



Burden of Coronary Heart Disease and Stroke in Kansas

JULY 2010

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
KANSAS HEART DISEASE AND STROKE PREVENTION PROGRAM



As the state's environmental protection and public health agency, KDHE promotes responsible choices to protect the health and environment for all Kansans

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Foreword

To My Fellow Kansans,

This is a report about a disease that is all too common in Kansas today. It is a report about cardiovascular disease, a cluster of circulatory conditions that includes ischemic heart disease (clogging of the arteries of the heart) and cerebrovascular disease (clogging of the arteries of the brain, or stroke). If you don't have cardiovascular disease yourself, you almost definitely know someone who does.

Perhaps you have a loved one who has suffered a heart attack or a stroke. Maybe someone in your family has had a coronary bypass operation, or takes medications for an abnormal heart rhythm, heart failure or the prevention of strokes. You probably know someone who has one or more of the leading risk factors for cardiovascular disease, such as a high cholesterol level, high blood pressure, diabetes or smoking. Or maybe you have some of these risk factors yourself.

One thing is certain: Whether you have this disease or not, you are paying for the enormous medical costs of cardiovascular disease in Kansas, through your taxes and the ever-increasing premiums you and your employer pay for health insurance. And if you are a typical Kansan, there is one chance in three that when you die it will be from cardiovascular disease.

Despite declines in cardiovascular disease mortality since the 1960s, heart disease and stroke remain among the leading causes of death and disability in Kansas, together killing nearly 8,000 residents each year and contributing to the state's escalating health care expenditures. On a typical day in Kansas, 22 people will die from cardiovascular disease, many of them before their time, due to preventable risk factors. Each of these premature deaths is a terrible loss, and each represents a missed opportunity to apply proven prevention strategies.

This report is dedicated to those Kansans who have died from cardiovascular disease before it could have been prevented. This report, *"The Burden of Coronary Heart Disease and Stroke in Kansas"*, is their story, presented in words, charts and tables, as assembled by the talented epidemiologists at KDHE who study the scope and depth of chronic diseases in Kansas.

In public health, we aim to ease the burden of cardiovascular disease across Kansas by reducing the prevalence of risk factors in communities. We do this by supporting ongoing efforts to cut smoking, obesity and diabetes in the population, while working with communities to find ways to make it easier for people to adopt more active lifestyles and healthier eating habits.

None of our strategies to prevent and control cardiovascular disease would have much chance for success without timely and accurate information on the magnitude of cardiovascular disease and its associated risk factors in Kansas. As this report improves our understanding of

the patterns of heart disease and stroke in our state, together with their risk factors, we are one step closer to making a lasting impact on these leading killers of Kansans.

Sincerely,

A handwritten signature in black ink that reads "Jason Eberhart-Phillips". The signature is written in a cursive, flowing style.

Jason Eberhart-Phillips, M.D., M.P.H.
State Health Officer and Director of Health,
Kansas Department of Health and Environment

Executive Summary

Coronary Heart Disease (CHD) and stroke are the two major components of cardiovascular disease, the leading cause of death and a major contributor to health care costs in Kansas. This burden document is a surveillance report that describes the status of coronary heart disease and stroke and their risk factors in Kansas. Public health professionals, healthcare providers, community members, advocates and other stakeholders are invited to use this report to understand patterns and changes in CHD and stroke population health indicators and healthcare practices in Kansas, to educate the public and policy makers about the burden of coronary heart disease and stroke and to inform their efforts to prevent CHD and stroke in Kansas.

Key Findings: Coronary Heart Disease

- CHD constituted the largest subcategory of cardiovascular disease accounting for 43% of all cardiovascular disease deaths in Kansas in 2008.
- Mortality from CHD continued to decline during 2000 through 2008 in Kansas and in the U.S.
- Age-adjusted CHD mortality was higher in men than women.
- In all age groups except 85 years and older, CHD mortality rates were higher among African American men and women as compared to white men and women, respectively.
- More than half (56.8%) of CHD deaths were pre-transport, occurring before reaching a hospital, clinic or medical center.
- About 1 in 3 deaths due to CHD is a heart attack or acute myocardial infarction (AMI) death.
- In 2009, an estimated 82,000 Kansas adults 18 years and older (3.9%) had angina or coronary heart disease. An estimated 78,000 Kansas adults 18 years and older (3.7%) have had a heart attack.
- Age-adjusted CHD hospital discharge rates were higher for men than women and higher in African Americans than in whites.
- About 8 in 10 CHD patients were discharged to home following their inpatient treatment in 2008.
- The percentage of adults who correctly recognize all signs and symptoms of heart attack and the appropriate response to call 911 was low (12%).

Key Findings: Stroke

- Stroke caused about 1 in 16 deaths in Kansas in 2008.
- Mortality from stroke declined during 2000 through 2008 in Kansas and in the U.S.
- Age-adjusted mortality from stroke was higher in African Americans as compared to whites.
- In all age groups except 85 years and older, stroke mortality rates were higher among African American men than white men or women of either race.
- The median age of death from stroke for African American men was 72 years, 82 years for white men, 76 years for African American women and 86 years for white women.
- More than half (54.1%) of stroke deaths were pre-transport, occurring before reaching a hospital, clinic or medical center.
- In 2009, nearly 55,000 Kansas adults 18 years and older (2.6%) have had a stroke.
- Age-adjusted stroke hospital discharge rates were higher for men than women and higher in African Americans than in whites.
- About half of stroke patients were discharged to home following their inpatient treatment in 2008.
- The percentage of adults who correctly recognize all signs and symptoms of stroke and the appropriate response to call 911 was low (22.8%).

Key Findings: High Blood Pressure

- About 600,000 Kansas adults 18 years and older (28.7%) had high blood pressure in 2009.
- The age-adjusted prevalence of high blood pressure was higher among men 18 years and older (29.2%) than among women (25.9%) in 2009.
- The prevalence of high blood pressure was higher among women ages 65 years and older than among men. However, among younger age groups from 18 to 44 years the prevalence of high blood pressure was higher among men than women.
- The age-adjusted prevalence of high blood pressure was higher among non-Hispanic African Americans (42.7%) than among non-Hispanic Whites (27.1%), non-Hispanic adults of other race or multiple race (28.8%) and Hispanics (27.0%).
- The prevalence of high blood pressure was higher among Kansans with lower average annual household income and with lower levels of education.
- In 2009, the majority of Kansans 18 years and older with high blood pressure were taking action to control the condition: 80.2% were taking blood pressure medication, 70.1% were adopting healthy eating habits, 72.8% were exercising, 69.6% were cutting down on salt, 9.6% avoiding salt completely, 25.9% reducing alcohol use and 51.2% avoiding alcohol completely.

- The prevalence of high blood cholesterol, diabetes, disability, arthritis, overweight and obesity and insufficient physical activity were higher among persons with high blood pressure as compared to persons without high blood pressure.

Key Findings: High Blood Cholesterol among those Ever Tested for Blood Cholesterol

- About 3 in 4 (75.0%) Kansas adults 18 years and older reported a cholesterol test within the past 5 years.
- Among those tested for high cholesterol, more than 1 in 3 (38.6%) had high cholesterol.
- The percentage of adults 18 years and older diagnosed with high blood cholesterol among those tested increased by 32% between 2001 (29.2%) and 2009 (38.6%).
- In 2009, the prevalence of high blood cholesterol was higher among men who were tested as compared to women who were tested.
- The prevalence of high blood cholesterol among those tested for blood cholesterol was higher among Kansans with lower average annual household income and with lower levels of education.
- The prevalence of high blood pressure, diabetes, disability, arthritis, overweight and obesity insufficient physical activity were higher among persons tested and diagnosed with high blood cholesterol as compared to persons without high blood cholesterol (among those tested for blood cholesterol).

Key Findings: Other Risk Factors

- During the period from 2001 to 2009, the prevalence of current cigarette smoking decreased from 22.2% in 2001 to 17.8% in 2009.
- During the period from 2001 to 2009, the prevalence of diabetes increased by 46%, from 5.8% in 2001 to 8.5% in 2009.
- The prevalence of diabetes was particularly high among Kansas adults 18 years and older with high blood cholesterol (16.4%), high blood pressure (19.2%) and stroke (27.5%).
- During the period from 2001 to 2009, the prevalence of obesity increased 33%, from 21.6% in 2001 to 28.8% in 2009.
- The age adjusted prevalence of diabetes was higher among non-Hispanic African Americans (14.3%) and Hispanics (13.7%) as compared with non-Hispanic whites (7.6%).
- The age-adjusted prevalence of overweight and obesity was higher among non-Hispanic African Americans (73.9%) and Hispanics (73.7%) as compared with non-Hispanic whites (64.1%).

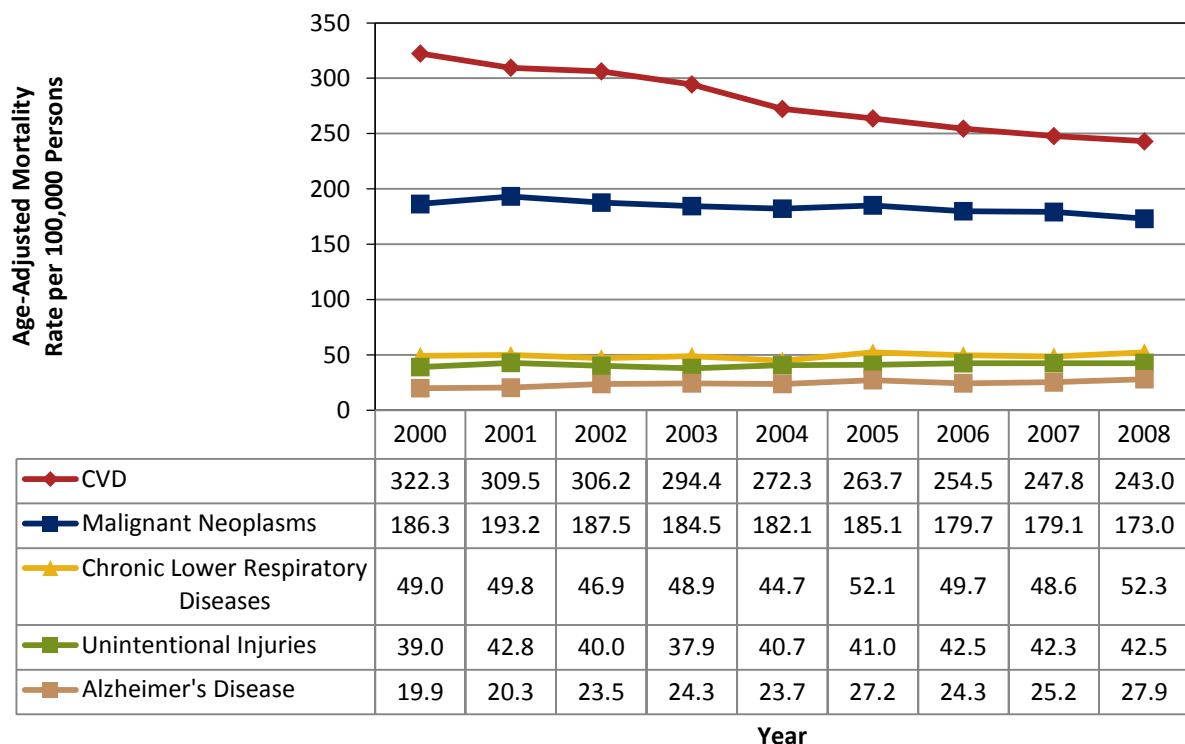
- The prevalence of overweight and obesity and eating an unhealthy diet were higher in men than women.
- The percentage of women 18 years and older to did not participate in leisure time physical activity was higher in women than men.
- The percentage of Kansans 18 years and older who ate fruits age vegetables fewer than 5 times per day was high (81.4% in 2009).
- Compared to persons with higher annual household income, persons with lower household income were more likely to currently smoke cigarettes, have diabetes, not participate in leisure time physical activity and eat an unhealthy diet (consuming fruits and vegetables fewer than 5 times per day).
- Compared to persons with higher education, persons with lower levels of education were more likely to currently smoke cigarettes, have diabetes, be overweight or obese, not participate in leisure time physical activity and eat an unhealthy diet.

Although coronary heart disease and stroke mortality have declined in recent years, they continue to be leading causes of death and a significant burden on the healthcare system in Kansas. Also, more than half of CHD and stroke deaths are pre-transport deaths. Efforts to improve the awareness of signs and symptoms of heart attack and stroke and the need to call 911 are essential to address the issue of high pre-transport deaths. The prevalence of CHD and stroke risk factors such as high blood pressure, high blood cholesterol among those tested for blood cholesterol, obesity and diabetes are increasing in Kansas underscoring the importance of prevention efforts in Kansas to sustain the decline in CHD and stroke mortality. Programs to improve cardiovascular health in Kansas, including health education campaigns, worksite wellness programs, efforts to improve quality of care for persons with diabetes, high blood pressure or high blood cholesterol, community efforts to strengthen emergency care systems and efforts to increase access to community and social supports to help individuals with cardiovascular disease manage their condition, are important steps necessary to achieve the goal of improved cardiovascular health for Kansans.

Introduction

Cardiovascular disease (CVD), including heart disease and stroke, is the leading cause of death in the United States and in Kansas (Figure 1). An estimated 81.1 million Americans have some form of cardiovascular disease, with total direct and indirect costs estimated to be \$503.2 billion in 2010.¹ In 2008, cardiovascular diseases accounted for 7,979 deaths in Kansas, 32% of all deaths. During the period from 2000-2008, cardiovascular disease mortality rates declined significantly, but continue to account for more deaths than any other cause. The age-adjusted CVD mortality rate in the U.S. (276.5 per 100,000 persons in 2006) was higher than the rate in Kansas (254.5 per 100,000 Kansans in 2006).

Figure 1. Age-adjusted mortality rates for 5 leading causes of death in Kansas, 2000-2008.



Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. For this chart the following ICD-10 code categories were used: CVD was defined as I00-I99, Malignant Neoplasms was defined as C00-C97, Chronic Lower Respiratory Diseases were defined as J40-J47 and Unintentional Injuries were defined as V01-X59, Y40-Y86, Y88 and Alzheimer's Disease was defined G30. Please note that these leading cause categories for CVD include coronary heart disease, stroke and all other categories of CVD, deviating from the Leading Cause of Death categories defined by the National Center for Health Statistics.

Cardiovascular disease includes all diseases of the heart and blood vessels, including ischemic heart disease, hypertensive heart disease (together also called coronary heart

disease), cerebrovascular disease or stroke, congestive heart failure, atherosclerosis, diseases of the veins and rheumatic heart disease. The two major components of cardiovascular disease, coronary heart disease and stroke, accounted for 43% and 6.2% of all cardiovascular disease deaths, respectively.

Healthy People 2010, a statement of national health objectives and guide for state-level prevention planning, enumerated sixteen objectives related to heart disease and stroke.² Progress toward four of those objectives is shown in Table 1. Age-adjusted mortality rates for coronary heart disease (Objective 12-1) and stroke (Objective 12-7) met and exceeded the Healthy People 2010 targets. However, two objectives related to high blood pressure and high cholesterol, important risk factors for CHD and stroke, showed increasing trends indicating movement away from the Health People targets. While declining mortality rates are encouraging, the increase in CHD and stroke risk factors may signal a future increase in CHD and stroke mortality. Controlling risk factors for CHD and stroke should continue to be a public health priority.

Table 1. Progress toward selected Healthy People 2010 objectives for heart disease and stroke.

Selected Healthy People 2010 Objectives	Kansas (baseline year)	Kansas (most recent year)	Healthy People 2010 Target
12-1 Reduce coronary heart disease deaths^a	160.4 deaths per 100,000 persons (2000)	105.3 deaths per 100,000 persons (2008)	166 deaths per 100,000 persons
12-7 Reduce stroke deaths^b	60.6 deaths per 100,000 persons (2000)	46.5 deaths per 100,000 persons (2008)	48 deaths per 100,000 persons
12-9 Reduce the proportion of adults with high blood pressure^c	23.4% (2001)	27.7% (2009)	16%
12-14 Reduce the proportion of adults with high total blood cholesterol levels^d	26.4% (2001)	34.1% (2009)	17%

Source:

^{a,b} 2000,2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE. Coronary heart disease defined as ICD-10 codes I11, I20-I25. Stroke defined as ICD-10 codes I60-I69. The Healthy People 2010 data source for these indicators is the National Vital Statistics System, CDC.

^{c,d} 2001,2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, KDHE. Estimate is for adults ages 18 years and older. Healthy People 2010 data source for these indicators is the National Health and Nutrition Examination Survey (NHANES), CDC.

^d Prevalence of high blood cholesterol among those who have ever had a cholesterol test.

All mortality rates and prevalence estimates are age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details.

This purpose of this burden document is to characterize mortality, morbidity and risk factors for CHD and stroke in Kansas since 2001. Chapter 1 focuses on CHD including sections on mortality from CHD, mortality from acute myocardial infarction or heart attack, prevalence of CHD, hospitalizations due to CHD and a section describing knowledge of signs and symptoms of heart attack among Kansas adults 18 years and older. Chapter 2 focuses on stroke including sections on mortality from stroke, prevalence of stroke, hospitalizations due to stroke and a section describing knowledge of signs and symptoms of stroke among Kansas adults 18 years and older. Chapter 3 focuses on risk factors for CHD and stroke with sections devoted to high blood pressure and high cholesterol, two priority risk factors for secondary prevention planning, and a section describing the prevalence of other risk factors for CHD and stroke, including smoking, diabetes, physical inactivity, overweight and obesity and unhealthy diet. Chapter 4 is a short section highlighting findings from the previous chapters related to health disparities and social determinants of health.

Chapter 1: Coronary Heart Disease

Coronary Heart Disease (CHD) occurs when the arteries that supply blood to the heart, called coronary arteries, harden and narrow. This process, called atherosclerosis, involves cholesterol and other fatty substances, cells, calcium and blood clotting factors building up and depositing on the inner lining of an artery. These plaques may also break off from the wall and enter the blood stream as a clot or thrombus. When a coronary artery becomes very narrow, or if a thrombus becomes lodged in a coronary artery, blood flow to the heart is reduced, leading to angina (chest pain), or can result in acute myocardial infarction (AMI) or heart attack if blood flow to the heart muscle is completely blocked. Nationwide, an estimated 17.6 million people have CHD with an estimated direct and indirect cost of \$177 billion in 2010; an estimated 1,255,000 Americans will have a new or recurrent myocardial infarction.¹ Coronary heart disease is the largest category of heart disease, the leading cause of death in the United States and in Kansas.

CHD constitutes the largest subcategory of cardiovascular disease accounting for 43% of all cardiovascular disease deaths in Kansas in 2008. For the purposes of this document, CHD encompasses hypertensive heart disease, angina, AMI and other ischemic heart diseases.

This chapter includes data describing the burden of CHD with some sections focusing on acute myocardial infarction.

1.1 Mortality from CHD

CHD Mortality Rates, 2000-2008

CHD Mortality by Sex, 2000-2008

CHD Mortality by Race, 2000-2008

Age-Specific CHD Mortality by Sex and Race

CHD Mortality by County Population Density Peer-Groups

Pre-Transport CHD Mortality

Pre-Transport CHD Mortality by Age, Sex and Race

1.2 Mortality from Heart Attack (AMI)

Percentage of CHD Mortality Due to Heart Attack (AMI)

Heart Attack (AMI) Mortality Rates, 2000-2008

1.3 Prevalence of CHD and Heart Attack

Prevalence of CHD by Age and Sex

1.4 Hospitalizations Due to CHD

CHD Hospital Discharges and Length of Stay, 2000-2008

CHD Hospital Discharge Rates by Sex, 2000-2008

CHD Hospital Discharge Rates by Race, 2000-2008

Primary Source of Payment for CHD Hospitalizations

Location of Hospital Discharge for CHD Hospitalizations

Selected Cardiac Procedures

1.5 Knowledge of Signs and Symptoms of Heart Attack

Knowledge of Signs and Symptoms of Heart Attack

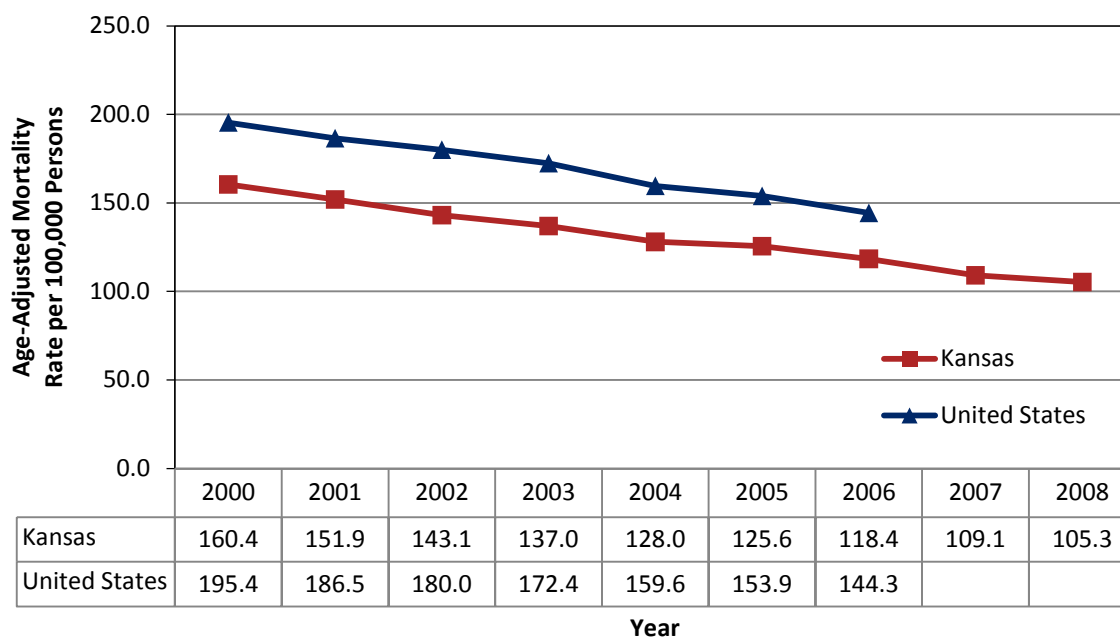
Knowledge of Signs and Symptoms of Heart Attack by Selected Characteristics

1.1 Mortality from CHD

CHD Mortality Rates, 2000-2008

In Kansas, age-adjusted CHD mortality rates have decreased through the period from 160.4 per 100,000 persons (95% confidence interval: 155.8 to 165.0) in 2000 to 105.3 per 100,000 persons (95% confidence interval: 101.7 to 108.9) in 2008. This declining trend in CHD mortality in Kansas was parallel to that in the United States (Figure 1-1). Data from the United States for 2007-2008 were not available at the time the document was created.

Figure 1-1. Age-adjusted CHD mortality rate, Kansas and the United States 2000-2008.

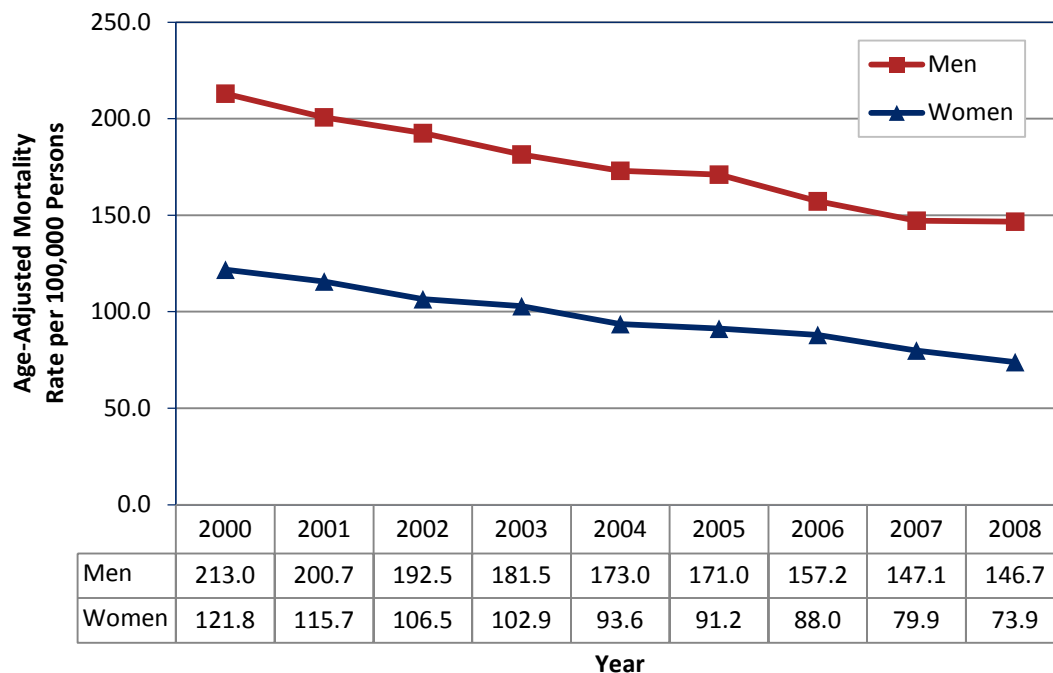


Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE. United States Compressed Mortality Data, CDC Wonder, Centers for Disease Control and Prevention. <http://wonder.cdc.gov/>
Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-10 codes I11, I20-I25.

CHD Mortality by Sex, 2000-2008

In Kansas, age-adjusted CHD mortality rates were higher for men as compared to women during the period 2000-2008 (Figure 1-2). Age-adjusted rates for men were nearly twice as high as for women throughout the period. The large difference in age-adjusted mortality rates between men and women is also evident in national figures (data not shown).

Figure 1-2. Age-adjusted CHD mortality rates by sex and year, Kansas 2000-2008.



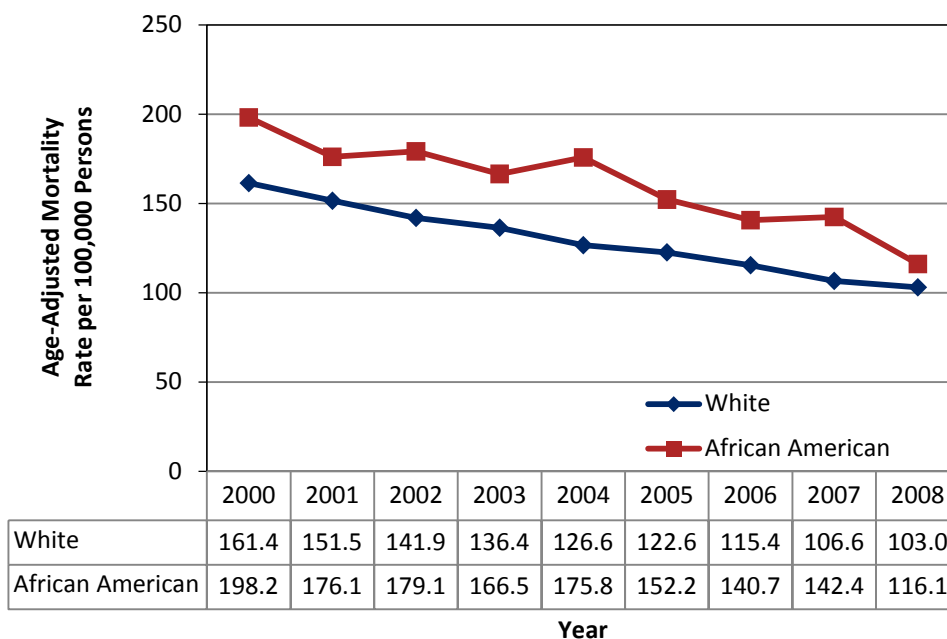
Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-10 codes I11, I20-I25.

CHD Mortality by Race, 2000-2008

Age-adjusted CHD mortality rates were higher for African American Kansans than for white Kansans each year during 2000-2008 (Figure 1-3). Age-adjusted CHD mortality rates declined for African Americans and whites, but the difference between the age-adjusted rates was fairly constant during the period. These trends are consistent with national trends in age-adjusted CHD mortality rates. Mortality rates for American Indian, Alaska Native, Asian, Pacific Islander or Kansans of other race categories are not shown because the number of deaths was insufficient for computing a statistically reliable rate for these race groups. Mortality rates by Hispanic ethnicity are also not shown because the number of deaths was insufficient for computing a statistically reliable rate.

Figure 1-3. Age-adjusted CHD mortality rates by race and year, Kansas 2000-2008.



