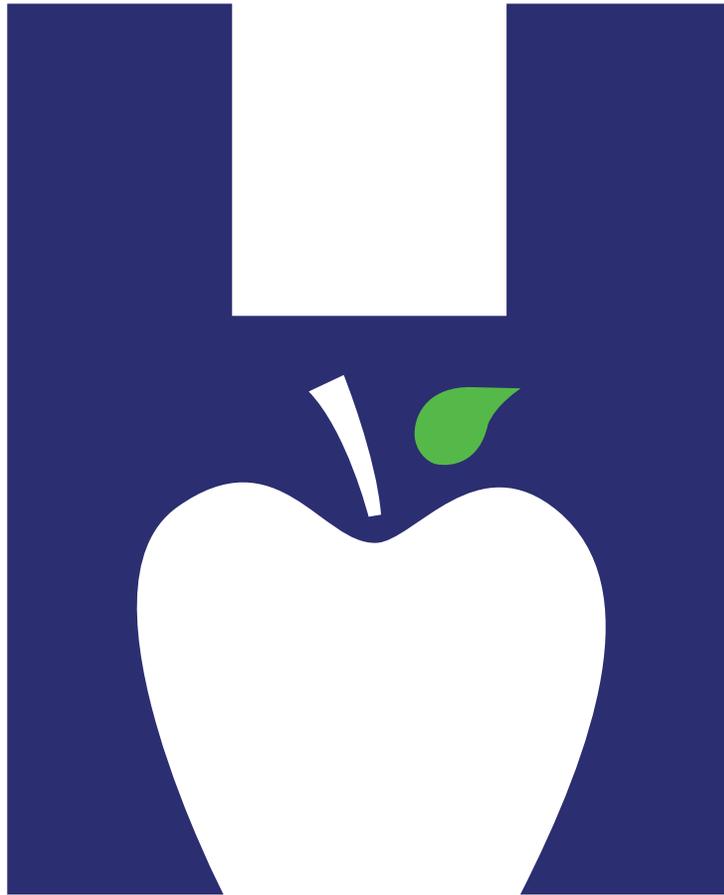


**The Burden of Heart  
Disease and Stroke  
In the Sooner State**



**Recognize and React**



Chronic Disease Service  
Oklahoma State Department Of Health

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Creating a State of Health

## Preface

As we near the centennial celebration of our state, we have much to celebrate. Important health-related laws have passed recently that prohibited tobacco use in state buildings, prohibited smoking in restaurants without a designated smoking room with its separate ventilation system, increased taxes on tobacco, required two officials at each school to be trained in CPR, made physical activity mandatory for grades K-5, established Healthy & Fit School Advisory Councils, and placed restrictions on items that can be put in school vending machines.

In spite of all of this progress, we still have much to improve upon. Oklahoma ranks 5<sup>th</sup> in the nation in the percent of adults without health insurance. According to the United Health Foundation's 2005 State Health Rankings Report, Oklahoma ranks **44<sup>th</sup> worst in the nation for health status** and **50<sup>th</sup> worst for cardiovascular disease death rates**. In addition, in 2002, Oklahoma ranked **second worst** in the nation for **heart disease deaths** and **eighth worst** for **stroke deaths**. These startling facts prompt the questions Who? What? Where? When? And most importantly, Why? While this report may not answer all of these questions, it is our hope that it will provide information to initiate positive changes in regard to cardiovascular disease deaths, particularly those from heart disease and stroke.



# The Burden of Heart Disease and Stroke in the Sooner State

June 2006

Available at: [www.health.ok.gov/program/cds/cvd](http://www.health.ok.gov/program/cds/cvd)

## Suggested Citation:

Tutor CG. The Burden of Heart Disease and Stroke in the Sooner State. Chronic Disease Service, Oklahoma State Department of Health, 2006.

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This publication was supported by the Oklahoma Heart Disease and Stroke Prevention Program's Cooperative Agreement #U50/CCU 621326 from the Centers for Disease Control and Prevention.

Its contents are solely the responsibility of the author and do not necessarily represent the official view of the Centers for Disease Control and Prevention.

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## Executive Summary

The following are findings related to heart disease and stroke that answer five key questions:

### 1. Who?

The state of Oklahoma as a whole is in poor standing when it comes to heart disease and stroke mortality, ranking second and eighth in the nation, respectively in 2002. The mortality rate for heart disease among our male population continues to be higher than for females throughout adulthood; however the disparity between genders is not as large for stroke mortality as it is for heart disease mortality. In fact, in 2002, the age-adjusted mortality rate for stroke was higher among females than males and the mortality rates among those aged 75 years and older, has been higher for females than males throughout the past decade. Mortality rates for heart disease are 16% and 29% higher for African Americans than whites among males and females, respectively while rates for stroke are 36% and 26% higher. The mortality rate for stroke among American Indian males is 29% higher than the rate for white males.

### 2. What?

*Mortality*-In 2004, mortality from diseases of the heart accounted for 31% of all deaths in Oklahoma in 2004. Coronary heart disease accounted for 76% of these deaths or 23% of total deaths. Congestive heart failure accounted for 11% of the deaths from diseases of the heart or 3% of all deaths. In 2002, the Oklahoma age-adjusted mortality rate for congestive heart failure was 64% higher than the US rate. In 2004, stroke accounted for 6% of all deaths.

*Hospitalizations/Economics*-Diseases of the heart accounted for 10.9% of the reported hospital discharges in 2003 and \$1,384,832,060 in total hospital charges. Stroke accounted for 2.6% of the reported hospital discharges and \$207,322,123 in total hospital charges.

### 3. Where?

Age-adjusted heart disease mortality rates are highest in some of the west/southwestern counties and age-adjusted mortality rates for stroke are the highest in many of the counties in this area. Age-adjusted heart disease mortality rates are highest in many of the counties in the southeastern part of the state.

### 4. When?

As with most other diseases, the morbidity and mortality from heart disease and stroke increases with increasing age; however in Oklahoma, the younger age groups have not had the decrease in mortality rates since 1993 as the older age groups have. The average hospital charge for heart disease among those under age 15 is higher than the average charge for the older age group.

## 5. Why?

Oklahoma ranks in the top ten of the 50 states for the following heart disease risk factors among adults: smoking, diabetes, no leisure time physical activity, and poor nutrition (not eating 5 or more servings of fruits and vegetables per day). Of these Oklahoma ranks 1<sup>st</sup> and 8<sup>th</sup> for not eating 5 or more servings of fruits and vegetables and smoking. In addition, Oklahoma ranks 13<sup>th</sup> and 14<sup>th</sup> for high blood pressure and obesity, respectively. Oklahoma has a significantly higher percentage of adults with two or more of the following risk factors than the US: diabetes, high blood pressure, high cholesterol, smoking, and obesity. Oklahoma also ranks 5<sup>th</sup> in the nation for the number of uninsured adults.

Recognition of signs and symptoms of a heart or stroke among Oklahoma adults has room for improvement. Over 60% of Oklahoma adults do not know all the signs and symptoms of a heart attack and over 57% of Oklahoma adults do not all the signs and symptoms of a stroke.

## Introduction

### a. The State

In 2004, Oklahoma had a population of over 3.5 million people. Of this population, 51% was female. The median age was 36.0 years. Twenty-four percent of the population was under 18 years and 13 percent was 65 years and older<sup>2</sup>.

Oklahoma has a substantial rural population. Oklahoma has three Metropolitan Statistical Areas [defined by the US Census as areas with a core nucleus with a substantial population (50,000 or more) with adjacent communities that are economically and socially integrated with that core] in Oklahoma City, Tulsa, and Lawton. Over 39%, or 1.39 million Oklahomans live outside of these areas.

The largest minority population in Oklahoma is American Indian consisting of an estimated 283,884 or 8.1% of the total state population<sup>3</sup>. When those who identified themselves as having two or more racial or ethnic identities including American Indian are included, the percentage of people with Native ancestry in Oklahoma jumps to 11.3%<sup>3</sup>. Oklahoma is home to 39 federally recognized tribes and the second largest American Indian population in the United States. African-Americans are the second largest minority population in Oklahoma consisting of an estimated 272,224 in 2004 or 7.7% of the total state population.<sup>3</sup> Oklahoma is also home to 14 historically African American towns, originally founded in the late 19th and early 20th centuries by former slaves and descendants of slaves from the South who were attracted to then-Indian Territory by the prospect of establishing their own municipalities. An estimated 6.3% of Oklahoma's population is Hispanic (223,005). An estimated 4.0% or 140,406 Oklahomans report themselves as mixed race<sup>3</sup>.

The unemployment rate in Oklahoma in November 2005 was 4.1% compared to the national rate of 5.0%<sup>4</sup>. The median household income was \$35,357 compared to \$44,684 in the US. Twelve percent of Oklahoma families are below poverty level compared to 10.1% of US families<sup>5</sup>. Over 21% of Oklahoma adults report not having health care coverage compared to 16% nationwide.<sup>14</sup>

## b. The Disease

The most common types of cardiovascular diseases are coronary heart disease (CHD) and stroke<sup>6</sup>. A number of factors contribute to heart disease and stroke. Some factors such as age, race, gender, and genetics are non-modifiable while others such as lack of physical activity, smoking, uncontrolled high blood pressure, uncontrolled diabetes, and uncontrolled high cholesterol are modifiable. New research has demonstrated that higher than normal levels of the inflammatory marker, C-reactive protein (CRP) can indicate an increased risk of CHD. Increased levels of homocysteine have been found to increase the risk of CHD, stroke, and peripheral vascular disease<sup>7</sup>.

The purpose of this report is to describe the morbidity and mortality of cardiovascular disease, specifically heart disease and stroke and its risk factors, in Oklahoma. The economic burden will also be described. Because one of the primary objectives of the OK Heart Program is preventing and controlling high blood pressure and high cholesterol, this report will present detailed statistics on these risk factors and only a brief overview of the other risk factors. Additional information on diabetes in Oklahoma can be found at <http://www.health.state.ok.us/program/cds/diabetes> and additional information on physical activity and nutrition in Oklahoma can be found at <http://www.health.state.ok.us/program/cds/obesity.html>.

## Mortality

### a. Overall

In this report, diseases of the heart and cerebrovascular disease or stroke will be defined according to “Indicators for Chronic Disease Surveillance” published in the September 2004 *MMWR*<sup>8</sup>.

Beginning in 1999, the Tenth Revision of the International Classification of Diseases (ICD-10) became effective. Based on a comparability analysis, there was a <2% decrease in the number of deaths coded as heart disease and a 6% increase in the number of deaths coded as stroke<sup>9</sup>.

Table 1. ICD-9 and ICD-10 codes for diseases of the heart and stroke

	ICD-9	ICD-10
Diseases of the Heart	390-398, 402, 404, 410-429	I00-I09, I11, I13, I20-I51
Coronary Heart Disease	402, 410-414, 429.2	I11, I20-I25
Congestive Heart Failure	428.0	I50.0
Cerebrovascular Disease (Stroke)	430-438	I60-I69

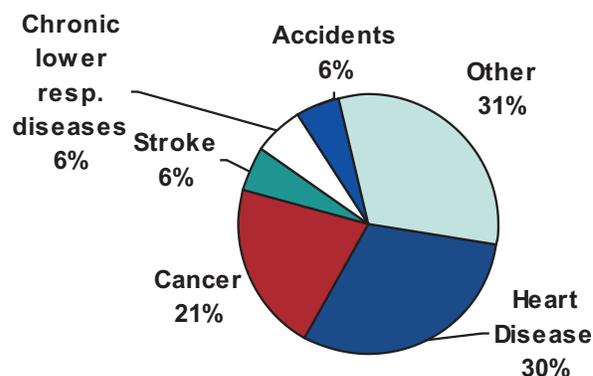
In 2002, Oklahoma ranked second worst in the nation for heart disease deaths and eighth worst in the nation for stroke deaths<sup>10</sup>.

Heart disease and stroke are the first and third leading causes of death among Oklahomans, accounting for over one-third of the total deaths. Everyday, 28 Oklahomans die of heart disease and 6 die of stroke compared to 20 who die of any type of cancer. Among women, 18 die of heart disease or stroke each day compared to less than 1 who dies of breast cancer each day.

Table 2. Top 10 causes of death in Oklahoma  
(Oklahoma Vital Statistics 2004)

ICD-10 Causes of death	Number of deaths
Diseases of the heart (I00-I09,I11,I13,I20-I51)	10,272
Cancer (C00-C97)	7,236
Stroke (I60-I69)	2,176
Chronic lower respiratory diseases (J40-J47)	1,977
Accidents (unintentional injuries) (V01-X59, Y85-Y86)	1,925
Diabetes mellitus (E10-E14)	1,137
Alzheimer's disease (G30)	864
Influenza and pneumonia (J10-J18)	809
Nephritis, nephritic syndrome and nephrosis (N00-N07,N17-N19,N25-N27)	565
Intentional self-harm (suicide) (X60-X84, Y87.0)	502

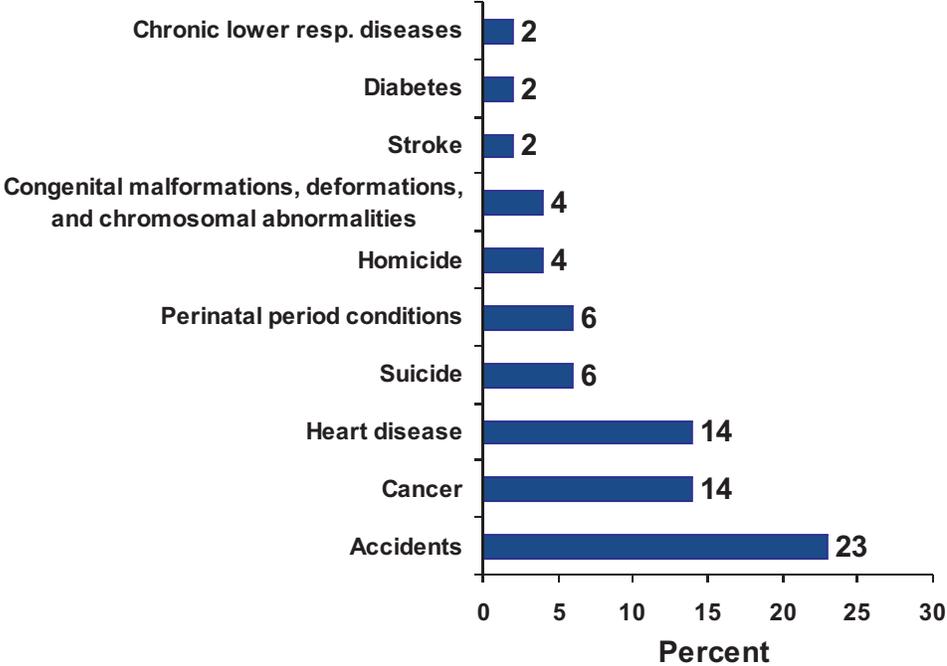
Figure 1. Leading causes of death  
(OK Vital Statistics 2004)<sup>11</sup>



Years of Potential Life Lost (YPLL) is a measure of premature mortality which estimates the number of years of life lost before a certain age because of death. Figure 2 shows the top ten causes of YPLL as percentages of the total YPLL before the age of 65 among Oklahomans (173,308 years) in 2004.

Figure 2. Percent of total potential years per life lost (YPLL) prior to age 65 (OK Vital Statistics 2004)

Heart disease and stroke are the second and eighth leading causes of years of potential life lost prior to age 65.



b. Diseases of the Heart

Figure 3. Mortality from diseases of the heart in Oklahoma (OK Vital Statistics 2004)

Coronary heart disease accounts for over 75% of the heart disease deaths in Oklahoma.

