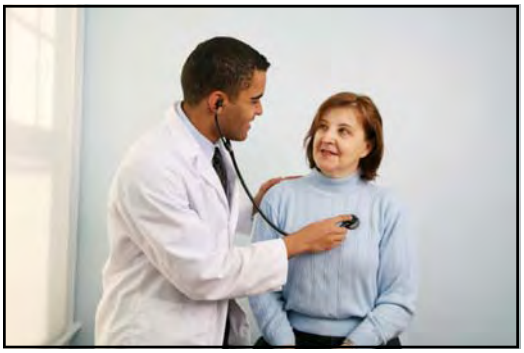
The Burden of Cardiovascular Disease in West Virginia



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Executive Summary

Cardiovascular disease (CVD) is the leading cause of death for both men and women in West Virginia. West Virginia also had the highest prevalence of CVD in the nation in 2007. Several diseases are included in the broad category of CVD including coronary heart disease, hypertensive diseases, cerebrovascular disease or stroke, and other diseases of the health and vascular system. Poor management of these diseases can lead to complications that result in poor health, disability, hospitalization, and even death. Listed below are some of the key findings contained in this surveillance report.

Behavioral Risk Factors in West Virginia

7.8% of middle school students and 19.5% of high school students smoke cigarettes.

65.1% of middle school students and 42.8% of high school students engage in regular exercise.

19.8% of high school students ate fruits and vegetables five or more times per day.

29.5% of high school students reported having five or more drinks at one time in the past month.

26.9% of adults are current smokers.

28.8% of adults reported they engaged in no physical activity in the past month.

19.8% of adults consumed more than five servings of fruits and vegetables per day.

3.3% of adults report heavy alcohol use and 9.8% report binge drinking.

Physiological Risk Factors in West Virginia

17.0% of adolescents are at risk for becoming overweight and 14.7% are overweight.

37.7% of adults are overweight and 30.3% are obese (2007 BRFSS).

The prevalence of diabetes among adults is 10.8%.

37.3% of adults did not have their teeth cleaned in the past year.

31.3% of adults are missing six or more teeth.

One in every three adults (33.3%) has been diagnosed with hypertension.

Nearly half (42.4%) of adults in the state have high cholesterol.

Prevalence of CVD in West Virginia

6.0% of adults have survived a heart attack or myocardial Infarction (MI).

The prevalence of angina or coronary heart disease (CHD) is 7.6%.

The prevalence of stroke is 3.2%.

Overall, 12.6% of adults have been diagnosed with some type of cardiovascular disease.

Executive Summary

Disease and Risk Factor Management in West Virginia

29.0% of those who had a heart attack reported participating in rehabilitation.

25.5% of those who had suffered a stroke participated in rehabilitation.

84.5% of those with hypertension report taking medication to control their blood pressure.

67.5% of adults with hypertension reported that they had changed their eating habits.

77.3% of adults with hypertension decreased their salt intake.

63.2% of adults with hypertension increased their exercise levels.

Hospitalizations and Costs in West Virginia

The hospitalization rate for CVD was 299.9 per 10,000 in 2006.

There were 54,242 hospital discharges for CVD in 2006.

Total charges for CVD hospitalizations were $1,074,955,404.17.

The hospitalization rate for heart disease was 209.9 per 10,000.

There were 37,954 hospital discharges for heart disease.

Total charges for heart disease hospitalizations were $792,387,470.64.

The hospitalization rate for stroke was 38.3 per 10,000.

There were 6,923 hospital discharges for stroke.

Total charges for stroke hospitalizations were $128,267,973.88.

Mortality in West Virginia

6,883 West Virginians died from cardiovascular disease in 2007.

5,234 deaths were due to heart disease.

1,112 deaths were due to stroke.

The age adjusted cardiovascular disease mortality rate for the State was 302.5 per 100,000 in 2007.

The age adjusted heart disease mortality rate was 230.2 per 100,000.

The age adjusted stroke mortality rate was 48.8 per 100,000.

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Introduction

Overview of Cardiovascular Disease

The term 'cardiovascular disease' is broadly used to describe dozens of disease states and events that affect the heart and blood vessels. The most common disease state is heart disease and the most common cardiovascular events include myocardial infarction (or heart attack) and stroke. The underlying process related to cardiovascular disease is called atherosclerosis. In atherosclerosis, plaques develop in the blood vessels causing them to narrow and become rigid (Newschaffer, Brownson, & Dusenbury, 1998; Centers for Disease Control and Prevention, 2009). Heart disease can occur when narrowing of the blood vessels due to plaque buildup or atherosclerosis reduces blood flow to the heart. The most common symptom of heart disease is angina or chest pain and can result in a heart attack. A heart attack or myocardial infarction occurs when atherosclerosis causes reduced blood flow and muscle cell death in the heart (Centers for Disease Control and Prevention, 2009; National Heart Lung and Blood Institute, 2009). Stroke is associated with high blood pressure weakening of the blood vessels and occurs when the blood supply to the brain is cut off by a clot (blood or plaque) or rupture of a blood vessel.

Signs and Symptoms of CVD

As discussed above, the two most common CVD outcomes or events are heart attack and stroke. It is important for the general population to know and understand the signs and symptoms associated with these CVD events. According to the Centers for Disease Control and Prevention (2009), the symptoms of heart attack are

- pain or discomfort in the jaw, neck, or back
- feeling week, light-headed, or faint
- chest pain or discomfort
- pain or discomfort in arms or shoulder
- shortness of breath

The symptoms of stroke are

- sudden numbness or weakness of the face, arms, or legs
- sudden confusion or trouble speaking or understanding others
- sudden trouble seeing in one or both eyes
- sudden trouble walking, dizziness, or loss of balance or coordination
- sudden severe headache with no known cause

It is also important for the population to understand that if they experience any of these signs they should immediately call 9-1-1 for emergency assistance.

Risk Factors for CVD

The Framingham Heart Study (2009) is a multi cohort longitudinal study designed to identify lifestyle factors, behavioral choices, and physiological changes that increase the risk of developing cardiovascular disease. The study has been running continuously for the past 60 years and forms the research base for cardiovascular disease prevention efforts. There are several factors that produce increased risk of developing cardiovascular disease including high blood pressure, high cholesterol, tobacco use, physical inactivity, diabetes, obesity, poor dietary habits, excessive alcohol use, and stress (Newschaffer, Brownson, & Dusenbury, 1998; National Heart Lung and Blood Institute, 2009). All of these factors can be modified to lower risk.

Tobacco contains nicotine which acts to constrict or reduce the size of blood vessels. Risk of developing CVD increases with both the amount smoked and the length of time a person smokes (Burns, 2003). Tobacco use also causes blood clots and blood vessel plaque development (Heart Lung and Blood Institute, 2009). Stress causes blood vessels to constrict as well as putting additional wear and tear on the heart via increases in heart rate and cardiac output. Another factor associated with CVD is periodontal disease. Genco, Offenbacher, and Beck (2002) argue that poor dental health is associated with both heart disease and stroke. They state that the organisms in dental plaque can travel through the blood and interact with other inflammatory markers to increase the risk of CVD events. High levels of blood sugar common in diabetes also contribute to plaque buildup. In addition to diabetes, two risk factors for CVD, high blood pressure and high blood cholesterol, are so detrimental to the body they can also be thought of as diseases in their own right.

High blood cholesterol is most closely associated with the risk of heart attack due to its contribution to plaque development in the blood vessels (National Heart Lung and Blood Institute, 2009). When there are excess amounts of fat in the blood stream, those cells stick to the interior walls of blood vessels leading to the development of plaques (McBride & Anda, 1998). High cholesterol can have a hereditary factor but is also caused by consumption of diets high in saturated fat. Other risk factors include obesity, physical inactivity, and tobacco use.

High blood pressure is associated with both heart attack and stroke due to its damage of blood vessels and heart tissue (Centers for Disease Control and Prevention, 2009; National Heart Lung and Blood Institute, 2009). High blood pressure weakens blood vessels by exerting pressure on the interior lining of vessels and damaging those cells. The cells can completely detach from the walls causing them to become thinner or become so damaged that they collect platelets and fatty deposits leading to plaque development. Risk factors for the development of high blood pressure are similar to CVD and include tobacco use, obesity, high cholesterol, alcohol use, physical inactivity, and poor dietary habits (Labarthe & Roccella, 1998).

Introduction

This Report

This report contains an analysis of the burden of cardiovascular disease in West Virginia. Cardiovascular disease surveillance for the state relies on three main data sources, the Behavioral Risk Factor Surveillance System, the Uniform Billing (UB-04) Hospital Discharge Database, and the Vital Registration Death Certificate Database.

In order to adequately define the burden of cardiovascular disease (CVD) in West Virginia, this report contains analysis of the risk factors associated with CVD, the prevalence of CVD, CVD management and lifestyle factors, disease co-morbidities, CVD related hospitalizations, and CVD mortality. Analysis includes examination of any disparities that occur for these issues. Specifically, this includes analysis of gender, age, household income, educational attainment, and geographic differences as well as comparisons between WV and U.S. statistics.

Methods for calculation of all prevalence estimates, rates, and 95% confidence intervals are included in Appendix A. Data tables corresponding to all figures in this report are included in Appendix B and contain all estimates, rates, and 95% confidence intervals.

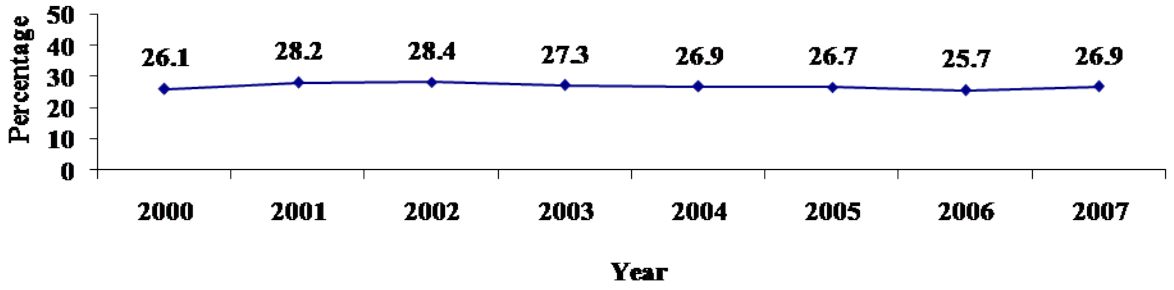
Behavioral Risk Factors

There are several behavioral risk factors associated with heart disease and stroke including tobacco use, lack of physical activity, poor nutrition, and alcohol use. Tobacco use is possibly the number one public health risk factor in the United States and West Virginia as it is implicated in the development of cardiovascular diseases, diabetes, cancer, and asthma. In West Virginia, tobacco use is a problem for not only adults, but adolescents as well.

The 2007 Youth Risk Factor Survey (YRBS) was given to randomly selected middle school and high school students in all counties of West Virginia. The results of the survey indicate that one in three (34.8%) middle school students and more than half (59.3%) of high school students have tried cigarette smoking in their lifetimes. The results also indicate that 7.8% of middle school students and 19.5% of high school students smoke cigarettes on a daily basis.

Cigarette smoking among adults is also an issue in West Virginia as more than one in four (26.9%) are considered current smokers according to results of the 2007 Behavioral Risk Factor Surveillance System (BRFSS). As the graph below indicates, smoking rates among adults have not changed in the past few years.

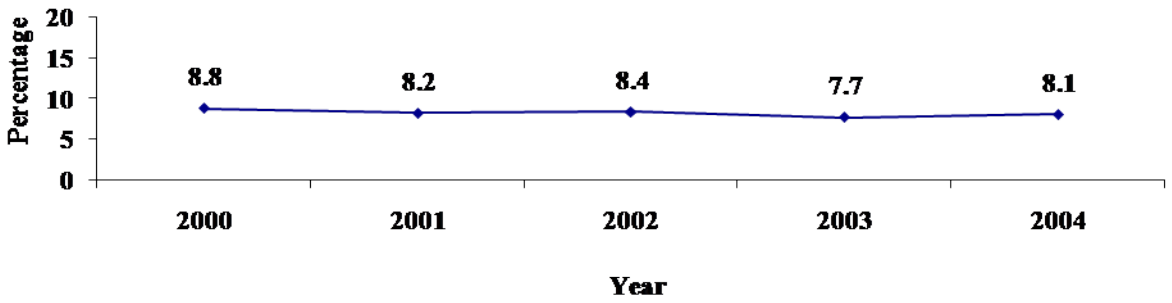
Figure 1.1: Current Cigarette Smoking Among Adults



Source: Behavioral Risk Factor Surveillance System

The use of smokeless tobacco products such as chewing tobacco and snuff is also a problem in West Virginia. According to the 2007 YRBS, 6.5% of middle school students and 14.8% of high school students have used smokeless tobacco during the past month. Rates are also high among adults. The BRFSS indicates that approximately 8.1% of West Virginia adults are regular users of smokeless tobacco products. Figure 1.2 indicates that rates of smokeless tobacco use have not varied in the past few years. The BRFSS survey has not included questions about smokeless tobacco use since 2004 but will be included in future surveys.

Figure 1.2: Current Smokeless Tobacco Use Among Adults

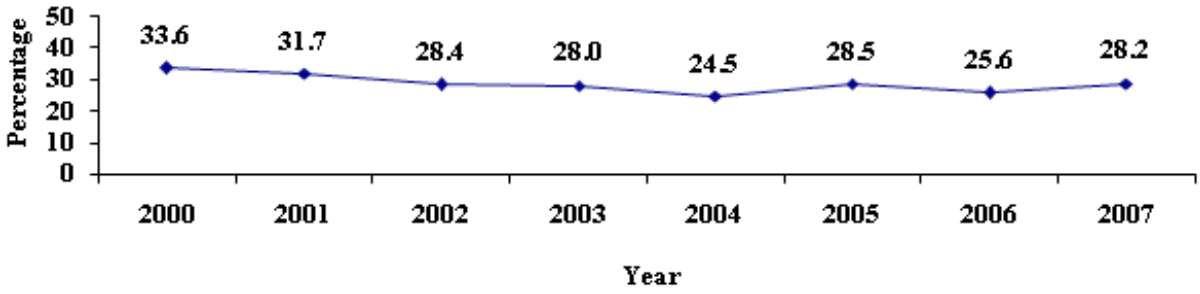


Source: Behavioral Risk Factor Surveillance System
No data available for 2005, 2006, 2007

Another behavioral risk factor associated with the development of cardiovascular disease is lack of physical activity. Physical activity can be thought of as low intensity activity such as gardening and golfing or activity specifically for the purpose of exercise such as running or lifting weights. Unfortunately, no matter how physical activity is defined, West Virginians are physically inactive even though the state offers many venues for exercise, sports, and leisure.

In 2007, 28.2% of West Virginia adults reported they engaged in no physical activity in the past month (BRFSS). As seen in Figure 1.3, this lack of physical activity has been declining slightly in recent years indicating that West Virginians are becoming more active. Specifically, there was a significant decline between 2000 and 2003 but has remained relatively stable since then.

Figure 1.3: No Leisure Time Physical Activity Among Adults

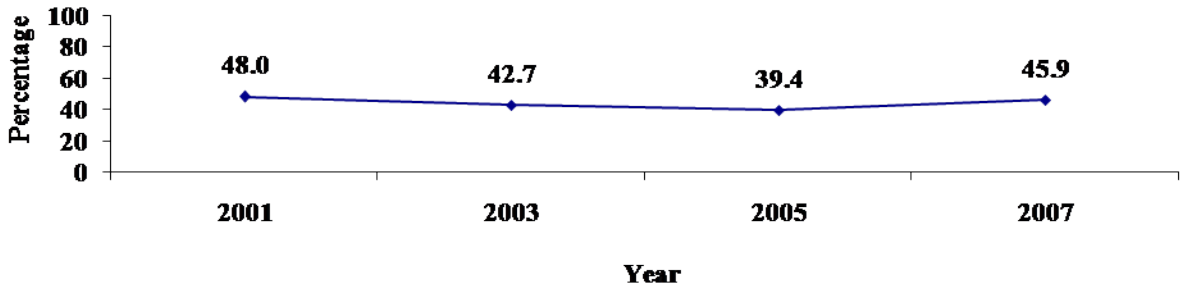


Source: Behavioral Risk Factor Surveillance System

Assessing exercise levels is another way to determine the amount of physical activity engaged in by West Virginians. Among adolescents, 65.1% of middle school students and 42.8% of high school students reported they are physically active for at least 60 minutes per day five or more days per week (2007 YRBS).

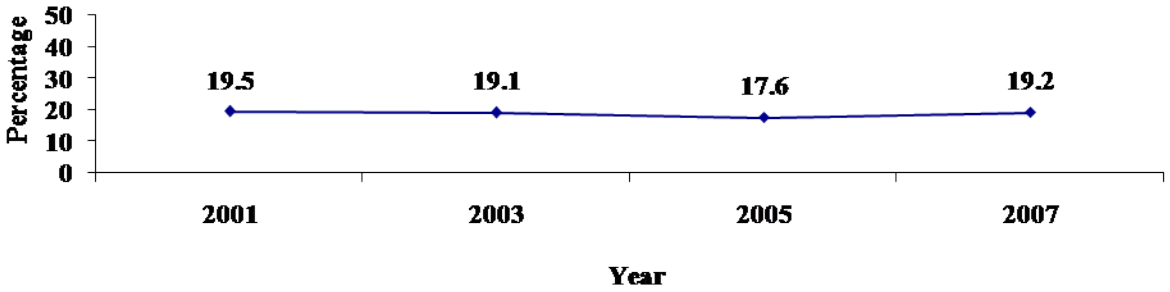
Adults also do not engage in recommended levels of exercise. In 2007, less than half (45.9%) of adults engaged in 30 or more minutes of moderate physical activity five or more days per week or vigorous physical activity for 20 or more minutes three or more days per week (BRFSS). Figure 1.4 shows that moderate levels of exercise among adults has not changed over the past several years. This is also true for level of vigorous exercise defined as 20 or more minutes of vigorous physical activity three or more days per week (see Figure 1.5).

Figure 1.4: Moderate Exercise Among Adults



Source: Behavioral Risk Factor Surveillance System

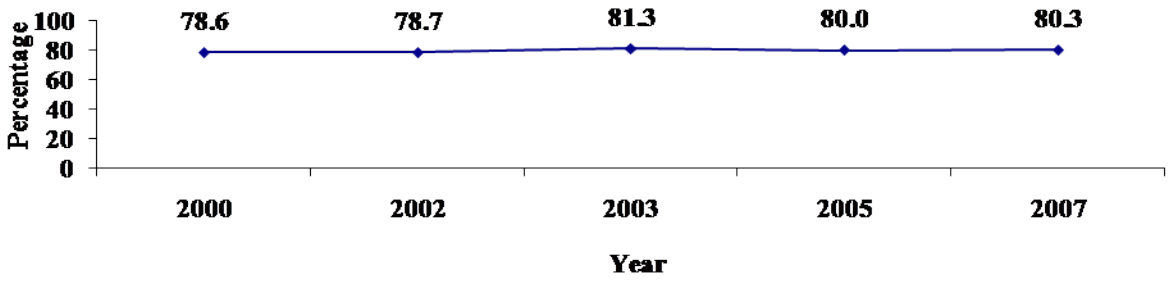
Figure 1.5: Vigorous Exercise Among Adults



Source: Behavioral Risk Factor Surveillance System

Lack of proper nutrition is also a risk factor for cardiovascular disease. One way to assess this risk factor is to measure the amount of fruits and vegetables consumed on a daily basis. Only 19.8% of high school students ate fruits and vegetables five or more times per day over the course of one week according to the 2007 YRBS. This trend also continues into adulthood as only 19.7% of adults consumed more than five servings of fruits and vegetables per day. Figure 1.6 displays yearly trends for consumption of inadequate amounts of fruits and vegetables and shows that rates have not changed over the past eight years.

Figure 1.6: Consumption of Less Than 5 Servings of Fruits and Vegetables Daily Among Adults

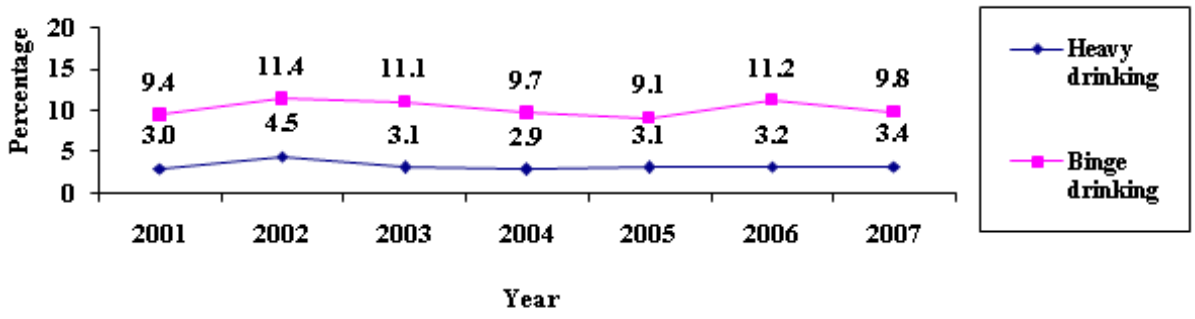


Source: Behavioral Risk Factor Surveillance System
No data available for 2001, 2004, 2006

A final behavioral risk factor associated with cardiovascular disease is alcohol use. The 2007 YRBS indicates that alcohol use is an important issue for adolescents. Approximately 39.9% of middle school students reported that they had at least one drink in their lifetime while 75.4% of high school students reported having at least one drink in their lifetime. Further, 43.5% of high school students reported that they had at least one drink in the past month and 29.5% reported having five or more drinks at one time in the past month indicating possible binge drinking episodes.