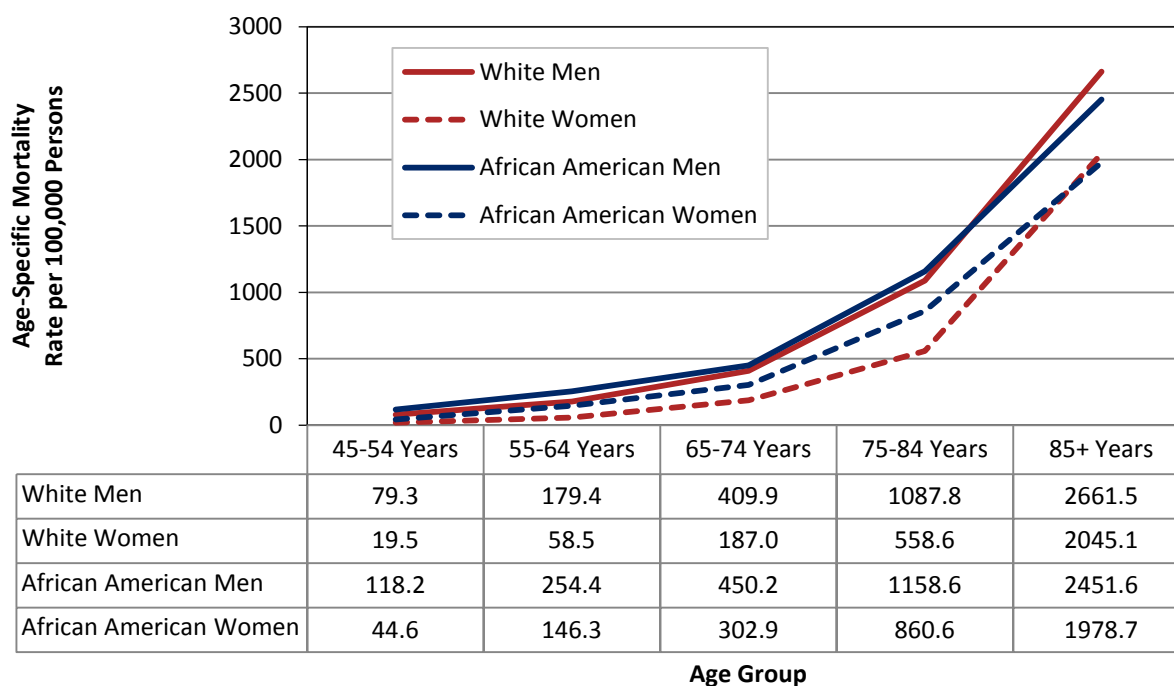
Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-10 codes I11, I20-I25.

Age-Specific CHD Mortality by Sex and Race

In Kansas, mortality from CHD increases dramatically with age (Figure 1-4). CHD mortality rates for African American men and women were higher than those for white men and women, respectively, for all age groups except among those 85 years and older. In all age groups, except 85 years and older, CHD mortality rates were higher among African American men as compared to white men and women of either race group. In 2008, the median age at death was 65 years for African American men, 77 years for African American women, 78 years for white men and 86 years for white women.

Figure 1-4. Age-specific CHD mortality rates by race and sex for Kansas residents 45 years and older, Kansas 2006-2008.



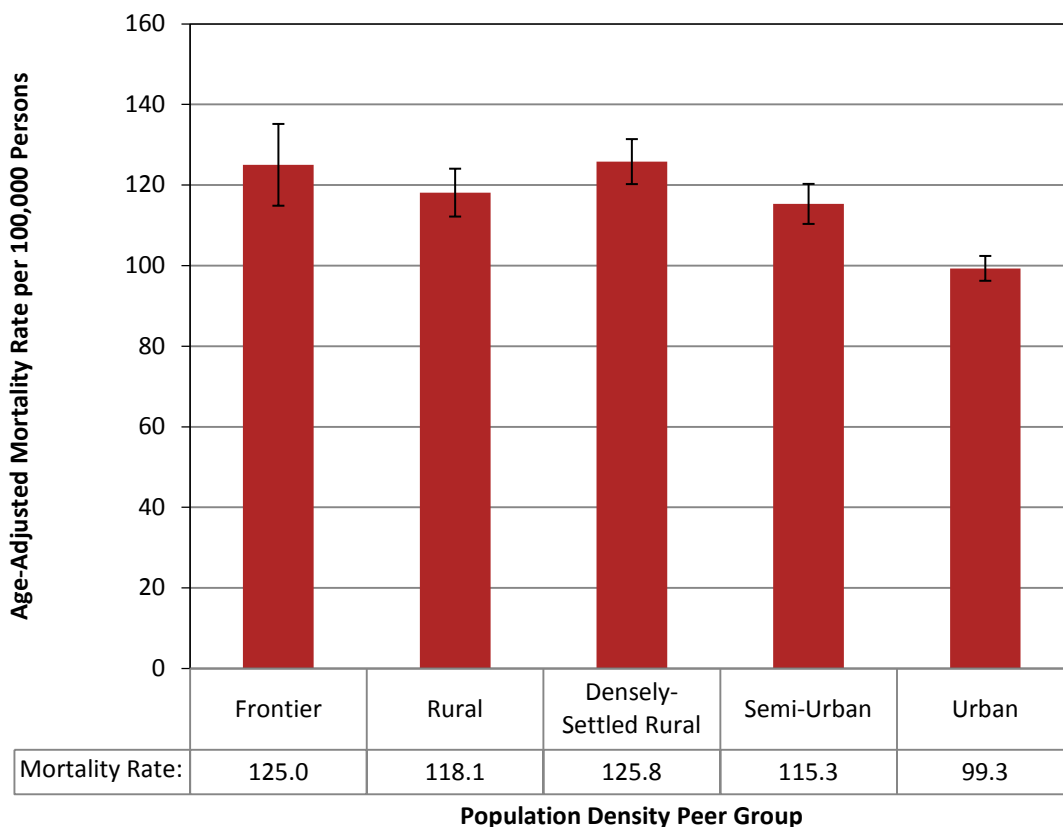
Source: 2006-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-10 codes I11, I20-I25.

CHD Mortality by County Population Density Peer-Groups

In Kansas, there were modest differences in age-adjusted CHD mortality rates by county population density (Figure 1-5). The age-adjusted mortality rate for the urban county peer group (99.3 deaths per 100,000 persons; 95% confidence interval: 96.2 to 102.3) was significantly lower than all other population density county peer groups (Figure 1-5). The highest rate (125.8 deaths per 100,000 persons; 95% confidence interval: 120.2 to 131.4) was in the densely-settled rural county peer group.

Figure 1-5. Age-adjusted CHD mortality rates by county of residence population density peer groups, Kansas 2006-2008.



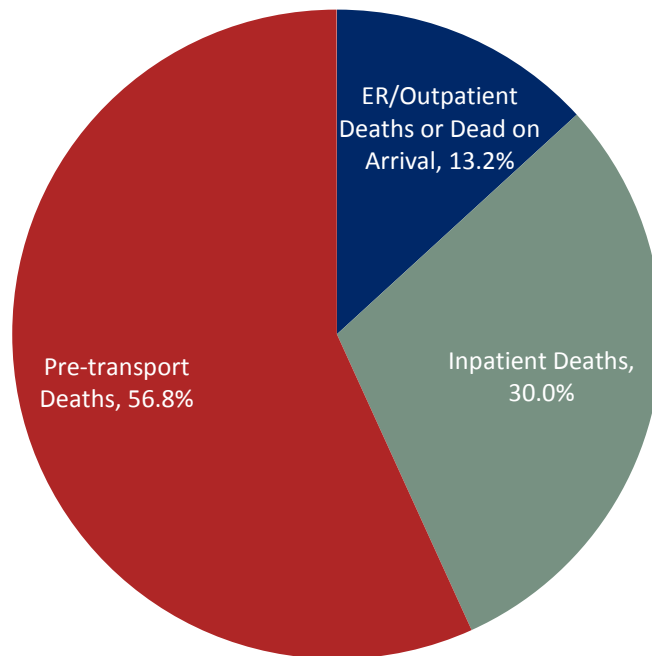
Source: 2006-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-10 codes I11, I20-I25.

Pre-Transport CHD Mortality

Many CHD deaths can be prevented if medical care is accessed immediately. In Kansas, more than half of persons who died from CHD (57%) die before reaching a hospital, clinic or medical center (Figure 1-6). The percentage of pre-transport CHD deaths has not increased or decreased significantly over the period 2000-2008 (data not shown) despite the general decline in CHD mortality during the period (see Figure 1-1). Decreasing the delay in the decision to seek medical care may be an opportunity to further decrease CHD mortality in Kansas.

Figure 1-6. Location of CHD Death, Kansas 2008.



Source: 2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Pre-transport Deaths includes deaths occurring in a nursing home, residence, assisted living facility or another location other than a hospital, clinic or medical center. Inpatient Deaths includes deaths occurring in a hospital, clinic or medical center after admission to that facility. ER/Outpatient Deaths or Dead on Arrival include deaths occurring before admission to a hospital, clinic or medical center. Deaths occurring in hospice were excluded. CHD was defined as ICD-10 codes I11, I20-I25.

Pre-Transport CHD Mortality by Age, Sex and Race

In Kansas, the percentage of pre-transport CHD deaths is higher for women (61%) than for men (54%). The percentage of pre-transport CHD deaths is higher among those 85 years and older (68%) as compared with all other age groups.

Table 1-1. Percentage of pre-transport CHD deaths by sex, race and age, Kansas 2008.

Population Group	Number of Pre-Transport Deaths	Percent Pre-Transport	95% Confidence Interval
Total	1911	56.8%	55.1% to 58.5%
Age			
<i>44 Years and Younger</i>	29	49.2%	35.9% to 62.5%
<i>45 to 64 Years</i>	303	53.4%	49.2% to 57.5%
<i>65 to 74 Years</i>	211	42.0%	37.6% to 46.4%
<i>75 to 84 Years</i>	485	52.2%	48.9% to 55.4%
<i>85 Years and Older</i>	422	67.7%	65.1% to 70.2%
Sex			
<i>Men</i>	992	54.2%	51.9% to 56.5%
<i>Women</i>	893	60.5%	58.0% to 63.0%
Race			
<i>White</i>	1798	57.5%	55.8% to 59.3%
<i>African American</i>	66	48.9%	40.2% to 57.6%
Race and Sex			
<i>White Men</i>	952	54.9%	52.5% to 57.2%
<i>White Women</i>	846	60.9%	58.3% to 63.4%
<i>African American Men</i>	28	41.2%	30.3% to 53.0%
<i>African American Women</i>	38	56.7%	44.8% to 67.9%

Source: 2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Pre-transport Deaths includes deaths occurring in a nursing home, residence, assisted living facility or another location other than a hospital, clinic or medical center. Inpatient Deaths includes deaths occurring in a hospital, clinic or medical center after admission to that facility.

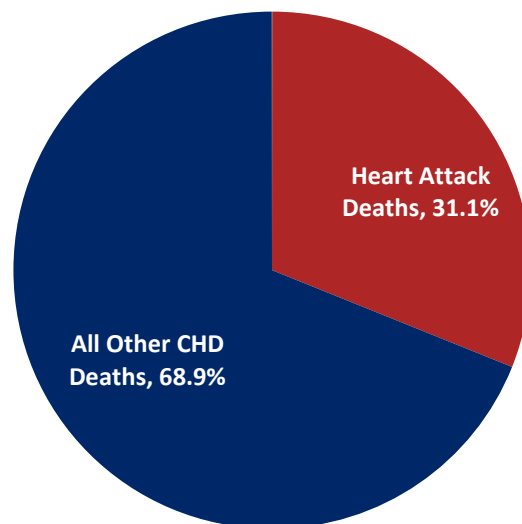
ER/Outpatient Deaths or Dead on Arrival include deaths occurring before admission to a hospital, clinic or medical center. Deaths occurring in hospice were excluded. CHD was defined as ICD-10 codes I11, I20-I25.

1.2 Mortality due to Heart Attack

Percentage of CHD mortality due to Heart Attack

About 1 in 3 deaths due to CHD is a heart attack or acute myocardial infarction (AMI) death (Figure 1-7). Other categories of CHD death include deaths due to hypertensive heart disease (ICD-10 code I11), Angina pectoris (ICD-10 code I20), other forms of acute ischemic heart disease (ICD-10 code I24) and chronic ischemic heart disease (ICD-10 code I25).

Figure 1-7. Percentage of heart attack (AMI) deaths among all CHD deaths, Kansas 2008.

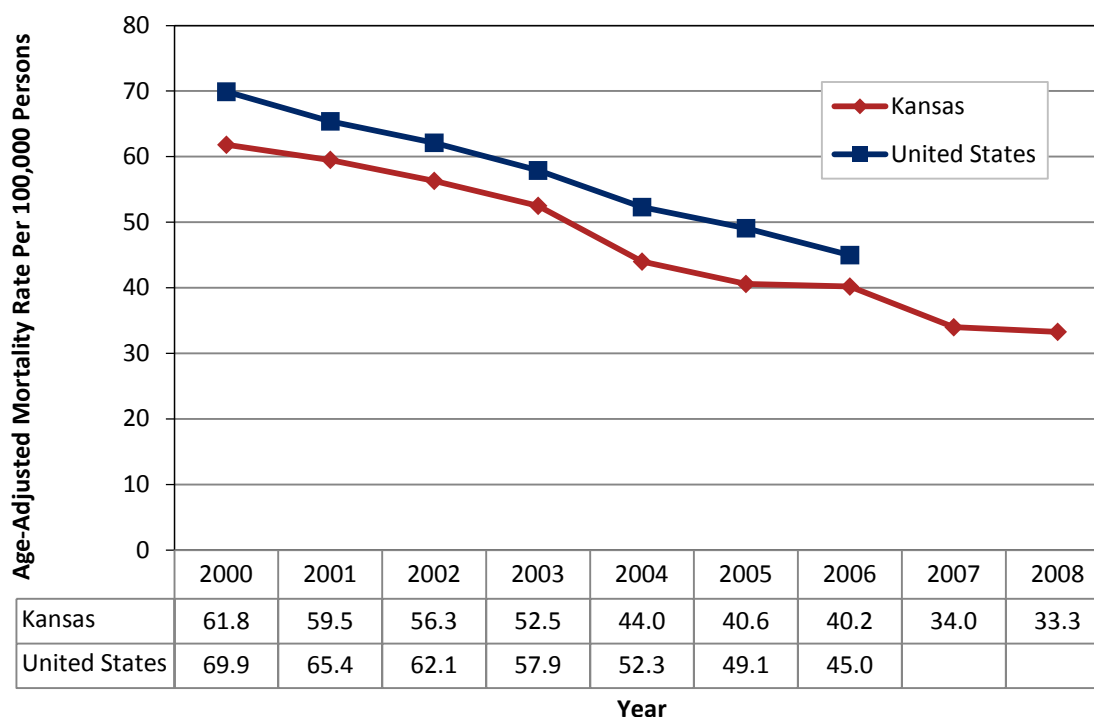


Source: 2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE. CHD was defined as ICD-10 codes I11, I20-I25. AMI was defined as ICD-10 codes (I21-I22).

Heart Attack (AMI) Mortality Rates, 2000-2008

As with other categories of cardiovascular disease, heart attack (AMI) mortality rates have declined each year during the period 2000-2008 in Kansas (Figure 1-8). This trend is consistent with the trend in the United States during 2000-2006. Rates for the United States were not available for 2007-2008 at the time of publication of this document.

Figure 1-8. Age-adjusted heart attack (AMI) mortality rate, Kansas and the United States 2000-2008.



Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE. United States Compressed Mortality Data, CDC Wonder, Centers for Disease Control and Prevention. <http://wonder.cdc.gov/>
 Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. AMI was defined as ICD=10 codes (I21-I22).

1.3 Prevalence of CHD and Heart Attack

Prevalence of CHD and Heart Attack by Age and Sex

In addition to being a leading cause of death, CHD is a major cause of morbidity (Table 1-2). In 2009, an estimated 82,000 Kansas adults 18 years and older (3.9%) reported that their health care provider told them they have angina or coronary heart disease. CHD prevalence was higher among men (4.6%) than women (3.2%) and higher among Kansans 65 years and older (12.3%) as compared with younger age groups. The prevalence of CHD was higher among non-Hispanic whites (4.0%) as compared to non-Hispanic African Americans (2.6%) and Hispanics (2.7%). The lower prevalence of CHD among non-Hispanic African Americans as compared to non-Hispanic whites may be related to higher mortality rates among African Americans as compared to whites.

In 2009, an estimated 78,000 Kansas adults 18 years and older (3.7%) reported that they have had a heart attack. The prevalence of heart attack was higher among men (4.9%) than among women (2.6%) and higher among Kansans 65 years and older (11.4%) than among those in younger age groups. The prevalence of heart attack is higher among non-Hispanic whites as compared to non-Hispanic African Americans and Hispanics.

Neither CHD nor heart attack prevalence has changed significantly during the period from 2004 to 2008 (data not shown).

Table 1-2. Percentage of adults 18 Years and older who have been diagnosed with coronary heart disease or who have had a heart attack, Kansas 2009.

Population Subgroup	Percent Reporting Angina or Coronary Heart Disease	95% Confidence Limit	Percent Reporting a Past Heart Attack	95% Confidence Limit
Total	3.9%	3.6% to 4.2%	3.7%	3.4% - 4.0%
Sex				
Men	4.6%	4.2% - 5.1%	4.9%	4.4% - 5.3%
Women	3.2%	2.9% - 3.5%	2.6%	2.3% - 2.9%
Age				
18 to 44	0.8%	0.5% - 1.1%	0.6%	0.3% - 0.8%
45 to 64	4.0%	3.5% - 4.5%	4.2%	3.7% - 4.7%
65 and older	12.3%	11.4% - 13.2%	11.4%	10.5% - 12.3%
Race and Ethnicity				
White, Non-Hispanic	4.0%	3.7% - 4.3%	3.7%	3.4% - 4.0%
African American, Non-Hispanic	2.6%	1.7% - 3.6%	3.0%	1.9% - 4.2%
Other/Multi-Race, Non-Hispanic	3.8%	2.6% - 5.0%	5.9%	4.1% - 7.8%
Hispanic	2.7%	1.3% - 4.1%	2.9%	1.5% - 4.3%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

1.4 Hospitalizations Due to CHD

CHD Hospital Discharges and Length of Stay, 2000-2008

Consistent with the downward trend in CHD mortality (see Figure 1-1), age-adjusted hospital discharge rates for CHD (as primary diagnosis) have declined in Kansas from 64.7 per 10,000 persons in 2000 to 37.8 per 10,000 persons in 2008 (Table 1-3). However, this trend should be interpreted with caution because the number of hospitals that submit data each year to the Kansas hospital discharge database changes, suggesting that records from some facilities may be missing for some years. The median length of stay for CHD hospitalizations was 3 days during the period 2000-2008.

Table 1-3. CHD inpatient hospital discharges and length of stay, Kansas 2000-2008.

Year	Number of CHD Discharges	Median Length of Stay	Average Length of Stay	Unadjusted Discharge Rate per 10,000 Persons	Age-Adjusted Discharge Rate per 10,000 Persons	95% Confidence Interval for Age-Adjusted Rate
2000	18,408	3	4.4	65.8	64.7	63.7 - 65.6
2001	18,614	3	4.1	68.9	64.4	63.4 - 65.3
2002	17,180	3*	4.2*	63.3	58.4	57.5 - 59.3
2003	16,009	3	4.1	58.8	55.3	54.4 - 56.2
2004	15,402	3	4.1	56.3	53.5	52.7 - 54.4
2005	14,641	3	4.0	53.3	50.0	49.1 - 50.8
2006	14,294	3	4.0	51.7	48.4	47.6 - 49.2
2007	12,701	3	4.0	45.7	41.9	41.1 - 42.6
2008	11,524	3	4.1	41.1	37.8	37.1 - 38.5

Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.

Where indicated, rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-9 codes 402, 410-414, 429.2.

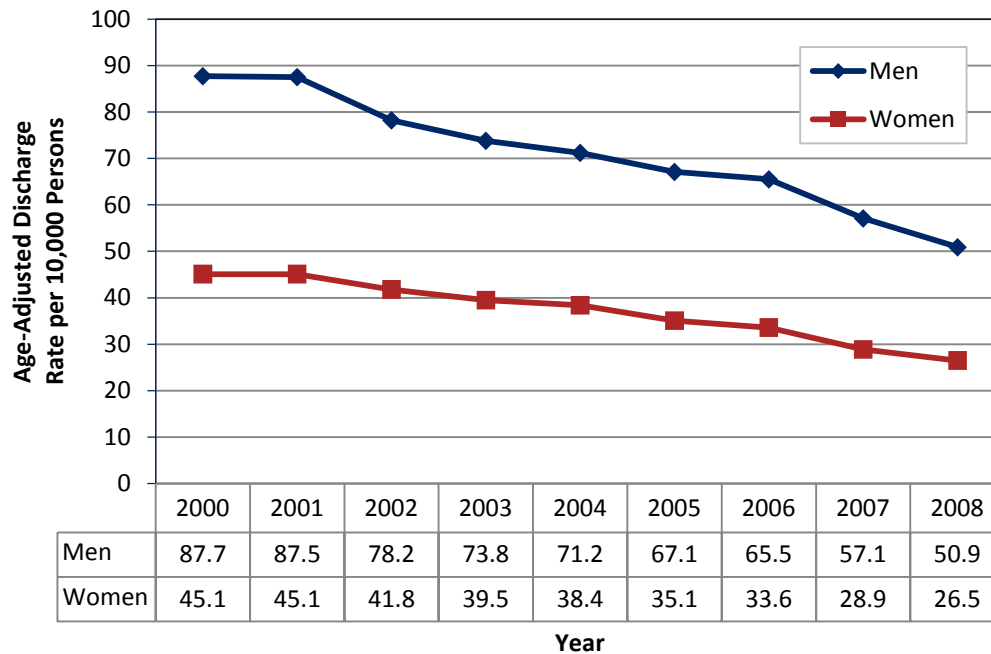
For the purposes of this document, the number of discharges and the unadjusted CHD discharge rate include records with missing values for age and may not match previously reported values.

* 71 records with invalid date of admission were excluded from length of stay calculations for 2002.

CHD Hospital Discharge Rates by Sex, 2000-2008

As with CHD mortality rates, age-adjusted hospital discharge rates were higher for women than for men in Kansas during the period from 2000 to 2008 (Figure 1-8). Age-adjusted hospital discharge rates declined for both men and women during 2000 to 2008.

Figure 1-8. Age-adjusted CHD hospital discharge rates by sex and year, Kansas 2000-2008.



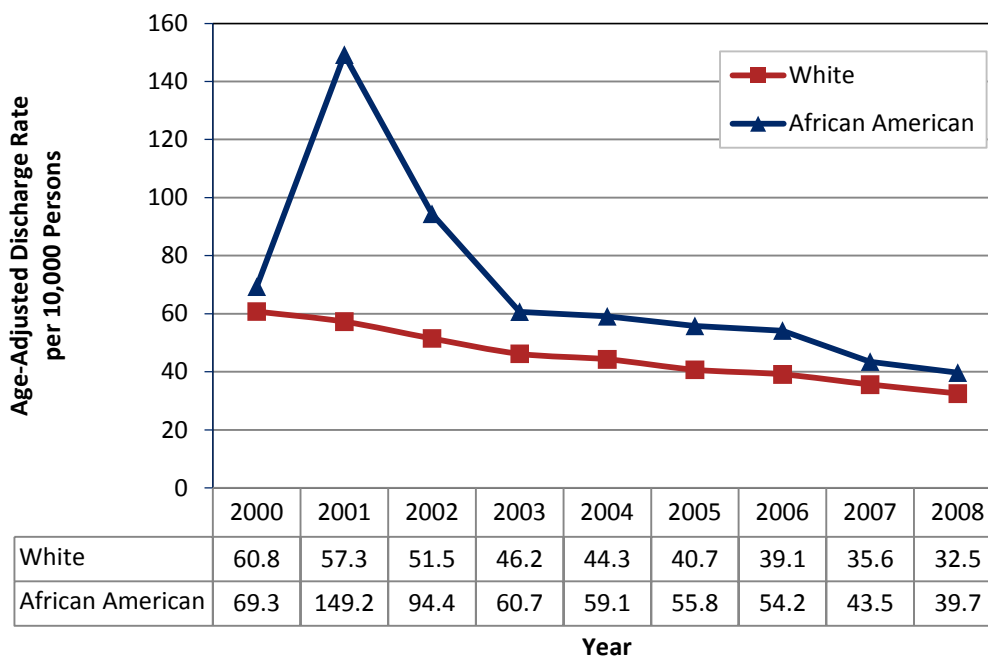
Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.

CHD was defined as ICD-9 codes 402, 410-414, 429.2.

CHD Hospital Discharge Rates by Race, 2000-2008

In Kansas, age-adjusted CHD hospital discharge rates were higher for African Americans as compared to whites for each year during the period 2000-2008 (Figure 1-9). The elevated rate in 2001 is likely due to certain hospitals submitting data that year as compared with previous and subsequent years. During the period from 2003 to 2008, the age-adjusted hospital discharge rate for African Americans decreased from 60.7 discharges per 10,000 persons (95% confidence interval: 56.2 to 65.2) in 2003 to 39.7 discharges per 10,000 persons (95% confidence interval: 36.2 to 43.2) in 2008; for whites the rate decreased from 46.2 discharges per 10,000 persons (95% confidence interval: 45.3 to 47.0) in 2003 to 32.5 discharges per 10,000 persons (95% confidence interval: 31.8 to 33.2) in 2008. Hospital discharge rates for other race groups could not be computed because the number of discharges was insufficient to compute a statistically reliable rate.

Figure 1-9. Age-Adjusted CHD Hospital Discharge Rates by Race and Year, Kansas 2000-2008.



Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. CHD was defined as ICD-9 codes 402, 410-414, 429.2.

Primary Source of Payment for CHD Hospitalizations

In Kansas, for patients younger than 65 years, the primary payment for CHD hospitalizations came from a variety of sources (Table 1-4). The majority (61.1%) of hospitalizations for patients aged 64 years and younger listed commercial or private insurers as the primary source of payment. For patients 65 years and older, Medicare was listed as the primary source of payment for the vast majority of CHD inpatient stays (91.3%). This pattern of primary payment source for stroke hospitalizations for patients younger and older than 65 years has been consistent throughout the period from 2000-2008 (data not shown).

Table 1-4. Primary source of payment for CHD hospital discharges for those aged younger than 65 years and those 65 years and older, Kansas 2008.

Payer	Percentage of Discharges Among Persons Ages 64 Years and Younger	Percentage of Discharges Among Persons Ages 65 Years and Older
Commercial/Private Insurance	61.1%	7.4%
Medicare	14.1%	91.3%
Self Pay	9.7%	0.3%
Medicaid	8.0%	0.4%
Other	7.1%	0.7%

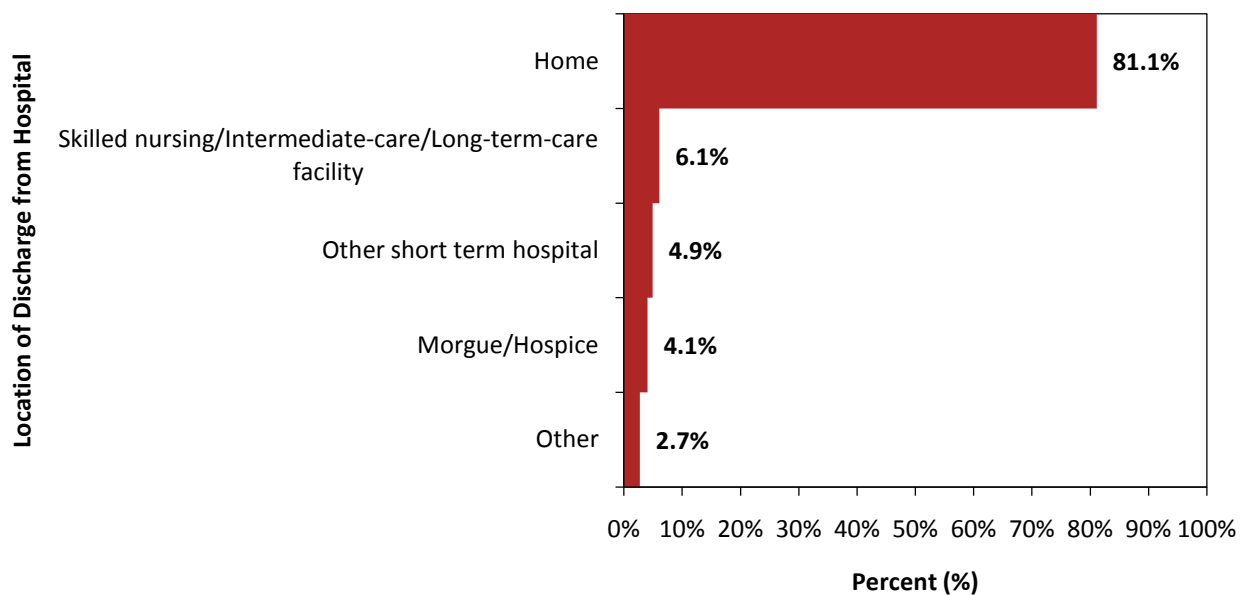
Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.

CHD was defined as ICD-9 codes 402, 410-414, 429.2.