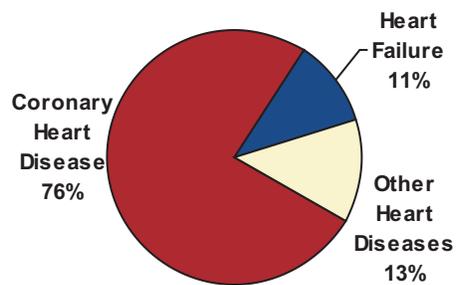
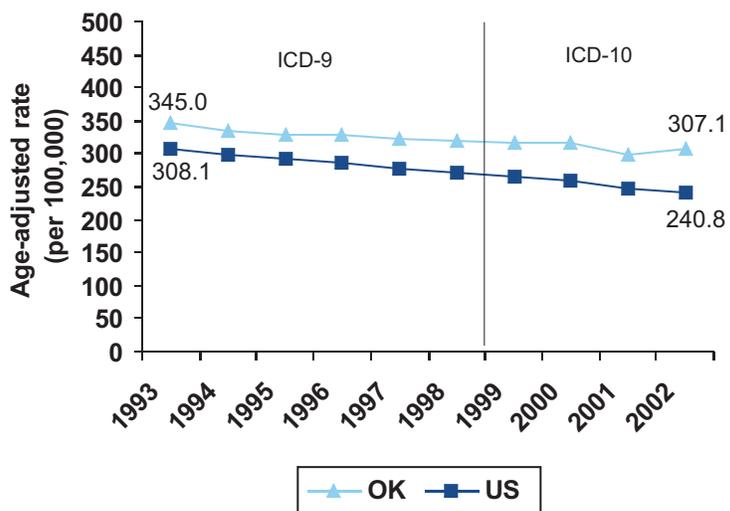


Figure 4. Trends in age-adjusted mortality rates from diseases of the heart (CDC Wonder 1993-2002)

Age-adjusted mortality rates from diseases of the heart are decreasing less sharply in Oklahoma than in the US. In 2002, the rate was 28% higher in Oklahoma compared to the US.



ICD-9 codes: 390-398, 402, 404, 410-429  
 ICD-10 codes: I00-I09, I11, I13, I20-I51

Figure 5. Trends in age-adjusted mortality rates from congestive heart disease (CDC Wonder 1993-2002)

The age-adjusted mortality rate for congestive heart disease has not decreased over the past ten years. In 2002, the rate in Oklahoma was 64% higher than the US rate.

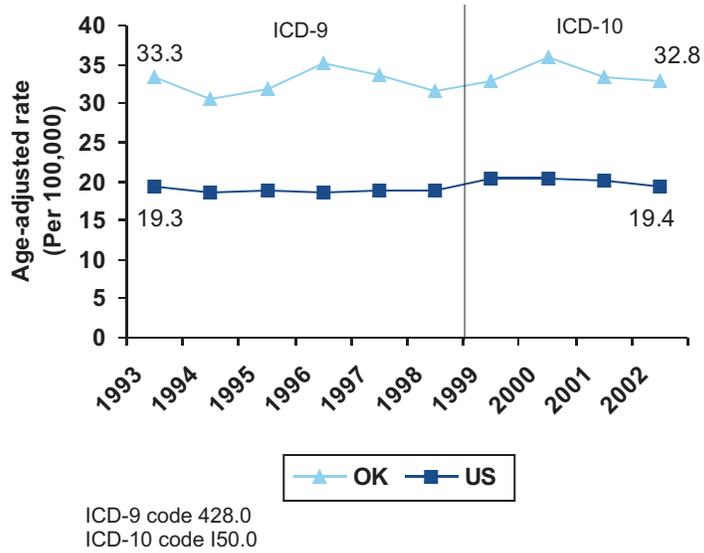


Figure 6. Trends in age-adjusted mortality rates from coronary heart disease (CDC Wonder 1993-2002)

Similarly to the all heart disease mortality rate trend, the gap in age-adjusted mortality rates for coronary heart disease between Oklahoma and the US has widened in the past ten years. In 2002, the Oklahoma rate was 29% higher than the US rate.

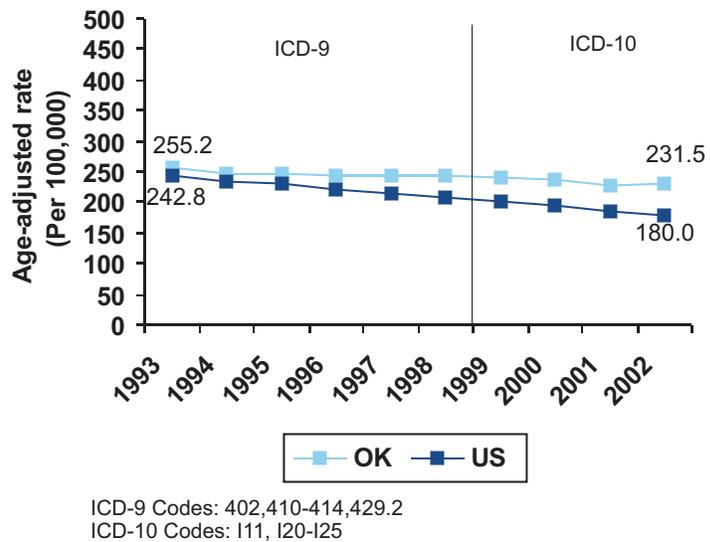
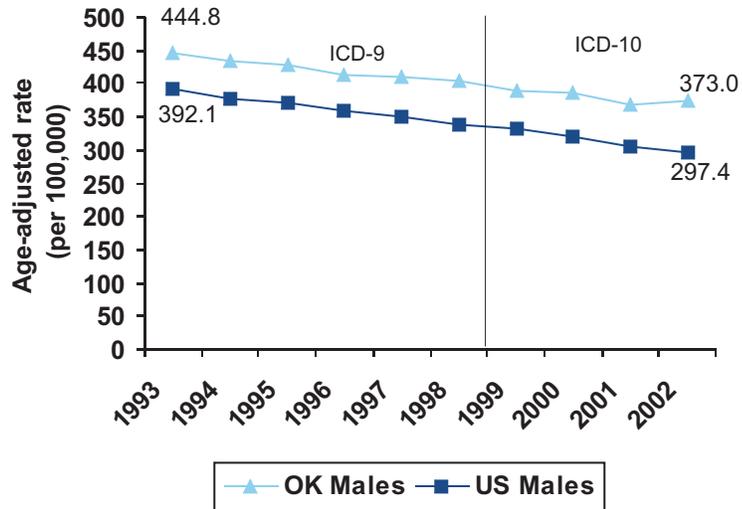


Figure 7a. Trends in age-adjusted mortality rates from diseases of the heart among males (CDC Wonder 1993-2002)

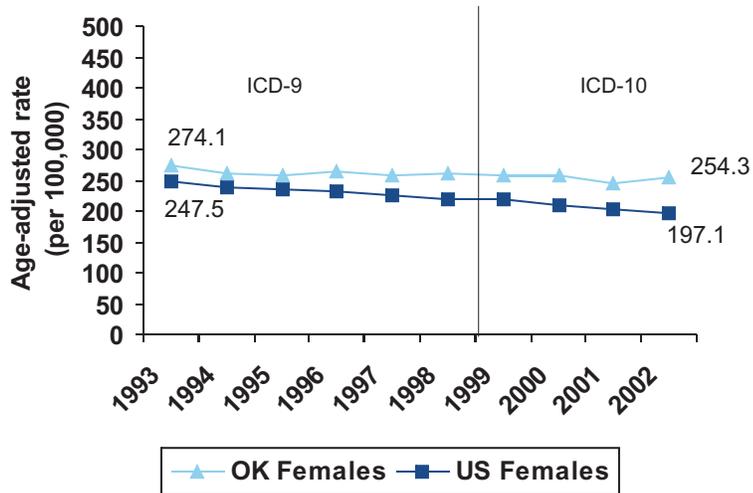
Over the past ten years, the age-adjusted mortality rate from diseases of the heart among Oklahoma males has been higher than the US rate. In 2002, the rate was 25% higher among Oklahoma males than US males.



ICD-9 codes: 390-398, 402, 404, 410-429  
 ICD-10 codes: I00-I09, I11, I13, I20-I51

Figure 7b. Trends in age-adjusted mortality rates from diseases of the heart among females (CDC Wonder 1993-2002)

The age-adjusted mortality rate from diseases of the heart among Oklahoma females has remained higher than that of US females. In 2002, the Oklahoma rate was 29% higher than the US rate.



ICD-9 codes: 390-398, 402, 404, 410-429  
 ICD-10 codes: I00-I09, I11, I13, I20-I51

The mortality rate from diseases of the heart among those 35-54 years old has not decreased steadily over the past ten years among either gender. The rate in 2003 was 142% higher for males compared to females.

Figure 8a. Trends in mortality rates from diseases of the heart among Oklahoma adults 35-54 years old by gender (OK Vital Statistics 1993-2003)

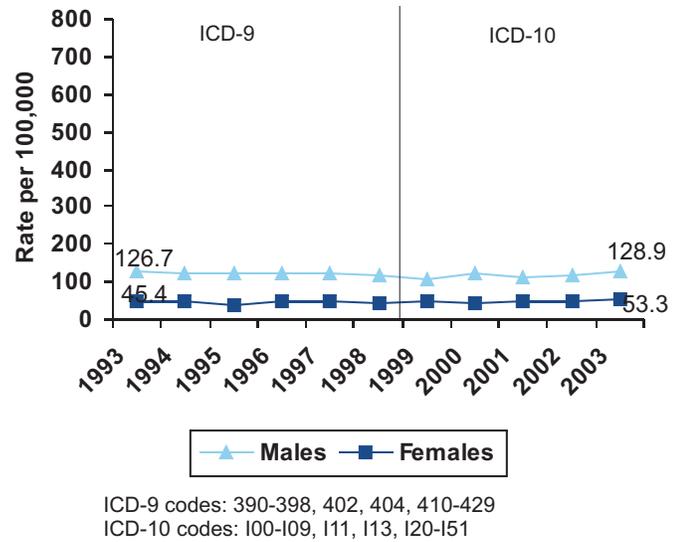


Figure 8b. Trends in mortality rates from diseases of the heart among Oklahoma adults 55-64 years old by gender (OK Vital Statistics 1993-2003)

The mortality rate from diseases of the heart has decreased among both males and females aged 55-64 years. However, the decrease among males was more dramatic.

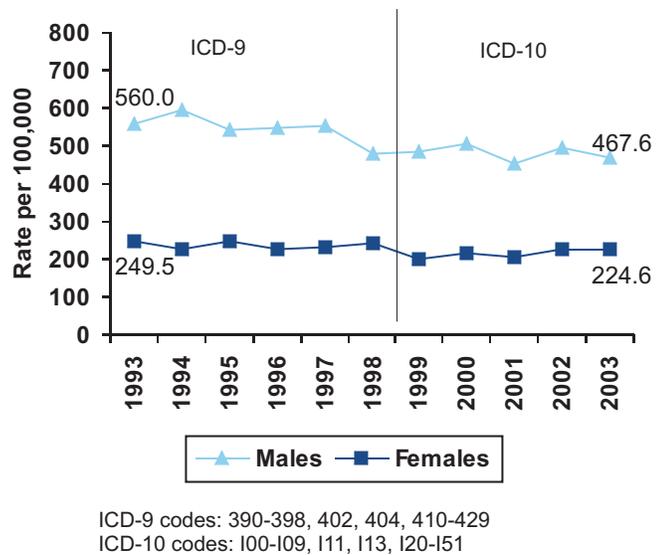
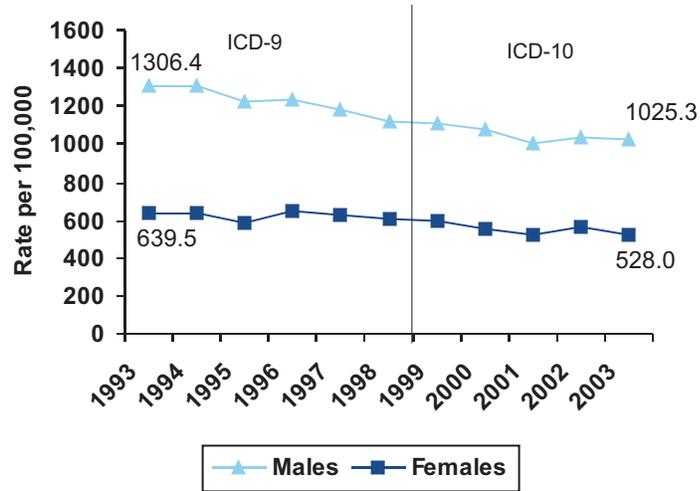


Figure 8c. Trends in mortality rates from diseases of the heart among Oklahoma adults 65-74 years old by gender (OK Vital Statistics 1993-2003)

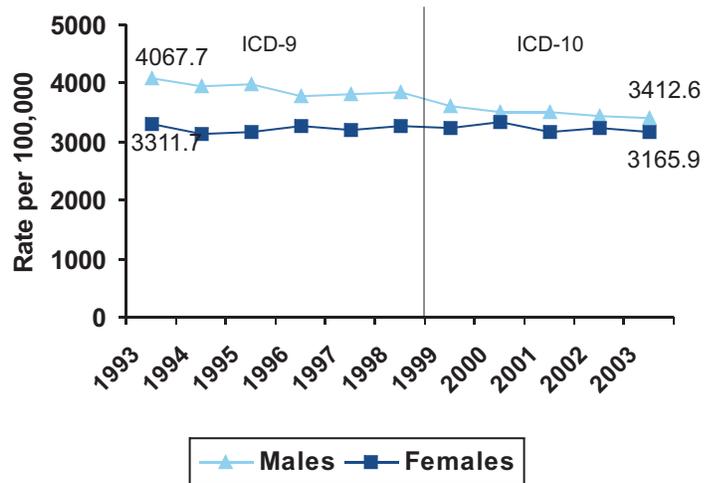
The age-adjusted mortality rate from diseases of the heart among both Oklahoma males and females 65 to 74 years old has decreased. In 2002, the mortality rate was 94% higher for Oklahoma males compared to females.



ICD-9 codes: 390-398, 402, 404, 410-429  
 ICD-10 codes: I00-I09, I11, I13, I20-I51

Figure 8d. Trends in mortality rates from diseases of the heart among Oklahoma adults 75 years and older by gender (OK Vital Statistics 1993-2003)

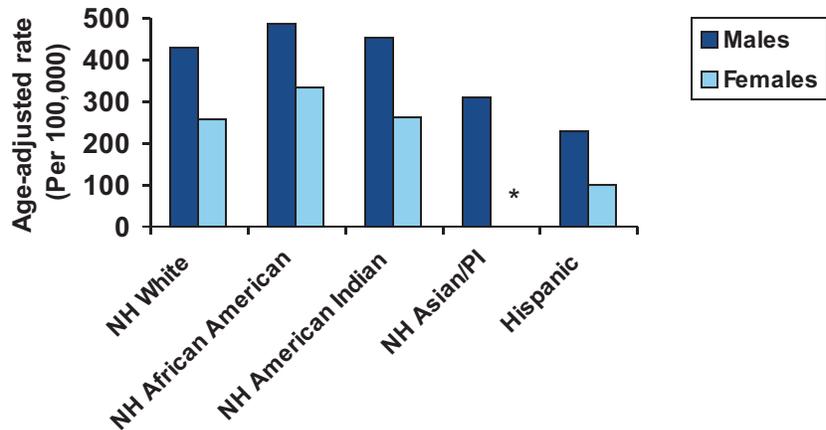
The age-adjusted mortality rate from diseases of the heart among Oklahoma males 75 years and older has decreased more than the rate among females in this age group.



ICD-9 codes: 390-398, 402, 404, 410-429  
 ICD-10 codes: I00-I09, I11, I13, I20-I51

Figure 9a. Age-adjusted Indian Health Service-linked mortality rates from diseases of the heart by gender and race/ethnicity (OK Vital Statistics 1993-1995)

In the years 1993-1995 combined, age-adjusted mortality rates from diseases of the heart were highest for African Americans among both genders. Asian males, Hispanic males, and Hispanic females had the lowest mortality rates.