Alcohol use is also an issue among West Virginia adults as 3.4% report heavy alcohol use and 9.8% report binge drinking (2007 BRFSS). Figure 1.7 shows that these rates have remained unchanged over the past several years.

Figure 1.7: Heavy and Binge Drinking Among Adults



Source: Behavioral Risk Factor Surveillance System

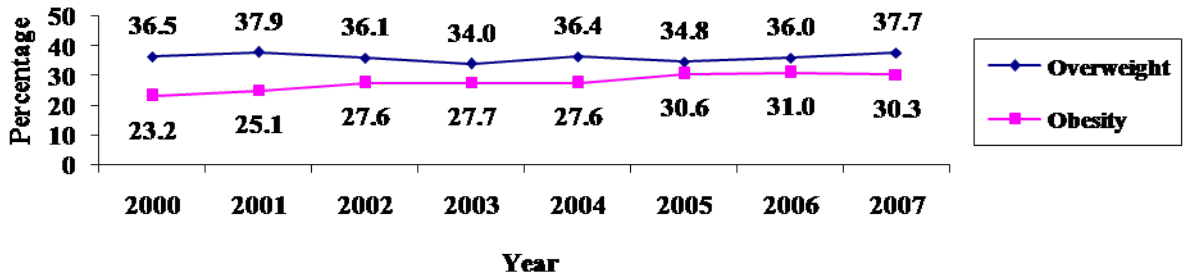
Physiological Risk Factors

Several physiological risk factors are also related to the development of cardiovascular disease including obesity, diabetes, oral health, hypertension, and high cholesterol.

Overweight and obesity are contributing factors to the development of cardiovascular disease and present a major problem for the U.S. and West Virginia. For adolescents, weight status is assessed using weight tables and classifications including at risk for becoming overweight for those who fall between the 85th and 95th percentiles based on their height, weight, and gender and overweight for those at or above the 95th percentile. This classification system was applied to data collected from the 2007 YRBS for high school students only. The results indicate that 17.0% are at risk for becoming overweight and 14.7% are overweight.

Overweight and obesity for adults is determined using body mass index or BMI. BMI is calculated as a ratio of height to weight. Adults are classified as overweight if their calculated BMI is 25.1-29.9 and obese if their BMI is 30.0 or greater. Both overweight and obesity among adults has been increasing over the past few decades. Figure 2.1 displays rates of overweight and obesity for West Virginia adults over the past eight years. Although the proportion of overweight adults has remained stable, the percentage of obese adults has significantly increased between 2000 and 2007. As with tobacco use, obesity is associated with several chronic diseases including diabetes and cancer.

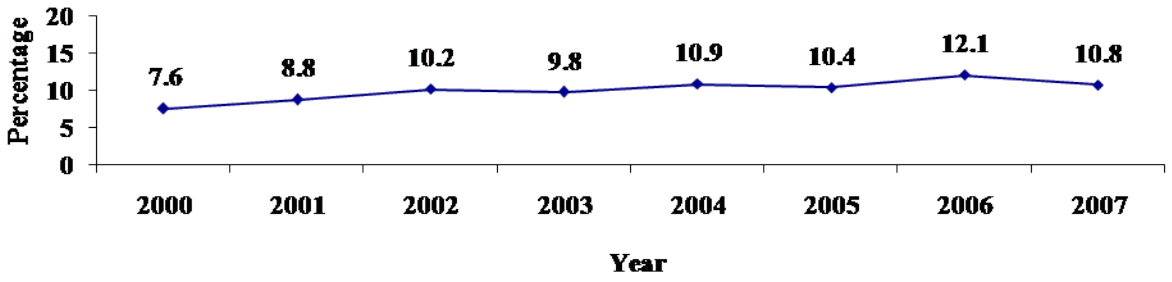
Figure 2.1: Overweight and Obesity Among Adults



Source: Behavioral Risk Factor Surveillance System

Diabetes is another physiological risk factor for the development of cardiovascular disease. Figure 2.2 shows that the prevalence of diabetes significantly increased between 2000 and 2007 though the rate has remained stable over the past six years.

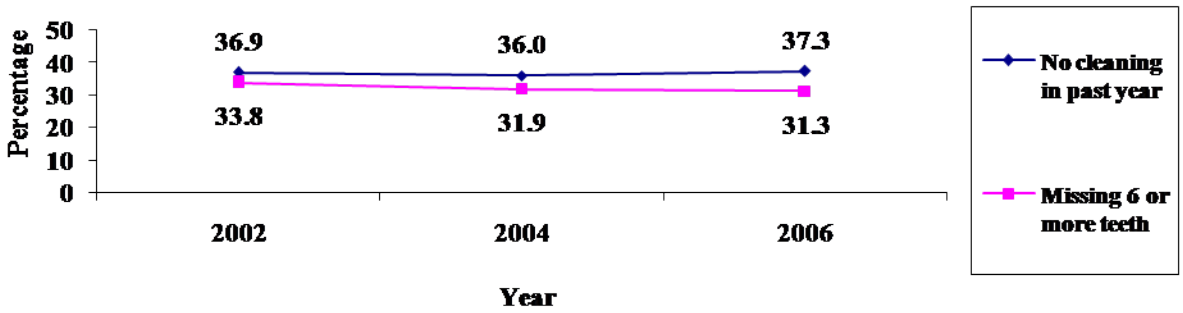
Figure 2.2: Prevalence of Diabetes Among Adults



Source: Behavioral Risk Factor Surveillance System

In recent years, oral health has also been associated with the development of cardiovascular disease. Figure 2.3 shows that rates of teeth cleaning among adults is relatively low with 37.3% of adults not having their teeth cleaned in the past year (2006 BRFSS). Results also indicate that 31.3% of West Virginia adults are missing six or more teeth. These statistics are problematic considering that periodontal disease has been associated with both heart disease and stroke.

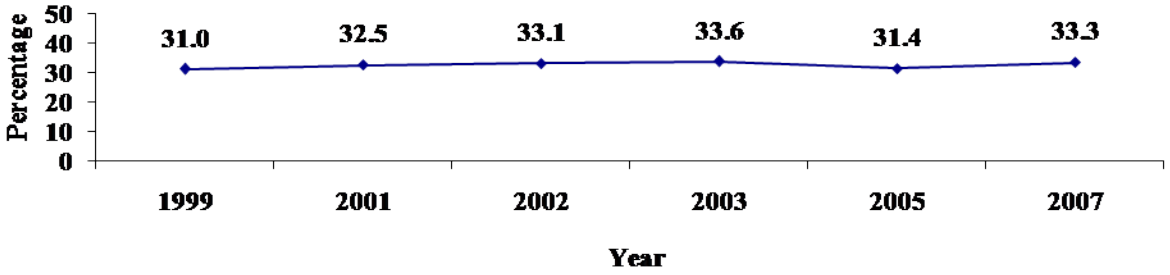
Figure 2.3: Oral Health Among Adults



Source: Behavioral Risk Factor Surveillance System

Another independent risk factor for the development of heart disease and stroke is hypertension. Hypertension, or high blood pressure, weakens the blood vessels making a stroke more likely. In 2007, one in every three West Virginia adults (33.3%) has been diagnosed with hypertension. Figure 2.4 shows that the prevalence of hypertension in West Virginia has remained stable over the past decade.

Figure 2.4: Prevalence of Hypertension Among Adults

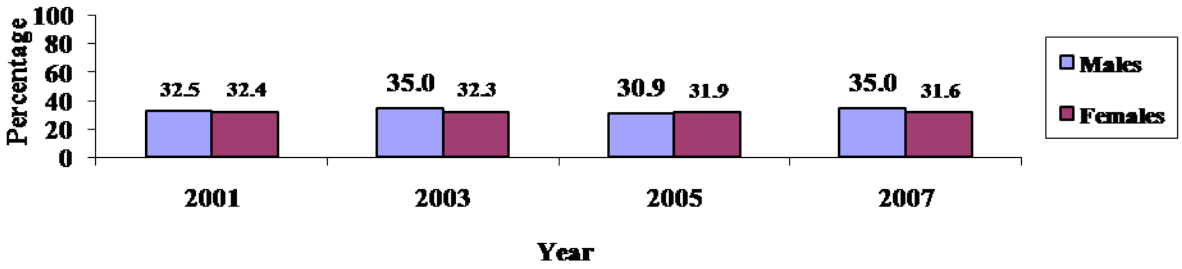


Source: Behavioral Risk Factor Surveillance System
No data available for 2000, 2004, 2006

The West Virginia hypertension prevalence of 33.3% (95% CI: 31.64-34.86) is significantly higher than the U.S. prevalence of 27.7% (95% CI: 27.43-27.97) for 2007. West Virginia has the 3rd highest prevalence of hypertension among all states, D.C., and U.S. territories.

Figure 2.5 shows that there are no gender differences in the prevalence of hypertension.

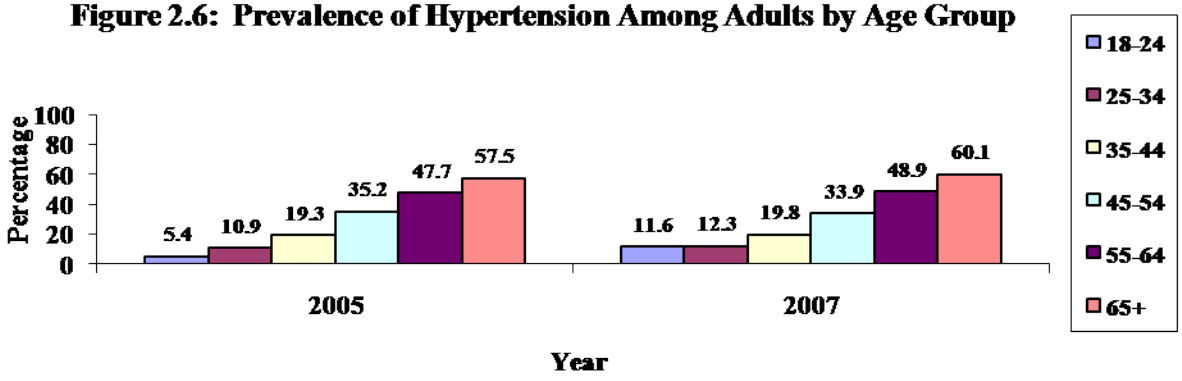
Figure 2.5: Prevalence of Hypertension Among Adults by Gender



Source: Behavioral Risk Factor Surveillance System

However, figure 2.6 shows there are significant age related differences in hypertension prevalence. Those aged 65 and older have the highest prevalence of hypertension. The age related differences are found for all age groups beginning with the 25-34 year age group. There are no significant differences between the 18-24 and 25-34 age groups.

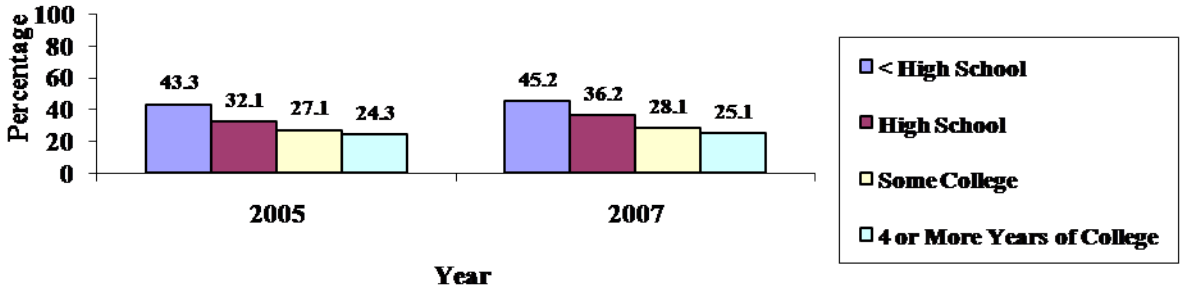
Figure 2.6: Prevalence of Hypertension Among Adults by Age Group



Source: Behavioral Risk Factor Surveillance System

There are also significant differences in hypertension by educational attainment. The prevalence of hypertension is highest (45.2%) among those with less than a high school education. As shown in Figure 2.7, there are differences between all levels of educational attainment except there are no significant differences between those with some college and those with four or more years of college.

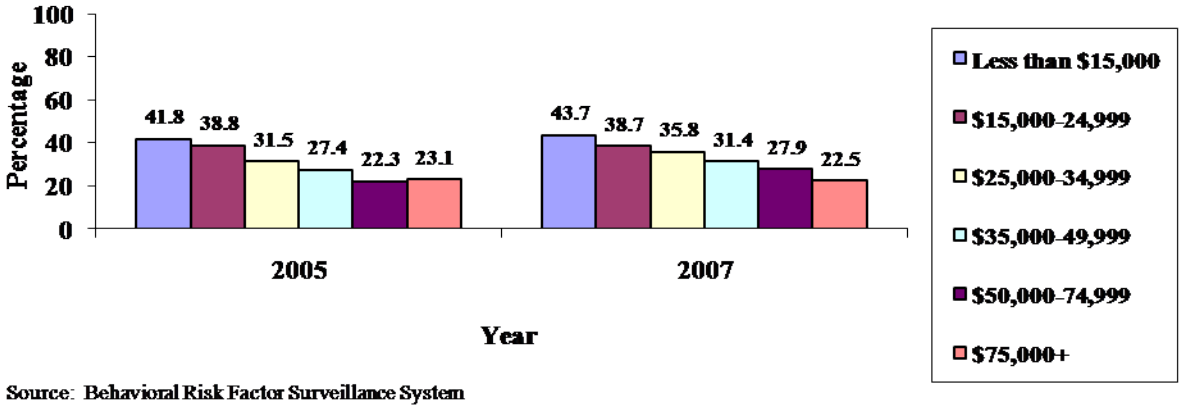
Figure 2.7: Prevalence of Hypertension Among Adults by Education Level



Source: Behavioral Risk Factor Surveillance System

There are also significant differences in hypertension prevalence for adults with different income levels. Figure 2.8 shows that among those who make less than $15,000 per year the prevalence of hypertension was 43.7%, the highest among all the income levels. Those who make $75,000 per year or more have the lowest prevalence, 22.5%. There is a significant difference between these two prevalence estimates.

Figure 2.8: Prevalence of Hypertension Among Adults by Income



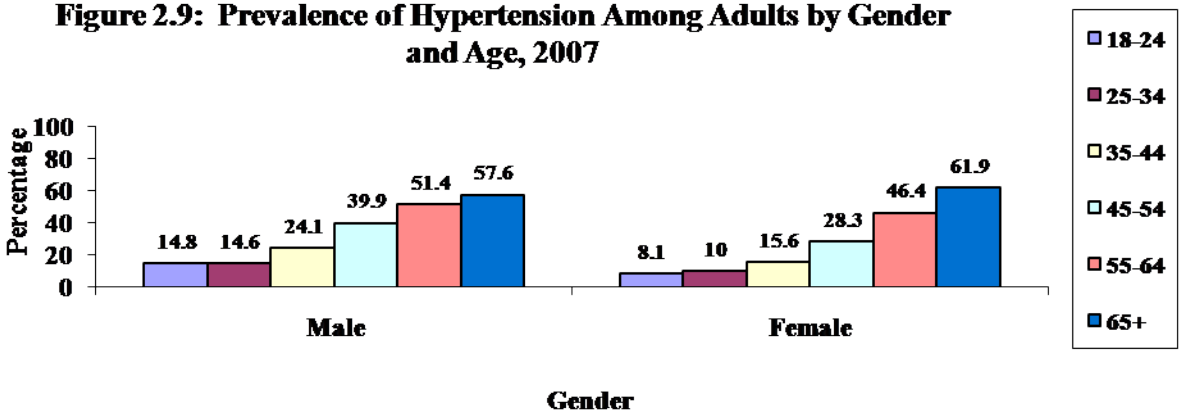
Source: Behavioral Risk Factor Surveillance System

Overall, these results indicate a socioeconomic disparity in the prevalence of hypertension with rates being highest among those with low levels of education and income.

The following graphs present age, education, and income differences in hypertension for males and females separately. Although there are no significant gender differences in hypertension prevalence, the patterns of age, education, and income differences are slightly different for the genders. Results are presented by gender in order to aid with strategic planning.

Women have relatively low rates of hypertension until age 45, then rates more than double by age 65. The age distribution for males is more gradual.

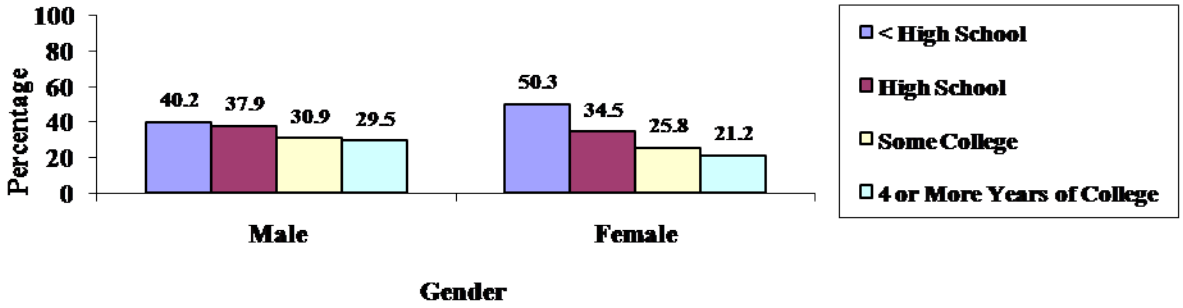
Figure 2.9: Prevalence of Hypertension Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

Similarly, Figure 2.10 demonstrates that hypertension rates for men are evenly distributed among the different education levels. There is a significant difference in hypertension rates by educational level for females. In other words, the highest rate of hypertension is found among women with less than a high school education while rates are relatively low among women with a college education.

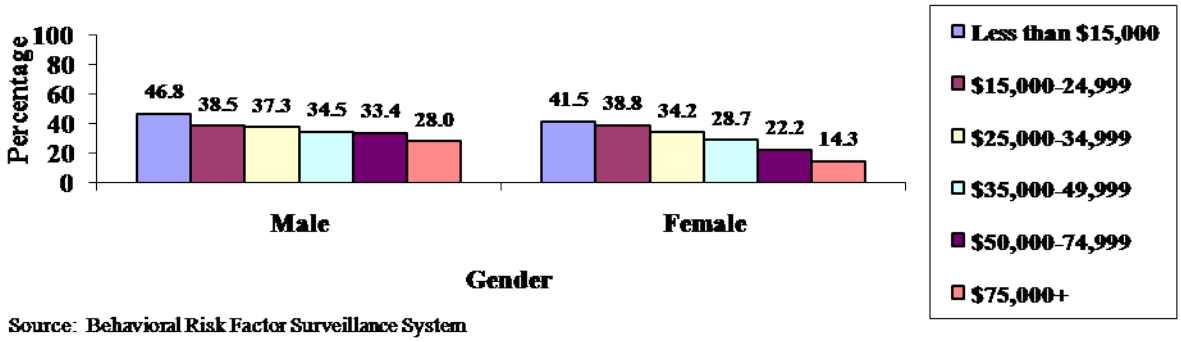
Figure 2.10: Prevalence of Hypertension Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

As with education level, rates of hypertension for men are relatively similar across the different income levels though there are significant differences between the less than $15,000 per year income bracket and the $75,000 per year and above bracket (Figure 2.11). For women, significant differences in hypertension prevalence are seen between the lowest, middle, and highest income brackets. For example, there are significant differences between the less than $15,000 bracket and the $35,000-$49,999 bracket as well as between the $35,000-$49,999 bracket and the $75,000 or greater income group.

Figure 2.11: Prevalence of Hypertension Among Adults by Gender and Income, 2007

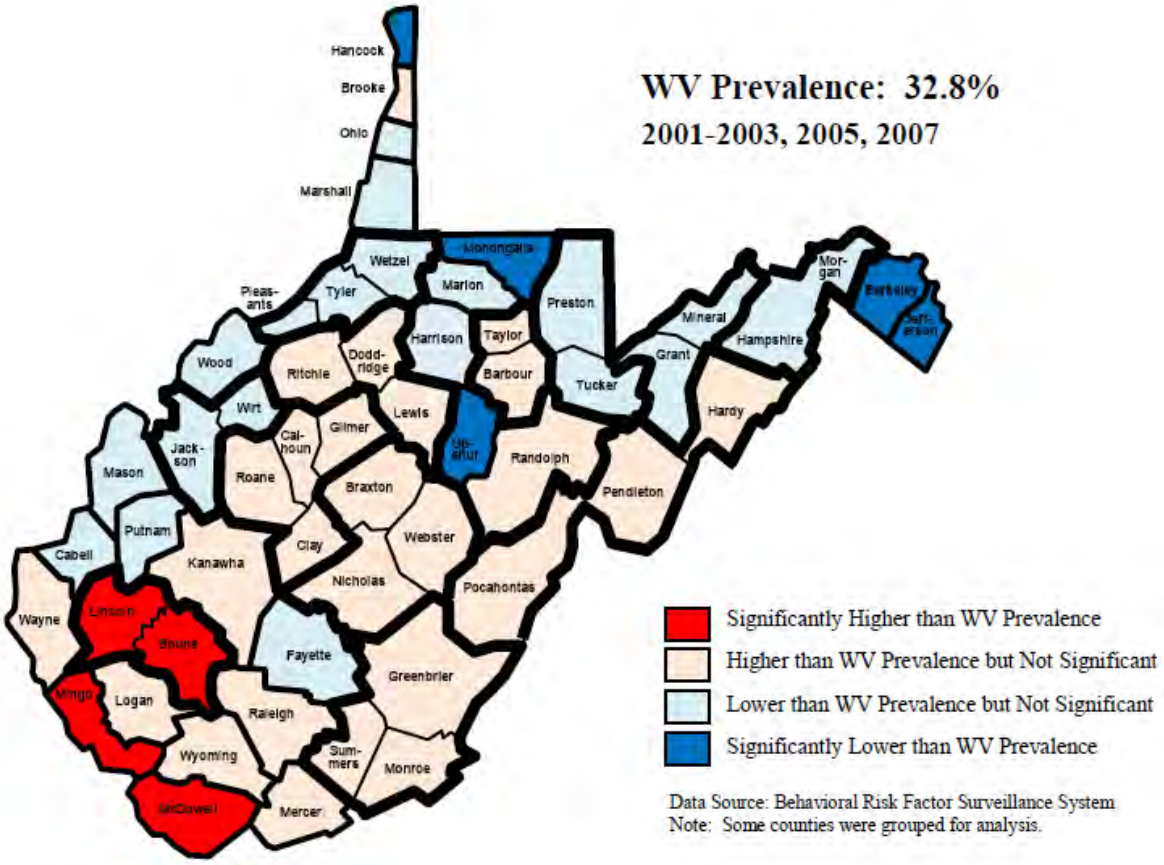


Source: Behavioral Risk Factor Surveillance System

These results seem to indicate that women are more affected by socioeconomic status in relation to hypertension than men. Though, men seem to have high rates of hypertension regardless of socioeconomic status.