Location of Hospital Discharge for CHD Hospitalizations

In Kansas, about 8 in 10 CHD patients (81.1%) were discharged to home following their inpatient treatment in 2008 (Figure 1-10). Among those not discharged to home, 6.1% were discharged to skilled nursing, intermediate-care or directly to long-term-care facilities, 4.9% to another short term hospital and 4.9% expired during their hospital stay or are discharged to hospice.

Figure 1-10. Percentage of CHD hospital discharges by location, Kansas 2008.



Source: 2008 Hospital Discharge Database, Kansas Hospital Association. See technical appendix for a full list of items included in each discharge location category. The category "Other" includes transfers to federal facilities, psychiatric hospitals, discharge against medical advice and discharges to other types of institutions not categorized here. CHD was defined as ICD-9 codes 402, 410-414, 429.2.

Selected Cardiac Procedures, 2000-2008

Table 1-5 displays the number of procedures performed on CHD patients during 2008 for the following procedures:

- Removal of Coronary Artery Obstruction and Insertion of Stents – a group of procedures including percutaneous transluminal coronary angioplasty (PTCA) and stent insertion and other methods used to remove coronary artery obstruction.
- Percutaneous Coronary Intervention (PCI) – a subset of the previous category including angioplasty procedures and stent insertion procedures.
- Coronary Artery Bypass Graft (CABG) – a group of cardiac revascularization procedures referred to colloquially as “heart bypass” surgeries.
- Cardiac Catheterization – a group of diagnostic procedures involving the insertion of a catheter into the heart.

Table 1-5. Number of cardiac procedures performed during inpatient CHD hospitalizations, Kansas 2008.

Characteristic	Removal of Coronary Artery Obstruction and Insertion of Stents	Percutaneous Coronary Intervention (PCI)	Coronary Artery Bypass Graft (CABG)	Cardiac Catheterization
Total	4557	4546	1848	6899
Age (Years)				
0-44	253	252	70	370
45-64	2041	2035	804	3044
65 and Older	2215	2211	950	3413
Sex				
Men	2997	2989	1356	4418
Women	1560	1557	492	2481
Race				
White	3598	3588	1460	5528
African American	170	170	53	288
All Others	789	788	335	1083

Source: 2008 Hospital Discharge Database, Kansas Hospital Association. Procedures were identified among all reported procedure codes using the following ICD-9-CM designations: 36.0 for removal of coronary artery obstruction and insertion of stents; 36.01-36.02 and 36.05-36.07 for percutaneous coronary intervention; 36.1 for coronary artery bypass graft; 37.20-37.23 for cardiac catheterization.

CHD was defined as ICD-9 codes 402, 410-414, 429.2. Excludes procedures performed on patients with a primary diagnosis other than CHD.

1.5 Knowledge of Signs and Symptoms of Heart Attack

Knowledge of Signs and Symptoms of Heart Attack

Prompt access to medical care is crucial for preventing death and disability from heart attack. The initial step in accessing medical care is recognizing the signs and symptoms of a heart attack as it begins and calling 911. A series of questions to assess knowledge of the signs and symptoms of heart attack among adult Kansans were included in the Kansas Behavioral Risk Factor Surveillance System (BRFSS) in 2007. Respondents were asked to identify whether each of 5 items are true signs of a heart attack and also to identify an additional item that is an incorrect symptom of a heart attack (trouble seeing in one or both eyes; in italic font in Table 1-6). A separate question asked respondents to indicate their first action in the event of a heart attack or stroke.

Table 1-6. Percentage of adults 18 years and older aware of the signs and symptoms of heart attack and the importance of accessing emergency medical by promptly calling 911, Kansas 2007.

Heart Attack Signs and Symptoms Questions	Percent with Correct Response (%)	95% Confidence Interval
Do you think pain or discomfort in the jaw, neck, or back are symptoms of a heart attack?	55.6%	53.7% to 57.5%
Do you think feeling weak, lightheaded, or faint are symptoms of a heart attack?	66.0%	64.1% to 67.8%
Do you think chest pain or discomfort are symptoms of a heart attack?	95.4%	94.6% to 96.3%
<i>Do you think sudden trouble seeing in one or both eyes is a symptom of a heart attack? (Incorrect Symptom)</i>	40.3%	38.5% to 42.2%
Do you think pain or discomfort in the arms or shoulder are symptoms of a heart attack?	90.4%	89.2% to 91.7%
Do you think shortness of breath is a symptom of a heart attack?	89.0%	87.7% to 90.2%
Summary Measures	Percent with Correct Response (%)	95% Confidence Interval
Correct response for all 6 questions for signs and symptoms of heart attack	14.4%	13.2% to 15.7%
Identified calling 911 as the first response to someone having a heart attack or stroke	86.2%	84.9% to 87.6%
All heart attack symptoms recognized and identified 911 as the first response to someone having a heart attack or stroke	12.6%	11.4% to 13.7%

Source: 2007 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

The percentage of adults 18 years and older in Kansas who correctly recognized “chest pain or discomfort” and “pain or discomfort in the arms or shoulder” as symptoms of a heart attack exceeded 90% (Table 1-6). Recognition of “pain or discomfort in the jaw, neck or back” (56%), “feeling weak, lightheaded or faint” (66%) and “shortness of breath” (89%) was lower. The percentage of adults that correctly noted “trouble seeing in one or both eyes” as an incorrect sign or symptoms of heart attack was lower (40%). The percentage of adults who correctly recognized all 6 signs and symptoms was 14% in 2007.

Estimates for the percentage of adults who could correctly recognize all 6 signs and symptoms of heart attack and also identified calling 911 as their first response to someone having a heart attack or stroke are provided in Table 1-7. Consistent with results from other states³, the percentage of adults 18 years and older who correctly recognized all heart attack symptoms and the appropriate response to call 911 was low (12.6%, 95% confidence interval: 11.4% to 13.7%) and has not changed significantly from the percentage in 2004 (11.9%, 95% confidence interval: 10.8% to 13.0%) or in 2005 (12.1%, 95% confidence interval: 11.0% to 13.2%).

Knowledge of Signs and Symptoms of Heart Attack by Selected Characteristics

Awareness of heart attack signs and symptoms and the importance of calling 911 was lowest among those aged 18 to 24 years (4.9%) and highest among those aged 45 to 64 years (15.8%). It was lower among Hispanics (3.2%) as compared with non-Hispanic whites (13.3%). Knowledge of heart attack signs and symptoms and the importance of calling 911 were higher among Kansans with higher annual household income and with higher educational levels. The percentage of Kansas adults with CHD or history of heart attack, diabetes, high blood pressure, stroke and among those tested and diagnosed with high cholesterol are low. Public health efforts to improve the knowledge of signs and symptoms of heart attack and the importance of calling 911 are important to decrease mortality due to heart attack.

Table 1-7. Percentage of adults 18 and older that correctly identified all heart attack symptoms and identified 911 as the first response to someone having a heart attack or stroke, Kansas 2007.

Characteristic	Percent of Adults 18 Years and Older	95% Confidence Interval
Total	12.6%	11.4% to 14.6%
Age (Years)		
18 to 24	4.9%	1.6% to 8.3%
25 to 34	11.1%	8.0% to 14.1%
35 to 44	12.9%	10.1% to 15.7%
45 to 64	15.8%	13.8% to 17.7%
65 and older	11.8%	9.9% to 13.7%
Sex		
Men	9.1%	7.5% to 10.8%
Women	15.8%	14.2% to 17.4%
Race and Ethnicity		
White, Non-Hispanic	13.3%	12.0% to 14.6%
African American, Non-Hispanic	8.7%	3.5% to 14.1%
Other/Multi-Race, Non-Hispanic	13.1%	6.3% to 19.8%
Hispanic	3.2%	0.8% to 5.5%
Household Income		
Below \$15,000	9.3%	3.5% to 11.0%
\$15,000 to \$24,999	8.3%	5.7% to 10.8%
\$25,000 to 34,999	9.0%	6.3% to 11.6%
\$35,000 to \$49,999	13.7%	10.7% to 16.7%
\$50,000 or Higher	15.2%	13.3% to 17.2%
Education		
Did Not Graduate High School	4.7%	1.4% to 8.0%
High School Graduate	8.2%	6.5% to 9.9%
Some Technical Education or College	13.2%	10.9% to 15.5%
College or Technical Education Graduate	16.6%	14.4% to 18.8%
Selected Health Conditions		
Coronary Heart Disease or History of Heart Attack	17.5%	13.4% to 21.6%
Diabetes	12.0%	8.4% to 15.5%
High Blood Cholesterol*	15.0%	12.8% to 17.1%
High Blood Pressure	13.1%	11.0% to 15.2%
Stroke	9.5%	4.8% to 14.2%

Source: 2007 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

*Respondents indicating that they have been tested and told that they have high blood cholesterol.

Chapter 2: Stroke

Stroke, also called cerebrovascular disease or brain attack, occurs when the blood supply to the brain is interrupted. It constitutes the second largest category of cardiovascular disease after coronary heart disease. Stroke can be caused either by a blockage of blood flow by a clot (ischemic stroke) or by rupture of a blood vessel leading to bleeding in or around the brain (hemorrhagic stroke). Stroke is a medical emergency and can lead to permanent disability and death. Nationwide, an estimated 795,000 people have a new or recurrent stroke each year with an estimated direct and indirect cost of \$73.7 billion in 2010.¹ Between 2000 and 2010, stroke shifted from being the 3rd leading cause of death in Kansas to being the 4th leading cause of death in 2008; chronic lower respiratory diseases became the 3rd leading cause during that period. Stroke continues to be the 3rd leading cause of death nationwide. Stroke caused about one in sixteen deaths in 2008.

This chapter includes data describing the burden of Stroke in Kansas.

2.1 Stroke Mortality

Mortality Rates 2000-2008

Stroke Mortality by Sex, 2000-2008

Stroke Mortality by Race, 2000-2008

Age-Specific Stroke Mortality by Sex and Race

Stroke Mortality by County Population Density Peer-Groups

Pre-Transport Stroke Mortality

Pre-Transport Stroke Mortality by Age, Sex and Race

2.2 Stroke Prevalence

Prevalence of Stroke by Age and Sex

2.3 Hospitalizations Due to Stroke

Hospital Discharges and Length of Stay, 2000-2008

Hospital Discharges by Sex, 2000-2008

Hospital Discharges by Race, 2000-2008

Primary Source of Payment for Stroke Hospitalizations

Location of Hospital Discharge for Stroke Hospitalizations

Hospital Discharges by Stroke Subtype

Selected Procedures: Endarterectomy and Thrombolytic Therapy, 2000-2008

2.4 Knowledge of Signs and Symptoms of Stroke

Knowledge of Signs and Symptoms of Stroke

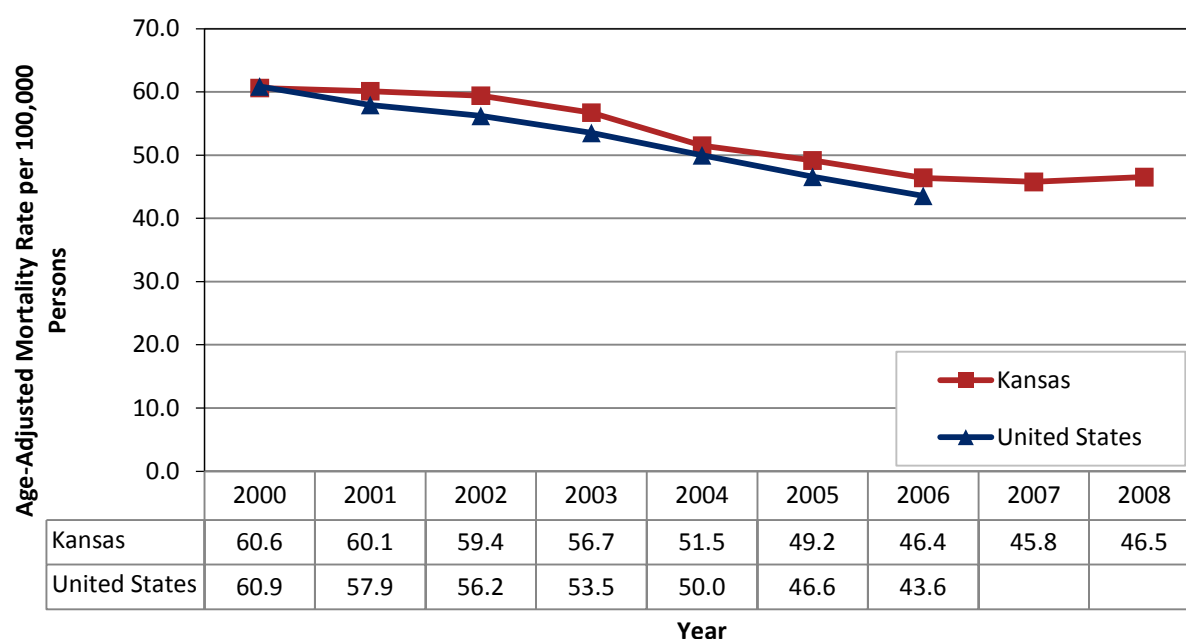
Knowledge of Signs and Symptoms of Stroke by Selected Characteristics

2.1 Stroke Mortality

Stroke Mortality 2000-2008

Consistent with trends in cardiovascular disease, stroke mortality rates have decreased through the period from 2000-2008 (Figure 2-1). The trend in stroke mortality for Kansas is parallel to that in the United States. However, during the period from 2006-2008, the mortality rate in Kansas appears to have stabilized. Data from the United States for 2007-2008 were not yet available at the time this document was created to assess whether or not rates have stabilized nationally.

Figure 2-1. Age-adjusted stroke mortality rate, Kansas and the United States 2000-2008.

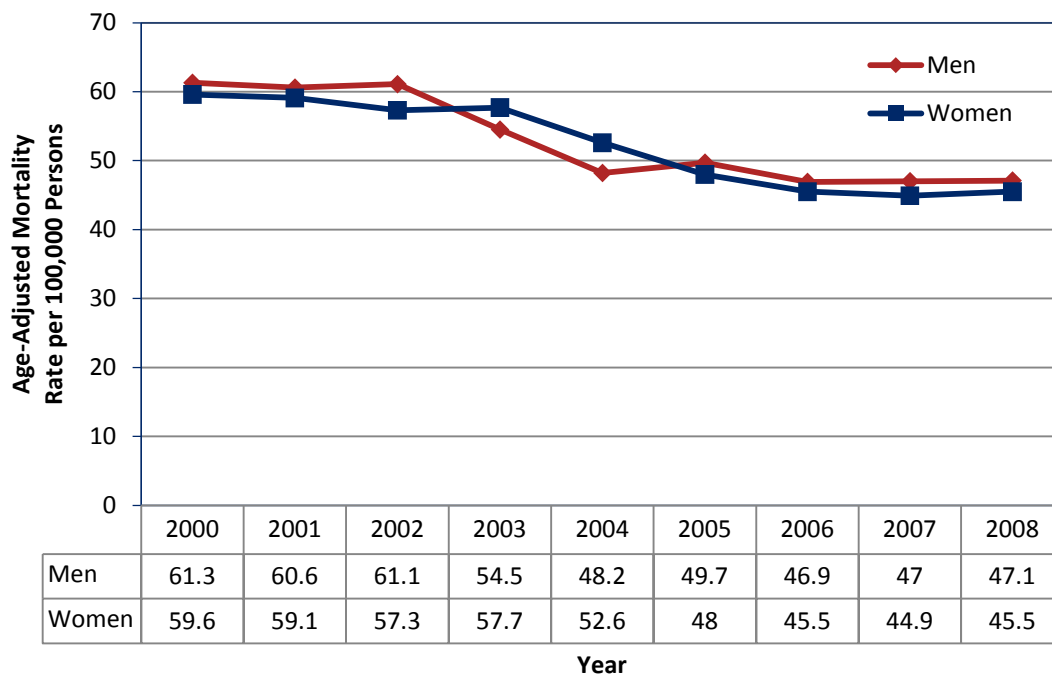


Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE. United States Compressed Mortality Data, CDC Wonder, Centers for Disease Control and Prevention. <http://wonder.cdc.gov/>
Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Stroke was defined as ICD-10 codes I60-I69.

Stroke Mortality by Sex, 2000-2008

In Kansas, age-adjusted stroke mortality rates were similar for men and women during the period from 2000-2008 (Figure 2-2). Mortality rates have declined for both men and women during this period, consistent with the national trend for both men and women. Age-adjusted stroke mortality rates for 2006 in Kansans were slightly higher than the national rates for both men (43.9 per 100,000 U.S. men compared to 47.1 per 100,000 Kansans men) and women (42.6 per 100,000 U.S. women compared to 45.5 per 100,000 Kansans women).

Figure 2-2. Age-adjusted stroke mortality rates by sex and year, Kansas 2000-2008.



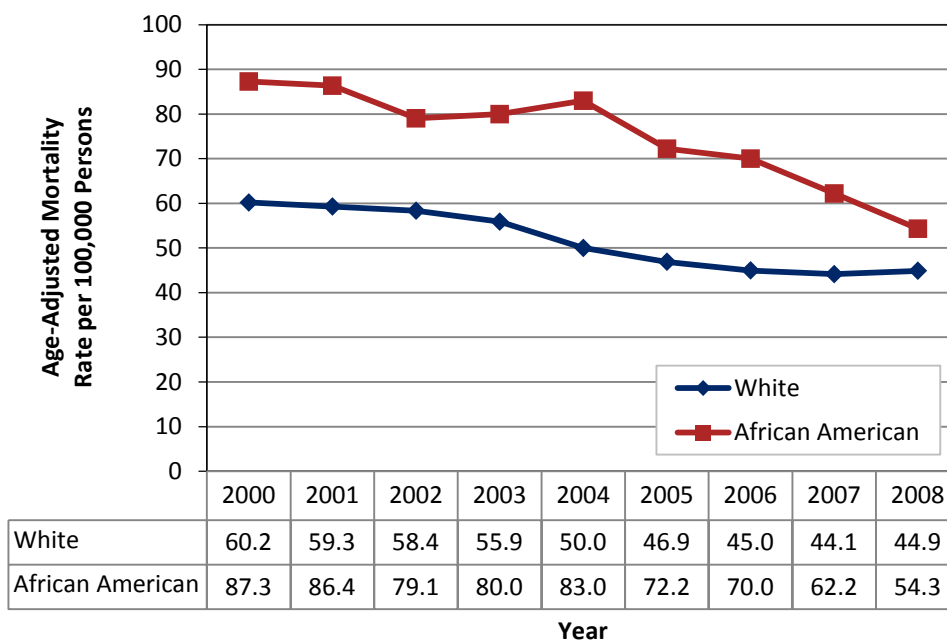
Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Stroke was defined as ICD-10 codes I60-I69.

Stroke Mortality by Race and Ethnicity, 2000-2008

In Kansas, stroke mortality showed a declining trend among whites and African Americans during the period 2000-2008 (Figure 2-3). Despite the decline in mortality rates in both race subgroups, stroke mortality was higher for African American Kansans than for White Kansans. This disparity in stroke mortality was evident each year during the period 2000-2008. Mortality rates for American Indian, Alaska Native, Asian, Pacific Islander or Kansans of other race categories are not shown because the number of deaths was insufficient for computing a statistically reliable rate for these race groups. Mortality rates by Hispanic ethnicity are not shown because the number of deaths was insufficient for computing a statistically reliable rate.

Figure 2-3. Age-adjusted stroke mortality rates by race and year, Kansas 2000-2008.



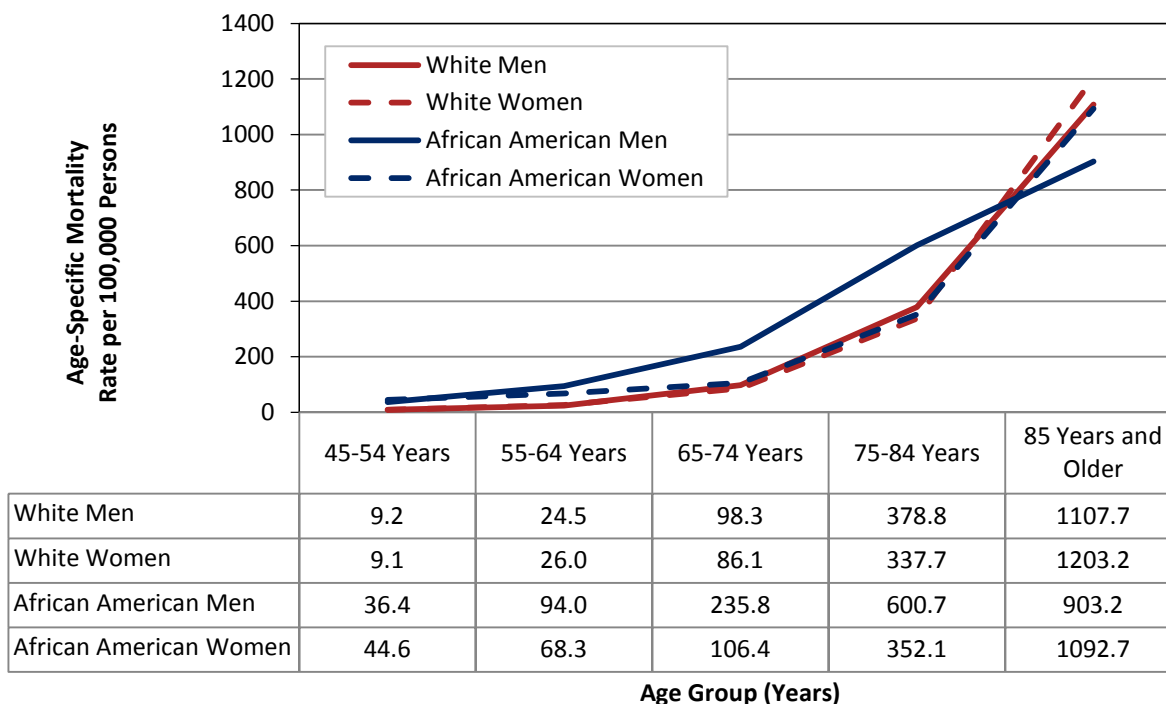
Source: 2000-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Stroke was defined as ICD-10 codes I60-I69.

Age-Specific Stroke Mortality by Sex and Race

In Kansas, mortality from stroke increases dramatically with age regardless of race or sex (Figure 2-4). Among those aged 65-84 years, stroke mortality rates were higher among African American men as compared to white men and among African American women as compared to white women. The mortality rate was particularly high for African American men ages 65 to 84 years as compared to white men and women of either race subgroup, but among those 85 years and older the mortality rate was lower for African American men. This pattern of age-specific mortality rates likely reflects a younger age of stroke death for African American men as compared with stroke deaths among white men and women of either race subgroup. In 2008, the median age of death from stroke for African American men was 72 years, 82 years for white men, 76 years for African American women and 86 years for white women.

Figure 2-4. Age-specific stroke mortality rates by race and sex for Kansas residents 45 years and older, Kansas 2006-2008.

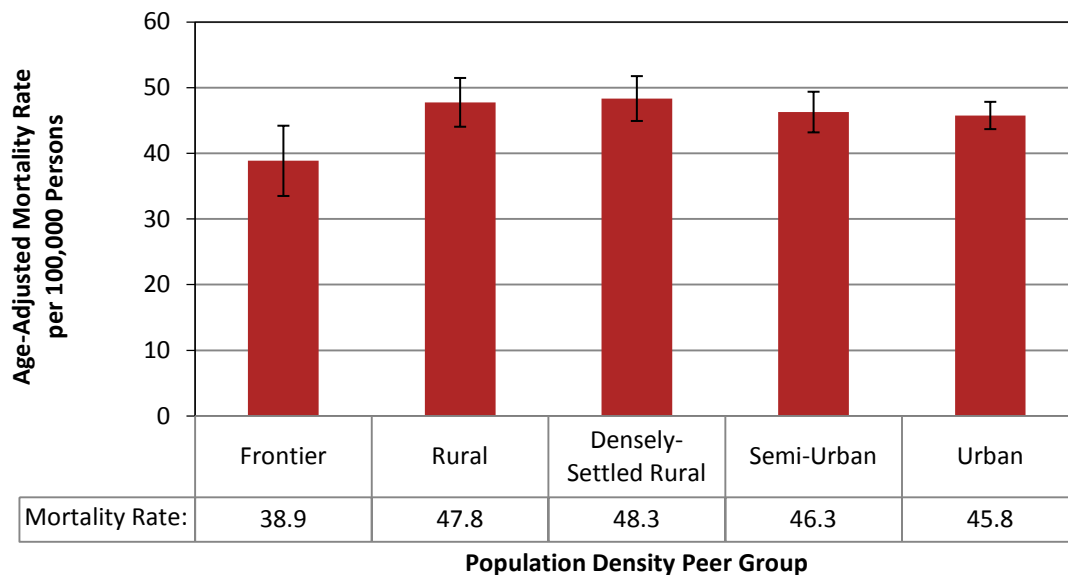


Source: 2006-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE. See Technical Appendix for details on how rates were calculated. Stroke was defined as ICD-10 codes I60-I69.

Stroke Mortality by County Population Density Peer-Groups

In Kansas, there was a modest difference in the age-adjusted mortality rate for frontier counties (38.9 deaths per 100,000 county residents; 95% confidence interval: 33.5 to 44.2) and densely-settled rural counties (48.3 deaths per 100,000 county residents; 95% confidence interval: 44.9 to 51.8), but not among other county population density peer groups (Figure 2-5).

Figure 2-5. Age-adjusted stroke mortality rates by county of residence population density peer groups, Kansas 2006-2008.



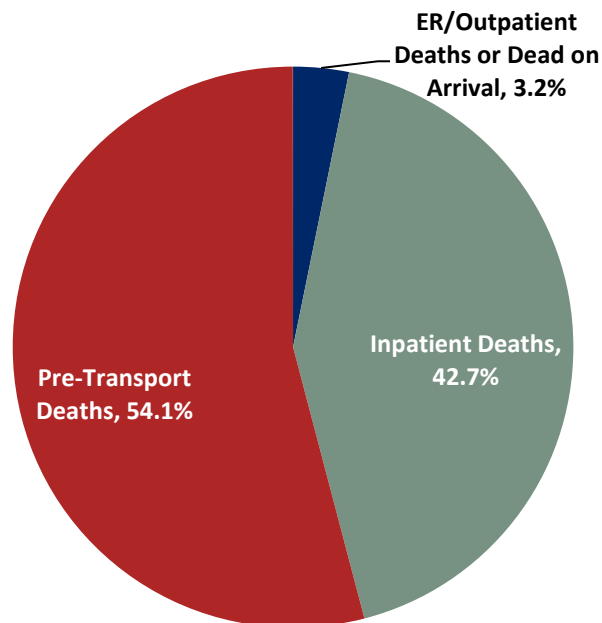
Source: 2006-2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated and county population density peer group definitions and list of counties. Stroke was defined as ICD-10 codes I60-I69.

Pre-Transport Stroke Mortality

Many stroke deaths can be prevented if medical care is accessed immediately. This requires early recognition of stroke onset, prompt access to emergency transport and medical treatment. In Kansas, more than half of persons who die from stroke (54%) die before reaching a hospital, clinic or medical center (Figure 2-6). The most recent national estimate⁴ of the percentage of pre-transport deaths is 49.2% for 2002, lower than the percentage of pre-transport deaths in Kansas in 2002 (55.4%). The percentage of pre-transport stroke deaths has not increased or decreased significantly over the period 2000-2008 (data not shown) despite the general decline in stroke mortality during the period (Figure 2-1). Decreasing the delay in the decision to seek medical care may be an opportunity to further decrease stroke mortality in Kansas.

Figure 2-6. Location of Stroke Death, Kansas 2008.



Source: 2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Pre-transport Deaths includes deaths occurring in a nursing home, residence, assisted living facility or another location other than a hospital, clinic or medical center. Inpatient Deaths includes deaths occurring in a hospital, clinic or medical center after admission to that facility. ER/Outpatient Deaths or Dead on Arrival include deaths occurring before admission to a hospital, clinic or medical center. Deaths occurring in hospice were excluded. Stroke was defined as ICD-10 codes I60-I69.

Pre-Transport Stroke Mortality by Age, Sex, and Race

Among stroke deaths in Kansas in individuals 85 years or older, about 2 out of 3 (66%) were pre-transport (Table 2-1). The percentage of pre-transport stroke deaths was higher for women (59.3%) than for men (47.0%). The percentage of pre-transport stroke deaths increased significantly with age. The percentage of pre-transport stroke deaths was higher among whites as compared to African Americans. The percentage of pre-transport stroke deaths was higher among white women as compared to African American women and men of both races. However, these differences should be interpreted with caution due to the small number of stroke deaths among African American men and women. These results are generally consistent with national figures.⁴

Table 2-1. Percentage of pre-transport stroke deaths by sex, race and age, Kansas 2008.