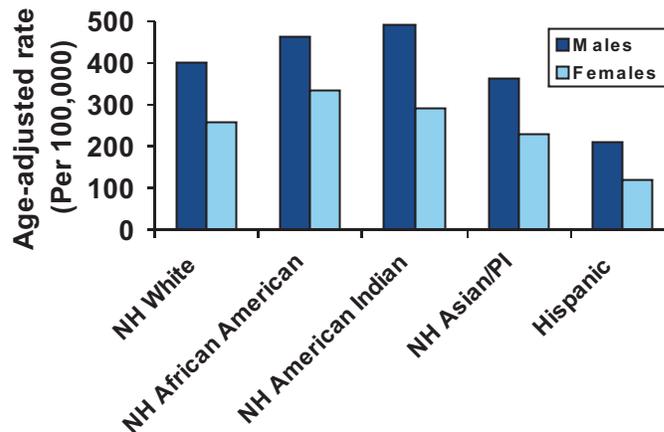


NH=Non-Hispanic  
ICD-9 codes: 390-398, 402, 404, 410-429

\*Asian female rate suppressed because cell size <20

Figure 9b. Age-adjusted Indian Health Service-linked mortality rates from diseases of the heart by gender and race/ethnicity (OK Vital Statistics 1996-1998)

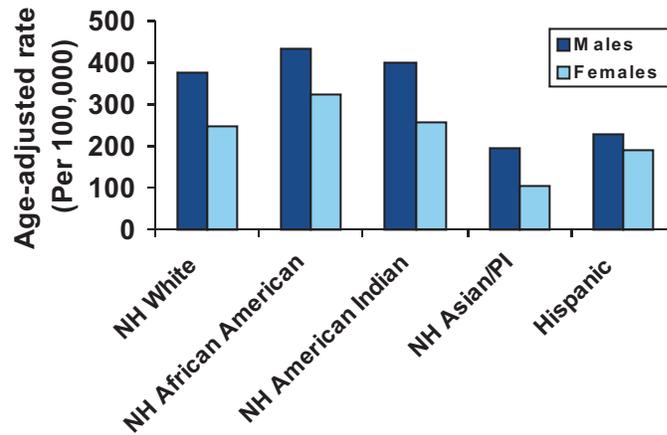
In the years 1996-1998 combined, American Indian and African American males had the highest age-adjusted mortality rates (491.2 and 461.7, respectively). Among females, African Americans had the highest rate (332.0). Among both genders, Asian/Pacific Islanders and Hispanics had the lowest rates.



NH=Non-Hispanic  
ICD-9 codes: 390-398, 402, 404, 410-429

Figure 9c. Age-adjusted IHS-linked mortality rates from diseases of the heart by gender and race/ethnicity (OK Vital Statistics 1999-2001)

In the years 1999-2001 combined, African American males and females had the highest age-adjusted mortality rates from diseases of the heart (433.0 and 321.8, respectively). Asian/Pacific Islanders and Hispanics continued to have the lowest rates.

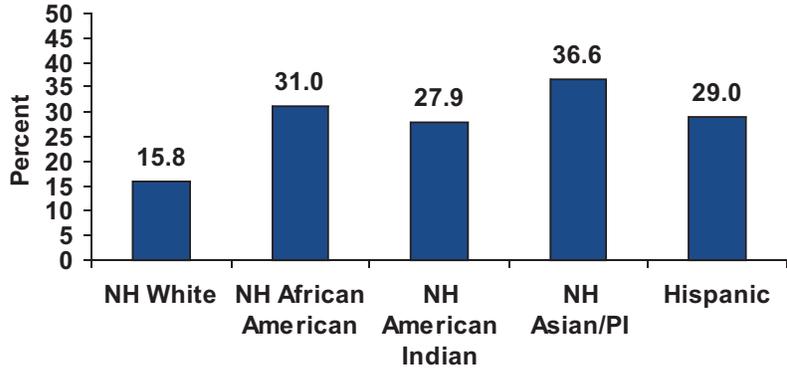


NH=Non-Hispanic  
ICD-10 codes: I00-I09, I11, I13, I20-I51

From the 1993-1995 to the 1999-2001 time period, the age-adjusted mortality rate for white males decreased by over 12% while the rate for females remained basically unchanged. Similarly, the age-adjusted rate for African American males decreased by 11% while the rate for African American females remained basically unchanged. The age-adjusted rates for American Indian males and females varied across the three time periods, first increasing, then decreasing. Because of the relatively small number of deaths, the age-adjusted rate for Asian males varied greatly across the three time periods. The age-adjusted rate among Hispanic males varied across the three time periods, first decreasing, then increasing back to the previous level. The age-adjusted rate among Hispanic females increased by 95% from the 1993-1995 time period to the 1999-2001 time period.

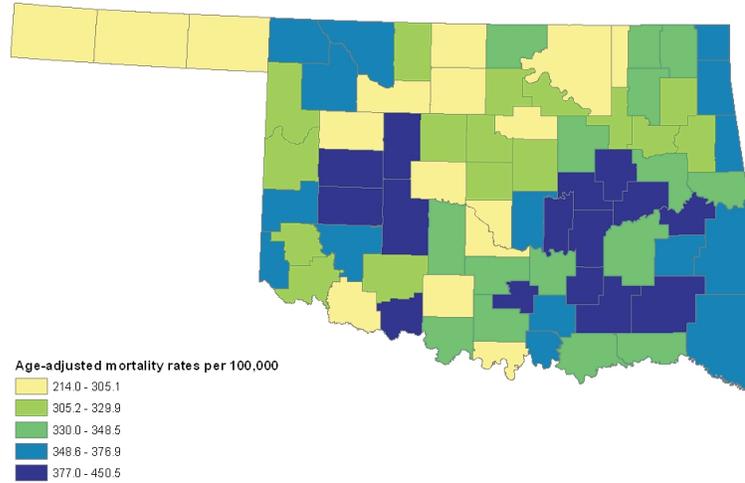
Figure 10. Percent of total heart disease deaths among Oklahoma adults younger than 65 by Indian Health Service-linked race/ethnicity (OK Vital Statistics 1999-2001)

Deaths from diseases of the heart among Oklahomans younger than 65 is more prevalent in racial/ethnic minority groups. Asian/Pacific Islanders had the highest percent of premature heart disease deaths followed by African Americans, Hispanics, and American Indians.



NH=Non-Hispanic  
ICD-10 codes: I00-I09, I11, I13, I20-I51

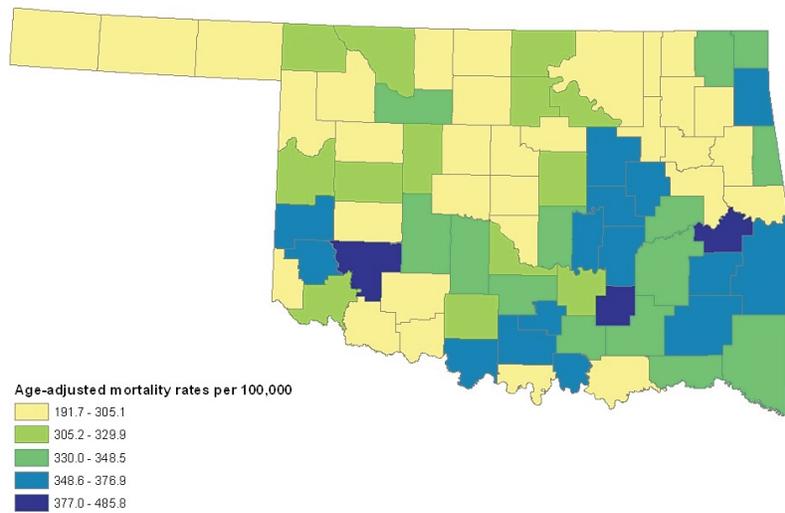
Figure 11a. Age-adjusted mortality rates from diseases of the heart by county (OK Vital Statistics 1991-1998)



ICD-9 codes: 390-398, 402, 404, 410-429

Figures 10a and 10b show age-adjusted mortality rates by county. The fewer number of darker counties in figure 10b is indicative of the decreasing mortality rates over time. In 1999-2003 (Figure 10b), Kiowa, Haskell, and Coal counties had heart disease mortality rates in the range of the highest quintile of the 1991-1998 rates.

Figure 11b. Age-adjusted mortality rates from diseases of the heart by county (OK Vital Statistics 1999-2003)

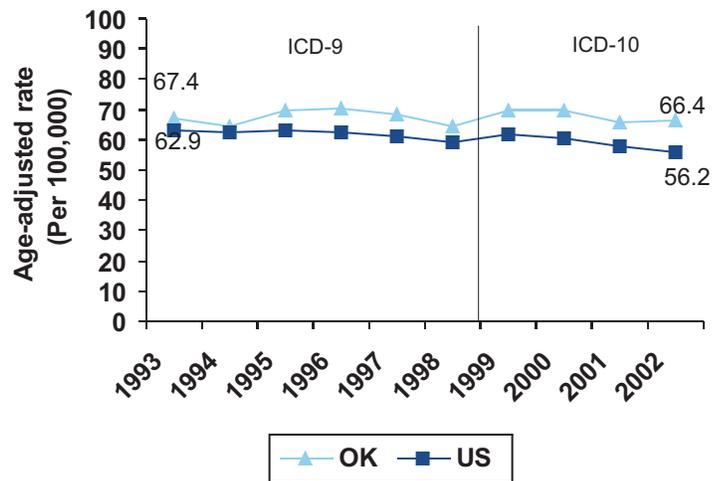


ICD-10 codes: I00-I09, I11, I13, I20-I51

c. Stroke Mortality

Figure 12. Trends in age-adjusted mortality rates from stroke (CDC Wonder 1993-2002)

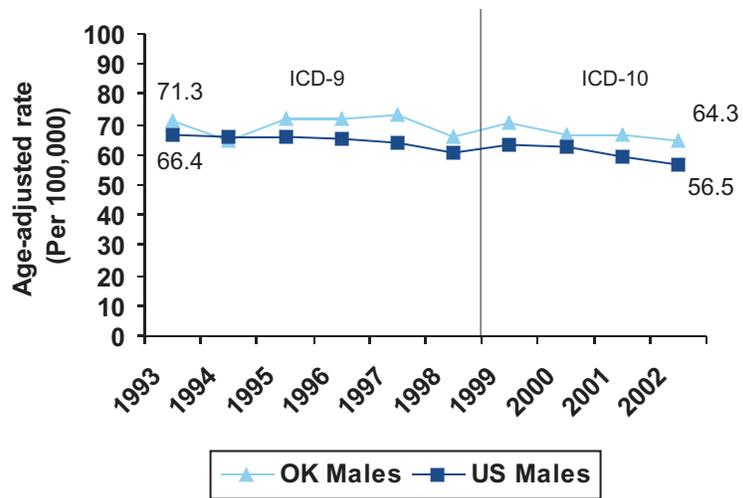
Stroke mortality rates have decreased slightly in Oklahoma and in the US over the past ten years.



ICD-9 codes: 430-438  
ICD-10 codes: I60-I69

Stroke mortality rates have remained higher for Oklahoma males than US males over the past eight years.

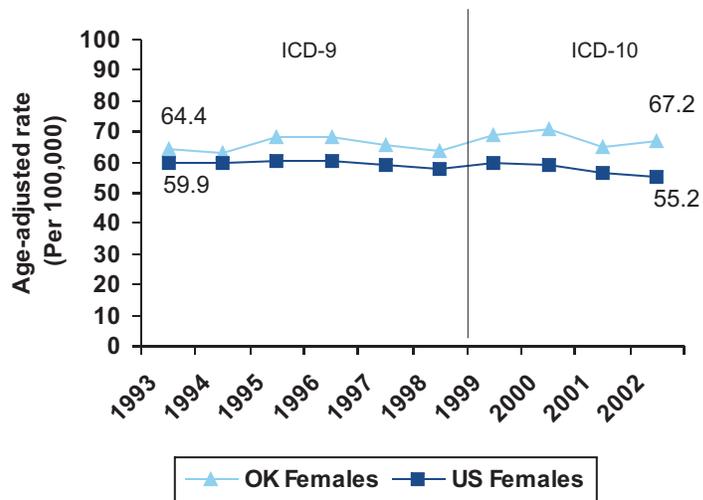
Figure 13a. Trends in age-adjusted mortality rates from stroke among males (CDC Wonder 1993-2002)



ICD-9 codes: 430-438  
ICD-10 codes: I60-I69

Figure 13b. Trends in age-adjusted mortality rates from stroke among females (CDC Wonder 1993-2002)

Stroke mortality rates have remained higher for Oklahoma females than for US females during the past ten years.



ICD-9 codes: 430-438  
ICD-10 codes: I60-I69

Figure 14a. Trends in mortality rates from stroke among adults 35-54 years old by gender (OK Vital Statistics 1993-2003)

Among Oklahoma adults 35-54 years, stroke mortality rates have remained similar for males and females.

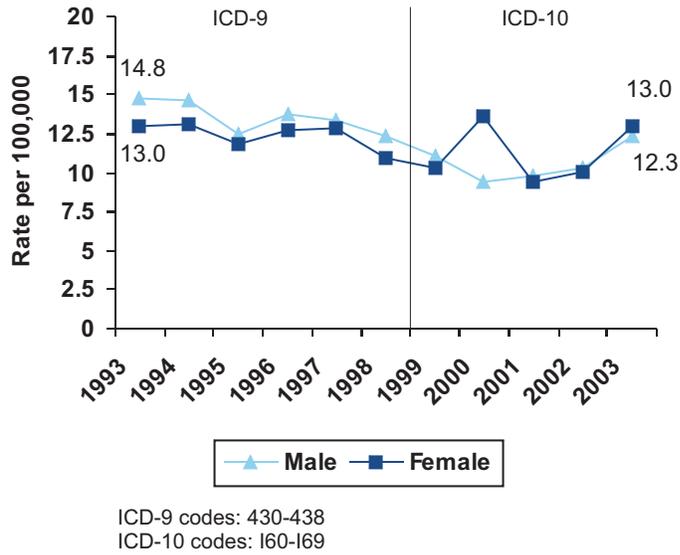


Figure 14b. Trends in mortality rates from stroke among those 55-64 years old by gender (OK Vital Statistics 1993-2003)

Among Oklahoma adults 55-64 years old, the rates of stroke have remained higher for males than females for nine of the last ten years.

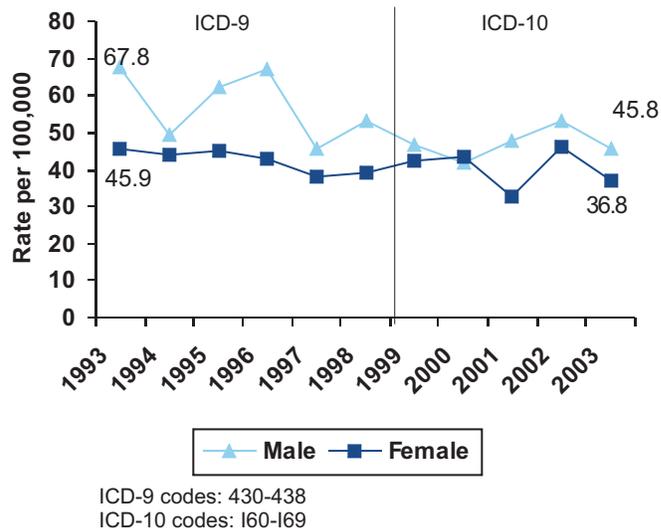
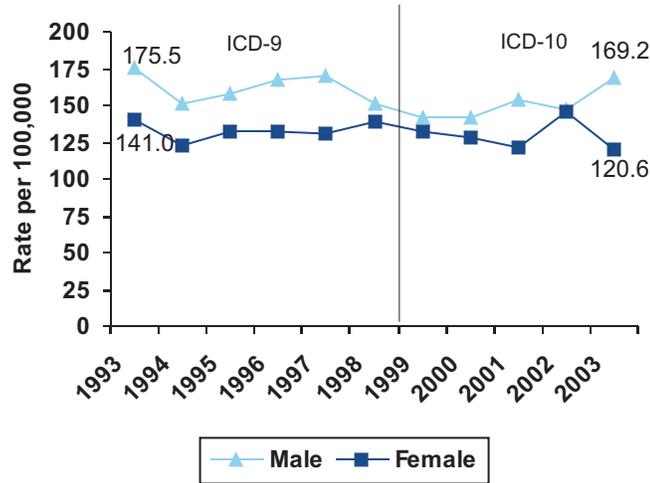


Figure 14c . Trends in mortality rates from stroke among those 65-74 years old by gender (OK Vital Statistics 1993-2003)

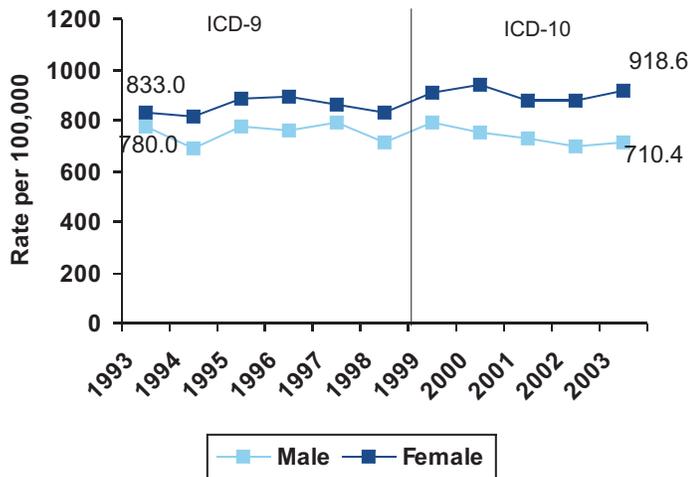
Among Oklahoma adults 65-74 years old, the stroke mortality rates for males were higher than those for females over the past ten years.