It is also important to examine geographic disparities in the prevalence of hypertension. Figure 2.12 indicates that several southern counties have significantly higher prevalence of hypertension than West Virginia as a whole. These counties include Lincoln, Boone, Mingo, and McDowell counties. This area of the state also has the highest rates of poverty, risk factors, and chronic disease. The area of the state with significantly lower prevalence of hypertension than the state prevalence is the northern and panhandle areas. The counties with the lowest prevalence of hypertension are Hancock, Monongalia, Upshur, Berkeley, and Jefferson counties.

Figure 2.12: Prevalence of Hypertension by County

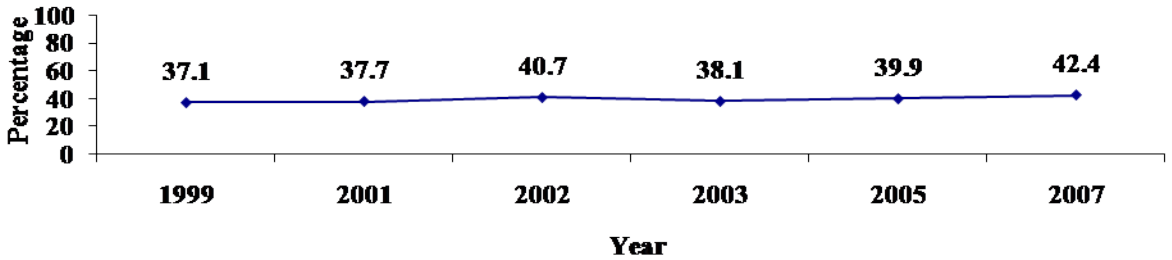


A final physiological risk factor associated with the development of heart disease and stroke is high cholesterol. High cholesterol is influenced by genetic predisposition as well as personal behavior (eating high fat foods). High cholesterol leads to the development of plaques which block blood vessels and leads to heart attack by reducing blood flow to the heart muscle and stroke if the plaque ruptures and sends clots and emboli that block blood vessels.

West Virginia adults do routinely get their cholesterol levels checked. In fact, 96.7% have had their cholesterol checked in the past five years (95% CI: 96.1-97.4). This is significantly higher than the U.S. rate of 95.8% (95% CI: 95.7-96.0). West Virginia ranks 11th highest in the nation among 54 BRFSS participants.

Figure 2.13 shows that the prevalence of high cholesterol has significantly increased between 1999 and 2007 in West Virginia. Currently, nearly half (42.4%) of adults in the state have high cholesterol.

Figure 2.13: Prevalence of High Cholesterol Among Adults

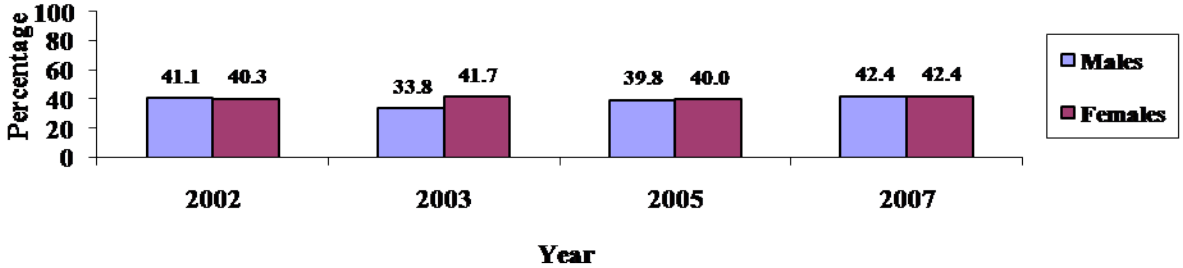


Source: Behavioral Risk Factor Surveillance System
No data available for 2000, 2004, 2006

For the year 2007, West Virginia's rate of high cholesterol (42.4%, 95% CI: 40.6-44.2) was significantly higher than the U.S. prevalence (37.3%, 95% CI: 36.9-37.6). Further, WV has the highest prevalence of high cholesterol among all states.

As can be seen in Figure 2.14, there are no gender related differences in the prevalence of high cholesterol.

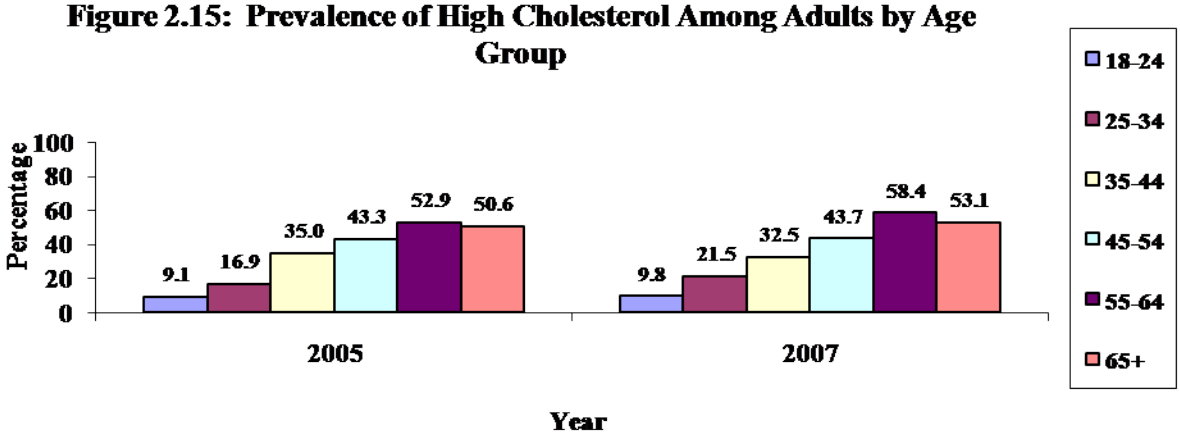
Figure 2.14: Prevalence of High Cholesterol Among Adults by Gender



Source: Behavioral Risk Factor Surveillance System

Although the prevalence of high cholesterol increases as age increases (see Figure 2.15), there is no difference between the 55-64 and 65+ age groups.

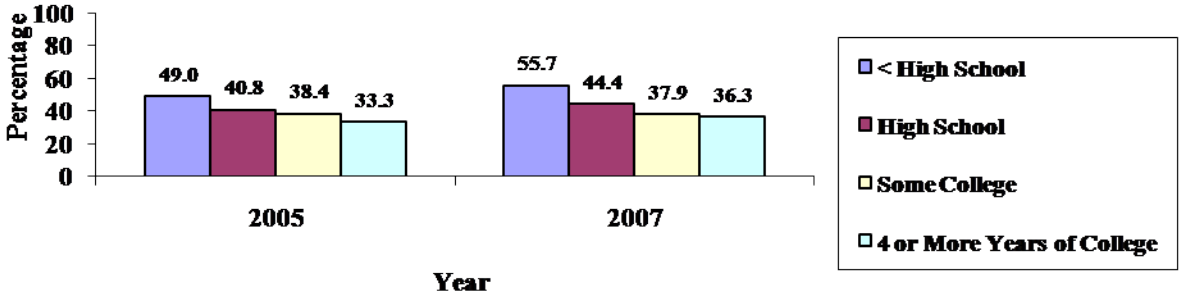
Figure 2.15: Prevalence of High Cholesterol Among Adults by Age Group



Source: Behavioral Risk Factor Surveillance System

There is also a significant difference in the prevalence of high cholesterol between the less than high school and college educated groups.

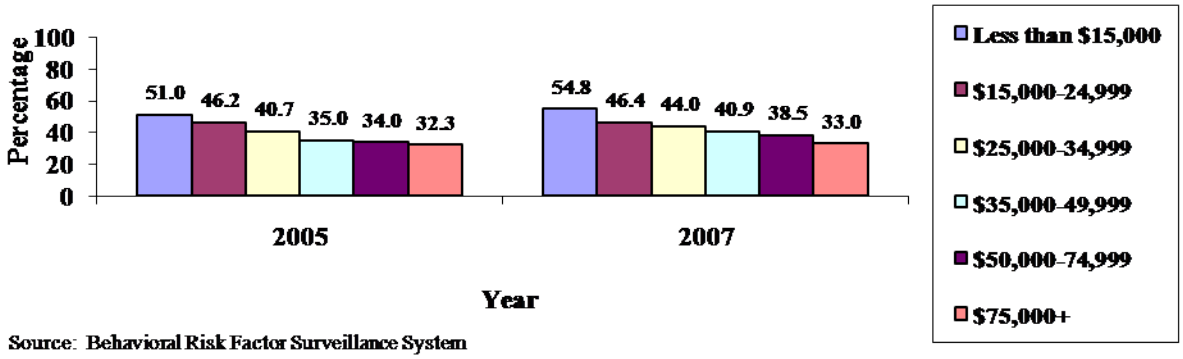
Figure 2.16: Prevalence of High Cholesterol Among Adults by Education Level



Source: Behavioral Risk Factor Surveillance System

There is also an effect for income with a significant difference in high cholesterol prevalence between less than $15,000 per year and $75,000 plus per year income brackets.

Figure 2.17: Prevalence of High Cholesterol Among Adults by Income

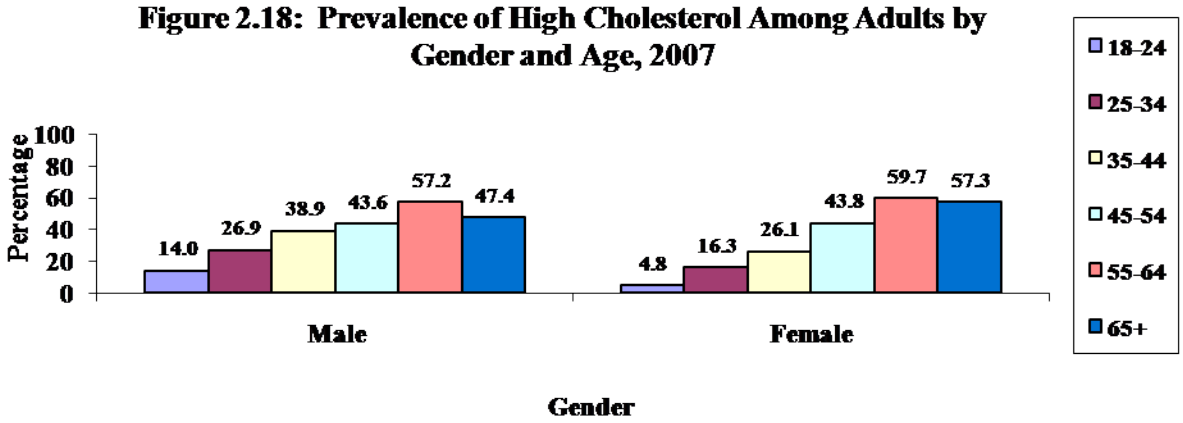


Source: Behavioral Risk Factor Surveillance System

Overall, these results indicate that those with low socioeconomic status have the highest rates of high cholesterol.

Although there is no gender difference in high cholesterol, analysis of the genders separately indicates similar patterns as described above for the prevalence of high cholesterol by age group.

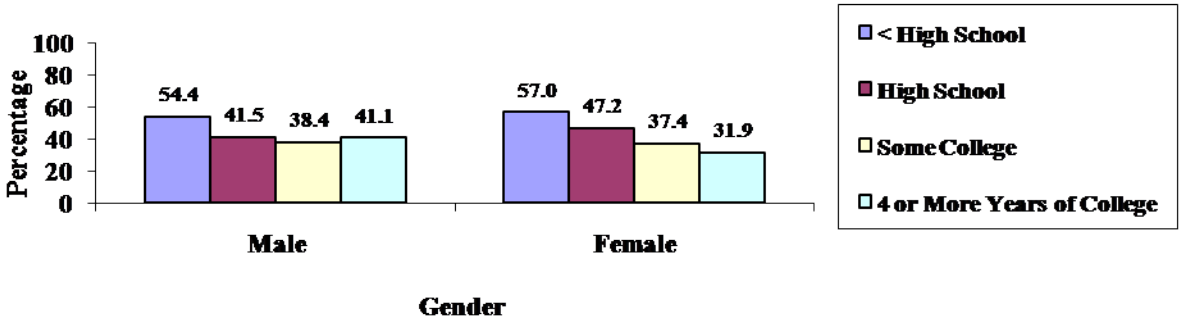
Figure 2.18: Prevalence of High Cholesterol Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

There is no significant difference in the prevalence of high cholesterol by education level for males. However, for females, there is a significant difference in high cholesterol prevalence between those with less than a high school education and those with a college education.

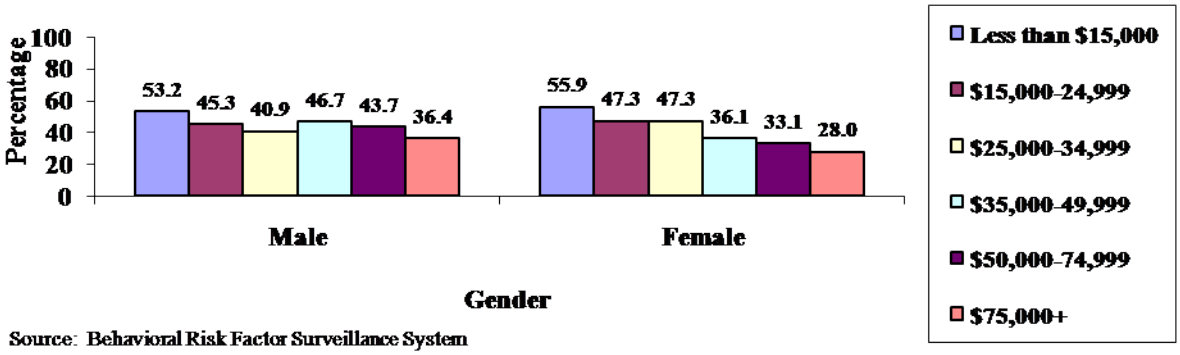
Figure 2.19: Prevalence of High Cholesterol Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

Analysis of the interaction between gender and income for high cholesterol prevalence indicates that there are significant income differences for both males and females. The highest prevalence of high cholesterol is seen for females whose household income is less than $15,000 per year. The magnitude of difference between the lowest and highest income brackets is also larger for females than males.

Figure 2.20: Prevalence of High Cholesterol Among Adults by Gender and Income, 2007

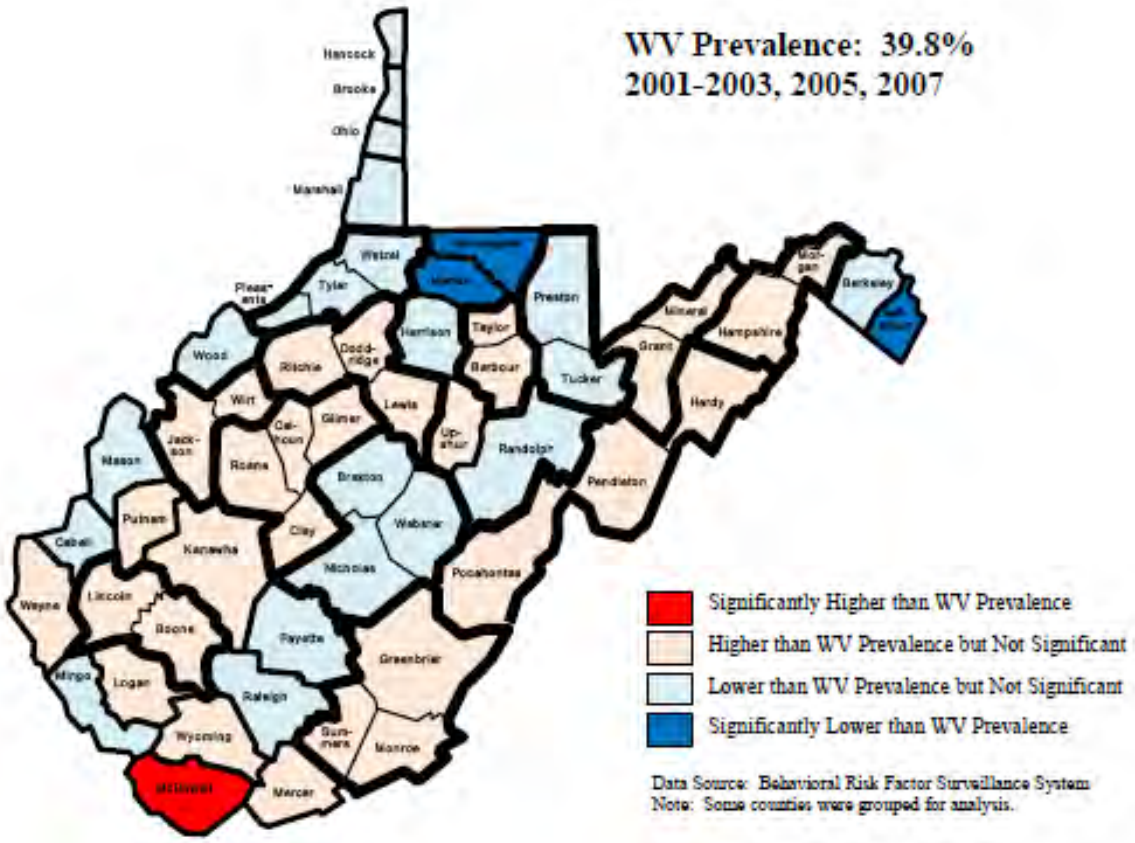


Source: Behavioral Risk Factor Surveillance System

Overall these results indicate that low socioeconomic status is particularly detrimental to women in relation to high cholesterol.

Analysis of geographic disparities in the prevalence of high cholesterol was also conducted. Figure 2.21 indicates that McDowell County is the only county that has significantly higher prevalence of high cholesterol than West Virginia as a whole. Similar to hypertension, the area of the state with significantly lower prevalence of high cholesterol than the state prevalence is the northern and eastern panhandle areas. The counties with the lowest prevalence of high cholesterol are Monongalia, Marion, and Jefferson counties.

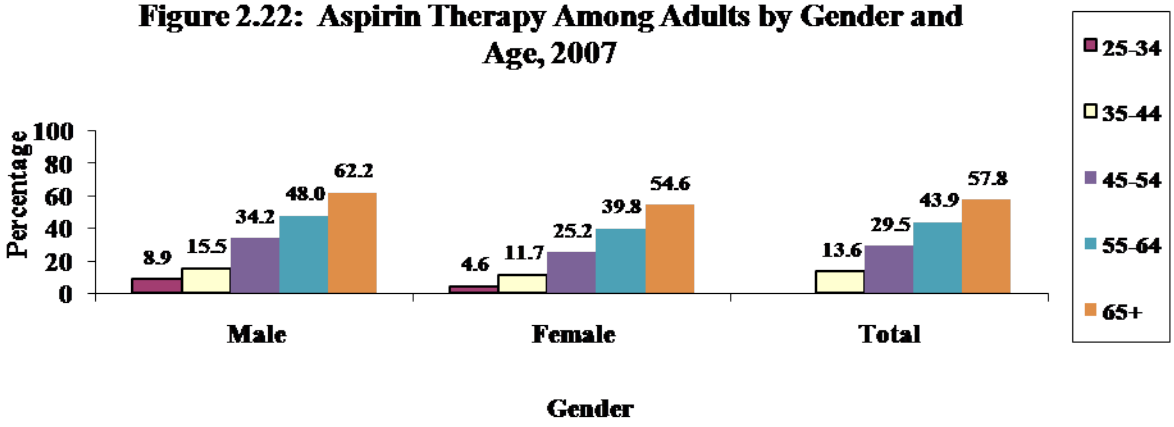
Figure 2.21: Prevalence of High Cholesterol by County



The use of aspirin is also a way to reduce the risk of heart attack and stroke. Approximately 28.2% of West Virginia adults (30.1% of males and 26.5% of females) take aspirin on a daily basis. There also appear to be age, education, and income related differences for use of aspirin therapy.