Population Group	Number of Pre-Transport Deaths	Percent Pre-Transport	95% Confidence Interval
Total	778	54.1%	51.7% to 54.8%
Age			
64 Years and Younger	47	30.3%	23.2% to 38.2%
65 to 74 Years	59	38.8%	31.0% to 47.1%
75 to 84 Years	222	50.0%	45.3% to 54.8%
85 Years and Older	450	65.5%	61.8% to 69.1%
Sex			
Men	255	47.0%	42.7% to 51.3%
Women	514	59.3%	55.9% to 62.6%
Race			
White	733	55.3%	52.6% to 58.0%
African American	28	44.4%	31.9% to 57.5%
Sex and Race			
White Men	238	47.3%	43.0% to 51.7%
White Women	495	60.2%	56.8% to 63.4%
African American Men	13	43.3%	27.4% to 60.8%
African American Women	15	45.5%	29.8% to 62.0%

Source: 2008 Kansas Vital Statistics, Center for Health and Environmental Statistics, KDHE.

Pre-transport Deaths includes deaths occurring in a nursing home, residence, assisted living facility or another location other than a hospital, clinic or medical center. Inpatient Deaths includes deaths occurring in a hospital, clinic or medical center after admission to that facility. ER/Outpatient Deaths or Dead on Arrival include deaths occurring before admission to a hospital, clinic or medical center. Deaths occurring in hospice were excluded. Stroke was defined as ICD-10 codes I60-I69.

2.2 Stroke Prevalence

Prevalence of Stroke by Age and Sex

In addition to being a leading cause of death, stroke is a major cause of morbidity (Table 2-2). In 2009, nearly 55,000 Kansans 18 years and older (2.6%) were told by a health care provider they have had a stroke. Stroke prevalence was higher in older age groups. About 7% of Kansans 65 years and older have been diagnosed with stroke. No significant differences were seen in stroke prevalence between men and women or among race and ethnicity groups. The prevalence of stroke has not changed significantly during the period from 2004 to 2008 (data not shown). The prevalence of stroke in Kansas was similar to the National median prevalence for 2009 (2.4%).

Table 2-2. Percentage of adults 18 Years and older who have been diagnosed with stroke by sex, age and race and ethnicity, Kansas 2009.

Population Subgroup	Percent Reporting a	
	Past Stroke	95% Confidence Limit
Total	2.6%	2.4% - 2.8%
Sex		
Men	2.5%	2.1% - 2.8%
Women	2.7%	2.4% - 3.0%
Age		
18 to 44	0.6%	0.3% - 0.8%
45 to 54	2.1%	1.6% - 2.6%
55 to 64	3.6%	3.0% - 4.2%
65 and older	7.8%	7.1% - 8.5%
Race, Ethnicity		
White, Non-Hispanic	2.6%	2.4% - 2.9%
African American, Non-Hispanic	3.5%	2.0% - 5.0%
Other/Multi-Race, Non-Hispanic	2.7%	1.6% - 3.7%
Hispanic	1.6%	0.8% - 2.4%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

2.3 Hospitalizations Due to Stroke

Hospital Discharges and Length of Stay, 2000-2008

In Kansas, consistent with the downward trend in stroke mortality rate (see Figure 2-1), age-adjusted hospital discharge rates for stroke (as the primary diagnosis) have declined from 24.3 per 10,000 persons in 2000 to 20.1 per 10,000 persons in 2008 (Table 2-3). However, this trend should be interpreted with caution because the number of hospitals that submit data each year to the Kansas hospital discharge database varies, suggesting that records from some facilities may be missing for some years. In Kansas, the median length of stay for stroke hospitalizations was 3 days in 2008.

Table 2-3. Stroke inpatient hospital discharges and length of stay, Kansas 2000-2008.

Year	Number of Stroke Discharges	Median Length of Stay (Days)	Average Length of Stay (Days)	Unadjusted Discharge Rate per 10,000 Persons	Age-Adjusted Discharge Rate per 10,000 Persons	95% Confidence Interval for Age-Adjusted Rate
2000	7,142	4	4.7	26.6	24.4	23.8 - 25.0
2001	6,977	4	5	25.8	23.7	23.1 - 24.2
2002	6,887	4*	4.8*	25.4	23.0	22.5 - 23.6
2003	6,415	3	4.7	23.6	21.8	21.3 - 22.4
2004	6,431	3	5	23.5	22.0	21.5 - 22.5
2005	6,357	3	4.8	23.2	21.4	20.9 - 21.9
2006	6,236	3	4.9	22.6	20.9	20.3 - 21.4
2007	6,092	3	4.8	21.9	19.9	19.4 - 20.5
2008	6,207	3	4.7	22.2	20.1	19.6 - 20.6

Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.

Where indicated, rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Stroke was defined as ICD-9 codes 430-434, 436-438.

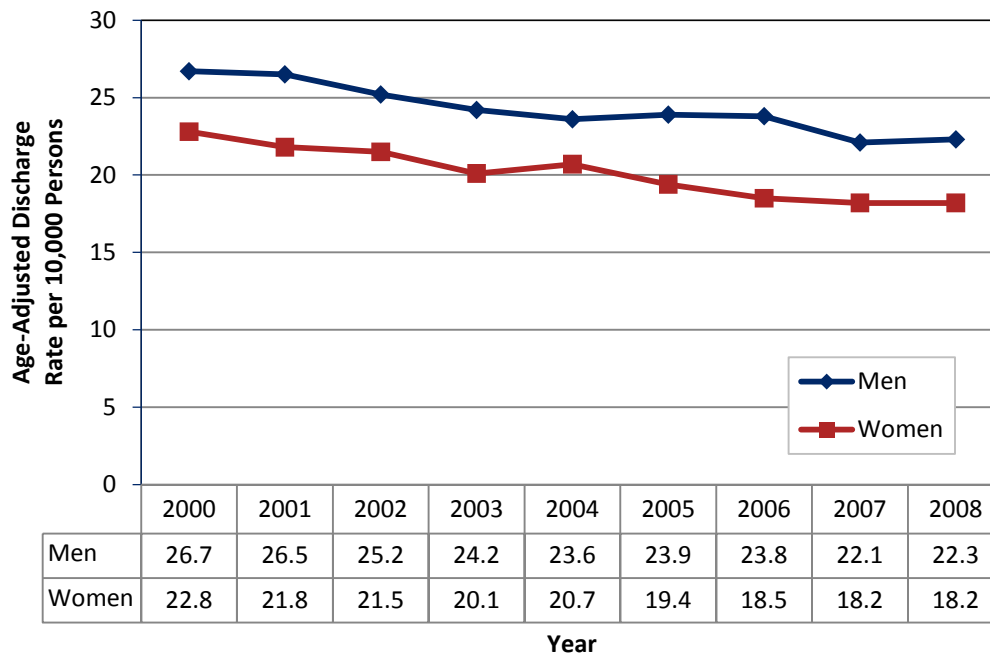
For the purposes of this document, the number of discharges and the unadjusted stroke discharge rate include records with missing values for age and may not match previously reported estimates.

* 19 records with invalid date of admission were excluded from length of stay calculations for 2002.

Hospital Discharges by Sex, 2000-2008

In Kansas, the age-adjusted hospital discharge rate decreased for both men and women during the period from 2000 to 2008. Men experienced higher age-adjusted rates of hospital discharges than men during the period 2000-2008 (Figure 2-7). The difference in rates was relatively constant throughout the period.

Figure 2-7. Age-adjusted stroke hospital discharge rates by sex and year, Kansas 2000-2008.

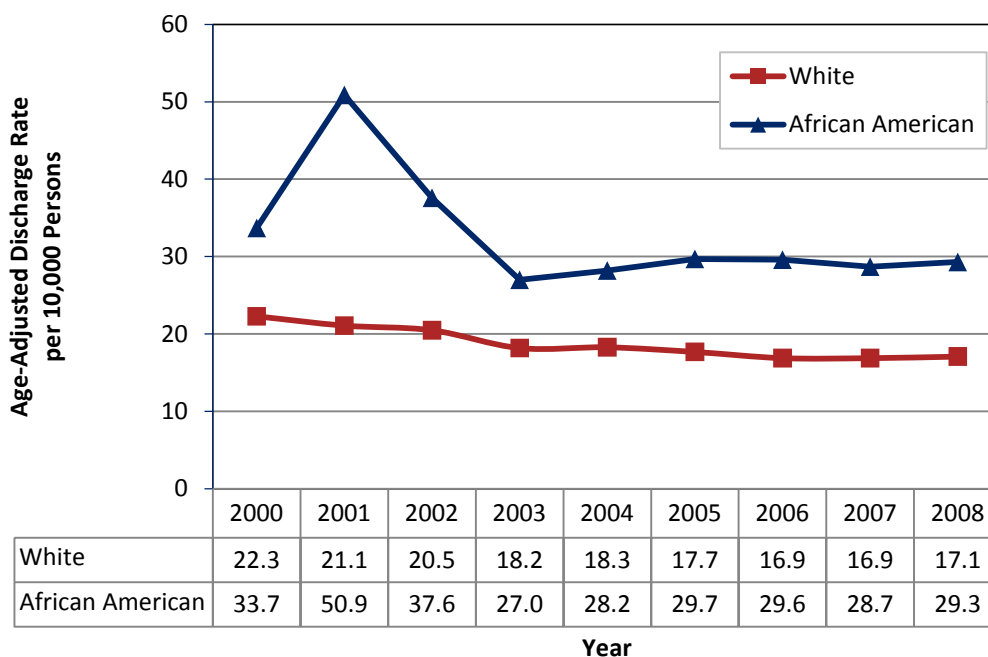


Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.
Stroke was defined as ICD-9 codes 430-434, 436-438.

Hospital Discharges by Race, 2000-2008

In Kansas, age-adjusted stroke hospital discharge rates were higher for African Americans as compared to whites for each year during the period 2000-2008 (Figure 2-8). The elevated rate in 2001 is likely due to certain hospitals submitting data that year as compared with previous and subsequent years. During the period from 2003 to 2008, the age-adjusted hospital discharge rate for African Americans remained relatively stable, increasing from 27.0 discharges per 10,000 persons (95% confidence interval: 24.0 to 30.1) in 2003 to 29.3 discharges per 10,000 persons (95% confidence interval: 26.3 to 32.4) in 2008. In contrast, the age-adjusted hospital discharge rate for whites decreased significantly during that period, from 18.2 discharges per 10,000 persons (95% confidence interval: 17.7 to 18.7) to 2003 to 17.1 discharges per 10,000 persons (95% confidence interval: 16.6 to 17.6) in 2008. Hospital discharge rates for other race groups could not be computed because the number of discharges was insufficient to compute a statistically reliable rate.

Figure 2-8. Age-Adjusted Stroke Hospital Discharge Rates by Race and Year, Kansas 2000-2008.



Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Stroke was defined as ICD-9 codes 430-434, 436-438.

Primary Source of Payment for Stroke Hospitalizations

In Kansas, for patients younger than 65 years, the primary payment for stroke hospitalizations came from a variety of sources (Table 2-4). The majority (53.8%) of hospitalizations for patients aged 64 years and younger listed commercial or private insurers as the primary source of payment. For patients 65 years and older, Medicare was listed as the primary source of payment for the vast majority of stroke inpatient stays (93.4%). This pattern of primary payment source for stroke hospitalizations for patients younger and older than 65 years has been consistent throughout the period from 2000-2008 (data not shown).

Table 2-4. Primary source of payment for stroke hospital discharges for those aged younger than 65 years and those 65 years and older, Kansas 2008.

Payer	Percentage of Discharges Among Persons Ages 64 Years and Younger	Percentage of Discharges Among Persons Ages 65 Years and Older
Commercial/Private Insurance	53.8%	5.3%
Medicare	16.9%	93.4%
Self Pay	12.3%	0.2%
Medicaid	10.6%	0.4%
Other	6.4%	0.6%

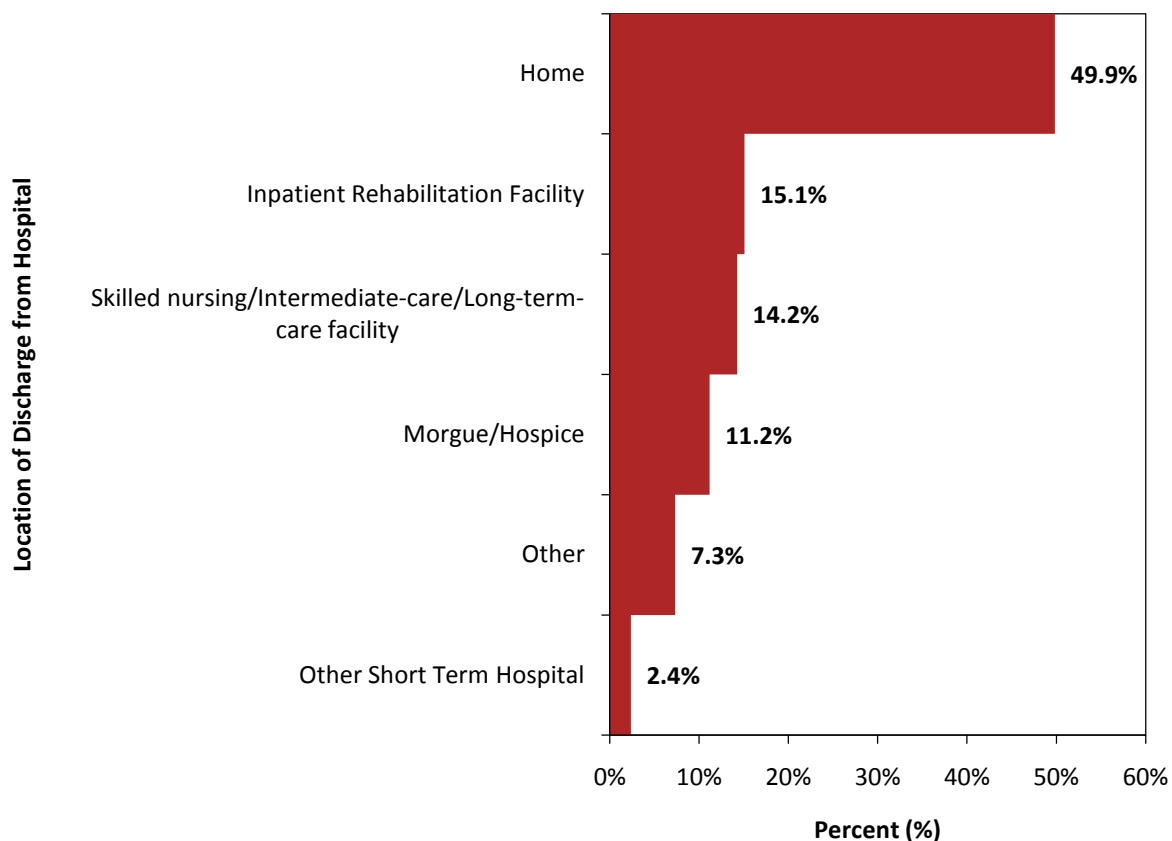
Source: 2008 Hospital Discharge Database, Kansas Hospital Association.

Stroke was defined as ICD-9 codes 430-434, 436-438.

Location of Hospital Discharge for Stroke Hospitalizations

In Kansas, about half of stroke patients were discharged to home following their inpatient treatment (Figure 2-9). Among those not discharged to home, 15.1% were discharged to inpatient rehabilitation facilities, 14.2% to skilled nursing, intermediate-care or directly to long-term-care facilities and 11.2% expired during their hospital stay or were discharged to hospice.

Figure 2-9. Percentage of stroke hospital discharges by location, Kansas 2008.

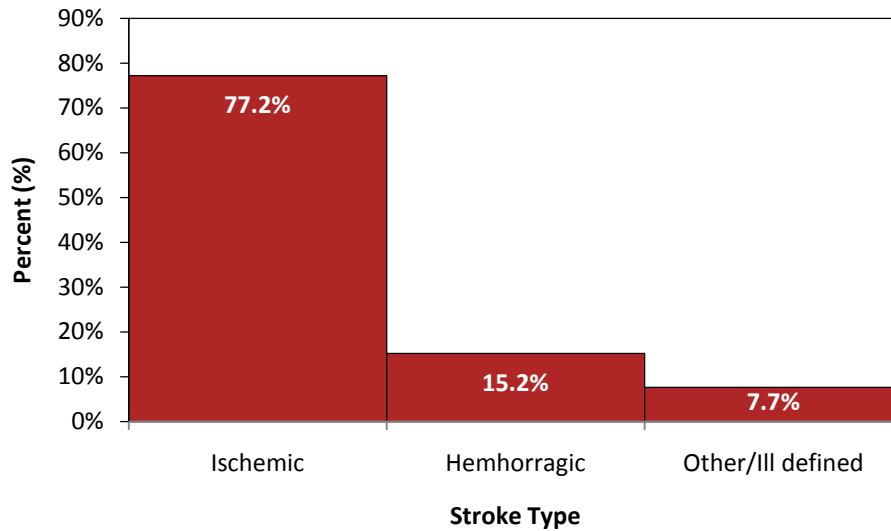


Source: 2008 Hospital Discharge Database, Kansas Hospital Association. See technical appendix for a full list of items included in each discharge location category. The category "Other" includes transfers to federal facilities, psychiatric hospitals, discharge against medical advice and discharges to other types of institutions not categorized here. Stroke was defined as ICD-9 codes 430-434, 436-438.

Hospital Discharges by Stroke Subtype

In Kansas, most stroke hospital discharges were for ischemic stroke (77.2%), with 15.2% hemorrhagic and 7.7% other or ill-defined (Figure 2-10).

Figure 2-10. Percentage of stroke hospital discharges by stroke subtype, Kansas 2008.



Source: 2008 Hospital Discharge Database, Kansas Hospital Association.

Ischemic stroke includes ICD-9 codes 433-434. Hemorrhagic stroke includes ICD-9 codes 430-432. Other/Ill defined strokes include ICD-9 codes 436-438.

Selected Procedures: Endarterectomy and Thrombolytic Therapy, 2000-2008

Table 2-5 displays the number and percentage of ischemic stroke hospitalizations during which endarterectomy was performed and for hospitalizations during which thrombolytic therapy was given. Endarterectomy is an expensive surgical procedure that involves removing atherosclerotic plaque from the inside of the carotid artery. During the period from 2000 to 2008, the percentage of hospital discharges for ischemic stroke that involved endarterectomy (as any listed procedure) declined from 35.7% in 2000 to 22.6% in 2008.

Thrombolytic therapy involves the injection or infusion of agents (for example, tissue plasminogen activator or t-PA) that can break down a clot and restore blood flow to the brain. To be effective, thrombolytic therapy must be administered during a certain time window after stroke onset. During the period from 2000 to 2008, there has been a significant increase in the percentage of stroke hospital discharges for which thrombolytic therapy was given (as any listed procedure).

Table 2-5. Endarterectomy and thrombolytic therapy procedures performed during inpatient ischemic stroke hospitalizations, Kansas 2000-2008.

Year	Endarterectomy			Injection or Infusion of Thrombolytic Agent		
	Number of Procedures	Percent of Ischemic Stroke Discharges	95% Confidence Interval for Percentage	Number of Procedures	Percent of Ischemic Stroke Discharges	95% Confidence Interval for Percentage
2000	1562	35.7%	34.3% - 37.1%	29	0.7%	0.4% - 1.0%
2001	1436	35.5%	34.0% - 37.0%	31	0.8%	0.5% - 1.1%
2002	1506	36.4%	34.9% - 37.9%	38	0.9%	0.7% - 1.3%
2003	1379	35.0%	33.5% - 36.5%	50	1.3%	0.9% - 1.7%
2004	1308	31.1%	29.7% - 32.5%	70	1.7%	1.3% - 2.1%
2005	1209	25.2%	23.9% - 36.4%	65	1.4%	1.1% - 1.7%
2006	1158	24.4%	23.2% - 25.7%	67	1.4%	1.1% - 1.8%
2007	1073	23.0%	21.8% - 24.2%	86	1.9%	1.5% - 2.3%
2008	1083	22.6%	21.4% - 23.8%	115	2.4%	2.0% - 2.9%

Source: 2000-2008 Hospital Discharge Database, Kansas Hospital Association.

Ischemic stroke was defined as ICD-9 codes 433-434. Endarterectomy was attributed to records with any listed ICD-9-CM code 38.1. Injection or infusion of thrombolytic agent was attributed to records with any listed ICD-9-CM code 99.10.

2.4 Knowledge of Signs and Symptoms of Stroke

Knowledge of Signs and Symptoms of Stroke by Selected Characteristics

Prompt access to medical care is crucial for preventing death and disability from stroke. The initial step in accessing medical care is recognizing the signs and symptoms of a stroke as it occurs and calling 911. A series of questions to assess knowledge of the signs and symptoms of stroke among adult Kansans were included in the Kansas BRFSS in 2007. Respondents were asked to identify whether each of 5 items are true signs of a stroke and also to identify an additional item that is an incorrect symptom of stroke (sudden chest pain or discomfort; in italic font in Table 2-6). A separate question asked respondents to indicate their first action in the event of a heart attack or stroke.

Table 2-6. Percentage of adults 18 years and older aware of the signs and symptoms of stroke and the importance of accessing emergency medical by promptly calling 911, Kansas 2007.

Stroke Signs and Symptoms Questions	Percent with Correct Response (%)	95% Confidence Interval
Do you think sudden confusion or trouble speaking are symptoms of a stroke?	91.3%	90.1% to 92.6%
Do you think sudden numbness or weakness of face, arm, or leg, especially on one side, are symptoms of a stroke?	95.3%	94.3% to 96.2%
Do you think sudden trouble seeing in one or both eyes is a symptom of a stroke?	76.4%	74.7% to 78.0%
<i>Do you think sudden chest pain or discomfort are symptoms of a stroke? (Incorrect Symptom)</i>	<i>46.2%</i>	<i>44.3% to 48.1%</i>
Do you think sudden trouble walking, dizziness, or loss of balance are symptoms of a stroke?	90.2%	89.0% to 91.4%
Do you think severe headache with no known cause is a symptom of a stroke?	63.4%	61.5% to 65.2%
Summary Measures	Percent with Correct Response (%)	95% Confidence Interval
Correct response for all 6 questions for stroke signs and symptoms	26.6%	24.9% to 28.2%
Identified calling 911 as the first response to someone having a heart attack or stroke	86.2%	84.9% to 87.6%
All stroke symptoms recognized and identified 911 as the first response to someone having a heart attack or stroke	22.8%	21.2% to 24.4%

Source: 2007 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

The percentage of adults 18 years and older in Kansas who correctly recognized “sudden confusion or trouble speaking”, “sudden numbness or weakness of the face, arm or leg” and “sudden trouble walking, dizziness, or loss of balance” exceeded 90% (Table 2-6). Recognition of “trouble seeing in one or both eyes” (76%) and “severe headache” (63%) was lower. The percentage of adults that correctly noted “chest pain or discomfort” as an incorrect sign or symptoms of heart attack was lower (46%). The percentage of adults who correctly recognized all 6 signs and symptoms was only 27% in 2007.

Estimates for the percentage of adults who could correctly recognize all 6 stroke signs and symptoms and also identified calling 911 as their first response to someone having a heart attack or stroke are provided in Table 2-7. Consistent with results from other states⁵, the percentage of adults 18 and older who correctly recognized all stroke symptoms and the appropriate response to call 911 was low (23%) and has not changed significantly from the percentage in 2004 (21.5%, 95% confidence interval: 20.0% to 23.0%) or in 2005 (21.1%, 95% confidence interval: 19.5% to 22.7%).

Knowledge of Signs and Symptoms of Stroke by Selected Characteristics

Awareness of stroke signs and symptoms and the importance of calling 911 was lower among those aged 18 to 24 years (12.6%) and among those aged 65 years and older (16.7%). It was lower among non-Hispanic African Americans (14.5%) as compared with non-Hispanic whites (24.4%). Knowledge of stroke signs and symptoms and the importance of calling 911 were higher among Kansans with higher annual household income and with higher educational attainment. Knowledge of stroke signs and symptoms and the importance of calling 911 was low among Kansans with a history of coronary heart disease or a past heart attack, diabetes, high blood pressure and among those who have been tested and diagnosed with high cholesterol. Public health efforts to improve knowledge of signs and symptoms of stroke and the importance of calling 911 may benefit Kansans, particularly among African Americans who experience a disproportionate burden of stroke mortality (see Figure 2-3).

Table 2-7. Percentage of adults 18 and older that correctly identified all stroke symptoms and identified 911 as the first response to someone having a heart attack or stroke, 2007.

Characteristic	Percent of Adults 18 Years and Older	95% Confidence Interval
Total	22.3%	21.2% to 26.1%
Age (Years)		
18 to 24	12.6%	6.5% to 18.7%
25 to 34	23.3%	19.0% to 27.5%
35 to 44	24.1%	20.4% to 27.7%
45 to 64	27.5%	25.2% to 29.8%
65 and older	16.7%	14.5% to 19.0%
Sex		
Men	21.7%	19.2% to 24.2%
Women	23.8%	21.9% to 25.8%
Race and Ethnicity		
White, Non-Hispanic	24.4%	22.7% to 26.1%
African American, Non-Hispanic	14.5%	6.5% to 22.4%
Other/Multi-Race, Non-Hispanic	20.6%	10.8% to 30.5%
Hispanic	5.0%	1.3% to 8.7%
Household Income		
Below \$15,000	15.4%	10.0% to 20.8%
\$15,000 to \$24,999	16.2%	12.0% to 20.5%
\$25,000 to 34,999	19.5%	15.0% to 24.1%
\$35,000 to \$49,999	23.0%	19.3% to 26.7%
\$50,000 or Higher	27.8%	25.2% to 30.3%
Education		
Did Not Graduate High School	8.8%	4.1% to 13.5%
High School Graduate	15.1%	12.7% to 17.5%
Some Technical Education or College	22.7%	19.8% to 25.6%
College or Technical Education Graduate	30.9%	28.0% to 33.8%
Selected Health Conditions		
Coronary Heart Disease or Past Heart Attack	19.8%	15.3% to 24.3%
Diabetes	19.7%	15.2% to 24.3%
High Blood Cholesterol*	24.6%	22.0% to 27.3%
High Blood Pressure	22.9%	20.2% to 25.7%
Stroke	13.2%	7.8% to 18.7%

Source: 2007 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

*Respondents indicating that they have been tested and told that they have high blood cholesterol.

Chapter 3: Risk Factors for CHD and Stroke

A number of factors significantly increase a person's risk for developing coronary heart disease (CHD) or stroke. Some of these risk factors cannot be modified. These include increasing age, being male and having a family history of cardiovascular disease. Modifiable risk factors include certain health conditions such as high blood pressure, high blood cholesterol, diabetes and obesity as well as unhealthy behaviors such as smoking tobacco, not exercising enough and eating a diet high in saturated fat and cholesterol. A diet high in sodium can also increase risk for high blood pressure, an important risk factor for CHD and stroke.

This chapter is divided into three sections focusing on high blood pressure, high blood cholesterol and other major risk factors for CHD and stroke. High blood pressure and high blood cholesterol have been considered separately in this document because these two factors are priorities for efforts directed toward secondary prevention of CHD and stroke in Kansas.

3.1 High Blood Pressure

Prevalence of High Blood Pressure 2001-2009

Prevalence of High Blood Pressure by Sex

Prevalence of High Blood Pressure by Age and Sex

Prevalence of High Blood Pressure by Race and Ethnicity

Prevalence of High Blood Pressure by Annual Household Income

Prevalence of High Blood Pressure by Education

Prevalence of High Blood Pressure by Population Density Peer Group

Prevalence of Selected Health Conditions and Risk Factors by High Blood Pressure Status

Preventive Care for High Blood Pressure: Actions to Control High Blood Pressure

Preventive Care for High Blood Pressure: Testing for High blood cholesterol

Preventive Care for High Blood Pressure: Influenza and Pneumonia Vaccination

3.2 High Blood Cholesterol

Prevalence of High Blood Cholesterol 2001-2009

Prevalence of High Blood Cholesterol by Sex

Prevalence of High Blood Cholesterol by Age and Sex

Prevalence of High Blood Cholesterol by Race and Ethnicity

Prevalence of High Blood Cholesterol by Annual Household Income

Prevalence of High Blood Cholesterol by Education

Prevalence of High Blood Cholesterol by Population Density Peer Group

Prevalence of Selected Health Conditions and Risk Factors by Cholesterol Status

3.3 Other Risk Factors

Smoking

Diabetes

Physical Inactivity

Overweight and Obesity

Unhealthy Diet

3.1 High Blood Pressure

Blood pressure is the force exerted on artery walls as blood is pumped by the heart through the circulatory system. High blood pressure, also called hypertension, is a chronic health condition that requires the heart to work harder causing the heart muscle to weaken over time. High blood pressure significantly increases risk for heart attack and stroke. One in 3 American adults has high blood pressure.¹

High blood pressure is defined as:

- Having systolic pressure of 140 mmHg or higher or diastolic pressure of 90 mmHg or higher
or
- Taking medication to control high blood pressure
or
- Being told at least twice by a physician or other health professional that you have high blood pressure

Table 3-1. Classification of blood pressure for adults.

