time of Scene to Hospital from the Total Average Time (Dispatch to Hospital).

The largest proportion of cardiac arrest transports was for persons aged 75-84 (23 percent). Thirteen percent of cardiac arrest transports occurred for patients 44 years and younger (Figure 2-16).

Figure 2-16. Percentage of Cardiac Arrest EMS Transports by Sex and Age Group, Ohio 2005.¹



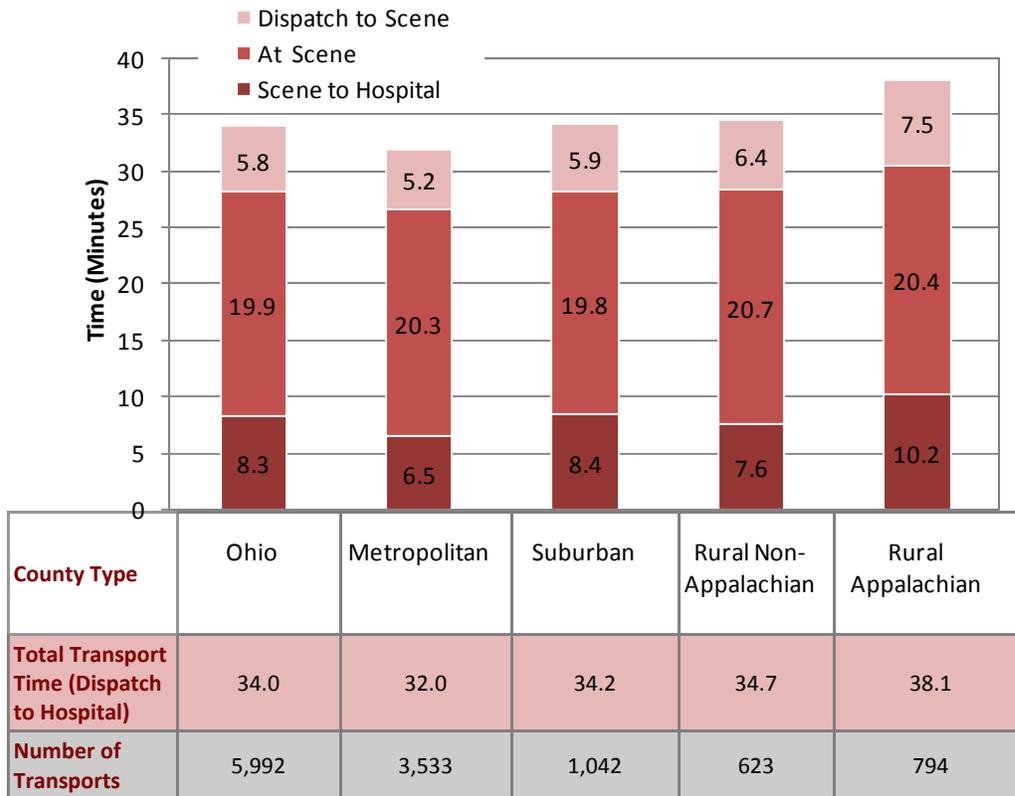
Source: Ohio EMS.

¹Percentages calculated using cardiac arrest transports with reported age (N=5,207) as the denominator.

Counties Grouped as Urban/Rural

The longest average transport time for cardiac arrest (38.1 minutes) and the longest time at scene (20.4 minutes) occurred in counties that are designated as rural Appalachian. These counties also had longest transport times for both dispatch to scene (7.5 minutes) and scene to hospital (10.2 minutes). In comparison, dispatch to scene transport time was 5.2 minutes and the scene to hospital transport time was 6.5 minutes for counties that are considered metropolitan (Figure 2-17). Average time at scene did not differ substantially among all county types.

Figure 2-17. Average EMS Transport Time¹ for Cardiac Arrest by County Type, Ohio 2005.^{1,3}



Source: Ohio EMS.

¹Average Time in Minutes.

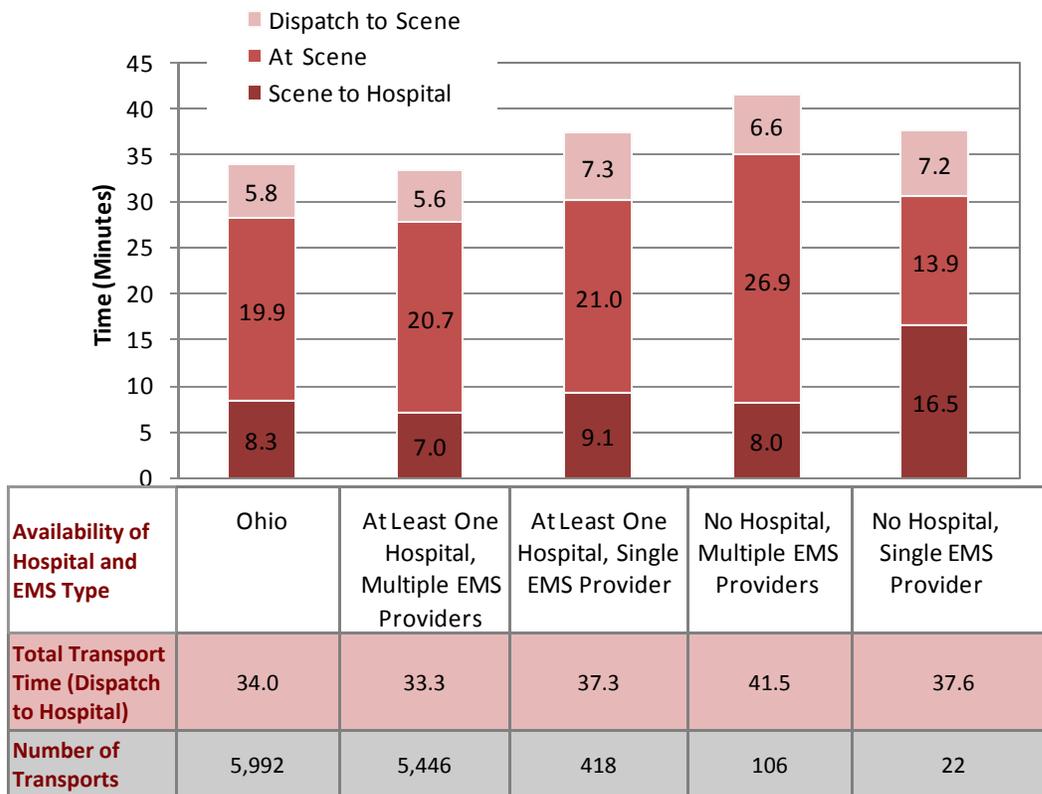
²Time at Scene was calculated by subtracting the sum of the Average Time of Dispatch to Scene and Average Time of Scene to Hospital from the Total Average Time (Dispatch to Hospital).

Availability of Hospital and EMS Provider

The longest average transport time for cardiac arrest from dispatch to hospital (41.5 minutes) and the longest reported time at scene (26.9 minutes) occurred in counties with no hospital and multiple EMS providers. These counties had an average transport time from dispatch to hospital of 41.5 minutes, compared with 33.3 minutes for counties with at least one hospital and multiple EMS providers (Figure 2-18).

Transport times in counties with no hospital and a single EMS provider averaged 37.6 minutes. These counties had the least amount of time at the scene (13.9 minutes) and the greatest amount of time from scene to hospital (16.5 minutes) (Figure 2-18).

Figure 2-18. Average Transport Time¹ for Cardiac Arrest by Availability of a Hospital in the County and EMS Provider Type, Ohio 2005.^{1,3}



Source: Ohio EMS.

¹Average Time in Minutes.

²Time at Scene was calculated by subtracting the sum of the Average Time of Dispatch to Scene and Average Time of Scene to Hospital from the Total Average Time (Dispatch to Hospital).

V. 12-Lead Usage for Suspected CV and Cardiac Arrest EMS Transports

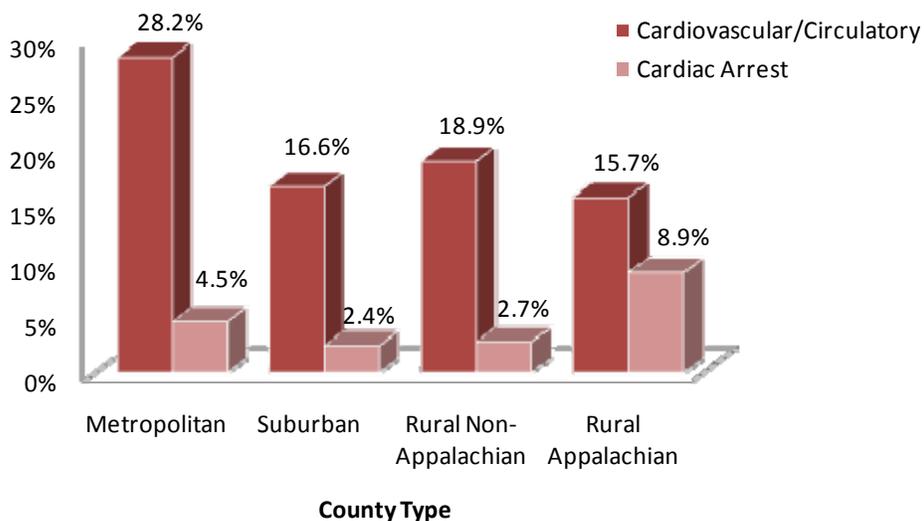
An electrocardiogram (ECG) is a test used to determine if a person’s heart rate and rhythm are normal or if heart damage has occurred.¹² A 12-lead ECG provides EMS and doctors with more accurate and revealing information, compared with a 4-lead ECG.¹² Prehospital 12-lead ECG usage has been shown to reduce the average time to fibrinolytic therapy in the hospital by 32 to 62 minutes for heart attack patients.¹³ Not every EMS provider is equipped with the 12-Lead ECG, and there are many barriers, including cost (a 12-lead ECG can range from \$9,000 to \$25,000), paramedic training and ongoing competency assessment and lack of electronic ECG receiving equipment at the destination hospital.¹³ Of the 82,658 CV transports, 23.0 percent had 12-lead usage documented. Metropolitan counties reported a higher usage (28.2 percent), compared with rural Appalachian counties (15.7 percent) (Table 2-4, Figure 2-18).

Table 2-4. 12-Lead Usage for Suspected Cardiovascular/Circulatory and Cardiac Arrest EMS Transports by County Type, Ohio 2005.

County Type	Cardiovascular/Circulatory			Cardiac Arrest			Total
	Transports with 12-Lead Usage	Total Transports	Percent of transports with 12-Lead Usage	Transports with 12-Lead Usage	Total Transports	Percent of transports with 12-Lead Usage	
Metropolitan	12,615	44,696	28.2%	160	3,533	4.5%	12,775
Suburban	2,642	15,935	16.6%	25	1,042	2.4%	2,667
Rural Non-Appalachian	1,960	10,354	18.9%	17	623	2.7%	1,977
Rural Appalachian	1,829	11,673	15.7%	71	794	8.9%	1,900
Total	19,046	82,658	23.0%	273	5,992	4.6%	19,319

Source: Ohio EMS.

Figure 2-19. 12-Lead Usage for Suspected Cardiovascular/Circulatory and Cardiac Arrest EMS Transports by County Type, Ohio 2005.



Source: Ohio EMS.

VI. Summary

Awareness of the signs and symptoms of heart attack varied among Ohio residents, with less than 40 percent of adults recognizing all symptoms. In general, blacks, Hispanics and adults of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) were less aware of heart attack signs and symptoms and the need to call 911 as soon as possible. Increasing awareness of these signs and symptoms, particularly among high-risk groups, will help decrease disability and death from heart attacks in Ohio.

In a well-coordinated system of care, rapid access to EMS via a comprehensive 911 system is the best method to assure that heart attack victims are triaged and transported to a hospital best equipped to provide necessary interventions. Ohio's 911 system is still developing, with 39 of 88 counties not yet implementing Wireless Phase II coverage, the highest level of coverage. Of this group, four counties have basic 911 service, the lowest level of coverage. Cardiovascular/circulatory transports accounted for 8.5 percent of all EMS runs statewide. Residents of non-Appalachian rural and rural Appalachian counties experienced the longest average transport times, compared with metropolitan counties. Rural counties were more likely to have fewer EMS providers and/or no hospital. EMS transports for cardiac arrest, or sudden cardiac death, represent less than 1 percent of all transports statewide, but require the most intense interventions. On-scene and transport times for cardiac arrest patients were slightly longer in all counties compared with suspected cardiovascular/circulatory patients.

3

The Burden of Heart Disease in Ohio

Heart Disease Hospitalizations and Quality of Care Measures



Introduction

The following chapter contains multiple sections that describe the magnitude of heart disease hospital discharges and care received by patients. The first section describes hospital discharges specific to the broad category of heart disease. The next series of sections provides information on hospital discharges for specific types of heart disease: coronary heart disease, myocardial infarction (commonly known as heart attack), heart failure and hypertension. Within each section is a special focus highlighting hospitalizations among Medicare beneficiaries, the primary payor for the majority of heart disease hospitalizations. Heart disease hospital discharges with the major co-morbidities of diabetes and end-stage renal disease are presented in section VII, followed by a brief description of cardiac inpatient procedures. The last part of the chapter provides some information on the quality of care patients receive in the hospital when being treated for a heart attack or heart failure. This is demonstrated through the reported process of care measures.

I. Heart Disease Hospital Discharges

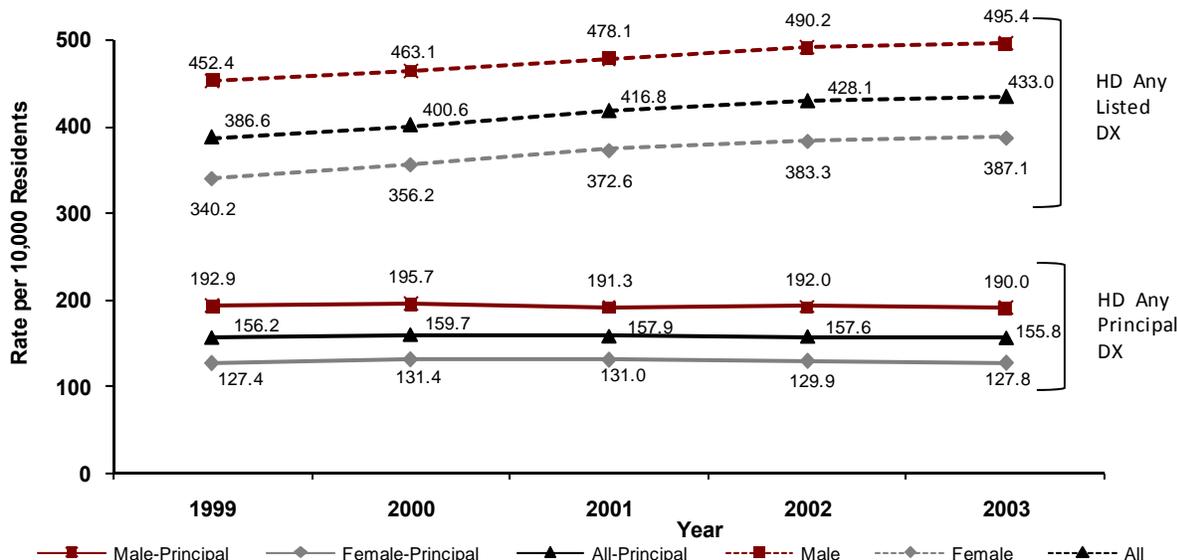
Heart disease is a leading cause of hospitalization in Ohio. In 2003, there were 528,637 discharges with a diagnosis of heart disease, representing 37 percent of all hospitalizations. As detailed below, the number as well as cost of these hospitalizations is increasing.

Sex and Year

Between 1999 and 2003, the number of discharges with heart disease listed as any diagnosis increased by 17.0 percent from 415,754 to 528,637. The age-adjusted hospital discharge rate increased by 12.0 percent from 386.6 to 433.0 per 10,000 residents during the same time period (Figure 3-1, Table 3-2).

For the same period of 1999-2003, the number of discharges with heart disease listed as the principal diagnosis increased slightly from 182,564 to 190,171 (4.2 percent); while the age-adjusted rate remained constant at approximately 156 discharges per 10,000 residents. In 2003, males (190.0 per 10,000 residents) had higher heart disease hospital discharge rates, compared with females (127.8 per 10,000 residents) (Figure 3-1, Table 3-1). In 2003, the discharge rate for males was 48.7 percent higher, compared with females.

Figure 3-1. Age-adjusted Rates for Hospital Discharges with Heart Disease¹ as Any Diagnosis and for Hospital Discharges with Heart Disease¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003².



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease (HD) defined as ICD-9 codes: 390-398, 402, 404, 410-429.

²DX=Diagnosis

Table 3-1. Hospital Discharges with Heart Disease¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	95,188	4.6	434,433	\$16,976	\$1,613,573,047	173.1	192.9
	Female	87,376	4.9	427,732	\$14,203	\$1,239,183,004	149.7	127.4
	All	182,564	4.7	862,165	\$15,649	\$2,852,756,051	161.1	156.2
2000	Male	97,785	4.6	446,905	\$18,598	\$1,815,003,445	177.2	195.7
	Female	90,744	4.9	445,278	\$15,588	\$1,411,375,170	155.3	131.4
	All	188,529	4.7	892,183	\$17,149	\$3,226,378,615	165.9	159.7
2001	Male	97,096	4.5	437,638	\$20,739	\$2,012,301,803	175.5	191.3
	Female	91,178	4.9	444,755	\$16,969	\$1,546,171,047	155.8	131.0
	All	188,274	4.7	882,393	\$18,913	\$3,558,472,850	165.4	157.9
2002	Male	99,252	4.5	444,255	\$24,468	\$2,427,159,394	178.9	192.0
	Female	90,868	4.9	446,444	\$19,958	\$1,812,412,028	155.1	129.9
	All	190,120	4.7	890,699	\$22,312	\$4,239,571,422	166.6	157.6
2003	Male	99,858	4.5	444,910	\$27,667	\$2,761,583,491	179.4	190.0
	Female	90,313	4.8	436,224	\$22,568	\$2,037,540,080	153.9	127.8
	All	190,171	4.6	881,134	\$25,245	\$4,799,123,571	166.3	155.8

Table 3-2. Hospital Discharges with Heart Disease¹ as Any Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Ohio Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	216,801	5.5	1,185,235	\$15,185	\$3,286,941,137	394.2	452.4
	Female	234,953	5.7	1,336,269	\$13,077	\$3,068,082,398	402.7	340.2
	All	451,754	5.6	2,521,504	\$14,088	\$6,355,023,535	398.5	386.6
2000	Male	225,299	5.5	1,242,419	\$16,799	\$3,779,253,436	408.3	463.1
	Female	247,471	5.7	1,417,479	\$14,347	\$3,545,036,456	423.4	356.2
	All	472,770	5.6	2,659,898	\$15,515	\$7,324,289,892	416.1	400.6
2001	Male	236,433	5.4	1,287,385	\$18,355	\$4,336,531,077	427.3	478.1
	Female	260,740	5.7	1,480,268	\$15,569	\$4,056,545,339	445.5	372.6
	All	497,173	5.6	2,767,653	\$16,893	\$8,393,076,416	436.7	416.8
2002	Male	247,220	5.5	1,350,063	\$21,166	\$5,228,815,229	445.6	490.2
	Female	269,514	5.7	1,541,346	\$17,867	\$4,811,532,865	459.9	383.3
	All	516,734	5.6	2,891,409	\$19,446	\$10,040,348,094	452.9	428.1
2003	Male	254,457	5.4	1,367,554	\$23,551	\$5,989,113,939	457.2	495.4
	Female	274,180	5.6	1,525,750	\$19,906	\$5,454,507,721	467.1	387.1
	All	528,637	5.5	2,893,304	\$21,661	\$11,443,621,660	462.3	433.0

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

²Total number of days divided by number of hospital discharges.

³Total amount of charges divided by number of hospital discharges.

⁴Charges represent total amount billed, not actual amount collected.

Age Group

The majority of heart disease discharges were for persons over the age of 65 years. However, 30.0 percent of the discharges had the age of the patient listed as 45 to 64 years old (Figure 3-2).

Figure 3-2. Percentage of Hospital Discharges with Heart Disease¹ as Principal Diagnosis by Age Group, Ohio 2003.

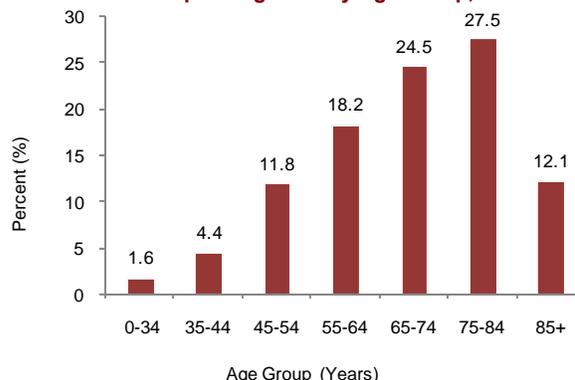
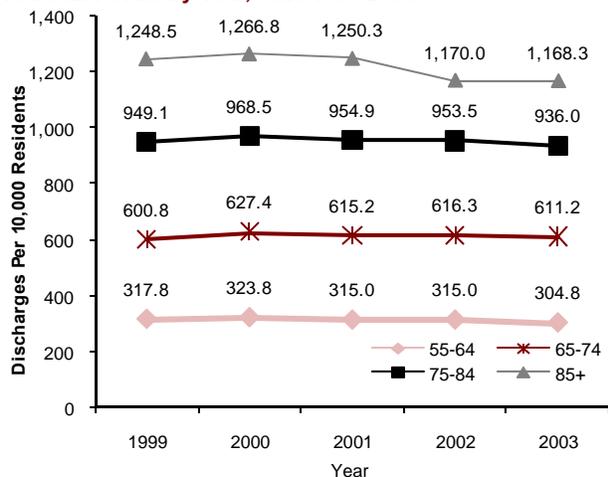


Figure 3-3. Age-specific Rates for Hospital Discharges with Heart Disease¹ as Principal Diagnosis for Age Groups 55 Years and Older by Year, Ohio 1999-2003.



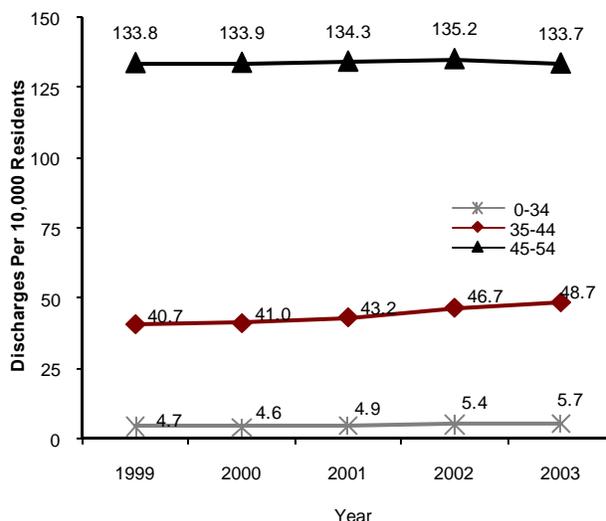
Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

Heart disease discharge rates were highest among older age groups, with patients 85 years and older having the highest rates. The discharge rates for patients 55 and older remained relatively constant between 1999 and 2003, with only slight fluctuations (Figure 3-3).

The heart disease discharge rates for patients 54 years of age and younger were significantly lower, compared with discharges of older patients. Between 1999 to 2003, the discharge rate for patients aged 35-44 years increased by 20 percent from 40.7 to 48.7 discharges per 10,000 residents. Similarly, the discharge rate for patients 0-34 years of age increased by 21 percent during the same time period (Figure 3-4).

Figure 3-4. Age-specific Rates for Hospital Discharges with Heart Disease¹ as Principal Diagnosis for Age Groups 54 Years and Younger by Year, Ohio 1999-2003.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

Table 3-3. Hospital Discharges with Heart Disease¹ as Principal Diagnosis by Age Group, Sex and Year, Ohio 1999-2003.

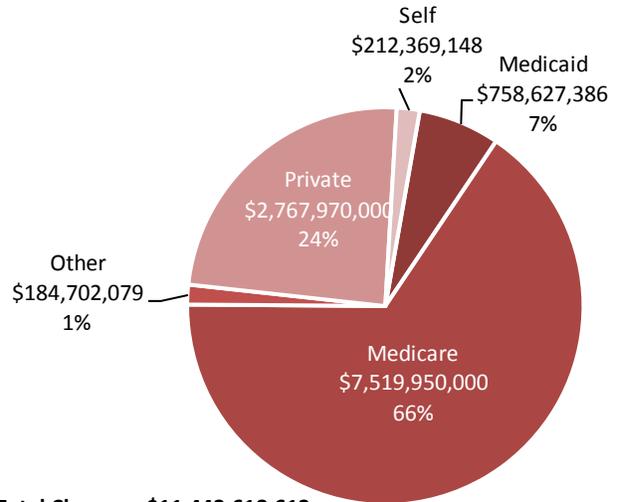
Year	Age Group (Years)	Number of Discharges	Discharges per 10,000 Residents	Number of Discharges	Discharges per 10,000 Residents	Number of Discharges	Discharges per 10,000 Residents
		Males		Females		All	
1999	0-34	1,526	5.5	1,026	3.8	2,552	4.7
	35-44	4,810	53.7	2,577	28.0	7,387	40.7
	45-54	13,360	178.8	7,040	90.6	20,400	133.8
	55-64	19,715	413.0	12,140	231.2	31,855	317.8
	65-74	25,949	732.5	21,877	495.2	47,826	600.8
	75-84	22,980	1,121.9	27,864	842.1	50,844	949.1
	85+	6,848	1,457.6	14,852	1,171.1	21,700	1,248.5
	All	95,188	173.1	87,376	149.7	182,564	161.1
2000	0-34	1,415	5.1	1,084	4.0	2,499	4.6
	35-44	4,764	53.7	2,624	28.8	7,388	41.0
	45-54	13,747	177.0	7,436	92.3	21,183	133.9
	55-64	20,035	415.3	12,754	240.5	32,789	323.8
	65-74	26,720	759.7	22,691	520.6	49,411	627.4
	75-84	23,800	1,139.8	28,772	861.5	52,572	968.5
	85+	7,304	1,488.4	15,383	1,183.2	22,687	1,266.8
	All	97,785	177.2	90,744	155.3	188,529	165.9
2001	0-34	1,660	6.0	1,018	3.8	2,678	4.9
	35-44	4,900	55.8	2,787	30.9	7,687	43.2
	45-54	14,164	177.2	7,712	93.0	21,876	134.3
	55-64	19,742	397.9	12,984	239.2	32,726	315.0
	65-74	25,690	738.7	22,147	515.3	47,837	615.2
	75-84	23,678	1,114.1	28,730	854.2	52,408	954.9
	85+	7,262	1,411.5	15,800	1,188.0	23,062	1,250.3
	All	97,096	175.5	91,178	155.8	188,274	165.4
2002	0-34	1,736	6.3	1,188	4.5	2,924	5.4
	35-44	5,117	59.4	3,037	34.4	8,154	46.7
	45-54	14,546	179.3	7,798	92.6	22,344	135.2
	55-64	20,727	399.2	13,463	237.8	34,190	315.0
	65-74	25,688	747.1	21,610	510.2	47,298	616.3
	75-84	24,160	1,116.8	28,762	849.1	52,922	953.5
	85+	7,278	1,340.6	15,010	1,102.1	22,288	1,170.0
	All	99,252	178.9	90,868	155.1	190,120	166.6
2003	0-34	1,784	6.5	1,284	4.8	3,068	5.7
	35-44	5,341	63.2	2,984	34.5	8,325	48.7
	45-54	14,635	177.9	7,776	91.1	22,411	133.7
	55-64	21,042	387.5	13,505	228.7	34,547	304.8
	65-74	25,501	747.0	21,010	500.8	46,511	611.2
	75-84	24,214	1,103.5	28,149	828.0	52,363	936.0
	85+	7,341	1,285.3	15,605	1,120.4	22,946	1,168.3
	All	99,858	179.4	90,313	153.9	190,171	166.3

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-396, 402, 404, 410-429.

Charges

The economic burden of heart disease is striking. In 2003, total charges billed for discharges with heart disease listed as any diagnosis were more than \$11.4 billion (Figure 3-5). This figure represents the total amount billed and not the actual amount collected. Medicare was the primary payor for 66 percent of the charges, followed by private insurance companies (24 percent) and then Medicaid with 7 percent. These figures do not include costs associated with emergency transport, physician fees, medications, rehabilitation, lost work, lost wages and long-term care.

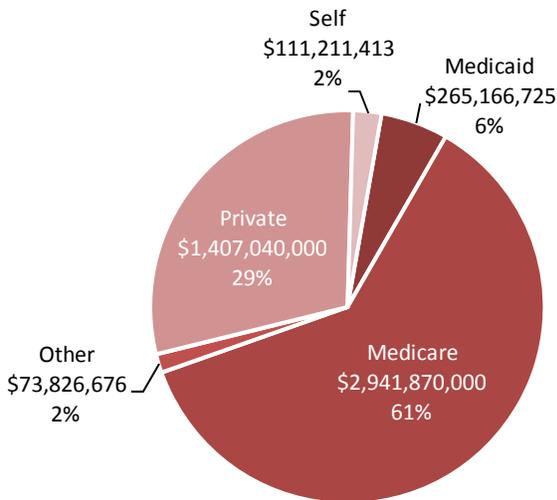
Figure 3-5. Total Charges¹ for Hospital Discharges with Heart Disease² as Any Diagnosis by Primary Payor, Ohio 2003.



Total Charges= \$11,443,618,613

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

Figure 3-6. Total Charges¹ for Hospital Discharges with Heart Disease as Principal Diagnosis by Primary Payor, Ohio 2003.



Total Charges= \$4,799,114,814

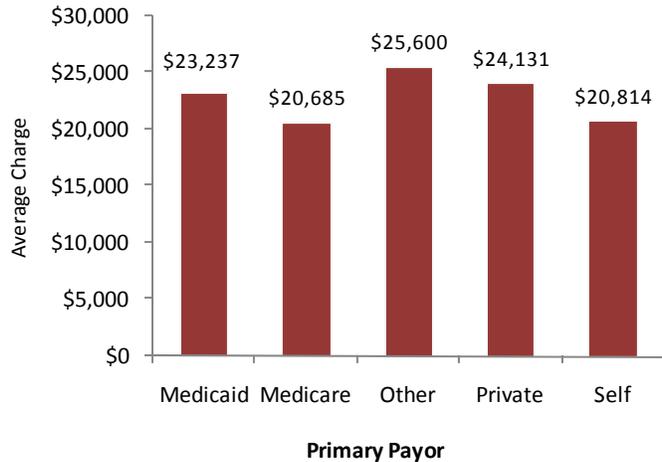
Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

A similar cost distribution was observed among the top three payors for discharges with heart disease listed as the principal diagnosis. Medicare was the primary payor for 61 percent of the charges, private insurance for 29 percent and Medicaid for 6 percent (Figure 3-6).

The average charge for a hospital stay with heart disease as the principal diagnosis varied by primary payor. Medicare and discharges classified as “self” pay had the lowest average charge (Figure 3-7).

The average charge per discharge for heart disease as any listed diagnosis and heart disease as the principal diagnosis increased between 1999 and 2003. In the five-year period, the average charge for heart disease as a principal diagnosis increased by 61.3 percent from \$15,649 to \$25,245. In 2003, the average charge for heart disease as any diagnosis increased by 53.8 percent from \$14,088 to \$21,661. The average charge for males was higher compared with females. In 2003, for discharges with a principal diagnosis of heart disease the average charge for males (\$27,667) was more than \$5,000 (22.6 percent) higher, compared with females (\$22,568) (Table 3-1, Figure 3-7).

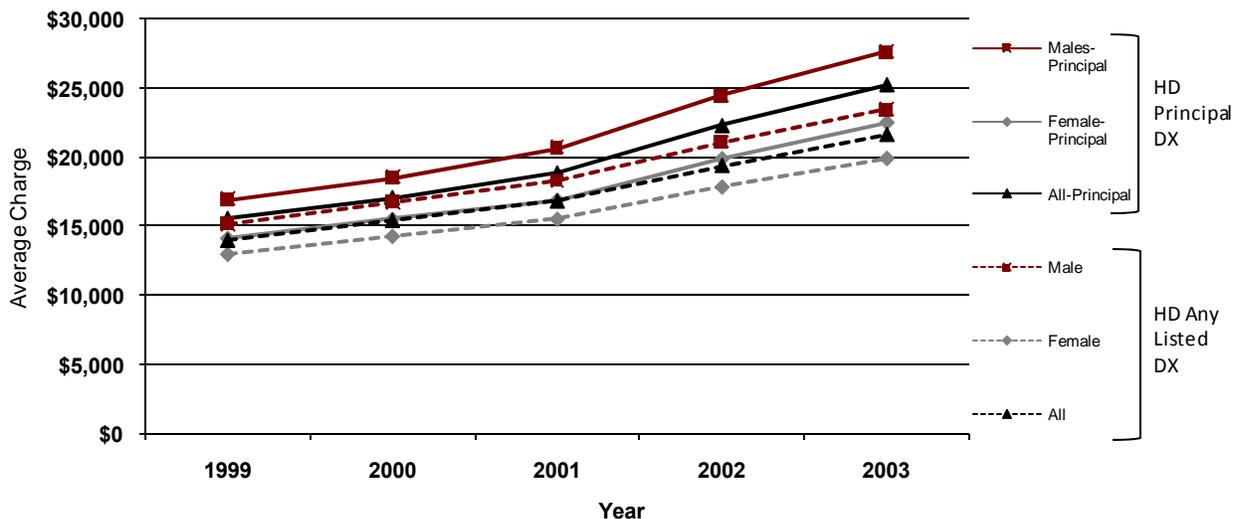
Figure 3-7. Average Charge^{1,2} for Hospital Discharges with Heart Disease³ as Principal Diagnosis by Primary Payor, Ohio 2003.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Average Charge equal to total number of charges divided by total number of discharges.
³Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.

Although, the average charges for males were higher, compared with charges for females, both the average length of stay (LOS) and mean age were lower for males, compared with the LOS and patient age for females. In, 2003 the LOS for males was 4.5 days, compared with 4.8 days for females. The average age for male patients was 67.9 years, compared with 71.4 years for females (data not shown).

Figure 3-8. Average Charge^{1,2} for Hospital Discharges with Heart Disease³ as Any Diagnosis and for Hospital Discharges with Heart Disease³ as Principal Diagnosis by Sex and Year, Ohio 1999-2003⁴.