The use of daily aspirin therapy is highest among adults aged 65 and older and there are significant differences for each age group. Similar patterns are found for both men and women with over half of all adults over the age of 65 taking aspirin daily.

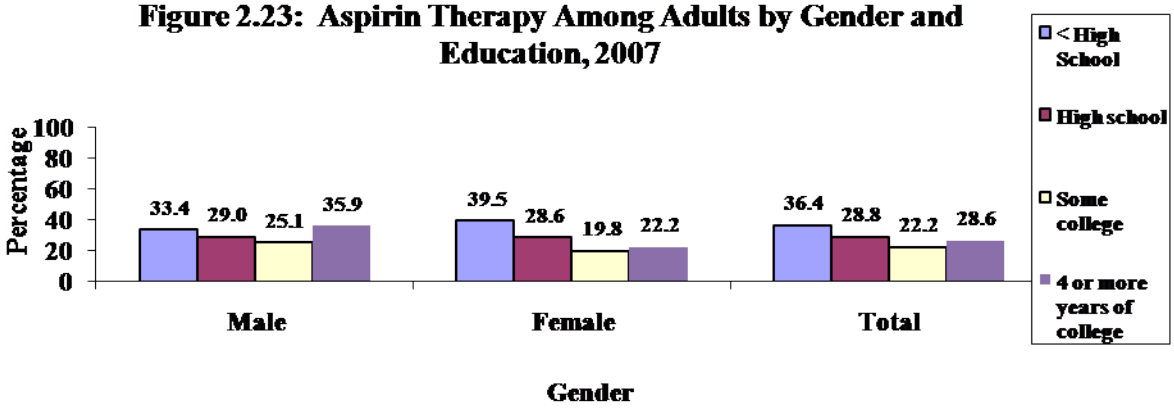
Figure 2.22: Aspirin Therapy Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

There are also significant differences by education level with less than high school having higher rates of aspirin use than college educated individuals. However, this pattern only holds for females. There is no education related difference for males.

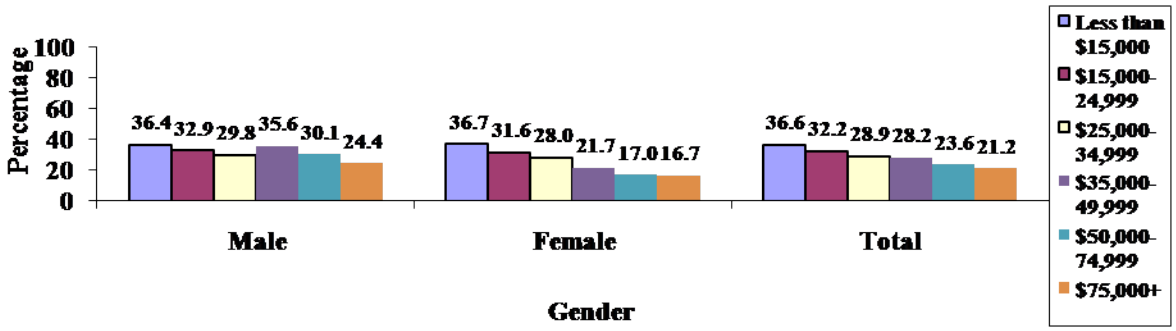
Figure 2.23: Aspirin Therapy Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

For the total population, there are income related differences in aspirin use. Specifically, those with low income have the highest rate of aspirin use. There are also significant differences between lowest and highest income brackets for females but not males.

Figure 2.24: Aspirin Therapy Among Adults by Gender and Income, 2007



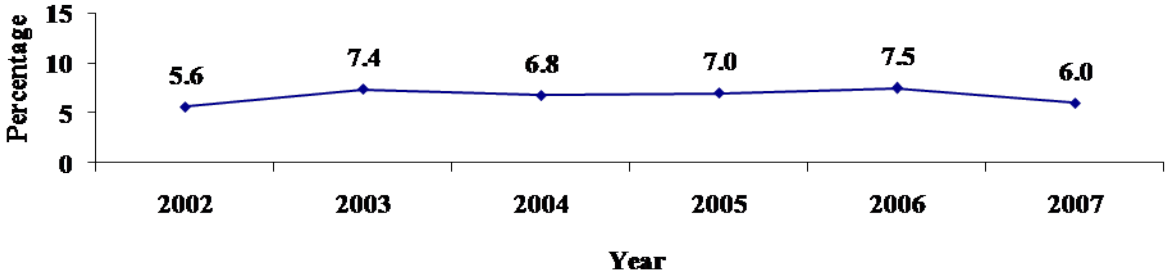
Source: Behavioral Risk Factor Surveillance System

Prevalence of CVD

The prevalence of cardiovascular diseases including heart attack or myocardial infarction, angina or coronary heart disease, and stroke are assessed yearly via the BRFSS.

Approximately 6.0% of West Virginia adults have survived a heart attack or myocardial infarction (MI). This prevalence rate is significantly higher than the U.S. rate of 4.2% (95% CI: 4.1-4.3). West Virginia ranks the 2nd highest in heart attack prevalence among all U.S. states, territories, and D.C. Figure 3.1 shows that rates of heart attack have not changed over the past several years.

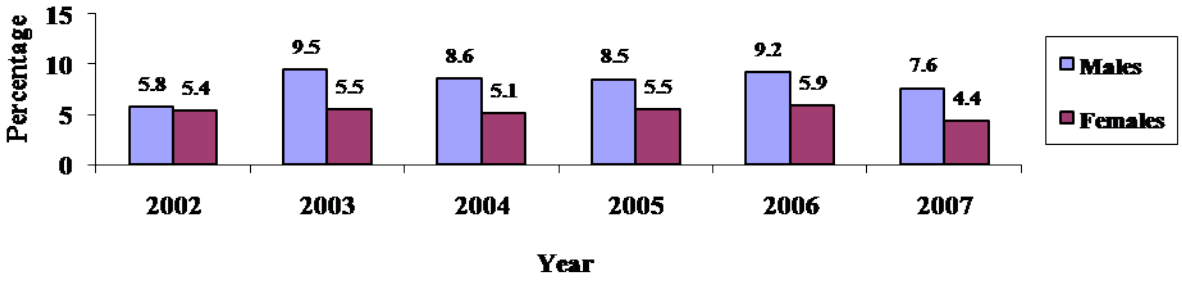
Figure 3.1: Prevalence of Heart Attack or Myocardial Infarction Among Adults



Source: Behavioral Risk Factor Surveillance System

Figure 3.2 indicates that there is a significant gender difference in the prevalence of heart attack or MI. In 2007, the prevalence of heart attack for males was 7.6% and 4.4% for females. Further, this gender difference has been found every year since 2003. As with total prevalence, the prevalence by gender has not changed significantly over time.

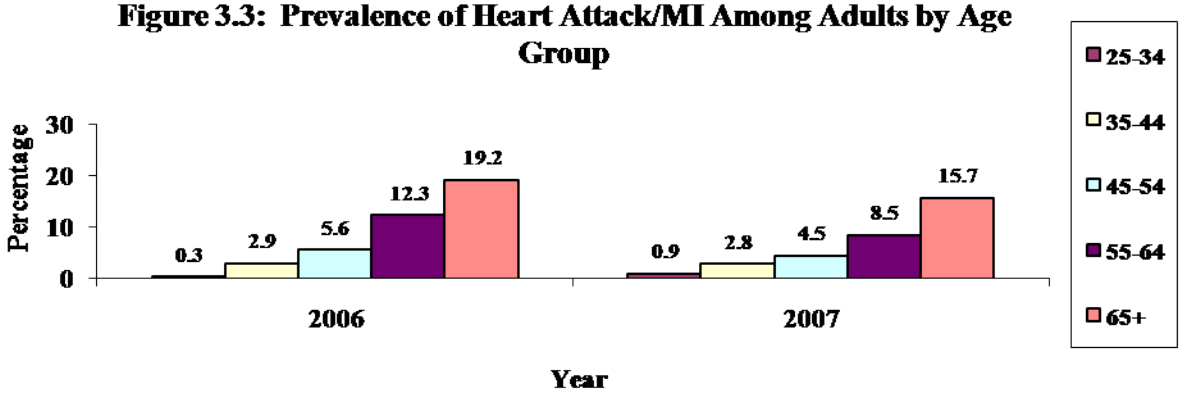
Figure 3.2: Prevalence of Heart Attack/MI Among Adults by Gender



Source: Behavioral Risk Factor Surveillance System

The prevalence of heart attack or MI is greatest among those aged 65 years and older. There are significant differences between the youngest and oldest age group as well as between the 45-54 and 55-64 and 65+ age groups.

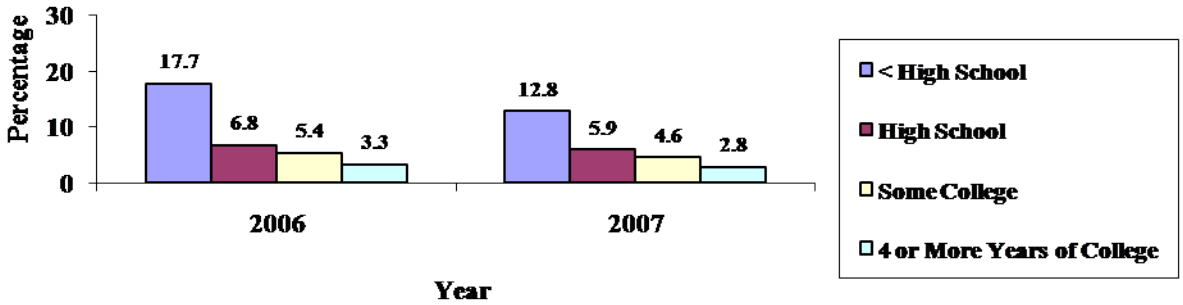
Figure 3.3: Prevalence of Heart Attack/MI Among Adults by Age Group



Source: Behavioral Risk Factor Surveillance System

Prevalence of heart attack or MI is highest among those with less than a high school education. The prevalence is doubled between high school and less than high school. There is also a significant difference between those with less than a high school education and the college educated.

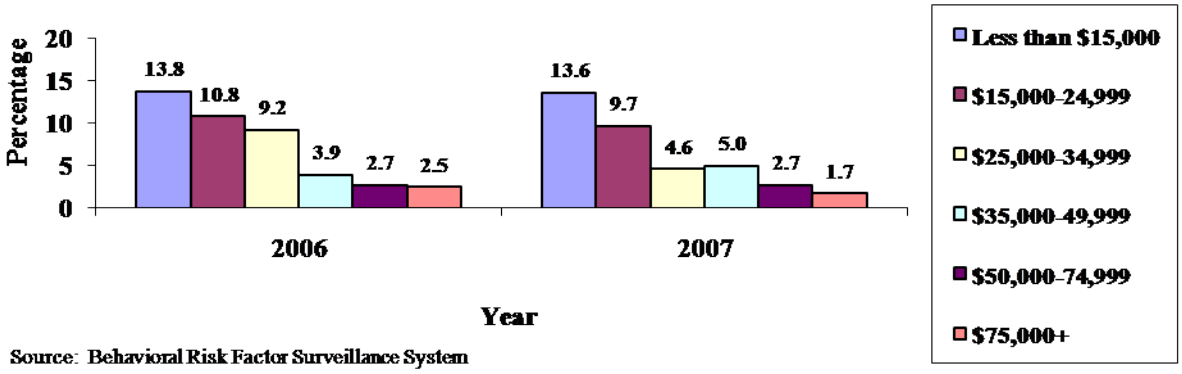
Figure 3.4: Prevalence of Heart Attack/MI Among Adults by Education Level



Source: Behavioral Risk Factor Surveillance System

Prevalence of heart attack or MI is highest among adults whose income is less than $15,000 per year. There is a significant difference between highest and lowest income brackets.

Figure 3.5: Prevalence of Heart Attack/MI Among Adults by Income

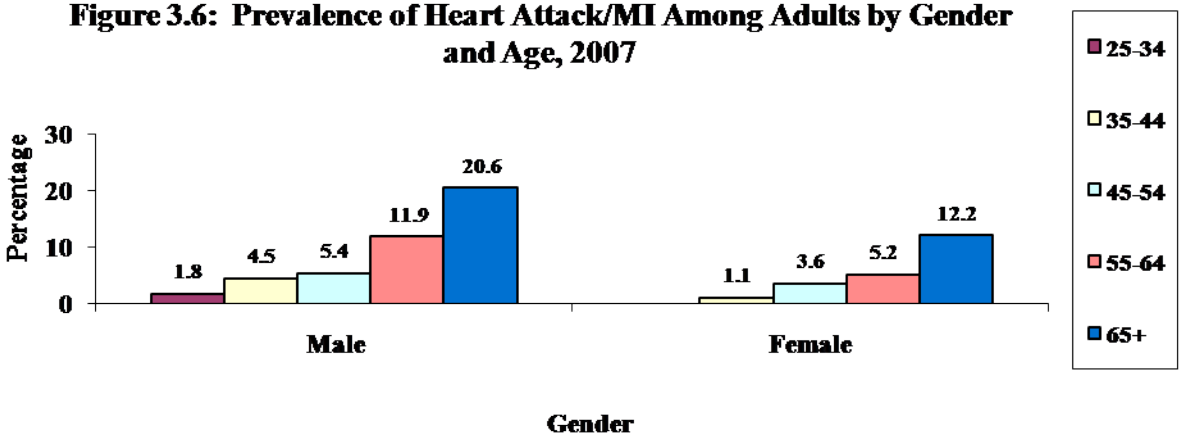


Source: Behavioral Risk Factor Surveillance System

Because there are significant gender differences in the prevalence of heart attack, the data were also analyzed by gender to determine any interactions.

Analyses reveal gender differences in heart attack prevalence by age. Prevalence significantly increases for females between 55-64 and 65+ age groups. Prevalence significantly increases between 45-54, 55-64, and 65+ age groups for males.

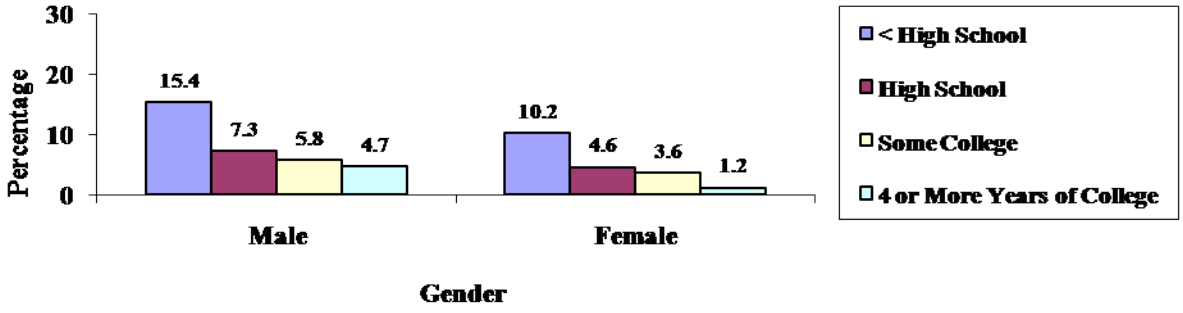
Figure 3.6: Prevalence of Heart Attack/MI Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

There are no significant gender differences in heart attack prevalence for the various levels of educational attainment. For males, there is a significant difference in heart attack prevalence between less than high school and a college education. Prevalence is also doubled between less than high school and a high school education. For females, there is a significant difference between those with less than a high school education and those with a college degree. There is also a significant difference between some college and four or more years of college, as well as a significant difference between less than high school and high school.

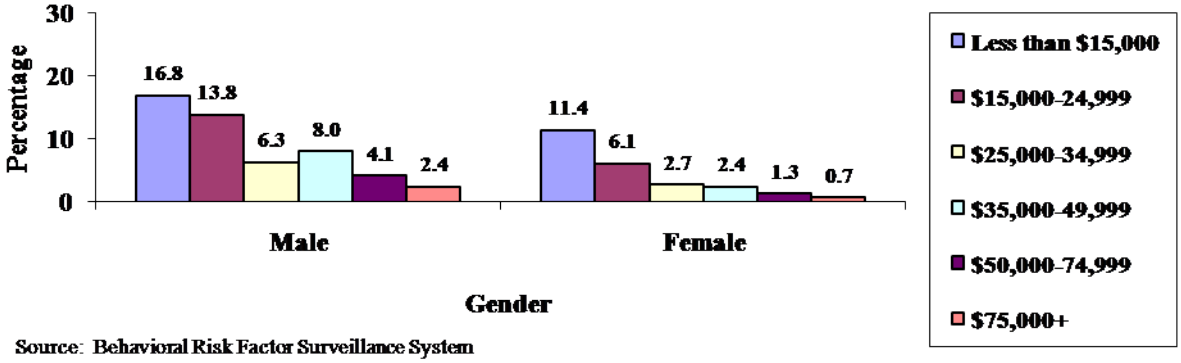
Figure 3.7: Prevalence of Heart Attack/MI Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

For males, there is a significant difference between less than $15,000 and $75,000+ income brackets. There is also a significant difference between less than $15,000 and $25,000-$34,999 income brackets and between the $25,000-$34,999 and $75,000+ income brackets. For females, there is a significant difference between less than $15,000 and $75,000+ income brackets.

Figure 3.8: Prevalence of Heart Attack/MI Among Adults by Gender and Income, 2007

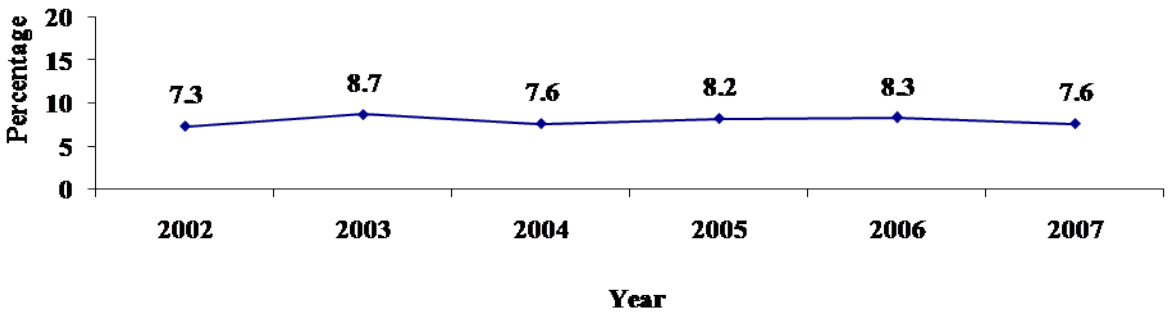


Source: Behavioral Risk Factor Surveillance System

Overall, the results indicate that those with lower socioeconomic status have higher prevalence of heart attack or myocardial infarction.

There are no significant changes in angina or coronary heart disease over time.

Figure 3.9: Prevalence of Angina or Coronary Heart Disease Among Adults

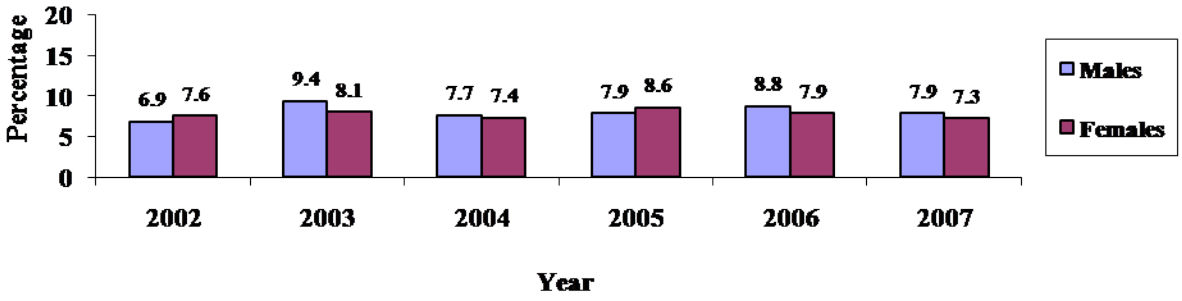


Source: Behavioral Risk Factor Surveillance System

The West Virginia prevalence of 7.6% (95% CI: 6.8-8.4) is significantly higher than the U.S. rate of 4.3% (95% CI: 4.2-4.4). West Virginia has the highest prevalence of angina/coronary heart disease in the U.S. (among all states, D.C., and territories).

There is no significant gender difference in the prevalence of angina/coronary heart disease. There also has not been any significant change in angina/CHD prevalence over time for males or females.

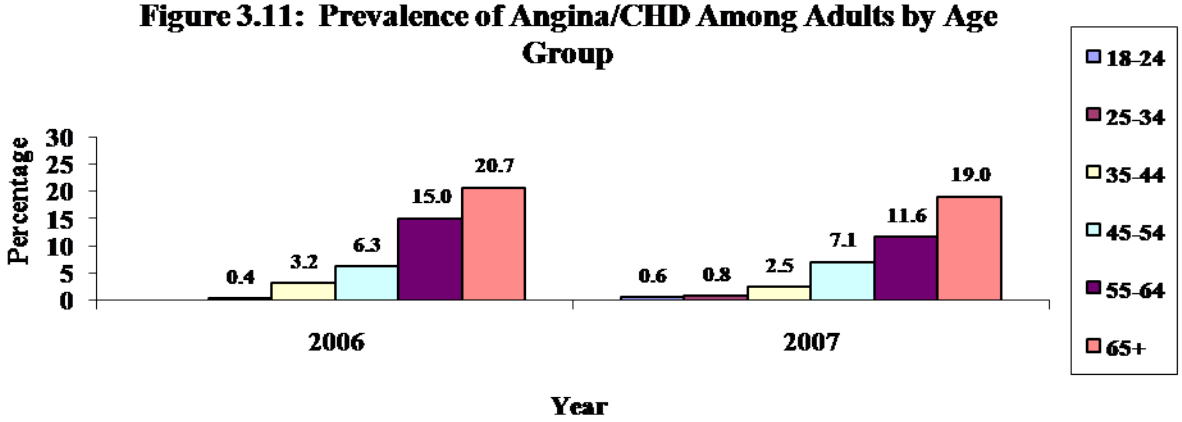
Figure 3.10: Prevalence of Angina/CHD Among Adults by Gender



Source: Behavioral Risk Factor Surveillance System

The prevalence of angina/CHD increases as age increases. There are significant increases with each age group from age 35 on.