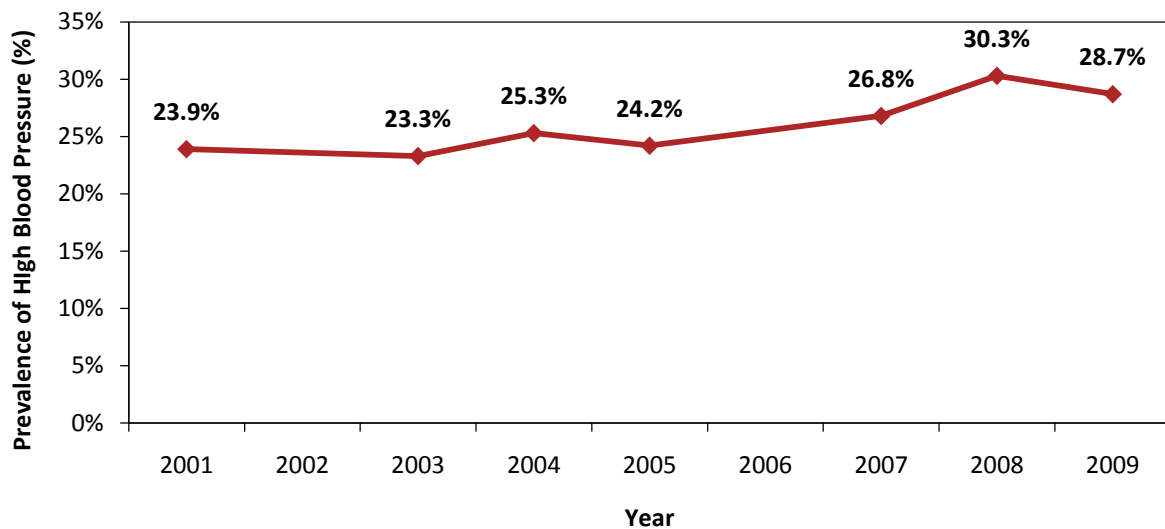
Blood Pressure Classification	Systolic Blood Pressure		Diastolic Blood Pressure
Normal	<120 mmHg	and	<80 mmHg
Prehypertension	120 to 139 mmHg	or	80 to 89 mmHg
Stage 1 Hypertension	140 to 159 mmHg	or	90 to 99 mmHg
Stage 2 Hypertension	≥160 mmHg	or	≥100 mmHg

Source: The Seventh Report of Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure, 2004.⁶

Prevalence of High Blood Pressure 2001-2009

About 600,000 Kansas adults 18 years and older (28.7%; 95% confidence interval: 27.9% to 29.5%) reported they have been diagnosed with high blood pressure, similar to the median National prevalence (28.6%) for 2009. During the period from 2001 to 2009, the prevalence of high blood pressure increased from 23.9% (95% confidence interval: 22.5% to 25.3%) in 2001 to 28.7% (27.9% to 29.5%) in 2009, a 20% increase (Figure 3-1). During the same period, the median National prevalence increased by 12%, from 25.6% in 2001 to 28.6% in 2009.⁷

Figure 3-1. Percentage of adults 18 years and older diagnosed with high blood pressure, Kansas 2001-2009.

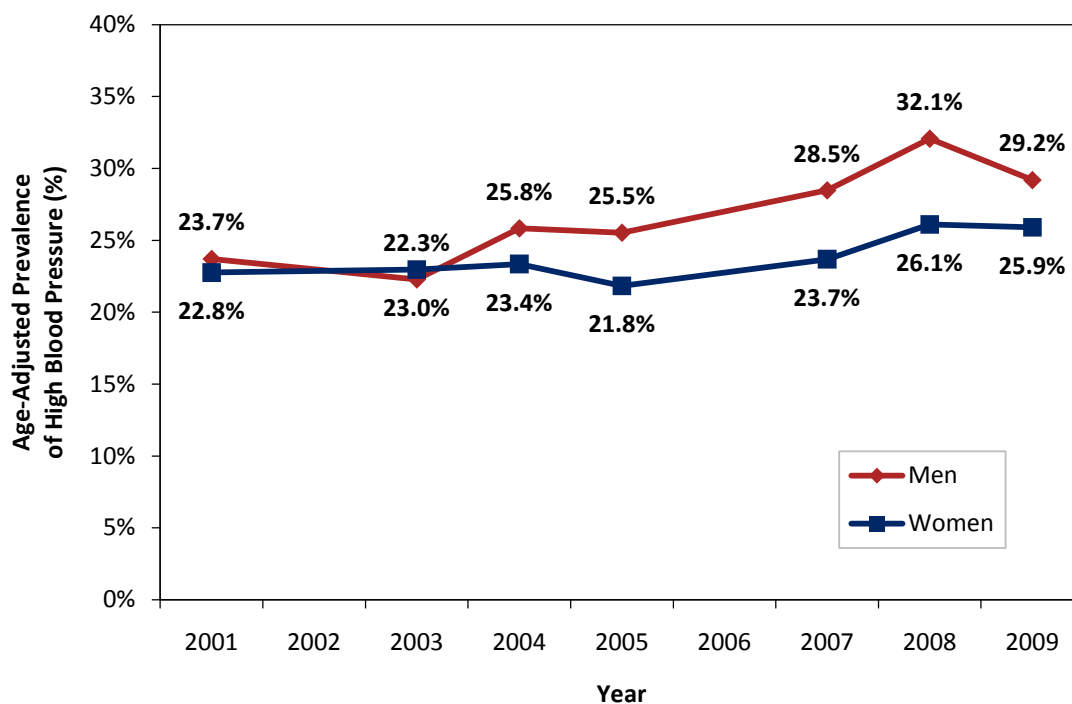


Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Questions regarding high blood pressure were asked on one branch of the BRFSS survey to approximately half of all respondents with high blood pressure for 2004 and 2008. Questions related to high blood pressure were not included in the survey for 2002 and 2006.

Prevalence of High Blood Pressure by Sex

In 2009, the age-adjusted prevalence of high blood pressure among men 18 years and older was 29.2% (95% confidence interval: 28.0% to 30.4%) and among women 18 years and older was 25.9% (95% confidence interval: 25.1% to 26.7%). During the period from 2001 through 2009, the age-adjusted percentage of men with high blood pressure increased from 23.7% (95% confidence interval: 21.7% to 25.6%) in 2001 to 29.2% (95% confidence interval: 28.0% to 30.4%), a 23% increase. During the same period, a smaller increase was seen in the percentage of women 18 years and older with high blood pressure, increasing from 22.8% (95% confidence interval: 21.2% to 24.3%) in 2001 to 25.9% (95% confidence interval: 25.1% to 26.7%) in 2009, a 14% increase.

Figure 3-2. Age-adjusted percentage of adults 18 years and older diagnosed with high blood pressure by sex, Kansas 2001-2009.

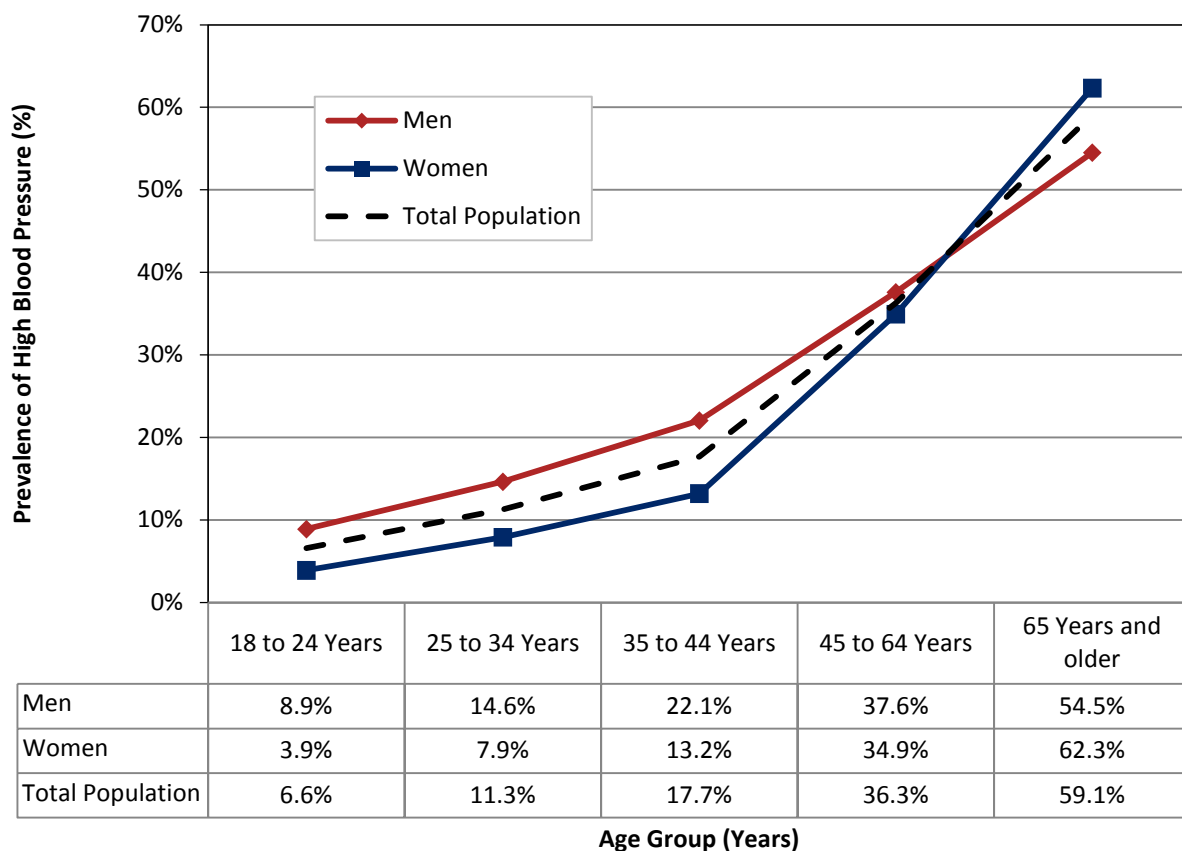


Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Data labels for men are shown above the point estimate on the chart. Data labels for women are shown below the point estimate on the chart. Questions regarding high blood pressure were asked on one branch of the BRFSS survey to approximately half of all respondents with high blood pressure for 2004 and 2008. Questions related to high blood pressure were not included in the survey for 2002 and 2006. Prevalence estimates were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated.

Prevalence of High Blood Pressure by Age and Sex

The percentage of adults with high blood pressure increases dramatically with age (Figure 3-3). Three in five Kansans 65 years and older have been diagnosed with high blood pressure (59.1% for the total population; 95% confidence interval: 57.7% to 60.4%) in 2009. The prevalence of high blood pressure was higher among women ages 65 years and older (62.3%; 95% confidence interval: 60.7% to 63.9%) than among men ages 65 years and older (54.5%; 95% confidence interval: 52.2% to 56.8%). However, among younger age groups from 18 years to 44 years, the prevalence of high blood pressure was significantly higher for men than for women.

Figure 3-3. Percentage of adults 18 years and older diagnosed with high blood pressure by age and sex, Kansas 2009.

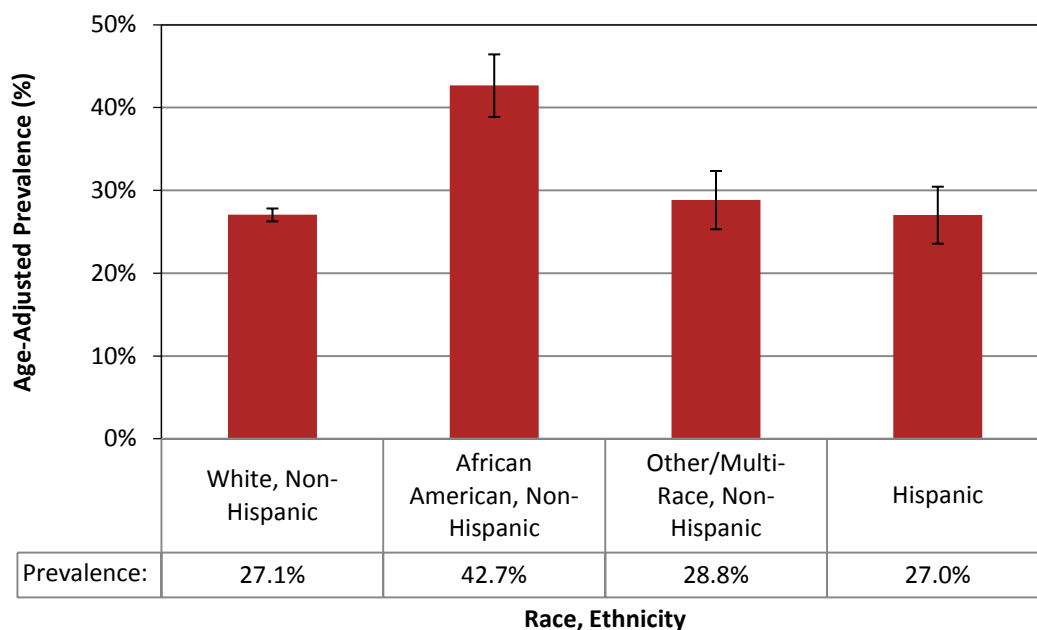


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

Prevalence of High Blood Pressure by Race and Ethnicity

In 2009, the age-adjusted percentage of non-Hispanic African American adults 18 years and older (42.7%; 95% confidence interval: 38.9% to 46.4%) was significantly higher than for non-Hispanic whites (27.1%; 95% confidence interval: 26.3% to 27.8%), non-Hispanic adults of other race or multiple race (28.8%; 95% confidence interval: 25.3% to 32.4%) and Hispanics (27.0%; 95% confidence interval: 23.6% to 30.5%).

Figure 3-4. Age-adjusted percentage of adults 18 years and older diagnosed with high blood pressure by race and ethnicity, Kansas 2009.

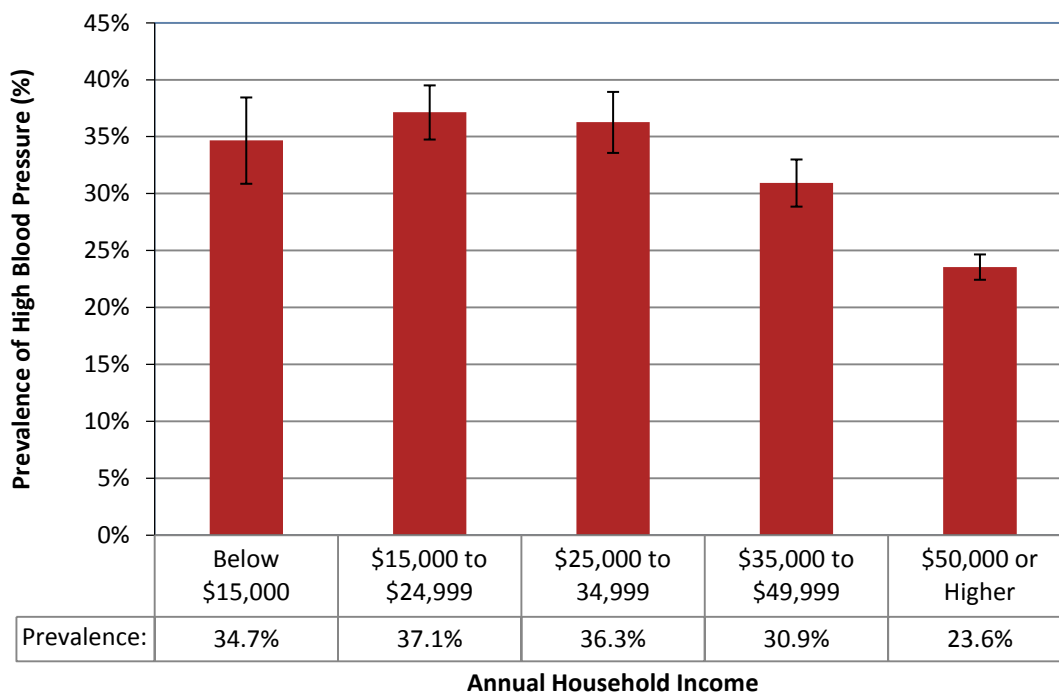


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. The Other/Multi race group includes Asians, Native Hawaiian or other Pacific Islanders, American Indians, Alaska Natives, other race groups and multiple race. Prevalence estimates were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated. Error bars indicate 95% confidence intervals.

Prevalence of High Blood Pressure by Annual Household Income

In 2009, the percentage of adults 18 years and older with high blood pressure was higher among those with lower average annual household income (Figure 3-5). The prevalence of high blood pressure was significantly lower among those with an annual household income of \$50,000 or more (23.6%; 95% confidence interval: 22.4% to 24.7%) as compared to all other income groups.

Figure 3-5. Percentage of adults 18 years and older diagnosed with high blood pressure by annual household income, Kansas 2009.

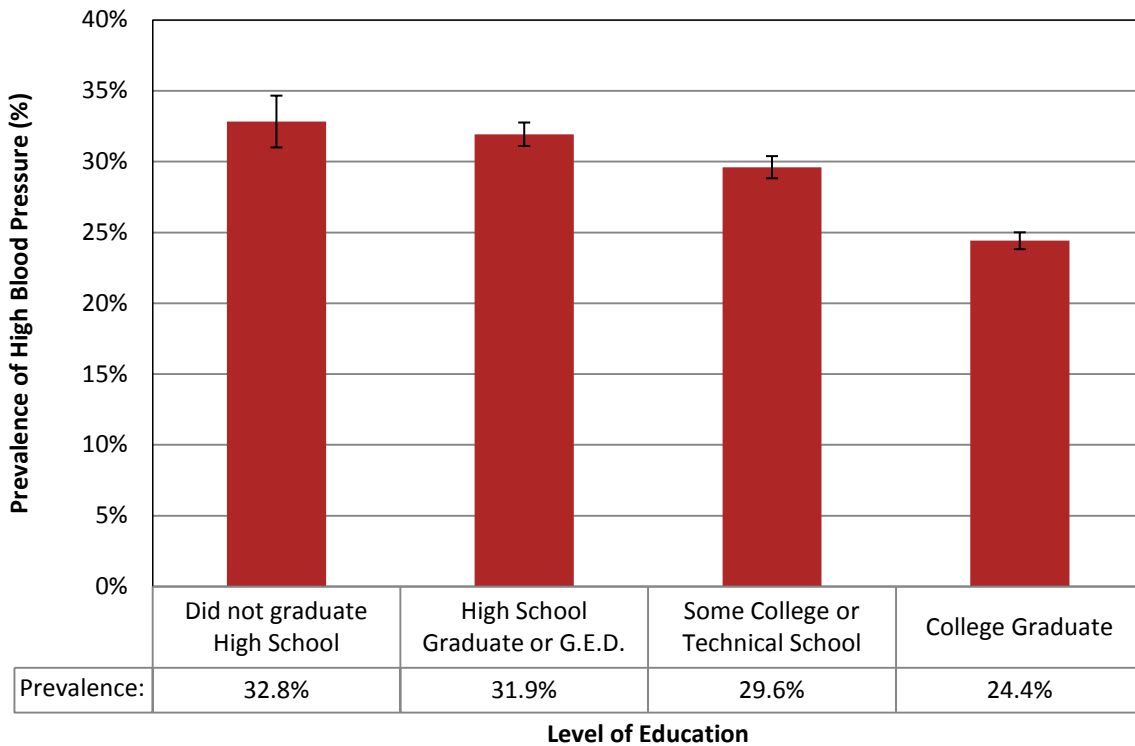


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Error bars indicate 95% confidence intervals.

Prevalence of High Blood Pressure by Education

In 2009, the percentage of adults 18 years and older with high blood pressure was lower among those with higher levels of education (Figure 3-6). The prevalence of high blood pressure was significantly lower among college graduates (24.4%; 95% confidence interval: 23.2% to 25.6%) as compared to all other levels of education.

Figure 3-6. Percentage of adults 18 years and older diagnosed with high blood pressure by education, Kansas 2009.

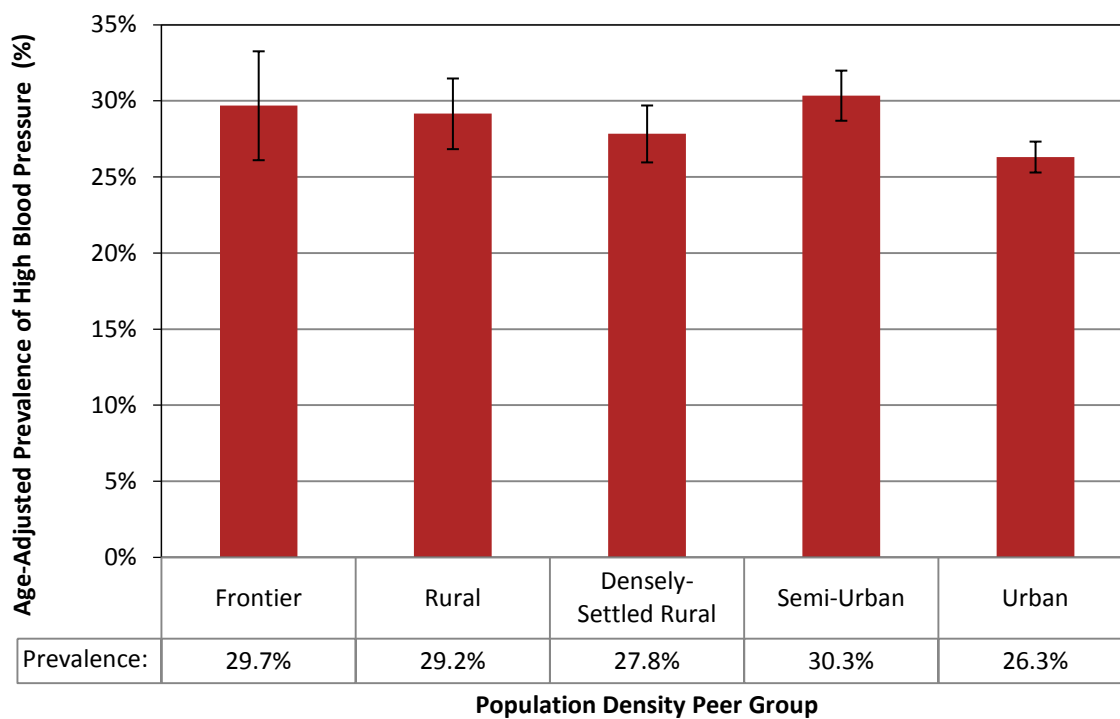


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Error bars indicate 95% confidence intervals.

Prevalence of High Blood Pressure by Population Density Peer Group

To examine differences in the percentage of adults 18 years and older with high blood pressure by rural or urban environment, counties were stratified according to population density peer groups using groups defined by the Kansas Office of Local and Rural Health (see technical appendix for a list of counties). The percentage of adults 18 years and older with high blood pressure was similar for all population density peer groups in 2009 (Figure 3-7).

Figure 3-7. Age-adjusted percentage of adults 18 years and older diagnosed with high blood pressure by population density peer group, Kansas 2009.



Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Prevalence estimates were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated. Error bars indicate 95% confidence intervals.

Prevalence of Selected Health Conditions and Risk Factors by High Blood Pressure Status

Table 3-2 shows the prevalence of selected health conditions and risk factors among adult Kansans 18 years and older with high blood pressure and without high blood pressure. The prevalence of CHD- and stroke-related health conditions including high blood cholesterol, diabetes, disability, arthritis and overweight or obesity were higher among persons with high blood pressure as compared to those without high blood pressure (Table 3-2). There was a higher prevalence of high blood pressure among adults who do not eat the recommended

amount of fruits and vegetables (5 or more times per day) and who do not participate in the recommended level of physical activity as compared to persons without high blood pressure. No significant difference was seen in the prevalence of current smoking among persons with high blood pressure and those without high blood pressure. Similarly, no significant difference was seen in the prevalence of heavy alcohol consumption (men who drink more than 2 drinks per day and women who drink more than 1 drink per day) among persons with high blood pressure and those without high blood pressure.

Table 3-2. Percentage of adults 18 years and older with selected health conditions and risk factors by high blood pressure status, Kansas 2009.

Selected Health Condition or Risk Factor	Among Persons with High Blood Pressure		Among Persons without High Blood Pressure	
	Prevalence of Select Health Condition or Risk Factor (%)	95% Confidence Interval	Prevalence of Select Health Condition or Risk Factor (%)	95% Confidence Interval
High Blood Cholesterol^a	56.0%	54.6% to 57.5%	29.4%	28.3% to 30.5%
Diabetes	19.2%	18.2% to 20.2%	4.2%	3.8% to 4.7%
Disability	34.1%	32.8% to 35.5%	14.9%	14.0% to 15.7%
Arthritis	42.9%	41.4% to 44.3%	16.5%	15.7% to 17.3%
Overweight or Obese (BMI≥25)	77.9%	76.7% to 79.2%	59.3%	58.0% to 60.6%
Current Smoker	16.8%	15.6% to 18.1%	18.2%	17.1% to 19.2%
Fruits and Vegetables Consumed Fewer than 5 Times Per Day	80.8%	79.7% to 81.9%	81.7%	80.7% to 82.6%
Heavy Alcohol Consumption (More than 2 Drinks Per Day for Men, 1 Drink per Day for Women)	3.8%	3.1% to 4.6%	4.2%	3.6% to 4.8%
<i>Physical Activity^b</i>				
Meets Recommendation	40.1%	38.6% to 41.6%	51.9%	50.5% to 53.2%
Does not Meet Recommendation	40.2%	38.7% to 41.6%	38.4%	37.2% to 39.7%
No Physical Activity	19.7%	18.5% to 20.9%	9.7%	9.0% to 10.5%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

^a Prevalence of High blood cholesterol among those who have ever had a cholesterol test.

^b Based on the recommendation for an average of 30 minutes of moderate physical activity 5 days per week or 20 minutes of vigorous physical activity 3 days per week.

Preventive Care for High Blood Pressure: Actions to Control High Blood Pressure

Controlling blood pressure among persons diagnosed with high blood pressure is crucial for preventing or delaying CHD and stroke. In 2009, an estimated 80.2% percent of Kansans 18 years and older with high blood pressure were taking blood pressure medication (Table 3-3). The majority of Kansans 18 years and older with high blood pressure also made modifications in their behavior to reduce blood pressure, which include adopting healthy eating habits (70.1%; 95% confidence interval: 68.1% to 72.0%), exercising (72.8%; 95% confidence interval: 71.0% to 74.7%), cutting down on salt (69.6%; 95% confidence interval: 67.6% to 72.0%) or avoiding salt (9.6%; 95% confidence interval 8.6% to 10.7%), and reducing alcohol use (25.9%; 95% confidence interval 24.0% to 27.8%) or avoiding alcohol (51.2%; 95% confidence interval 49.0% to 53.3%).

Table 3-3. Actions to control high blood pressure, Kansas 2009.

Action to Control High Blood Pressure	Percentage (%)	95% Confidence Interval
Taking blood pressure medication	80.2%	78.8% to 81.7%
Changing eating habits	70.1%	68.1% to 72.0%
Exercising	72.8%	71.0% to 74.7%
<i>Salt</i>		
Cutting down	69.6%	67.6% to 71.6%
Do not use	9.6%	8.6% to 10.7%
<i>Alcohol use</i>		
Reducing	25.9%	24.0% to 27.8%
Do not drink	51.2%	49.0% to 53.3%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. The question regarding use of blood pressure medication was asked of all survey respondents with high blood pressure; all other questions on actions to control high blood pressure were asked on one branch of the BRFSS survey to approximately half of all respondents with high blood pressure.

Preventive Care for High Blood Pressure: Testing for High blood cholesterol

Most adults 18 years and older in Kansas report having had their cholesterol checked (Table 3-4). During the period 2001 through 2009, there was a higher percentage of adults 18 years and older who have ever had a cholesterol test among persons with high blood pressure as compared to those who have not been diagnosed with high blood pressure.

Table 3-4. Percentage of adults 18 years and older who have ever had a test for high blood cholesterol by high blood pressure status, Kansas 2009.

Year	Among Persons with High Blood Pressure		Among Persons without High Blood Pressure	
	Percent Ever Tested for High blood cholesterol	95% Confidence Interval	Percent Ever Tested for High blood cholesterol	95% Confidence Interval
2001	90.7%	88.8% to 92.6%	72.4%	70.6% to 74.2%
2003	90.1%	87.9% to 92.3%	69.1%	67.1% to 71.1%
2004	89.0%	86.2% to 91.8%	67.4%	65.2% to 69.6%
2005	90.5%	88.8% to 92.2%	68.9%	67.3% to 70.5%
2007	92.2%	90.6% to 93.8%	70.3%	68.4% to 72.2%
2008	89.5%	86.8% to 92.3%	73.0%	70.4% to 75.5%
2009	92.7%	91.5% to 93.9%	72.8%	71.4% to 74.1%

Source: 2001- 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Questions regarding high blood pressure and cholesterol awareness were asked on one branch of the BRFSS survey to approximately half of all respondents with high blood pressure for 2004 and 2008. Questions related to high blood pressure and high blood cholesterol were not included in the survey for 2002 and 2006.