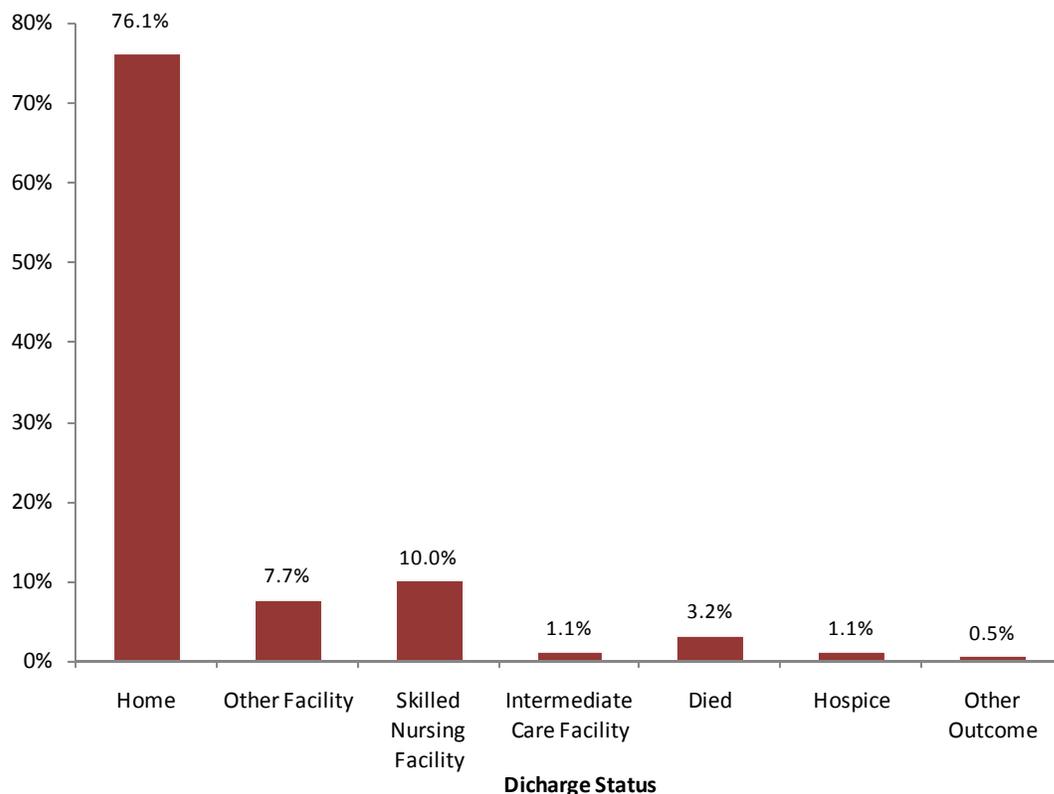


Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Average Charge equal to total number of charges divided by total number of discharges.
³Heart Disease defined (HD) as ICD-9 codes: 390-398, 402, 404, 410-429.
⁴DX=Diagnosis

Discharge Status

The majority of heart disease patients were discharged to home (76.1 percent). Discharged to skilled nursing facility was the next largest category (10.0 percent), followed by discharged to another facility for additional medical care (7.7 percent) (Figure 3-9).

Figure 3-9. Hospital Discharges with Heart Disease as Principal Diagnosis by Discharge Status, Ohio 2003.¹



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease defined as ICD-9 codes: 390-396, 402, 404, 410-429.

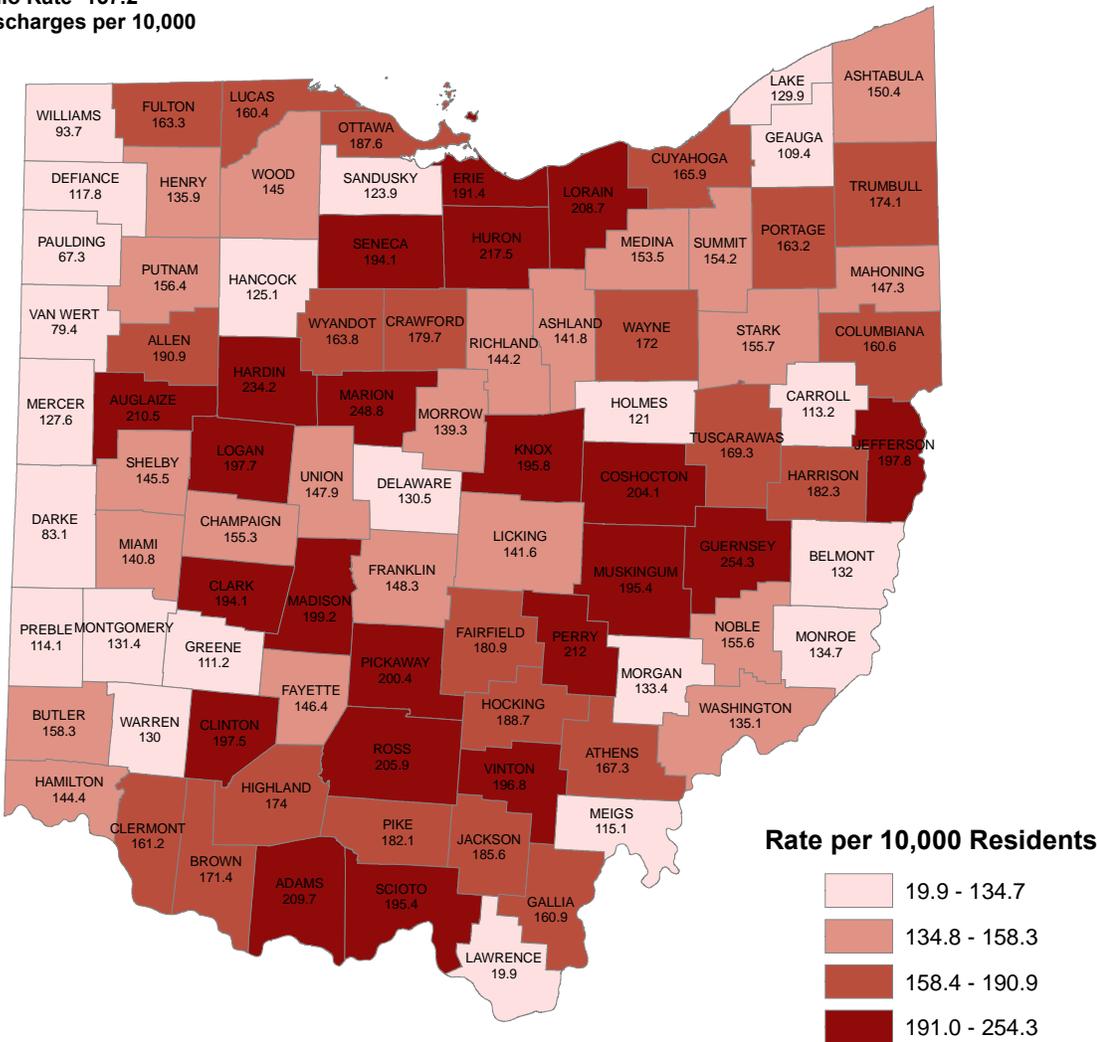
Hospital Discharges Rates by County

Ohio's hospital discharge rate for heart disease for 1999-2003 was 157.2 discharges per 10,000 residents. County rates ranged from a low of 19.9 discharges per 10,000 residents in Lawrence County to a high of 254.3 discharges per 10,000 residents in Guernsey County (Figure 3-10).

**Hospital discharge data from Ohio residents who received care at West Virginia hospitals were not collected in 2003. Therefore caution must be used when interpreting data from border counties where residents may have received care in West Virginia.*

Figure 3-10. Average Annual Age-adjusted Rates for Hospital Discharges with Heart Disease¹ as Principal Diagnosis by County, Ohio 1999-2003.

**Ohio Rate=157.2
Discharges per 10,000**



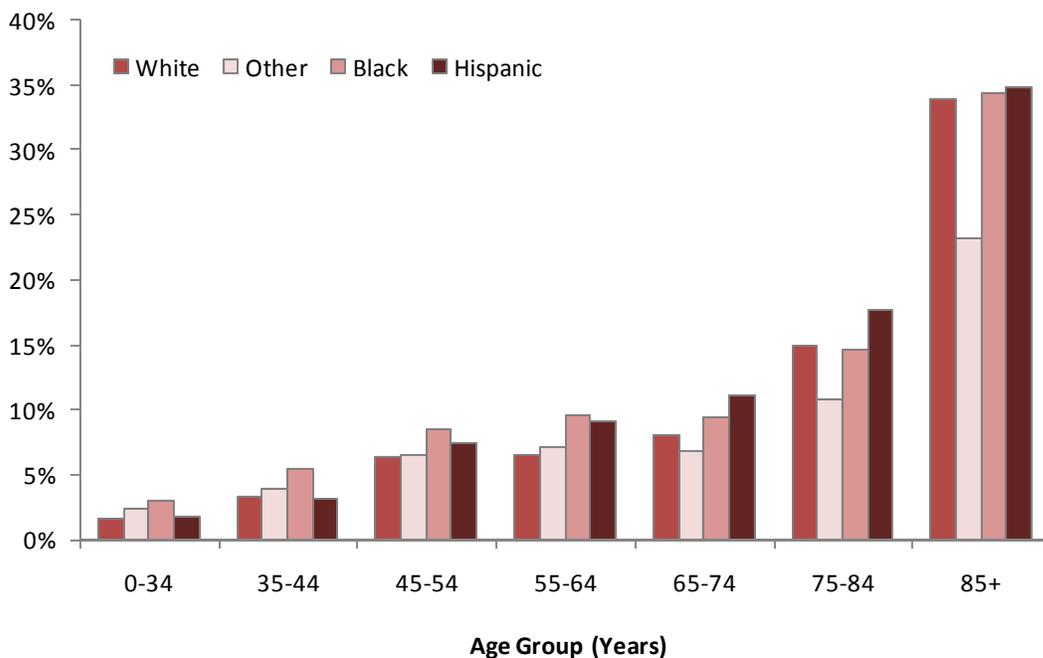
Special Focus: Heart Disease Hospital Discharges among Medicare Beneficiaries

The majority of Ohioans with CVD have Medicare as their primary insurer (see Chapter 1, section IV). The following section describes heart disease hospitalizations among Medicare beneficiaries. Overall, 12.4 percent of all Medicare beneficiaries had an inpatient hospitalization for heart disease in 2005. Beneficiaries 65 and older were more likely to be hospitalized for heart disease and accounted for 89.7 percent of total heart disease discharges. Among beneficiaries aged 75-84, 15.0 percent had a heart disease discharge and among beneficiaries 85 years of age and older, 33.8 percent had a discharge for heart disease (Table 3-4).

Race/Ethnicity and Age Group

The prevalence of heart disease discharges among beneficiaries differed by race and age group. Hispanics (34.9 percent), blacks (34.4 percent) and whites (33.9 percent) aged 85 years and older had the highest prevalence of a hospital discharge of all racial-age groups. Blacks had the highest prevalence of heart disease discharges for all age groups less than 65 years, while Hispanics had the highest prevalence among all age groups 65 years and older (Figure 3-11, Table 3-5).

Figure 3-11. Percentage of Ohio Medicare Beneficiaries with a Heart Disease Hospital Discharge by Race/Ethnicity and Age Group, 2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease was defined as ICD 9 codes: 390-398, 402, 404, 410-429.

²A Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Heart Disease in the inpatient claim record for the beneficiary.

Table 3-4. Heart Disease Hospital Discharges for Ohio Medicare Beneficiaries by Age Group, 2005.^{1,2}

Age Group (Years)	Number of Hospital Discharges with a Diagnosis of Heart Disease	Number of Beneficiaries with a Heart Disease Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a Heart Disease Hospital Discharge	Rate of Heart Disease Discharges per 10,000 Beneficiaries
0-34	1,404	619	31,650	2.0	444
35-44	4,396	1,893	51,411	3.7	855
45-54	14,140	5,921	87,079	6.8	1,624
55-64	30,150	12,986	187,745	6.9	1,606
65-74	125,509	60,954	747,208	8.2	1,680
75-84	173,595	81,980	547,603	15.0	3,170
85+	138,048	64,469	190,626	33.8	7,242
All	487,242	228,822	1,843,322	12.4	2,643

Table 3-5. Heart Disease Hospital Discharges for Ohio Medicare Beneficiaries By Race and Age Group, 2005.^{1,2}

Age Group (Years)	Number of Hospital Discharges with a Diagnosis of Heart Disease	Number of Beneficiaries with a Heart Disease Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a Heart Disease Hospital Discharge	Rate of Heart Disease Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with a diagnosis of Heart Disease	Number of Beneficiaries with a Heart Disease Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a Heart Disease Hospital Discharge	Rate of Heart Disease Discharges per 10,000 Beneficiaries
White						Other				
0-34	818	389	23,614	1.6	346	34	17	718	2.4	474
35-44	2,776	1,314	40,380	3.3	687	73	30	775	3.9	942
45-54	9,921	4,369	68,244	6.4	1,454	280	125	1,907	6.6	1,468
55-64	23,922	10,469	160,502	6.5	1,490	566	263	3,698	7.1	1,531
65-74	109,759	54,100	672,735	8.0	1,632	1,054	547	7,967	6.9	1,323
75-84	158,269	75,358	501,942	15.0	3,153	741	351	3,238	10.8	2,288
85+	126,009	59,337	175,067	33.9	7,198	1,077	476	2,046	23.3	5,264
All	431,474	205,336	1,642,484	12.5	2,627	3,825	1,809	20,349	8.9	1,880
Black						Hispanic				
0-34	532	207	6,980	3.0	762	20	6	338	1.8	592
35-44	1,509	537	9,869	5.4	1,529	38	12	387	3.1	982
45-54	3,865	1,394	16,484	8.5	2,345	74	33	444	7.4	1,667
55-64	5,572	2,218	23,147	9.6	2,407	90	36	398	9.0	2,261
65-74	14,442	6,211	65,638	9.5	2,200	254	96	868	11.1	2,926
75-84	14,057	6,045	41,141	14.7	3,417	528	226	1,282	17.6	4,119
85+	10,752	4,567	13,258	34.4	8,110	210	89	255	34.9	8,235
All	50,729	21,179	176,517	12.0	2,874	1,214	498	3,972	12.5	3,056

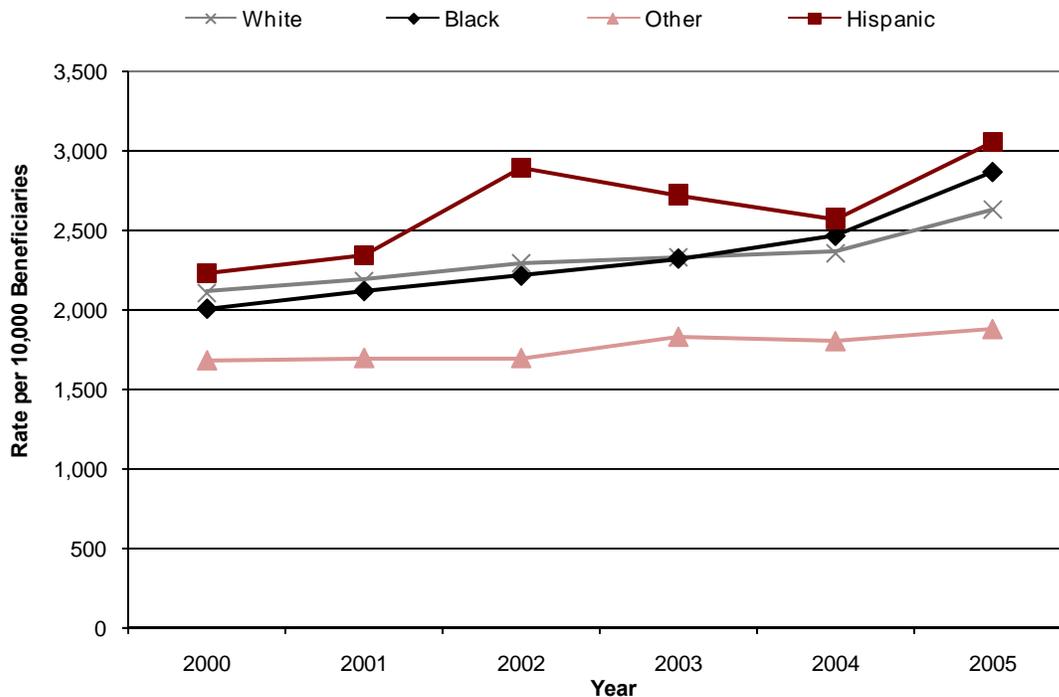
Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease was defined as ICD 9 codes: 390-398, 402, 404, 410-429.²A Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Heart Disease in the inpatient claim record for the beneficiary.

Race/Ethnicity and Year

From 2000 to 2005, heart disease hospital discharge rates among Medicare beneficiaries increased for all racial-ethnic groups. Hispanic beneficiaries had the highest discharge rates, and during this time period the rate increased by 36.8 percent from 2,234 discharges to 3,056 discharges per 10,000 beneficiaries. Black beneficiaries had the second-highest discharge rates, and during the same time period observed a 43.0 percent increase from 2,008 discharges to 2,874 discharges per 10,000 beneficiaries. The discharge rate for white beneficiaries increased by 23.2 percent from 2,113 to 2,627 discharges per 10,000 beneficiaries. Beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) observed the smallest increase in discharge rates during this time period. The discharge rate increased by 11.8 percent from 1,682 to 1,880 discharges per 10,000 beneficiaries (Figure 3-12, Table 3-5).

Figure 3-12. Heart Disease Hospital Discharge Rates for Ohio Medicare Beneficiaries by Race/Ethnicity and Year, 2000-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.
²Heart Disease was defined as ICD-9 codes: 390-398, 402, 404, 410-429.
³A Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Heart Disease in the inpatient claim record for the beneficiary.

Race, Sex and Age Group

As shown in Table 3-6, males had higher heart disease hospital discharge rates compared with females. Black males had the highest hospital discharge rates of all racial/sex groups.

Table 3-6. Heart Disease Hospital Discharges for Ohio Medicare Beneficiaries by Race, Sex and Age Group, 2005.^{1,2,3}

Age Group (Years)	Males					Females				
	Number of Hospital Discharges with a Diagnosis of Heart Disease	Number of Beneficiaries with a Heart Disease Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a Heart Disease Hospital Discharge	Rate of Heart Disease Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with a Diagnosis of Heart Disease	Number of Beneficiaries with a Heart Disease Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a Heart Disease Hospital Discharge	Rate of Heart Disease Discharges per 10,000 Beneficiaries
White										
0-34	441	205	13,150	1.6	335	377	184	10,464	1.8	360
35-44	1,530	728	22,350	3.3	685	1,246	586	18,030	3.3	691
45-54	6,053	2,557	37,685	6.8	1,606	3,868	1,812	30,559	5.9	1,266
55-64	13,523	5,946	81,597	7.3	1,657	10,399	4,523	78,905	5.7	1,318
65-74	57,853	28,974	306,573	9.5	1,887	51,906	25,126	366,162	6.9	1,418
75-84	73,951	35,071	199,685	17.6	3,703	84,318	40,287	302,257	13.3	2,790
85+	48,900	22,208	51,123	43.4	9,565	77,109	37,129	123,944	30.0	6,221
All	202,251	95,689	712,163	13.4	2,840	229,223	109,647	930,321	11.8	2,464
Black										
0-34	271	107	3,812	2.8	711	261	100	3,168	3.2	824
35-44	750	283	5,414	5.2	1,385	759	254	4,455	5.7	1,704
45-54	2,152	764	8,667	8.8	2,483	1,713	630	7,817	8.1	2,191
55-64	2,710	1,066	10,797	9.9	2,510	2,862	1,152	12,350	9.3	2,317
65-74	6,684	2,839	27,940	10.2	2,392	7,758	3,372	37,698	8.9	2,058
75-84	5,495	2,364	15,319	15.4	3,587	8,562	3,681	25,822	14.3	3,316
85+	3,884	1,589	3,544	44.8	10,959	6,868	2,978	9,714	30.7	7,070
All	21,946	9,012	75,493	11.9	2,907	28,783	12,167	101,024	12.0	2,849
All										
0-34	744	326	17,552	1.9	424	660	293	14,098	2.1	468
35-44	2,347	1,036	28,481	3.6	824	2,049	857	22,930	3.7	894
45-54	8,435	3,420	47,766	7.2	1,766	5,705	2,501	39,313	6.4	1,451
55-64	16,569	7,173	94,671	7.6	1,750	13,581	5,813	93,074	6.2	1,459
65-74	65,281	32,186	339,146	9.5	1,925	60,228	28,768	408,062	7.0	1,476
75-84	80,061	37,712	216,873	17.4	3,692	93,534	44,268	330,730	13.4	2,828
85+	53,276	24,006	55,284	43.4	9,637	84,772	40,463	135,342	29.9	6,264
All	226,713	105,859	799,773	13.2	2,835	260,529	122,963	1,043,549	11.8	2,497

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.

²Heart Disease was defined as ICD 9 codes: 390-398, 402, 404, 410-429.

³A Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Heart Disease in the inpatient claim record for the beneficiary.

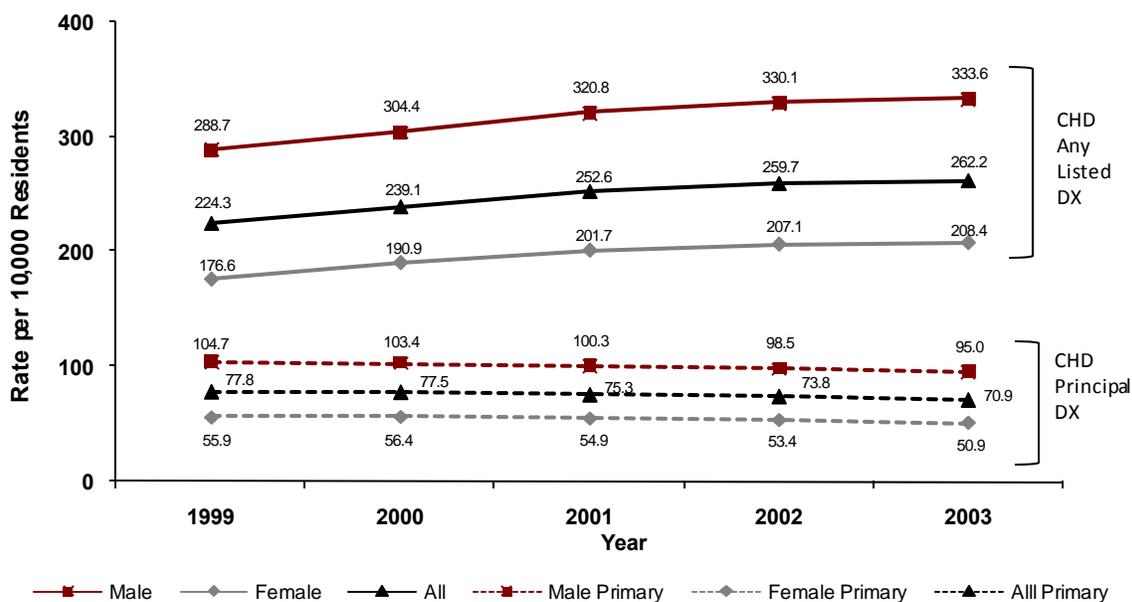
II. Coronary Heart Disease Hospital Discharges

Sex and Year

Coronary heart disease (CHD), which includes acute myocardial infarction, angina pectoris, atherosclerosis and ischemic heart disease, is the most common form of heart disease in the United States.¹ Between 1999-2003, both the number of discharges and the rate of discharges with CHD listed as the principal diagnosis decreased by 4.8 percent and 8.9 percent, respectively. The rate for hospital discharges with CHD as the principal diagnosis decreased from 77.8 per 10,000 in 1999 to 70.9 per 10,000 in 2003. Decreases in the number of discharges and rates were also observed by sex (Figure 3-13, Table 3-7). Males accounted for more discharges than females. In 2003, there were 51,318 discharges with CHD listed as the principal diagnosis for males, compared with 35,194 discharges for females (Table 3-7).

The rate of discharges with CHD listed as any diagnosis increased by 16.9 percent. Similar trends were observed by sex. The discharge rate for males increased by 15.6 percent, whereas the discharge rate for females increased by 18.0 percent (Figure 3-13). The number of hospital discharges for heart disease listed as any diagnosis increased by 22.1 percent from 262,750 discharges in 1999 to 320,941 discharges in 2003.

Figure 3-13. Age-adjusted Rates for Hospital Discharges with Coronary Heart Disease as Any Diagnosis and for Hospital Discharges with Coronary Heart Disease as Principal Diagnosis by Sex and Year, Ohio 1999-2003.¹



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease (CHD) defined as ICD-9 codes: 402, 410-414, 429.2.

Table 3-7. Hospital Discharges with Coronary Heart Disease¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	53,254	4.2	225,547	\$19,874	\$1,056,857,946	96.8	104.7
	Female	37,617	4.5	169,469	\$17,277	\$648,822,420	64.5	55.9
	All	90,871	4.3	395,016	\$18,799	\$1,705,680,366	80.2	77.8
2000	Male	53,232	4.2	223,942	\$21,952	\$1,166,675,069	96.5	103.4
	Female	38,162	4.5	170,642	\$19,027	\$724,769,979	65.3	56.4
	All	91,394	4.3	394,584	\$20,731	\$1,891,445,048	80.4	77.5
2001	Male	52,344	4.1	215,718	\$24,333	\$1,272,905,967	94.6	100.3
	Female	37,419	4.4	165,596	\$20,841	\$779,318,016	63.9	54.9
	All	89,763	4.2	381,314	\$22,877	\$2,052,223,983	78.8	75.3
2002	Male	52,326	4.1	214,454	\$28,418	\$1,486,310,962	94.3	98.5
	Female	36,641	4.4	162,837	\$24,579	\$899,961,112	62.5	53.4
	All	88,967	4.2	377,291	\$26,837	\$2,386,272,074	78.0	73.8
2003	Male	51,318	4.0	206,228	\$32,012	\$1,642,162,055	92.2	95.0
	Female	35,194	4.3	150,431	\$27,681	\$973,951,525	60.0	50.9
	All	86,512	4.1	356,659	\$30,250	\$2,616,113,580	75.7	70.9

Table 3-8. Hospital Discharges with Coronary Heart Disease¹ as Any Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	140,316	4.8	671,804	\$14,806	\$2,074,741,490	255.1	288.7
	Female	122,434	5.2	630,994	\$12,837	\$1,569,879,367	209.8	176.6
	All	262,750	5.0	1,302,798	\$13,888	\$3,644,620,857	231.8	224.3
2000	Male	149,652	5.0	742,228	\$16,557	\$2,474,859,335	271.2	304.4
	Female	133,172	5.3	709,532	\$14,299	\$1,901,764,779	227.8	190.9
	All	282,824	5.1	1,451,760	\$15,494	\$4,376,624,114	248.9	239.1
2001	Male	160,039	4.9	786,438	\$18,040	\$2,885,231,783	289.2	320.8
	Female	141,896	5.3	748,322	\$15,482	\$2,195,539,247	242.5	201.7
	All	301,935	5.1	1,534,760	\$16,838	\$5,080,771,030	265.2	252.6
2002	Male	167,651	4.9	826,250	\$20,927	\$3,506,249,698	302.2	330.1
	Female	146,554	5.3	777,323	\$17,789	\$2,604,988,129	250.1	207.1
	All	314,205	5.1	1,603,573	\$19,464	\$6,111,237,828	275.4	259.7
2003	Male	172,310	4.8	833,242	\$23,199	\$3,995,304,068	309.6	333.6
	Female	148,631	5.2	765,758	\$19,834	\$2,946,341,190	253.2	208.4
	All	320,941	5.0	1,599,000	\$21,641	\$6,941,645,258	280.7	262.2

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2.

²Total number of days divided by number of hospital discharges.

³Total amount of charges divided by number of hospital discharges.

⁴Charges represent total amount billed, not actual amount collected.

Sex and Age Group

Table 3-9. Hospital Discharges with Coronary Heart Disease¹ as Principal Diagnosis by Sex and Age Group, Ohio 2003.

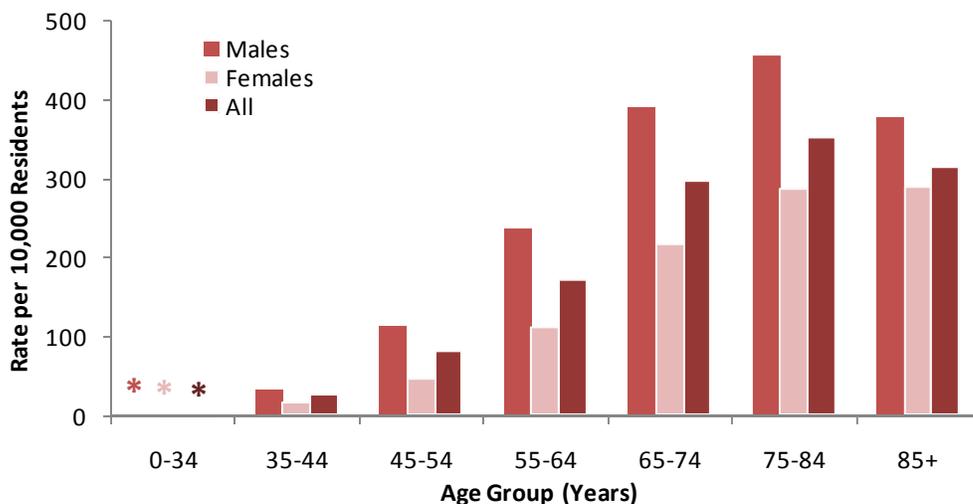
Age Group (Years)	Male		Female		All	
	Number of Discharges	Rate per 10,000 Residents	Number of Discharges	Rate per 10,000 Residents	Number of Discharges	Rate per 10,000 Residents
0-34	345	1.3	155	0.6	500	0.9
35-44	3,027	35.8	1,382	16.0	4,409	25.8
45-54	9,420	114.5	4,048	47.4	13,468	80.3
55-64	12,917	237.9	6,660	112.8	19,577	172.7
65-74	13,393	392.3	9,165	218.4	22,558	296.4
75-84	10,056	458.3	9,758	287.0	19,814	354.2
85+	2,160	378.2	4,026	289.1	6,186	315.0
All	51,318	92.2	35,194	60.0	86,512	75.7

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2.

The CHD discharge rate increased as the age of the patient increased. Males had higher discharge rates, compared with females. In 2003, the discharge rate for males was more than double the rate for females in every group for patients less than 65 years of age (Table 3-9, Figure 3-14).

Figure 3-14. Age-specific Rates for Hospital Discharges with Coronary Heart Disease¹ as Principal Diagnosis by Sex and Age Group, Ohio 2003.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

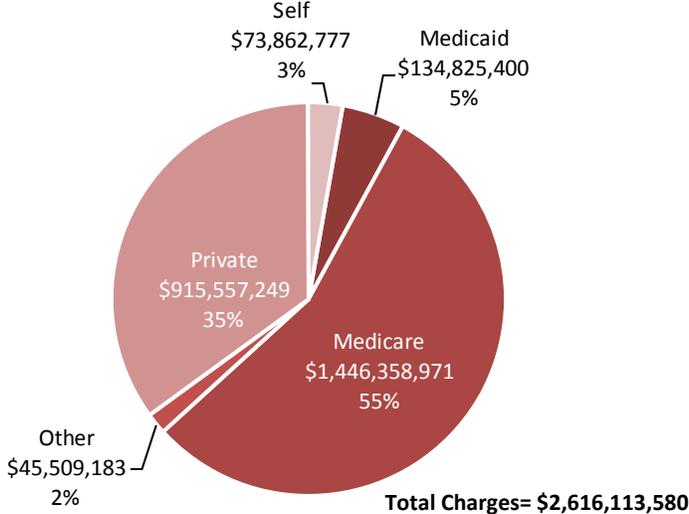
¹Coronary Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2.

*Rate too small to appear on scale of graph.

Charges

Figure 3-15. Total Charges¹ for Hospital Discharges with Coronary Heart Disease² as Principal Diagnosis by Primary Payor, Ohio 2003.

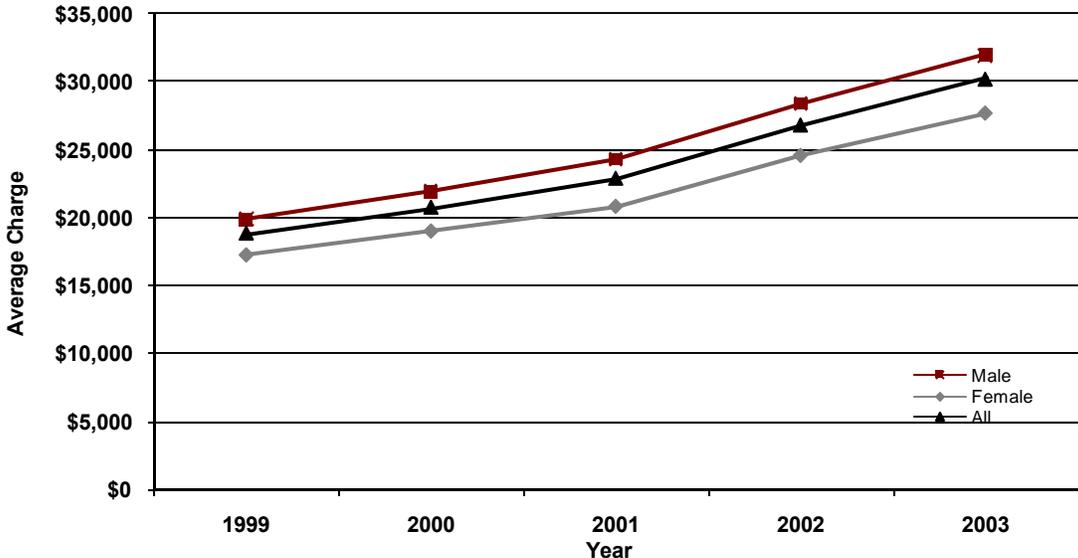
In 2003, total charges billed for discharges with CHD as the principal diagnosis totaled more than \$2.6 billion. Fifty-five percent of the total charges were attributed to Medicare as the primary payor (Figure 3-15).



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Coronary Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2.

The average charge billed for CHD discharges increased more 60 percent from \$18,799 in 1999 to \$30,250 in 2003 (Table 3-7, Figure 3-16); the average length of stay (LOS) decreased slightly during this time period from 4.3 days to 4.1 days (Table 3-7).

Figure 3-16. Average Charge^{1,2} for Hospital Discharges with Coronary Heart Disease³ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

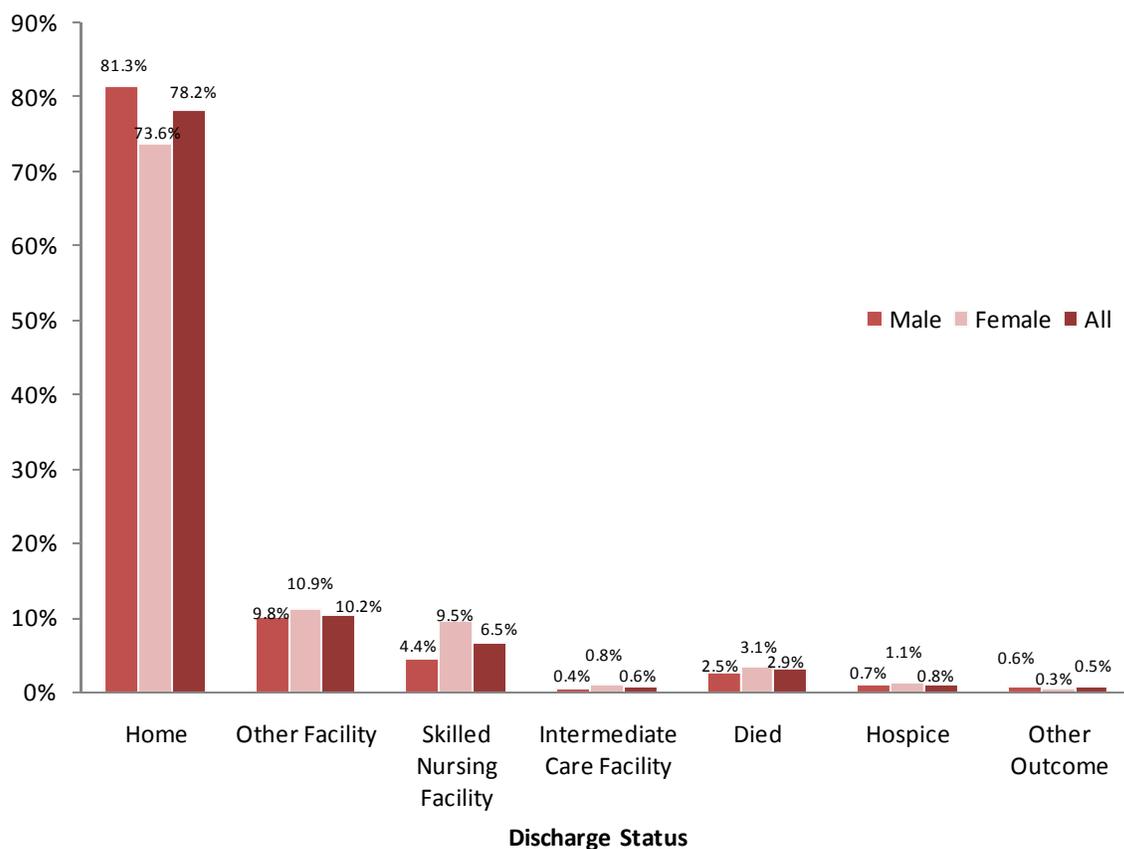


Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Average Charge equal to total number of charges divided by total number of discharges.
³Coronary Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2.