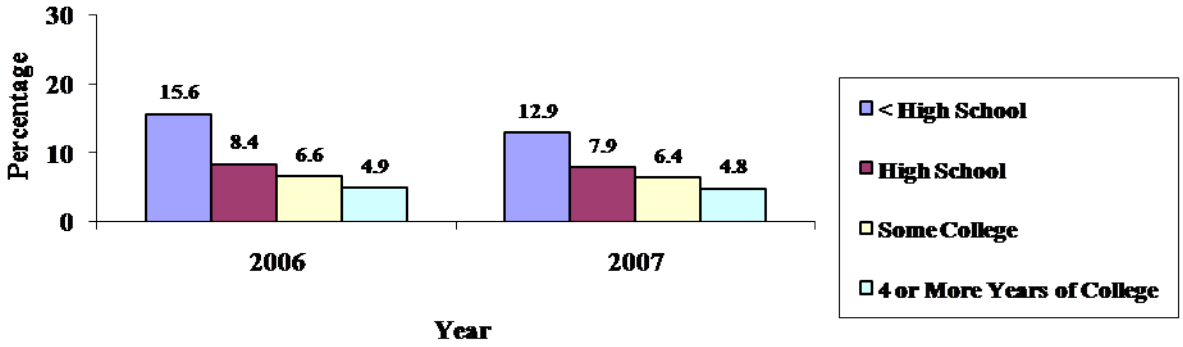
Figure 3.11: Prevalence of Angina/CHD Among Adults by Age Group



Source: Behavioral Risk Factor Surveillance System

For the prevalence of angina or coronary heart disease, there are significant differences between those with less than a high school education and those with a college education as well as differences in prevalence between those with less than a high school education and those with a high school diploma. There is also a difference between high school and college educated individuals.

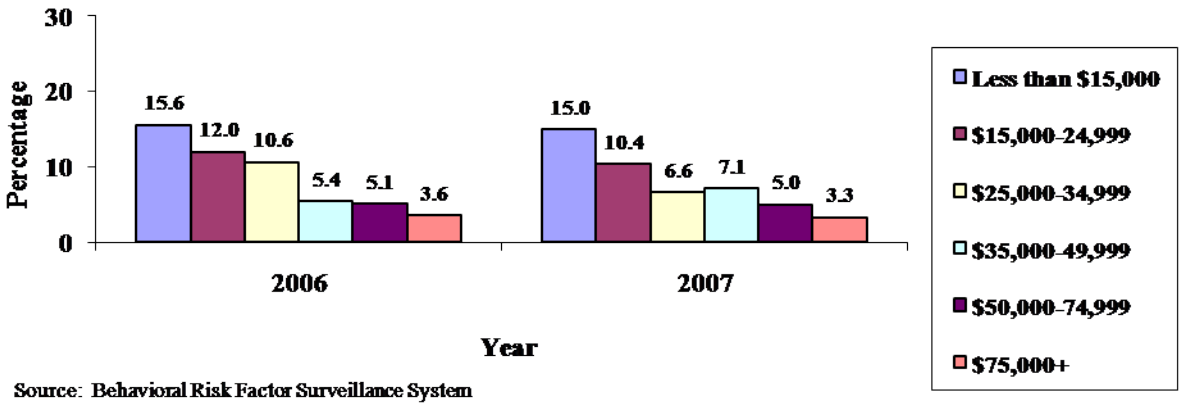
Figure 3.12: Prevalence of Angina/CHD Among Adults by Education Level



Source: Behavioral Risk Factor Surveillance System

There are significant differences in angina/CHD prevalence between less than $15,000 and $75,000+ income brackets.

Figure 3.13: Prevalence of Angina/CHD Among Adults by Income

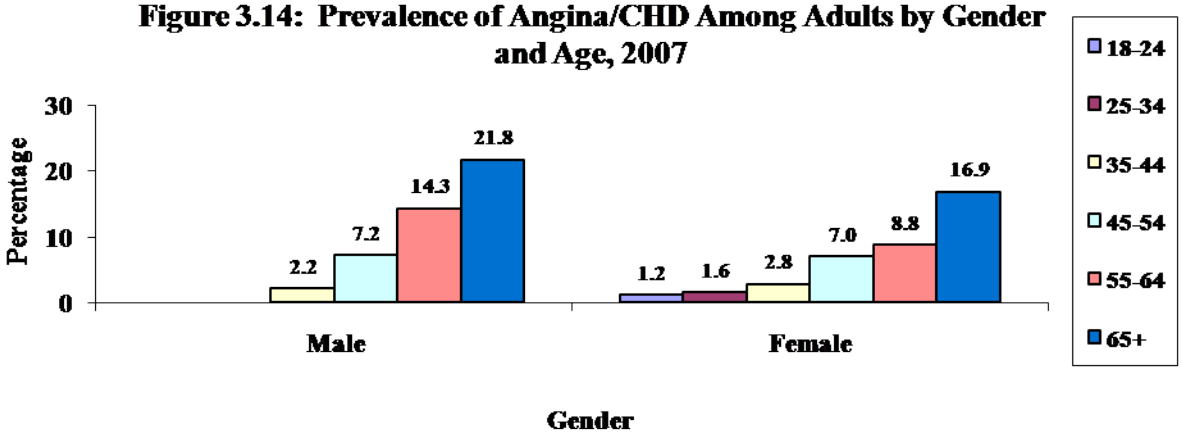


Source: Behavioral Risk Factor Surveillance System

Although there are no significant gender differences in the prevalence of angina/CHD, results are presented by gender here for strategic planning.

While there are no gender differences by age group, prevalence is highest among the 65+ age group for both genders.

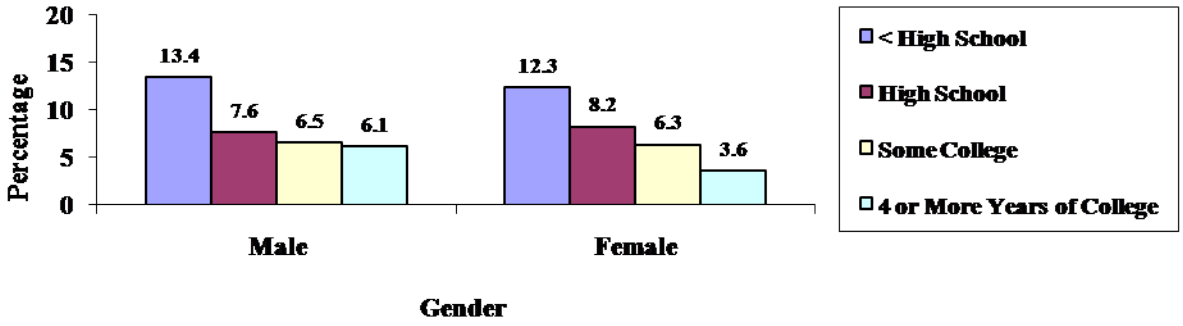
Figure 3.14: Prevalence of Angina/CHD Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

While there are no gender differences by education level, prevalence is highest among those with less than a high school education for both genders.

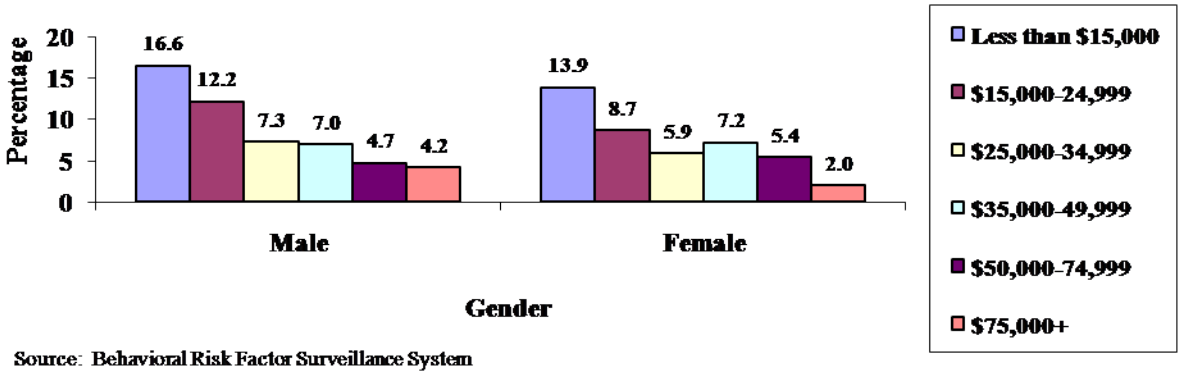
Figure 3.15: Prevalence of Angina/CHD Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

While there are no gender differences by income level, prevalence is highest among those who earn less than $15,000 per year for both genders.

Figure 3.16: Prevalence of Angina/CHD Among Adults by Gender and Income, 2007

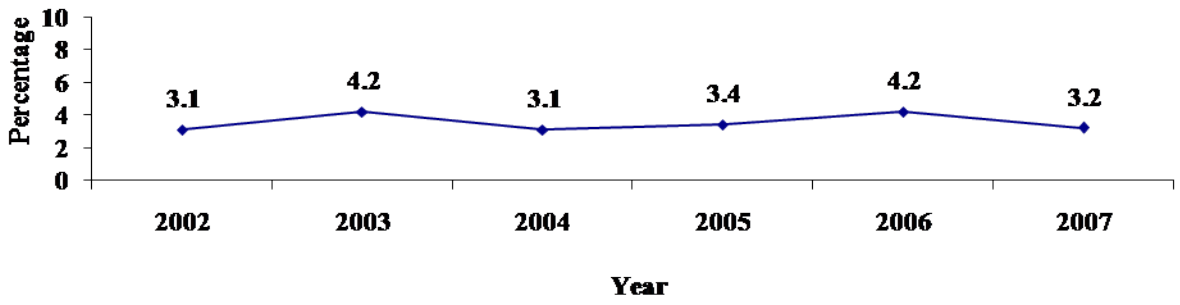


Source: Behavioral Risk Factor Surveillance System

The results indicate socioeconomic status influences in the prevalence of angina or coronary heart disease.

The prevalence of stroke in West Virginia is relatively low (3.2%) and has not changed over the past six years.

Figure 3.17: Prevalence of Stroke Among Adults

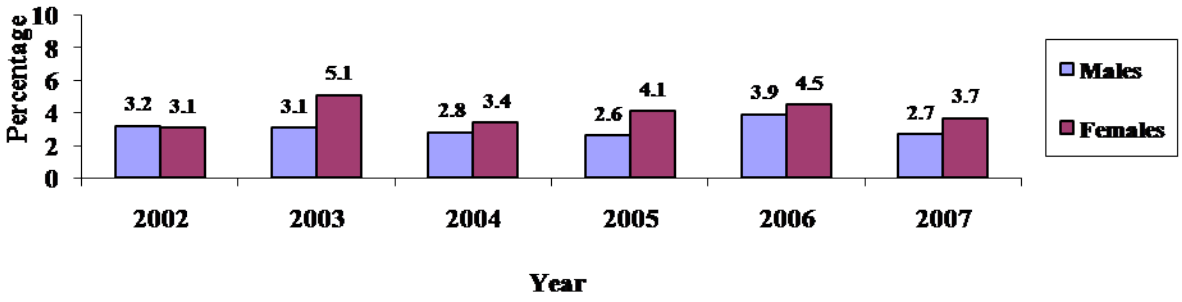


Source: Behavioral Risk Factor Surveillance System

There is no significant difference between the prevalence of stroke in West Virginia (3.2%, 95% CI: 2.7-3.7) and the U.S. (2.7%, 95% CI: 2.6-2.7). West Virginia ranks 9th highest for stroke prevalence in the U.S.

There are no significant gender differences in stroke prevalence. There are also no changes across time for either males or females.

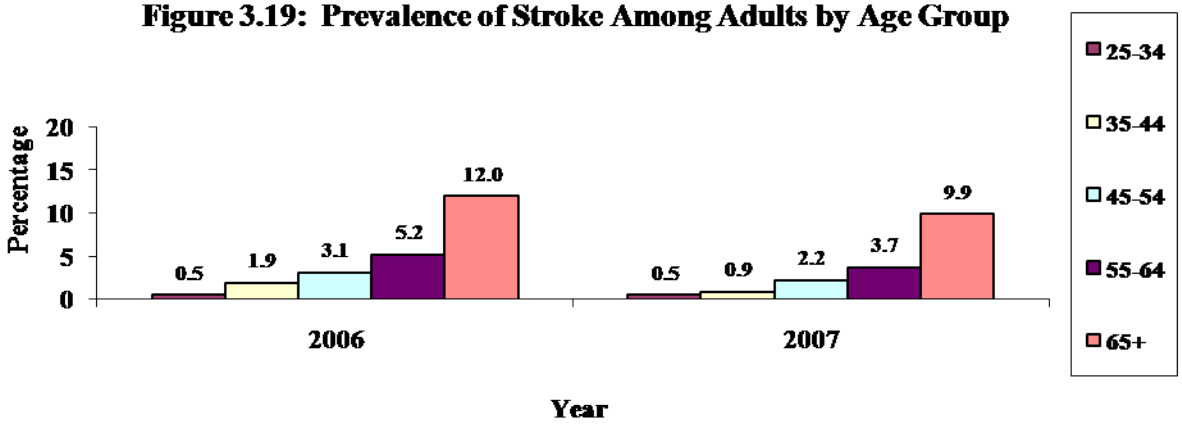
Figure 3.18: Prevalence of Stroke Among Adults by Gender



Source: Behavioral Risk Factor Surveillance System

Stroke prevalence is highest among adults aged 65 years or older. Significant differences are found between the 55-64 and 65+ age groups.

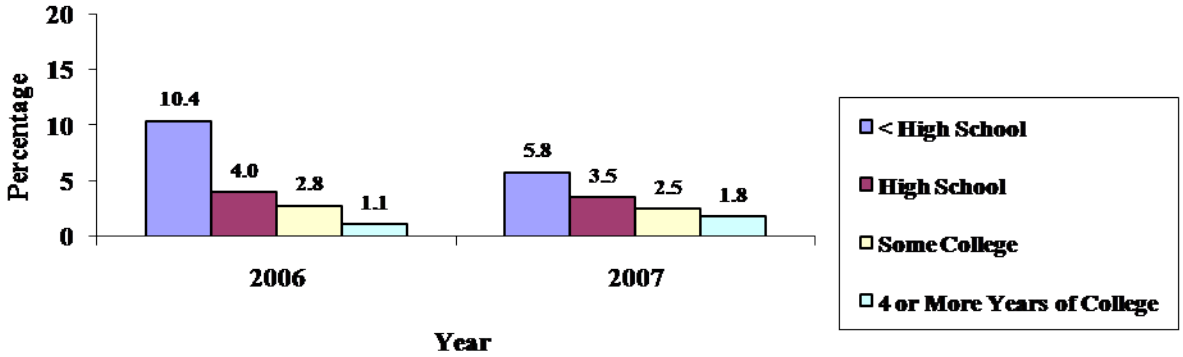
Figure 3.19: Prevalence of Stroke Among Adults by Age Group



Source: Behavioral Risk Factor Surveillance System

There are significant differences in stroke prevalence between those with less than a high school education and those with a high school diploma.

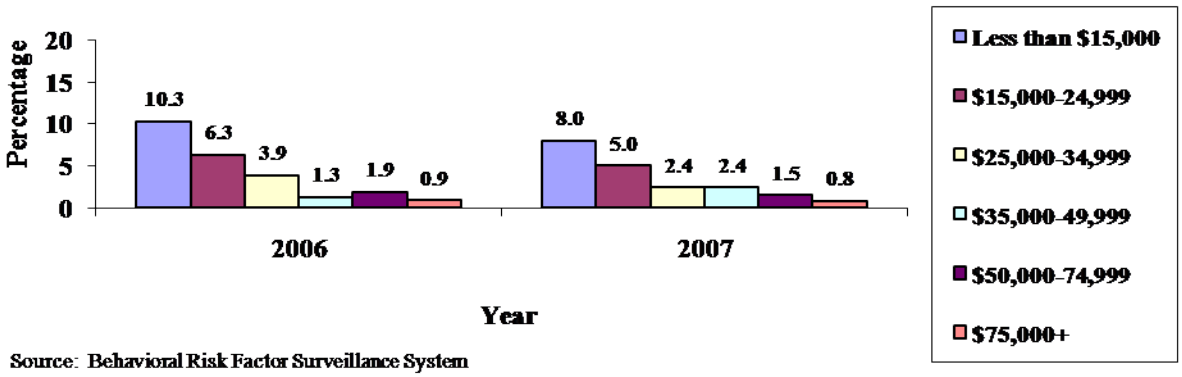
Figure 3.20: Prevalence of Stroke Among Adults by Education Level



Source: Behavioral Risk Factor Surveillance System

The prevalence of stroke is highest among those with annual incomes of less than $15,000. There is a significant difference between less than $15,000 and $75,000+ income brackets.

Figure 3.21: Prevalence of Stroke Among Adults by Income

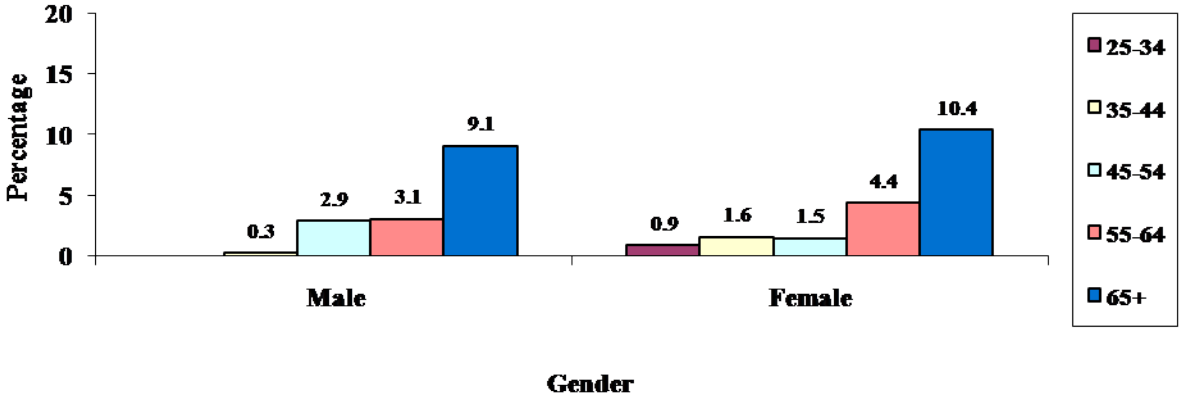


Source: Behavioral Risk Factor Surveillance System

Although there are no gender differences in stroke prevalence, the results below are presented to aid strategic planning.

While there is no gender difference for the age groups, there are age differences for each gender. There is a significant difference between the 55-64 and 65+ age groups for males. There are significant differences between the 45-54, 55-64, and 65+ age groups for females.

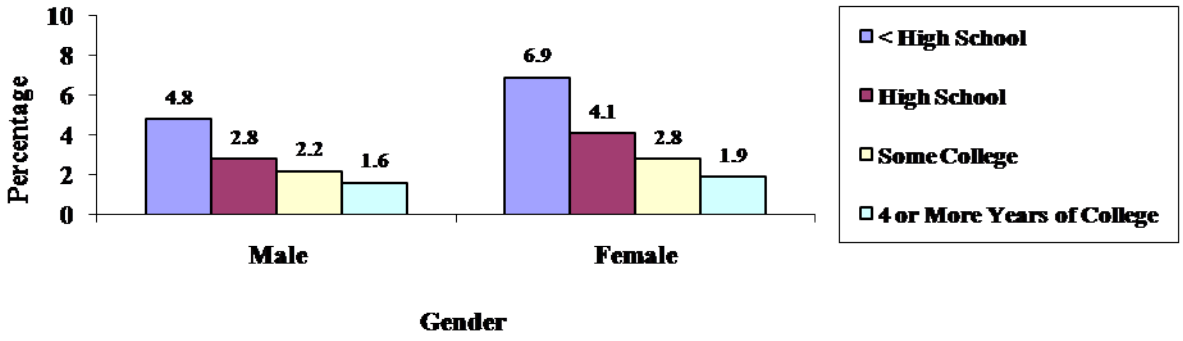
Figure 3.22: Prevalence of Stroke Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

There is no gender difference for education level. There is no significant difference in education level for males. There is a significant difference between less than high school and college education for females as well as a significant difference between less than high school and some college.