ICD-9 codes: 430-438  
ICD-10 codes: I60-I69

Figure 14d. Trends in mortality rates among those 75 years and older by gender (OK Vital Statistics 1993-2003)

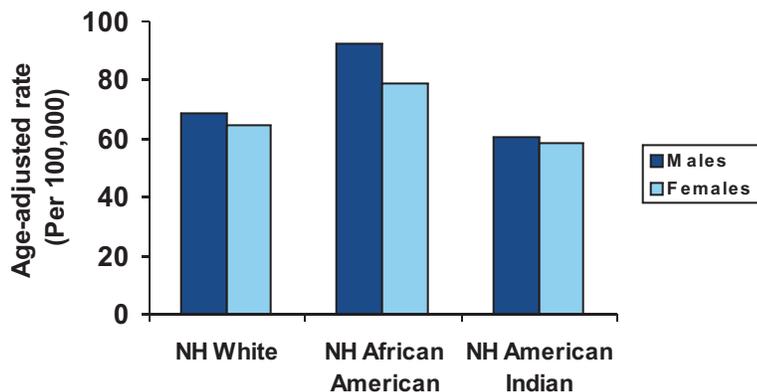
Among Oklahoma adults 75 years and older, the stroke mortality rates among women have remained higher than those for men over the past ten years.



ICD-9 codes: 430-438  
ICD-10 codes: I60-I69

Figure 15a. Age-adjusted IHS-linked mortality rates from stroke by gender and race/ethnicity (OK Vital Statistics 1993-1995)

In 1993-1995 combined, the age-adjusted rate for African American males was 92.8 and the rate for females was 79.1 per 100,000 compared to 68.4 for white males and 64.8 for white females. The age-adjusted rates for American Indian males and females were lower than those for white males and females during this time period.

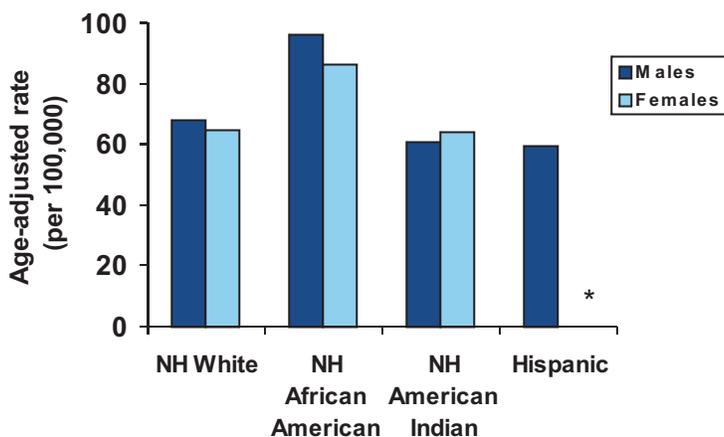


NH=Non-Hispanic  
ICD-9 codes: 430-438

Asian and Hispanic rates suppressed because number of deaths <20

Figure 15b. Age-adjusted IHS-linked mortality rates from stroke by gender and race/ethnicity (OK Vital Statistics 1996-1998)

In 1996-1998 combined, the age-adjusted rate for African American males was 95.9 and the rate for females was 86.5 per 100,000 compared to 68.2 for white males and 64.5 for white females. The age-adjusted rates for American Indian and Hispanic males and females were lower than those for white males and females during this time period.

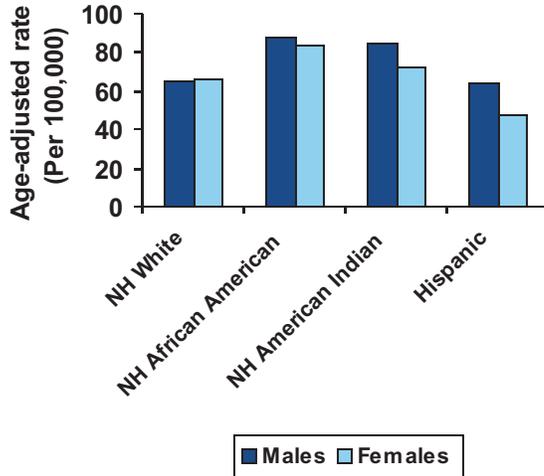


NH=Non-Hispanic  
ICD-9 codes: 430-438

\*Asian and Hispanic female rates suppressed because number of deaths <20

Figure 15c. Age-adjusted IHS-linked mortality rates from stroke by gender and race/ethnicity (OK Vital Statistics 1999-2001)

In 1999-2001 combined, the age-adjusted rate for African American males was 95.5 and the rate for females was 86.1 per 100,000 compared to 64.9 for white males and 66.5 for white females. Also, in the 1999-2001 time period, stroke mortality rates for American Indians surpassed those of whites at 84.0 for males and 71.3 per 100,000 for females.

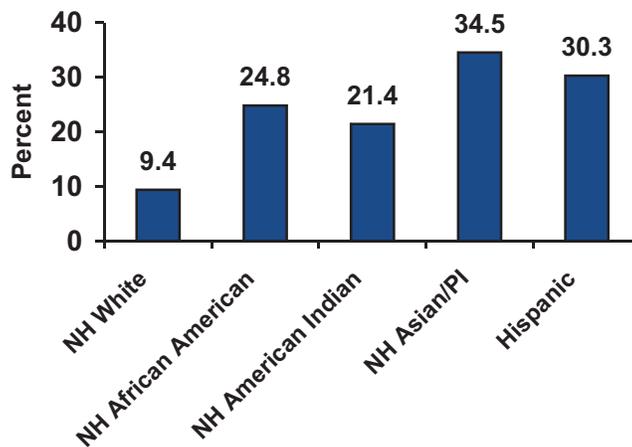


NH=Non-Hispanic  
ICD-10 codes: I60-I69

Asian rates suppressed because  
number of deaths <20

Similarly to deaths from diseases of the heart, the percent of deaths from stroke among Oklahomans younger than 65 is much higher for racial/ethnic minority groups. Asians and Hispanics have three times the percent of premature deaths from strokes than whites while African Americans and American Indians have over two times the percent of premature deaths.

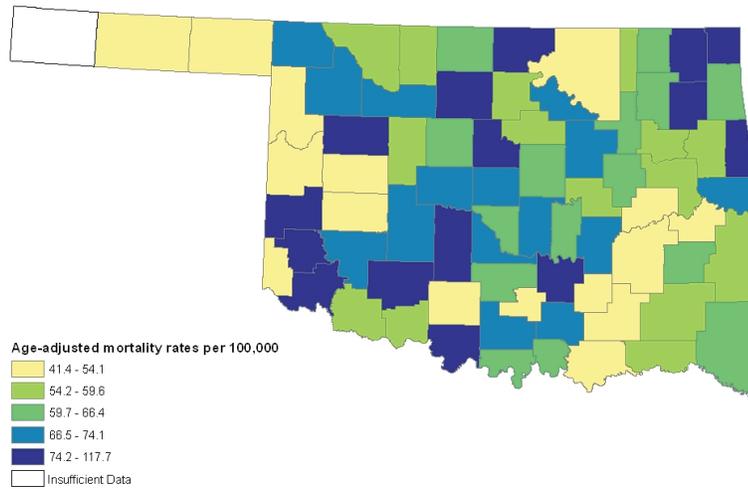
Figure 16. Percent of stroke deaths among those less than 65 years by Indian Health Service-linked race/ethnicity (OK Vital Statistics 1999-2001)



ICD-10 codes: I60-I69

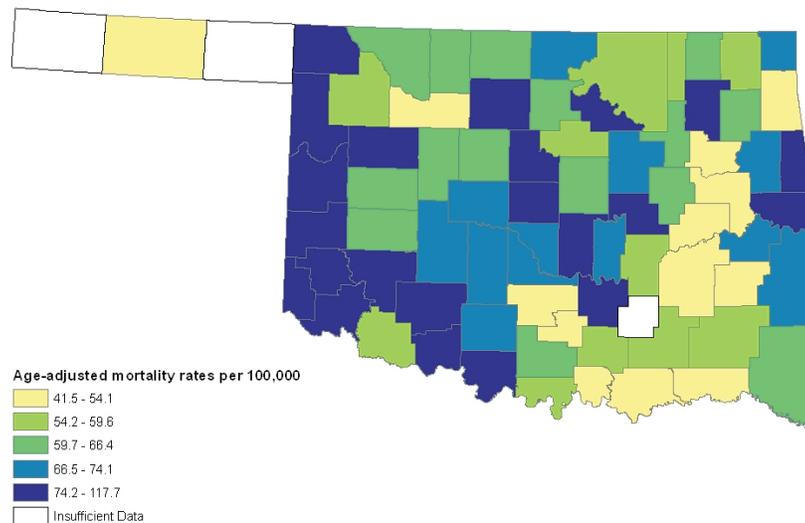
Figure 17a. Age-adjusted mortality rates from stroke by county (OK Vital Statistics 1991-1998)

Stroke mortality rates have increased with the highest rates being in the western and southwestern part of the state.



Source: Oklahoma Vital Statistics  
ICD-9 Codes 430-438

Figure 17b. Age-adjusted mortality rates from stroke by county (OK Vital Statistics 1999-2003)



Source: Oklahoma Vital Statistics  
ICD-10 Codes I60-I69

## Hospitalizations

In 2003, 125 of the 130 licensed, non-psychiatric hospitals in Oklahoma reported discharge data to the Oklahoma State Department of Health. This dataset only includes non-federal hospitals therefore data from VA hospitals and Indian Health Service or Tribal Health Service hospitals are not included. The discharges represent encounters rather than individuals.

- a. Hospitalizations from diseases of the heart
- Diseases of the heart accounted for 10.9% of the 506,983 discharges among Oklahoma residents of which coronary heart disease accounted for nearly half.
  - Discharges in 2003 with a primary diagnosis of heart disease accounted for \$1,384,832,060 in hospital charges.

Table 3. Oklahoma inpatient hospital discharges with a primary diagnosis of heart disease (OK Hospital Discharge Data 2003)

	Number of discharges	Rate per 10,000 population	Average length of stay (days)	Average hospital charge
<b>Total</b>	55,292	147.2*	4.4	\$25,046
<b>Gender</b>				
Male	28,827	173.3*	4.2	\$28,827
Female	26,464	118.6*	4.6	\$21,970
Unknown	1			
<b>Age</b>				
<15	122	1.7	4.5	\$32,613
15-44	3,348	22.5	3.7	\$23,697
45-64	17,206	201.1	3.9	\$27,911
65+	34,616	745.3	4.7	\$23,725

ICD-9 codes: 390-398, 402, 404, 410-429

\*Age-adjusted rate

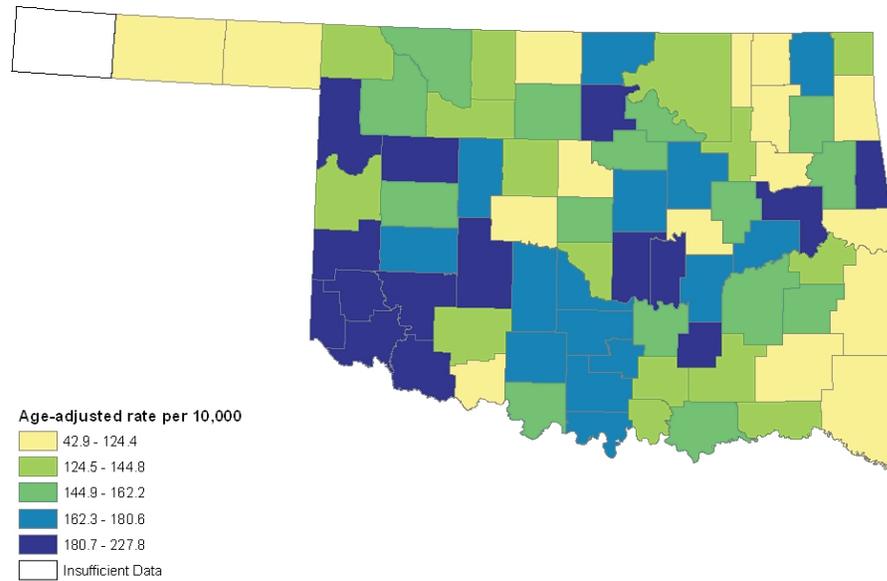
Table 4. Oklahoma inpatient hospital discharges with coronary heart disease as the primary diagnosis (OK Hospital Discharge Data 2003)

	Number of discharges	Rate per 10,000 population	Average length of stay	Average hospital charge
<b>Total</b>	28,372	75.0*	3.9	\$29,919
<b>Gender</b>				
Male	16,652	97.5*	3.8	\$32,115
Female	11,719	52.2*	4.0	\$26,780
Unknown	1			
<b>Age</b>				
<15	3		3.7	\$39,273
15-44	1,572	10.5	3.0	\$25,656
45-64	11,013	128.7	3.5	\$31,239
65+	15,784	339.9	4.2	\$29,420

ICD-9 codes: 390-398, 402, 404, 410-429

\*Age-adjusted rate

Figure 18. Average age-adjusted rate of hospital discharges with heart disease as the primary diagnosis by county of residence (OK Hospital Discharge Data 2002 and 2003)



ICD-9 codes: 390-398, 402, 404, 410-429

b. Hospitalizations from stroke

- In 2003, hospitalizations with stroke as the primary diagnosis accounted for 2.6% of all hospital discharges of Oklahoma residents.
- In 2003, hospital discharges with stroke as the primary diagnosis accounted for \$207,322,123 in hospital charges.
- Those in younger age groups had higher average charges than those in older age groups.