Discharge Status

The majority of patients with CHD were discharged to home. A higher percentage of males (81.3 percent) compared with females (73.6 percent) were discharged to home. A higher percentage of females (9.5 percent) compared with males (4.4 percent) were discharged to a skilled nursing facility (Figure 3-17).

Figure 3-17. Hospital Discharges with a Principal Diagnosis of Coronary Heart Disease¹ by Sex and Discharge Status, Ohio 2003.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Coronary Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2.

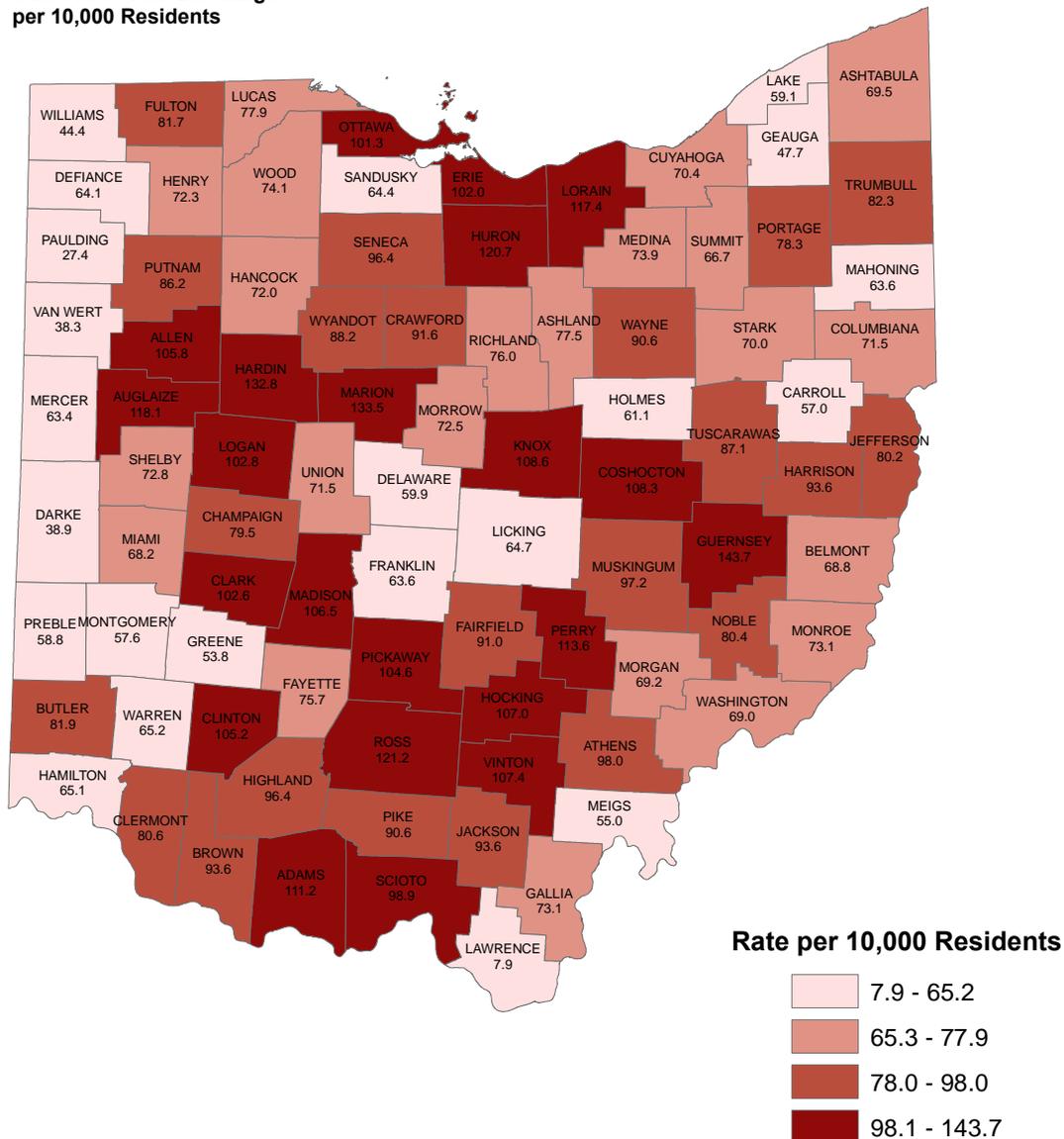
Hospital Discharges Rates by County

Ohio's hospital discharge rate for the five-year period 1999 through 2003 was 75.0 discharges per 10,000 residents. The rates for counties ranged from a low of 7.9 discharges per 10,000 residents in Lawrence County to a high of 143.7 discharges per 10,000 residents in Guernsey County (Figure 3-18).

**Hospital discharge data from Ohio residents who received care at West Virginia hospitals were not collected in 2003. Therefore caution must be used when interpreting data from border counties where residents may have received care in West Virginia.*

Figure 3-18. Average Annual Age-adjusted Rates for Hospital Discharges with Coronary Heart Disease¹ as Principal Diagnosis by County, Ohio 1999-2003.

Ohio Rate= 75.0 Discharges per 10,000 Residents



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease (CHD) defined as ICD-9 codes: 402, 410-414, 429.2.

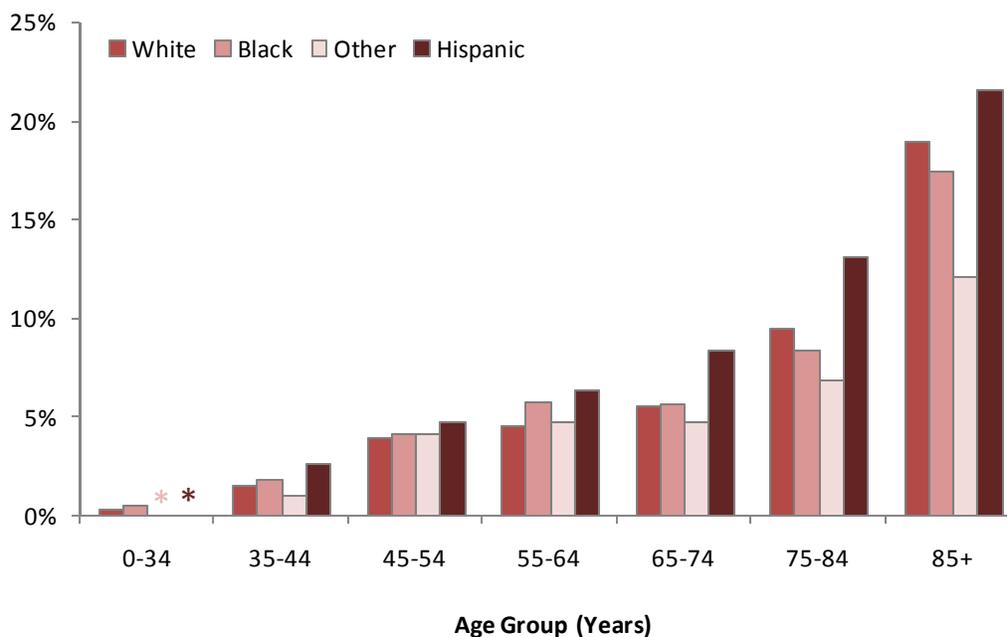
Special Focus: Coronary Heart Disease Hospital Discharges among Medicare Beneficiaries

In 2005, 7.6 percent (140,860) beneficiaries had at least one hospitalization for CHD among the 1,843,322 total Ohio Medicare beneficiaries. There were 272,826 discharges among the 140,860 beneficiaries. This equates to an average of 1.9 hospital discharges for each beneficiary (Table 3-10).

Race/Ethnicity and Age Group

Hispanic beneficiaries had the highest prevalence of a CHD hospitalization at 8.8 percent of beneficiaries followed by white beneficiaries at 7.8 (Table 3-11). Hispanic beneficiaries age 85 years (21.6 percent) and older had the highest prevalence of a CHD hospitalization, compared with all other racial/age groups (Figure 3-19, Table 3-11).

Figure 3-19. Percentage of Ohio Medicare Beneficiaries with a Coronary Heart Disease Hospital Discharge by Race/Ethnicity and Age Group, 2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease was defined as ICD 9 codes: 402, 410-414, 429.2.

²A Coronary Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Coronary Heart Disease in the inpatient claim record for the beneficiary.

*Percentages were not calculated if number of beneficiaries was less than five.

Table 3-10. Coronary Heart Disease Hospital Discharges for Ohio Medicare Beneficiaries By Age Group, 2005.^{1,2,3}

Age Group (Years)	Number of Hospital Discharges with a CHD Diagnosis	Number of Beneficiaries with a CHD Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a CHD Hospital Discharge	Rate of CHD Discharges per 10,000 Beneficiaries
0-34	194	106	31,650	0.3%	61.3
35-44	1,722	782	51,411	1.5%	334.9
45-54	7,541	3,412	87,079	3.9%	866.0
55-64	18,149	8,731	187,745	4.7%	966.7
65-74	77,996	40,951	747,208	5.5%	1,043.8
75-84	98,393	51,206	547,603	9.4%	1,796.8
85+	68,831	35,672	190,626	18.7%	3,610.8
All	272,826	140,860	1,843,322	7.6%	1,480.1

Table 3-11. Coronary Heart Disease Hospital Discharges for Ohio Medicare Beneficiaries By Race/Ethnicity and Age Group, 2005.^{1,2,3}

Age Group (Years)	Number of Hospital Discharges with a CHD Diagnosis	Number of Beneficiaries with a CHD Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a CHD Hospital Discharge	Rate of CHD Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with CHD Diagnosis CHD	Number of Beneficiaries with a CHD Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a CHD Hospital Discharge	Rate of CHD Discharges per 10,000 Beneficiaries
White						Other				
0-34	134	73	23,614	0.3%	56.7	<5	<5	718	*	*
35-44	1,215	584	40,380	1.4%	300.9	24	8	775	1.0%	309.7
45-54	5,783	2,640	68,244	3.9%	847.4	173	79	1,907	4.1%	907.2
55-64	14,945	7,206	160,502	4.5%	931.1	344	175	3,698	4.7%	930.2
65-74	69,448	36,824	672,735	5.5%	1,032.3	685	373	7,967	4.7%	859.8
75-84	90,759	47,398	501,942	9.4%	1,808.2	420	220	3,238	6.8%	1,297.1
85+	63,458	33,060	175,067	18.9%	3,624.8	488	246	2,046	12.0%	2,385.1
All	245,742	127,785	1,642,484	7.8%	1,496.2	2,136	1,103	20,349	5.4%	1,049.7
Black						Hispanic				
0-34	58	31	6,980	0.4%	83.1	<5	<5	338	*	*
35-44	464	180	9,869	1.8%	470.2	19	10	387	2.6%	491.0
45-54	1,533	672	16,484	4.1%	930.0	52	21	444	4.7%	1,171.2
55-64	2,812	1,325	23,147	5.7%	1,214.8	48	25	398	6.3%	1,206.0
65-74	7,695	3,682	65,638	5.6%	1,172.3	168	72	868	8.3%	1,935.5
75-84	6,863	3,420	41,141	8.3%	1,668.2	351	168	1,282	13.1%	2,737.9
85+	4,771	2,311	13,258	17.4%	3,598.6	114	55	255	21.6%	4,470.6
All	24,196	11,621	176,517	6.6%	1,370.7	752	351	3,972	8.8%	1,893.3

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease was defined as ICD-9 codes: 402, 410-414, 429.2.²A Coronary Heart Disease (CHD) hospital discharge was defined as having a primary or secondary diagnosis (ICD-9) for Heart Disease in the inpatient claim record for the beneficiary.³Rates were calculated using the number of Medicare beneficiaries as the denominator.

* Percentages and rates were not calculated if N<5 .

Race/Ethnicity and Year

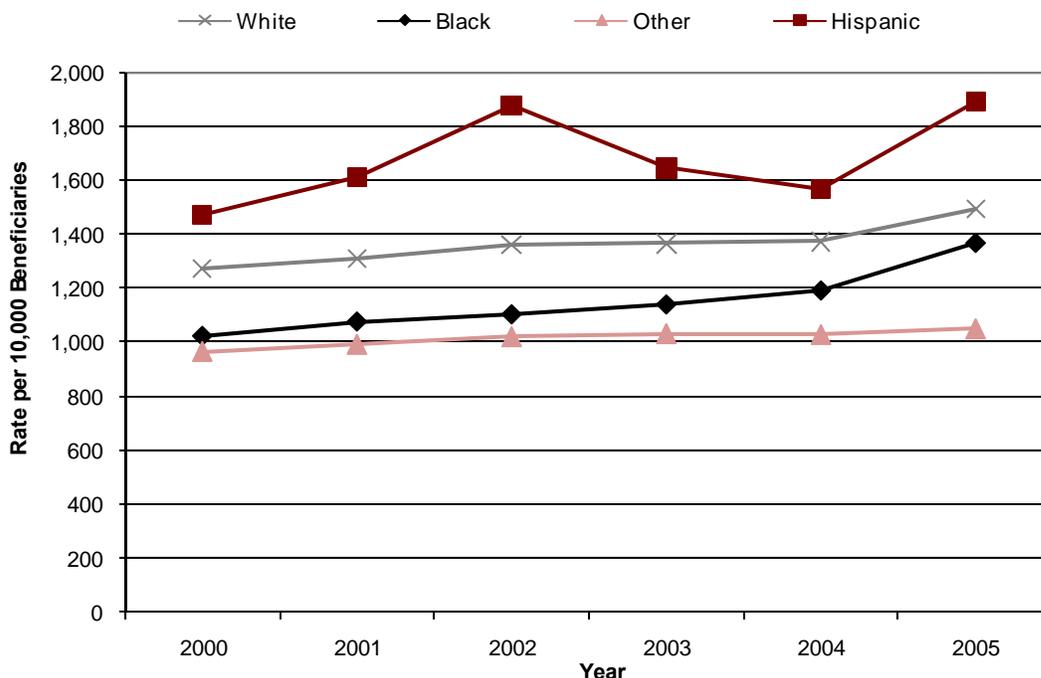
During the six year period of 2000 to 2005 the CHD Medicare hospital discharge rate increased for all races. The greatest increase (34.2 percent) occurred among black beneficiaries, from 1,021.7 to 1,370.7 discharges per 10,000 beneficiaries.

Hispanic beneficiaries had the highest discharge rates compared with all other races. The CHD discharge rate increased by 28.7 percent among Hispanic beneficiaries from 1,471.1 to 1,893.3 discharges per 10,000 beneficiaries.

White beneficiaries had the second highest CHD discharge rates. During the same time period the discharge rates increased by 17.3 percent from 1,275.5 to 1,496.2 per 10,000 beneficiaries.

Beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) not only had the lowest discharge rates, they also observed the smallest increase in the discharge rate during the same time period. The discharge rate increased by 8.5 percent from 967.6 to 1,049.7 per 10,000 beneficiaries (Figure 3-20, Table 3-10).

Figure 3-20. Coronary Heart Disease Hospital Discharge Rates for Ohio Medicare Beneficiaries by Race/Ethnicity and Year, 2000-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.

²Coronary Heart Disease was defined as ICD 9 codes: 402, 410-414, 429.2.

³A Coronary Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Coronary Heart Disease in the inpatient claim record for the beneficiary.

Race, Sex and Age Group

As shown in Table 3-21, white males not only had the highest prevalence of CHD hospitalizations (9.4 percent), but also had the highest rate of CHD discharges (1,824.2 per 10,000 beneficiaries).

Table 3-12. Coronary Heart Disease Hospital Discharges for Ohio Medicare Beneficiaries By Race, Sex and Age Group, 2005.^{1,2,3}

Age Group (Years)	Males					Females				
	Number of Hospital Discharges with a CHD Diagnosis	Number of Beneficiaries with a CHD Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a CHD Hospital Discharge	Rate of CHD Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with a CHD Diagnosis	Number of Beneficiaries with a CHD Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with a CHD Hospital Discharge	Rate of CHD Discharges per 10,000 Beneficiaries
White										
0-34	61	38	13,150	0.3%	46.4	73	35	10,464	0.3%	69.8
35-44	764	369	22,350	1.7%	341.8	451	215	18,030	1.2%	250.1
45-54	3,890	1,726	37,685	4.6%	1,032.2	1,893	914	30,559	3.0%	619.5
55-64	9,239	4,431	81,597	5.4%	1,132.3	5,706	2,775	78,905	3.5%	723.1
65-74	40,556	21,804	306,573	7.1%	1,322.9	28,892	15,020	366,162	4.1%	789.0
75-84	47,558	24,715	199,685	12.4%	2,381.7	43,201	22,683	302,257	7.5%	1,429.3
85+	27,842	14,122	51,123	27.6%	5,446.1	35,616	18,938	123,944	15.3%	2,873.6
All	129,910	67,205	712,163	9.4%	1,824.2	115,832	60,580	930,321	6.5%	1,245.1
Black										
0-34	25	15	3,812	0.4%	65.6	33	16	3,168	0.5%	104.2
35-44	234	94	5,414	1.7%	432.2	230	86	4,455	1.9%	516.3
45-54	878	387	8,667	4.5%	1,013.0	655	285	7,817	3.6%	837.9
55-64	1,411	661	10,797	6.1%	1,306.8	1,401	664	12,350	5.4%	1,134.4
65-74	3,680	1,752	27,940	6.3%	1,317.1	4,015	1,930	37,698	5.1%	1,065.0
75-84	2,778	1,380	15,319	9.0%	1,813.4	4,085	2,040	25,822	7.9%	1,582.0
85+	1,794	855	3,544	24.1%	5,062.1	2,977	1,456	9,714	15.0%	3,064.6
All	10,800	5,144	75,493	6.8%	1,430.6	13,396	6,477	101,024	6.4%	1,326.0
All										
0-34	88	55	17,552	0.3%	50.1	106	51	14,098	0.4%	75.2
35-44	1,016	473	28,481	1.7%	356.7	706	309	22,930	1.3%	307.9
45-54	4,938	2,184	47,766	4.6%	1,033.8	2,603	1,228	39,313	3.1%	662.1
55-64	10,862	5,207	94,671	5.5%	1,147.3	7,287	3,524	93,074	3.8%	782.9
65-74	44,750	23,833	339,146	7.0%	1,319.5	33,246	17,118	408,062	4.2%	814.7
75-84	50,734	26,290	216,873	12.1%	2,339.3	47,659	24,916	330,730	7.5%	1,441.0
85+	29,895	15,111	55,284	27.3%	5,407.5	38,936	20,561	135,342	15.2%	2,876.9
All	142,283	73,153	799,773	9.1%	1,779.0	130,543	67,707	1,043,549	6.5%	1,251.0

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease (CHD) was defined as ICD 9 codes: 402, 410-414, 429.2.

²A Coronary Heart Disease hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Coronary Heart Disease in the inpatient claim record for the beneficiary.

³Rates were calculated using the number of Medicare beneficiaries as the denominator.

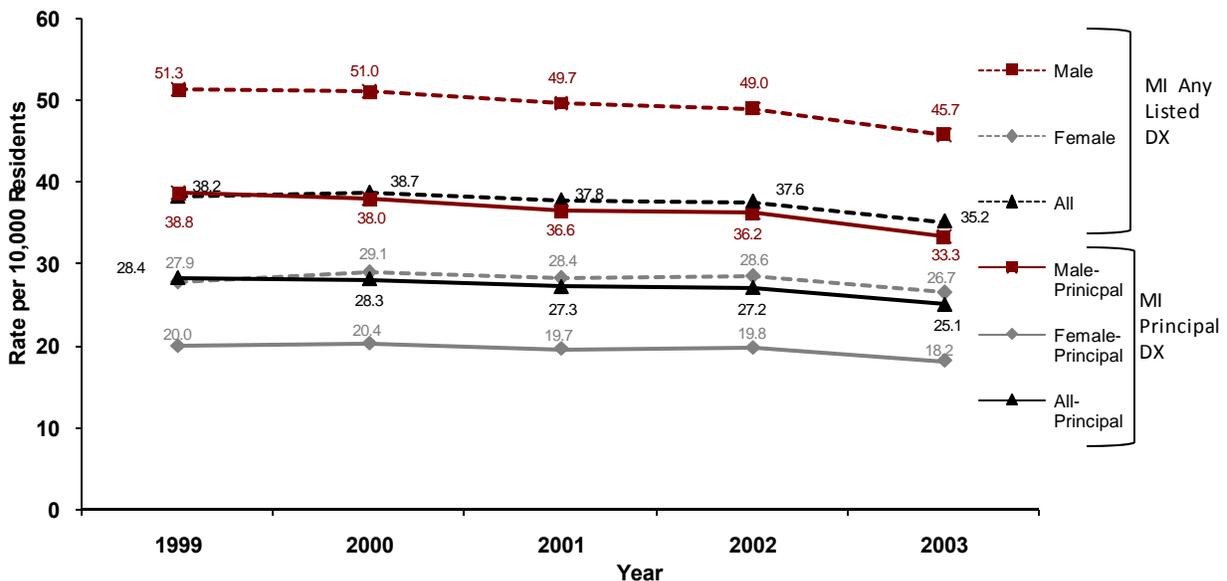
III. Myocardial Infarction Hospital Discharges

Sex and Year

In 2003, there were 30,624 discharges with myocardial infarction (MI) listed as the principal diagnosis among Ohio residents. Males (17,705 discharges) had more discharges than females (12,919 discharges). The rate for hospital discharges with MI as principal diagnosis for males (33.3 per 10,000) was 83.0 percent higher, compared with females (18.2 per 10,000) (Table 3-13, Figure 3-22).

Between 1999-2003 the rate for discharges with a principal diagnosis of MI decreased by 11.6 percent from 28.4 to 25.1 discharges per 10,000 residents. The discharge rate for females decreased by 9.0 percent and the discharge rate for males decreased by 14.2 percent (Figure 3-21, Table 3-13).

Figure 3-21. Age-adjusted Rates for Hospital Discharges with Myocardial Infarction¹ as Any Diagnosis and Hospital Discharges with Myocardial Infarction as Principal Diagnosis by Sex and Year, Ohio 1999-2003².



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹ Myocardial Infarction (MI) defined as ICD-9 code 410.

² DX=Diagnosis

Table 3-13. Hospital Discharges with Myocardial Infarction¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	19,296	5.1	99,333	\$21,361	\$411,547,861	35.1	38.8
	Female	13,793	5.7	78,562	\$19,482	\$268,343,680	23.6	20.0
	All	33,089	5.4	177,895	\$20,578	\$679,891,541	29.2	28.4
2000	Male	19,199	5.1	97,591	\$23,709	\$454,662,488	34.8	38.0
	Female	14,112	5.7	80,086	\$21,395	\$301,372,726	24.1	20.4
	All	33,311	5.3	177,677	\$22,729	\$756,035,214	29.3	28.3
2001	Male	18,726	5.0	93,832	\$26,323	\$492,706,889	33.8	36.6
	Female	13,773	5.8	79,773	\$23,916	\$329,293,256	23.5	19.7
	All	32,499	5.3	173,605	\$25,302	\$822,000,145	28.5	27.3
2002	Male	18,862	5.1	97,051	\$31,920	\$601,859,402	34.0	36.2
	Female	13,932	5.8	80,128	\$28,025	\$390,133,873	23.8	19.8
	All	32,794	5.4	177,179	\$30,266	\$991,993,275	28.7	27.2
2003	Male	17,705	5.1	90,655	\$35,844	\$634,475,088	31.8	33.3
	Female	12,919	5.6	72,535	\$31,380	\$405,302,647	22.0	18.2
	All	30,624	5.3	163,190	\$33,961	\$1,039,777,734	26.8	25.1

Table 3-14. Hospital Discharges with Myocardial Infarction¹ as Any Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	25,281	5.7	144,409	\$22,256	\$561,640,550	46.0	51.3
	Female	19,311	6.4	123,610	\$20,430	\$393,849,093	33.1	27.9
	All	44,592	6.0	268,019	\$21,465	\$955,489,643	39.3	38.2
2000	Male	25,457	5.8	148,229	\$24,979	\$635,224,967	46.1	51.0
	Female	20,202	6.5	131,678	\$22,756	\$458,979,801	34.6	29.1
	All	45,659	6.1	279,907	\$23,996	\$1,094,204,769	40.2	38.7
2001	Male	25,136	5.8	147,001	\$28,075	\$705,241,733	45.4	49.7
	Female	19,948	6.7	133,090	\$25,535	\$509,218,068	34.1	28.4
	All	45,084	6.2	280,091	\$26,951	\$1,214,459,801	39.6	37.8
2002	Male	25,193	6.0	151,716	\$33,573	\$845,396,193	45.4	49.0
	Female	20,263	6.7	136,650	\$29,814	\$603,666,899	34.6	28.6
	All	45,456	6.3	288,366	\$31,897	\$1,449,063,092	39.8	37.6
2003	Male	23,991	6.0	143,700	\$37,742	\$905,130,490	43.1	45.7
	Female	19,065	6.6	125,380	\$33,322	\$635,076,376	32.5	26.7
	All	43,056	6.2	269,080	\$35,785	\$1,540,206,866	37.7	35.2

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹ Myocardial Infarction defined as ICD-9 code 410.

² Total number of days divided by number of hospital discharges.

³ Total amount of charges divided by number of hospital discharges.

Sex and Age Group

As expected, the discharge rates for MI increased as the age of the patient increased.

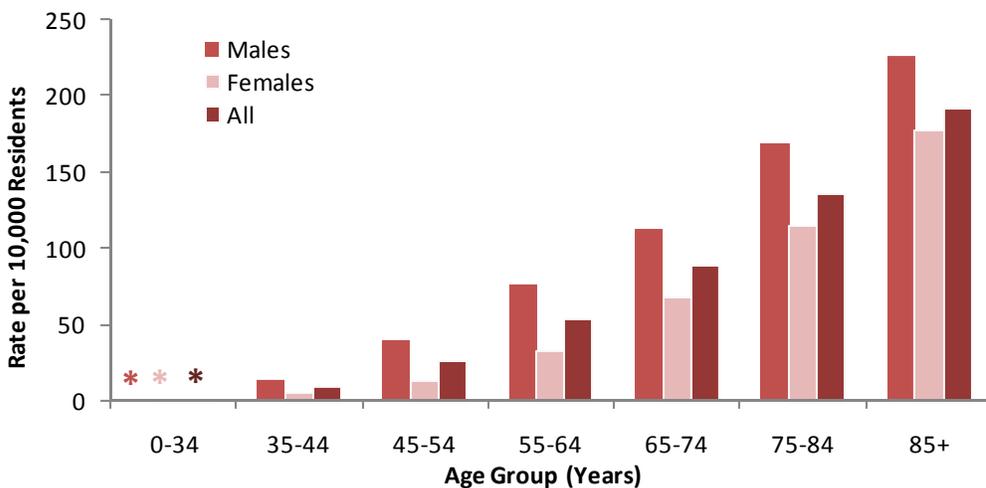
In 2003, the discharge rates for MI were higher for males than females. This also held true for age-specific rates, for which discharge rates for males were higher in every age group. Males aged 85 years and older had the highest discharge rates of all sex-age groups (Table 3-15, Figure 3-22). However, males aged 55-64 accounted for 23.3 percent (4,142 discharges) of discharges among males and 13.5 percent of the total number of all discharges (Table 3-15).

Table 3-15. Hospital Discharges with Myocardial Infarction¹ as Principal Diagnosis by Sex and Age Group, Ohio 2003.

Age Group (Years)	Males		Females		All	
	Number of Discharges	Rate per 10,000 Residents	Number of Discharges	Rate per 10,000 Residents	Number of Discharges	Rate per 10,000 Residents
0-34	167	0.6	73	0.3	240	0.4
35-44	1,233	14.6	445	5.2	1,678	9.8
45-54	3,282	39.9	1,164	13.6	4,446	26.5
55-64	4,142	76.3	1,970	33.4	6,112	53.9
65-74	3,878	113.6	2,887	68.8	6,765	88.9
75-84	3,708	169.0	3,910	115.0	7,618	136.2
85+	1,295	226.7	2,470	177.3	3,765	191.7
All	17,705	31.8	12,919	22.0	30,624	26.8

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹ Myocardial Infarction defined as ICD-9 code: 410.

Figure 3-22. Age-specific Rates for Hospital Discharges with Myocardial Infarction¹ as Principal Diagnosis by Sex and Age Group, Ohio 2003.

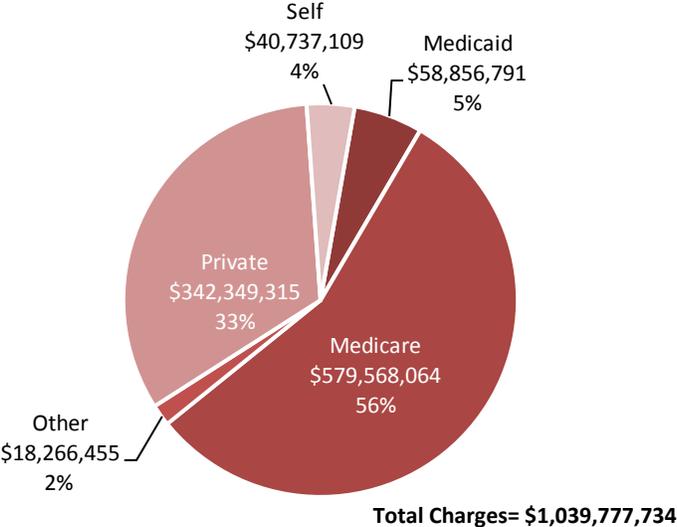


Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹ Myocardial Infarction defined as ICD-9 code 410.
 *Rates too small to appear on scale of graph.

Charges

Figure 3-23. Total Charges¹ for Hospital Discharges with Myocardial Infarction² as Principal Diagnosis by Primary Payor, Ohio 2003.⁴

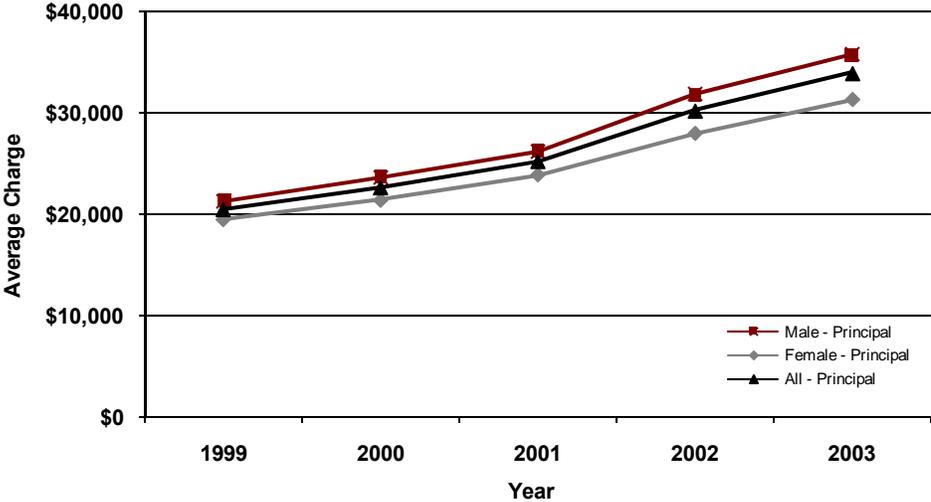
In 2003, more than \$1 billion in charges billed were for MI discharges. The majority (55 percent) of charges billed were to Medicare. Private insurance had the second-largest total with over \$342 million in charges (33 percent) (Figure 3-23).



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
² Myocardial Infarction defined as ICD-9 code 410.

The average charge for an MI hospitalization increased by 65.0 percent from 1999 to 2003. The average charge for males increased by 67.8 percent. The average charge for females increased by 61.7 percent (Figure 3-24).

Figure 3-24. Average Charge^{1,2} for Hospital Discharges with Myocardial Infarction³ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

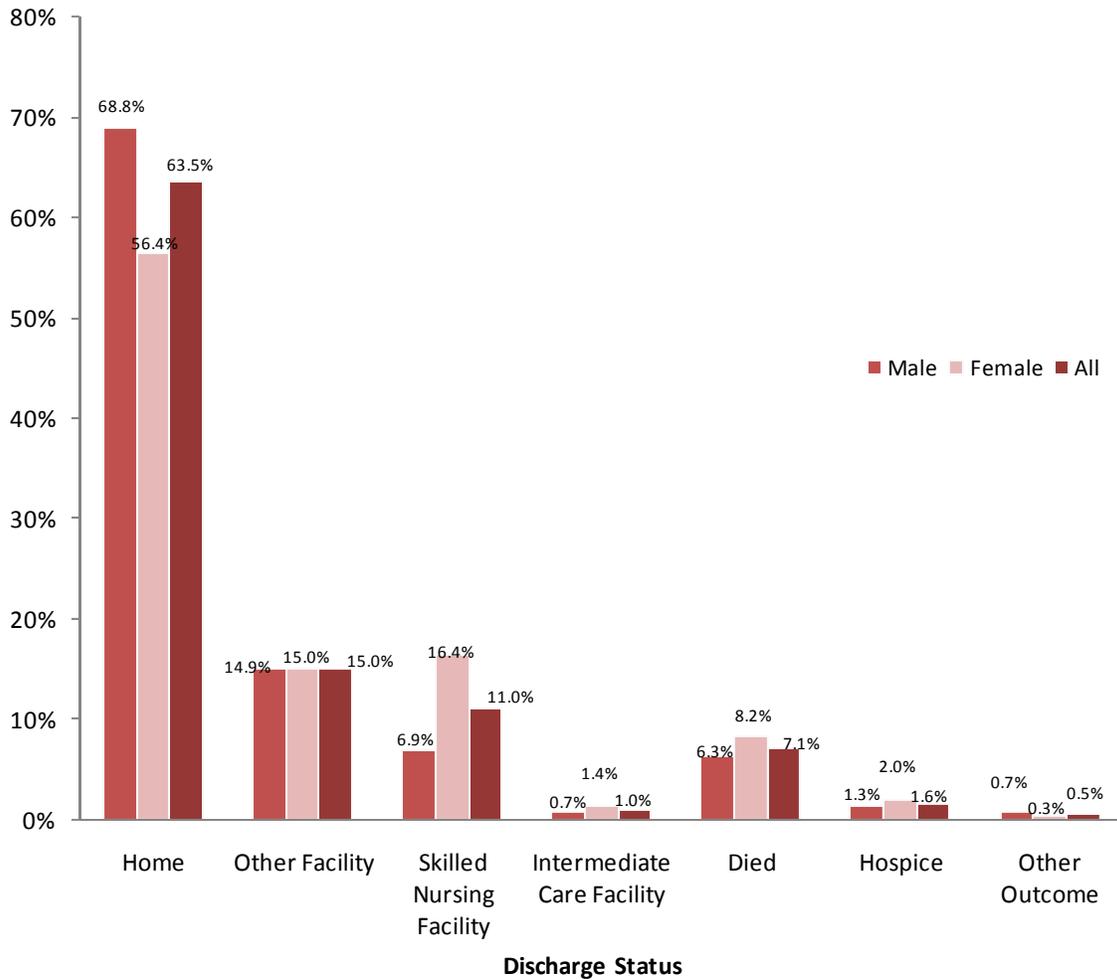


Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Average Charge equal to total number of charges divided by total number of discharges.
³ Myocardial Infarction defined as ICD-9 code 410.

Discharge Status

The majority (63.5 percent) of hospitalizations with MI listed as the principal diagnosis were discharged to home. The next most common discharge status was to an other facility for follow-up care (15 percent) and then skilled nursing facility (11.0 percent) (Figure 3-25).

Figure 3-25. Hospital Discharges with Myocardial Infarction¹ as Principal Diagnosis by Sex and Discharge Status, Ohio 2003.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹ Myocardial Infarction defined as ICD-9 code 410.