Preventive Care for High Blood Pressure: Influenza and Pneumonia Vaccination

About 54% of Kansans 18 years and older with high blood pressure had an influenza vaccination in the past 12 months (Table 3-5). About 43% of Kansans 18 years and older with high blood pressure have had a pneumonia immunization in their lifetime. Although a higher percentage of adults with high blood pressure had influenza and pneumonia vaccinations as compared to those without high blood pressure, there is still a need for further improvement in this regard.

Table 3-5. Percentage of adults 18 years and older who have had an influenza immunization in the past year and who have ever had a pneumonia immunization by high blood pressure status, Kansas 2009.

Vaccination	Among Persons with High Blood Pressure		Among Persons without High Blood Pressure	
	Vaccination (%)	95% Confidence Interval	Vaccination (%)	95% Confidence Interval
Influenza shot in past 12 months	53.8%	52.4% to 55.3%	35.9%	34.7% to 37.1%
Pneumonia shot ever	43.2%	41.8% to 44.7%	18.4%	17.4% to 19.4%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

3.2 High Blood Cholesterol

Cholesterol is a waxy substance present throughout the body. In the blood, cholesterol is transported predominantly in two forms: low density lipoproteins (LDL), also known as “bad cholesterol”, and high density lipoproteins (HDL), also known as “good cholesterol”. When LDL cholesterol is too high it can contribute to atherosclerosis, the disease process underlying CHD and stroke. Because HDL cholesterol can be processed in the liver and removed from the body, high levels of HDL are protective factors for CHD and stroke. Because there are different categories of cholesterol, high blood cholesterol can be defined in different ways. For the purpose of this document, high blood cholesterol is defined as total cholesterol of 240 mg/dL or higher. In 2010, an estimated 35.7 million U.S. adults 20 years and older have high blood cholesterol.¹

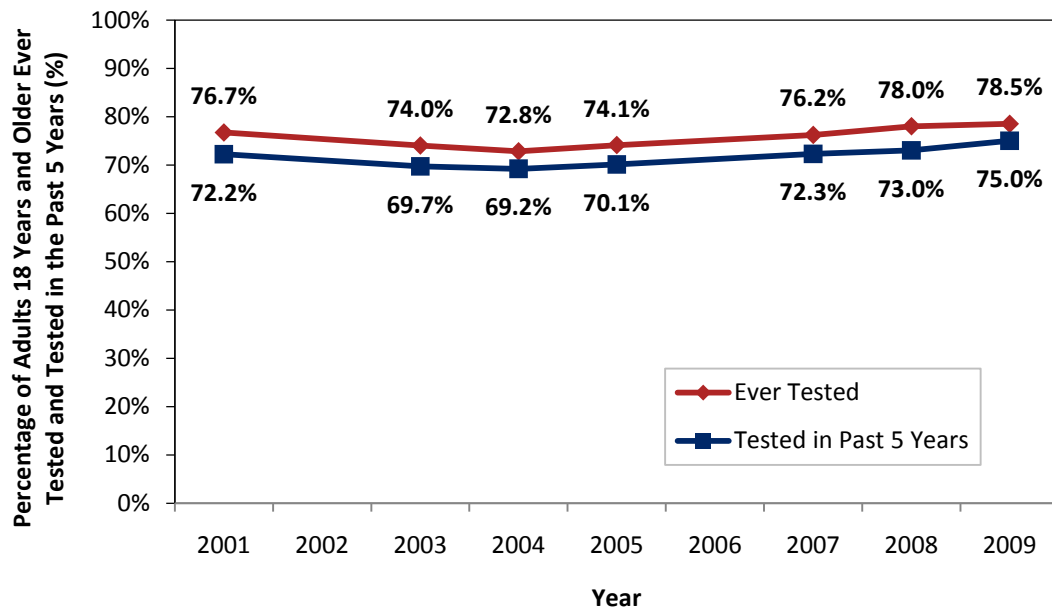
Table 3-6. ATP III classification of LDL, Total and HDL Cholesterol

LDL Cholesterol – Primary Target of Therapy	
< 100 mg/dL	Optimal
100-129 mg/dL	Near optimal/above optimal
130-159 mg/dL	Borderline high
160-189 mg/dL	High
≥ 190 mg/dL	Very high
Total Cholesterol	
< 200 mg/dL	Desirable
200-239 mg/dL	Borderline high
≥ 240 mg/dL	High
HDL Cholesterol	
<40 mg/dL	Low
≥ 60 mg/dL	High

Testing for High Blood cholesterol

In 2009, 78.5% (95% confidence interval: 77.5% to 79.6%) of adults 18 years and older reported ever having a cholesterol test. About 3 in 4 Kansas adults 18 years and older (75.0%; 95% confidence interval: 73.9% to 76.1%) reported a cholesterol test within the past 5 years (Figure 3-8). For both indices, the rate was stable throughout the period from 2001 to 2009.

Figure 3-8. Percentage of adults 18 years and older ever tested for high blood cholesterol and tested in the past 5 years, Kansas 2001-2009.

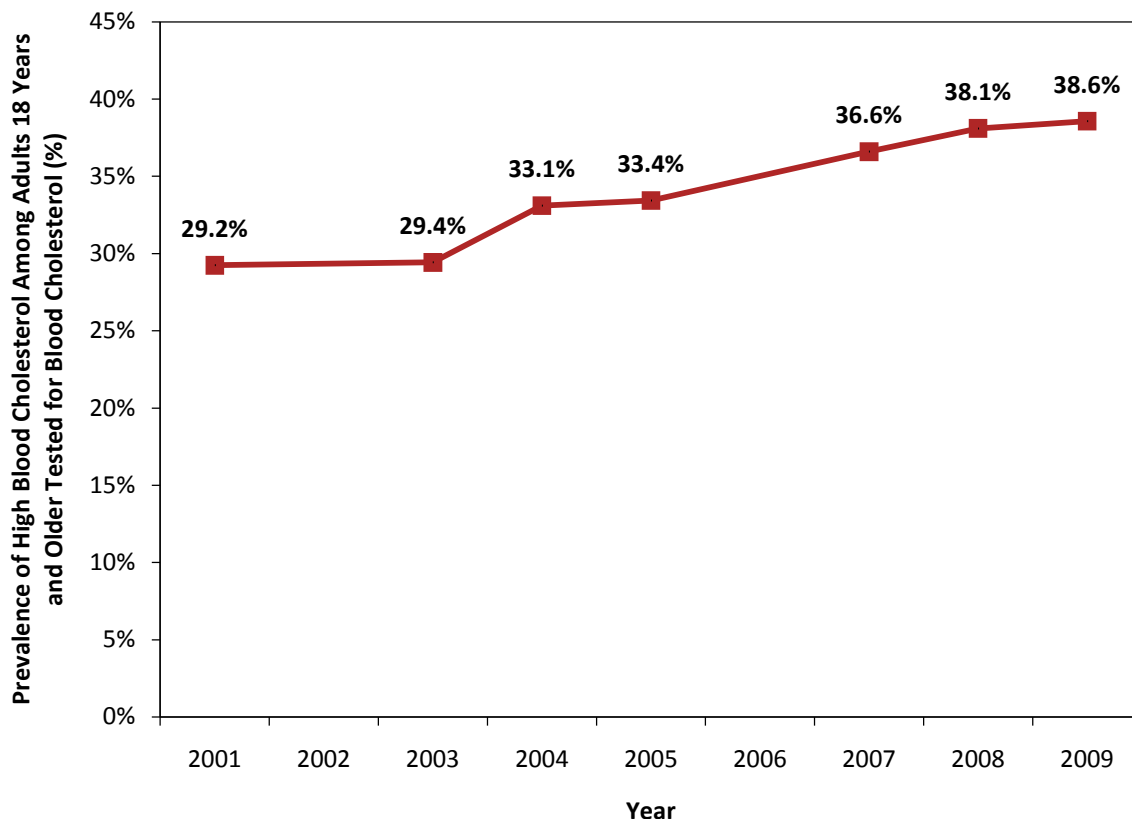


Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Data labels for ever being tested for cholesterol are shown above the point estimate on the chart. Data labels for having been tested in the past 5 years are shown below the point estimate on the chart. Questions regarding high blood cholesterol were asked on one branch of the BRFSS survey to approximately half of all respondents with high blood pressure for 2004 and 2008. Questions related to high blood cholesterol were not included in the survey for 2002 and 2006.

Prevalence of High Blood cholesterol 2001-2009

In Kansas, about one-third of adults 18 years and older who were tested for cholesterol had high blood cholesterol. During the period from 2001 through 2009, the prevalence of high blood cholesterol among those who were tested for blood cholesterol increased from 29.2% (95% confidence interval: 27.6% to 30.9%) in 2001 to 38.6% (95% confidence interval: 37.6% to 39.5%) in 2009, a 32% increase (Figure 3-9). It is important to note that about 21.5% of the adult population report never having been tested for cholesterol (Figure 3-8). During the same period, the median National prevalence increased by 23%, from 30.3% in 2001 to 37.4% in 2009.⁷

Figure 3-9. Percentage of adults 18 years and older tested and diagnosed with high blood cholesterol, Kansas 2001-2009.



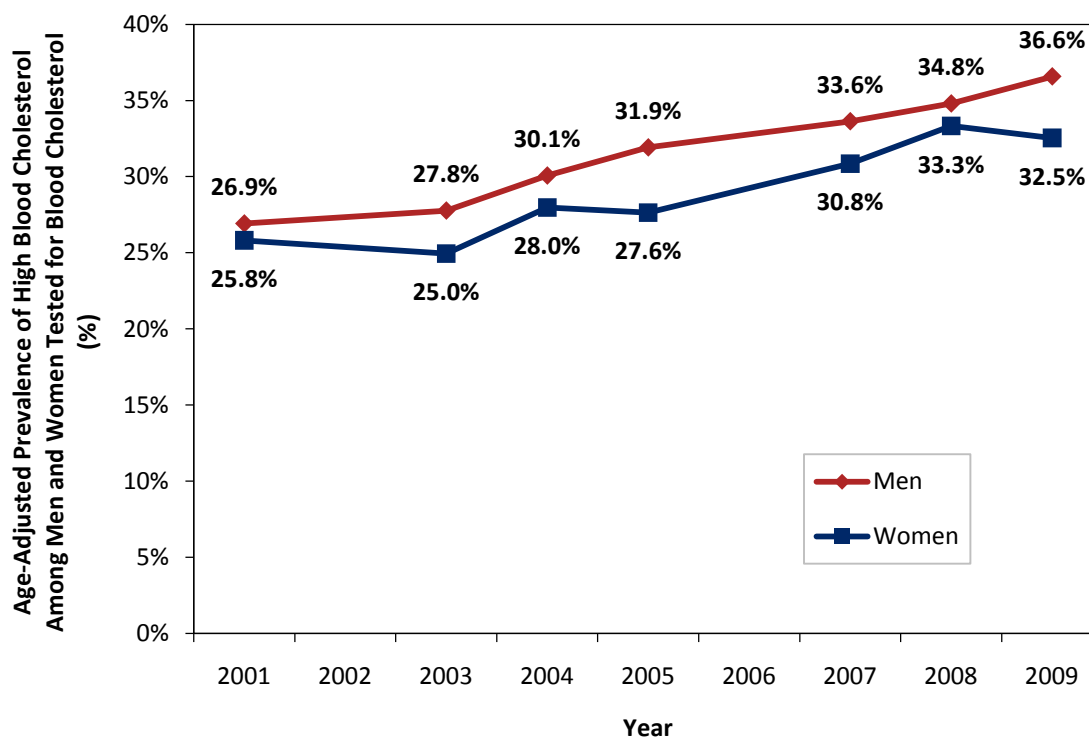
Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. Questions regarding high blood cholesterol were asked on one branch of the BRFSS survey to approximately half of all respondents for 2004 and 2008. Questions related to high blood cholesterol were not included in the survey for 2002 and 2006.

Prevalence of High Blood Cholesterol by Sex

In Kansas, the age-adjusted prevalence of high blood cholesterol among men and women who were tested for blood cholesterol was 36.6% (95% confidence interval: 34.9% to 38.2%) and 32.5% (95% confidence interval: 31.3% to 33.8%), respectively. In 2009, the age-adjusted percentage of men tested and diagnosed with high blood cholesterol was significantly higher than the age-adjusted percentage of women who were tested and diagnosed with high blood cholesterol.

During the period from 2001 to 2009, the age-adjusted percentage of adult men tested and diagnosed with high blood cholesterol increased from 26.9% (95% confidence interval: 24.5% to 29.4%) in 2001 to 36.6% (95% confidence interval: 34.9% to 38.2%) in 2009, a 36% increase. The age-adjusted percentage of adult women tested and diagnosed with high blood cholesterol increased to a lesser degree, from 25.8% (95% confidence interval: 23.9% to 27.8%) in 2001 to 32.5% (95% confidence interval: 31.3% to 33.8%) in 2009, a 26% increase.

Figure 3-10. Age-adjusted percentage of adults 18 and older tested and diagnosed with high blood cholesterol by sex, Kansas 2001-2009.

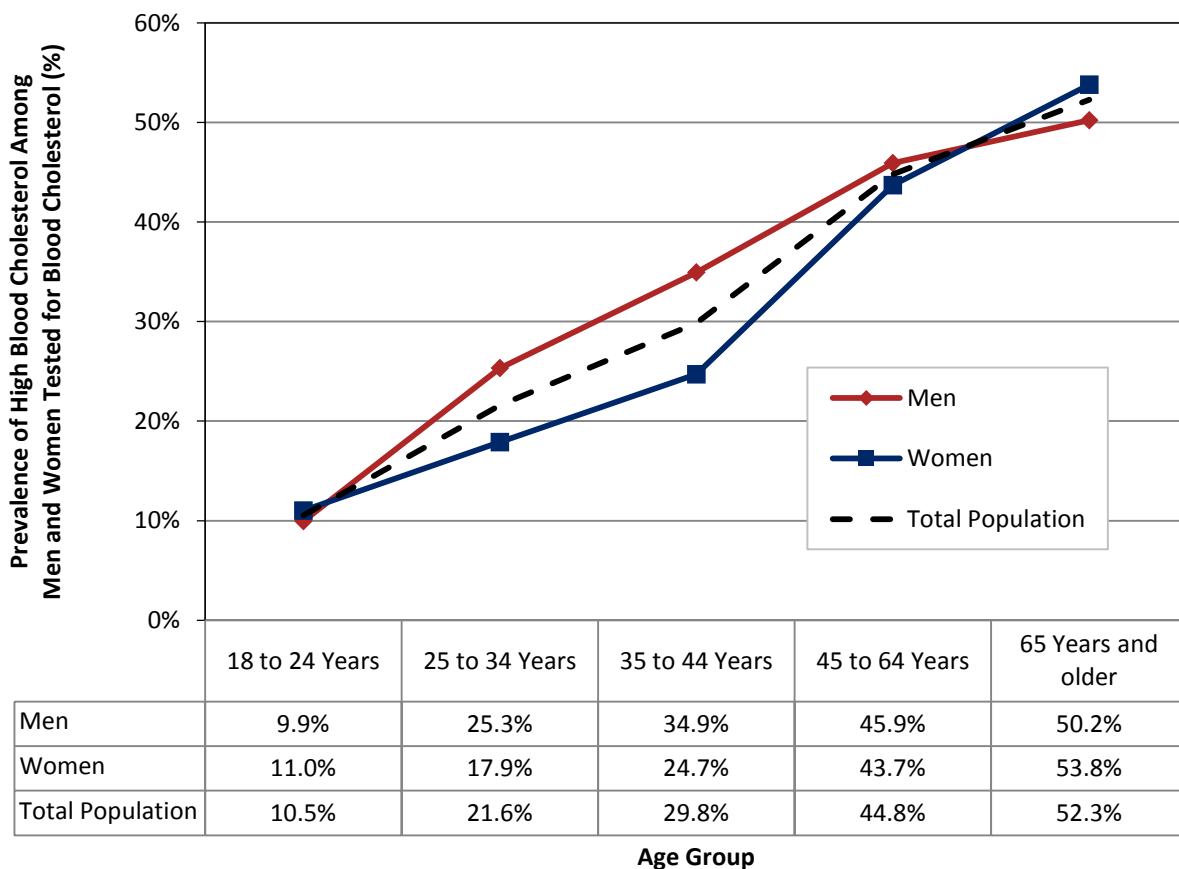


Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Data labels for men are shown above the point estimate on the chart. Data labels for women are shown below the point estimate on the chart. Survey respondents who reported never having had a cholesterol test were excluded. Questions regarding high blood cholesterol were asked on one branch of the BRFSS survey to approximately half of all respondents for 2004 and 2008. Questions related to high blood cholesterol were not included in the survey for 2002 and 2006. Prevalence estimates were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated.

Prevalence of High Blood Cholesterol by Age and Sex

For both men and women, the prevalence of having been tested and diagnosed with high blood cholesterol increases with age (Figure 3-11). The age adjusted percentage of adult men ages 35 to 44 years was significantly higher in men (35.9%; 95% confidence interval: 31.4% to 38.5%) as compared with women in the same age group (24.7%; 22.1% to 27.2%). For other age groups the difference in the prevalence between men and women was not significant.

Figure 3-11. Percentage of adults 18 years and older diagnosed with high blood cholesterol by age and sex, Kansas 2009.

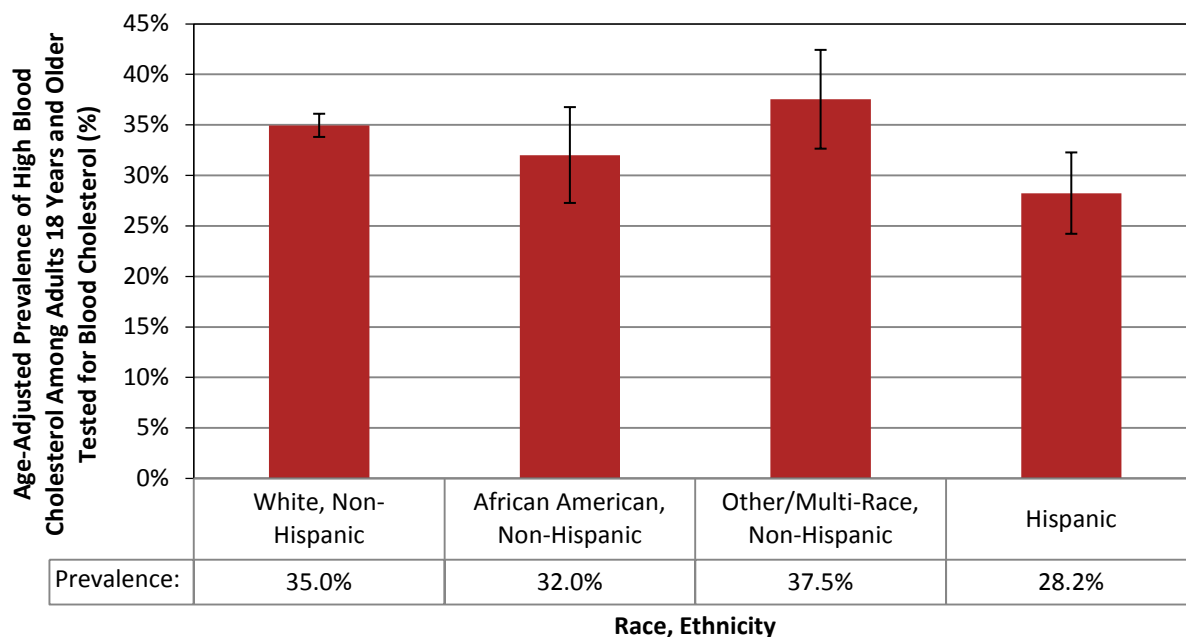


Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. Questions regarding high blood cholesterol were asked on one branch of the BRFSS survey to approximately half of all respondents for 2004 and 2008. Questions related to high blood cholesterol were not included in the survey for 2002 and 2006.

Prevalence of High Blood Cholesterol by Race and Ethnicity

The age-adjusted percentage of adults 18 years and older tested and diagnosed with high blood cholesterol was similar for non-Hispanic whites, non-Hispanic African Americans and persons of other and multiple race who are not Hispanic (Figure 3-12). The age-adjusted percentage of adults 18 years and older tested and diagnosed with high blood cholesterol was lower among Hispanics (28.2%; 95% confidence interval: 24.2% to 32.3%) as compared with non-Hispanic whites (35.0%; 33.8% to 36.1%).

Figure 3-12. Age-adjusted percentage of adults 18 years and older diagnosed with high blood cholesterol by race and ethnicity, Kansas 2009.

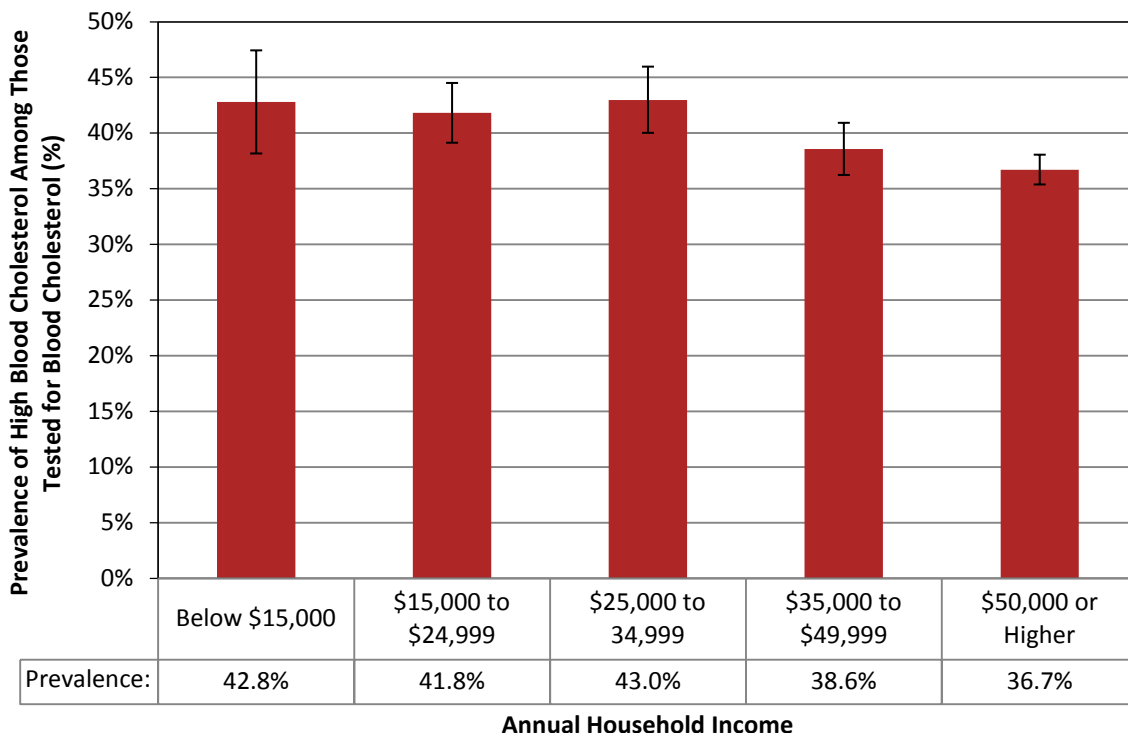


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. Prevalence estimates were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated. Error bars indicate 95% confidence intervals.

Prevalence of High Blood Cholesterol by Annual Household Income

The percentage of adults 18 years and older tested and diagnosed with high blood cholesterol was lower for those with higher annual household income (Figure 3-13). The percentage of adults 18 years and older with high blood cholesterol was significantly higher for those with an annual household income below \$35,000 (42.8% for incomes below \$15,000, 95% confidence interval: 38.2% to 47.4%; 41.8% for incomes between \$15,000 and \$24,999, 95% confidence interval: 39.1% to 44.5%; 43.0% for incomes between \$25,000 and \$34,999, 95% confidence interval: 40.0% to 46.0%) as compared to those with an annual household income of \$50,000 or more (36.7%; 95% confidence interval: 35.4% to 38.1%).

Figure 3-13. Percentage of adults 18 years and older diagnosed with high blood cholesterol by annual household income, Kansas 2009.

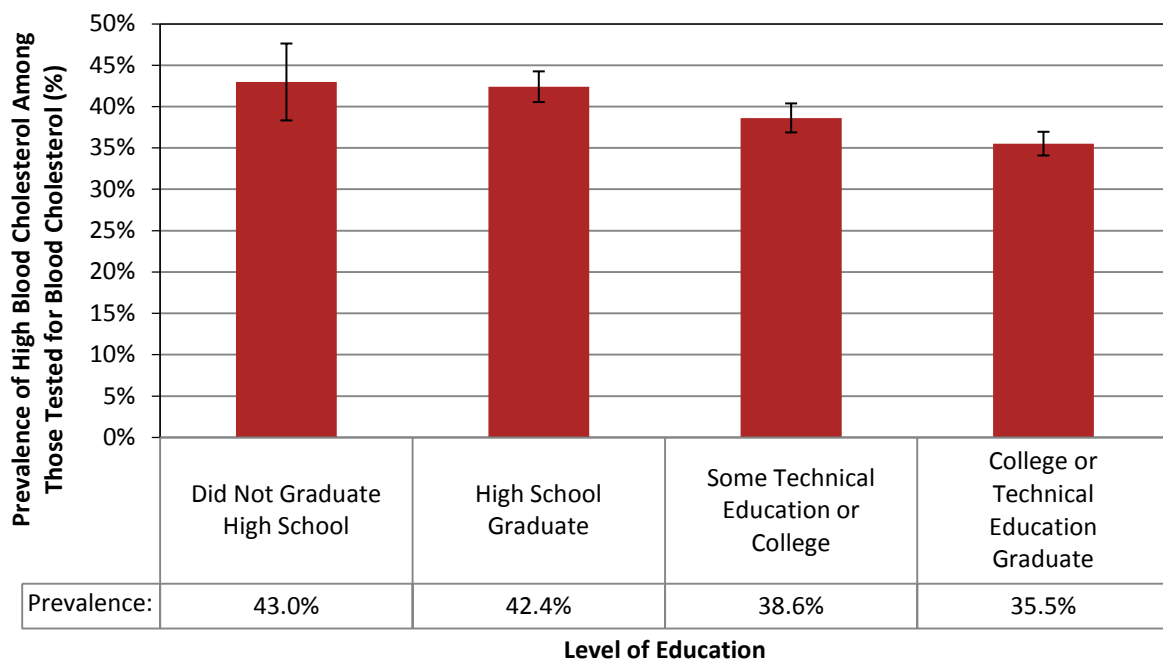


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. Error bars indicate 95% confidence intervals.

Prevalence of High Blood Cholesterol by Education

The percentage of adults 18 years and older tested and diagnosed with high blood cholesterol was lower for those with higher levels of education (Figure 3-14). The percentage of adults 18 years and older with high blood cholesterol was significantly higher among those without a high school diploma (43.0%; 95% confidence interval: 38.3% to 47.6%) and among high school graduates (42.4%; 95% confidence interval: 40.5% to 44.3%) as compared to college graduates (35.5%; 95% confidence interval: 34.1% to 36.9%).

Figure 3-14. Percentage of adults 18 years and older diagnosed with high blood cholesterol by level of education, Kansas 2009.

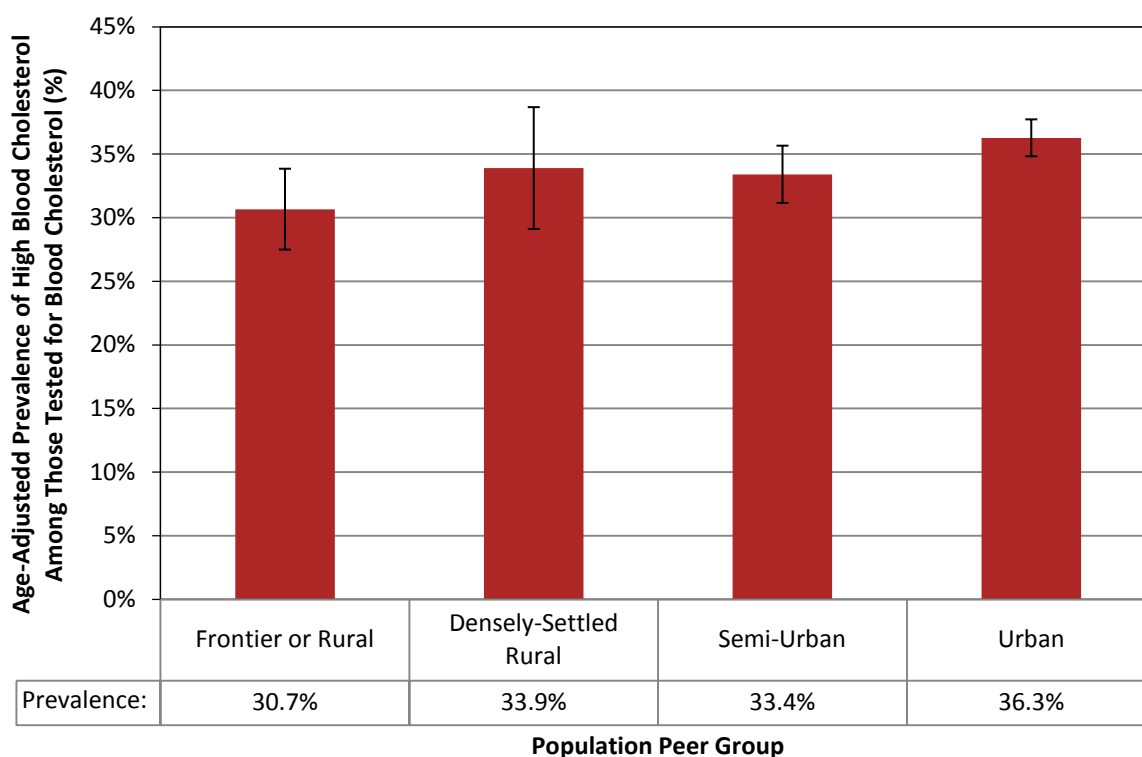


Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. Error bars indicate 95% confidence intervals.