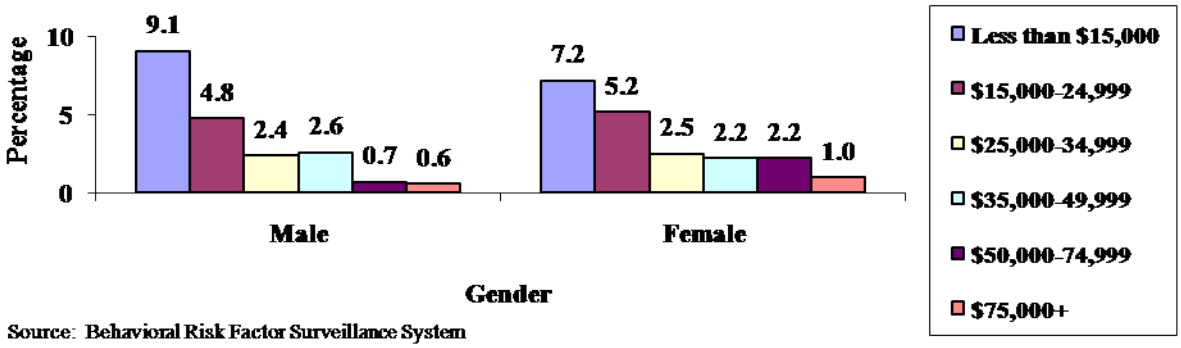
Figure 3.23: Prevalence of Stroke Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

Figure 3.24 shows no gender differences for income groups, however, there are significant differences between the highest and lowest income brackets for both males and females.

Figure 3.24: Prevalence of Stroke Among Adults by Gender and Income, 2007



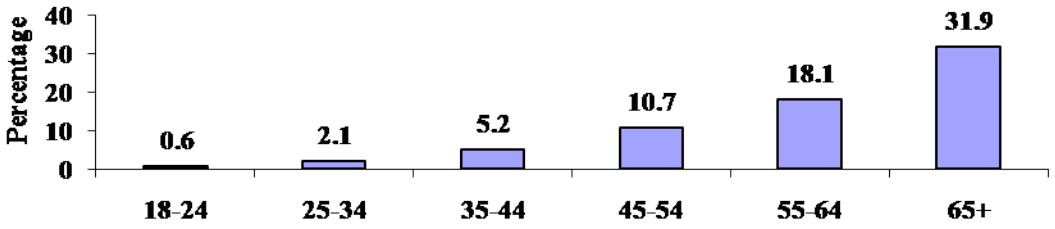
Source: Behavioral Risk Factor Surveillance System

Overall, these results indicate that socioeconomic status is an important factor in the prevalence of heart attack, coronary heart disease, and stroke.

The data were also analyzed for those diagnosed with any cardiovascular disease (heart attack, CHD, or stroke). The results indicate that 12.6% of West Virginia adults have been diagnosed with some type of cardiovascular disease. There are no significant gender differences in cardiovascular disease prevalence (males 13.0%, females 12.2%). There is a significant difference between the West Virginia rate of 12.6% (95% CI: 11.6-13.6) and the U.S. prevalence of 8.1% (95% CI: 8.0-8.3). West Virginia has the highest rate of cardiovascular disease in the nation (among all states, territories, and D.C.).

Figure 3.25 shows that the prevalence of cardiovascular disease is highest among those aged 65 years and older. There are significant differences between the 45-54, 55-64 and 65+ age groups.

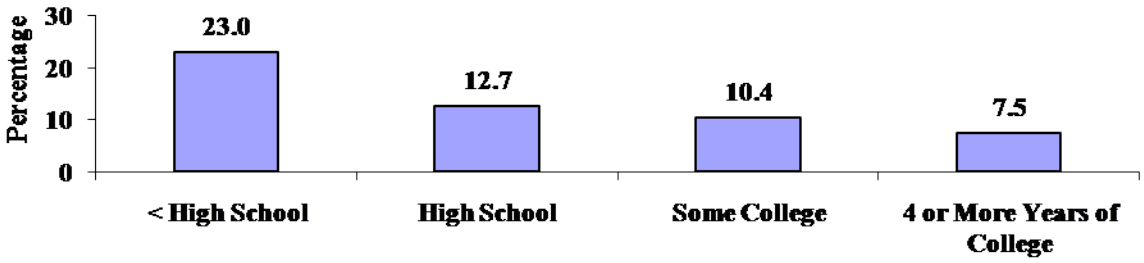
Figure 3.25: Prevalence of Cardiovascular Disease Among Adults by Age Group, 2007



Source: Behavioral Risk Factor Surveillance System

There is a significant difference between CVD prevalence among those with less than a high school education and those with a high school diploma as well as a significant difference between college educated individuals and those with a high school education and those with less than a high school education.

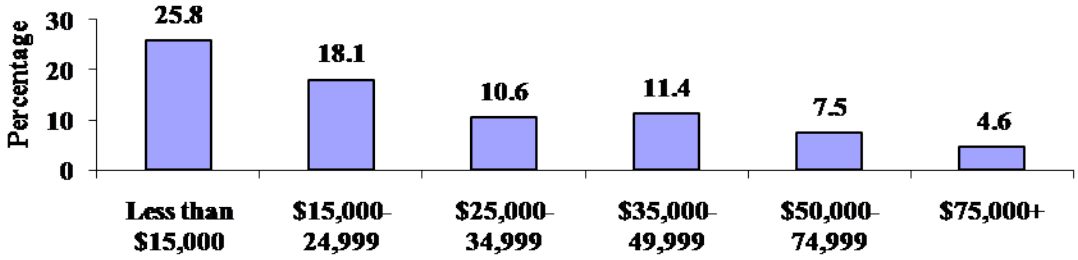
Figure 3.26: Prevalence of Cardiovascular Disease Among Adults by Education Level, 2007



Source: Behavioral Risk Factor Surveillance System

There is also a significant difference in CVD prevalence for income. More than one in four who earn less than $15,000 per year have cardiovascular disease.

Figure 3.27: Prevalence of Cardiovascular Disease Among Adults by Income, 2007

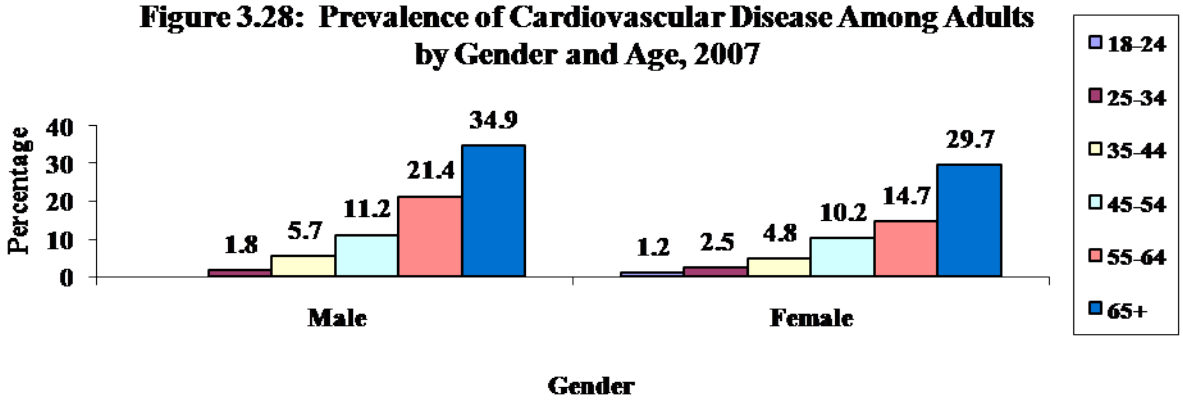


Source: Behavioral Risk Factor Surveillance System

Although there are no gender differences in cardiovascular disease, the results below are presented to aid with strategic planning.

There are no significant gender differences in CVD prevalence for any age groups. However, there are significant age differences when examining males and females separately. For males, there are significant differences in CVD prevalence between the 45-54, 55-64, and 65+ age groups. For females, there is a significant difference in CVD prevalence between the 55-64 and 65+ age groups.

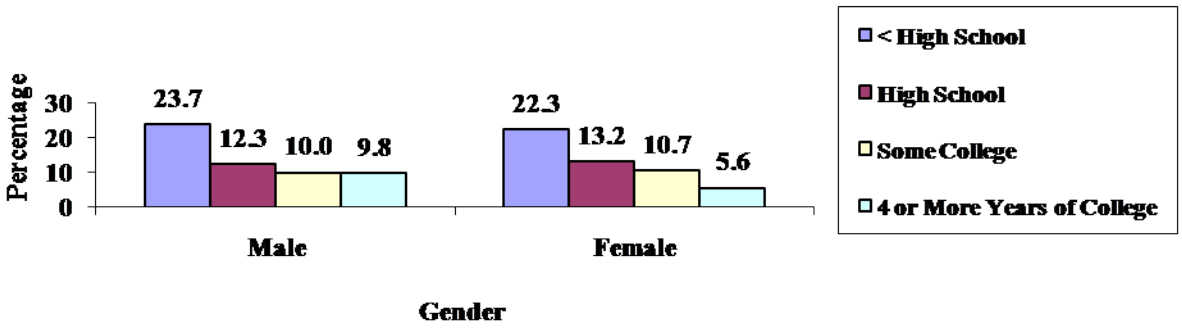
Figure 3.28: Prevalence of Cardiovascular Disease Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

While there is no gender difference in CVD prevalence for education level, there are significant education differences in CVD prevalence between those with less than a high school education and those with a college education for both males and females.

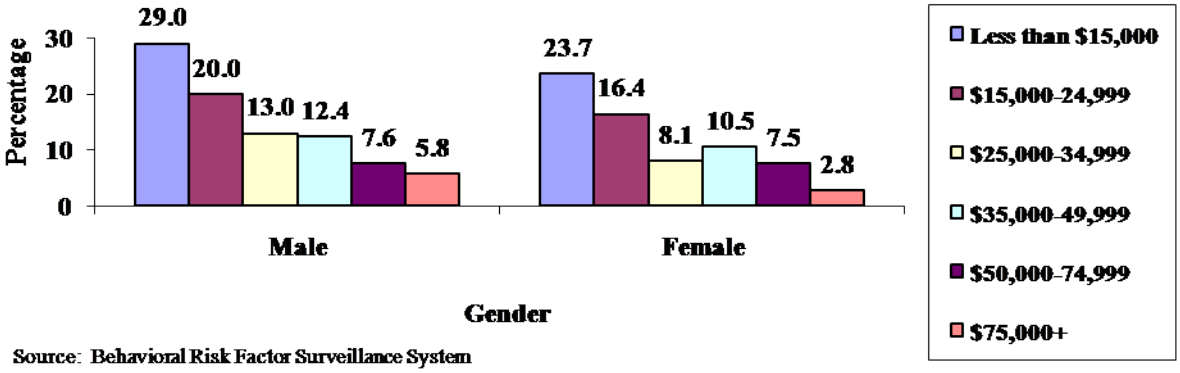
Figure 3.29: Prevalence of Cardiovascular Disease Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

There is no gender difference in CVD prevalence by income level, however, there are similar income difference patterns in CVD prevalence for men and women.

Figure 3.30: Prevalence of Cardiovascular Disease Among Adults by Gender and Income, 2007

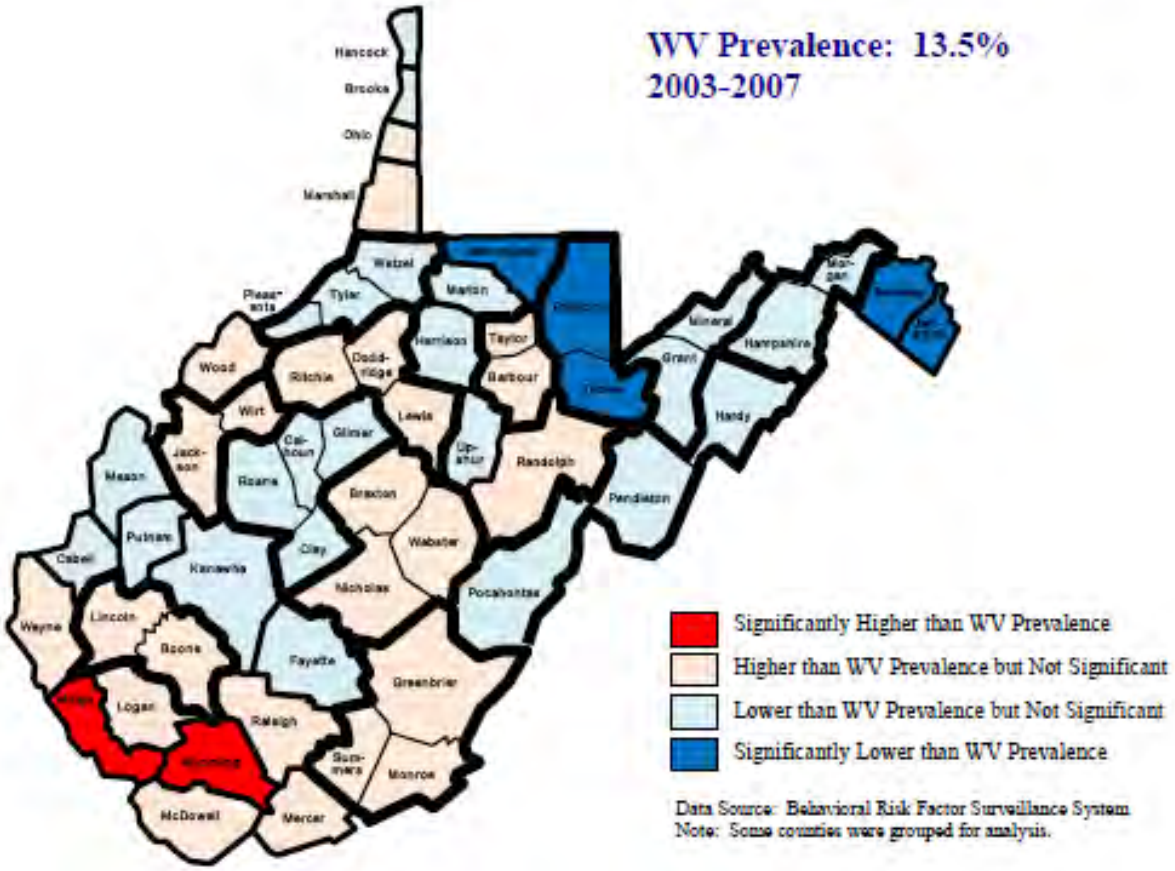


Source: Behavioral Risk Factor Surveillance System

Again, socioeconomic status appears to be a significant factor in cardiovascular disease prevalence.

Geographic disparities in the prevalence of cardiovascular disease were also examined. Figure 3.31 indicates that two southern counties (Mingo and Wyoming) have significantly higher prevalence of cardiovascular disease than West Virginia as a whole. As with the prevalence of hypertension and high cholesterol, the area of the state with significantly lower prevalence of cardiovascular disease than the state prevalence is the northern and eastern panhandle areas. The counties with the lowest prevalence of cardiovascular disease are Monongalia, Preston, Tucker, Berkeley, and Jefferson counties.

Figure 3.31: Prevalence of Cardiovascular Disease by County



Disease and Risk Factor Management

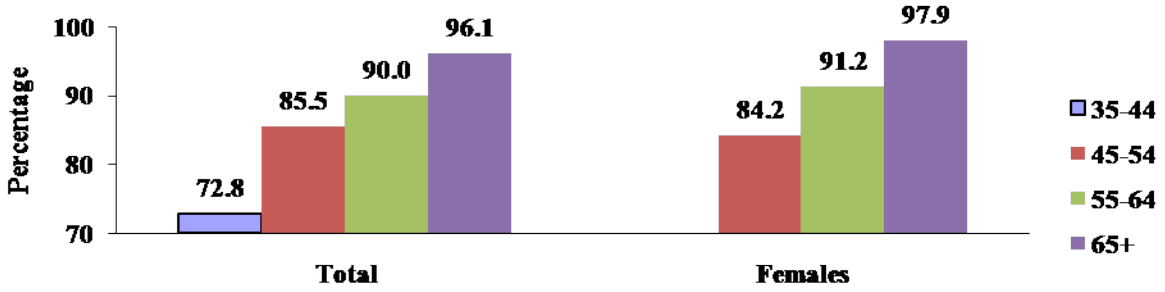
It is important for people with hypertension, high cholesterol, or cardiovascular disease to adequately manage these health problems in order to prevent further deterioration of health and prevent disability. Disease management includes rehabilitation after a heart attack or stroke, hypertension management, and controlling other risk factors.

One important aspect of cardiovascular disease management is completing rehabilitation after a heart attack or stroke. In 2007, only 29.0% of those who had a heart attack reported participating in rehabilitation (32.5% of males and 23.6% of females). Similarly, only 25.5% of those who had suffered a stroke participated in rehabilitation (30.8% of males and 22.0% of females).

An important aspect of disease management for hypertension is taking medication. Approximately 84.8% of those with hypertension report taking medication to control their blood pressure. A slightly higher proportion of women with hypertension take medication (86.9%) than men (82.7%) however this is not a significant difference.

There are age related differences in hypertension medication use with compliance being highest among those aged 65 years and older. However, this age difference in hypertension medication use is seen only among females.

Figure 4.1: Hypertension Med Use Among Adults by Age Group, 2007



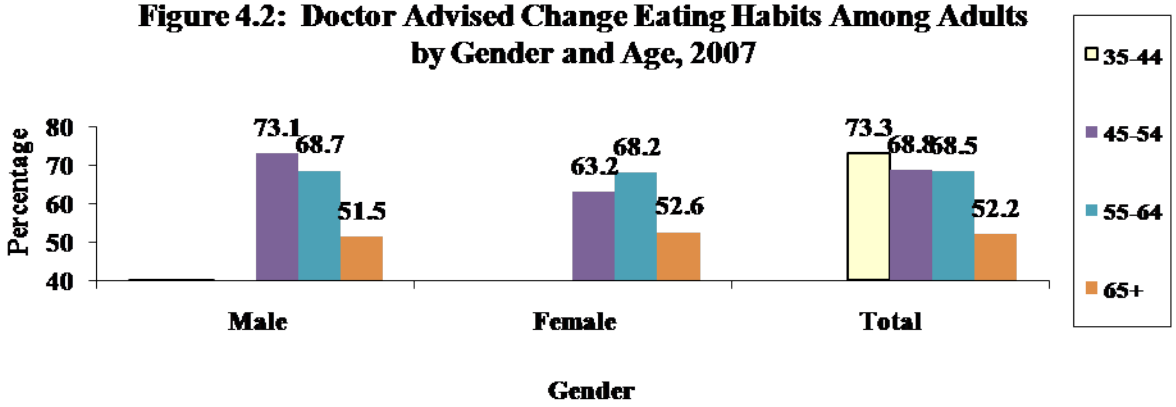
Source: Behavioral Risk Factor Surveillance System

The use of hypertension medication in West Virginia (84.8%, 95% CI: 82.4-87.2) is significantly higher than the U.S. prevalence of 78.9% (95% CI: 78.4-79.5). West Virginia ranks 3rd in the nation in hypertension medication use.

Persons with hypertension are also advised by doctors to change certain behaviors or habits in order to better manage their disease including changing eating habits, using medication, decreasing salt and alcohol intake, and increasing exercise. In West Virginia, a vast majority (96.4%) of adults with hypertension report that their doctors advise at least one of these behavior changes.

Approximately 63.4% of adults with hypertension reported that their doctor advised them to change their eating habits (65.9% of males and 60.8% of females). While there is no gender difference in these recommendations, there is an age difference. Doctors appear to recommend changes in diet to younger hypertension patients.

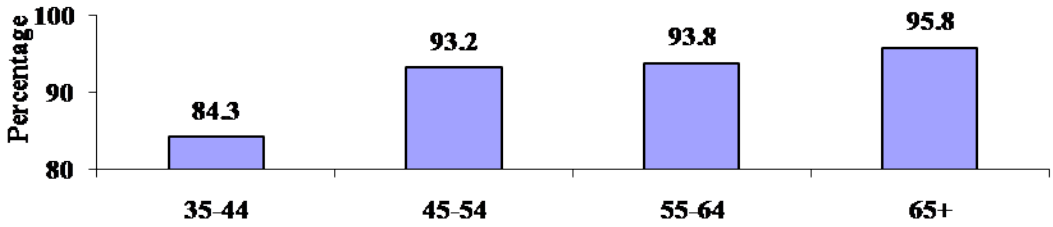
Figure 4.2: Doctor Advised Change Eating Habits Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

Doctors also seem to recommend the use of hypertension medication for their patients (90.2%). While there is no gender difference in this recommendation (88.6% of males and 91.8% of females) the recommendation does seem to be related to the age of the patient. Patients over the age of 45 are advised to take medication more often than those younger than age 45.

Figure 4.3: Doctor Advised Take Meds to Lower Blood Pressure Among Adults by Age Group, 2007



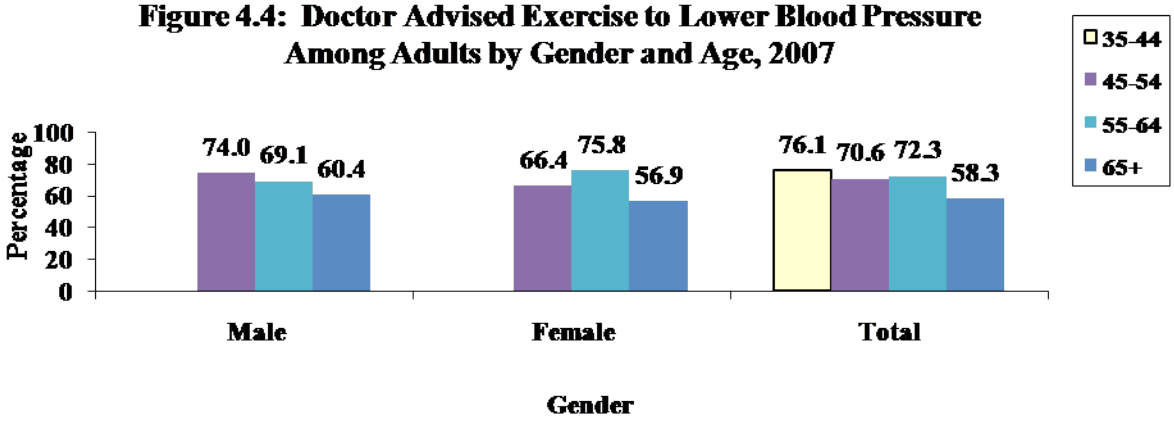
Source: Behavioral Risk Factor Surveillance System

Adults with hypertension also report that their doctor advised them to decrease their salt and alcohol intake. Approximately 69.5% of hypertension patients reported their doctor advised them to lower their salt intake, but there was no significant gender difference in this recommendation (males: 70.0%, females: 68.9%). Fewer hypertension patients report that their doctor advised them to decrease alcohol intake (45.8%). While a higher proportion of males (50.5%) stated their doctor made this recommendation than females (37.2%) this difference is not statistically significant.