² Other Facility includes discharged to short-term care, home health care, rehabilitation

Special Focus: Myocardial Infarction Hospital Discharges among Medicare Beneficiaries

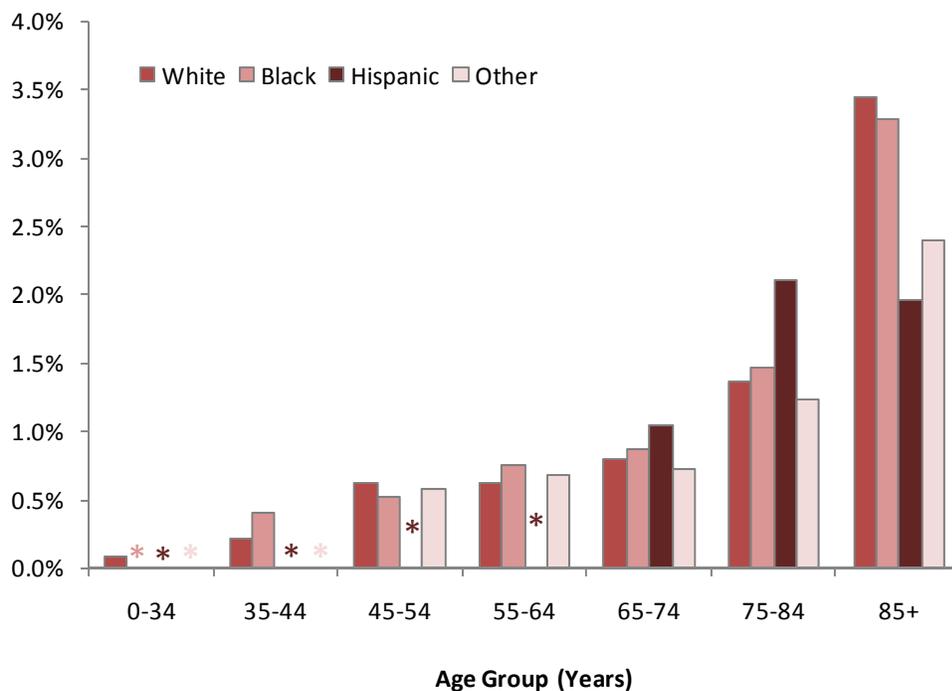
In 2005, 1.2 percent (21,773) of beneficiaries had a hospitalization for MI among the 1,843,322 total Medicare beneficiaries in Ohio. There were 34,179 hospitalizations among the 21,773 beneficiaries, equating to an average of 1.6 hospitalizations for each beneficiary (Table 3-16).

The prevalence of MI discharge was most common among Hispanic beneficiaries (1.3 percent); followed by white beneficiaries (1.2 percent) and black beneficiaries (1.1 percent). The prevalence of MI discharge among beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) was 0.9 percent (Table 3-17).

Race/Ethnicity and Age Group

As expected, the prevalence of an MI hospital discharge for Medicare beneficiaries increased as the age of the beneficiary increased. Beneficiaries aged 85 years and older had the highest prevalence of an MI hospital discharge followed by beneficiaries 75-84 years of age (Figure 3-27, Table 3-16, Table 3-17).

Figure 3-27. Percentage of Ohio Medicare Beneficiaries with a Myocardial Infarction Hospital Discharge by Race/Ethnicity and Age Group, 2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹ Myocardial Infarction was defined as ICD 9 code: 410

² Myocardial Infarction hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Myocardial Infarction in the inpatient claim record for the beneficiary.

*Percentage not calculated if number of beneficiaries is less than 5.

Table 3-16. Myocardial Infarction Hospital Discharges for Ohio Medicare Beneficiaries by Age Group, 2005.^{1,2,3}

Age Group (Years)	Number of Hospital Discharges with an MI Diagnosis	Number of Beneficiaries with an MI Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an MI Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries
0-34	33	20	31,650	0.1%	10.4
35-44	194	128	51,411	0.2%	37.7
45-54	823	519	87,079	0.6%	94.5
55-64	1,964	1,198	187,745	0.6%	104.6
65-74	9,444	5,924	747,208	0.8%	126.4
75-84	11,798	7,483	547,603	1.4%	215.4
85+	9,923	6,501	190,626	3.4%	520.5
All	34,179	21,773	1,843,322	1.2%	185.4

Table 3-17. Myocardial Infarction Hospital Discharges for Ohio Medicare Beneficiaries by Race/Ethnicity and Age Group, 2005.^{1,2,3}

Age Group (Years)	Number of Hospital Discharges with an MI Diagnosis	Number of Beneficiaries with an MI Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an MI Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with an MI Diagnosis	Number of Beneficiaries with an MI Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an MI Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries
White						Other				
0-34	26	18	23,614	0.1%	11.0	<5	<5	718	*	*
35-44	133	84	40,380	0.2%	32.9	<5	<5	775	*	*
45-54	654	418	68,244	0.6%	95.8	13	11	1,907	0.6%	68.2
55-64	1,633	997	160,502	0.6%	101.7	39	25	3,698	0.7%	105.5
65-74	8,443	5,291	672,735	0.8%	125.5	86	57	7,967	0.7%	107.9
75-84	10,741	6,816	501,942	1.4%	214.0	57	40	3,238	1.2%	176.0
85+	9,158	6,013	175,067	3.4%	523.1	65	49	2,046	2.4%	317.7
All	30,788	19,637	1,642,484	1.2%	187.4	262	184	20,349	0.9%	128.8
Black						Hispanic				
0-34	7	<5	6,980	*	10.0	<5	<5	338	*	*
35-44	56	39	9,869	0.4%	56.7	<5	<5	387	*	*
45-54	150	86	16,484	0.5%	91.0	6	<5	444	*	135.1
55-64	288	172	23,147	0.7%	124.4	<5	<5	398	*	*
65-74	901	567	65,638	0.9%	137.3	14	9	868	1.0%	161.3
75-84	950	600	41,141	1.5%	230.9	50	27	1,282	2.1%	390.0
85+	692	434	13,258	3.3%	521.9	8	5	255	2.0%	313.7
All	3,044	1,900	176,517	1.1%	172.4	85	52	3,972	1.3%	214.0

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Myocardial Infarction (MI) was defined as ICD-9 code: 410.

²Myocardial Infarction hospital discharge was defined as having a primary or secondary diagnosis (ICD-9) for Myocardial Infarction in the inpatient claim record for the beneficiary.

³Rates were calculated using the number of Medicare beneficiaries as a denominator.

*Percentages were not calculated if number of beneficiaries was less than five, rates were not calculated if the number discharges was less than five.

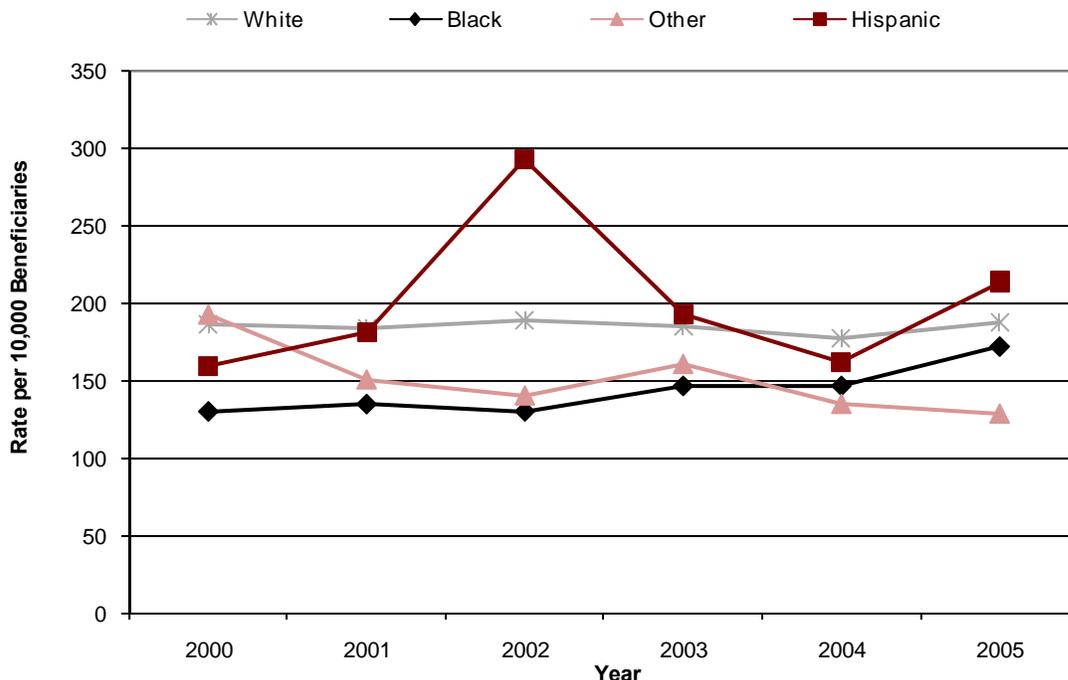
Race/Ethnicity and Year

During the six-year time period of 2000-2005, the MI hospital discharge rate per 10,000 Medicare beneficiaries increased by more than 30 percent for black and Hispanic beneficiaries. The rate for black beneficiaries increased by 31.7 percent from 130.9 to 172.4 discharges per 10,000 beneficiaries. The rate for Hispanic beneficiaries increased by 34.3 percent from 159.4 to 214.0 discharges per 10,000 beneficiaries during that same time period (Figure 3-28).

The MI rate in 2005 for white beneficiaries (187.4) remained relatively constant compared with the rate of 186.3 discharges per 10,000 beneficiaries in 2000 (Figure 3-28).

The rate for beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) decreased by 33.4 percent from 193.3 to 128.8 discharges per 10,000 beneficiaries.

Figure 3-28. Myocardial Infarction Hospital Discharge Rates for Ohio Medicare Beneficiaries by Race/Ethnicity and Year, 2000-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.

²Myocardial Infarction was defined as ICD 9 code: 410.

³Myocardial hospital discharge was defined as having a primary or secondary diagnosis (ICD-9) for MI in the inpatient claim record for the beneficiary.

Race, Sex and Age Group

As shown in Table 3-18, males had higher MI Medicare hospital discharge rates, compared with females. In 2005, white males had the highest MI rate (216.5 per 10,000 beneficiaries), followed by black males (182.9 per 10,000 beneficiaries). Black females (164.6 per 10,000) and white females (165.2 per 10,000) had the lowest rates.

Table 3-18. Myocardial Infarction Hospital Discharges for Ohio Medicare Beneficiaries By Race, Sex and Age Group, 2005.^{1,2,3}

Age Group (Years)	Males					Females				
	Number of Hospital Discharges with an MI Diagnosis	Number of Beneficiaries with an MI Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an MI Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with an MI Diagnosis	Number of Beneficiaries with an MI Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an MI Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries
White										
0-34	17	13	13,150	0.1%	12.9	9	5	10,464	0.0%	8.6
35-44	99	62	22,350	0.3%	44.3	34	22	18,030	0.1%	18.9
45-54	484	306	37,685	0.8%	128.4	170	112	30,559	0.4%	55.6
55-64	1,015	624	81,597	0.8%	124.4	618	373	78,905	0.5%	78.3
65-74	4,905	3,078	306,573	1.0%	160.0	3,538	2,213	366,162	0.6%	96.6
75-84	5,177	3,342	199,685	1.7%	259.3	5,564	3,474	302,257	1.1%	184.1
85+	3,723	2,454	51,123	4.8%	728.2	5,435	3,559	123,944	2.9%	438.5
All	15,420	9,879	712,163	1.4%	216.5	15,368	9,758	930,321	1.0%	165.2
Black										
0-34	<5	<5	3,812	*	*	5	<5	3,168	*	15.8
35-44	36	23	5,414	0.4%	66.5	20	16	4,455	0.4%	44.9
45-54	103	56	8,667	0.6%	118.8	47	30	7,817	0.4%	60.1
55-64	142	89	10,797	0.8%	131.5	146	83	12,350	0.7%	118.2
65-74	417	272	27,940	1.0%	149.2	484	295	37,698	0.8%	128.4
75-84	388	243	15,319	1.6%	253.3	562	357	25,822	1.4%	217.6
85+	293	170	3,544	4.8%	826.7	399	264	9,714	2.7%	410.7
All	1,381	854	75,493	1.1%	182.9	1,663	1,046	101,024	1.0%	164.6
All										
0-34	19	14	17,552	0.1%	10.8	14	6	14,098	0.0%	9.9
35-44	138	88	28,481	0.3%	48.5	56	40	22,930	0.2%	24.4
45-54	603	375	47,766	0.8%	126.2	220	144	39,313	0.4%	56.0
55-64	1,181	728	94,671	0.8%	124.7	783	470	93,074	0.5%	84.1
65-74	5,380	3,389	339,146	1.0%	158.6	4,064	2,535	408,062	0.6%	99.6
75-84	5,626	3,623	216,873	1.7%	259.4	6,172	3,860	330,730	1.2%	186.6
85+	4,052	2,648	55,284	4.8%	732.9	5,871	3,853	135,342	2.8%	433.8
All	16,999	10,865	799,773	1.4%	212.5	17,180	10,908	1,043,549	1.0%	164.6

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹ Myocardial Infarction (MI) was defined as ICD 9 code: 410.

² An Myocardial Infarction hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for MI in the inpatient claim record for the beneficiary.

³ Rates were calculated using the number of Medicare beneficiaries as a denominator.

*Percentages were not calculated if number of beneficiaries was less than five, rates were not calculated if the number discharges was less than five.

IV. Heart Failure Hospital Discharges

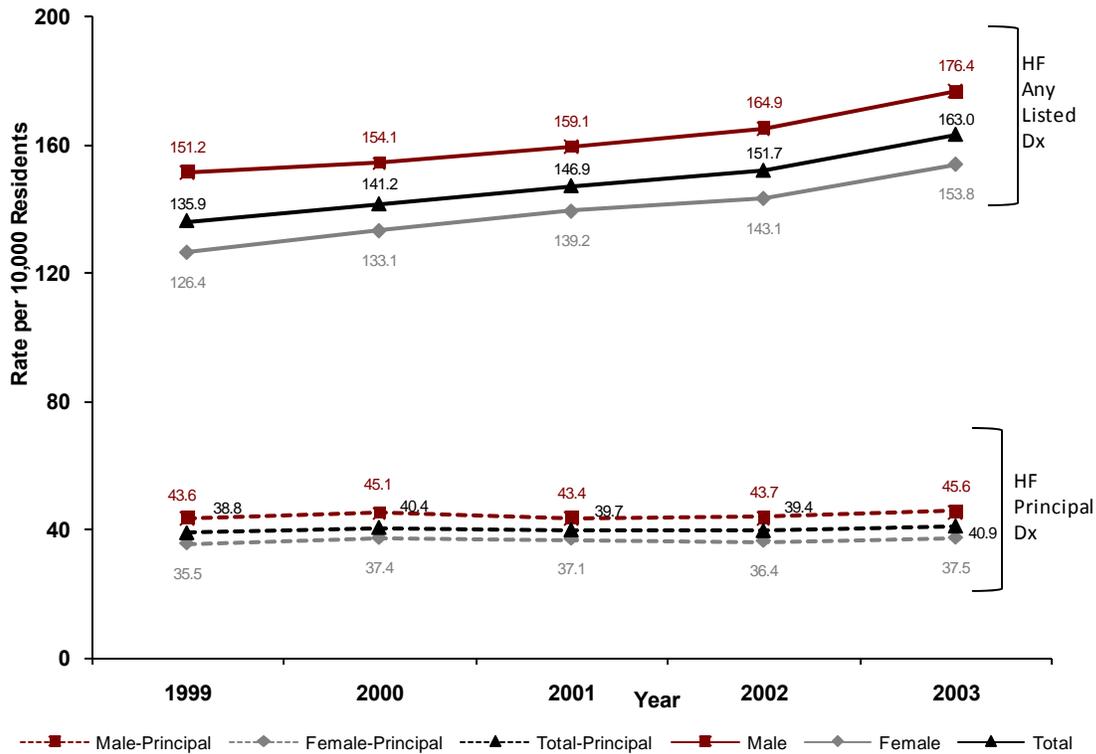
Sex and Year

Heart failure (HF) is the end stage of heart disease. It is most often a consequence of hypertension, CHD, heart valve deformity, diabetes or cardiomyopathy.¹ Eighty percent of men and 70 percent of women age 65 years and who have HF die within 8 years.¹

HF was more often listed as a secondary diagnosis compared with being listed as the principal diagnosis. In 2003, there were 50,201 discharges with HF listed as the principal diagnosis and 200,105 with HF listed as any diagnosis (Tables 3-19 and 3-20).

Between 1999-2003, both the number of discharges and the discharge rate for HF increased. The age-adjusted discharge rate for discharges with HF listed as the principal diagnosis increased by 5.4 percent. The age-adjusted rate for discharges where HF was listed as any diagnosis increased by 19.9 percent (Figure 3-29).

Figure 3-29. Age-adjusted Rates for Discharge for Hospital Discharges with Heart Failure² as Any Diagnosis and for Hospital Discharges with Heart Failure² as Principal Diagnosis by Sex and Year, Ohio 1999-2003³.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Failure (HF) defined as ICD-9 code 428.
²DX=Diagnosis

Table 3-19. Hospital Discharges with Heart Failure¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	20,165	5.4	109,129	\$11,016	\$221,850,076	36.7	43.6
	Female	25,169	5.5	138,083	\$10,172	\$255,776,888	43.1	35.5
	All	45,334	5.5	247,212	\$10,548	\$477,626,963	40.0	38.8
2000	Male	21,243	5.5	116,059	\$12,022	\$254,630,261	38.5	45.1
	Female	26,584	5.5	145,787	\$11,276	\$298,877,587	45.5	37.4
	All	47,827	5.5	261,846	\$11,607	\$553,507,847	42.1	40.4
2001	Male	20,863	5.4	112,952	\$13,472	\$280,881,401	37.7	43.4
	Female	26,602	5.5	146,227	\$12,116	\$322,100,451	45.5	37.1
	All	47,465	5.5	259,179	\$12,712	\$602,981,852	41.7	39.7
2002	Male	21,470	5.3	113,989	\$16,062	\$344,741,715	38.7	43.7
	Female	26,294	5.5	143,688	\$14,049	\$369,244,124	44.9	36.4
	All	47,764	5.4	257,677	\$14,954	\$713,985,840	41.9	39.4
2003	Male	22,771	5.3	120,493	\$19,049	\$433,551,731	40.9	45.6
	Female	27,430	5.4	147,625	\$16,230	\$444,996,343	46.7	37.5
	All	50,201	5.3	268,118	\$17,509	\$878,548,074	43.9	40.9

Table 3-20. Hospital Discharges with Heart Failure¹ as Any Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	69,109	6.6	459,487	\$15,817	\$1,091,075,437	125.6	151.2
	Female	89,865	6.6	589,252	\$13,707	\$1,229,885,650	154.0	126.4
	All	158,974	6.6	1,048,739	\$14,624	\$2,320,961,087	140.2	135.9
2000	Male	71,879	6.7	482,325	\$17,719	\$1,271,900,618	130.3	154.1
	Female	95,136	6.6	631,101	\$15,228	\$1,446,629,655	162.8	133.1
	All	167,015	6.7	1,113,426	\$16,300	\$2,718,530,273	147.0	141.2
2001	Male	75,607	6.6	500,263	\$19,358	\$1,462,523,921	136.6	159.1
	Female	100,145	6.6	663,132	\$16,691	\$1,670,435,340	171.1	139.2
	All	175,752	6.6	1,163,395	\$17,838	\$3,132,959,260	154.4	146.9
2002	Male	80,323	6.6	533,541	\$22,684	\$1,820,895,195	144.8	164.9
	Female	103,604	6.7	691,212	\$19,208	\$1,988,767,083	176.8	143.1
	All	183,927	6.7	1,224,753	\$20,726	\$3,809,662,278	161.2	151.7
2003	Male	87,913	6.5	572,829	\$25,434	\$2,234,833,832	157.9	176.4
	Female	112,192	6.5	727,576	\$21,310	\$2,389,472,379	191.1	153.8
	All	200,105	6.5	1,300,405	\$23,122	\$4,624,306,211	175.0	163.0

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Failure defined as ICD-9 code 428.²Total number of days divided by number of hospital discharges.³Total amount of charges divided by number of hospital discharges.⁴Charges represent total amount billed, not actual amount collected.

Sex and Age Group

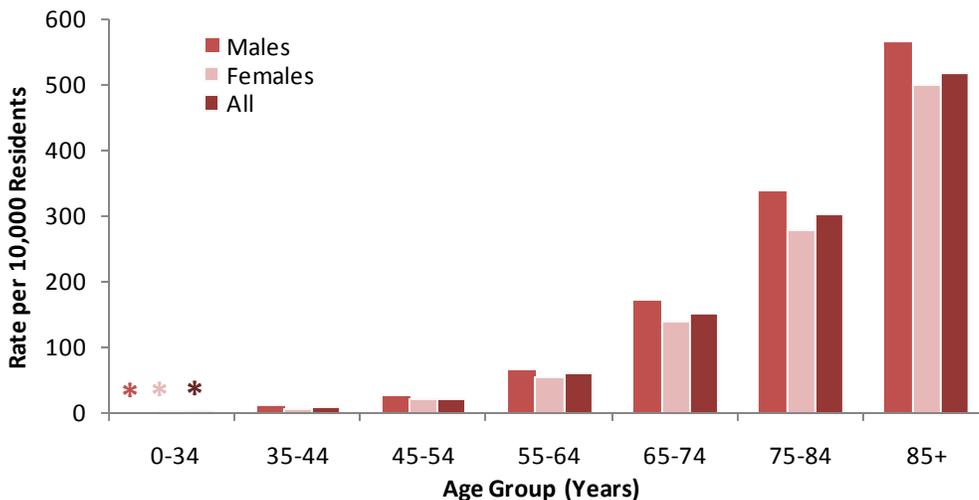
As expected, the number and rate of heart failure discharges increased with age. Although there were more discharges for females compared with males, males had higher discharge rates for every listed age group (Table 3-21, Figure 3-30).

Table 3-21. Hospital Discharges with Heart Failure¹ as Principal Diagnosis by Sex and Age Group, Ohio 2003.

Age Group (Years)	Male		Female		All	
	Number of Discharges	Rate per 10,000 Residents	Number of Discharges	Rate per 10,000 Residents	Number of Discharges	Rate per 10,000 Residents
0-34	256	0.9	139	0.5	395	0.7
35-44	656	7.8	443	5.1	1,099	6.4
45-54	1,974	24.0	1,571	18.4	3,545	21.1
55-64	3,519	64.8	3,192	54.1	6,711	59.2
65-74	5,758	168.7	5,754	137.1	11,512	151.3
75-84	7,382	336.4	9,406	276.7	16,788	300.1
85+	3,226	564.8	6,925	497.2	10,151	516.9
All	22,771	40.9	27,430	46.7	50,201	43.9

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Failure defined as ICD-9 code 428.

Figure 3-30. Age-specific Rates for Hospital Discharges with Heart Failure¹ as Principal Diagnosis by Sex, Ohio 2003.

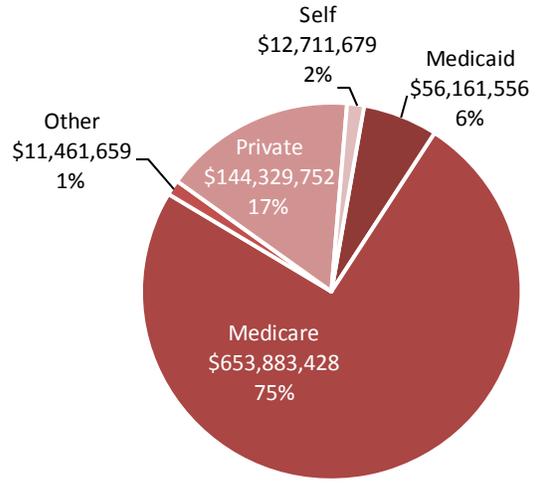


Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Failure defined as ICD-9 code 428.
 *Rate too small to appear on scale of graph.

Charges

In 2003, the total charges billed for hospital discharges with heart failure listed as the primary diagnosis were more than \$878 million. Medicare was the primary payor for 75 percent of the charges, followed by private insurance with 17 percent and Medicaid at 6 percent (Figure 3-31).

Figure 3-31. Total Charges¹ for Hospital Discharges with Heart Failure² as Principal Diagnosis by Primary Payor, Ohio 2003.

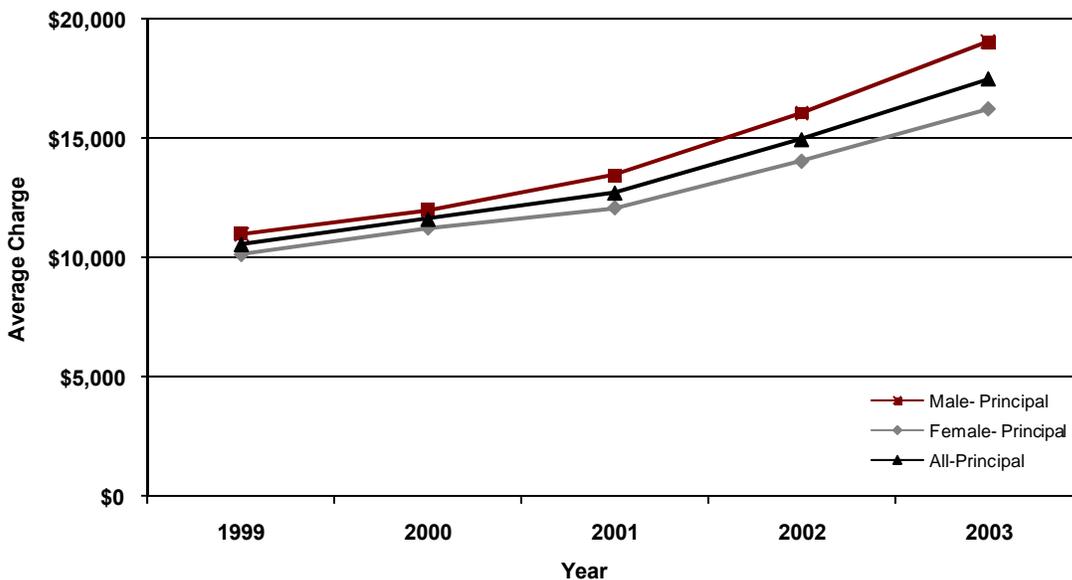


Total Charges= \$878,548,074

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Heart Failure defined as ICD-9 code 428.
³Percentages may not add up to 100%, because of rounding.

The average charge per discharge for heart failure as the principal diagnosis increased between 1999 and 2003. In that five-year period, the average charge for heart failure increased by 66.0 percent from \$10,548 in 1999 to \$17,509 in 2003. The average charge increased for both males and females. The average for males increased by 72.9 percent; whereas, the average for females increased by 61.7 percent (Figure 3-32).

Figure 3-32. Average Charge^{1,2} for Hospital Discharges with Heart Failure³ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.



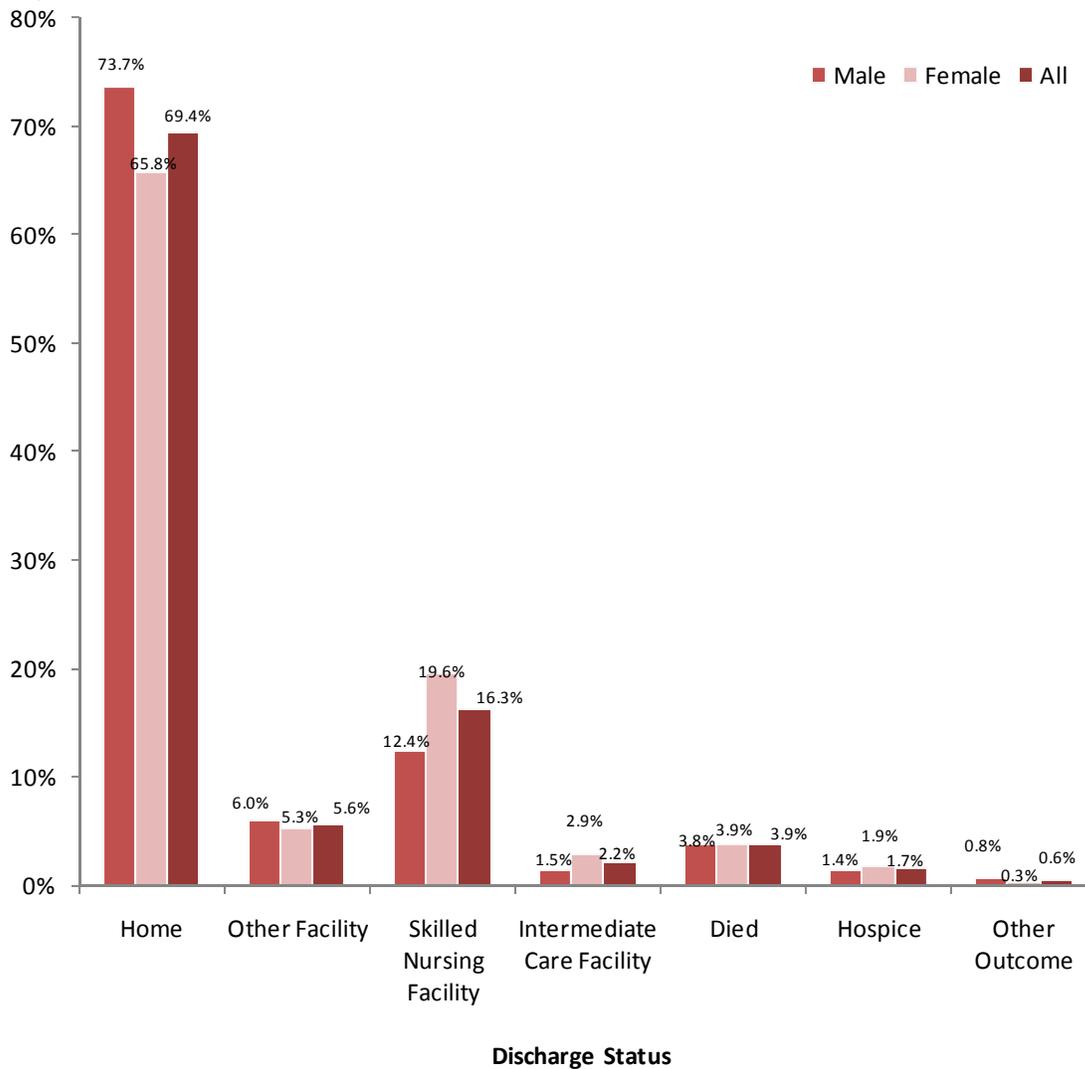
Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Average Charge equal to total number of charges divided by total number of discharges.
³Heart Failure defined as ICD-9 code 428.

Discharge Status

The majority (69.4 percent) of hospital discharges with a principal diagnosis of heart failure were discharged to home. The next most common discharge status was to a skilled nursing home facility (SNF) (16.3 percent) (Figure 3-34).

Nearly 20 percent (19.6 percent) of females were discharged to SNFs, compared with 12.4 percent of males. Males were more often (73.7 percent) discharge to home, compared with females (65.8 percent) (Figure 3-33).

Figure 3-33. Hospital Discharges with Heart Failure¹ as Principal Diagnosis by Sex and Discharge Status, Ohio 2003.



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Failure defined as ICD-9 code 428.

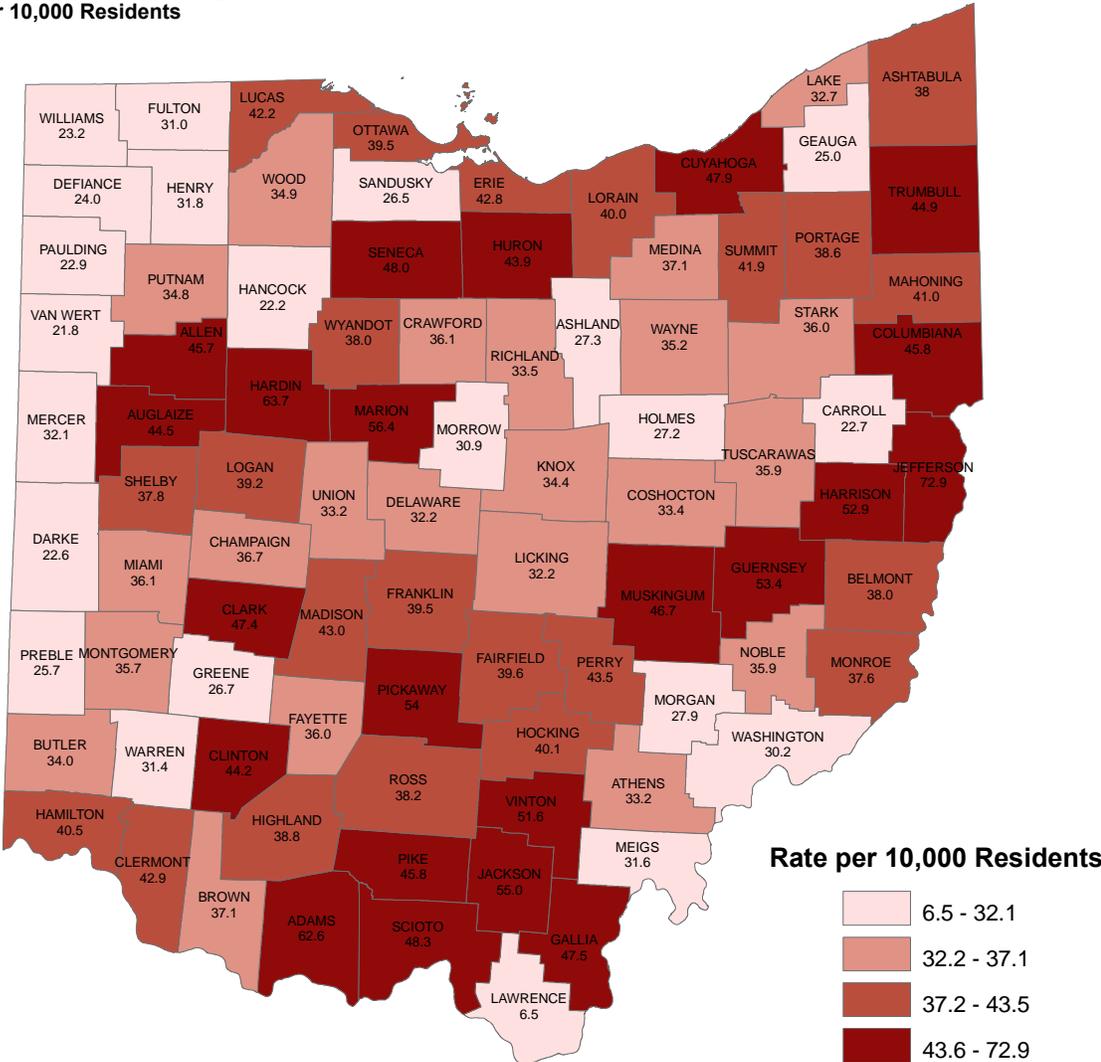
Hospital Discharge Rates by County

The heart failure hospital discharge rate for the five-year period of 1999 through 2003 for Ohio was 39.8 per 10,000 residents. The rates for the counties ranged from low a of 6.5 discharges per 10,000 residents in Lawrence County to a high of 72.9 discharges per 10,000 residents in Jefferson County (Figure 3-34).

**Hospital discharge data from Ohio residents who received care at West Virginia hospitals were not collected in 2003. Therefore caution must be used when interpreting data from border counties where residents may have received care in West Virginia.*

Figure 3-34. Average Annual Age-adjusted Rates for Hospital Discharges with Heart Failure¹ as Principal Diagnosis by County, Ohio 1999-2003.

Ohio Rate= 39.8 Discharges per 10,000 Residents



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Failure defined as ICD-9 code 428.