Prevalence of High Blood Cholesterol by Population Density Peer Group

To examine differences in the percentage of adults 18 years and older tested and diagnosed with high blood cholesterol by rural or urban environment, counties were stratified according to population density peer groups using groups defined by the Kansas Office of Local and Rural Health (see technical appendix for a list of counties). The percentage of adults 18 years and older with high blood cholesterol was similar for most population density peer groups in 2009 (Figure 3-15). The percentage of adults 18 years and older with high blood cholesterol was higher in urban counties (36.3%; 95% confidence interval: 34.8% to 37.7%) as compared with frontier or rural counties (30.7%; 95% confidence interval: 28.3% to 33.0%).

Figure 3-15. Age-adjusted percentage of adults 18 years and older diagnosed with high blood cholesterol by population density peer group, Kansas 2009.



Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. Frontier and Rural counties are grouped together due to the small sample size for frontier counties. Error bars indicate 95% confidence intervals. Prevalence estimates were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated. Error bars indicate 95% confidence intervals.

Prevalence of Selected Health Conditions and Risk Factors by Cholesterol Status

Table 3-7 shows the percentage of adults 18 years and older with selected health conditions and risk factors for persons tested and diagnosed with high blood cholesterol and

persons tested, but not diagnosed with high blood cholesterol. The percentage of adults 18 years and older with CHD and stroke related health conditions including high blood pressure, diabetes, disability, arthritis and being overweight or obese, all were higher among persons with high blood cholesterol as compared to those without high blood cholesterol. Not participating in physical activity was higher among persons with high blood cholesterol as compared to persons without high blood cholesterol. The percentage of adults 18 years and older who are current smokers, heavy alcohol consumers (more than 2 drinks per day for men, 1 drink per day for women) and the percentage who eat fruits and vegetables fewer than 5 times per day were similar for persons with high blood cholesterol as compared to those without high blood cholesterol.

Table 3-7. Percentage of adults 18 years and older with selected health conditions and risk factors by high blood cholesterol status, Kansas 2009.

Selected Health Condition or Risk Factor	Among Persons with High Blood Cholesterol		Among Persons without High Blood Cholesterol	
	Prevalence of Select Health Condition or Risk Factor (%)	95% Confidence Interval	Prevalence of Select Health Condition or Risk Factor (%)	95% Confidence Interval
High Blood Pressure	49.9%	48.5% to 51.3%	24.6%	23.5% to 25.6%
Diabetes	16.4%	15.5% to 17.4%	6.7%	6.1% to 7.2%
Disability	29.2%	27.9% to 30.4%	17.8%	16.8% to 18.7%
Arthritis	37.5%	36.2% to 38.8%	23.0%	22.0% to 24.0%
Overweight or Obese (BMI \geq 25)	75.4%	74.2% to 76.7%	62.6%	61.2% to 63.9%
Current Smoker	15.3%	14.2% to 16.3%	15.5%	14.4% to 16.6%
Fruits and Vegetables Consumed Fewer than 5 Times Per Day	81.1%	80.0% to 82.2%	79.2%	78.2% to 80.3%
Heavy Alcohol Consumption (More than 2 Drinks Per Day for Men, 1 Drink per Day for Women)	3.5%	2.9% to 4.1%	3.8%	3.3% to 4.4%
Physical Activity*				
Meets Recommendation	41.8%	40.4% to 43.3%	50.7%	49.3% to 52.0%
Does not Meet Recommendation	43.3%	41.8% to 44.7%	38.2%	36.8% to 39.5%
No Physical Activity	14.9%	14.0% to 15.9%	11.2%	10.3% to 12.0%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Survey respondents who reported never having had a cholesterol test were excluded. *Based on the recommendation for an average of 30 minutes of moderate physical activity 5 days per week or 20 minutes of vigorous physical activity 3 days per week.

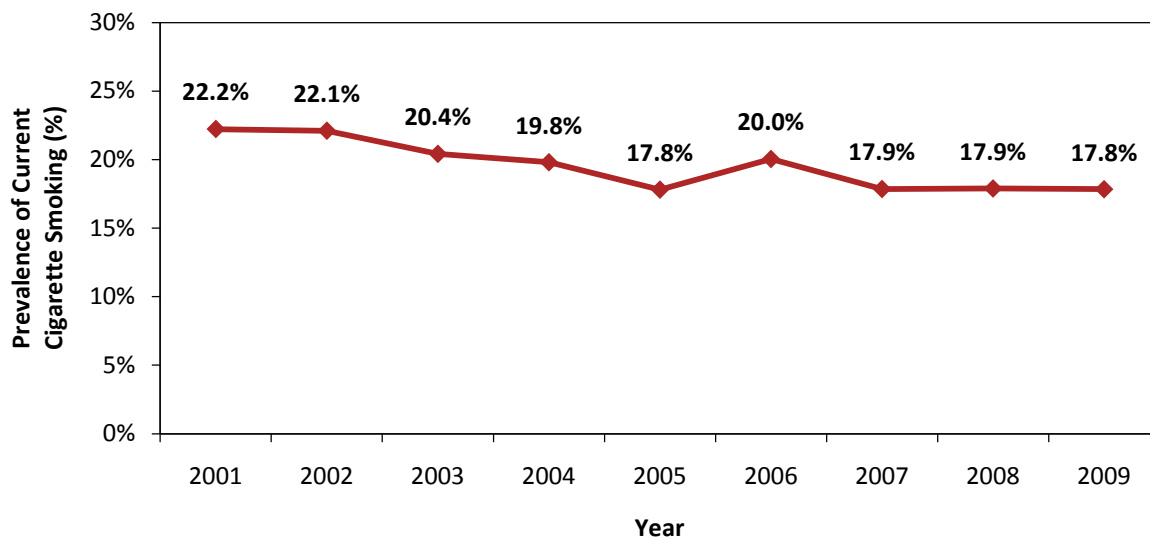
3.3 Other Risk Factors

Smoking

Smoking is the leading cause of preventable death in the U.S. accounting for 1 in 5 deaths during 2002-2004.⁸ The risk of developing CHD and stroke is 2 to 4 times higher for smokers as compared to non-smokers.⁹ An estimated 46 million (20.6%) U.S. adults 18 years and older are current cigarette smokers.¹⁰ Cigarette smoking also poses a risk to non-smokers because it is an important causal factor for CHD.¹¹

In 2009, 17.8% of adult Kansans 18 years and older were current cigarette smokers. During the period from 2001 to 2009, the percentage of Kansas adults 18 years and older who smoke cigarettes decreased significantly from 22.2% (95% confidence interval: 20.9% to 23.5%) in 2001 to 17.8% (95% confidence interval: 17.0% to 18.7%) in 2009 (Figure 3-1).

Figure 3-16. Percentage of adults 18 years and older who are current cigarette smokers, Kansas 2001-2009.



Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

Table 3-8. Percentage of adults 18 years and older who are current cigarette smokers by selected demographic and social factors and health conditions, Kansas 2009.

Characteristic	Percent of Adults 18 Years and Older who are Current Smokers	95% Confidence Interval
Total	17.8%	17.0% to 18.7%
Sex		
Men	18.6%	17.3% to 19.9%
Women	17.1%	16.1% to 18.1%
Age		
18 to 24	22.0%	18.0% to 26.1%
25 to 34	23.2%	20.8% to 25.5%
34 to 44	16.7%	15.0% to 18.3%
45 to 64	19.3%	18.3% to 20.2%
65 and older	7.7%	7.0% to 8.5%
Race and Ethnicity (age-adjusted)		
White, Non-Hispanic	17.4%	16.5% to 18.3%
African American, Non-Hispanic	21.2%	17.3% to 25.1%
Other/Multi-Race, Non-Hispanic	21.8%	17.8% to 25.9%
Hispanic	19.1%	15.7% to 22.5%
Household Income		
Below \$15,000	34.0%	29.6% to 38.3%
\$15,000 to \$24,999	27.0%	24.5% to 29.5%
\$25,000 to 34,999	21.3%	18.6% to 24.0%
\$35,000 to \$49,999	19.4%	17.2% to 21.5%
\$50,000 or Higher	12.7%	11.6% to 13.7%
Education		
Did Not Graduate High School	36.3%	32.0% to 40.5%
High School Graduate	24.2%	22.4% to 26.0%
Some Technical Education or College	19.1%	17.5% to 20.6%
College or Technical Education Graduate	8.1%	7.2% to 8.9%
Selected Health Conditions		
CHD or History of Heart Attack	19.5%	17.1% to 21.8%
Diabetes	15.0%	13.0% to 17.1%
High Blood Cholesterol*	15.3%	14.2% to 16.3%
High Blood Pressure	16.8%	15.6% to 18.1%
Stroke	22.6%	18.2% to 26.9%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Prevalence estimates for race and ethnicity were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated.

* Among survey respondents who reported having had a cholesterol test in their lifetime.

The percentage of adults 18 years and older who currently smoke cigarettes is highest among Kansans aged 25 to 34 years (23.2%; 95% confidence interval: 20.8% to 25.5%). The prevalence of current smoking among adults 65 years and older was significantly lower than in younger age groups.

To assess the prevalence of current cigarette smoking by race and ethnicity, prevalence estimates were age-adjusted to account for differences in the underlying age distribution among different racial and ethnic population subgroups. The age-adjusted prevalence of current cigarette smoking was not significantly different among racial and ethnic subgroups.

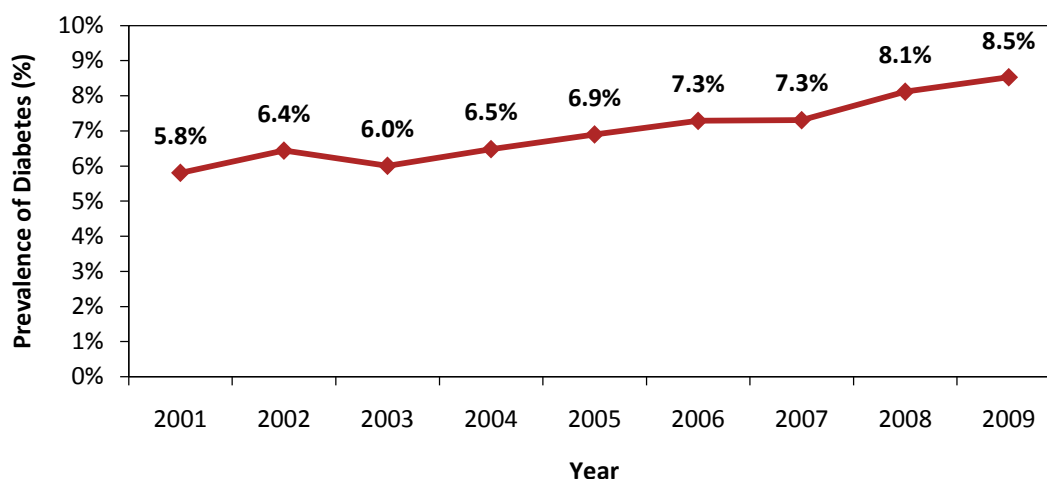
The prevalence of smoking is higher among Kansans 18 years and older with lower annual household income. More than a third (34.0%; 95% confidence interval: 29.6% to 38.3%) of adults with an annual household income of \$15,000 or less are current cigarette smokers as compared to 12.7% (95% confidence interval: 11.6% to 13.7%) among those with an annual household income of \$50,000 or more. The prevalence of smoking is also higher among Kansans 18 years and older with lower educational levels. The prevalence of current smoking was 36.3% (95% confidence interval: 32.0% to 40.5%) among those without a high school diploma as compared to 8.1% (95% confidence interval: 7.2% to 8.9%) among college graduates. The prevalence of current cigarette smoking was 19.5% (95% confidence interval: 17.1% to 21.8%) among persons with angina, coronary heart disease or a previous heart attack, 15.0% (95% confidence interval: 13.0% to 17.1%) among persons with diabetes, 15.3% (95% confidence interval: 14.2% to 16.3%) among persons tested and diagnosed with high blood pressure, 16.8% (95% confidence interval: 15.6% to 18.1%) among persons with high blood pressure and 22.6% (95% confidence interval: 18.2% to 26.9%) among persons with stroke.

Diabetes

Diabetes is a chronic disease associated with elevated blood glucose caused by a lack of insulin production or a failure of action of insulin. Cardiovascular disease mortality rates are 2-4 times higher for adults with diabetes than for adults without diabetes. Stroke risk is also 2-4 times higher among adults with diabetes.¹² Total direct and indirect costs from diabetes were estimated at \$174 billion in 2007.¹³

In 2009, 8.5% of adult Kansans 18 years and older were diagnosed with diabetes. During the period from 2001 to 2009, the percentage of Kansans 18 years and older with diabetes increased in Kansas from 5.8% (95% confidence interval: 5.1% to 6.5%) in 2001 to 8.5% (95% confidence interval: 8.1% to 9.0%) in 2009, a 46% increase (Figure 3-17). The increasing trend in diabetes prevalence may signal a pending increase in cardiovascular disease burden.

Figure 3-17. Percentage of adults 18 years and older who have been diagnosed with diabetes, Kansas 2001-2009.



Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

The prevalence of diabetes among Kansans 18 years and older increases with age from 2.4% (95% confidence interval: 0.8% to 4.1%) among those aged 18 to 24 years to 19.4% (95% confidence interval: 18.3% to 20.5%) among those aged 65 years and older.

To assess the prevalence of diabetes by race and ethnicity, prevalence estimates were age-adjusted to account for differences in the underlying age distribution among different racial and ethnic population subgroups. The age-adjusted prevalence of diabetes is higher among non-Hispanic African Americans (14.3%; 95% confidence interval: 11.7% to 17.0%), non-Hispanic persons of other race groups or multiple races (11.3%; 95% confidence interval: 9.0% to 13.5%) and Hispanics (13.7%; 95% confidence interval: 11.0% to 16.4%) as compared to non-Hispanic whites (7.6%; 95% confidence interval 7.1% to 8.0%).

The prevalence of diabetes among Kansans 18 years and older was significantly higher among persons with lower annual household income. The prevalence of diabetes was significantly higher among those with an annual household income of \$15,000 or less (14.4%; 95% confidence interval: 11.3% to 17.6%) as compared to those with an annual household income of \$50,000 or more (6.2%; 95% confidence interval: 5.6% to 6.7%). The prevalence of diabetes was also significantly higher among Kansans 18 years and older with lower levels of education; the prevalence of diabetes was 13.5% (95% confidence interval: 11.0% to 15.9%) among those without a high school diploma as compared to 6.4% (95% confidence interval: 5.7% to 7.0%) among college graduates. The prevalence of diabetes was particularly high among Kansans 18 years and older with high blood cholesterol (16.4%; 95% confidence interval: 15.5% to 17.4%), high blood pressure (19.2%; 95% confidence interval: 18.2% to 20.2%) or a past stroke (27.5%; 95% confidence interval: 23.6% to 31.4%).

Table 3-9. Percentage of adults 18 years and older diagnosed with diabetes by selected demographic and social factors and health conditions, Kansas 2009.

Characteristic	Percent of Adults 18 Years and Older Diagnosed with Diabetes	95% Confidence Interval
Total	8.5%	8.1% to 9.0%
Sex		
Men	8.8%	8.1% to 9.5%
Women	8.3%	7.7% to 8.8%
Age		
18 to 24	2.4%	0.8% to 4.1%
25 to 34	2.1%	1.3% to 2.9%
34 to 44	4.2%	3.3% to 5.1%
45 to 64	10.9%	10.1% to 11.6%
65 and older	19.4%	18.3% to 20.5%
Race and Ethnicity (age-adjusted)		
White, Non-Hispanic	7.6%	7.1% to 8.0%
African American, Non-Hispanic	14.3%	11.7% to 17.0%
Other/Multi-Race, Non-Hispanic	11.3%	9.0% to 13.5%
Hispanic	13.7%	11.0% to 16.4%
Household Income		
Below \$15,000	14.4%	11.3% to 17.6%
\$15,000 to \$24,999	13.7%	12.2% to 15.2%
\$25,000 to 34,999	11.2%	9.7% to 12.6%
\$35,000 to \$49,999	7.9%	6.9% to 8.9%
\$50,000 or Higher	6.2%	5.6% to 6.7%
Education		
Did Not Graduate High School	13.5%	11.0% to 15.9%
High School Graduate	9.8%	8.9% to 10.7%
Some Technical Education or College	8.7%	7.9% to 9.6%
College or Technical Education Graduate	6.4%	5.7% to 7.0%
Selected Health Conditions		
CHD or History of Heart Attack	7.1%	6.7% to 7.6%
High Blood Cholesterol*	16.4%	15.5% to 17.4%
High Blood Pressure	19.2%	18.2% to 20.2%
Stroke	27.5%	23.6% to 31.4%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Prevalence estimates for race and ethnicity were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated.

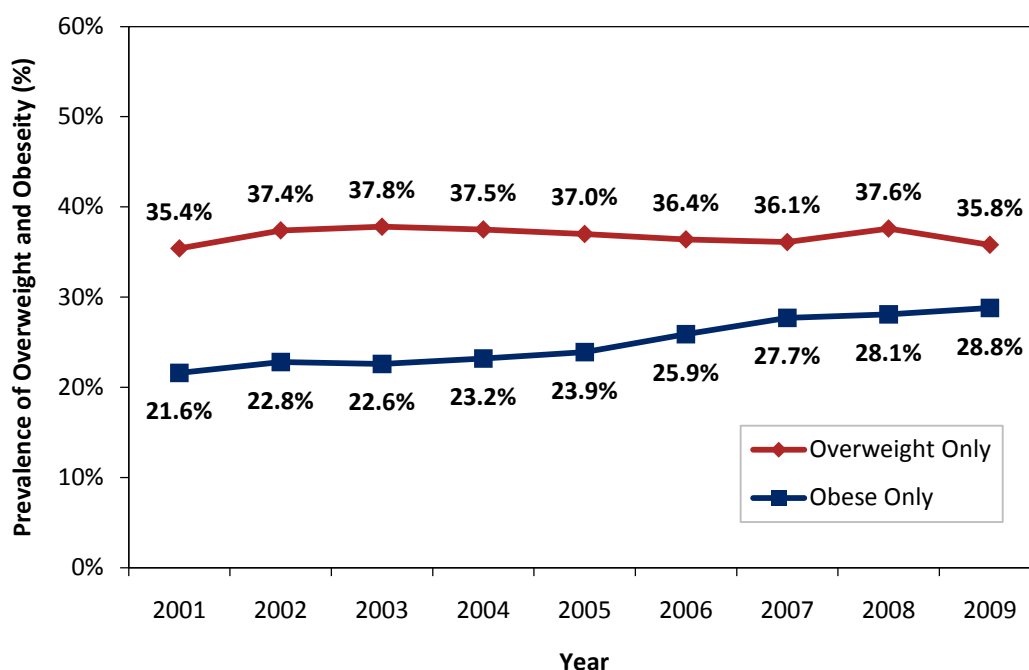
* Among survey respondents who reported having had a cholesterol test in their lifetime.

Overweight and Obesity

Overweight (defined as a body mass index between 25 and 29 kg/m²) or obesity (defined as a body mass index of 30 kg/m² or higher) increases risk for CHD and stroke as well as a number of other chronic health conditions. For individuals who are overweight or obese, weight loss is an effective way to reduce cardiovascular disease risk or manage cardiovascular disease.

In 2009, about two-thirds of Kansans 18 years and older were either overweight or obese. About 28.8% of adults were obese. During the period from 2001 to 2009, the prevalence of obesity among Kansans 18 years and older increased from 21.6% (95% confidence interval: 20.2% to 23.0%) in 2001 to 28.8% (95% confidence interval 27.9% to 29.7%) in 2009, a 33% increase (Figure 3-18). During the same period, the percentage of Kansans 18 years and older who were overweight was relatively stable.

Figure 3-18. Percentage of adults 18 years and older who are overweight and who are obese, Kansas 2001-2009.



Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Overweight is defined as Body Mass Index 25 to 29. Obese is defined as Body Mass Index 30 or higher.

In Kansas, the percentage of overweight or obese men 18 years and older (72.4%; 95% confidence interval: 70.8% to 73.9%) was significantly higher than the percentage of overweight or obese women (56.8%; 95% confidence interval: 55.5% to 58.1%). The percentage of overweight or obese was highest among those aged 45 to 64 years (70.9%; 95% confidence interval: 69.7% to 72.0%).

To assess the prevalence of overweight and obesity by race and ethnicity, prevalence estimates were age-adjusted to account for differences in the underlying age distribution among different racial and ethnic population subgroups. The age-adjusted prevalence of overweight and obesity was higher among non-Hispanic African Americans (73.9%; 95% confidence interval: 69.4% to 78.4%) and Hispanics (73.7%; 95% confidence interval: 70.0% to 77.5%) as compared with non-Hispanic whites (64.1%; 95% confidence interval: 62.9% to 65.2%).

In contrast to other CHD and stroke risk factors, overweight and obesity was not strongly associated with annual household income or education. The percentage of overweight or obese adults 18 years and older was particularly high among persons with diabetes (84.0%; 95% confidence interval: 81.7% to 86.2%), high blood cholesterol (75.4%; 95% confidence interval: 74.2% to 76.7%) and high blood pressure (77.9%; 95% confidence interval: 76.7% to 79.2%).

Table 3-10. Percentage of overweight or obese adults 18 years and older by selected demographic and social factors and health conditions, Kansas 2009.

Characteristic	Percent of Adults 18 Years and Older who are Overweight or Obese	95% Confidence Interval
Total	64.6%	63.6% to 65.6%
Sex		
Men	72.4%	70.8% to 73.9%
Women	56.8%	55.5% to 58.1%
Age		
18 to 24	47.0%	42.1% to 51.8%
25 to 34	62.2%	59.5% to 64.8%
34 to 44	69.3%	67.3% to 71.3%
45 to 64	70.9%	69.7% to 72.0%
65 and older	64.3%	63.0% to 65.6%
Race and Ethnicity (age-adjusted)		
White, Non-Hispanic	64.1%	62.9% to 65.2%
African American, Non-Hispanic	73.9%	69.4% to 78.4%
Other/Multi-Race, Non-Hispanic	59.6%	54.8% to 64.4%
Hispanic	73.7%	70.0% to 77.5%
Household Income		
Below \$15,000	63.5%	58.7% to 68.3%
\$15,000 to \$24,999	68.7%	66.2% to 71.3%
\$25,000 to 34,999	68.2%	65.2% to 71.1%
\$35,000 to \$49,999	67.5%	65.0% to 70.0%
\$50,000 or Higher	64.9%	63.5% to 66.3%
Education		
Did Not Graduate High School	63.6%	59.2% to 68.1%
High School Graduate	65.9%	63.9% to 67.9%
Some Technical Education or College	65.4%	63.4% to 67.3%
College or Technical Education Graduate	63.1%	61.6% to 64.6%
Selected Health Conditions		
CHD or History of Heart Attack	74.5%	72.1% to 76.9%
Diabetes	84.0%	81.7% to 86.2%
High Blood Cholesterol*	75.4%	74.2% to 76.7%
High Blood Pressure	77.9%	76.7% to 79.2%
Stroke	66.9%	62.5% to 71.3%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Prevalence estimates for race and ethnicity were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated. Overweight or obese is defined as Body Mass Index 25 or higher.

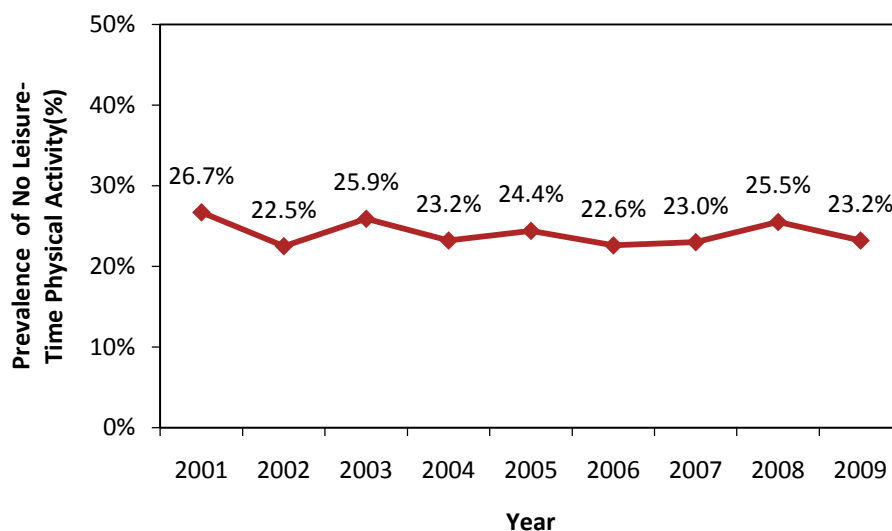
* Among survey respondents who reported having had a cholesterol test in their lifetime.

Physical Inactivity

Lack of physical activity is associated with increased risk for a number of CHD and stroke risk factors including overweight and obesity, high blood pressure, high blood cholesterol, diabetes. Exercise is an effective way to prevent or manage these health conditions. In 2008, the U.S. Department of Health and Human Services issued guidelines for physical activity for the first time recommending at least 150 minutes per week of moderate physical activity or 75 minutes per week of vigorous physical activity (or an equivalent combination of both) for most adults.¹⁴

In 2009, 1 in 5 adult Kansans 18 years and older did not participate in any leisure time physical activity. During the period from 2001 to 2009, the percentage of Kansans 18 years and older reporting no leisure time physical activity in the past 30 days declined significantly from 26.7% (95% confidence interval: 25.3% to 28.1%) in 2001 to 23.2% (95% confidence interval: 22.3% to 24.0%) in 2009 (Figure 3-19).

Figure 3-19. Percentage of adults 18 years and older who reported no leisure time physical activity in the past 30 days, Kansas 2001-2009.



Source: 2001-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Leisure time physical activity is defined as participation in any physical activity or exercise, other than at a regular job, such as running, calisthenics, golf, gardening or walking for exercise.

Table 3-11. Percentage of adults 18 years and older who reported no leisure time physical activity in the past 30 days by selected demographic and social factors and health conditions, Kansas 2009.

Characteristic	Percent of Adults 18 Years and Older Reporting No Physical Activity	95% Confidence Interval
Total	23.2%	22.3% to 24.0%
Sex		
Men	21.4%	20.1% to 22.6%
Women	24.9%	23.8% to 25.9%
Age		
18 to 24	17.7%	14.0% to 21.4%
25 to 34	17.8%	15.7% to 19.9%
34 to 44	20.6%	18.8% to 22.4%
45 to 64	24.6%	23.5% to 25.6%
65 and older	32.5%	31.2% to 33.8%
Race and Ethnicity (age-adjusted)		
White, Non-Hispanic	21.8%	20.9% to 22.7%
African American, Non-Hispanic	30.2%	25.9% to 34.5%
Other/Multi-Race, Non-Hispanic	26.3%	22.4% to 30.2%
Hispanic	32.6%	28.7% to 36.6%
Household Income		
Below \$15,000	40.4%	36.1% to 44.8%
\$15,000 to \$24,999	36.5%	34.0% to 39.0%
\$25,000 to 34,999	30.6%	27.8% to 33.4%
\$35,000 to \$49,999	23.6%	21.6% to 25.5%
\$50,000 or Higher	14.6%	13.6% to 15.5%
Education		
Did Not Graduate High School	42.5%	38.3% to 46.8%
High School Graduate	32.4%	30.6% to 34.2%
Some Technical Education or College	21.4%	19.9% to 22.8%
College or Technical Education Graduate	13.5%	12.5% to 14.4%
Selected Health Conditions		
CHD or History of Heart Attack	37.6%	34.9% to 40.4%
Diabetes	36.6%	34.1% to 39.2%
High Blood Cholesterol*	26.2%	25.0% to 27.4%
High Blood Pressure	31.2%	29.9% to 32.6%
Stroke	39.7%	35.4% to 44.0%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Prevalence estimates for race and ethnicity were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated. Leisure time physical activity is defined as participation in any physical activity or exercise, other than at a regular job, such as running, calisthenics, golf, gardening or walking for exercise.

* Among survey respondents who reported having had a cholesterol test in their lifetime.