A majority of adults with hypertension (67.0%) reported that their doctor recommended they should increase exercise to control their high blood pressure (67.9% of males and 66.1% of females). Interestingly, there appears to be age, education, and income differences in this recommendation.

Overall, fewer adults with hypertension over the age of 65 (58.3%) reported that their doctor recommended exercise than those aged 35-64. It also appears that this pattern is true only for women with significant differences between the 55-64 and 65+ age groups. There are no age related differences regarding the recommendation for men.

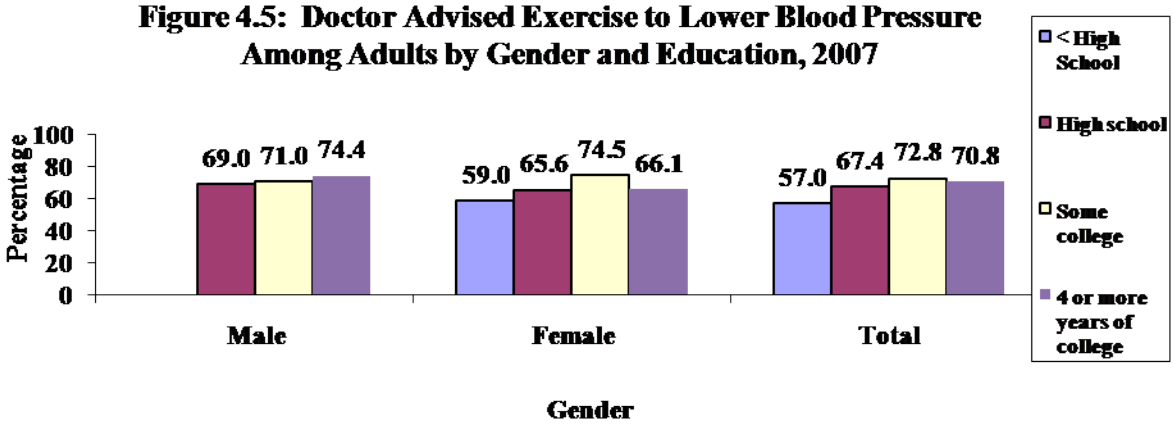
Figure 4.4: Doctor Advised Exercise to Lower Blood Pressure Among Adults by Gender and Age, 2007



Source: Behavioral Risk Factor Surveillance System

Overall, there is a significant difference in doctor advice for exercise between those with less than a high school education and those with a high school or college education. While this pattern does not hold for males, there is a significant difference between those with less than a high school education and those with some college education among women.

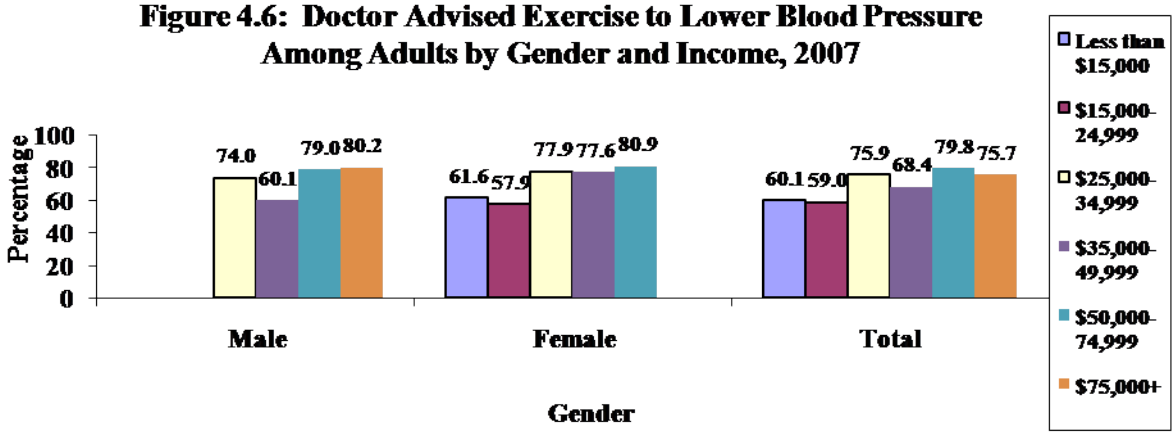
Figure 4.5: Doctor Advised Exercise to Lower Blood Pressure Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

Overall, there are significant income differences for exercise advice between the highest and lowest income brackets. This pattern is similar for females. For males, the only significant difference is between the middle and high income brackets.

Figure 4.6: Doctor Advised Exercise to Lower Blood Pressure Among Adults by Gender and Income, 2007

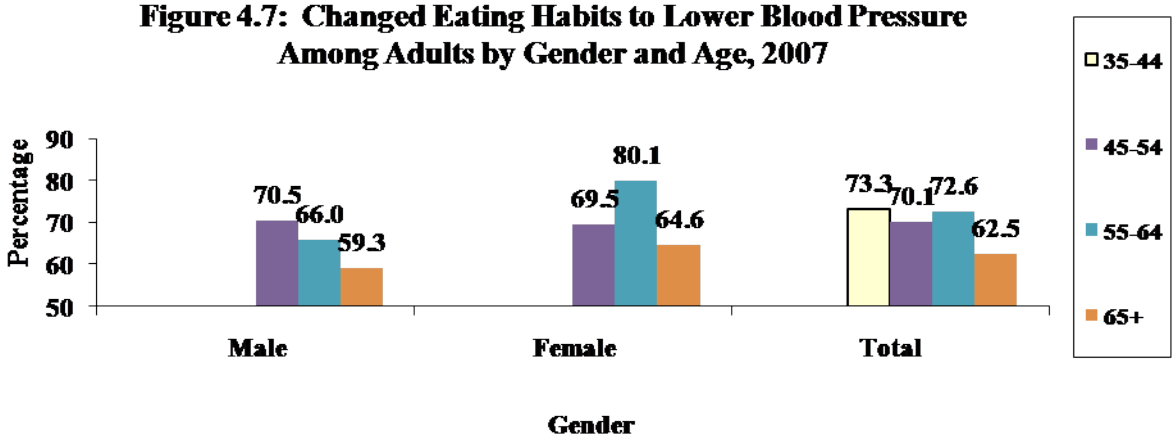


Source: Behavioral Risk Factor Surveillance System

Adults with hypertension also appear to heed their doctor recommendations and actually change their behavior in order to manage their hypertension. Approximately 97% of adults with hypertension reported they changed some aspect of their behavior in order to lower their high blood pressure.

As stated previously, 63.4% of adults with hypertension reported that their doctor advised them to change their eating habits in order to control the disease. When asked about their own behavior change related to diet, 67.5% of adults with hypertension reported that they had changed their eating habits in order to lower their blood pressure. There is no gender difference (males: 65.3%, females: 69.7%). However, there does appear to be an age related difference regarding this behavior change. A larger proportion of younger people changed their eating habits than people aged 65 and older. There is no significant difference for men. For women, there is a significant difference between the 55-64 and 65+ age groups.

Figure 4.7: Changed Eating Habits to Lower Blood Pressure Among Adults by Gender and Age, 2007



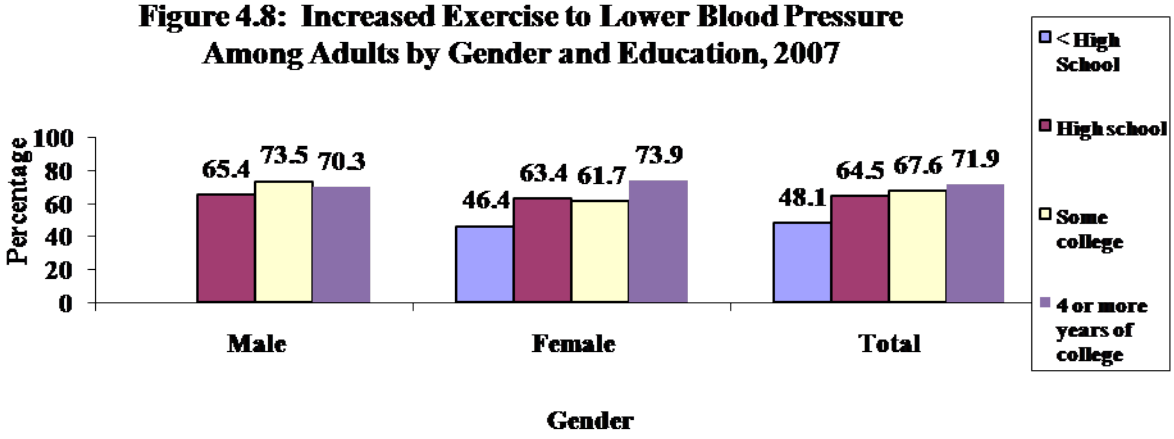
Source: Behavioral Risk Factor Surveillance System

While 69.5% of adults with hypertension reported that their doctor recommended a decrease in salt intake, 77.3% reported that they did decrease salt intake (males: 76.0%, females: 78.5%). Also, 51.1% reduced their alcohol intake (males: 49.4%, females: 54.9%).

Approximately 67% of adults with hypertension reported that their doctor recommended exercise, 63.2% actually increased their exercise level in order to manage their hypertension (males: 65.3%, females: 61.0%). There also appears to be education and income related differences for this behavior change.

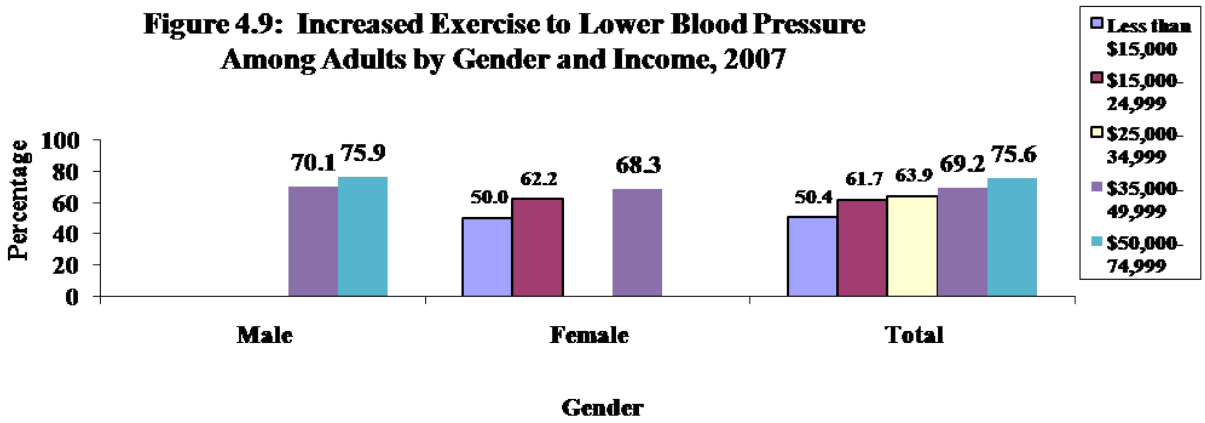
Nearly 72% of those with a college education increased exercise while only 48.1% of those with less than a high school education reported that they increased their exercise levels. Even greater differences were found for women with 74% of those with a college education reporting increased exercise and only 46.4% women with less than a high school education. There is no difference for men.

Figure 4.8: Increased Exercise to Lower Blood Pressure Among Adults by Gender and Education, 2007



Source: Behavioral Risk Factor Surveillance System

Overall, there are income differences for increased exercise between the lowest and highest income brackets. For women, there is a significant difference in exercise between the low and middle income brackets. There is no income difference for males.

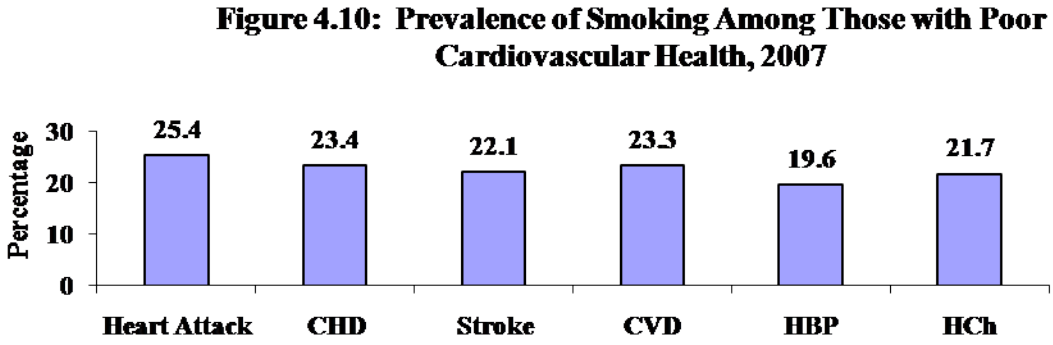


Source: Behavioral Risk Factor Surveillance System

As stated previously, overall 97% of adults in West Virginia with hypertension took some kind of action or changed their behavior in some way in order to lower their blood pressure (95% CI: 95.8-98.2). This is significantly higher than the U.S. prevalence of 84% (95% CI: 83.5-84.5) and ranks us at sixth in the nation.

Another important factor for persons diagnosed with high cholesterol, hypertension, or cardiovascular disease is risk factor management. Continuing to smoke, eat unhealthy diets, and not getting enough exercise may lead to poor health outcomes for those with poor cardiovascular health. The following graphs show the prevalence of each of these habits among those with heart attack, CHD, stroke, any CVD, high blood pressure, and high cholesterol.

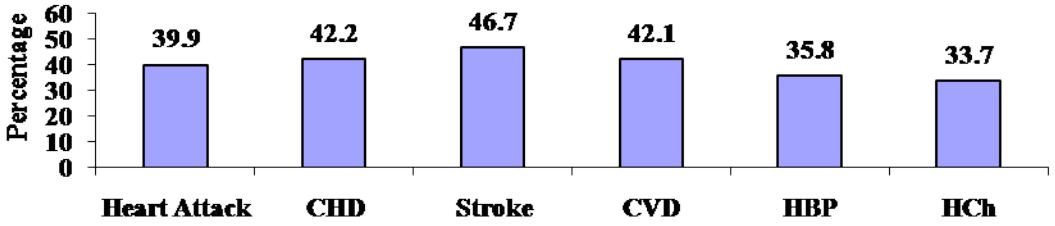
The prevalence of smoking among the general population for 2007 was 26.9%. Only those with hypertension and high cholesterol had a lower prevalence of smoking than the general population. Those who have had a heart attack, CHD, or stroke have similar rates of smoking as the general population.



Source: Behavioral Risk Factor Surveillance System

The prevalence of physical inactivity among the general population for 2007 was 28.2%. Those with heart attack, CHD, stroke, cardiovascular disease, hypertension or high cholesterol have significantly higher prevalence of physical inactivity than the general population.

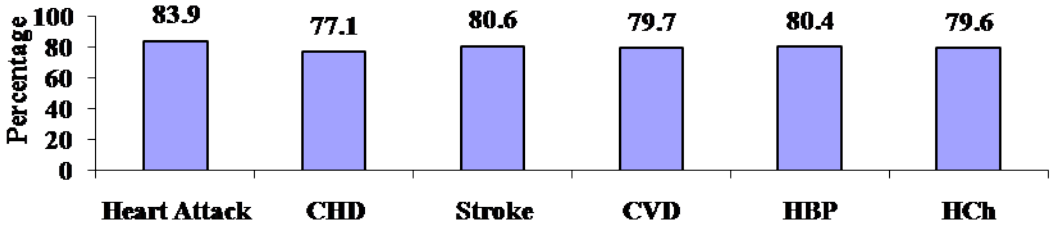
Figure 4.11: Prevalence of Physical Inactivity Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of inadequate fruit and vegetable intake among the general population for 2007 was 80.3%. There are no significant differences between those with poor cardiovascular health and the general population.

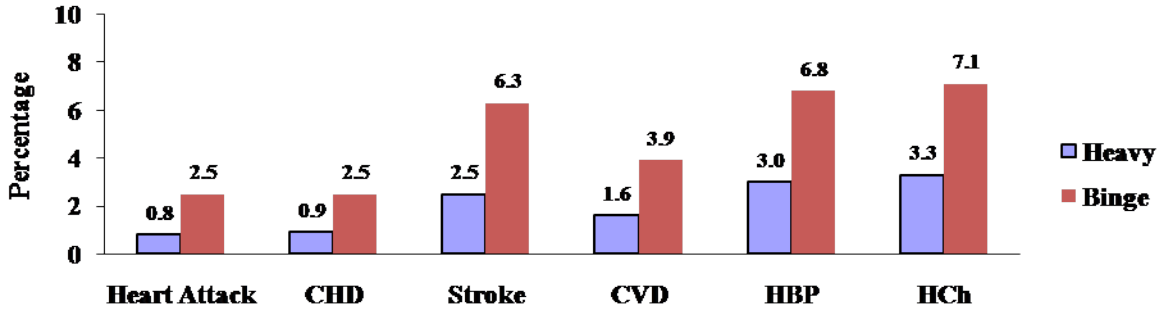
Figure 4.12: Prevalence of Inadequate Fruit and Vegetable Intake Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of heavy and binge drinking among the general population for 2007 was 3.3% and 9.8% respectively. The results indicate that those with heart attack or CHD have lower heavy drinking rates than the general population. Also, those with heart attack, CHD, or CVD have lower binge drinking rates than the general population.

Figure 4.13: Prevalence of Heavy and Binge Drinking Among Those with Poor Cardiovascular Health, 2007



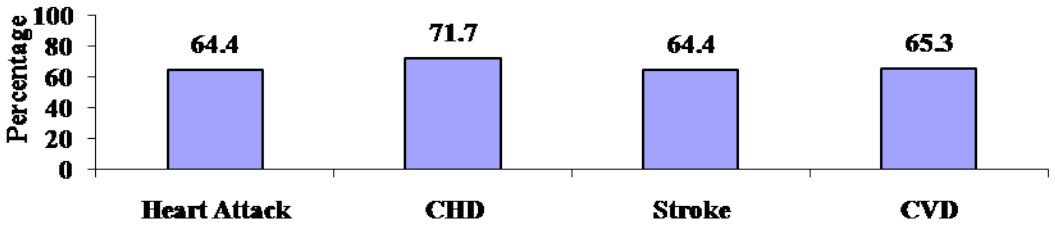
Source: Behavioral Risk Factor Surveillance System

Co-morbid Diseases

Because of the poor health of West Virginians and the rise in chronic disease across the nation, it is important to investigate the prevalence of multiple co-morbid diseases among the population. Figures 5.1 and 5.2 display the prevalence of hypertension and high cholesterol among those with heart attack, CHD, stroke, and any CVD.

The prevalence of hypertension among the general population for 2007 was 33.3%. Those with heart attack, CHD, stroke, or CVD have higher rates of hypertension than the general population.

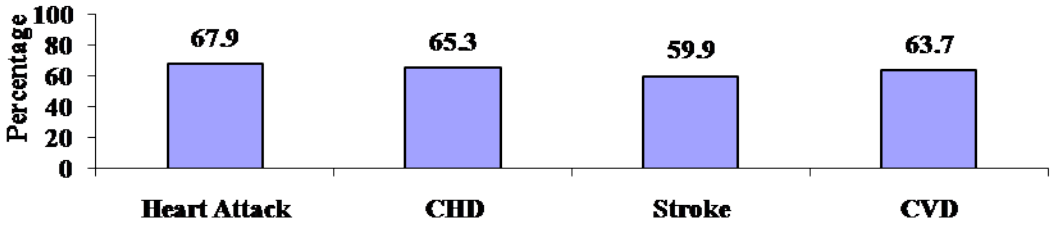
Figure 5.1: Prevalence of Hypertension Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of high cholesterol among the general population for 2007 was 42.4%. Similar to hypertension, those with heart attack, CHD, stroke, or CVD have higher rates of high cholesterol than the general population.

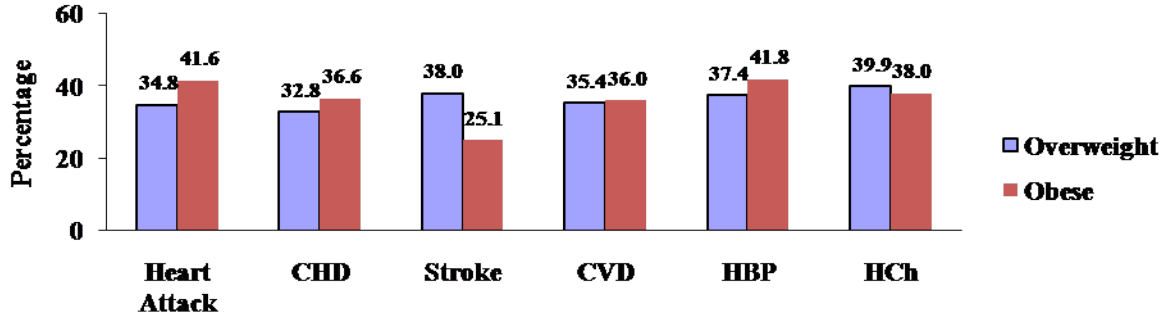
Figure 5.2: Prevalence of High Cholesterol Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of overweight and obesity among the general population for 2007 was 37.7% and 30.3%, respectively. There are no significant differences for overweight, however, those with heart attack, CVD, hypertension, or high cholesterol have higher rates of obesity than the general population.