Special Focus: Heart Failure Hospital Discharges among Medicare Beneficiaries

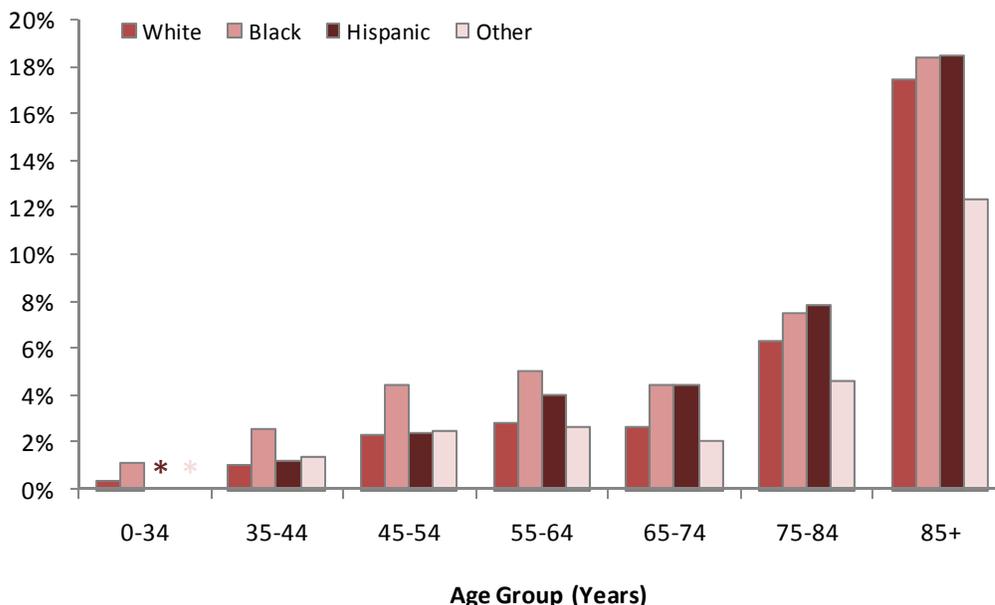
Race/Ethnicity and Age Group

In 2005, there were 212,537 heart failure discharges among 99,129 (5.4 percent) Medicare beneficiaries, slightly more than two hospitalizations per year for each beneficiary (Table 3-22).

The prevalence of a heart failure hospital discharge was higher in beneficiaries aged 85 years and older. Nearly 18 percent of beneficiaries in this age group had a hospitalization with a diagnosis of heart failure in their Medicare claims record (Figure 3-35, Table 3-22).

Black beneficiaries had the highest prevalence of a hospital discharge (6.1 percent), followed by Hispanic (5.6 percent) and white (5.3 percent) beneficiaries. Similar to trends observed with other forms of heart disease, beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) had the lowest prevalence of a heart failure hospital discharge (3.6 percent) (Table 3-23).

Figure 3-35. Percentage of Ohio Medicare Beneficiaries with a Heart Failure Hospital Discharge by Race/Ethnicity and Age Group, 2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Failure was defined as ICD 9 codes: 428.

²A Heart Failure hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Heart Failure in the inpatient claim record for the beneficiary.

*Percentage not calculated N<5.

Table 3-22. Heart Failure Hospital Discharges for Ohio Medicare Beneficiaries By Age Group, 2005.^{1,2}

Age Group (Years)	Number of Hospital Discharges with an HF Diagnosis	Number of Beneficiaries with an HF Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HF Hospital Discharge	Rate of HF Discharges per 10,000 Beneficiaries
0-34	456	195	31,650	0.6%	144.1
35-44	1,697	698	51,411	1.4%	330.1
45-54	6,022	2,407	87,079	2.8%	691.6
55-64	13,728	5,860	187,745	3.1%	731.2
65-74	46,897	21,582	747,208	2.9%	627.6
75-84	74,354	35,104	547,603	6.4%	1357.8
85+	69,383	33,283	190,626	17.5%	3639.7
All	212,537	99,129	1,843,322	5.4%	1153.0

Table 3-23. Heart Failure Hospital Discharges for Ohio Medicare Beneficiaries By Race/Ethnicity and Age Group, 2005.^{1,2}

Age Group (Years)	Number of Hospital Discharges with an HF Diagnosis	Number of Beneficiaries with an HF Hospital Discharge	All Medicare Beneficiaries	Percent of Beneficiaries with an HF Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with an HF Diagnosis	Number of Beneficiaries with an HF Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HF Hospital Discharge	Rate of MI Discharges per 10,000 Beneficiaries
White						Other				
0-34	243	107	23,614	0.5%	102.9	5	<5	718	*	69.6
35-44	916	424	40,380	1.1%	226.8	26	11	775	1.4%	335.5
45-54	3,738	1,608	68,244	2.4%	547.7	96	49	1,907	2.6%	503.4
55-64	10,322	4,563	160,502	2.8%	643.1	243	101	3,698	2.7%	657.1
65-74	39,093	18,410	672,735	2.7%	581.1	331	170	7,967	2.1%	415.5
75-84	66,326	31,748	501,942	6.3%	1321.4	310	150	3,238	4.6%	957.4
85+	62,951	30,554	175,067	17.5%	3595.8	559	252	2,046	12.3%	2732.2
Total	183,589	87,414	1,642,484	5.3%	1117.8	1,570	737	20,349	3.6%	771.5
Black						Hispanic				
0-34	191	80	6,980	1.1%	273.6	17	<5	338	*	503.0
35-44	741	258	9,869	2.6%	750.8	14	5	387	1.3%	361.8
45-54	2,168	739	16,484	4.5%	1315.2	20	11	444	2.5%	450.5
55-64	3,114	1,180	23,147	5.1%	1345.3	49	16	398	4.0%	1231.2
65-74	7,354	2,963	65,638	4.5%	1120.4	119	39	868	4.5%	1371.0
75-84	7,487	3,105	41,141	7.5%	1819.8	231	101	1,282	7.9%	1801.9
85+	5,782	2,430	13,258	18.3%	4361.1	91	47	255	18.4%	3568.6
Total	26,837	10,755	176,517	6.1%	1520.4	541	223	3,972	5.6%	1362.0

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

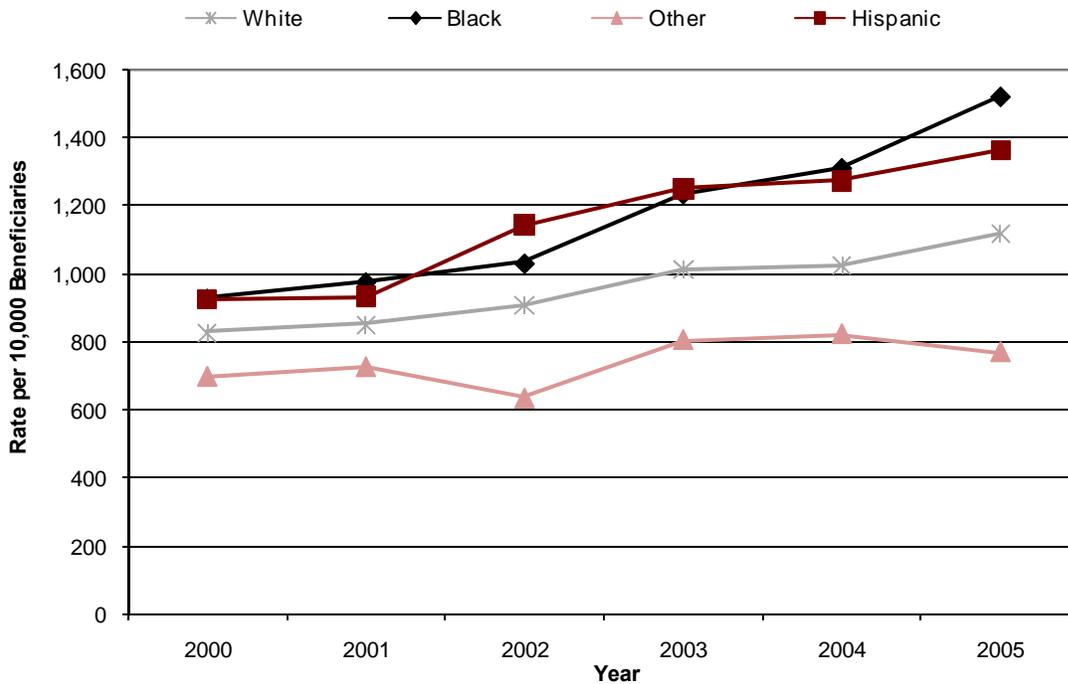
¹Heart Failure (HF) was defined as ICD 9 codes: 428.²Heart Failure defined as having a primary or secondary diagnosis (ICD-9) for Heart Failure in the inpatient claim record for the beneficiary.

*Percentages were not calculated if number of beneficiaries was less than five, rates were not calculated if the number discharges was less than five.

Race/Ethnicity and Year

Between 2000 and 2005, the heart failure (HF) discharge rates increased among Medicare beneficiaries of all races and ethnicities. Black beneficiaries observed the most dramatic increase of 63.4 percent from 930.2 to 1,520.4 discharges per 10,000 beneficiaries. The HF discharge rates for both Hispanic and white beneficiaries also increased substantially. Hispanic beneficiaries observed a 47.2 percent increase, from 925 to 1,362 discharges per 10,000 beneficiaries. The discharge rate for white beneficiaries increased by 34.6 percent from 830.4 to 1,117.8 discharges per 10,000 beneficiaries. Beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) increased by 10.2 percent from 700.2 to 771.5 discharges per 10,000 beneficiaries (Figure 3-36).

Figure 3-36. Heart Failure Hospital Discharge Rates for Ohio Medicare Beneficiaries by Race/Ethnicity and Year, 2000-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.
²Heart Failure was defined as ICD 9 codes: 428.
³A Heart Failure hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Heart Failure in the inpatient claim record for the beneficiary.

Race, Sex and Age Group

In, 2005 black males aged 85 years and older had the highest HF discharge rate among all age groups. The HF discharge rate was nearly double for black males and females in every age group less than 75 years (Table 3-24.) compared with white males and females (Table 3-24) .

Table 3-24. Heart Failure Hospital Discharges for Ohio Medicare Beneficiaries By Race, Sex and Age Group, 2005.^{1,2,3}

Age Group (Years)	Males					Females				
	Number of Hospital Discharges with an HF Diagnosis	Number of Beneficiaries with an HF Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HF Hospital Discharge	Rate of HF Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with an HF Diagnosis	Number of Beneficiaries with an HF Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HF Hospital Discharge	Rate of HF Discharges per 10,000 Beneficiaries
White										
0-34	135	56	13,150	0.4%	102.7	108	51	10,464	0.5%	103.2
35-44	553	251	22,350	1.1%	247.4	363	173	18,030	1.0%	201.3
45-54	2,307	938	37,685	2.5%	612.2	1,431	670	30,559	2.2%	468.3
55-64	5,659	2,533	81,597	3.1%	693.5	4,663	2,030	78,905	2.6%	591.0
65-74	19,087	9,204	306,573	3.0%	622.6	20,006	9,206	366,162	2.5%	546.4
75-84	29,522	14,141	199,685	7.1%	1,478.4	36,804	17,607	302,257	5.8%	1,217.6
85+	23,049	10,852	51,123	21.2%	4,508.5	39,902	19,702	123,944	15.9%	3,219.4
Total	80,312	37,975	712,163	5.3%	1,127.7	103,277	49,439	930,321	5.3%	1,110.1
Black										
0-34	117	46	3,812	1.2%	306.9	74	34	3,168	1.1%	233.6
35-44	395	150	5,414	2.8%	729.6	346	108	4,455	2.4%	776.7
45-54	1,239	427	8,667	4.9%	1,429.6	929	312	7,817	4.0%	1,188.4
55-64	1,495	549	10,797	5.1%	1,384.6	1,619	631	12,350	5.1%	1,310.9
65-74	3,318	1,326	27,940	4.7%	1,187.5	4,036	1,637	37,698	4.3%	1,070.6
75-84	2,823	1,183	15,319	7.7%	1,842.8	4,664	1,922	25,822	7.4%	1,806.2
85+	2,039	828	3,544	23.4%	5,753.4	3,743	1,602	9,714	16.5%	3,853.2
Total	11,426	4,509	75,493	6.0%	1,513.5	15,411	6,246	101,024	6.2%	1,525.5
All										
0-34	269	107	17,552	0.6%	153.3	187	88	14,098	0.6%	132.6
35-44	978	414	28,481	1.5%	343.4	719	284	22,930	1.2%	313.6
45-54	3,621	1,404	47,766	2.9%	758.1	2,401	1,003	39,313	2.6%	610.7
55-64	7,279	3,140	94,671	3.3%	768.9	6,449	2,720	93,074	2.9%	692.9
65-74	22,651	10,649	339,146	3.1%	667.9	24,246	10,933	408,062	2.7%	594.2
75-84	32,609	15,441	216,873	7.1%	1,503.6	41,745	19,663	330,730	5.9%	1,262.2
85+	25,324	11,788	55,284	21.3%	4,580.7	44,059	21,495	135,342	15.9%	3,255.4
Total	92,731	42,943	799,773	5.4%	1,159.5	119,806	56,186	1,043,549	5.4%	1,148.1

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.

²Heart Failure (HF) was defined as ICD-9 code: 428.

³A Heart Failure hospital discharge was defined as having a primary or secondary diagnosis (ICD-9) for Heart Failure in the inpatient claim record for the beneficiary.

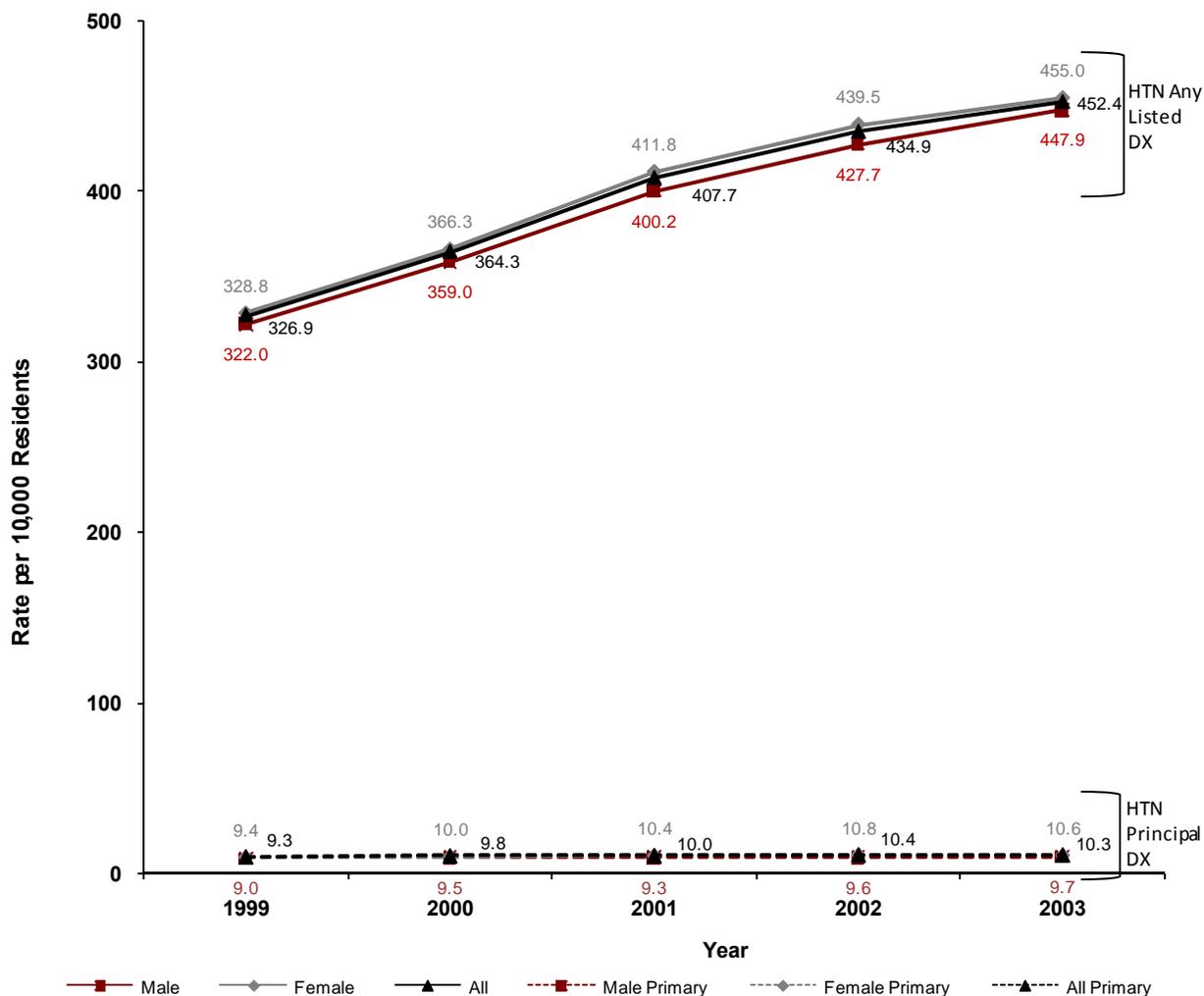
V. Hypertension Hospital Discharges

Sex and Year

In 2003, there were 551,061 discharges with hypertension listed as a diagnosis in the medical record among all inpatient hospital discharges in Ohio. In the five-year period of 1999-2003, the age-adjusted discharge rate increased by 38.4 percent from 326.9 to 452.4 discharges per 10,000 residents. Increases in number of discharges and rates were observed for both males and females (Table 3-25, Figure 3-37).

Hypertension was more commonly listed as a secondary diagnosis compared with a principal diagnosis. In 2003, 12,429 discharges had hypertension listed as the principal diagnosis, out of the 551,061 hypertension discharges.

Figure 3-37. Age-adjusted Rates for Hospital Discharges with Hypertension¹ as Any Diagnosis and Hospital Discharges with Hypertension¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003².



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Hypertension (HTN) defined as ICD-9 codes: 401-404.
²DX=Diagnosis

Table 3-25. Hospital Discharges with Hypertension¹ as Principal Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	4,459	5	22,211	\$11,919	\$53,052,500	8.1	9.0
	Female	6,312	4.9	31,006	\$10,471	\$65,991,138	10.8	9.4
	Total	10,771	4.9	53,217	\$11,071	\$119,043,638	9.5	9.3
2000	Male	4,771	5	23,659	\$13,088	\$62,259,899	8.7	9.5
	Female	6,748	4.9	32,828	\$11,373	\$76,417,214	11.5	10.0
	Total	11,519	4.9	56,487	\$12,084	\$138,677,114	10.1	9.8
2001	Male	4,785	4.8	22,729	\$13,930	\$66,597,745	8.7	9.3
	Female	7,059	4.9	34,886	\$12,120	\$85,421,671	12.1	10.4
	Total	11,844	4.9	57,615	\$12,851	\$152,019,415	10.4	10.0
2002	Male	5,012	4.8	24,176	\$16,472	\$82,490,748	9.0	9.6
	Female	7,401	4.9	36,576	\$14,042	\$103,839,866	12.6	10.8
	Total	12,413	4.9	60,752	\$15,023	\$186,330,614	10.9	10.4
2003	Male	5,144	4.7	23,938	\$18,333	\$94,269,647	9.2	9.7
	Female	7,285	4.8	34,776	\$15,935	\$116,035,349	12.4	10.6
	Total	12,429	4.7	58,714	\$16,927	\$210,304,996	10.9	10.3

Table 3-26. Hospital Discharges with Hypertension¹ as Any Diagnosis by Sex and Year, Ohio 1999-2003.

Year	Sex	Number of Hospital Discharges	Average Length of Stay in Days ²	Total Number of Days	Average Charges ^{3,4}	Total Charges ⁴	Crude Discharges per 10,000 Residents	Age-adjusted Discharges per 10,000 Residents
1999	Male	158,477	5.0	787,102	\$12,612	\$1,996,378,832	288.1	322.0
	Female	223,255	5.1	1,139,445	\$10,866	\$2,423,397,979	382.6	328.8
	Total	381,732	5.0	1,926,547	\$11,591	\$4,419,776,812	336.8	326.9
2000	Male	178,964	5.2	923,955	\$14,330	\$2,561,918,661	324.3	359.0
	Female	250,502	5.2	1,309,687	\$12,217	\$3,056,434,286	428.6	366.3
	Total	429,466	5.2	2,233,642	\$13,097	\$5,618,352,946	377.9	364.3
2001	Male	202,236	5.1	1,037,641	\$15,717	\$3,175,731,463	365.5	400.2
	Female	283,502	5.2	1,468,763	\$13,364	\$3,785,615,319	484.4	411.8
	Total	485,738	5.2	2,506,404	\$14,344	\$6,961,346,782	426.6	407.7
2002	Male	220,033	5.1	1,130,711	\$18,177	\$3,996,297,151	396.6	427.7
	Female	303,879	5.2	1,582,716	\$15,303	\$4,645,620,674	518.6	439.5
	Total	523,912	5.2	2,713,427	\$16,510	\$8,641,917,825	459.2	434.9
2003	Male	234,210	5.1	1,184,590	\$20,200	\$4,728,019,508	420.8	447.9
	Female	316,851	5.1	1,612,458	\$17,182	\$5,440,943,175	539.8	455.0
	Total	551,061	5.1	2,797,048	\$18,465	\$10,168,962,683	481.9	452.4

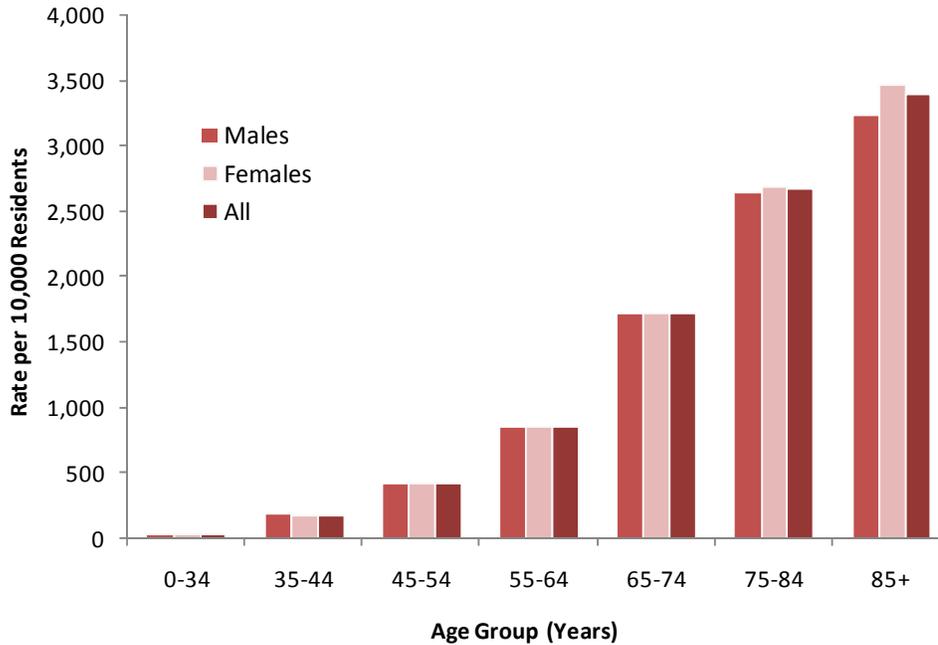
Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Hypertension defined as ICD-9 codes 401-404.²Total number of days divided by number of hospital discharges.³Total amount of charges divided by number of hospital discharges.⁴Charges represent total amount billed, not actual amount collected.

Sex and Age Group

The age-specific rates among males and females for hypertension hospital discharges were similar and, as expected increased with age (Figure 3-38).

Figure 3-38. Age-specific Rates for Hospital Discharges with Hypertension as Any Diagnosis by Sex and Age Group, Ohio 2003.

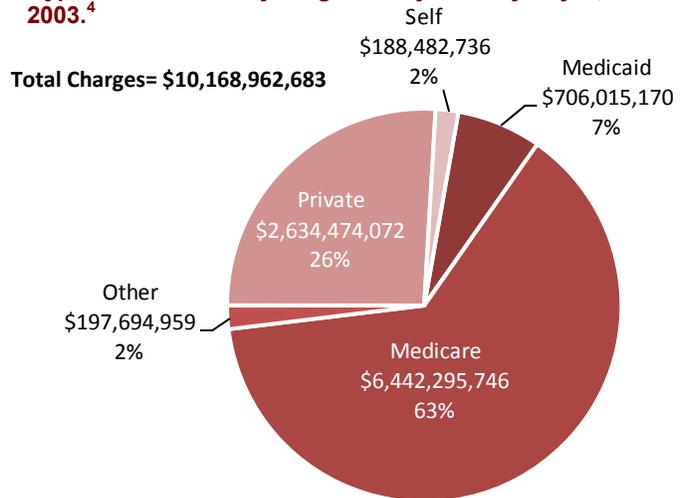


Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Hypertension defined as ICD-9 codes: 401-404.

Charges

In 2003, the amount billed to payors for hypertension discharges was \$10.2 billion. The majority of the charges were billed to Medicare (63 percent) followed by private insurance (26 percent) (Figure 3-39).

Figure 3-39. Total Charges¹ for Hospital Discharges with Hypertension² as Any Diagnosis by Primary Payor, Ohio 2003.⁴



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Charges represent total amount billed, not actual amount collected.
²Hypertension defined as ICD-9 codes 401-404.

Special Focus: Hypertension Hospital Discharges among Medicare Beneficiaries

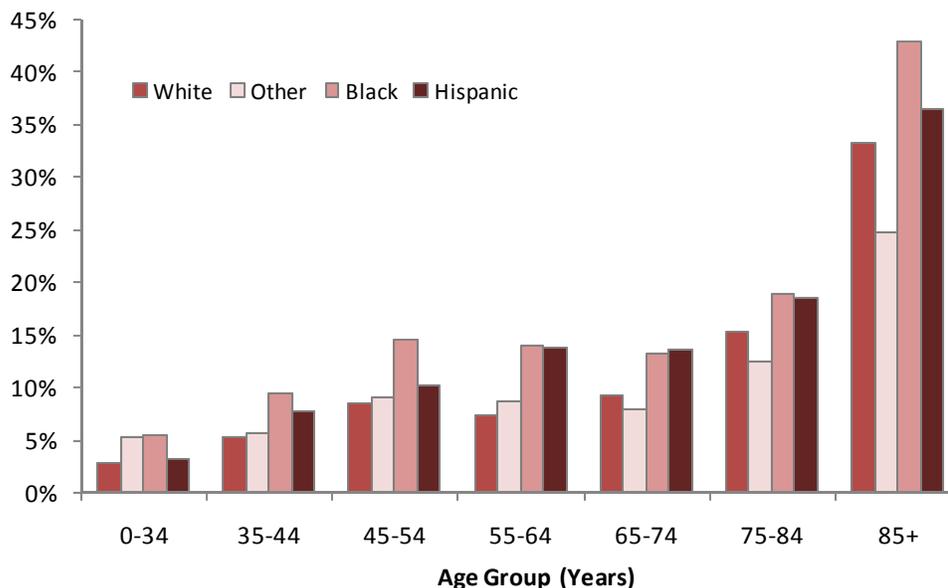
Race/Ethnicity and Age Group

In 2005, there were 486,035 discharges with a diagnosis of hypertension (HTN) in the claim record for 248,331 (13.5 percent) Medicare beneficiaries (Table 3-27).

Beneficiaries aged 85 years and older had a higher prevalence of a HTN hospital discharge. More than one-third of beneficiaries in this age group had a hospitalization with a diagnosis of HTN (Table 3-27).

Black beneficiaries had the highest prevalence of a HTN hospital discharge (16.5 percent), followed by Hispanic (14.8 percent) and white (13.2 percent) beneficiaries. Similar to trends observed with other forms of heart disease, beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) had the lowest prevalence of a HTN hospitalization (10.3 percent) (Table 3-28, Figure 3-40).

Figure 3-40. Percentage of Ohio Medicare Beneficiaries with a Hypertension Hospital Discharge by Race/Ethnicity and Age Group, 2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Hypertension was defined as ICD 9 codes: 401-404

²A Hypertension hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Hypertension in the inpatient claim record for the beneficiary.

The Burden of Heart Disease in Ohio

Table 3-27. Hypertension Hospital Discharges for Ohio Medicare Beneficiaries by Age Group, 2005.^{1,2}

Age Group (Years)	Number of Hospital Discharges with an Diagnosis of HTN	Number of Beneficiaries with a HTN Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HTN Hospital Discharge	Rate of HTN Discharges per 10,000 Beneficiaries
0-34	2,915	1,090	31,650	3.4%	921.0
35-44	8,045	3,078	51,411	6.0%	1,564.8
45-54	20,070	8,350	87,079	9.6%	2,304.8
55-64	33,149	15,208	187,745	8.1%	1,765.6
65-74	133,904	71,133	747,208	9.5%	1,792.1
75-84	162,421	85,210	547,603	15.6%	2,966.0
85+	125,531	64,262	190,626	33.7%	6,585.2
Total	486,035	248,331	1,843,322	13.5%	2,636.7

Table 3-28. Hypertension Hospital Discharges for Ohio Medicare Beneficiaries by Race/Ethnicity and Age Group, 2005.^{1,2}

Age Group (Years)	Number of Hospital Discharges with an HTN Diagnosis	Number of Beneficiaries with an HTN Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HTN Hospital Discharge	Rate of HTN Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with an Diagnosis of HTN	Number of Beneficiaries with an HTN Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HTN Hospital Discharge	Rate of HTN Discharges per 10,000 Beneficiaries
White						Other				
0-34	1,734	663	23,614	2.8%	734.3	71	38	718	5.3%	988.9
35-44	4,930	2,079	40,380	5.1%	1220.9	114	43	775	5.5%	1471.0
45-54	12,849	5,733	68,244	8.4%	1882.8	417	171	1,907	9.0%	2186.7
55-64	24,120	11,624	160,502	7.2%	1502.8	706	317	3,698	8.6%	1909.1
65-74	113,292	61,686	672,735	9.2%	1684.1	1,176	627	7,967	7.9%	1476.1
75-84	144,167	76,786	501,942	15.3%	2872.2	745	400	3,238	12.4%	2300.8
85+	111,040	57,993	175,067	33.1%	6342.7	1,033	506	2,046	24.7%	5048.9
Total	412,132	216,564	1,642,484	13.2%	2509.2	4,262	2,102	20,349	10.3%	2094.5
Black						Hispanic				
0-34	1,080	378	6,980	5.4%	1547.3	30	11	338	3.3%	887.6
35-44	2,918	926	9,869	9.4%	2956.7	83	30	387	7.8%	2144.7
45-54	6,675	2,401	16,484	14.6%	4049.4	129	45	444	10.1%	2905.4
55-64	8,178	3,212	23,147	13.9%	3533.1	145	55	398	13.8%	3643.2
65-74	19,125	8,703	65,638	13.3%	2913.7	311	117	868	13.5%	3582.9
75-84	17,000	7,788	41,141	18.9%	4132.1	509	236	1,282	18.4%	3970.4
85+	13,246	5,670	13,258	42.8%	9990.9	212	93	255	36.5%	8313.7
Total	68,222	29,078	176,517	16.5%	3864.9	1,419	587	3,972	14.8%	3572.5

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

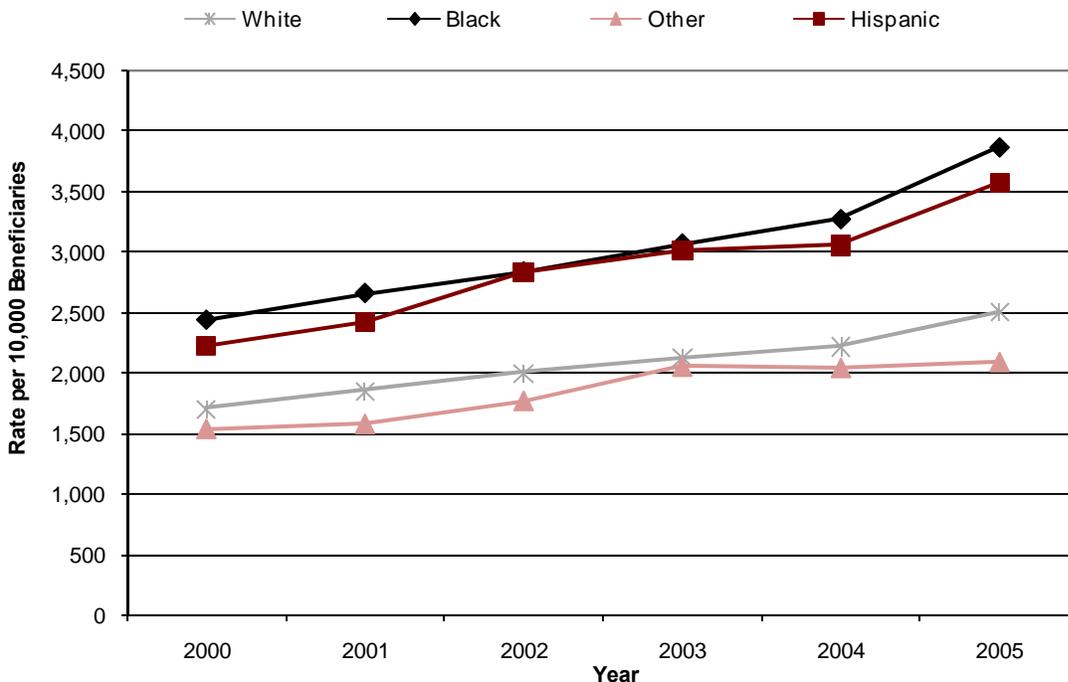
¹Hypertension (HTN) was defined as ICD 9 codes: 401-404.

²A Hypertension Hospital Discharge defined as having a primary or secondary diagnosis (ICD-9) for Hypertension in the inpatient claim record for the beneficiary.

Race/Ethnicity and Year

Between 2000-2005, hypertension (HTN) discharge rates among Medicare beneficiaries increased for all races and ethnicities. Black and Hispanic beneficiaries observed the most dramatic increases. The discharge rate for black beneficiaries increased by 58.4 percent from 2,439.3 to 3,864.9 discharges per 10,000 beneficiaries. The discharge rate for Hispanic beneficiaries increased by 60.5 percent from 2,226.3 to 3,572.5 discharges per 10,000 beneficiaries. The HTN discharge rate for white beneficiaries also increased substantially. White beneficiaries observed a 46.6 percent increase, from 1,711.9 to 2,509.2 discharges per 10,000 beneficiaries. Discharges for beneficiaries of other races (Asian, Native Hawaiian, Pacific Islander, American Indian, Alaskan Native or races other than white or black) increased by 35.7 percent from 1,543 to 2,094.5 per 10,000 (Figure 3-41).

Figure 3-41. Hypertension Hospital Discharge Rates for Ohio Medicare Beneficiaries by Race/Ethnicity and Year, 2000-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The age-specific rates were calculated using the total number of Medicare Beneficiaries as the denominator.

²Hypertension was defined as ICD 9 codes: 401-404.

³A Hypertension hospital discharge defined as having a primary or secondary diagnosis (ICD-9) for Hypertension in the inpatient claim record for the beneficiary.

Race, Sex and Age Group

In 2005, black males age 85 and older had the highest HTN discharge rate (12,909.1 per 10,000 beneficiaries) among all racial-gender age groups; more than half of black males (52.3 percent) in this age group had an HTN discharge. Black females had the next highest age-specific discharge rates for HTN (Table 3-29).

Table 3-29. Hypertension Hospital Discharges for Ohio Medicare Beneficiaries by Race, Sex and Age Group, 2005.