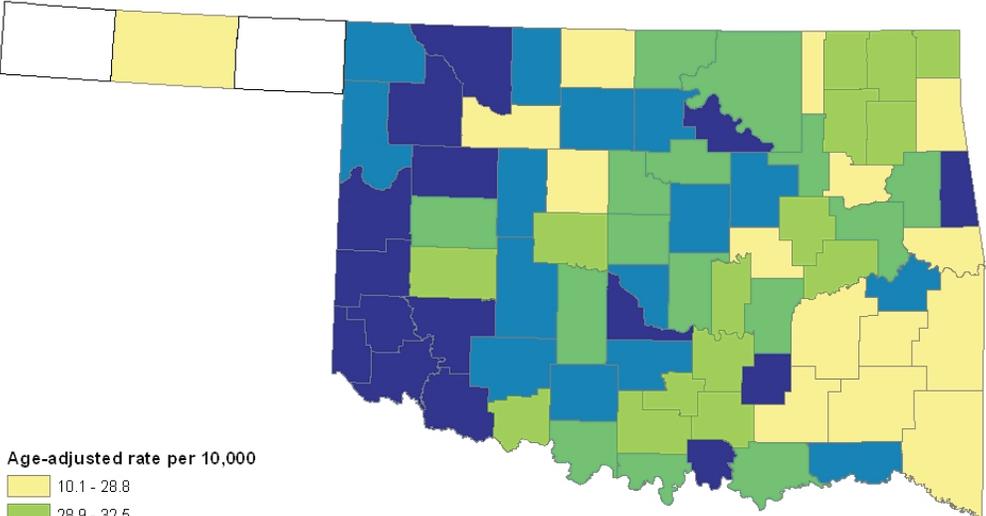
Table 5. Oklahoma inpatient hospital discharges for stroke (OK Hospital Discharge Data 2003)

	Number of discharges	Rate per 10,000 population	Average length of stay (days)	Average hospital charge
<b>Total</b>	12,964	34.6*	5.3	\$15,922
<b>Gender</b>				
Male	5,593	34.8*	5.0	\$16,052
Female	7,368	32.9*	5.5	\$15,920
Unknown	3		15	\$80,781
<b>Age</b>				
<15	21	0.29	10.3	\$41,329
15-44	488	3.3	6.2	\$28,262
45-64	2,981	34.8	5.0	\$18,804
65+	9,474	204.0	5.3	\$14,419

ICD-9 codes 430-438

\*Age-adjusted rates

Figure 19. Average age-adjusted rate of hospital discharges with stroke as the primary diagnosis (2002-2003 OK Hospital Discharge Data)



Age-adjusted rate per 10,000

- 10.1 - 28.8
- 28.9 - 32.5
- 32.6 - 36.1
- 36.2 - 40.9
- 41.0 - 63.2
- Insufficient Data

ICD-9 codes 430-438

## Prevalence of heart disease and stroke

Prevalence data for heart disease and stroke in Oklahoma is limited in that there is no official registry. Other than the hospital discharge data previously presented, prevalence data is limited to the Behavioral Risk Factor Surveillance System (BRFSS), which is a randomized, telephone survey of adults and is conducted in all US states and territories and Washington, D.C. In 2004, questions pertaining to cardiovascular disease were asked in Oklahoma. These three questions asked if participants 1) had ever been told that they had a heart attack or myocardial infarction, 2) had ever been told they had angina or coronary heart disease, and 3) had ever been told that they had a stroke.

Five percent of Oklahoma adults had been told that they had a heart attack and three percent had been told they had a stroke.

Figure 20. Prevalence of angina or coronary heart disease by gender and age group (OK BRFSS 2004)

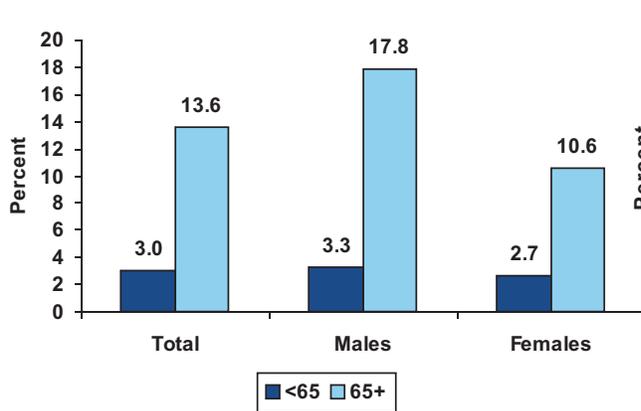


Figure 21. Prevalence of ever having a heart attack by gender and age group (OK BRFSS 2004)

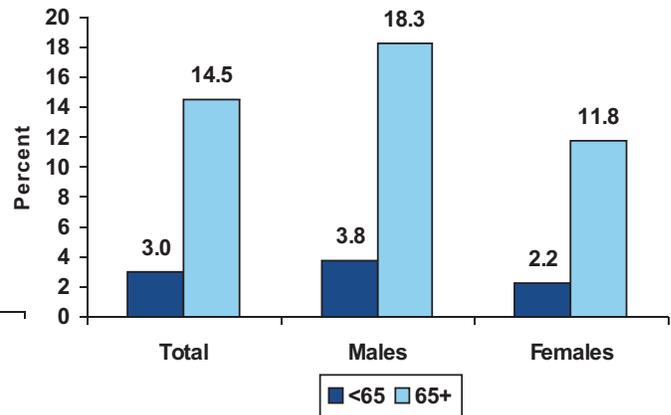
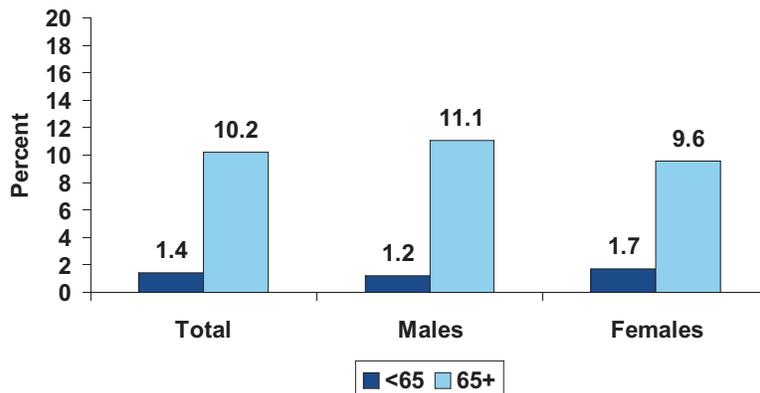


Figure 22. Prevalence of ever having a stroke by gender and age group (OK BRFSS 2004)



## Signs and Symptoms Recognition

The 2003 Oklahoma BRFSS contained questions that tested participants' knowledge of heart attack and stroke symptoms. The series of questions asked the participants if they thought each of the symptoms were a sign of a heart attack. Another series of questions asked the participants if they thought the symptoms were a sign of a stroke. Participants could answer yes, no, don't know, or not sure. The results of these questions are summarized in the following two tables. Sixty-three percent of Oklahoma adults knew all of the signs and symptoms of a heart attack and 57.7% knew all the signs and symptoms of a stroke.

Table 6. Knowledge of heart attack symptoms among Oklahoma adults (OK BRFSS 2003)

	Yes	No	Don't know/ Not sure
Pain in the jaw, neck, or back	53.0%	22.0%	25.0%
Feeling weak, lightheaded, or faint	70.0%	12.9%	17.0%
Chest pain or discomfort	93.9%	2.3%	3.9%
Trouble seeing out of one or both eyes*	34.7%	29.5%	35.8%
Pain or discomfort in the arms or shoulders	85.6%	5.9%	8.4%
Shortness of breath	87.4%	4.5%	8.0%

\*Not a symptom of a heart attack

Table 7. Knowledge of stroke symptoms among Oklahoma adults (OK BRFSS 2003)

	Yes	No	Don't know/ Not sure
Sudden confusion or trouble speaking	87.2%	2.6%	10.2%
Sudden numbness or weakness of face, arm, or leg, especially on one side	90.4%	2.7%	6.9%
Sudden trouble seeing in one or both eyes	64.6%	7.5%	28.0%
Chest pain or discomfort*	39.6%	30.8%	29.5%
Sudden trouble walking, dizziness, or loss of balance	85.8%	3.3%	11.0%
Severe headache with no known cause	59.7%	10.8%	29.5%

\*Not a symptom of a stroke

## Risk factors for heart disease and stroke

### a. Hypertension

Hypertension is an important risk factor for heart disease and stroke.

Table 2 depicts blood pressure classification according to the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. “The classification is based on the average of two or more properly measured, seated BP readings on each of two or more office visits.”<sup>12</sup>

Table 8. Classification of Blood Pressure for Adults

Classification	Systolic (mmHg)	Diastolic (mmHg)
Normal	<120	and <80
Prehypertension	120-139	or 80-89
Stage 1 Hypertension	140-159	or 90-99
Stage 2 Hypertension	>=160	or >=100

Adapted from the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

The data presented here are from the 2003 Oklahoma BRFSS and from the 2003-2004 Oklahoma Minority Behavioral Risk Factor Survey (OKMBRFS). In both surveys, participants were asked the following question about hypertension: “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?” In the BRFSS but not the OKMBRFS, if a female respondent answered “yes”, she was then asked: “Was this only while you were pregnant?” Except for figures 23a and b, the BRFSS data presented here does not include females who were told they had hypertension only when they were pregnant.

Figure 23a. Prevalence of Lifetime Hypertension Among Oklahoma Adults (OK BRFSS 2003)

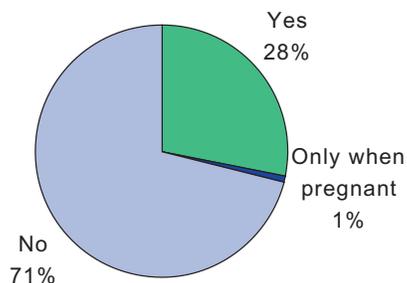


Figure 23b. Prevalence of Lifetime Hypertension Among US Adults (US BRFSS 2003)

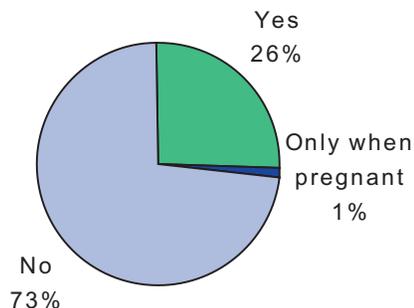


Figure 24. Prevalence of lifetime hypertension among adults, total and by gender (OK and US BRFSS 2003)

Oklahoma females had significantly higher rates of hypertension than US females.

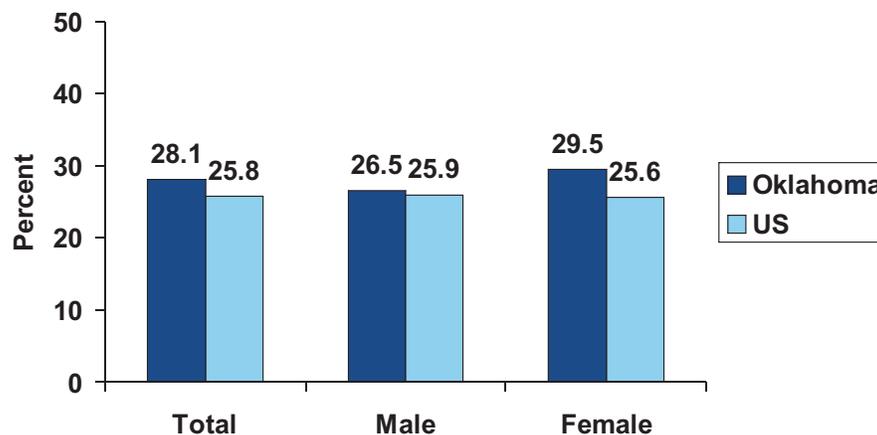


Figure 25. Prevalence of lifetime hypertension by race/ethnicity (OK BRFSS 2003 and OKMBRFS 2003-2004)

The prevalence of hypertension was significantly lower among Asians and Hispanics compared to those in other racial/ethnic groups.

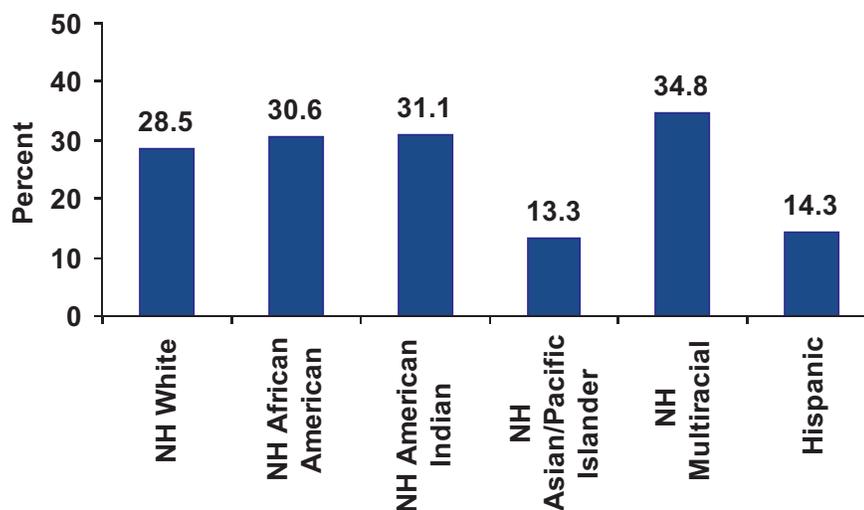


Figure 26. Prevalence of lifetime hypertension by age group among Oklahoma adults (OK BRFSS 2003)

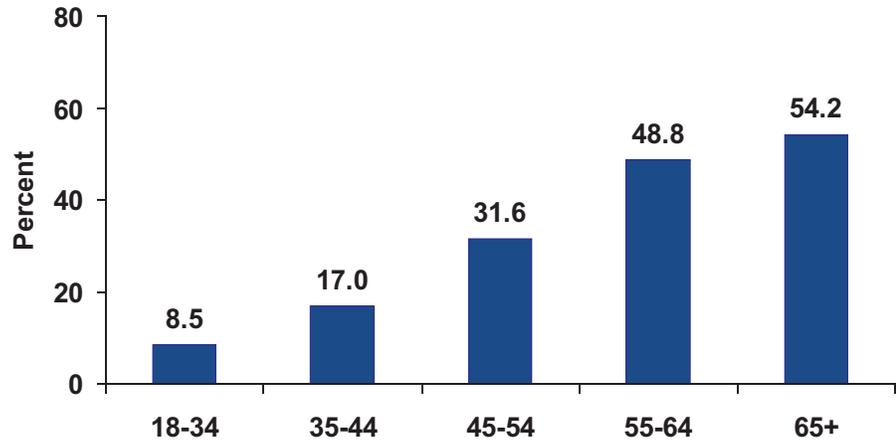


Figure 27. Prevalence of lifetime hypertension by annual income among Oklahoma adults (OK BRFSS 2003)

The prevalence of hypertension was significantly higher among Oklahomans with a household income less than \$15,000 and significantly lower among those with a household income of  $\geq$ \$75,000.

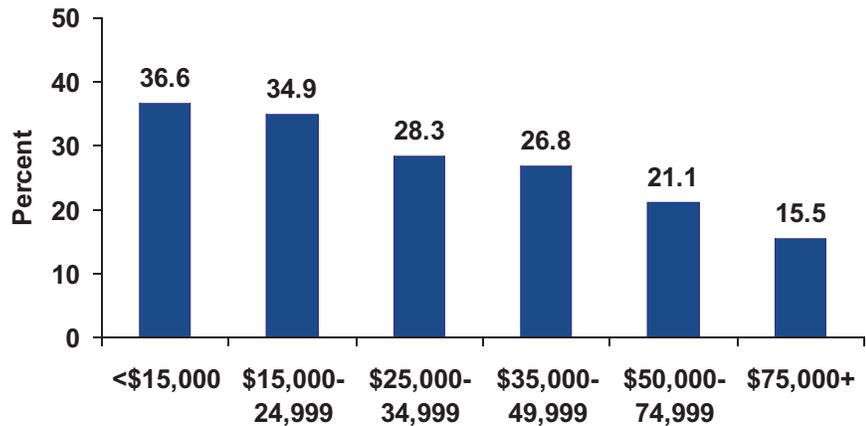


Figure 28. Prevalence of lifetime hypertension by level of education among Oklahoma adults (OK BRFSS 2003)

Hypertension prevalence decreased with increasing levels of education. Those with less than a high school education had a significantly higher rate of hypertension than those with a college degree.