In Kansas, the prevalence of no leisure time physical activity was higher for women 18 years and older (24.9%; 95% confidence interval: 23.8% to 25.9%) than for men 18 years and older (21.4%; 95% confidence interval: 20.1% to 22.6%) and increased with age from 17.7% (95% confidence interval: 14.0% to 21.4%) among persons ages 18 to 24 years to 32.5% (95% confidence interval: 31.2% to 33.8%) among persons ages 65 years and older.

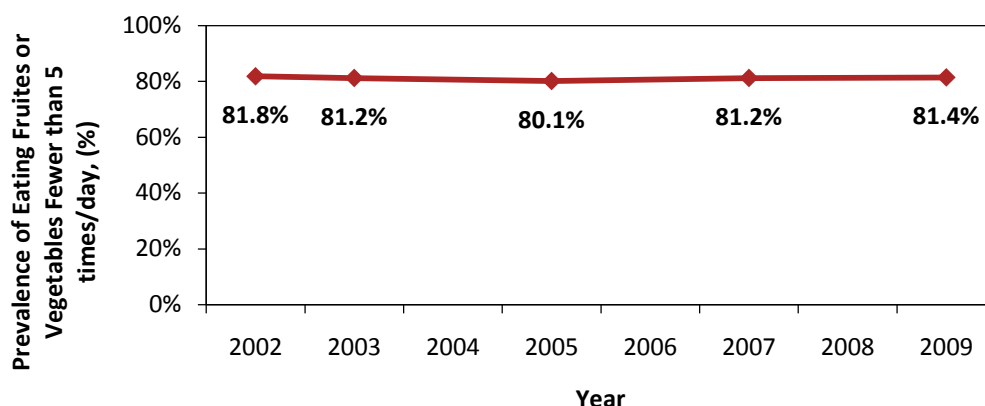
To assess the prevalence of no leisure time physical activity by race and ethnicity, prevalence estimates were age-adjusted to account for differences in the underlying age distribution among different racial and ethnic population subgroups. The age-adjusted prevalence of no leisure physical activity among adults 18 years and older was higher among non-Hispanic African Americans (30.2%; 95% confidence interval: 25.9% to 34.5%) and among Hispanics (32.6%; 95% confidence interval: 28.7% to 36.6%) as compared with non-Hispanic whites (21.8%; 95% confidence interval: 20.9% to 22.7%).

The prevalence of no leisure physical activity was higher among adults 18 years and older with lower annual household income; the prevalence was 40.4% (95% confidence interval: 36.1% to 44.8%) among those with an income of \$15,000 or less as compared to 14.6% (95% confidence interval: 13.6% to 15.5%) among those with an income of \$50,000 or higher. Similarly, the prevalence of no leisure physical activity was higher among adults 18 years and older with lower education; the prevalence was 42.5% (95% confidence interval: 38.3% to 46.8%) among those without a high school diploma as compared to 13.5% (95% confidence interval: 12.5% to 14.4%) among college graduates. The prevalence of no leisure physical activity was particularly high among adults 18 years and older who have been diagnosed with CHD or have had a previous myocardial infarction (37.6%; 95% confidence interval: 34.9% to 40.4%), persons with diabetes (36.6%; 95% confidence interval: 34.1% to 39.2%), persons with high blood cholesterol (26.2%; 95% confidence interval: 25.0% to 27.4%), persons with high blood pressure (31.2%; 95% confidence interval: 29.9% to 32.6%) and persons who have had a stroke (39.7%; 95% confidence interval: 35.4% to 44.0%).

Unhealthy Diet

Eating a healthy diet rich in fresh fruits and vegetables can prevent and help control risk factors for CHD and stroke. The percentage of Kansans 18 years and older who ate fruits or vegetables fewer than 5 times per day was high in 2009 (81.4%; 95% confidence interval: 80.6% to 82.1%). The prevalence of eating fruits or vegetables fewer than 5 times per day did not increase or decrease significantly during the period from 2001 to 2009 (Figure 3-20).

Figure 3-20. Percentage of adults 18 years and older who eat fruits and vegetables fewer than 5 times per day, Kansas 2001-2009.



Source: 2002-2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Questions regarding fruit and vegetable consumption were asked on one branch of the BRFSS survey to approximately half of all respondents with for 2004 and 2008. Questions related to fruit and vegetable consumption were not included in the survey for 2001 and 2006.

The prevalence of eating fruits or vegetables fewer than 5 times per day was higher among men 18 years and older (85.6%; 95% confidence interval: 84.5% to 86.7%) than among women 18 years and older (77.4%; 95% confidence interval: 76.3% to 78.4%) and tended to decrease with age from 85.6% (95% confidence interval: 82.2% to 88.9%) among those ages 18 to 24 years to 75.7% (95% confidence interval: 74.5% to 76.9%) among those ages 65 years and older.

To assess the prevalence of eating fruits and vegetables fewer than 5 times per day by race and ethnicity, prevalence estimates were age-adjusted to account for differences in the underlying age distribution among different racial and ethnic population subgroups. The prevalence of eating fruits and vegetables fewer than 5 times per day was lower for Hispanics (85.6%; 95% confidence interval: 82.8% to 88.3%) as compared with non-Hispanics of any race.

While there was no evidence that the percentage of adults who ate fruits and vegetables fewer than 5 times per day differed by annual household income, it was lower among those with higher levels of education; the prevalence was 85.7% (95% confidence interval: 82.4% to 89.0%) among those without a high school diploma as compared to 77.5% (95% confidence interval: 76.3% to 78.7%) among college graduates.

The prevalence of eating fruits or vegetables fewer than 5 times per day was 82.0% (95% confidence interval: 79.9% to 84.0%) among persons with angina, coronary heart disease or a previous heart attack, 78.4% (95% confidence interval: 76.0% to 80.8%) among persons with diabetes, 81.1% (95% confidence interval: 80.0% to 82.2%) among persons tested and diagnosed with high blood cholesterol, 80.8% (95% confidence interval: 79.7% to 81.9%) among persons with high blood pressure and 78.8% (95% confidence interval: 75.1% to 82.4%) among persons with stroke.

Table 3-12. Percentage of adults 18 years and older who ate fruits and vegetables fewer than 5 times per day by selected demographic and social factors and health conditions, Kansas 2009.

Characteristic	Percent of Adults 18 Years and Older Eating Fruits or Vegetables < 5 Times Per Day	95% Confidence Interval
Total	81.4%	80.6% to 82.1%
Sex		
Men	85.6%	84.5% to 86.7%
Women	77.4%	76.3% to 78.4%
Age		
18 to 24	85.6%	82.2% to 88.9%
25 to 34	82.3%	80.3% to 84.4%
34 to 44	82.6%	81.0% to 84.2%
45 to 64	81.6%	80.6% to 82.5%
65 and older	75.7%	74.5% to 76.9%
Race and Ethnicity (age-adjusted)		
White, Non-Hispanic	81.6%	80.8% to 82.4%
African American, Non-Hispanic	78.6%	74.8% to 82.5%
Other/Multi-Race, Non-Hispanic	78.3%	74.3% to 82.4%
Hispanic	85.6%	82.8% to 88.3%
Household Income		
Below \$15,000	81.4%	77.6% to 85.1%
\$15,000 to \$24,999	83.1%	81.0% to 85.2%
\$25,000 to 34,999	82.6%	80.3% to 84.9%
\$35,000 to \$49,999	82.3%	80.5% to 84.0%
\$50,000 or Higher	80.5%	79.5% to 81.6%
Education		
Did Not Graduate High School	85.7%	82.4% to 89.0%
High School Graduate	85.0%	83.7% to 86.4%
Some Technical Education or College	81.5%	80.1% to 82.9%
College or Technical Education Graduate	77.5%	76.3% to 78.7%
Selected Health Conditions		
CHD or History of Heart Attack	82.0%	79.9% to 84.0%
Diabetes	78.4%	76.0% to 80.8%
High Blood Cholesterol*	81.1%	80.0% to 82.2%
High Blood Pressure	80.8%	79.7% to 81.9%
Stroke	78.8%	75.1% to 82.4%

Source: 2009 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Prevalence estimates for race and ethnicity were age-adjusted to the U.S. 2000 standard population. See Technical Appendix for details on how prevalence estimates were calculated.

* Among survey respondents who reported having had a cholesterol test in their lifetime.

Chapter 4: Health Disparities and Social Determinants of CHD, Stroke, High Blood Pressure, High Blood Cholesterol and Other Risk Factors

Differences in the mortality and morbidity between subgroups within a population are referred to as health disparities. Health disparities usually occur between population subgroups that differ on the basis of socioeconomic status, race, ethnicity, sexual orientation, sex, disability, geographic location or some intersection of these characteristics. Individuals in these groups may have less access to healthy food, good housing, quality education, safe neighborhoods, and may be affected by racism or another form of discrimination. Together, these factors are called social determinants of health.¹⁵

This chapter includes a listing of findings from previous chapters related to health disparities and social determinants of CHD and stroke.

- 4.1 Coronary Heart Disease
- 4.2 Stroke
- 4.3 High Blood Pressure
- 4.4 High Blood Cholesterol
- 4.5 Other Risk Factors

4.1 Coronary Heart Disease (CHD)

- Age-adjusted CHD mortality rates were higher in men than in women.
- African Americans had higher age-adjusted CHD mortality rates than whites.
- African American men and women died from CHD at younger ages than white men and women.
- CHD mortality rates were lower in urban counties than in semi-urban, densely-settled rural, rural and frontier counties.
- Pre-transport deaths from CHD were higher among those aged 85 years and older than in any other age group.
- Pre-transport deaths from CHD were higher in men than women.
- The percentage of adults 18 years and older with angina or coronary heart disease or a past heart attack was higher in men than in women.
- Age-adjusted CHD hospital discharge rates were higher in men than in women.
- Age-adjusted CHD hospital discharge rates were higher among African Americans than among whites.
- The percentage of adult Kansans who correctly identified all CHD symptoms and identified 911 as the first response to someone having a heart attack was lower among men than among women.
- The percentage of Kansans 18 years and older who correctly identified all CHD symptoms and identified 911 as the first response to someone having a heart attack was lower among Hispanics as compared with non-Hispanic whites.
- The percentage of Kansans 18 years and older who correctly identified all heart attack symptoms and identified 911 as the first response to someone having a heart attack was lower among those with lower annual household incomes and lower levels of education.

4.2 Stroke

- African Americans had higher age-adjusted stroke mortality rates than whites.
- African American men and women died from stroke at younger ages than white men and women.
- Pre-transport deaths from stroke were higher in white women than in white men and African Americans men and women.
- Age-adjusted stroke hospital discharge rates were higher in men than in women.
- Age-adjusted stroke hospital discharge rates were higher among African Americans than among whites.

- The percentage of Kansans who correctly identified all stroke symptoms and identified 911 as the first response to someone having a heart attack or stroke was lower among those 65 years and older.
- The percentage of Kansans 18 years and older who correctly identified all stroke symptoms and identified 911 as the first response to someone having a heart attack or stroke was lower among Hispanics and non-Hispanic African Americans as compared with non-Hispanic whites.
- The percentage of Kansans 18 years and older who correctly identified all stroke symptoms and identified 911 as the first response to someone having a heart attack or stroke was lower among those with lower annual household incomes and lower levels of education.

4.3 High Blood Pressure

- The age-adjusted prevalence of high blood pressure was higher among men than women.
- The prevalence of high blood pressure was higher among women ages 65 years and older than among men ages 65 years and older. However, among younger age groups from 18 to 44 years the prevalence of high blood pressure was higher among men than women.
- The age-adjusted prevalence of high blood pressure was higher among non-Hispanic African Americans than among all other race and ethnicity groups.
- The prevalence of high blood pressure was higher among Kansans with lower average annual household income.
- The prevalence of high blood pressure was higher among Kansans with lower levels of education.

4.4 High Blood Cholesterol (among those ever tested for high cholesterol)

- The age-adjusted prevalence of high blood cholesterol was higher among men than among women.
- The prevalence of high blood cholesterol was higher among Kansans with lower average annual household income.
- The prevalence of high blood cholesterol was higher among Kansans with lower levels of education.

4.5 Other Risk Factors

- The prevalence of current cigarette smoking was higher among Kansans with lower annual household income.

- The prevalence of current cigarette smoking was higher among Kansans with lower levels of education.
- The age-adjusted prevalence of diabetes was higher among non-Hispanic African Americans than among non-Hispanic whites.
- The age-adjusted prevalence of diabetes was higher among Hispanics than among non-Hispanic whites.
- The prevalence of diabetes was higher among Kansans with lower annual household income.
- The prevalence of diabetes was higher among Kansans with lower levels of education.
- The prevalence of overweight and obesity was higher among men than among women.
- The age-adjusted prevalence of overweight and obesity was higher among non-Hispanic African Americans than among non-Hispanic whites.
- The age-adjusted prevalence of overweight and obesity was higher among Hispanics than among non-Hispanic whites.
- The prevalence of no leisure time physical activity in the past 30 days was higher among men than women.
- The prevalence of no leisure time physical activity in the past 30 days was higher among Kansans 65 years and older than among all other age groups. Nearly 1 in 3 Kansans 65 years and older participated in no leisure time physical activity in the past 30 days.
- The age-adjusted prevalence of no leisure time physical activity in the past 30 days was higher among non-Hispanic African Americans than among non-Hispanic whites.
- The age-adjusted prevalence of no leisure time physical activity in the past 30 days was higher among Hispanics than among non-Hispanic whites.
- The prevalence of no leisure time physical activity in the past 30 days was higher among Kansans with lower annual household income.
- The prevalence of no leisure time physical activity in the past 30 days was higher among Kansans with lower levels of education.
- The prevalence of eating fruits and vegetables fewer than 5 times per day was higher among men than women.
- The age-adjusted prevalence of eating fruits and vegetables fewer than 5 times per day was higher among Hispanics than among non-Hispanic whites.
- The prevalence of eating fruits and vegetables fewer than 5 times per day was higher among Kansans with lower levels of education.

References

1. WRITING GROUP MEMBERS, Lloyd-Jones, D., Adams, R.J., Brown, T.M., Carnethon, M., Dai, S., De Simone, G., Ferguson, T.B., Ford, E., Furie, K., Gillespie, C., Go, A., Greenlund, K., Haase, N., Hailpern, S., Ho, P.M., Howard, V., Kissela, B., Kittner, S., Lackland, D., Lisabeth, L., Marelli, A., McDermott, M.M., Meigs, J., Mozaffarian, D., Mussolino, M., Nichol, G., Roger, V.L., Rosamond, W., Sacco, R., Sorlie, P., Roger, V.L., Thom, T., Wasserthiel-Smoller, S., Wong, N.D., Wylie-Rosett, J. (2010). Heart Disease and Stroke Statistics 2010 Update: A Report from the American Heart Association. *Circulation*, 121 (7), e46-e215.
2. U.S. Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: U.S. Government Printing Office, November 2000.
3. Fang, J., Keenan, N.L., Ayala, C. and Dai, S. (2008). Disparities in Adult Awareness of Heart Attack Warning Signs and Symptoms --- 14 States, 2005. *Morbidity and Mortality Weekly Report*, 57 (07), 175-179.
4. Harris, C., Ayala, C., Croft, J.B. (2006). Place of death after stroke --- United States, 1999—2002. *Morbidity and Mortality Weekly Report*, 55 (19), 529-532.
5. Fang, J., Keenan, N.L., Ayala, C., Dai, S., Merritt, R. and Denny, C.H. (2008). Awareness of Stroke Warning Symptoms – 13 States and the District of Columbia, 2005. *Morbidity and Mortality Weekly Report*, 57 (18), 481-485.
6. U.S. Department of Health and Human Services. (2004). The Seventh Report of the Joint National National Heart, Lung and Blood Institute, National Institutes of Health.
7. Centers for Disease Control and Prevention. Behavioral Risk Factors Surveillance System Prevalence and Trends Data website. <http://apps.nccd.cdc.gov/BRFSS/>. Accessed 6/25/2010.
8. Adhikari, B., Kahende, J., Malarcher, A., Pechacek, T. and Tong, V. (2008). Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses---United States, 2000—2004. *Morbidity and Mortality Weekly Report*, 57 (45), 1226-1228.
9. U.S. Department of Health and Human Services. (2004) The health consequences of smoking: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC.
10. Dube, S.R., Asman, K., Malarcher, A. and Caraballo, R. (2009). Cigarette smoking among adults and trends in smoking cessation --- United States, 2008. *Morbidity and Mortality Weekly Report*, 58 (44), 1227-1232.
11. U.S. Department of Health and Human Services. (2006). The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC.

12. Centers for Disease Control and Prevention. 2007 Diabetes Fact Sheet.
http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf. Accessed 6/20/2010.
13. American Diabetes Association. (2008). Economic Costs of Diabetes in the U.S. *Diabetes Care*, 31 (3), 1-20.
14. U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. <http://www.health.gov/paguidelines/guidelines/summary.aspx>. Accessed 6/21/2010.
15. Brennan Ramirez, L.K, Baker, E.A., Metzler, M. (2008). Promoting Health Equity: A resource to help communities address social determinants of health. Atlanta: U.S. Department of Health and Human Services, CDC.
16. Klein, R.J. and Schoenborn, C.A. (2001). Age Adjustment using the 2000 projected U.S. Population. *Healthy People 2010 Statistical Notes*, 20, 1-10.

Technical Appendix

1. Description of Data Sources
 - Vital Statistics
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 - Behavioral Risk Factor Surveillance System
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1. Description of Data Sources

Vital Statistics

All vital events in Kansas are reported to the Kansas Department of Health and Environment's Center for Health and Environmental Statistics (CHES). Certificates of death are completed and registered through the efforts of physicians, hospital personnel, funeral directors, attorneys and local courts. Underlying cause of death is defined as the disease or injury that initiated the chain of events leading directly to death. It is established by a physician and classified according to the International Classification of Diseases, 10th Revision (ICD-10).

Because vital events are reportable by law, the quality of mortality data is high. Nevertheless, there are several important considerations for mortality data:

- To be consistent with existing vital statistics publications, analyses presented in this report include only deaths of Kansas residents registered in the annual research summary files, provided to the Bureau of Health Promotion by CHES. The number of deaths in Kansas reported here may differ slightly from those available through the National Center for Health Statistics or other sources due to differences in time frames and procedures for collecting mortality data.
- Mortality rates reported by CHES in the Annual Summary of Vital Statistics include only deaths that are fully registered by June 1 of the year after the year the death occurred. Mortality rates reported in this document include deaths that may have been registered at later dates. For this reason, mortality rates reported here may not match those reported previously by CHES or in previous reports from the Kansas Heart Disease and Stroke Prevention Program. However, for 2000-2008, this was a very small number of deaths, so mortality rates from the two sources should be very close.
- Deaths of Kansas residents occurring in other states or abroad may be less likely to be included than records from deaths occurring in Kansas.
- In 2005, the Kansas death certificate was revised. Race and ethnicity items were revised to allow reporting of multiple races and collecting race separately from ethnicity. Although collection of race and ethnicity data changed, the categories used in this report were the same for 2000-2004 and 2005-2008.

Kansas Hospital Association Inpatient Database

Hospital discharge data are collected by the Kansas Hospital Association and made available to the Kansas Department of Health and Environment's Office of Health Assessment. The complete dataset contains nearly all inpatient discharges from non-federal, short stay community and general hospitals in Kansas. Analyses in this report are limited to Kansas residents. Principal diagnosis is determined from information in the medical record and is classified according to the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM). Length of stay and age are determined from admission date, discharge date and birth date. Selected medical procedures reported in this report are identified by scanning through all listed ICD-9-CM procedure codes.

Several considerations should be taken into account when interpreting hospital discharge rates:

- Analyses are limited to data and classification codes listed in the inpatient database. Bias may be introduced by inaccurate coding or incomplete records.
- It is not possible, using the inpatient database provided to KDHE, to verify that all short-stay community or general hospitals in Kansas reported to the inpatient registry each year, or to verify that all discharges are reported by a given hospital.
- Some Kansas Hospitals that treat heart disease and stroke, particularly specialty hospitals that are not open to the public, do not submit data to the Kansas Hospital Association. This is likely to cause some bias, especially for geographic regions served by those hospitals. The extent of this bias has not been assessed.
- It is often impossible to perform subpopulation analyses with hospital discharge data due to insufficient discharges. Hospital discharge rates are only reported if at least 20 records are available.
- At the time the document was created, hospital discharge data were considered provisional for discharges occurring between October and December (4th quarter) 2008.

Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS is an ongoing, population-based, random-digit-dialed telephone survey of non-institutionalized civilian adults 18 years and older. The survey is coordinated by the Centers for Disease Control and Prevention (CDC) and is conducted annually by all 50 states, the District of Columbia and several U.S. Territories. This report includes data collected by the Kansas Department of Health and Environment during 2001-2009.

The Kansas BRFSS employs a disproportionate stratified sampling method. During data analysis, sampling weights are applied to account for unequal selection probability and response bias. The complex survey methodology and analytical procedures for BRFSS are designed to produce valid statewide estimates of prevalence. Several considerations should be taken into account when interpreting BRFSS estimates:

- BRFSS estimates do not apply to individuals without telephone service, those on military bases or living within institutions and do not include answers from individuals who are unable to complete a telephone survey.
- For the years of data included in the current report, the BRFSS only sampled individuals with a landline phone. Future surveys will include a cell-phone sample as well.
- BRFSS prevalence estimates are self-reported. Some prevalence estimates may be higher or lower than the true prevalence due to inaccuracies in self-reported data (for example, inability to remember, exaggeration, refusal to respond to a particular question, etc...).
- It is often difficult to obtain subpopulation estimates because of an insufficient number of respondents. In order to report a prevalence estimate, the sample for the population subgroup must have at least 50 denominator respondents and 6 numerator respondents.

- The methodology for computing the prevalence of knowledge of signs and symptoms of heart disease and stroke and the appropriate response to call 911 were updated in 2008; estimates reported here may not match previously reported estimates.

2. Statistical Methods

Population based rates

Rates presented in this report for mortality and hospital discharges are computed as the number of events divided by the total population of Kansas or for the Kansas subpopulation of interest. Population denominators are taken from estimates produced by the U.S. Census Bureau. The Census population estimates used in this report for computing unadjusted (crude) rates and age-specific rates are midyear (July 1) bridged race post-censal estimates. To be consistent with other KDHE publications, 2002-2008 midyear population estimates produced for each year are used, rather than using the most recent estimate. For example, a 2005 rate will be based on the Kansas population estimate published in 2005 (2005 Vintage), rather than using the most recent 2005 population estimate (2009 Vintage). For 2001, the vintage 2002 population estimates were used. For 2000, census 2000 populations were used. Details on population datasets are available from the Census website: <http://www.census.gov>.

Age adjusted rates

Age adjustment is a statistical method for standardizing rates to rates for groups that have different underlying age distributions more comparable. Age-adjusted rates should be used to compare Kansas with the United States as a whole, or for comparing two groups, or the same group over time, if the underlying population distribution is different or changes (for example, comparing rates for men and women). Age-adjusted rates should be understood as relative indices, not as actual measures of burden, and should not be compared to unadjusted rates.

All age-adjusted rates in this report are computed using the direct method. Briefly, rates are first computed within each age group stratum. The products of each age-specific rate multiplied by the proportion of the 2000 U.S. Standard Population in that age category are summed across the age group strata.¹⁶ For vital statistics and hospital discharges, age-specific rates are based on 10 age groups: 0 to 4, 5 to 14, 15 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74, 75 to 84 and 85 years and older. For BRFSS age-adjusted prevalence estimates, age-specific rates are based on the 5 age groups recommended by the Council of State and Territorial Epidemiologists: 18 to 24, 25 to 34, 35 to 44, 45 to 64, 65 years and older. If the sample was insufficient for the 18 to 24 year group, the youngest two groups were combined (18 to 34 years) for that analysis. Sample size was sufficient for all analyses presented in this report in all age groups 25 years and older.

Confidence intervals

All rates, proportions and prevalence estimates presented in this report can be thought of as estimates of a theoretical true value, or population parameter. These estimates are subject to random variation. To characterize this variability, some of the statistics presented in this report include 95% confidence intervals. This can be thought of as a range of values that will contain the population parameter (theoretical true value) 95% of the time. To compute confidence intervals presented in this report, mortality and hospital discharge were assumed to follow a Poisson distribution. If the number of deaths or discharges was 100 or higher, confidence limits were produced using the normal approximation. If the number of deaths or discharges was fewer than 100, limits are taken directly from the Poisson distribution. For proportions, exact confidence limits were computed from the binomial distribution. For BRFSS, the complex survey design is taken into account for variance estimation and 95% confidence intervals are constructed using a normal approximation.

All statistical data analyses presented in this report were accomplished using SAS, Version 9.2.

3. County Population Density Peer Groups

County population density peer groups were established by the Kansas Department of Health and Environment's Office of Local and Rural Health. Population density was computed based on the population for each county in the 2000 Census.

Table T-1. County Population Density Peer Groups.

Category	Population Density	Kansas Counties
Frontier	Fewer than 6 persons per square mile	Barber, Chase, Cheyenne, Clark, Comanche, Decatur, Edwards, Elk, Gove, Graham, Greeley, Hamilton, Hodgeman, Jewell, Kearny, Kiowa, Lane, Lincoln, Logan, Meade, Morton, Ness, Osborne, Rawlins, Rush, Sheridan, Smith, Stanton, Trego, Wallace, Wichita
Rural	6 to 19.9 persons per square mile	Anderson, Brown, Chautauqua, Clay, Cloud, Coffey, Ellsworth, Grant, Gray, Greenwood, Harper, Haskell, Jackson, Kingman, Linn, Marion, Marshall, Morris, Nemaha, Norton, Ottawa, Pawnee, Phillips, Pratt, Republic, Rice, Rooks, Russell, Scott, Stafford, Stevens, Thomas, Wabaunsee, Wilson, Woodson
Densely Settled Rural	20 to 39.9 persons per square mile	Allen, Atchison, Barton, Bourbon, Cherokee, Cowley, Dickinson, Doniphan, Ellis, Finney, Ford, Jefferson, Labette, McPherson, Neosho, Osage, Pottawatomie, Seward, Sumner,
Semi-urban	40 to 149.9 persons per square mile	Butler, Crawford, Franklin, Geary, Harvey, Leavenworth, Lyon, Miami, Montgomery, Reno, Riley, Saline
Urban	150 or more persons per square mile	Douglas, Johnson, Sedgwick, Shawnee, Wyandotte

4. Selected Category Crosswalks

Table T-2. Crosswalk for Patient Disposition at Discharge categories used in this report, Kansas Hospital Association Inpatient Database.

KHA Inpatient Database Category	Burden Document Category
Expired	Morgue/Hospice
Expired at home (Medicare and CHAMPUS claims for hospice care)	Morgue/Hospice
Expired in a medical facility (Medicare and CHAMPUS claims for hospice care)	Morgue /Hospice
Expired, place unknown (Medicare and CHAMPUS claims for hospice care)	Morgue /Hospice
Hospice - home	Morgue /Hospice
Hospice - medical facility	Morgue /Hospice
To home health care	Home
To home IV service	Home
To an inpatient rehabilitation facility (IRF)	Inpatient rehabilitation facility
To another short term general hospital	Other short term hospital
To another type of institution	Other
Against Medical Advice (AMA)	Other
Admitted as inpatient to this hospital	Other
Still a patient	Other
Discharged/Transferred to a federal hospital	Other
To hospital-based swing-bed within this institution	Other
To a psychiatric hospital	Other
Discharged/Transferred to another type of healthcare institution not defined elsewhere in this code list	Other
To another institution for outpatient services	Other
To this institution for outpatient services	Other
To a skilled nursing facility (SNF)	Skilled nursing/Intermediate care/Long-term-care facility
To an intermediate care facility (ICF)	Skilled nursing/Intermediate care/Long-term-care facility
To a long-term-care hospital	Skilled nursing/Intermediate care/Long-term-care facility
To a nursing facility certified under Medicaid but not under Medicare	Skilled nursing/Intermediate care/Long-term-care facility

Table T-3. Crosswalk for primary payer source categories used in this report, Kansas Hospital Association Inpatient Database.

KHA Inpatient Database Category	Burden Document Category
Medicaid	Medicaid
Blue Cross/Blue Shield	Commercial/Private Insurance
Workers Comp	Other
Self Pay	Self Pay
Commercial/Private Insurance	Commercial/Private Insurance
Charity/No charge	Other
Other Government (not Champus)	Other
Champus	Other
Other	Other
Medicare Managed Care	Medicare
Medicaid Managed Care	Medicaid
HealthWave/Health Connect Managed Care	HealthWave/Health Connect Managed Care
Blue Cross/Blue Shield Managed Care	Commercial/Private Insurance
Workers Comp Managed Care	Other
All Commercial Payers Managed Care	Commercial/Private Insurance
Other Government Managed Care (not Champus)	Other
Champus Managed Care	Other
Other Managed Care	Other

Burden of Coronary Heart Disease and Stroke in Kansas

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