Age Group (Years)	Males					Females				
	Number of Hospital Discharges with an HTN Diagnosis	Number of Beneficiaries with an HTN Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HTN Hospital Discharge	Rate of HTN Discharges per 10,000 Beneficiaries	Number of Hospital Discharges with an HTN Diagnosis	Number of Beneficiaries with an HTN Hospital Discharge	Total Medicare Beneficiaries	Percent of Beneficiaries with an HTN Hospital Discharge	Rate of HTN Discharges per 10,000 Beneficiaries
White										
0-34	978	362	13,150	2.8%	743.7	756	301	10,464	2.9%	722.5
35-44	2,668	1,150	22,350	5.1%	1,193.7	2,262	929	18,030	5.2%	1,254.6
45-54	7,323	3,216	37,685	8.5%	1,943.2	5,526	2,517	30,559	8.2%	1,808.3
55-64	12,497	6,000	81,597	7.4%	1,531.6	11,623	5,624	78,905	7.1%	1,473.0
65-74	51,992	28,704	306,573	9.4%	1,695.9	61,300	32,982	366,162	9.0%	1,674.1
75-84	57,672	31,058	199,685	15.6%	2,888.1	86,495	45,728	302,257	15.1%	2,861.6
85+	36,618	18,794	51,123	36.8%	7,162.7	74,422	39,199	123,944	31.6%	6,004.5
Total	169,748	89,284	712,163	12.5%	2,383.6	242,384	127,280	930,321	13.7%	2,605.4
Black										
0-34	550	192	3812	5.0%	1,442.8	530	186	3,168	5.9%	1,673.0
35-44	1,473	489	5414	9.0%	2,720.7	1,445	437	4,455	9.8%	3,243.5
45-54	3,550	1,231	8667	14.2%	4,096.0	3,125	1,170	7,817	15.0%	3,997.7
55-64	3,719	1,467	10797	13.6%	3,444.5	4,459	1,745	12,350	14.1%	3,610.5
65-74	8,088	3,677	27940	13.2%	2,894.8	11,037	5,026	37,698	13.3%	2,927.7
75-84	6,306	2,876	15319	18.8%	4,116.5	10,694	4,912	25,822	19.0%	4,141.4
85+	4,575	1,853	3544	52.3%	12,909.1	8,671	3,817	9,714	39.3%	8,926.3
Total	28,261	11,785	75493	15.6%	3,743.5	39,961	17,293	101,024	17.1%	3,955.6
All										
0-34	1,596	583	17,552	3.3%	909.3	1,319	507	14,098	3.6%	935.6
35-44	4,251	1,685	28,481	5.9%	1492.6	3,794	1,393	22,930	6.1%	1654.6
45-54	11,179	4,566	47,766	9.6%	2340.4	8,891	3,784	39,313	9.6%	2261.6
55-64	16,639	7,659	94,671	8.1%	1757.6	16,510	7,549	93,074	8.1%	1773.9
65-74	60,830	32,758	339,146	9.7%	1793.6	73,074	38,375	408,062	9.4%	1790.8
75-84	64,494	34,192	216,873	15.8%	2973.8	97,927	51,018	330,730	15.4%	2960.9
85+	41,642	20,848	55,284	37.7%	7532.4	83,889	43,414	135,342	32.1%	6198.3
Total	200,631	102,291	799,773	12.8%	2508.6	285,404	146,040	1,043,549	14.0%	2734.9

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Hypertension (HTN) was defined as ICD-9 codes: 401-404.

²A Hypertension hospital discharge was defined as having a primary or secondary diagnosis (ICD-9) for Hypertension in the inpatient claim record for the beneficiary.

VI. Heart Disease Co-morbidities

Heart Disease and Diabetes Hospital Discharges

Diabetes is not only a risk factor for heart disease, but also a serious co-morbidity.¹ In 2003, 62,697 discharges had heart disease listed as the principal diagnosis and diabetes as a secondary diagnosis. This represents 33.0 percent of the discharges with a principal diagnosis of heart disease (Table 3-30).

When diabetes was listed as a diagnosis on the medical record, the LOS was slightly higher. The LOS was 4.9 days for discharges with a principal diagnosis of heart disease and a secondary diagnosis of diabetes (Table 3-30), compared with 4.6 days for all discharges with heart disease listed as the principal diagnosis (Table 3-1).

The number of discharges and age-adjusted rates increased for discharges with heart disease and diabetes listed as a co-morbidity. The discharge rate increased 17 percent for those with a principal diagnosis of heart disease and a secondary diagnosis of diabetes; and the rate increased 40 percent for discharges with any mention of heart disease and diabetes (Figure 3-42).

While the discharge rate increased, the average age of the patient decreased slightly from 68.9 years in 1999 (data not shown) to 68.4 years in 2003 for discharges with a principal diagnosis of heart disease and secondary diagnosis of diabetes.

Table 3-30. Hospital Discharges with a Principal Diagnosis of Heart Disease¹ and Any Diagnosis of Diabetes² by Sex, Ohio 2003.

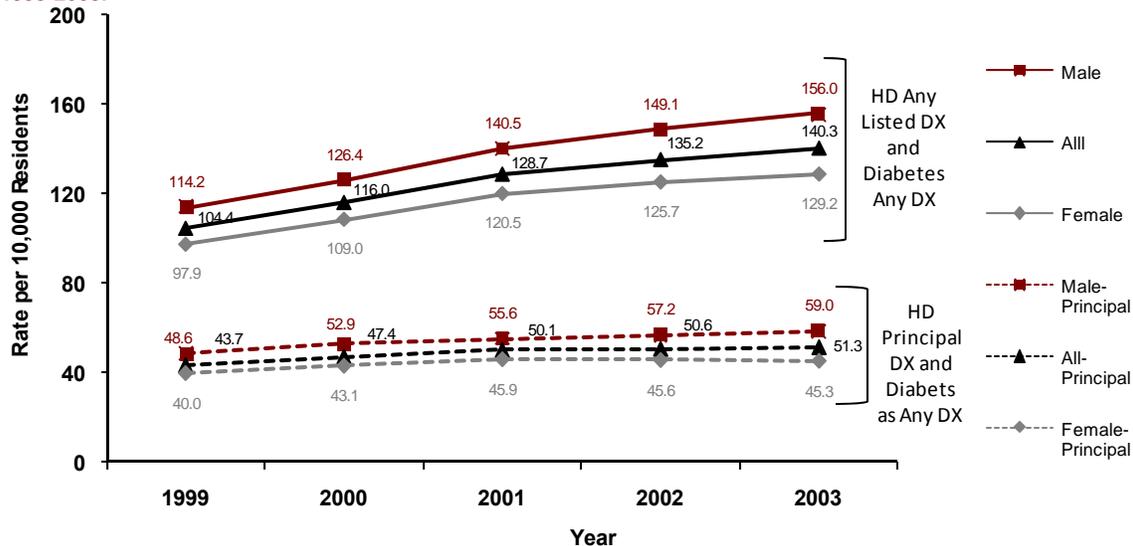
	Male	Female	Total
Discharges	31,261	31,436	62,697
Rate per 10,000	59	45.3	51.3
Average LOS ³	4.7	5.0	4.9
Total Days	147,795	158,568	306,363
Average Charge ^{4,5}	\$26,784	\$22,649	\$24,711
Total Charges ⁵	836,899,865	711,787,903	1,548,687,759
Average Age (Years)	66.9	70.0	68.4

Table 3-31. Hospital Discharges with Any Diagnosis of Heart Disease¹ and Any Diagnosis of Diabetes² by Sex, Ohio 2003.

	Male	Female	Total
Discharges	81,478	89,993	171,471
Rate per 10,000	156.0	129.2	140.3
Average LOS ³	5.4	5.6	5.5
Total Days	437,570	504,933	942,503
Average Charge ^{4,5}	\$21,695	\$19,404	\$20,493
Total Charges ⁵	1,766,414,477	1,744,973,411	3,511,387,888
Average Age (Years)	68.1	70.3	69.2

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429
²Diabetes defined as ICD-9 code 250.
³Total number of days divided by number of hospital discharges.
⁴Total amount of charges divided by number of hospital discharges.
⁵Charges represent total amount billed, not actual amount collected.

Figure 3-42. Age-adjusted Rates for Hospital Discharges with a Principal Diagnosis of Heart Disease and Any Diagnosis of Diabetes and for Hospital Discharges with Heart Disease as Any Diagnosis and Diabetes as Any Diagnosis by Sex and Year, Ohio 1999-2003.^{1,2,3}



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease (HD) defined as ICD-9 codes: 390-398, 402, 404, 410-429
²Diabetes defined as ICD-9 code 250.
³DX=Diagnosis

Heart Disease and End-stage Renal Disease Hospital Discharges

End-stage renal disease (ESRD) is a very serious complication resulting from chronic diseases such as uncontrolled hypertension, diabetes or heart disease. CVD is the leading cause of death for persons with ESRD.¹ In 2003, there were 7,963 discharges with heart disease listed as a principal diagnosis and ESRD as a secondary diagnosis. There were 28,823 discharges in which there was any mention of both ESRD and heart disease listed as a diagnosis. Both types of discharges have increased from 1999 to 2003 by 27 percent and 44 percent, respectively (Tables 3-32 and 3-33).

Similar to the number of discharges, the discharge rates for hospitalizations for heart disease and ESRD have increased from 1999 to 2003. The discharge rate for hospitalizations with heart disease listed as the principal diagnosis increased by 20 percent, from 5.4 in 1999 to 6.5 per 10,000 in 2003. The rate for discharges with any mention of heart disease and ESRD as a diagnosis increased by 38.6 percent during the same period (Figure 3-43).

Heart disease discharges with a diagnosis of ESRD had longer average LOS (8.1 days), compared with all heart disease discharges (5.5 days) (Table 3-2). The average charge for heart disease with ESRD discharge was higher (\$30,601) (Table 3-33), compared with the average charge for all heart disease hospital discharges (\$21,661) (Tables 3-2).

Table 3-32. Hospital Discharges with a Principal Diagnosis of Heart Disease¹ and Any Diagnosis of End-stage Renal Disease² by Sex, Ohio 2003.

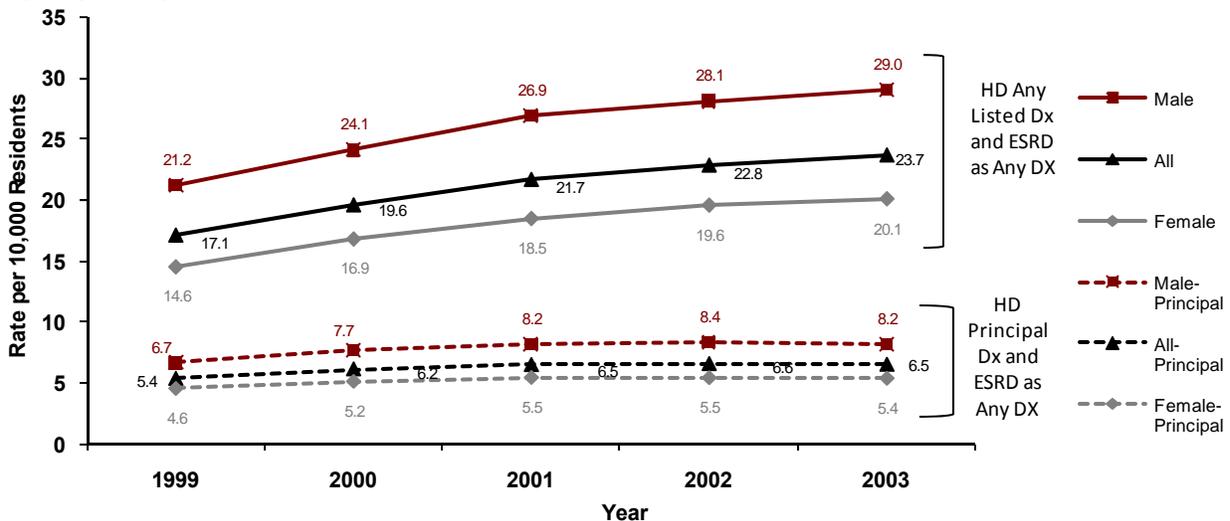
	Male	Female	Total
Discharges	4,237	3,726	7,963
Rate per 10,000	6.7	4.6	5.4
Average LOS ³	7.1	7.4	7.3
Total Days	30,087	27,656	57,743
Average Charge ^{4,5}	32,194	31,348	31,798
Total Charges ⁵	136,374,463	116,804,048	253,178,511
Average Age (Years)	67.6	68.6	68.0

Table 3-33. Hospital Discharges with Any Diagnosis of Heart Disease¹ and Any Diagnosis of End-stage Renal Disease² by Sex, Ohio 2003.

	Male	Female	Total
Discharges	15,127	13,969	28,823
Rate per 10,000	21.2	14.6	17.1
Average LOS ³	7.9	8.2	8.1
Total Days	120,050	112,753	232,803
Average Charge ^{4,5}	31,076	30,077	30,601
Total Charges ⁵	469,8403,38	411,450,907	881,291,246
Average Age (Years)	66.8	67.5	67.1

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.
²End stage renal Disease (ESRD) defined as ICD-9-CM procedure codes 39.95 or 55.60-55.69 or disease codes: 585, V42.0 or V45.1.
³Total number of days divided by number of hospital discharges.
⁴Total amount of charges divided by number of hospital discharges.
⁵Charges represent total amount billed, not actual amount collected.

Figure 3-43. Age-adjusted Rates for Hospital Discharges with a Principal Diagnosis of Heart Disease and Any Diagnosis of End-stage Renal Disease and for Hospital Discharges with Heart Disease¹ as Any diagnosis and End-stage Renal Disease as Any Diagnosis by Sex and Year, Ohio 1999-2003.^{1,2}



Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹Heart Disease defined as ICD-9 codes: 390-398, 402, 404, 410-429.
²End stage renal Disease (ESRD) defined as ICD-9-CM procedure codes 39.95 or 55.60-55.69 or disease codes: 585, V42.0 or V45.1.
³DX=Diagnosis

VII. Inpatient Cardiac Procedures

In 2003, there were 188,373 hospital discharges with a cardiac procedure. The most common procedure of those listed below was diagnostic catheterizations (74,819) followed by angioplasty. Cardiac procedures were more common among males and the average male patient age was lower, compared with females (Table 3-34).

The average charge for a hospital discharge with a cardiac procedure was \$38,291. The most costly of the selected cardiac procedures listed below was for discharges with implantable defibrillators (\$87,150). The charges billed include all hospital charges for the admission, including any other surgical procedures received, during the hospital stay (Table 3-34).

Table 3-34. Hospital Discharges¹ with a Listed Cardiac Procedure by Sex, Ohio 2003.

Cardiac Procedure (ICD-9 Procedure Codes)	Sex	Number of Discharges	Age-adjusted Rate ² per 10,000 Residents	Average LOS ³ (Days)	Average Age (Years)	Average Charge ^{3,4}
Angioplasty (36.0)	Male	23,746	43.2	2.9	62.5	\$32,664
	Female	13,295	19.6	3.5	67.1	\$33,475
	All	37,041	30.4	3.1	64.1	\$32,955
Percutaneous Coronary Intervention (PCI) (36.01, 36.02, 36.05, 36.06, 36.07)	Male	23,711	43.1	2.9	62.5	\$32,636
	Female	13,271	19.6	3.5	67.1	\$33,386
	All	36,982	30.4	3.1	64.1	\$32,906
Cardiac Revascularization (bypass) (36.1-36.3)	Male	10,824	19.8	8.7	64.5	\$69,803
	Female	4,997	7.4	10.4	67.5	\$77,736
	All	15,821	13.0	9.3	65.4	\$72,309
Implantable Defibrillators (37.94-37.99)	Male	3,536	6.6	6.2	66.1	\$85,557
	Female	1,247	1.9	8.3	65.3	\$91,672
	All	4,783	3.9	6.8	65.9	\$87,150
Open Heart Surgery (35 [less 35.4,3.96], 36 [less 36.0], 37.1, 37.3-37.5)	Male	2,964	5.5	8.8	58.2	\$69,135
	Female	2,362	3.6	9.3	60.0	\$64,442
	All	5,326	4.4	9.0	59.0	\$67,054
Pacemakers (37.8)	Male	4,283	8.7	5.5	74.0	\$42,843
	Female	4,506	6.1	6.0	76.6	\$40,696
	All	8,789	7.1	5.7	75.3	\$41,743
Diagnostic Catheterizations (37.2)	Male	44,290	81.0	4.7	62.6	\$38,539
	Female	30,529	45.4	5.2	65.7	\$35,165
	All	74,819	61.5	4.9	63.9	\$37,162
All Cardiac Procedures (35-39)	Male	102,232	190.4	6.2	63.9	\$39,633
	Female	86,141	127.1	6.9	67.0	\$36,699
	All	188,373	155.1	6.5	65.3	\$38,291

Source: Ohio Hospital Association. Analysis completed by the Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Among Hospital Discharges with Disease of Circulatory System (ICD-9 codes: 390-459) listed as any diagnosis.

²Rates adjusted to the 2000 standard population.

³Average Length of Stay (LOS) equals the total number of days divided by number of hospital discharges.

⁴Total amount of charges divided by number of hospital discharges.

⁵Charges represent total amount billed, not actual amount collected.

VIII. Quality of Inpatient Hospital Care

Quality of care is defined as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.”¹ Several medical interventions have been documented as reducing deaths or recurrent events for patients with heart disease. These interventions provided the basis for different quality improvement measures that many health care providers report. Quality improvement measures allow tracking and monitoring of the treatment patients receive, and also monitor improvement within the healthcare delivery system.¹

The process of care measures for heart attack and heart failure detailed in this section are collected by and reported to multiple agencies including the Joint Commission, Centers for Medicare and Medicaid Services and the Agency for Healthcare Research and Quality.¹⁴ The measures are used by these agencies to accredit hospitals and provide consumers with information on the quality of care hospitals provide. Data collected from patients’ medical records are used to calculate a rate or percentage that shows how well hospitals care for their patients.¹⁴

Heart Attack Process of Care Measures

Of the eight measures related to heart attack care, six are included in a composite variable to describe the percentage of patients who receive the recommended hospital care. In Ohio, 95.1 percent of patient charts sampled received the recommended care. For the six measures with comparable nation data, the percentage for Ohio was higher than the average for all other states. The results for the other measures not included in the composite variable of 1) Thrombolytic agent received within 30 minutes and 2) percutaneous coronary intervention (PCI) received within 120 minutes were 30.3 percent and 74.8 percent of patients, respectively (Table 3-35).

Table 3-35. Heart Attack Process of Care Measures, Ohio 2005.

Heart Attack Process of Care Measures	Brief Explanation	Ohio	All states Average
Percent of Heart Attack Patients Given ACE Inhibitor or ARB for Left Ventricular Systolic Dysfunction (LVSD)	ACE (angiotensin converting enzyme) inhibitors and ARBs (angiotensin receptor blockers) are medicines used to treat heart attacks, heart failure or a decreased function of the heart.	83.8%	84.4%
Percent of Heart Attack Patients Given Aspirin at Arrival	Aspirin can help keep blood clots from forming and dissolve blood clots that can cause heart attacks.	96.5%	95.5%
Percent of Heart Attack Patients Given Aspirin at Discharge	Taking aspirin may help prevent future heart attacks.	96.7%	96.2%
Percent of Heart Attack Patients Given Beta Blocker at Arrival	Beta blockers are a type of medicine used to lower blood pressure, treat chest pain (angina) and heart failure and to help prevent a heart attack.	94.0%	92.5%
Percent of Heart Attack Patients Given Beta Blocker at Discharge	Beta blockers are a type of medicine used to lower blood pressure, treat chest pain (angina) and heart failure and to help prevent a heart attack.	96.3%	95.3%
Percent of Heart Attack Patients Given Smoking Cessation Advice/Counseling	Smoking is linked to heart attacks. Quitting may help prevent another heart attack.	94.5%	92.9%
*Heart Attack Recommended Care in Hospital	Percent of heart attack patients who receive recommended hospital care, all payers. This is a composite of the six measures listed above.	95.1%	94.5
Measures not included in Composite Variable			
Percent of Heart Attack Patients Given Fibrinolytic Medication Within 30 Minutes Of Arrival	Blood clots can cause heart attacks. Doctors may give this medicine, or perform a procedure to open the blockage, and in some cases, may do both.	30.3%	NA
Percent of Heart Attack Patients Given PCI Within 120 Minutes Of Arrival	The procedure called Percutaneous Coronary Intervention (PCI) is one of the most effective for opening blocked blood vessels that cause heart attacks. Doctors may perform PCI, or give medicine to open the blockage, and in some cases, may do both.	74.8%	NA

Source: Chart adapted from National Healthcare Quality Report (NHQR) state snapshots. Ohio data provided by Ohio KePRO.
 *Recommended hospital care for MI includes administering aspirin and beta blocker within 24 hours of hospital arrival and at discharge, giving a prescription of angiotensin converting enzyme (ACE) inhibitor or angiotensin receptor blocker at discharge to patients with left ventricular systolic dysfunction and giving smoking cessation counseling to smoking patients.
 NA=Data not Available.

Heart Failure Process of Care Measures

Of the four measures related to heart failure care, two are included in a composite variable to describe the percentage of patients who received recommended care during their hospital admission. In Ohio, 90.4 percent of patients sampled received the recommended care. For the three measures with comparable national data, the percentage for Ohio was higher than the average for all the other states. The two additional measures not included in the composite variable indicated that 68.0 percent of heart failure patients were given discharge instructions and 87.9 percent of patients sampled were given smoking cessation/advice counseling. Both measures are important for improved patient care and reducing heart failure readmission (Table 3-36).

Table 3-36. Heart Failure Process of Care Measures, Ohio 2005

Heart Failure Process of Care Measures	Brief Explanation	Ohio	All states Average
Percent of Heart Failure Patients Given ACE Inhibitor or ARB for Left Ventricular Systolic Dysfunction (LVSD)	ACE (angiotensin converting enzyme) inhibitors and ARBs (angiotensin receptor blockers) are medicines used to treat heart attacks, heart failure or a decreased function of the heart.	84.4%	83.0%
Percent of Heart Failure Patients Given an Evaluation of Left Ventricular Systolic (LVS) Function	An evaluation of the LVS function checks how effectively the left chamber of the heart is pumping.	92.8%	90.6%
*Heart Failure Recommended Care in Hospital	Percent of heart failure patients who received recommend hospital care, all payers. This is a composite variable of the above two measures.	90.4%	88.5%
Measures not included in Composite Variable			
Percent of Heart Failure Patients Given Discharge Instructions	The staff at the hospital should provide the patient with information to help manage heart failure symptoms at discharge.	68.0%	NA
Percent of Heart Failure Patients Given Smoking Cessation Advice/Counseling	Smoking is linked to heart failure. Quitting may help improve the patient’s condition.	87.9%	NA

Source: Chart adapted from National Healthcare Quality Report (NHQR) state snapshots. Ohio data provided by Ohio KePRO.

*Recommended hospital care for heart failure includes evaluation of left ventricular ejection fraction and prescription of an angiotensin converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) at discharge for patients with left ventricular systolic dysfunction.

NA=Data not Available.

IX. Summary

Heart disease is the leading cause of hospitalization in Ohio and accounted for 37 percent of all hospitalizations and more than \$11 billion in charges during 2003. While people 75 and older were more likely to be hospitalized for heart disease, adults 45 to 64 years old represented 30 percent of these cases. Men were more likely than women to be hospitalized for heart disease at a younger age and incurred higher charges. However, the volume of discharges for heart disease and the cost increased across all age groups from 1999 to 2003 with Medicare covering the majority of these charges.

Heart failure, the end stage of heart disease, is most often classified as a secondary diagnosis and accounted for more than 200,000 hospital discharges between 1999 and 2003. Among Medicare beneficiaries, heart failure discharges increased steadily between 2000 and 2005 and occurred at the rate of two per person/per year. Discharge rates increased for all races and ethnicities during this period, but black beneficiaries experienced the greatest increase at more than 60 percent.

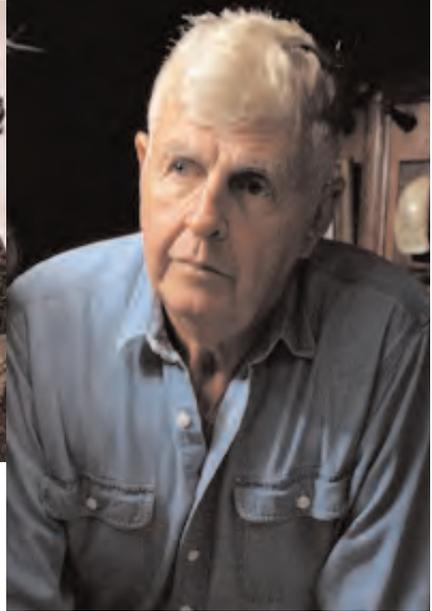
Hypertension prevalence among all hospitalized patients increased steadily between 1999 and 2003. The rate of hypertension, classified as a secondary diagnosis, increased by 38 percent and accounted for more than 550,000 discharges and \$10.2 billion in billed charges in 2003. During 2005, 13.5 percent of all Medicare beneficiaries had a diagnosis of hypertension in their claim record, with black beneficiaries experiencing the highest prevalence of a hypertension discharge.

When heart disease is accompanied by diabetes or end-stage renal disease (ESRD), hospital length of stay and the costs incurred increase substantially. The prevalence of these two serious co-morbid conditions has increased by 33 percent for diabetes and 27 percent for ESRD between 1999 and 2003. The discharge rate for patients with heart disease accompanied by diabetes or ESRD increased by 17 percent and 20 percent, respectively. Patients with heart disease and either of these co-morbidities also were likely to be hospitalized at a younger age and require more interventions. For example, heart disease accompanied by ESRD increased the average hospitalization charge by almost \$10,000.

4

The Burden of Heart Disease in Ohio

Heart Disease Mortality

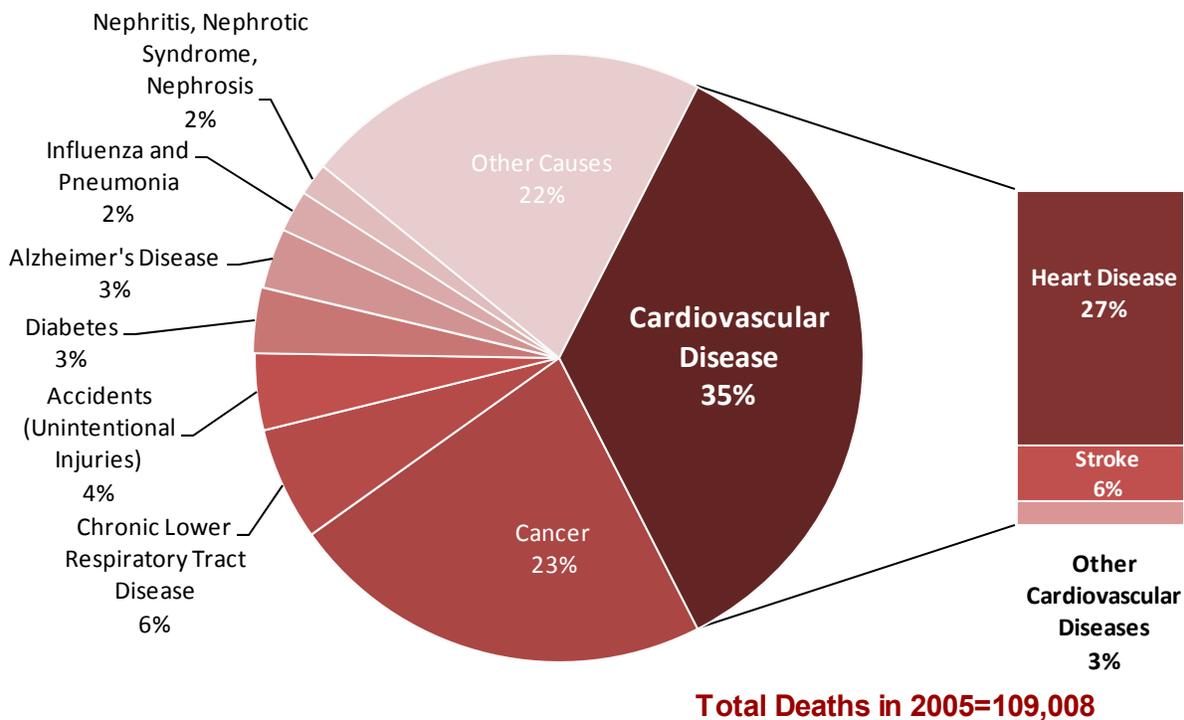


I. Leading Causes of Death

Cardiovascular disease, which includes heart disease and stroke, was the leading cause of death (38,123 deaths) among Ohio residents in 2005, accounting for 35 percent of all deaths. There were more deaths in Ohio from cardiovascular disease than from cancer, automobile crashes, suicide, homicide and AIDS combined (Figure 4-1).

Heart disease, specifically, is the leading cause of death for both males and females accounting for 27 percent (28,995 deaths) of all deaths in Ohio in 2005 (Figure 4-1).

Figure 4-1. Leading Causes of Death, Ohio 2005.



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Cardiovascular Disease was defined as ICD-10 codes I00-I78.

²Heart Disease was defined as ICD-10 codes I00-I09, I11, I13, I20-I51.

³Stroke was defined as ICD-10 codes I60-I69.

⁴Cancer was defined as ICD-10 codes C00-C97.

⁵Nephritis, Nephrotic Syndrome and Nephrosis was defined as ICD-10 codes N00-N07, N17-N19, N25-N27.

⁶Influenza and Pneumonia was defined as ICD-10 codes J10-J18.

⁷Alzheimer's disease was defined as ICD-10 codes G30.

⁸Accidents (Unintentional Injuries) was defined as ICD-10 codes V01-X59, Y85-Y86.

⁹Chronic Lower Respiratory Tract Disease was defined as ICD-10 codes J40-J47.

II. Heart Disease Mortality

Ohio Compared to United States

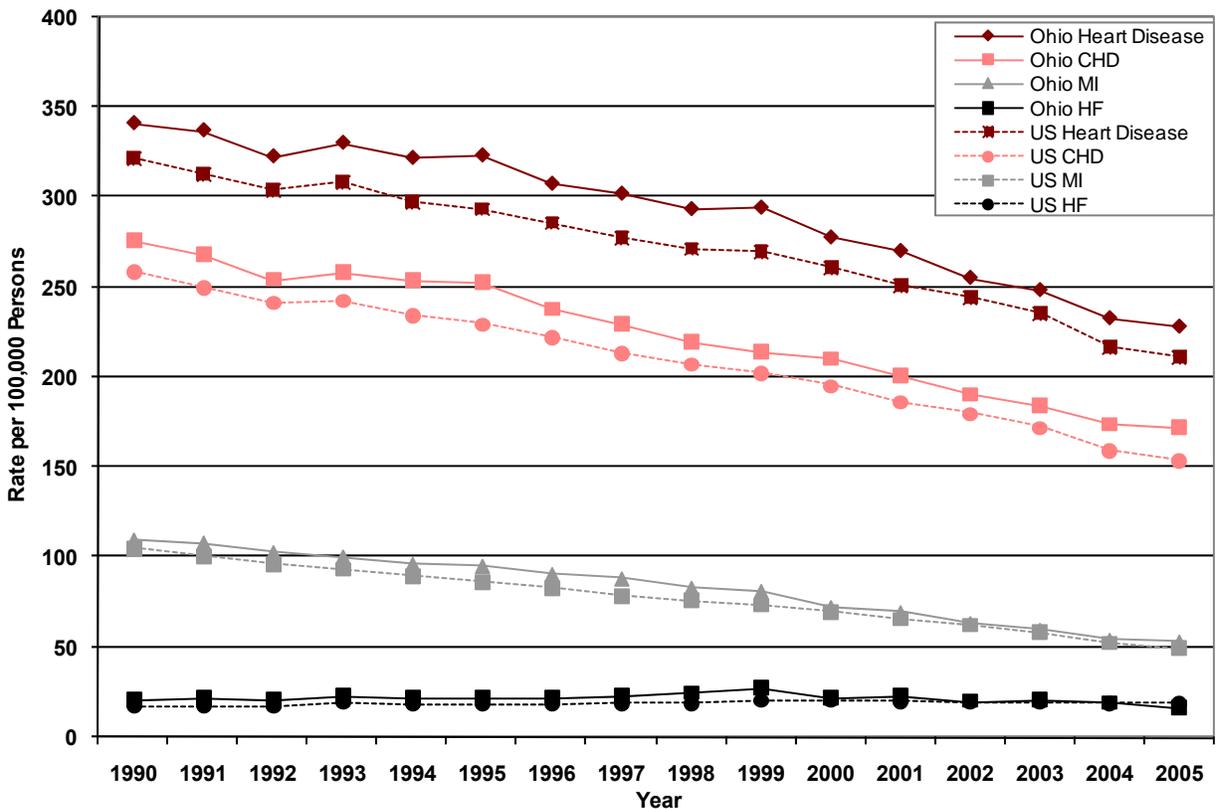
Since 1990, mortality from heart disease (HD) has declined significantly. From 1990 to 2005, HD mortality declined by 33.1 percent in Ohio from 341.3 to 228.2 per 100,000 persons. A similar reduction of 34.4 percent was observed in the US mortality rate, which declined from 321.8 to 211.1 per 100,000 persons (Figure 4-2).

Reductions in mortality rates were observed for both coronary heart disease (CHD) and myocardial infarction (MI) between 1999 through 2005. There was a 37.6 percent decline in CHD mortality in Ohio and a 40.6 percent decline for the United States. Ohio's mortality rate declined from 276.0 in 1990 to 172.3 per 100,000 persons in 2005. Between 1990 and 2005, the MI mortality rate both in Ohio and the United States declined by more than half, from 109.7 per 100,000 persons to 53.3 per 100,000 persons in Ohio and from 105.2 to 49.1 per 100,000 persons for the United States.

Over the same period, mortality rates for heart failure in Ohio decreased from 20.6 to 16.1 per 100,000 persons, compared with an increase in US mortality rates from 17.6 to 18.9 per 100,000 persons (Figure 4-2).

Ohio mortality rates from HD, CHD and MI were consistently higher from 1990-2005 when compared with the US.

Figure 4-2. Age-adjusted Mortality Rates for Heart Disease, Coronary Heart Disease, Heart Failure and Myocardial Infarction by Year, Ohio Compared to the US, 1990-2005.^{1,2,3,4,5,6}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July 1) bridged race census estimates 2000 (April 1) and post-censal bridged race estimates for 2001-2005 (July 1), as a denominator and to U.S. 2000 standard population for age adjustment.

²Heart Disease (HD) was defined as: ICD-9 codes: 390-398, 402, 404, 410-429 for 1990-1998 deaths and ICD-10 codes I00-I09, I11, I13, I20-I51 for 1999-2003 deaths.

³Coronary Heart Disease (CHD) was defined as: ICD-9 codes: 402, 410-414, 429.2 for 1990-1998 deaths and ICD-10 codes I11, I20-I25 for 1999-2005 deaths.

⁴Myocardial Infarction (MI) was defined as: ICD-9 code: 410 for 1990-1998 deaths and ICD-10 codes I21-I22 for 1999-2005 deaths.

⁵Heart Failure (HF) was defined as: ICD-9 code: 428 for 1990-1998 deaths and ICD-10 code I50 for 1999-2005 deaths.

⁶US mortality rates obtained from CDC Wonder at <http://wonder.cdc.gov/mortSQL.html>

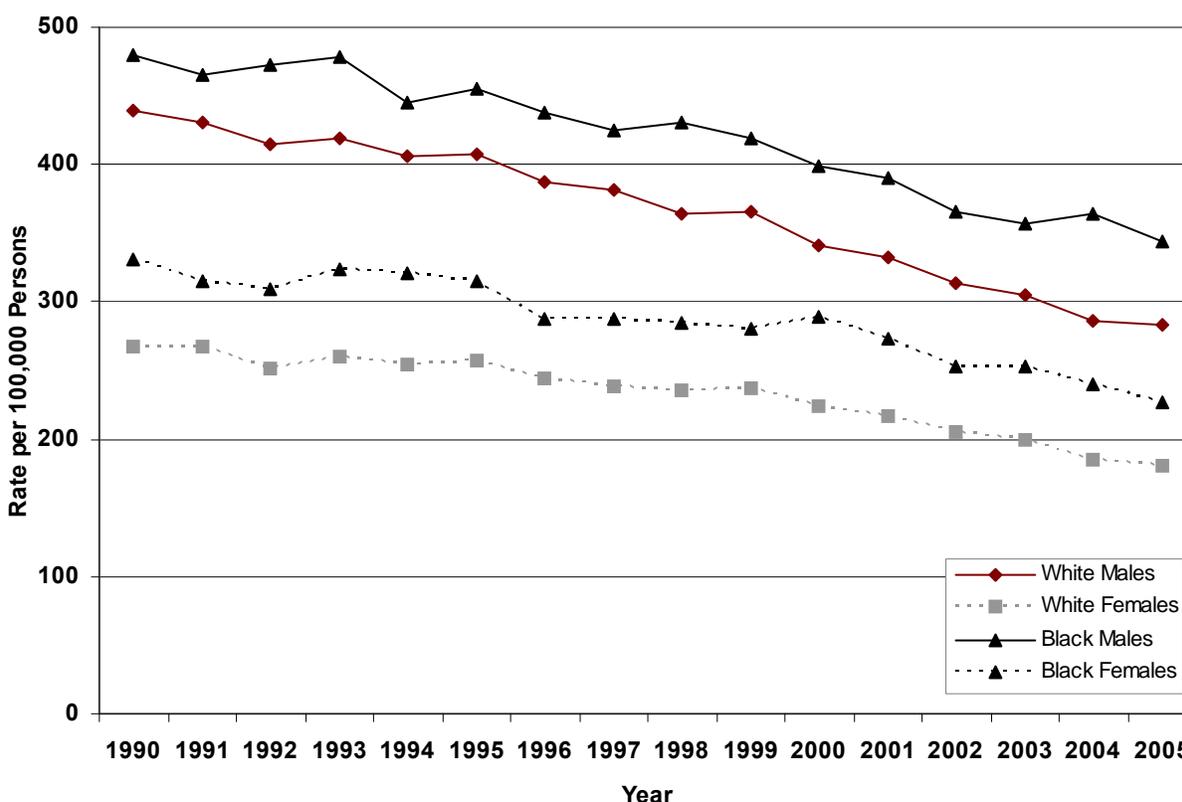
Race, Sex and Year

Between 1990 to 2005, the mortality rate from heart disease declined by 35.7 percent for white males, 32.7 percent for white females, 28.2 percent for black males and 31.4 percent for black females (Figure 4-3).