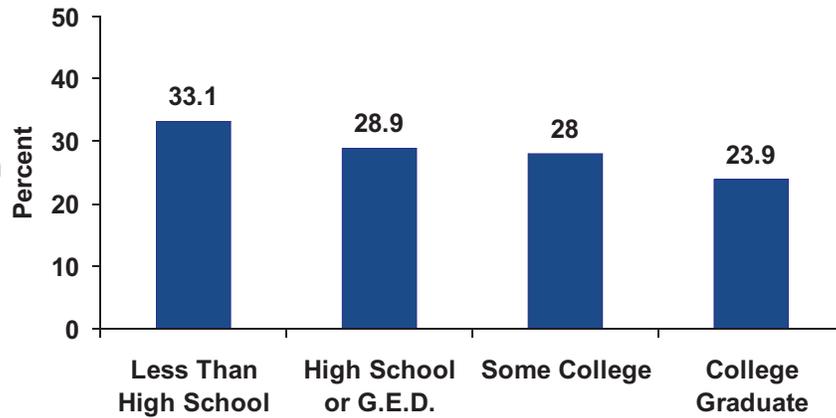
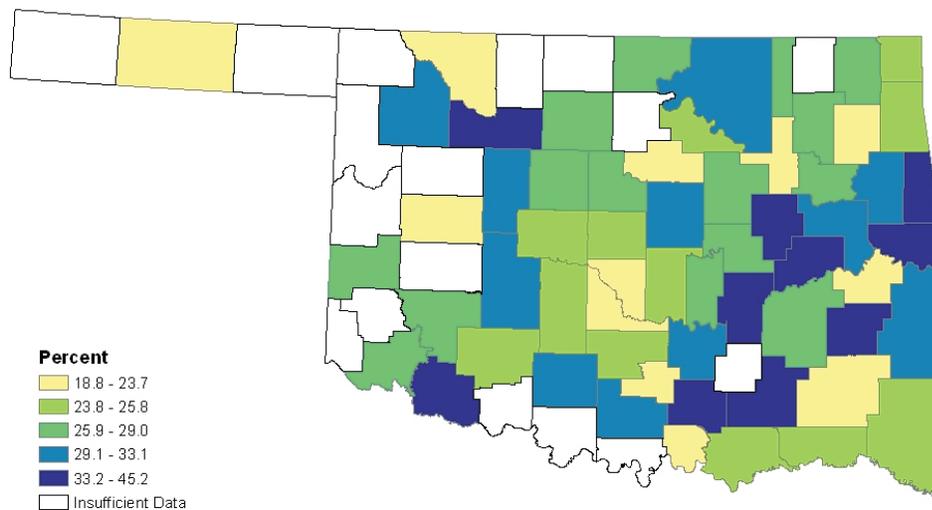


Figure 29. Prevalence of lifetime hypertension by county (OK BRFSS 1999, 2001, 2003)



This question addresses the taking of medication but does not answer the question of whether or not blood pressure is under control (below 140/90).

Figure 30. Currently taking blood pressure medication among Oklahoma adults with high blood pressure (OK BRFSS 2003)

Over three-quarters of Oklahoma adults with diagnosed high blood pressure are taking medication to control the disease. More females are taking medication than males.

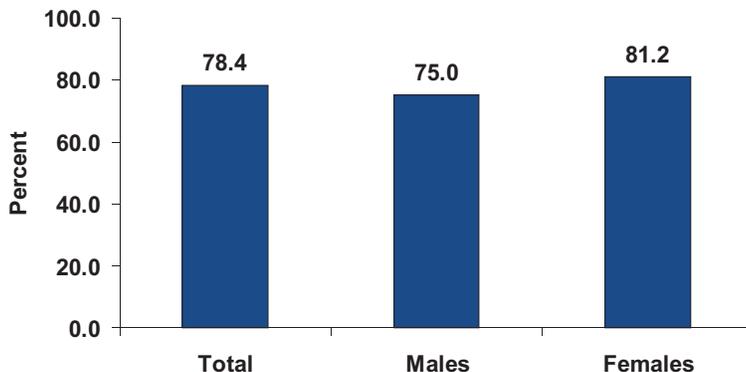
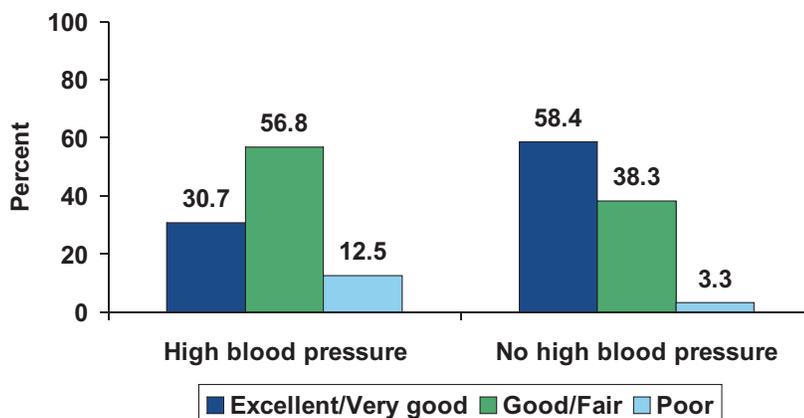


Figure 31. Self-reported general health status by lifetime hypertension status (OK BRFSS 2003)

Adults with high blood pressure are more likely to report poor health status than those without high blood pressure.



Adults with high blood pressure report more days in the past month of poor physical and mental health as well as more days of usual activity limitations because of health problems.

Figure 32. Average self-reported number of days in the past month of poor physical and poor mental health (OK BRFSS 2003)

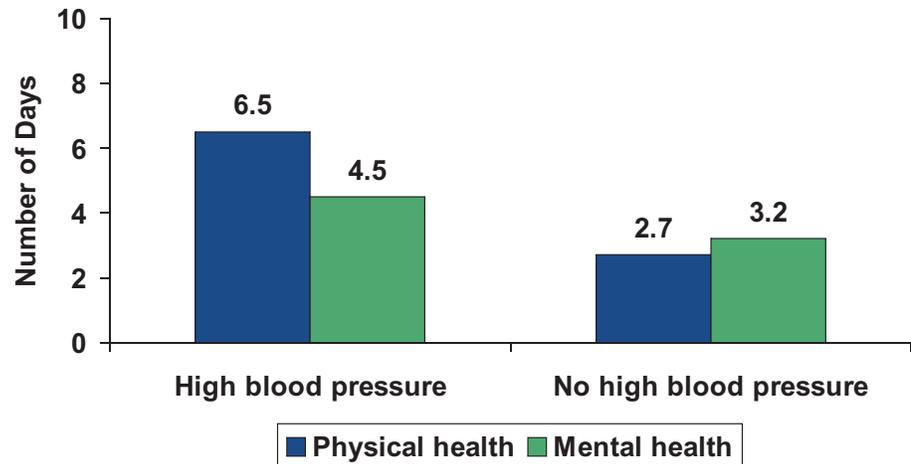
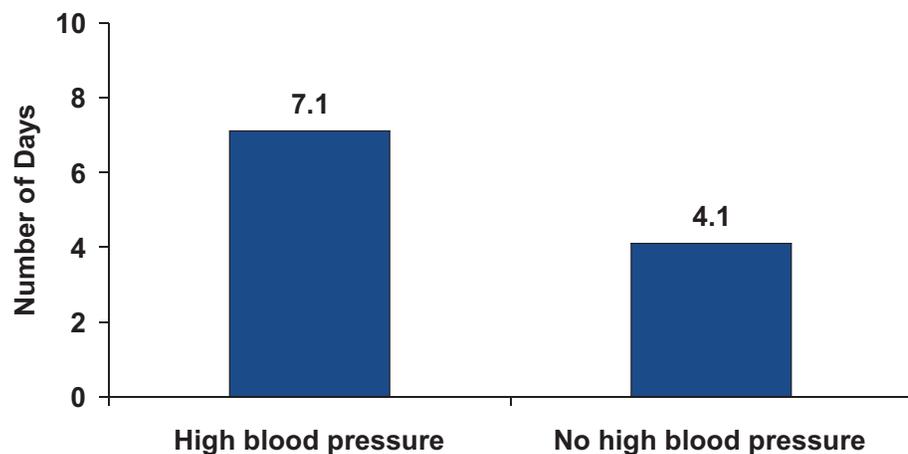
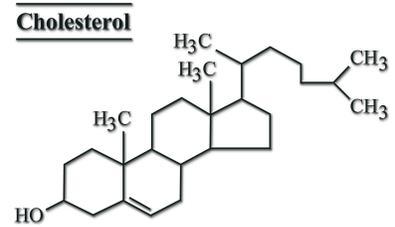


Figure 33. Average self-reported days in the past month that usual activities were limited because of poor physical or mental health by high blood pressure status among those who reported at least one day of poor physical or mental health in the past month (OK BRFSS 2003)



b. High Blood Cholesterol



Cholesterol is a fat-like substance or lipid present in cell membranes. It travels in the blood through distinct particles containing both lipids and proteins (lipoproteins)<sup>13</sup>. The three major classes of these lipoproteins are high density lipoproteins (HDL), low density lipoproteins (LDL), and very low density lipoproteins (VLDL). Studies have demonstrated that high cholesterol is associated with atherosclerosis and CHD; and that LDL cholesterol plays a major role in this process. Other studies have demonstrated that low levels of HDL are associated with an increased risk of CHD<sup>13</sup>.

Table 9 is from the Third Report of the National Cholesterol Education Program Expert Panel (NCEP) on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults.

Table 9. ATP III Classification of LDL, Total, and HDL Cholesterol (mg/dL)

<b>LDL Cholesterol</b>	
<100	Optimal
100-129	Near optimal/above optimal
130-159	Borderline high
160-189	High
>=190	Very high
<b>Total Cholesterol</b>	
<200	Desirable
200-239	Borderline high
>=240	High
<b>HDL Cholesterol</b>	
<40	Low
>=60	High

Data presented here are from the 2003 Oklahoma BRFSS and the 2003-2004 OKMBRFS. In both of these surveys the following questions pertaining to cholesterol were asked:

“Blood cholesterol is a fatty substance found in the blood. Have you ever had your blood cholesterol checked?”

(If yes)

“About how long has it been since you last had your cholesterol checked?”

“Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?”

Figure 34a. Most recent cholesterol check among Oklahoma adults (OK BRFSS 2003)

Nearly 30% of Oklahoma adults have never had their cholesterol checked or have not had it checked in the past five years. Among those without insurance, however, this prevalence rate jumps to over 50%.

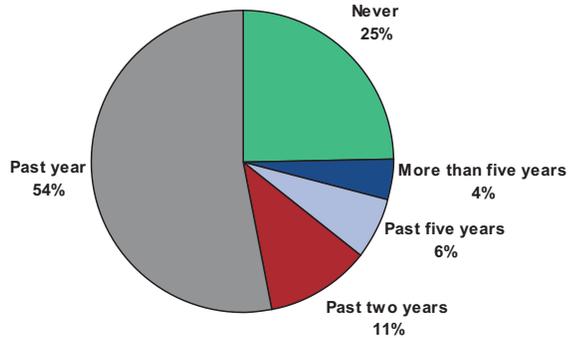


Figure 34b. Most recent cholesterol check among adults *with* any type of health care coverage or insurance (OK BRFSS 2003)

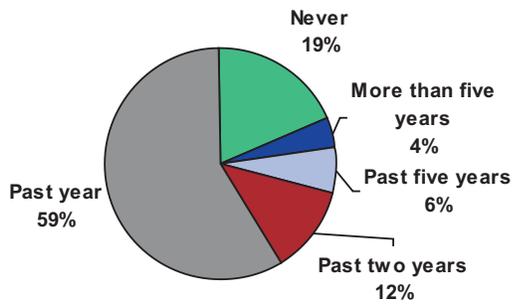


Figure 34c. Most recent cholesterol check among adults *without* any type of health care coverage or insurance (OK BRFSS 2003)

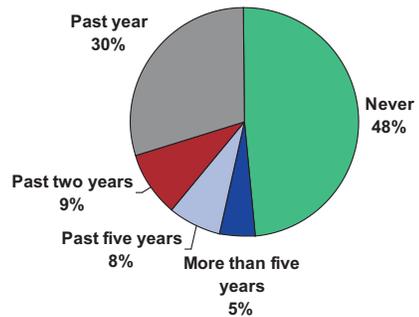


Figure 35a. Most recent cholesterol check among US adults (US BRFSS 2003)

Over 25% of US adults have never had their cholesterol checked or have not had it checked in the past five years. Among those without insurance, however, this prevalence rate jumps to over 51%.

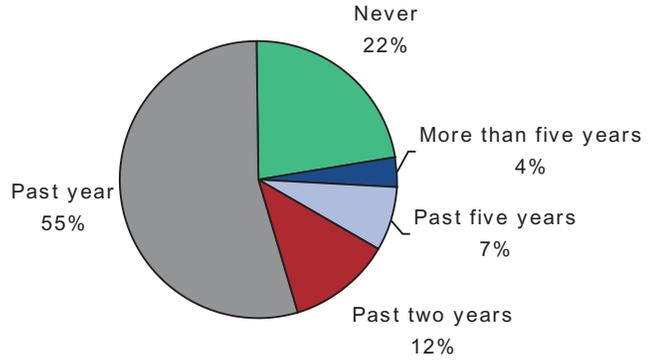


Figure 35b. Most recent cholesterol check among US adults *with* any type of health care coverage or insurance (US BRFSS 2003)

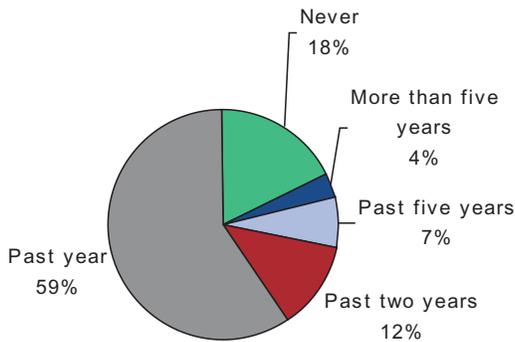


Figure 35c. Most recent cholesterol check among US adults without any type of health care coverage or insurance (US BRFSS 2003)

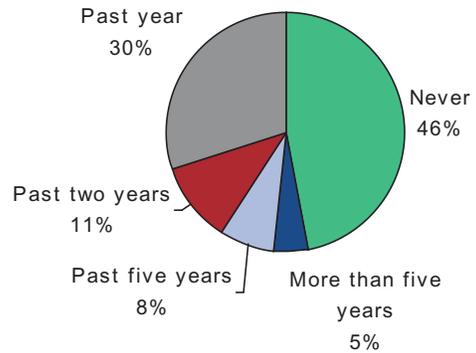


Figure 36a. Prevalence of not having cholesterol checked in the past five years, total and by gender (OK and US BRFSS 2003)

A significantly higher percent of Oklahoma adults have not had their cholesterol checked in the past year than US adults.

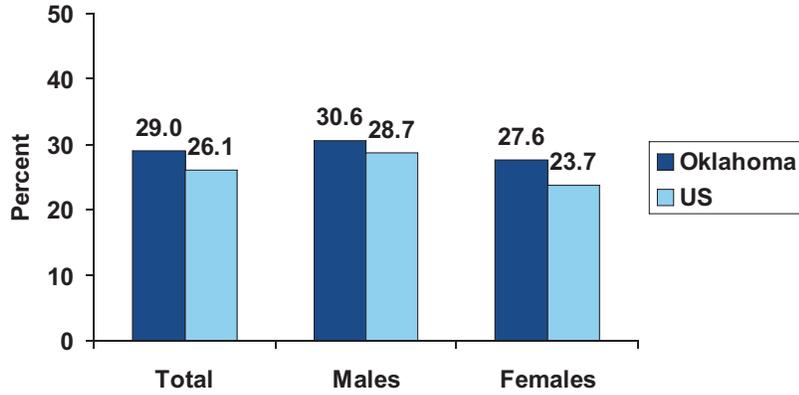


Figure 36b. Prevalence of high cholesterol, total and by gender (OK and US BRFSS 2003)

There is not a significant difference in the prevalence of high cholesterol between Oklahoma and US adults.