Black and white males have the highest mortality rates from heart disease. In 2005, the mortality rate was 344.4 deaths per 100,000 for black males and 282.6 deaths per 100,000 for white males. In comparison, the rate was 227.2 deaths per 100,000 for black females and 180.2 deaths per 100,000 for white females (Appendix B. Table B-2) (Figure 4-3).

In 2005, the mortality rate for black males was 21.8 percent higher, compared with white males and the mortality rate for black females was 26.1 percent higher, compared with white females (Appendix C. Table C-2) (Figure 4-3).

Figure 4-3. Age-adjusted Mortality Rates for Heart Disease, by Race, Sex and Year, Ohio 1990-2005.^{1,2}



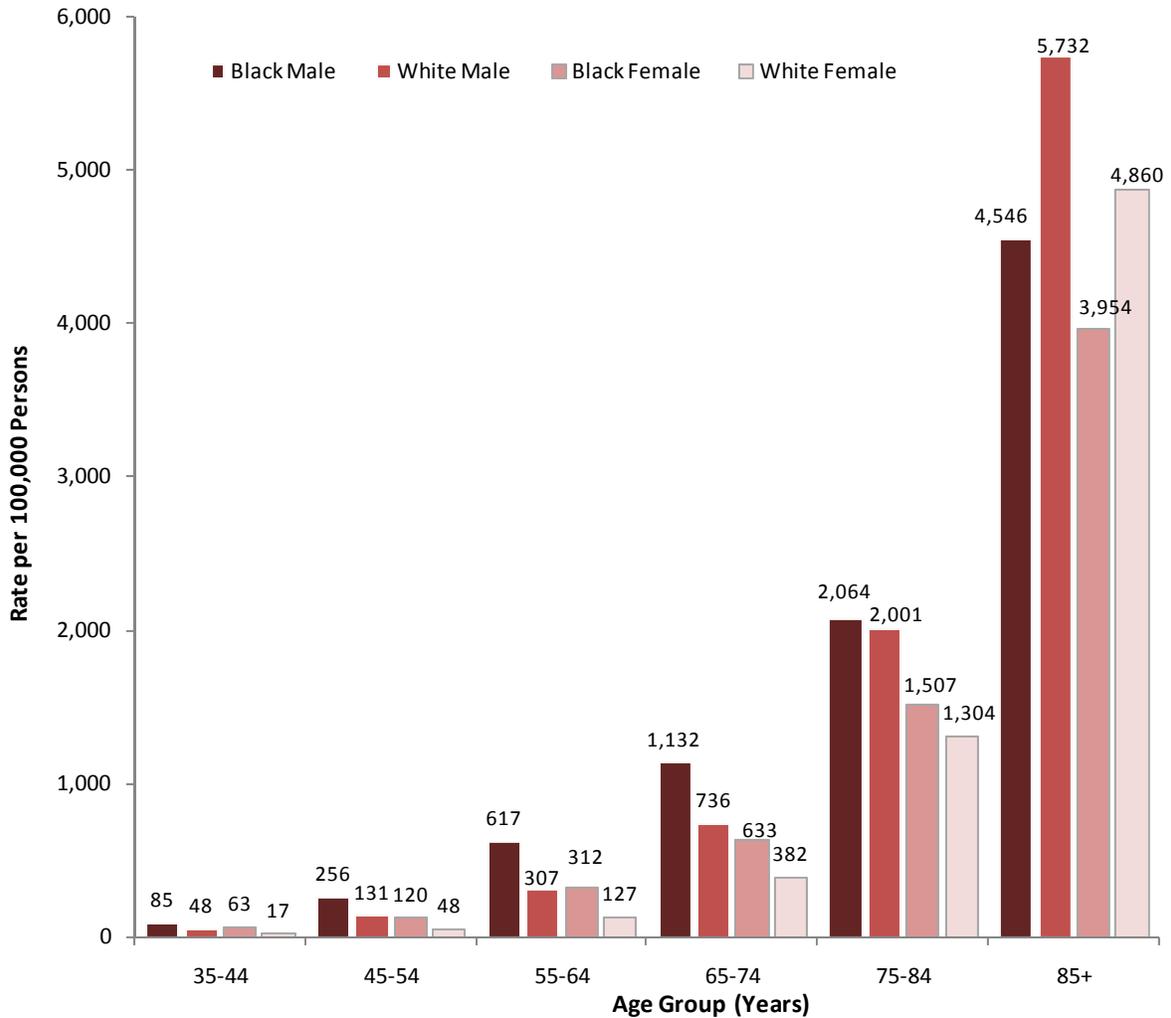
Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.
¹The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July 1) bridged race censal estimates 2000 (April 1) and post-censal bridged race estimates for 2001-2005 (July 1), as a denominator and to the U.S. 2000 standard population for age adjustment.
²ICD-9 codes: 390-398, 402, 404, 410-429 for 1990-1998 deaths and ICD-10 codes I00-I09, I11, I13, I20-I51 for 1999-2005 deaths.

Age, Race and Sex

Black males had the highest age-specific mortality rate for heart disease in every age group less than 85 years old (Figure 4-4). This indicates that black males die from heart disease at a higher rate and at a younger age.

On average, black males died seven years earlier from heart disease than white males, and black females died nine years earlier than white females. The average age of death from heart disease for black males was 67 years (median age 68 years), 74 years (median age 77 years) for white males, 73 years (median age 77 years) for black females and 82 years (median age 84 years) for white females (data not shown).

Figure 4-4. Age-specific Mortality Rates for Heart Disease by Race and Sex, Ohio 2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹The age-specific rates were calculated using the inter-censal population estimates for post-censal bridged race estimates 2001-2005 (July 1), as a denominator.

²Heart Disease was defined as ICD-10 codes; I00-I09, I11, I13, I20-I51.

Premature Death and Years of Potential Life Lost

Table 4-1. Premature Heart Disease¹ Deaths by Race and Sex, Ohio 2005

	Under 65 Years	Under 75 Years	YPLL for deaths before 75 years of age	YPLL Rate per 1,000 persons
Black Males	42%	64%	16,243	24.0
White Males	24%	42%	78,866	16.4
Black Females	27%	44%	10,961	14.7
White Females	9%	20%	32,680	6.5
All	19%	33%	139,393	12.2

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease was defined as ICD-10 codes: I00-I09, I11, I13, I20-I51.

²YPLL= Years of Potential Life Lost.

Heart disease causes premature death for many Ohioans. In 2005, of those who died of heart disease, 19 percent died before age 65, and 33 percent died before age 75 (includes deaths before 65). Based on an average life expectancy of 75 years, Ohioans lost 139,393 years of potential life from heart disease (Table 4-1).

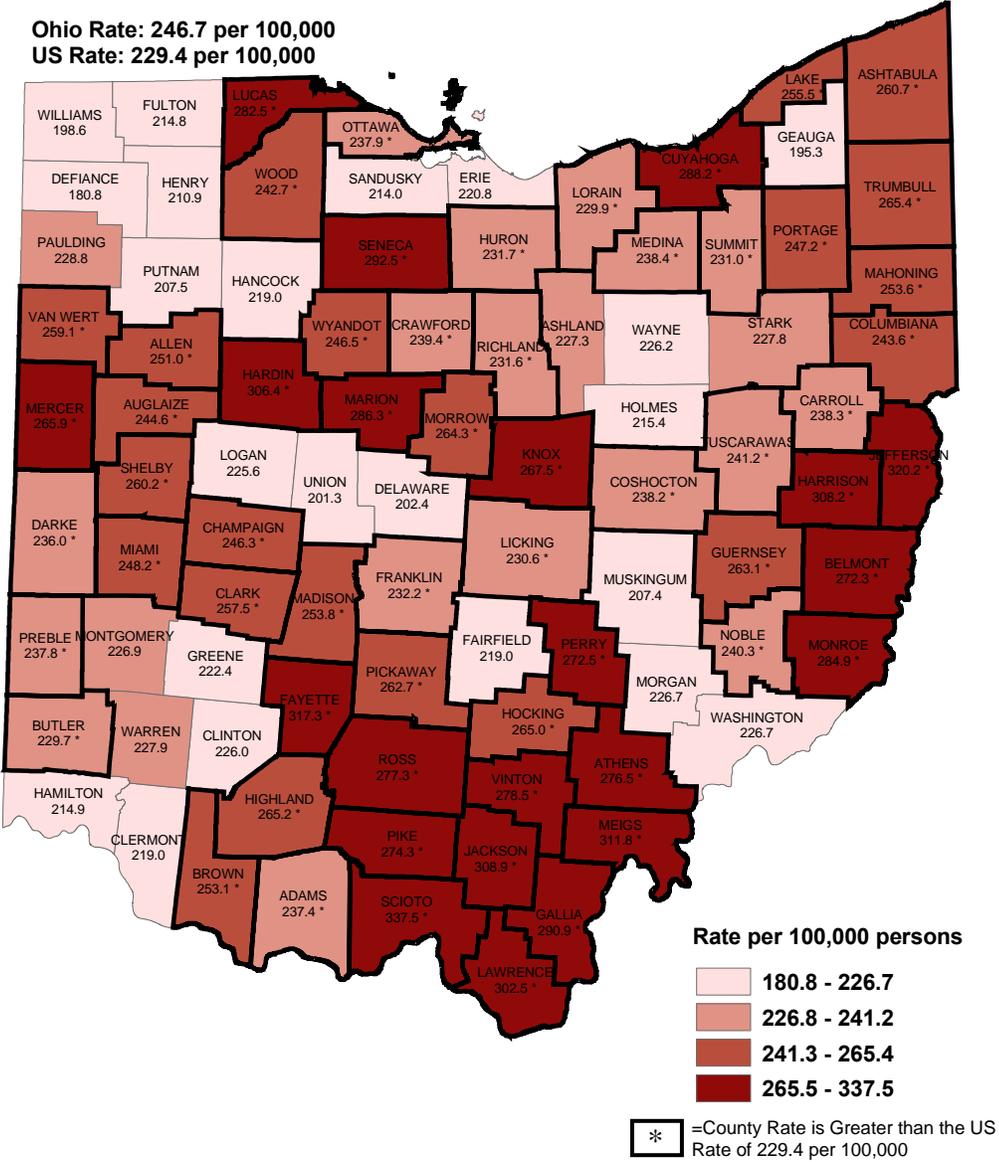
More often, black Ohioans die prematurely from heart disease, compared with white Ohioans. Forty-two percent of black males died of heart disease before age 65, and 64 percent died before age 75. In comparison, 24 percent of white males died before age 65 and 42 percent before age 75. A similar trend was observed for black females where 27 percent died before age 65 and 44 percent died before age 75. By contrast, 9 percent of white females died before age 65 and 20 percent before age 75 (Table 4-1).

Black males had the highest years of potential life lost (YPLL) rate from heart disease. The YPLL rate for black males (24.0 per 1,000) was nearly four times greater than the YPLL rate for white women. The YPLL rate for both white males and black females was more than double the YPLL for white women. The YPLL rate for black males was nearly four times that of the YPLL rate for white women (Table 4-1).

Rates by County

Between 2001 and 2005, the heart disease mortality rate for Ohio was 246.7 deaths per 100,000 persons. The mortality rate by county ranged from a low of 180.8 in Defiance County to a high of 337.5 deaths per 100,000 in Scioto County (Figure 4-5). Many of the highest mortality rates occurred in counties that are part of Ohio’s Appalachian region. The majority of Ohio’s counties (55) have a higher heart disease mortality rate than the US rate of 229.4 per 100,000 persons (Figure 4-5). In 2005, Ohio ranked 14th in heart disease mortality among the 50 states and the District of Columbia.

Figure 4-5. Average Annual Age-adjusted Mortality Rates per 100,000 Persons for Heart Disease by County, Ohio 2001-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics, Ohio Department of Health
¹The direct age-adjusted rates were calculated using the bridged race post-censal estimates for 2001-2005 (July 1) as the denominator and to the U.S. standard population for age adjustment.
²Heart disease deaths were defined as follows: ICD-10 codes I00-I09, I11, I113 and I20-I51.
³US rate was obtained from CDC Wonder at <http://wonder.cdc.gov/mortSQL.html>

III. Coronary Heart Disease Mortality

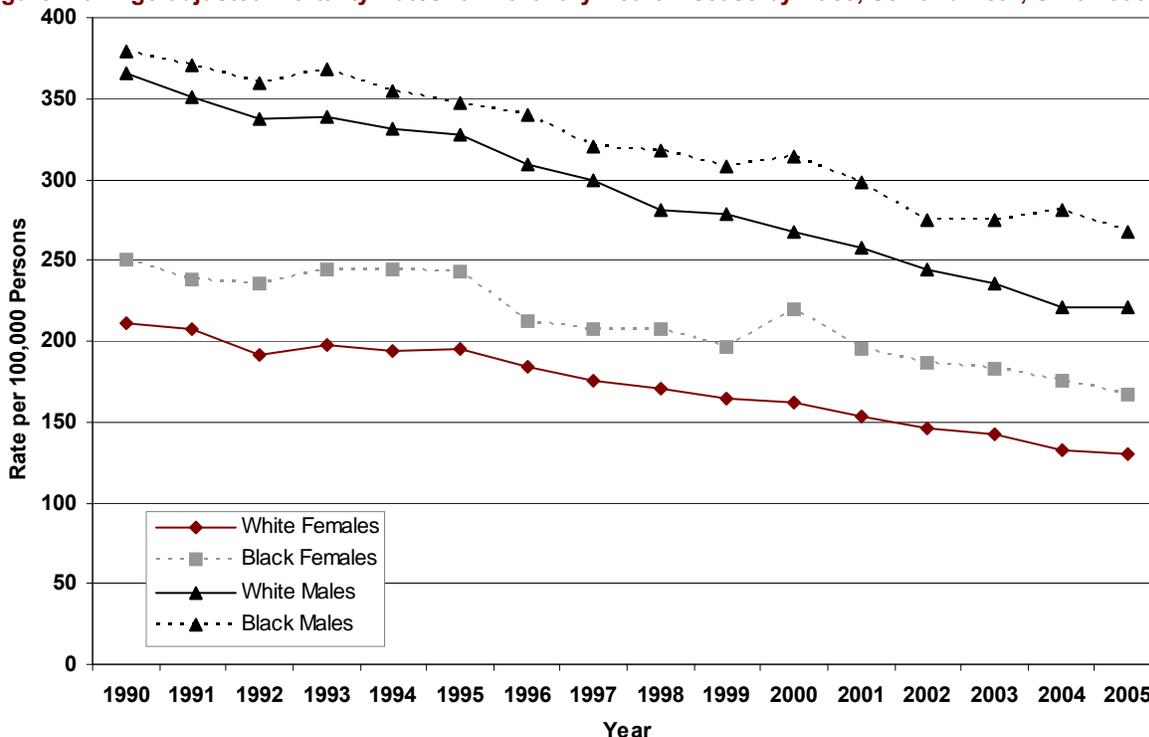
Race, Sex and Year

In 2005, more than 22,800 Ohioans died from coronary heart disease. This figure represented 71 percent of the total number of deaths due to heart disease.

Coronary heart disease mortality rates in Ohio differ by race/sex. The highest mortality rate was among black males, followed by white males, then black females. In 2005, the mortality rate for black males (267.0 deaths per 100,000 persons) was 60.0 percent higher, compared with black females (166.9 deaths per 100,000 persons). The rate for white males (221.2 deaths per 100,000 persons) was 69.2 percent higher, compared with white females (130.7 deaths per 100,000 persons) (Table C-2, Figure 4-6).

Nationally, CHD mortality rates have been declining since 1968. Studies indicate that 47 percent of the decrease in CHD deaths was attributed to treatments and medical interventions. Approximately 44 percent are attributed to reduction in risk factors including lowering of total cholesterol, lowering of systolic blood pressure, decreased smoking prevalence and an increase in physical activity.¹ However, these improvements in risk factors were partially offset by increases in obesity and diabetes.¹ Between 1990 and 2005, Ohio mortality rates from coronary heart disease for all racial/sex groups declined. White males observed the greatest decline in mortality (39.4 percent), followed by white females (38.3 percent), black females (33.4 percent) and black males (29.6 percent) (Figure 4-6).

Figure 4-6 . Age-adjusted Mortality Rates for Coronary Heart Disease by Race, Sex and Year, Ohio 1990-2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

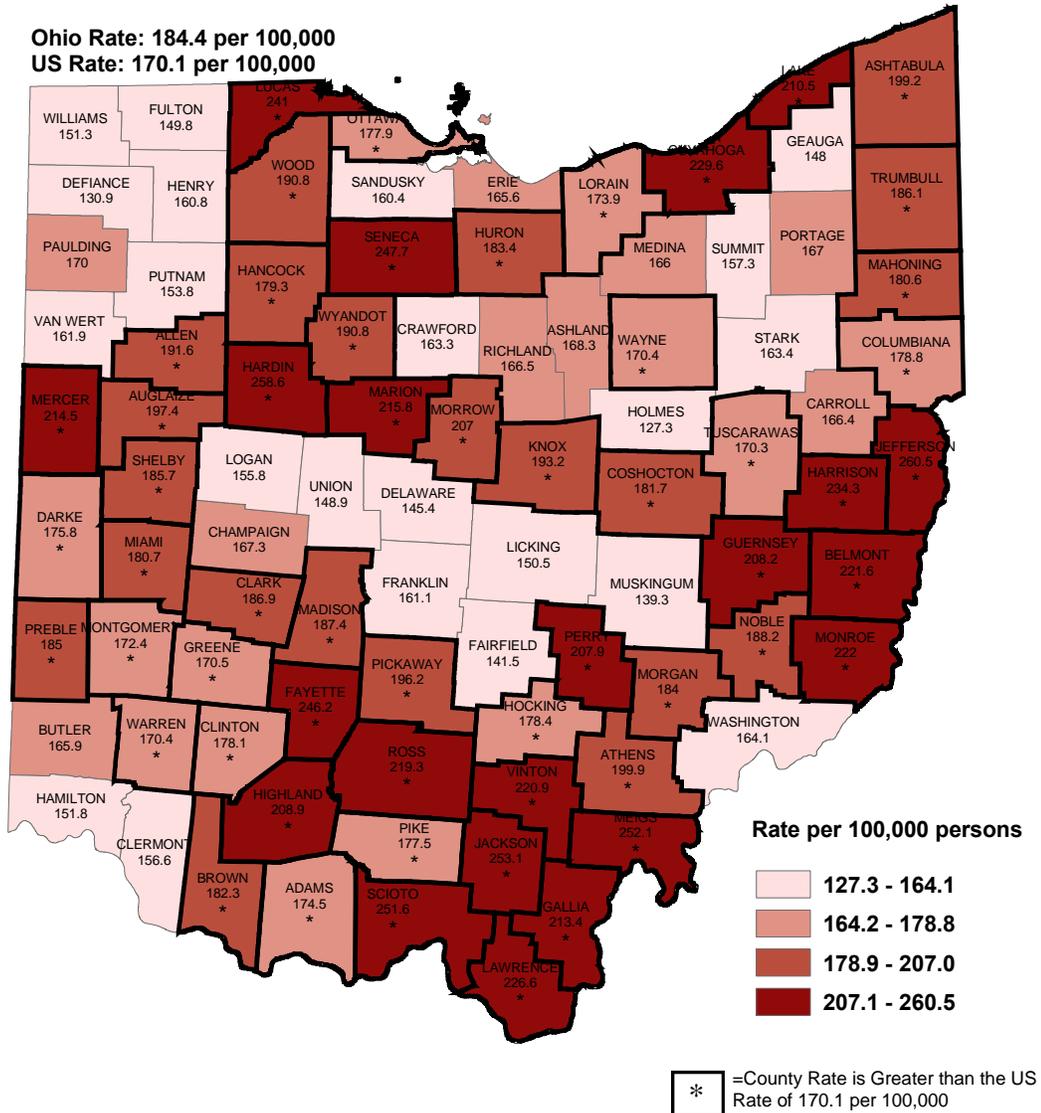
¹The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July 1) bridged race censal estimates for 2000 (April 1) and post-censal bridged race estimates for 2001-2005 (July 1), as a denominator and to the U.S. 2000 standard population for age adjustment.

²Heart Disease defined as ICD-9 codes: 402, 410-414, 429.2 for 1990-1998 deaths and ICD-10 codes I11, I20-I25 for 1999-2005 deaths.

Rates by County

For the period 2001-2005, the CHD mortality rate for Ohio was 184.4 deaths per 100,000 persons. The mortality rates by county ranged from a low of 127.3 in Holmes County to a high of 260.5 deaths per 100,000 in Jefferson County (Figure 4-7). The majority of Ohio's counties (57) had CHD mortality rates higher than the US mortality rate (Figure 4-7). In 2005, Ohio ranked 10th in CHD mortality among the 50 states and the District of Columbia.

Figure 4-7. Average Annual Age-adjusted Mortality Rates 100,000 Persons for Coronary Heart Disease by County, Ohio 2001-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics, Ohio Department of Health
¹The direct age-adjusted rates were calculated using the bridged race post-censal estimates for 2001-2005 (July 1) as the denominator and to the U.S. standard population for age adjustment.
² Coronary heart disease deaths were defined as follows: ICD-10 codes I11 and I20-I25.
³US rates were obtained from CDC Wonder at <http://wonder.cdc.gov/mortSQL.html>

IV. Myocardial Infarction Mortality

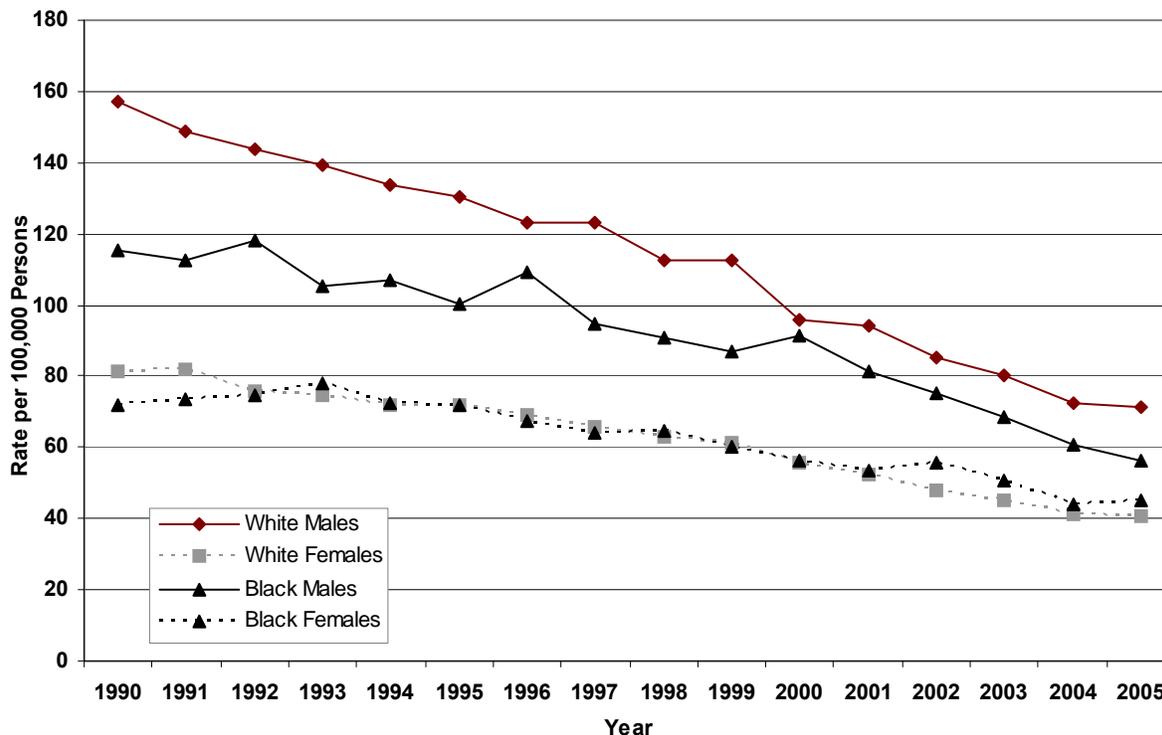
Race, Sex and Year

As with coronary heart disease, white males and black males have a greater risk of dying from myocardial infarction (MI), compared with black and white females. In 2005, white males had the highest MI mortality rate (71.1 deaths per 100,000) followed by black males (56.5 deaths per 100,000), compared with black and white females (45 and 40.5 deaths per 100,000, respectively) (Table C-3, Figure 4-8). White males had the highest MI mortality rates of all racial-sex groups. In 2005, the mortality rate for white males was 76 percent higher, compared with white females, who had the lowest mortality rates.

Between 1990 and 2005, MI mortality rates for all racial/sex groups declined dramatically. The mortality rate for white males declined by 55 percent (156.9 to 71.1 deaths per 100,000 persons); the mortality rate for black males declined by 51 percent (115.6 to 56.5 deaths per 100,000 persons); and the mortality rate for white females declined by 50 percent (81.1 to deaths 40.5 per 100,000 persons). Black females observed the smallest decline of 37 percent from 71.9 to 45 deaths per 100,000 persons.

Although mortality rates have declined significantly, 6,758 Ohioans died from myocardial infarction in 2005.

Figure 4-8. Age-adjusted Mortality Rates for Myocardial Infarction by Race, Sex and Year, Ohio 1990-2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

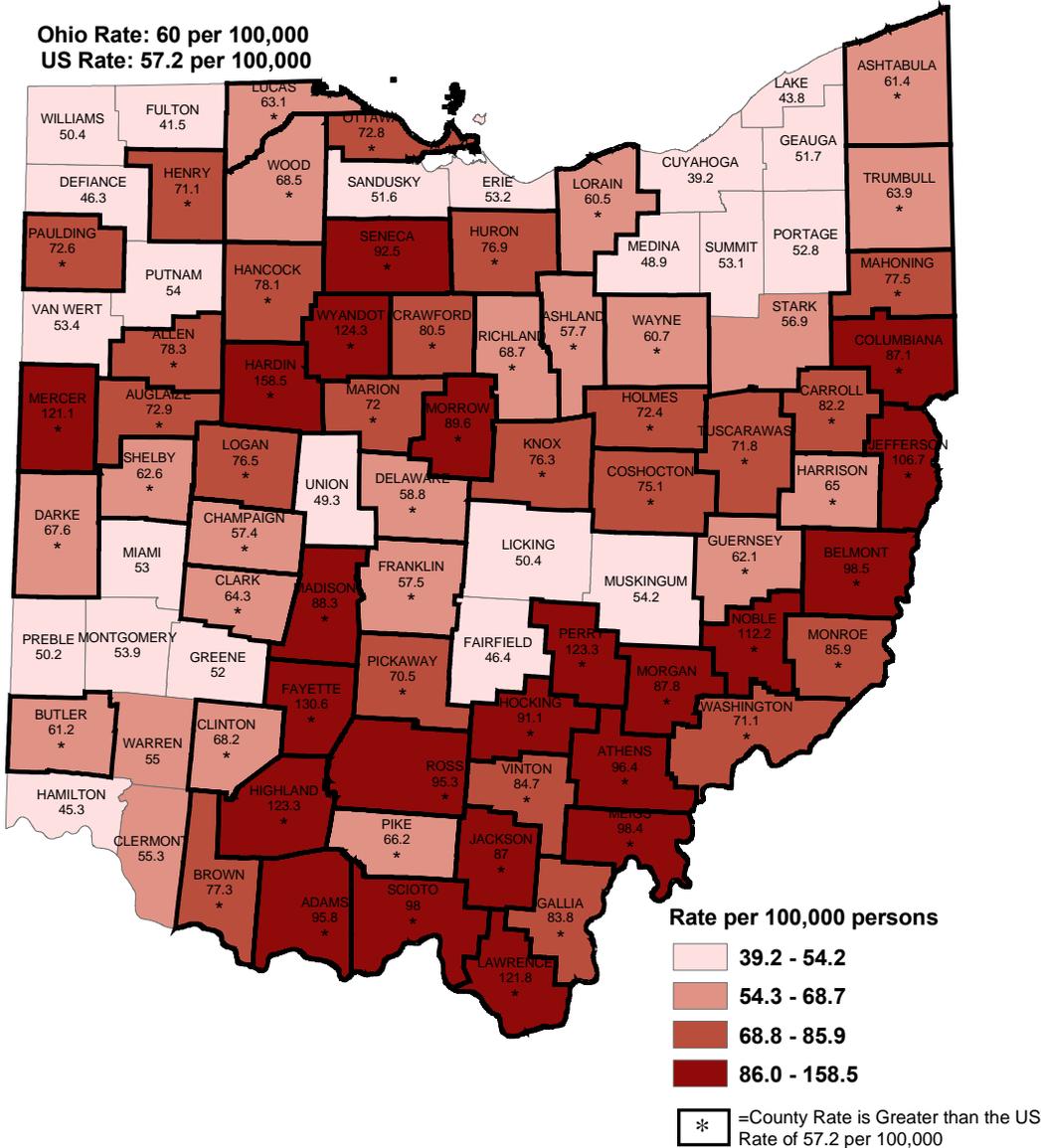
¹The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July 1) bridged race census estimates for 2000 (April 1) and post-censal bridged race estimates for 2001-2005 (July 1), as a denominator and to the U.S. 2000 standard population for age-adjustment.

²Myocardial Infarction was defined as ICD-9 code: 410 for 1990-1998 deaths and ICD-10 codes I21-I22 for 1999-2005 deaths.

Rates by County

In 2001-2005, the MI mortality rate for Ohio was 60.0 deaths per 100,000 persons. The mortality rate by county ranged from a low of 39.2 in Cuyahoga County to a high 158.5 deaths per 100,000 persons in Hardin County. Many counties with the highest MI mortality rates were located in Ohio’s Appalachian region. More than 70 percent of Ohio’s Counties (63) have higher MI mortality rates than the U.S. mortality rate for MI (Figure 4-9). In 2005, Ohio ranked 19th highest in MI mortality among the 50 states and the District of Columbia.

Figure 4-9. Average Annual Age-adjusted Mortality Rates 100,000 Persons for Myocardial Infarction by County, Ohio 2001-2005.^{1,2,3}



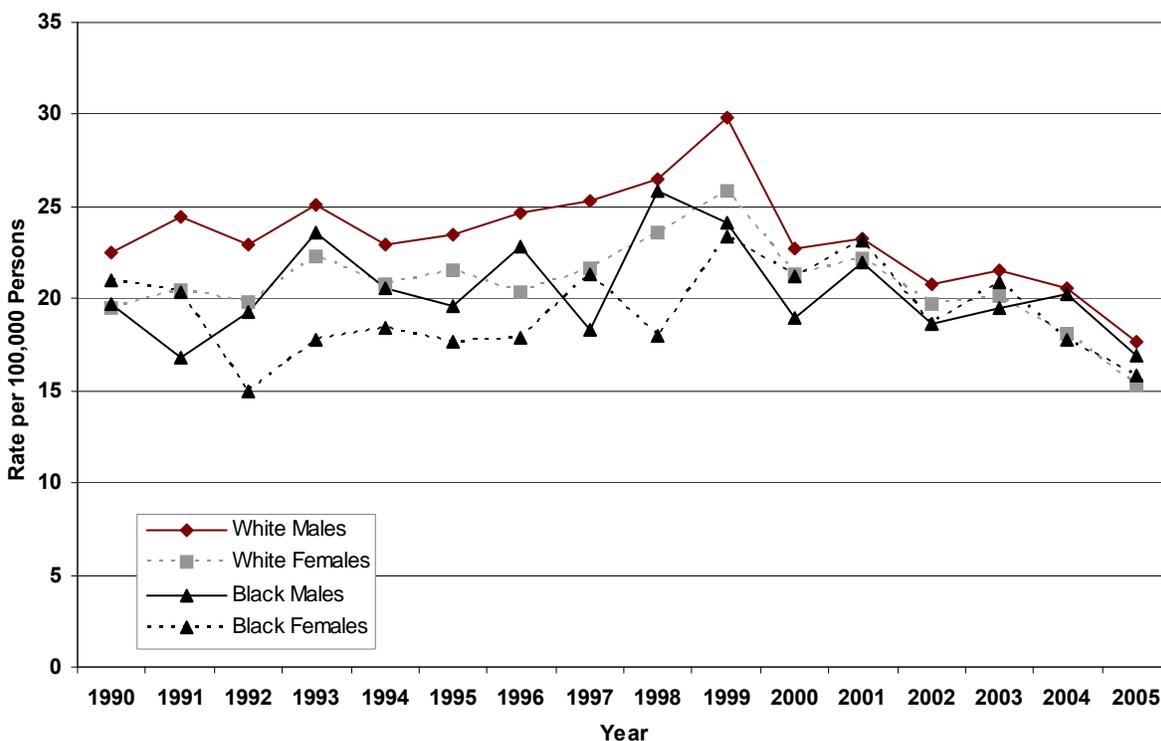
Source: Center for Public Health Statistics and Informatics, Ohio Department of Health
 1 The direct age-adjusted rates were calculated using the bridged race post-censal estimates for 2001-2005 (July 1, 2007) as the denominator and to the U.S. standard population for age adjustment.
 2 Myocardial deaths were defined as follows: ICD-10 codes I21-I22.
 3 US rates were obtained from CDC Wonder at <http://wonder.cdc.gov/mortSQL.html>

V. Heart Failure Mortality

Race, Sex and Year

Heart failure (HF) is the end stage of cardiovascular disease. In 2005, 2,076 Ohioans had heart failure listed as the underlying cause of death on their death certificate. Between 1990 and 2005, white males had slightly higher HF mortality rates, compared with black males and females and white females. Beginning in 2003, HF mortality appeared to decrease for all racial-sex groups (Figure 4-10).