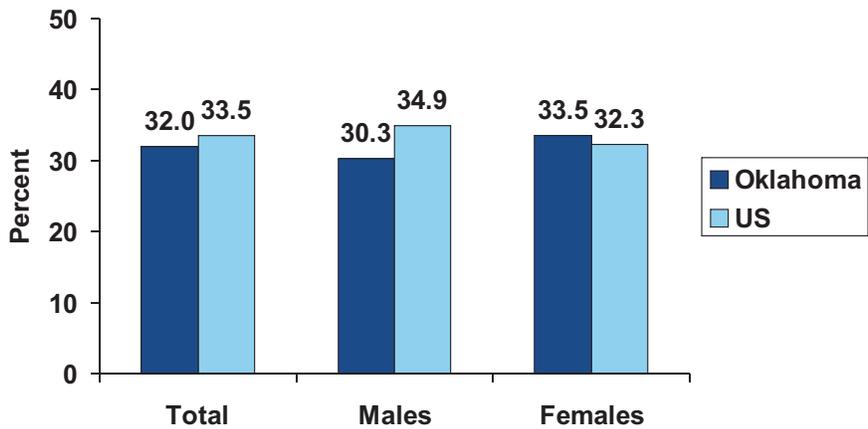


Figure 37a. Prevalence of not having cholesterol checked in the past five years among Oklahoma adults by race/ethnicity (OK BRFSS 2003 and OKMBRFS 2003-2004)

Whites have significantly lower rates of **not** having their cholesterol checked in the past five years compared to African Americans, American Indians, and Hispanics. Hispanics have a significantly higher rate than any of the other groups.

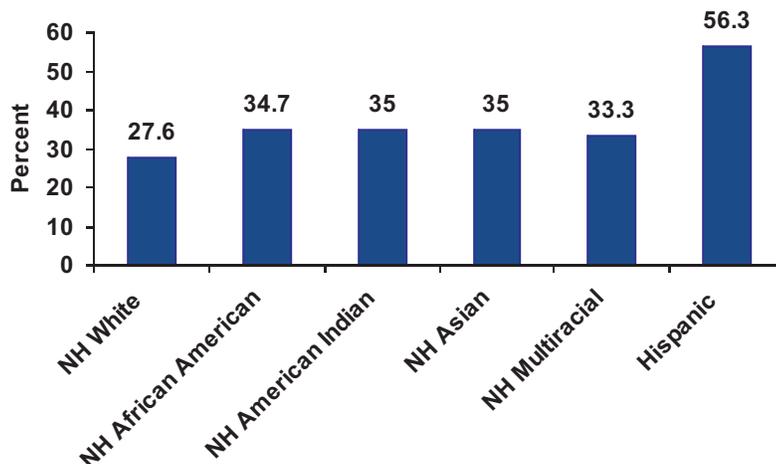


Figure 37b. Prevalence of high cholesterol among Oklahoma adults ever tested by race/ethnicity (OK BRFSS 2003 and OKMBRFS 2003-2004)

African Americans and Hispanics have significantly lower rates than whites of being told by a health care provider that they have high cholesterol.

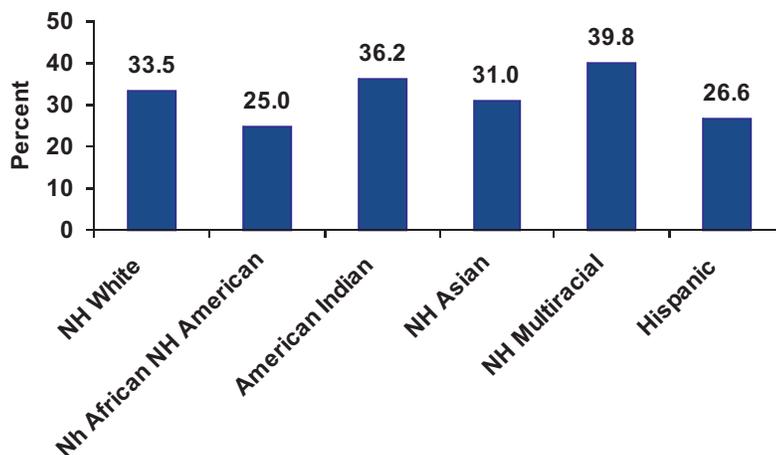


Figure 38a. Prevalence of not having cholesterol tested in the past five years among Oklahoma adults by age group (OK BRFSS 2003)

The likelihood of an Oklahoma adult not having their cholesterol checked in the past five years decreased significantly with increasing age group.

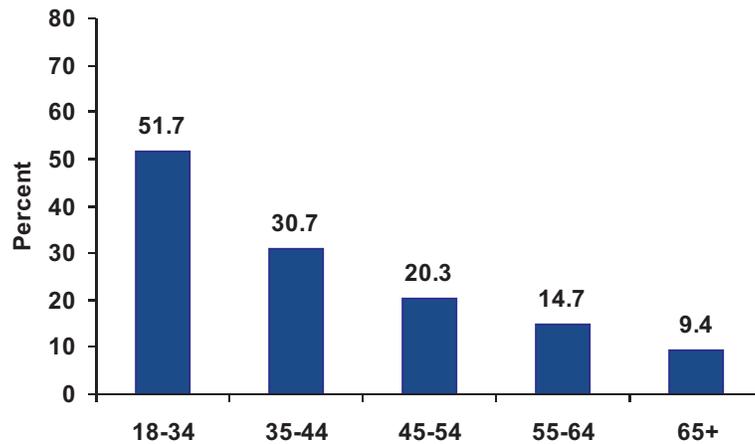


Figure 38b. Prevalence of high cholesterol among Oklahoma adults who had been screened by age group (OK BRFSS 2003)

The prevalence of high cholesterol is significantly higher among those in the oldest two age groups compared to those in the younger age groups.

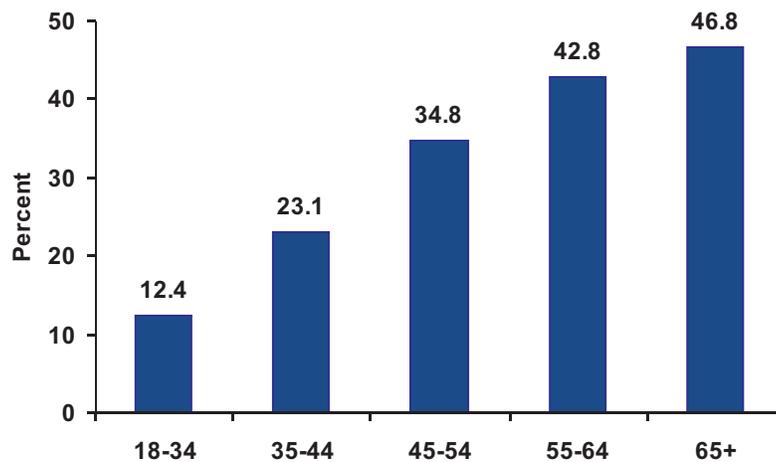


Figure 39a. Prevalence of not having cholesterol checked in the past five years among Oklahoma adults by level of household income (OK BRFSS 2003)

Oklahoma adults in the lowest income groups are significantly more likely to not have had their cholesterol checked in the past five years. Those in the highest income group are significantly less likely to not have had their cholesterol checked in the past five years.

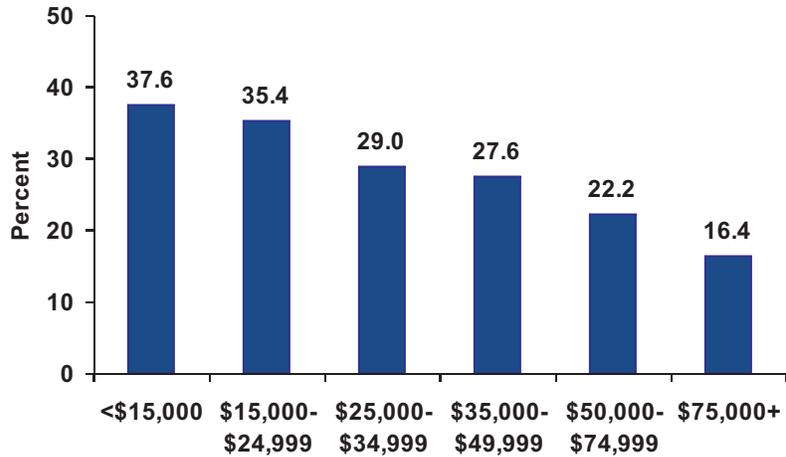


Figure 39b. Prevalence of high cholesterol among adults ever tested by level of household income (OK BRFSS 2003)

Oklahoma adults with a household income of less than \$15,000 per year are significantly more likely than those in the three highest income groups to have been told by a health care provider that they have high cholesterol.

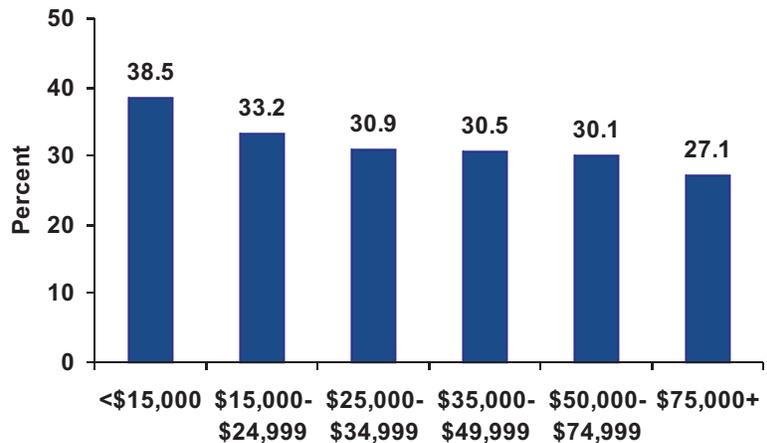


Figure 40a. Prevalence of not having cholesterol checked in the past five years among Oklahoma adults by level of education (OK BRFSS 2003)

The prevalence of not having cholesterol checked in the past five years decreases with increasing level of education. Each educational level is significantly different from each other.

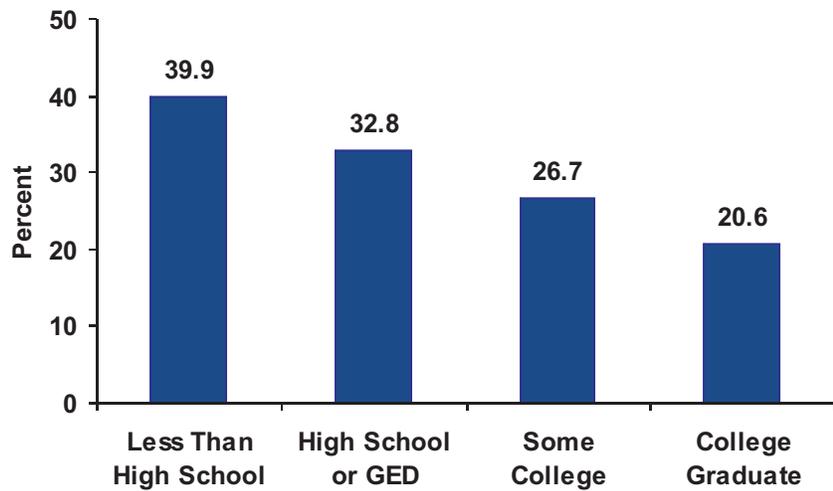
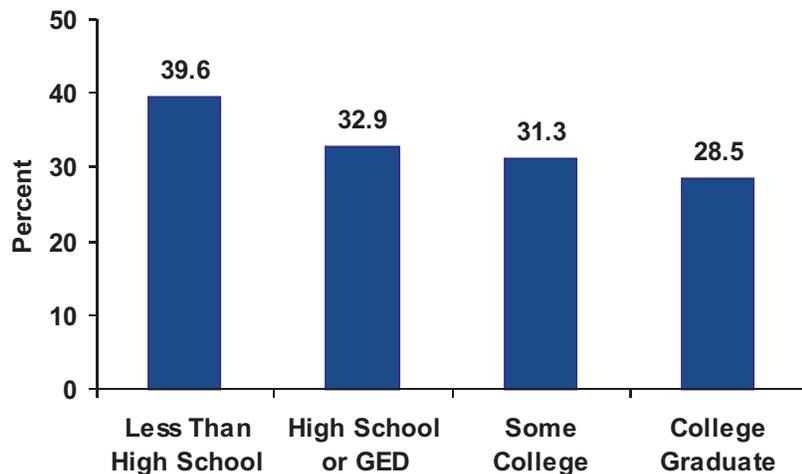


Figure 40b. Prevalence of high cholesterol among Oklahoma adults by level of education

The prevalence of high cholesterol among those tested decreases as level of education increases.



c. Other Risk Factors

Other important risk factors for heart disease and stroke are smoking, obesity, lack of physical activity, eating a poor diet, and diabetes. In 2004, Oklahoma adults had a higher prevalence of all five of these risk factors (eating less than five servings of fruits and vegetables per day as a proxy for poor diet) than the US.

Figure 41. Smoking prevalence among Oklahoma and US adults (OK and US BRFSS 2004)

The prevalence of current smokers is higher among Oklahoma adults compared to US adults. Oklahoma males have significantly higher rates of current smoking than Oklahoma females.

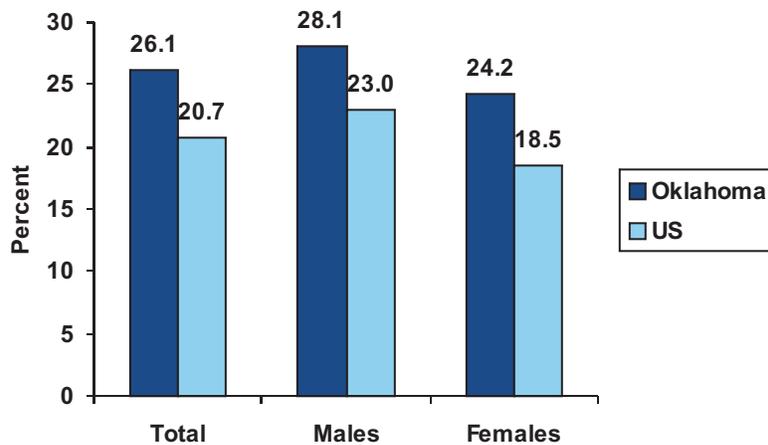


Figure 42. Obesity prevalence among Oklahoma and US adults by gender (OK and US BRFSS 2004)

Obesity (BMI  $\geq 30$ ) is not significantly higher among Oklahoma adults compared to US adults. There is no significant difference in obesity prevalence by gender among Oklahoma adults.

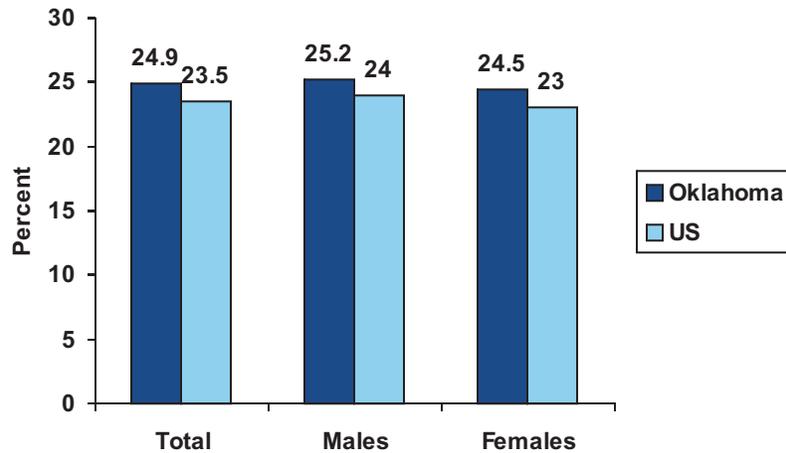


Figure 43. Lack of leisure time physical activity in Oklahoma and the US by gender (OK and US BRFSS 2004)

Oklahoma adults have a significantly higher prevalence of not participating in leisure time physical activity compared to the US prevalence. Oklahoma females are more likely to not have participated in leisure time physical activity in the past month than Oklahoma males.

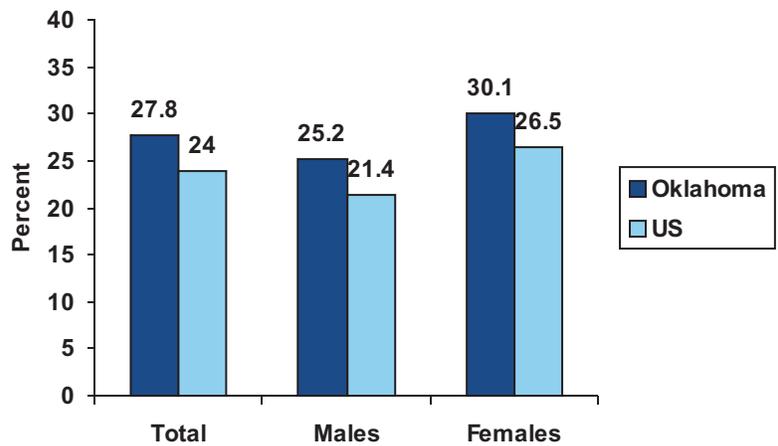


Figure 44. Not eating five or more servings of fruits and vegetables each day among Oklahoma and US adults by gender (OK and US BRFSS)

Oklahoma ranks last in the nation for the percent of adults who eat five or more servings of fruits and vegetables each day. Oklahoma males are more likely to not eat five or more servings of fruits and vegetables each day than Oklahoma females.

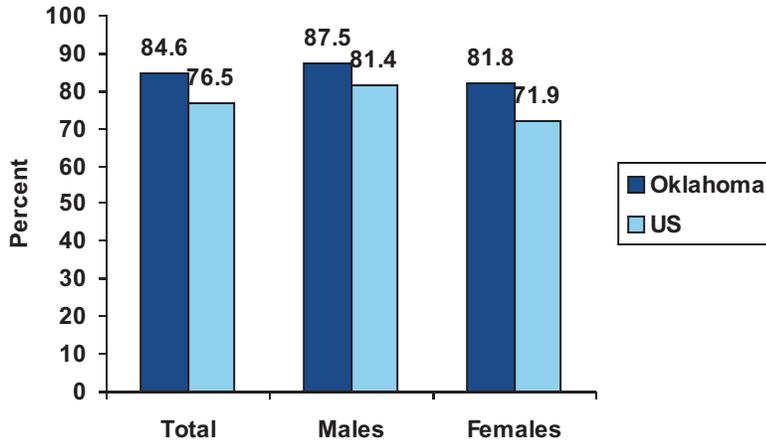
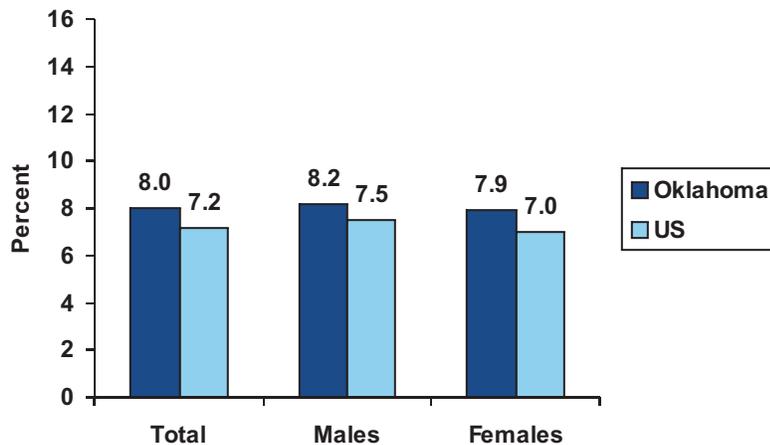


Figure 45. Diabetes prevalence among Oklahoma and US adults by gender (OK and US BRFSS 2004)

The prevalence of diabetes is not significantly higher among Oklahoma adults than US adults. There is no significant difference between Oklahoma males and females.



d. Multiple Risk Factors

According to a national study, the risk for cardiovascular disease and all-cause mortality increased with each additional risk factor present (current smoking, overweight, hypertension, high blood cholesterol, and diabetes).<sup>14</sup>

Figure 46a. Number of risk factors among Oklahoma adults (OK BRFSS 2003)

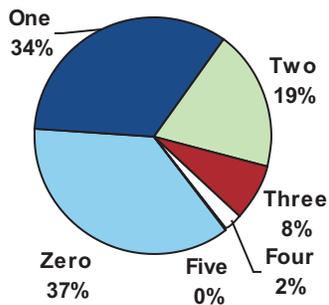
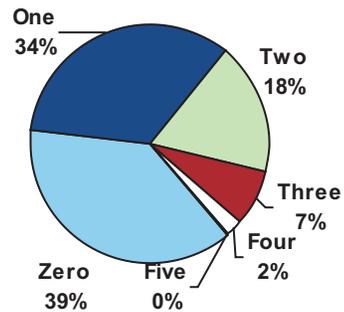


Figure 46b. Number of risk factors among US adults (US BRFSS 2003)



Among Oklahoma adults, 29.8% have two or more risk factors (hypertension, high cholesterol, diabetes, obesity, and current smoking), compared to 27.8% of US adults. This difference is statistically significant.

## Economic Impact

- Direct and indirect costs of cardiovascular disease in the US for 2006 is estimated at \$403.1 billion.<sup>6</sup>
- Total hospital charges with heart disease as the primary diagnosis in Oklahoma in 2003 was over \$1.3 billion.
- Total hospital charges with stroke as the primary diagnosis in Oklahoma in 2003 was over \$207 million.

## Conclusions

The purpose of this report was to answer five key questions regarding heart disease and stroke in Oklahoma. The following is a summary of the information in this report that provides some answers to these questions.

### Who?

*Oklahoma*-The state as a whole is in poor standing when it comes to heart disease and stroke mortality, ranking second and eighth in the nation, respectively in 2002.

*Males*-The age-adjusted mortality rate for heart disease among Oklahoma males continues to be higher than Oklahoma females throughout adulthood.

*Females*-While the age-adjusted heart disease mortality rate for females is lower than that for males, the rate has not declined as fast as that of males in the past decade. The disparity between genders is not near as large for stroke mortality as it is for heart disease mortality. In 2002, the age-adjusted mortality rate for stroke was slightly higher among females than males; and among those 75 years and older, the mortality rate for females has remained higher than that of males throughout the past decade.

*African Americans*-Mortality rates for heart disease are 16% and 29% higher than whites among males and females, respectively while rates for stroke are 36% and 26% higher. The percent of **premature** heart disease deaths (deaths among persons younger than 65) and stroke deaths are 96% and 164% higher for African Americans than for whites.

*American Indians*-The mortality rate for stroke among American Indian males is 29% higher than the rate for white males. The percent of **premature** heart disease deaths and stroke deaths are 76% and 128% higher for American Indians than whites.

*Asian/Pacific Islanders*-Even though age-adjusted heart disease mortality rates are 92% and 136% higher among white males and females than Asian/Pacific Islander males and females, the percent of **premature** heart disease and stroke deaths are 132% and 267% higher for Asian/Pacific Islander males and females than white males and females.

*Hispanics*-Even though age-adjusted heart disease mortality rates are 64% and 29% higher for white males and females than Hispanic males and females, the percent of **premature** heart disease and stroke deaths is 84% and 222% higher for Hispanics than whites. In addition, the mortality rate for heart disease has increased drastically among Hispanic women.

### What?

#### *Mortality*

**All Diseases of the Heart**-Diseases of the heart accounted for 31% of all deaths in Oklahoma in 2004.

**Coronary heart disease**-Coronary heart disease accounted for 76% of the deaths from diseases of the heart or 23% of all deaths in 2004. In 2002, the Oklahoma age-adjusted mortality rate was 29% higher than the US rate.

**Congestive heart failure**-Congestive heart failure accounted for 11% of

of the deaths from diseases of the heart or 3% of the total deaths in 2004. In 2002, the Oklahoma age-adjusted mortality rate for congestive heart failure was 64% higher than the US rate.

**Stroke**-Stroke accounted for 6% of deaths in Oklahoma in 2004. In 2002, the Oklahoma age-adjusted mortality rate for stroke was 18% higher than the US rate.

*Prevalence*-Five percent of Oklahoma adults have been told that they have had a heart attack. Fifteen percent of Oklahomans 65 and older have been told that they have had a heart attack. Three percent of Oklahoma adults have been told that they have had a stroke. Ten percent of Oklahoma adults over the age of 65 have been told that they have had a stroke.

*Hospitalizations/Economics*-Diseases of the heart accounted for 10.9% of the reported hospital discharges in 2003 and \$1,384,832,060 in total hospital charges. Stroke accounted for 2.6% of the reported hospital discharges and \$207,322,123 in total hospital charges.

## Where?

*West/Southwestern Oklahoma*-Age-adjusted heart disease mortality rates are highest in some of the west/southwestern counties and age-adjusted mortality rates for stroke are the highest in many of the counties in this area.

*Southeastern Oklahoma*-Age-adjusted heart disease mortality rates are highest in many of the counties in the southeastern part of the state.

## When?

*Older Age*-As with most other diseases, the morbidity and mortality from heart disease and stroke increases with increasing age.

*Younger Age*-In Oklahoma, the younger age groups have not had the decrease in mortality rates since 1993 as the older age groups have. The average hospital charge for heart disease among those under age 15 is higher than the average charge for the older age group.

## Why?

### *Risk Factors*

- 1<sup>st</sup> among the 50 states for not eating/drinking five or more servings of fruits and vegetables per day among adults.<sup>16</sup>
- 4<sup>th</sup> among the 50 states for adult smoking.<sup>15</sup>
- 6<sup>th</sup> among the 50 states for no leisure time physical activity among adults.<sup>15</sup>
- 8<sup>th</sup> among the 50 states for diabetes prevalence among adults.<sup>15</sup>
- 13<sup>th</sup> among the 50 states for prevalence of high blood pressure among adults.<sup>16</sup>
- 14<sup>th</sup> among the 50 states for prevalence of obesity among adults.<sup>15</sup>

### *Access to Care*

- 5<sup>th</sup> in the nation for adults uninsured.<sup>15</sup>
- 19<sup>th</sup> in the nation for percent never having cholesterol checked.<sup>16</sup>

### *Signs and Symptoms Recognition*

- Sixty-three percent of Oklahoma adults do not know all the signs and symptoms of a heart attack.<sup>14</sup>
- Fifty-eight percent of Oklahoma adults do not know all the signs and symptoms of a stroke.<sup>14</sup>

## **How do we fix this?**

We hope the data presented in this report will result in meaningful programs/activities, such as those listed below, that combat heart disease and stroke and improve the quality and length of life for those whose lives have been encumbered by these diseases.

- Statewide media campaign to educate the public on recognizing the signs and symptoms of a heart attack and reacting appropriately.
- Statewide media campaign to educate the public on recognizing the signs and symptoms of stroke and reacting appropriately.
- Statewide examination survey to obtain blood pressure and blood cholesterol measurements from a sample of Oklahoma adults.
- Partnerships with women's groups to raise awareness regarding women (especially minority women) and cardiovascular disease.
- Early detection and management system for blood cholesterol, blood pressure, and diabetes.
- Disease management of congestive heart failure.
- State appropriations to address Oklahoma's leading killer.

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## Appendix

### Data and Methodology Notes

#### a. Mortality

Graphs that compare Oklahoma and US mortality rates contain data obtained from CDC Wonder.<sup>10</sup> Graphs that contain only Oklahoma rates contain data obtained from the Oklahoma Vital Statistics queryable web page.<sup>11</sup> The data presented are based on underlying causes of death using the ICD-9 and ICD-10 codes in Table 1. ICD-9 codes are used for all years through 1998. ICD-10 codes are used for all years from 1999 when the Tenth Revision of the International Classification of Diseases (ICD-10) went into effect. All rates are age-adjusted to the 2000 US standard population except for the age-group-specific rates, which are not age-adjusted. Indian Health Service (IHS)-linked rates are reported in the graphs containing racial/ethnic data. Rates were suppressed for those subgroups where there were fewer than 20 deaths.

#### b. Hospitalizations

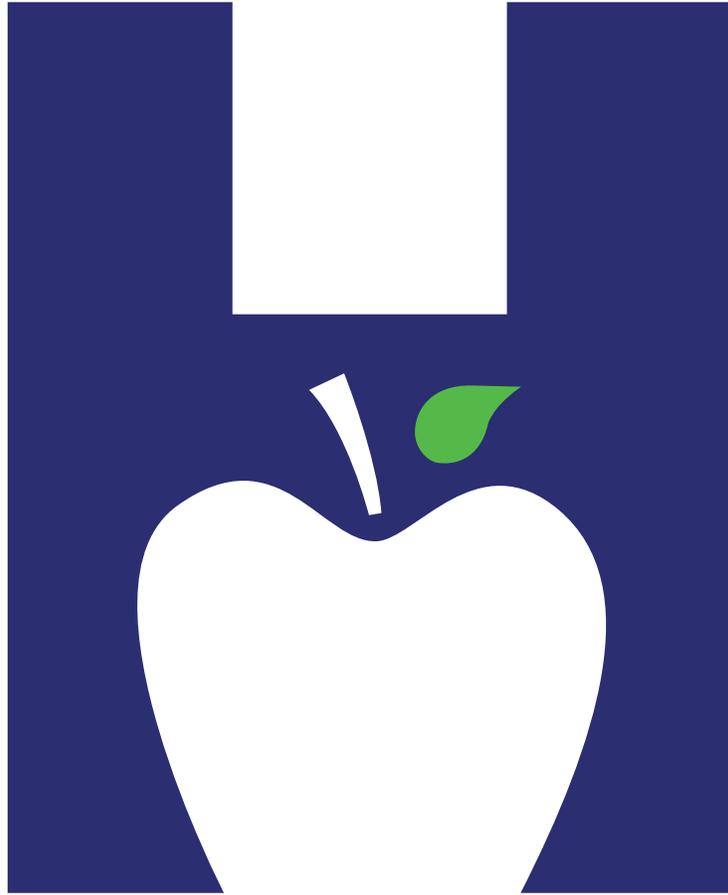
Hospital discharge data were obtained from the 2002 and 2003 Oklahoma Hospital Discharge Data sets, provided by the Oklahoma Health Care Information Center for Health Statistics at the Oklahoma State Department of Health. The discharge data in this report represent encounters, not individuals; therefore the same individuals could be represented multiple times. Another limitation is that these data only represent those in non-federal hospitals excluding VA and Indian Health Service hospitals. The discharges reported here were limited to those with a discharge year of 2003 for the total and demographic analyses. County-specific rates were generated using those with a discharge year of 2002 or 2003. Discharges of non-Oklahoma residents were excluded from all analyses. Rates were age-adjusted to the 2000 US standard population using 2004 county estimates from the US Census Bureau.

#### c. Prevalence and Risk Factors

Heart disease, stroke, and risk factor prevalence was obtained from the US and Oklahoma Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is an ongoing, state-based, random-digit dialed telephone survey of the non-institutionalized adult population aged 18 years and older. BRFSS is designed to monitor health behaviors, document health trends, and measure progress toward health goals. In Oklahoma, the number of adults surveyed has increased each year, with over 6,800 surveyed in 2004. Data from the most recent year in which the particular questions were asked are used. For example, questions about high blood pressure and high cholesterol were not asked in 2002 or 2004 so these years were not used for these questions. The data were weighted so the percentages are representative of the state or national population. Comparisons between subgroups were made with 95% confidence intervals.

State rankings of risk factors were obtained from the BRFSS website ([www.cdc.gov/brfss](http://www.cdc.gov/brfss)). US BRFSS datasets were used to obtain national percentages and 95% confidence intervals for US data. The total number of risk factors was calculated by adding the number of the following risk factors: diabetes, smoking, obesity, hypertension, and high cholesterol.

Data from the Oklahoma Minority Behavioral Risk Factor Survey was used to compare obtain percents and 95% confidence intervals for racial/ethnic minority adults. The Oklahoma Minority Behavioral Risk Factor Survey (OKMBRFS) is a survey that was done in Oklahoma and focused specifically on minority populations. Information was collected using a questionnaire similar to the one used in the OK BRFSS. The OKMBRFS was conducted over the telephone and includes several initial questions to identify whether or not there is anyone in the household who may be any racial group other than non-Hispanic White. While all Hispanic and non-White members of a given household were eligible, only one member was selected at random to be interviewed. In addition to the routine questions regarding health status, access to care, and various health behaviors, other important questions were also asked to determine if minority populations acted or were treated differently from White populations.



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