Figure 4-10. Age-adjusted Mortality Rates for Heart Failure by Race, Sex and Year, Ohio 1990-2005.^{1,2}



Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

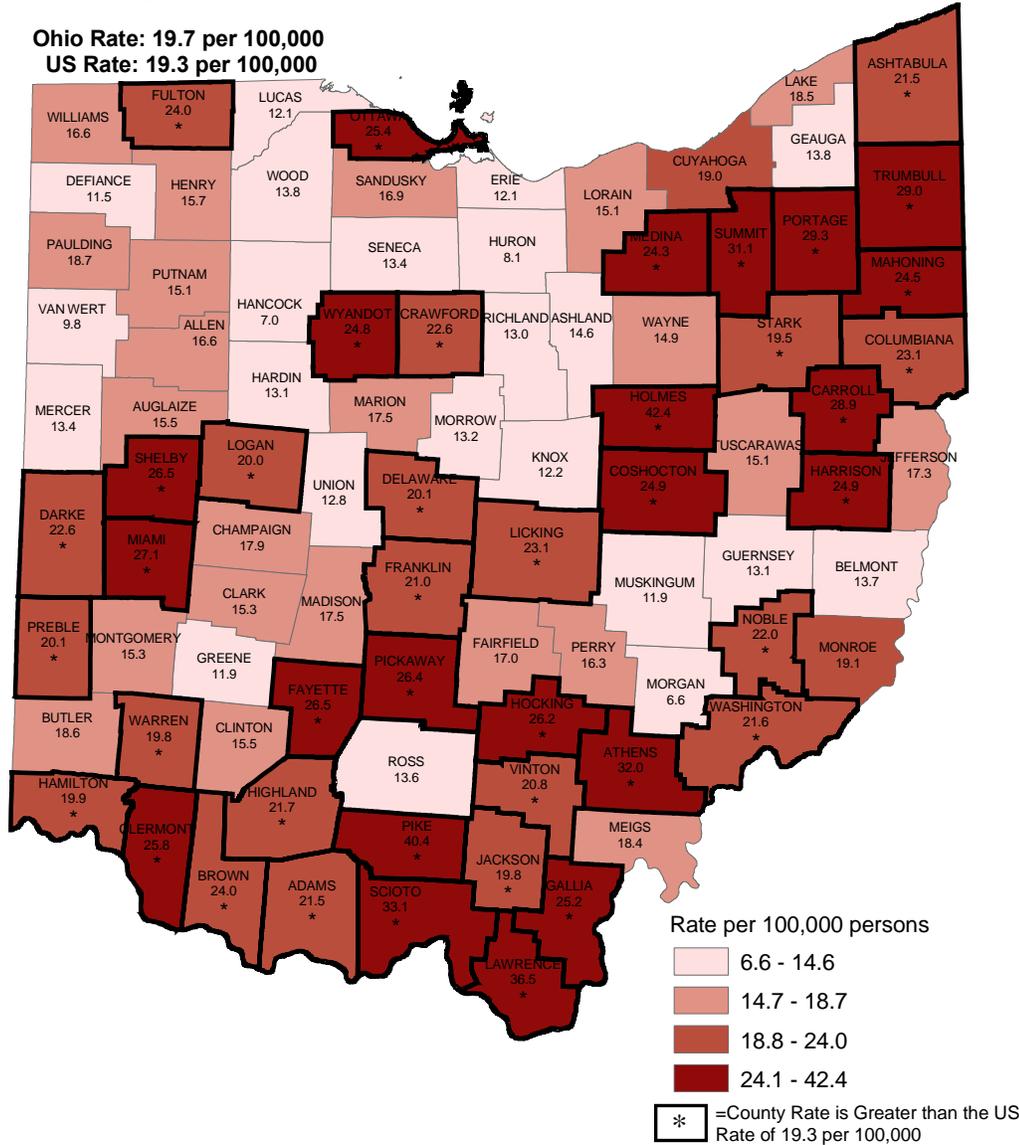
1 The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July 1) bridged race censal estimates 2000 (April 1) and post-censal bridged race estimates for 2001-2005 (July 1, 2007), as a denominator and to the U.S. 2000 standard population for age adjustment.

2 Heart failure was defined as: ICD-9 code: 428 for 1990-1998 deaths and ICD-10 codes: I50 for 1999-2005 deaths.

Rates By County

Between 2001 and 2005, the HF mortality rate for Ohio was 19.7 deaths per 100,000 persons. The mortality rate by county ranged from a low of 6.6 in Morgan County to a high of 42.4 deaths per 100,000 persons in Holmes County. Many counties with the highest HF mortality rates were located in the south central and northeast regions of the state (Figure 4-11). Nearly half (40) of Ohio’s 88 counties had HF mortality rates higher than the U.S. HF mortality rate (Figure 4-11). In 2005, Ohio ranked 34th highest in HF mortality among the 50 states and the District of Columbia.

Figure 4-11. Average Annual Age-adjusted Mortality Rates per 100,000 Persons for Heart Failure by County, Ohio 2001-2005.^{1,2,3}



Source: Center for Public Health Statistics and Informatics, Ohio Department of Health
 1 The direct age-adjusted rates were calculated using the bridged race census estimates for 2000 (April 1), and the bridged race post-censal estimates for 2001-2005 (July 1, 2007) as the denominator and to the U.S. standard population for age adjustment.
 2 Heart failure deaths were defined as follows: ICD-10 codes I50.
 3 US rates were obtained from CDC Wonder at <http://wonder.cdc.gov/mortSQL.html>

References

1. Rosamond R., Flegal K., Furie K., Go A., Greenlund K., Haase N., et al. (2008). Heart Disease and Stroke Statistics--2008 Update. *Circulation* (117), e25-e149.
2. Centers for Disease Control and Prevention (n.d.). *Heart disease risk factors*. Retrieved October 8, 2008 from http://www.cdc.gov/heartdisease/risk_factors.htm
3. Centers for Disease Control and Prevention. (n.d.). *About high blood pressure*. Retrieved October 8, 2008 from <http://www.cdc.gov/bloodpressure/about/htm>
4. Reeves, M.J., McGee, H., Rafferty, A.P., Remington P., Cautley E.,(1997). Prevalence of Aspirin Use to Prevent Heart Disease--Wisconsin, 1991, and Michigan, 1994. *Morbidity and Mortality Weekly Report* , 46 (22), 498-502.
5. Thomas, R.J., King, M., Lui, K., Oldridge, N., Pina, I., Spertus, J., (2007). AACVPR/ACC/AHA 2007 Performance Measures on Cardiac Rehabilitation for Referral to and Delivery of Cardiac Rehabilitation/secondary Prevention Services. *Circulation*, 116, 1611-1642. Retrieved April 28, 2009 from <http://circ.ahajournals.org/cgi/reprint/116/14/1611>
6. Moyer, P.,Ornato, J., Brady, W., Leslie, Davis, L., Ghaemmaghami, C., Gibler, B., et al. (2007, July 10). Development of System of Care for ST-Elevation Myocardial Infarction Patients; The Emergency Medical Services and Emergency Department Perspective. *Circulation* , e42-e48.
7. Hutchings, C. Mann, C., Daya, M., Jui, J., Goldberg, R., Cooper, L., et al. (2004). Patients with Chest Pain Calling 9-1-1 or Self Transporting to Reach Definitive Care: Which Mode is Quicker? *American Heart Journal* , 147 (1), 35-41.
8. Centers for Disease Control and Prevention. (n.d.). *Heart Disease Signs and Symptoms*. Retrieved October 8, 2008 from http://www.cdc.gov/heartdisease/signs_symptoms.htm
9. National Emergency Number Association. (n.d.). *9-1-1 Fast Facts*. Retrieved December 9, 2008 from <http://nena.org/pages/Content.asp?CID=144&CTID=22>
10. Public Utilities Commission of Ohio (2009). Ohio Wireless Enhanced 9-1-1 Retrieved May 19, 2009 from <http://www.puc.state.oh.us/pucogis/E911Wireless.pdf>
11. American Heart Association. (n.d.). *Cardiac Arrest*. Retrieved December 9, 2008 from http://www.americanheart.org/print_presenter.jhtml?identifier=4481
12. American Heart Association. (n.d.). *Heart Damage Detection*. Retrieved July 24, 2008 from <http://www.americanheart.org/presenter.jhtml?identifier=4620>
13. Garvey, J.L, MacLeod B., Sopko G. & Hand, M. (2006). Pre-Hospital 12-Lead Electrocardiography Programs- A call for Implementation by Emergency Medical Services Systems Providing Advance Life Support--National Heart Attack Alert Program Coordinating Committee; National Heart, Lung, and Blood Institute; NIH. *Journal of the American College of Cardiology*, 47 (3), 485-491.

14. United States Department of Health and Human Services. (n.d.). *Hospital Compare*. Retrieved July 9, 2008 from Medicare.gov: <http://www.hospitalcompare.hhs.gov/Hospital/Static/About-HospQuality.asp?dest=NAV>

Appendix A. Description of Databases

The findings presented in this report were obtained from the following data sources and were analyzed by the Center for Public Health Statistics and Informatics at the Ohio Department of Health.

Behavioral Risk Factor Surveillance System (BRFSS):

The BRFSS is an ongoing, population-based, statewide, random-digit-dialed telephone survey of adults 18 years of age and older for the U.S. non-institutionalized civilian population. The survey is coordinated by the Centers for Disease Control and Prevention (CDC) and is conducted annually by all states.¹ Ohio BRFSS data collected for the years 1997 through 2006 were analyzed for this report.

The BRFSS provides an estimate of prevalence; however, it has limitations: 1) the BRFSS only measures prevalence, not incidence, 2) it only surveys the non-institutionalized population (i.e. residents of nursing homes and prisons are not included), 3) only people capable of answering a telephone survey are able to participate (i.e. those with a disability which prevent phone use would not be included), 4) it is self-reported information; 5) it only surveys people with a landline phone, and 6) it only includes adults age 18 and older. Therefore, it most likely is an underestimation of the number of people who have had a heart attack or CHD or participated in cardiac rehabilitation.

A person was considered to have had a myocardial infarction if they answered “yes” to the question: “Has a doctor, nurse or other health professional ever told you that you had a myocardial infarction, more commonly known as a heart attack?” A person was considered to have coronary heart disease if they answered “yes” to the question: “Has a doctor, nurse or other health professional ever told you that you had coronary heart disease or angina?”

The following BRFSS variables were analyzed: age, sex, race, fruit and vegetable consumption, high cholesterol, high blood pressure, physical activity, cigarette smoking, body mass index (BMI) and diabetes. The results of the two modules for cardiovascular health and heart attack and stroke symptom awareness were also presented. These variables included prevention of stroke and heart attack through reduction of risk factors (increased fruit and vegetable consumption, reduction in high-fat and high-cholesterol foods and increased physical activity). Also, the frequency of a doctor advising the person to take action to reduce risk factors was analyzed. Heart attack symptom awareness was measured by the respondent answering “yes” to the following questions: 1) “Which of the following do you think is a symptom of a heart attack. For each, tell me Yes, No or Not Sure.”

- a. “Do you think pain or discomfort in the jaw, neck, or back [are symptoms of a heart attack]?”
- b. “Do you think feeling weak, lightheaded, or faint [are symptoms of a heart attack]?”
- c. “Do you think chest pain or discomfort [are symptoms for a heart attack] ?”
- d. “Do you think pain or discomfort in the arms or shoulder [are symptoms of a heart attack]?”
- e. “Do you think shortness of breath [is a symptom of a heart attack]?”

The response of calling 911 to someone having a heart attack or stroke was measured by

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answering “call 911” to the following question: “If you thought someone was having a heart attack or a stroke, what is the first thing you would do?”

- a. “Take them to the hospital.”
- b. “Tell them to call their doctor.”
- c. “Call 911.”
- d. “Call their spouse or a family member.”
- e. “Do something else.”
- f. “Don’t know/Not sure.”
- g. “Refused.”

The prevalence estimates were adjusted to: 1) probability of selection, i.e. the number of different phone numbers that reach the household, the number of adults in each household and the number of completed interviews in each cluster; and 2) demographic distribution, i.e. age, sex and race. The “Don’t know/Not sure” respondents were excluded from the analysis except for questions measuring knowledge of heart attack symptoms and response to someone having a heart attack or stroke. The respondents who “Refused” to answer were excluded from all analyses. All analyses were completed using SAS version 9 (SAS Institute, Cary, N.C.) and SUDAAN version 9 (Research Triangle Institute, Research Triangle Park, N.C.).

Ohio Family Health Survey 2004

The 2004 Ohio Family Health Survey was conducted to collect data on health insurance coverage, health status, health risk behaviors, access to care, health care utilization, health care costs, satisfaction with care and unmet health needs. The survey was a joint effort between Ohio Department of Health, the Ohio Department of Job and Family Services and other partner agencies. The survey was conducted from October 2003 through August 2004, and the survey obtained a sample size consisting of 39,953 Ohio adults.²

The survey is a stratified sample of the community-dwelling population of Ohio. Therefore the sample frame does not include persons whose residence includes institutional settings such as nursing homes, military bases or college dorms.²

Adults were considered to have cardiovascular disease if they answered “yes” to the following question, “Have you ever been told by a doctor or any other health care professional that you had coronary artery disease, congestive heart disease, angina, a stroke, a heart attack, or any other kind of heart condition or circulatory problem?”

Emergency Medical Services Incident Reporting System

The suspected cardiovascular/circulatory EMS transport data were obtained from the Emergency Medical Services Incident Reporting System (EMSIRS) at the Ohio Department of Public Safety (ODPS). Cardiovascular/Circulatory transports for 2005 were defined by the following provider assessment codes:

- 1) Angina pectoris 0301
- 2) Aortic Aneurysm 0302
- 3) Congestive Heart Failure 0303
- 4) Dysrhythmia 0304
- 5) Hypertension 0305
- 6) Myocardial Infarction 0307
- 7) Chest Pain/Discomfort 0309³

This definition was used under advisement of the Ohio EMS. The provider assessment is defined as the single clinical assessment that primarily drive the actions of the EMS responder.³ The majority of the transports were categorized as chest pain. Cardiac Arrest was defined as provider assessment code 1801. The variables analyzed were sex, age, county of transport (where the event occurred, not the individual's county of residence), transport time of dispatch to the scene, transport time from scene to the hospital and total transport time (including time spent at the scene) in minutes. All analysis was completed by the EMS Data Center, ODPS.

Ohio Hospital Discharge Data

The hospital discharge data were collected and provided to the Center for Public Health Statistics and Informatics at Ohio Department of Health by the Ohio Hospital Association. Data collected between 1999–2003 were analyzed for this report. Heart disease was defined by the range of ICD-9-CM Codes listed in Table A-1.

Table A-1. International Classification of Disease Heart Disease Codes		
Disease ICD-10		ICD-9
Heart Disease	I00-I09, I11, I13, I20-I51	390-398, 402, 404, 410-429
Myocardial Infarction	I21-I22	410
Coronary Heart Disease	I11, I20-I25	402, 410-414, 429.2
Heart Failure	I50	428
Hypertension	N/A	401-404

Hospital discharges with heart disease listed in any of the 15 diagnosis code fields and hospital discharges with heart disease listed in the principal diagnosis field were analyzed. Hospital discharges with invalid birthdates, ages, unknown sex and lengths of stay more than 365 days were excluded from analysis. All analyses were performed using SAS version 9 (SAS Institute, Cary, N.C.). The variables analyzed included length of stay (days), age, sex, county of residence, charges (dollars) and primary payor.

To calculate the number of discharges with a cardiac surgical procedure listed, hospital discharges with any listed diagnosis of Disease of the Circulatory System ICD-9-CM codes 390-459 in the diagnosis code field and a surgical procedure codes shown in Table A-2 listed in any of the six procedure code fields were analyzed.

Table A-2. International Classification of Disease Surgical Procedure Codes	
Procedure	ICD-9 Procedure Code
Angioplasty	36.0
PCI	36.01, 36.02, 36.05, 36.06, 36.07
Cardiac Revascularization (bypass)	36.1-36.3
Implantable Defibrillators	37.94-37.99
Open Heart Surgery	Codes 35 [less 35.4, 35.96], 36[less 36.0], 37.1, 37.3-37.5
Pacemakers	37.8
Diagnostic Cardiac Catheterization	37.2
All Cardiac Procedures	35-39

Two different methods were used to calculate hospital discharge rates. In the first method, rates were calculated by using the estimate for Ohio’s resident population as the denominator (crude rate). In the second method, rates were calculated and age-adjusted using the direct method to the U.S. 2000 standard population. Both rates were calculated as the number of hospital discharges per 10,000 persons. The Ohio resident population was obtained from the U.S. Census Bureau using the intercensal 1999, censal 2000 population estimates and the 2001-2003 intercensal population estimates.

Ohio Medicare Program

The Medicare heart disease hospital discharge data were provided from Ohio KePRO, the Medicare Quality Improvement Organization (QIO) for Ohio. The data provided included hospital claims from the period January 2000 through December 2005. The ICD-9 codes listed in Table A-1 (p. 111) were used to define each disease. Hospital inpatient claims with one of the ICD-9 codes listed as any diagnosis in the record were analyzed.

Mortality

All deaths between 1990 through 2005 (numerator) were identified through the population-based, computerized database maintained by the Office of Vital Statistics, Ohio Department of Health. Any person who had heart disease listed on their death certificate as an underlying cause of death was included in the analysis. Table A-1 defines the ICD codes for each type of heart disease. For deaths, the underlying causes of death were classified by the International Classification of Diseases. The tenth revision (ICD-10) was used for deaths from 1999-2005. For death 1990-1998, ICD codes from the ninth revision were used (ICD-9).^{4,5}

The Ohio intercensal estimates for 1990-1999 (July 1), bridged race census estimates for 2000 (April 1) and the bridged race post-censal estimates for 2001-2005 (July 1) from the U.S. Bureau of Census were used as the denominator.

Two methods of calculating mortality rates were used. Direct age-adjusted mortality rates were calculated for different race and sex groups (white male, black male, white female, black female and all) for all 16 years from 1990–2005. Average annual direct age-adjusted rates were calculated for Ohio’s 88 counties for the five-year period, 2001-2005. Because some Ohio counties had a relatively small number of residents, and thus a small number of heart

disease deaths, five years of data were combined to obtain a sufficiently large sample for analysis. Both rates were age-adjusted using the U.S. 2000 standard population and calculated per 100,000 persons.

The U.S. heart disease mortality rates were retrieved from CDC Wonder <http://wonder.cdc.gov/cmfi-icd10.html>.

References for Description of Databases

1. Centers for Disease Control and Prevention (n.d.). Behavioral Risk Factor Surveillance Survey. Retrieved May 20, 2009 from <http://www.cdc.gov/brfss/about.htm>
2. Ohio Emergency Medical Services. Emergency Medical Services Incident Reporting System Version 2.2 (EMSIRS-2) Data Dictionary. Retrieved May 20, 2009 from http://www.ems.ohio.gov/Datacenter/EMSIRS_2/EMSIRS%20v2.2%20Data%20Dictionary%202007.pdf
3. Ohio Department of Job and Family Services (n.d.). Family Health Survey. Retrieved May 20, 2009 from <http://jfs.ohio.gov/ohp/reports/FamHlthSurv.stm>
4. Centers for Disease Control and Prevention (n.d.). International Classification of Disease-9. Retrieved May 20, 2009 from <http://www.cdc.gov/nchs/about/major/dvs/icd9des.htm>
5. World Health Organization (2007). International Classification of Diseases-10. Retrieved May 20, 2009 from <http://apps.who.int/classifications/apps/icd/icd10online/>

Appendix B. Glossary of Terms

Age-adjusted rates: Age-adjustment is a statistical process applied to rates of disease, death, injuries or other health outcomes that allows communities with different age structures to be compared.

Any listed diagnosis of heart disease: Refers to a diagnosis of heart disease listed in any one of the available diagnosis fields of the hospital record.

Acute myocardial infarction: *Also referred to as a heart attack.* An acute event in which the heart muscle is damaged because of a lack of blood flow from the coronary arteries, typically accompanied by chest pain and other warning signs, but sometimes occurring without recognized symptoms (i.e., “silent heart attack”).

Appalachian region: A region of United States spanning along the Appalachian Mountains from southern New York to northern Mississippi designated as Appalachian by the U.S. Congress in the Appalachian Regional Development Act of 1965. For the purposes of this report, the following 29 Ohio Counties were defined as the Ohio Appalachian region: Adams, Athens, Belmont, Brown, Carroll, Clermont, Columbiana, Coshocton, Gallia, Guernsey, Harrison, Highland, Hocking, Holmes, Jackson, Jefferson, Lawrence, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Ross, Scioto, Tuscarawas, Vinton and Washington.

Blood cholesterol: The blood concentration of a family of lipid or “fatty” molecular compounds obtained directly from the diet or produced in the body from fatty dietary components. Subtypes of cholesterol differ in their relation to cardiovascular disease risk; high-density lipoprotein (HDL) cholesterol is considered “good” and low-density cholesterol (LDL) is considered “bad.”

Blood pressure: The force or pressure exerted by the heart in pumping blood; the pressure of blood in the arteries.

Body mass index (BMI): A measurement of weight in relation to height. It is calculated as weight (in kilograms), divided by the square of height (in meters). It correlates highly with body fat in most people. A BMI of less than 25 is considered normal, 25-29 is overweight and 30 or greater is obese.

Cardiovascular disease (CVD): May refer to any of the disorders that can affect the circulatory system, but often means coronary heart disease (CHD), heart failure and stroke, taken together.

Cardiovascular health (CVH): A combination of favorable health habits and conditions that protects against the development of cardiovascular diseases.

Cholesterol: A waxy, fat-like substance found in the bloodstream and produced in the liver.

Heart failure (HF): impairment of the pumping function of the heart as the result of heart disease; heart failure causes physical disability and increased risk for other CVD events.

Comorbidity: The condition of having two or more diseases at the same time.

Coronary heart disease (CHD): heart disease caused by impaired circulation in one or more coronary arteries; often manifests as chest pain or heart attack.

Diabetes (or diabetes mellitus): A metabolic disorder resulting from insufficient production or utilization of insulin. Cardiovascular disease is a common complication.

Direct costs: Costs associated with an illness that can be attributed to a medical service, procedure, medication, etc. such as X-ray examination, pharmaceutical drugs, surgery or a clinic visit.

Emergency care: Treatment for people who have experienced a first or recurrent acute cardiovascular disease event (e.g., heart attack, heart failure, stroke) designed to increase their probability of survival and to minimize associated damage or disability.

Emergency Medical Services (EMS): The prehospital medical stabilization, triage and transportation of persons who are sick, injured, wounded or otherwise incapacitated or helpless by any person who is in that service or regularly provides that service.

Electrocardiogram (ECG or EKG): a test that measures the electrical activity of the heart beat. Each time the heart beats, an electrical impulse (or wave) travels through the heart. A normal heartbeat on the ECG will show the timing of the top and lower chambers.

End-stage renal disease (ESRD): The final phase of kidney disease; treated by dialysis or kidney transplantation.

Health disparities: Differences in the burden and impact of disease among different populations defined, for example, by sex, race or ethnicity, education, income, disability, place of residence or sexual orientation.

Heart attack (also referred to as myocardial infarction): An acute event in which the heart muscle is damaged because of a lack of blood flow from the coronary arteries, typically accompanied by chest pain and other warning signs, but sometimes occurring without recognized symptoms (i.e., “silent heart attack”).

Heart disease: Any affliction that impairs the structure or function of the heart (e.g. atherosclerotic and hypertensive diseases, congenital heart disease, rheumatic heart disease, cardiomyopathies).

High blood pressure (also referred as hypertension): A chronic condition in which the pressure in the arterial circulation is greater than desired and associated with increased risk for heart disease, stroke, chronic kidney disease and other conditions. Blood pressure is considered “high” if systolic pressure (measured at the peak of contraction of the heart) is ≥ 140 mm Hg or if diastolic pressure (measured at the fullest relaxation of the heart) is ≥ 90 mm Hg.

Incidence: The number of new cases of disease occurring in a population of given size within a specified time interval.

Indirect costs: Costs associated with an illness that occurs because an individual or family members cannot work at their usual job because of premature death, sickness or disability.

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Medicaid: A program that provides health care services for eligible individuals and families with low incomes and resources. Although the federal government establishes general guidelines for the program, the Medicaid program requirements are established by each state. Whether a person can be eligible for Medicaid will depend on the state where they live. Each state administers its own Medicaid program.

Medicare: A social program enacted in 1965 that is financed by a combination of payroll taxes from workers and their employers, beneficiary premium payments and general federal revenues. The program provides health insurance to people age 65 and older, those who have permanent kidney failure requiring dialysis or transplant and certain individuals under 65 with disabilities.

Morbidity: Disease; any departure, subjective or objective, from a state of physiological or psychological health and well-being.

Mortality rate: Rate of death expressed as the number of deaths occurring in a population of a given size within a specified time interval.

Obesity: A condition characterized by excessive body fat. Usually defined as a body mass index of 30 or higher.

Plaque: A deposit of fatty (and other) substances in the inner lining of an artery wall characteristic of atherosclerosis.

Premature death: Death that occurs at an age earlier than the average life expectancy for the population.

Prevalence: The frequency of a particular condition within a defined population at a designated time.

Primary CVD Prevention: A set of interventions including the detection and control of risk factors, designed to prevent the first occurrence of heart attack, heart failure or stroke among people at risk for heart disease.

Principal diagnosis of heart disease: The condition established after study to be chiefly responsible for admitting the patient to the hospital for care. The principal diagnosis is submitted as the first of several possible diagnoses coded on the discharge record.

Rehabilitation: An intervention approach designed to limit disability among survivors of CVD events and reduce their risk for subsequent events.

Risk factor: An individual characteristic associated with increased frequency of specified health problems; for example, high LDL cholesterol, high blood pressure and diabetes are all associated with CVD.

Secondary CVD prevention: A set of interventions aimed at survivors of acute CVD events (e.g., heart attack, heart failure, stroke) or others with known CVD in which long-term case management is used to reduce disability and risk for subsequent CVD events.

Stroke: Sudden interruption of blood supply to the brain caused by an obstruction or rupture of a blood vessel. There are two types of stroke: ischemic and hemorrhagic.

Years of potential life lost (YPLL): A measure of the impact of premature death on a population. YPLL is calculated using a predetermined expected life span and is the sum of the differences between this age and the age at death for everyone who died early.

Glossary References

- American Heart Association (n.d.). *Electrocardiogram (EKG or ECG)*. Retrieved March 17, 2009, from http://www.americanheart.org/print_presenter.jhtml?identifier=3005172
- Appalachian Regional Commission (n.d) *The Appalachian Region*. Retrieved May 5, 2009, from <http://www.arc.gov/index.do?nodeId=2>
- Centers for Disease Control and Prevention. (2004). *Charting the course: State Heart Disease and Stroke Prevention Programs*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention.
- Centers for Disease Control and Prevention. (n.d.). *EXCITE*. Retrieved March 17, 2009, from <http://www.cdc.gov/excite/library/glossary.htm>
- Centers for Medicare and Medicaid Services. (n.d.). *Glossary*. Retrieved March 17, 2009, from <http://www.cms.hhs.gov/apps/glossary>
- National Cancer Institute.(n.d.). *Dictionary of cancer terms*. Retrieved June 30,2009 from http://www.cancer.gov/templates/db_alpha.aspx?expand=C
- National Institute of Diabetes and Digestive and Kidney Diseases. (1994). *The Diabetes Dictionary*. Baltimore: US Department of Health and Human Services.
- US Department of Health and Human Services. (2003). *A Public Health Action Plan to Prevent Heart Disease and Stroke*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention.
- Wayne Rosamond, P. F., Flegal, K., Furie, K., Go, A., Greenlund, K., Haase, N., et al. (2008). Heart Disease and Stroke Statistics--2008 Update. *Circulation* (117), e25-e149.

Appendix C. Additional State Mortality Data

Table C-1. Number of Deaths and Age-adjusted Mortality Rates of Heart Disease per 100,000 Persons, by Race, Sex and Year, Ohio 1990-2005.^{1,2,3}

Year	White				Black				All	
	Males		Females		Males		Females		Number of Deaths	Rate
	Number of Deaths	Rate								
1990	15,544	439.3	15,905	267.8	1,556	479.5	1,614	331.1	34,658	341.3
1991	15,572	431.2	16,222	266.9	1,541	464.6	1,574	315.3	34,955	337.3
1992	15,238	414.2	15,595	251.3	1,615	472.5	1,578	309.8	34,083	322.9
1993	15,589	418.8	16,488	260.6	1,627	478.5	1,697	324.4	35,451	330.4
1994	15,409	406.1	16,294	254.9	1,576	444.6	1,707	320.6	35,034	322.0
1995	15,566	407.0	16,655	257.0	1,646	455.3	1,727	314.7	35,668	323.4
1996	15,051	386.8	16,097	244.8	1,583	437.3	1,600	288.0	34,398	307.6
1997	15,006	381.1	15,916	239.1	1,586	424.6	1,630	287.2	34,201	302.1
1998	14,528	363.5	15,874	235.4	1,612	430.0	1,646	285.1	33,721	293.5
1999	14,713	365.4	16,149	236.8	1,616	418.8	1,647	279.7	34,199	294.3
2000	13,910	340.4	15,443	223.5	1,555	398.6	1,725	288.5	32,713	277.8
2001	13,844	332.2	15,128	216.4	1,559	390.6	1,665	273.7	32,265	270.3
2002	13,301	313.1	14,517	205.4	1,506	366.0	1,561	253.0	30,972	255.3
2003	13,194	304.6	14,322	199.5	1,510	356.6	1,595	252.6	30,695	248.5
2004	12,589	285.5	13,319	184.4	1,560	364.5	1,546	240.4	29,093	232.9
2005	12,684	282.6	13,230	180.2	1,507	344.4	1,496	227.2	28,995	228.2

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Heart Disease was defined as ICD-9 code: 390-398, 402, 404, 410-429 for 1990-1998 deaths and ICD-10 codes I00-I09, I11, I13, I20-I51 for 1999-2005 deaths.

²The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July1) bridged race censal estimates for 2000 (April 1) and post-censal bridged race estimates 2001-2005 (July 1, 2007), as a denominator and to U.S. 2000 standard population for age adjustment.

³All includes all additional races.

Table C-2. Number of Deaths and Age-adjusted Mortality Rates of Coronary Heart Disease per 100,000 Persons, by Race , Sex and Year, Ohio 1990-2005.^{1,2,3}

Year	White				Black				All	
	Males		Females		Males		Females		Number of Deaths	Rate
	Number of Deaths	Rate								
1990	13,012	365.5	12,588	211.7	1,218	379.4	1,216	250.5	28,064	276.0
1991	12,758	351.2	12,616	207.2	1,207	369.9	1,190	238.6	27,809	268.0
1992	12,488	337.4	11,934	192.0	1,224	359.0	1,197	235.5	26,891	254.4
1993	12,719	338.9	12,514	197.4	1,249	368.0	1,273	243.6	27,793	258.5
1994	12,641	331.0	12,428	194.1	1,237	354.0	1,289	243.6	27,630	253.6
1995	12,627	327.2	12,644	194.7	1,253	347.1	1,331	242.8	27,912	252.6
1996	12,116	309.7	12,086	183.6	1,219	339.6	1,180	212.8	26,651	238.1
1997	11,916	299.7	11,703	175.4	1,188	319.9	1,175	207.2	26,026	229.7
1998	11,319	280.6	11,497	170.2	1,185	318.0	1,189	207.4	25,235	219.4
1999	11,313	278.7	11,226	164.5	1,190	308.1	1,148	195.8	24,932	214.3
2000	10,980	266.9	11,252	162.5	1,211	313.9	1,312	219.9	24,814	210.6
2001	10,850	258.2	10,752	153.7	1,179	298.0	1,183	195.1	24,013	201.1
2002	10,418	243.6	10,366	146.5	1,128	274.9	1,151	186.9	23,129	190.6
2003	10,270	235.7	10,203	141.9	1,155	274.9	1,153	182.9	22,835	184.9
2004	9,818	221.2	9,563	132.6	1,194	280.7	1,122	175.0	21,752	174.1
2005	9,981	221.2	9,600	130.7	1,160	267.0	1,097	166.9	21,900	172.3

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Coronary Heart Disease was defined as:ICD-9 code: 402, 410-414, 429.2 for 1990-1998 deaths and ICD-10 codes I11, I20-I25 for 1999-2005 deaths.

²The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July1) bridged race censal estimates for 2000 (April 1) and post-censal bridged race estimates for 2001-2005 (July 1, 2007), as a denominator and to the U.S. 2000 standard population for age adjustment.

³All includes all additional races.

Table C-3. Number of Deaths and Age-adjusted Mortality Rates of Myocardial Infarction per 100,000 Persons, by Race, Sex, and Year, Ohio 1990-2005.^{1,2,3}

Year	White				Black				All	
	Males		Females		Males		Females			
	Number of Deaths	Rate	Number of Deaths	Rate	Number of Deaths	Rate	Number of Deaths	Rate	Number of Deaths	Rate
1990	5,818	156.9	4,799	81.1	371	115.6	353	71.9	11,353	109.7
1991	5,646	149.0	4,953	81.9	361	112.4	368	73.4	11,343	108.1
1992	5,493	143.8	4,665	75.9	403	118.4	378	74.6	10,957	102.7
1993	5,414	139.4	4,693	74.9	357	105.4	411	77.9	10,885	100.3
1994	5,296	133.6	4,530	71.8	373	107.2	389	72.3	10,599	96.3
1995	5,198	130.5	4,615	72.1	369	100.5	396	72.0	10,594	95.2
1996	4,935	123.0	4,485	69.3	399	109.2	375	67.3	10,210	90.7
1997	5,019	123.2	4,296	65.5	345	94.6	365	64.1	10,047	88.2
1998	4,643	112.7	4,192	63.1	350	90.6	373	64.8	9,580	83.0
1999	4,657	112.4	4,124	61.4	332	87.1	349	60.0	9,483	81.3
2000	4,024	96.0	3,806	55.8	349	91.5	335	56.4	8,534	72.4
2001	4,039	94.4	3,591	52.4	324	81.5	326	53.6	8,303	69.5
2002	3,716	85.3	3,317	47.8	297	75.5	344	55.9	7,699	63.5
2003	3,567	80.2	3,187	45.3	285	68.6	320	50.8	7,380	59.8
2004	3,275	72.3	2,935	41.5	257	60.9	280	43.9	6,765	54.3
2005	3,277	71.1	2,921	40.5	247	56.5	294	45.0	6,758	53.3

Source: Center for Public Health Statistics and Informatics; Ohio Department of Health.

¹Myocardial Infarction was defined as: ICD-9 codes 410 for 1990-1998 deaths and ICD-10 codes I21-I22 for 1999-2005 deaths.

²The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1999 (July 1) bridged race census estimates for 2000 (April 1) and post-censal bridged race estimates for 2001-2003 (July 1, 2007), as a denominator and to the U.S. 2000 standard population for age adjustment.

³All includes all additional races.

Table C-4. Number of Deaths and Age-adjusted Mortality Rates of Heart Failure per 100,000 Persons, by Race, Sex and Year, Ohio 1990-2005.^{1,2,3}

Year	White				Black				All	
	Males		Females		Males		Females			
	Number of Deaths	Rate								
1990	684	22.5	1,168	19.5	54	19.7	99	21.0	2,008	20.6
1991	753	24.5	1,260	20.4	48	16.8	97	20.3	2,162	21.6
1992	737	22.9	1,256	19.9	57	19.3	74	15.0	2,125	20.8
1993	814	25.1	1,440	22.3	71	23.6	89	17.8	2,416	23.1
1994	748	22.9	1,362	20.8	62	20.5	96	18.4	2,271	21.4
1995	782	23.5	1,432	21.5	59	19.6	95	17.7	2,374	22.0
1996	856	24.7	1,379	20.3	74	22.8	96	17.8	2,410	21.9
1997	878	25.3	1,484	21.6	63	18.3	117	21.4	2,547	22.8
1998	955	26.5	1,647	23.6	83	25.9	102	17.9	2,791	24.5
1999	1,096	29.9	1,835	25.8	83	24.2	135	23.4	3,151	27.3
2000	844	22.7	1,531	21.3	67	18.9	125	21.2	2,574	21.9
2001	879	23.2	1,611	22.2	83	22.0	139	23.1	2,717	22.7
2002	813	20.8	1,444	19.7	66	18.6	114	18.6	2,441	20.0
2003	864	21.6	1,505	20.2	76	19.5	131	20.9	2,582	20.7
2004	835	20.5	1,368	18.1	72	20.3	114	17.7	2,396	19.0
2005	741	17.6	1,168	15.3	61	17.0	103	15.8	2,076	16.1

Source: Chronic Disease and Behavioral Epidemiology, Ohio Department of Health (January 2007).

¹Heart Failure was defined as ICD-09 codes 428 for 1990-1998 deaths and ICD-10 codes I50 for 1999-2005 deaths.

²The direct age-adjusted rates were calculated using the inter-censal estimates for 1990-1999 (July 1), bridged race census estimates for 2000 (April 1) and the bridged race post-censal estimates for 2001-2005 (July 1, 2007) as a denominator and to the U.S. 2000 standard population for age adjustment.

³All includes all additional races.

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