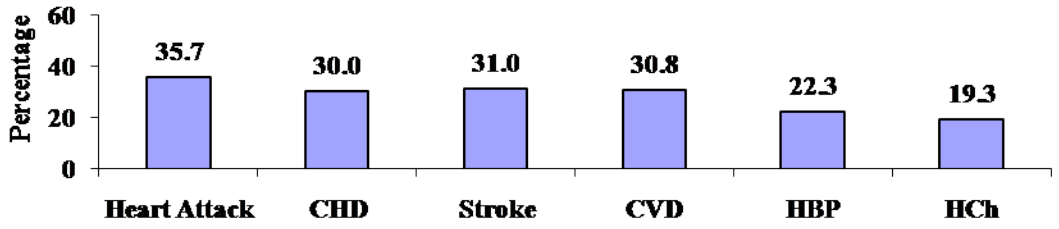
Figure 5.3: Prevalence of Overweight and Obesity Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of diabetes among the general population for 2007 was 10.8%. The prevalence of diabetes is significantly higher among those with poor cardiovascular health than in the general population.

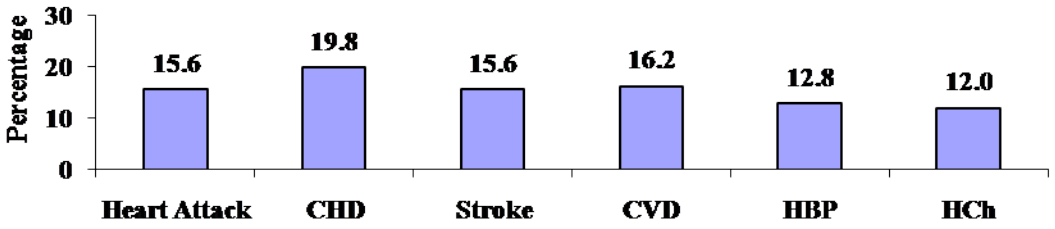
Figure 5.4: Prevalence of Diabetes Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of asthma among the general population for 2007 was 9.0%. The prevalence of asthma is higher for those with heart attack, CHD, CVD, hypertension, or high cholesterol than those in the general population.

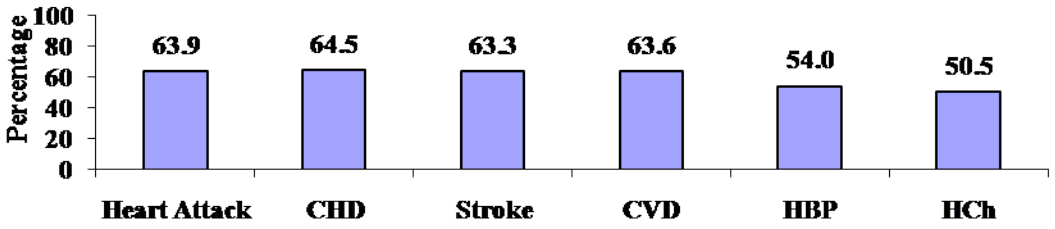
Figure 5.5: Prevalence of Asthma Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of arthritis among the general population for 2007 was 35.5%. The prevalence of arthritis is significantly higher among those with poor cardiovascular health than in the general population.

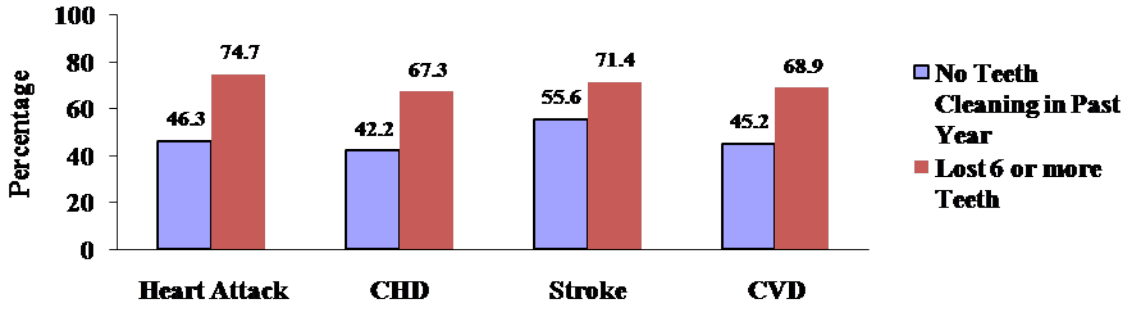
Figure 5.6: Prevalence of Arthritis Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of no teeth cleaning in past year and loss of six or more teeth among the general population for 2006 was 37.3% and 31.3% respectively. Those with stroke or CVD have higher rates of no teeth cleaning than adults in the general population. Also, all those with poor cardiovascular health have higher rates of missing teeth than those in the general population.

Figure 5.7: Prevalence of Poor Oral Health Among Those with Poor Cardiovascular Health, 2006



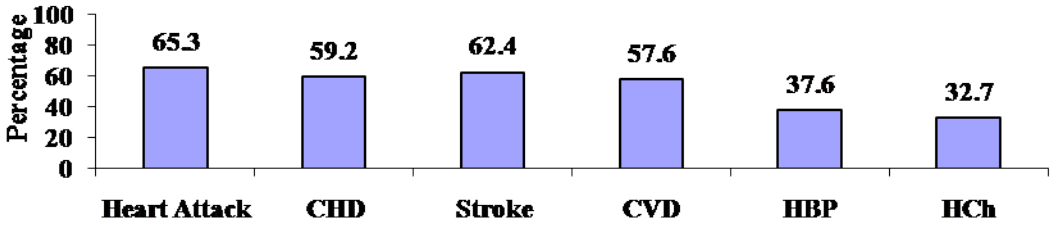
Source: Behavioral Risk Factor Surveillance System

Quality of Life

It is also important to examine quality of life issues among those with cardiovascular disease. The following graphs show the prevalence of quality of life factors among those with heart attack, CHD, stroke, any CVD, hypertension, and high cholesterol.

The prevalence of fair or poor health among the general population for 2007 was 21.6%. The results indicate that the prevalence of fair/poor health is significantly higher among those with poor cardiovascular health than in the general population.

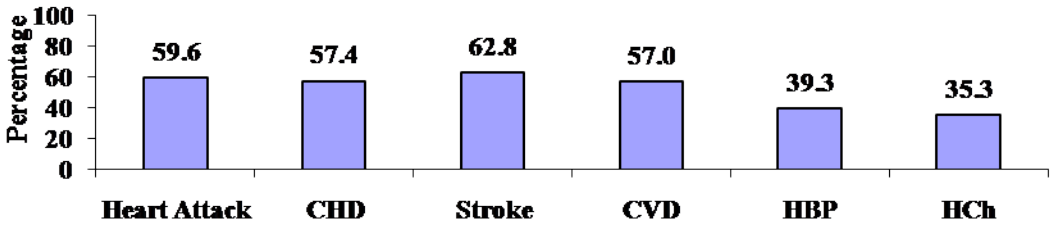
Figure 6.1: Prevalence of Fair/Poor Health Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of disability among the general population for 2007 was 25.9%. The prevalence of disability is significantly higher among those with poor cardiovascular health than those in the general population.

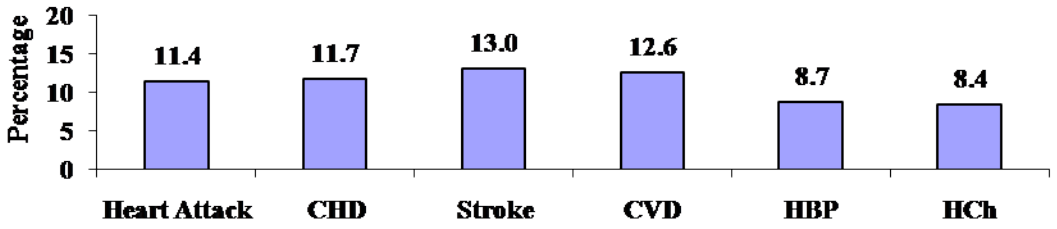
Figure 6.2: Prevalence of Disability Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of lack of emotional support among the general population for 2007 was 7.0%. Those with CHD, stroke, or CVD have higher rates of lack of emotional support than those in the general population.

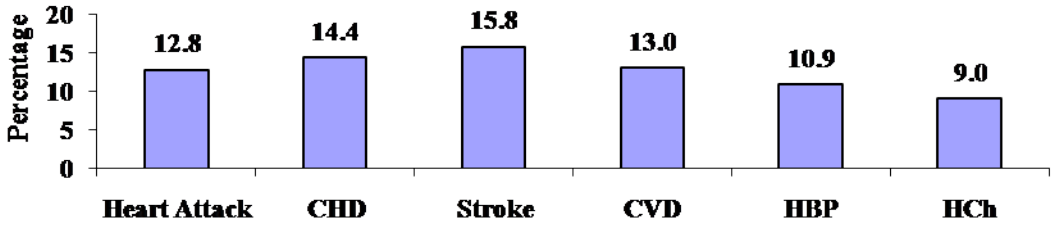
Figure 6.3: Lack of Emotional Support Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of lack of life satisfaction among the general population for 2007 was 7.8%. Those with CHD, stroke, CVD, or hypertension have higher rates of lack of life satisfaction than those in the general population.

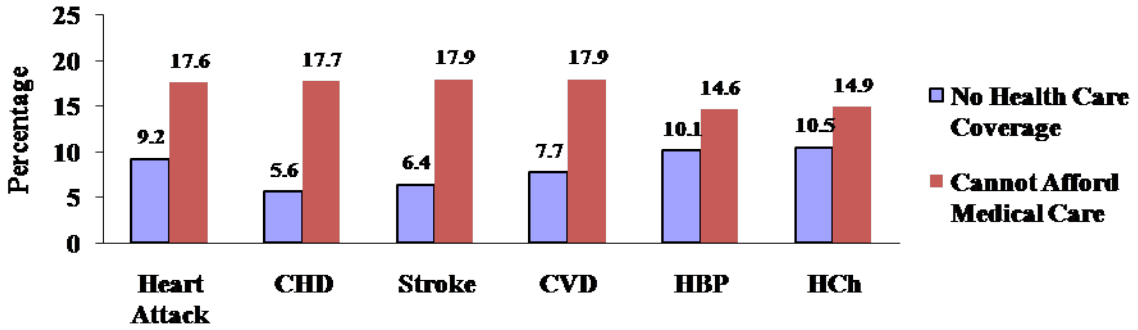
Figure 6.4: Lack of Life Satisfaction Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of no health care coverage among the general population for 2007 was 16.9%. The results indicate that those with CHD, stroke, CVD, hypertension, or high cholesterol have lower rates of no health care coverage then the general population. The prevalence of those who cannot afford medical care among the general population was 17.1% in 2007. There are no significant differences between those with poor cardiovascular health and the general population.

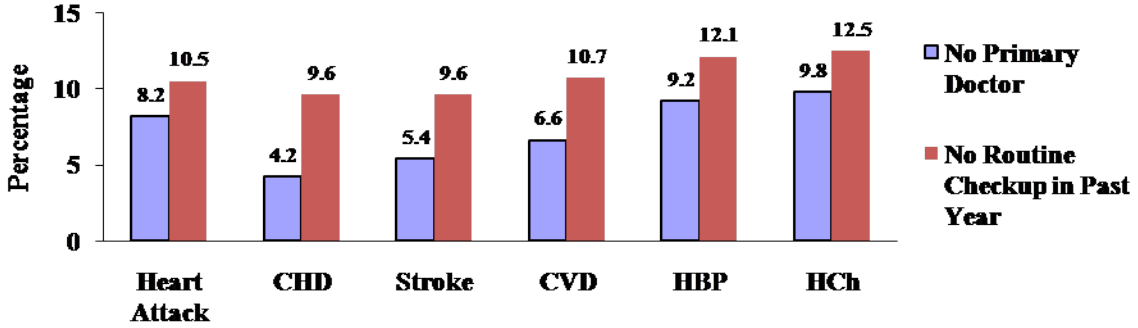
Figure 6.5: Health Care Access Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

The prevalence of no primary doctor and no routine checkup in past year among the general population for 2007 was 21.7% and 25.9% respectively. Figure 6.6 shows that those with poor cardiovascular health have lower rates of no primary doctor and no checkup than adults in the general population. These results indicate that cardiovascular patients are receiving medical care.

Figure 6.6: Medical Care Access Among Those with Poor Cardiovascular Health, 2007



Source: Behavioral Risk Factor Surveillance System

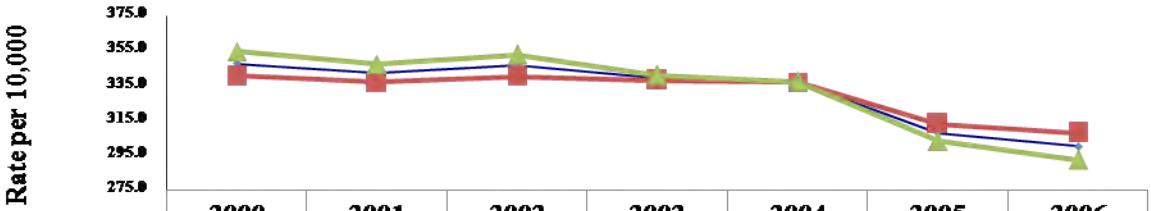
Chapter 7

Hospitalizations and Costs

In this chapter, the number of hospital discharges, charges for hospital stays, and hospitalization rates are presented for all diseases of the circulatory system (ICD-9 codes 390-459), heart disease (ICD-9 codes 390-398, 402, 404-429), and stroke (ICD-9 codes 430-434, 436-438). All data presented in this chapter are WV Health Care Authority UB-04 data.

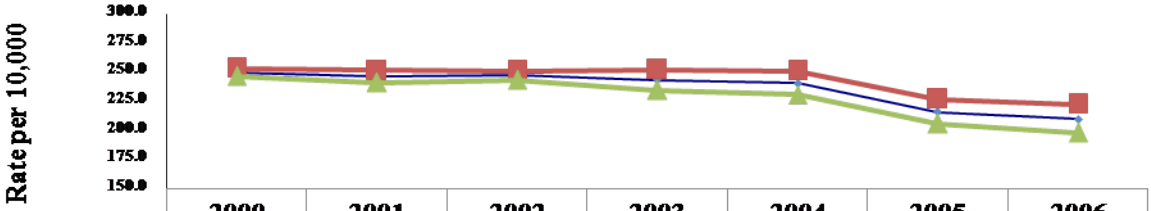
Hospitalization rates per 10,000 population are presented in Figures 7.1-7.3 below.

Figure 7.1: Hospitalization Rates for All Diseases of the Circulatory System



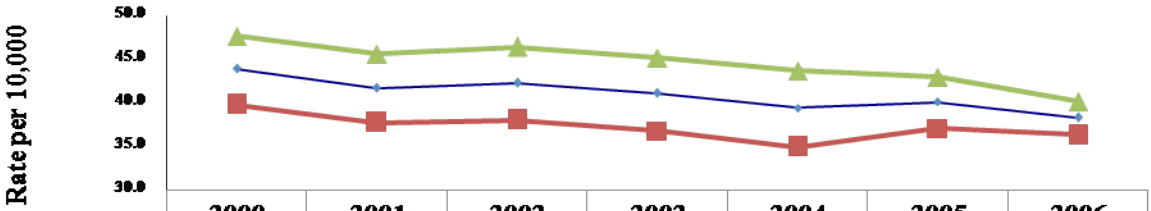
	2000	2001	2002	2003	2004	2005	2006
Total	347.7	342.1	346.7	339.4	337.2	307.9	299.9
Male	340.4	336.9	340.2	337.9	337.0	313.0	307.8
Female	354.6	347.1	352.8	340.8	337.4	303.0	292.3

Figure 7.2: Hospitalization Rates for Heart Diseases



	2000	2001	2002	2003	2004	2005	2006
Total	250.0	246.3	247.3	243.2	240.6	216.0	209.9
Male	253.4	251.4	251.3	252.4	250.9	226.7	222.4
Female	246.9	241.4	243.4	234.5	230.8	205.8	197.8

Figure 7.3: Hospitalization Rates for Stroke

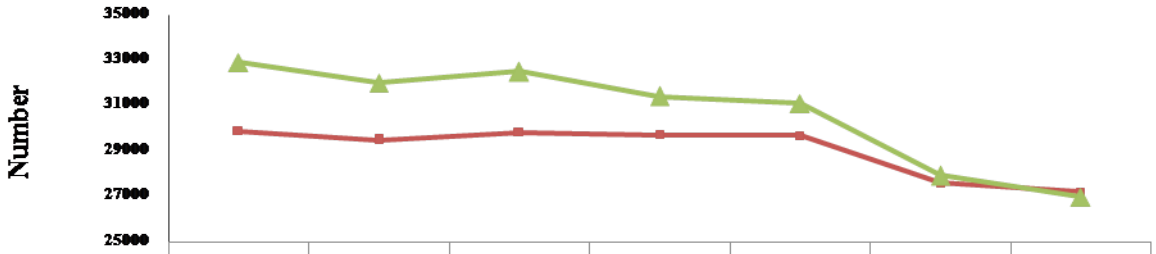


	2000	2001	2002	2003	2004	2005	2006
Total	43.9	41.7	42.3	41.1	39.4	40.1	38.3
Male	39.8	37.7	38.0	36.8	34.9	37.1	36.3
Female	47.7	45.6	46.4	45.2	43.7	43.0	40.2

Overall, hospitalization rates are decreasing for both men and women for total cardiovascular, heart disease, and stroke.

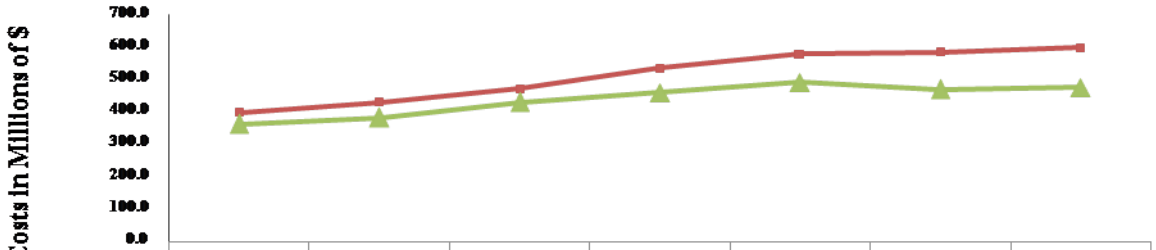
The number and total cost of hospital discharges for cardiovascular disease are presented in Figures 7.4 and 7.5.

Figure 7.4: Number of Hospitalizations for All Diseases of the Circulatory System by Gender



	2000	2001	2002	2003	2004	2005	2006
Male	29925	29510	29871	29754	29712	27636	27239
Female	32953	32034	32534	31447	31142	27955	27003

Figure 7.5: Total Cost of Hospitalizations for All Diseases of the Circulatory System by Gender



	2000	2001	2002	2003	2004	2005	2006
Male	399.3	431.3	473.0	536.2	579.2	586.2	598.4
Female	362.3	382.6	429.8	461.1	492.5	470.1	476.5

The number of hospital discharges for cardiovascular disease are decreasing for both men and women, however, the total costs associated with those hospitalizations are increasing.

The number and total cost of hospital discharges for heart disease are presented in Figures 7.6-7.7.

Figure 7.6: Number of Hospitalizations for Heart Disease by Gender

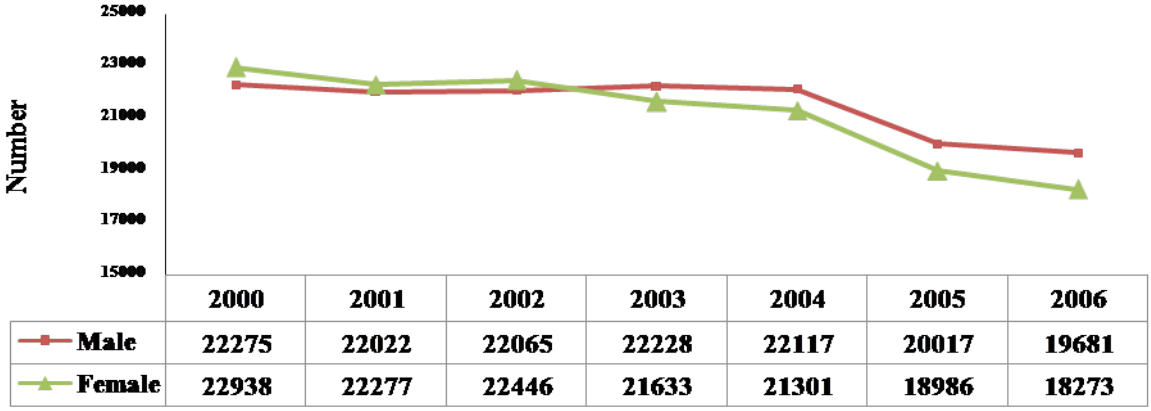
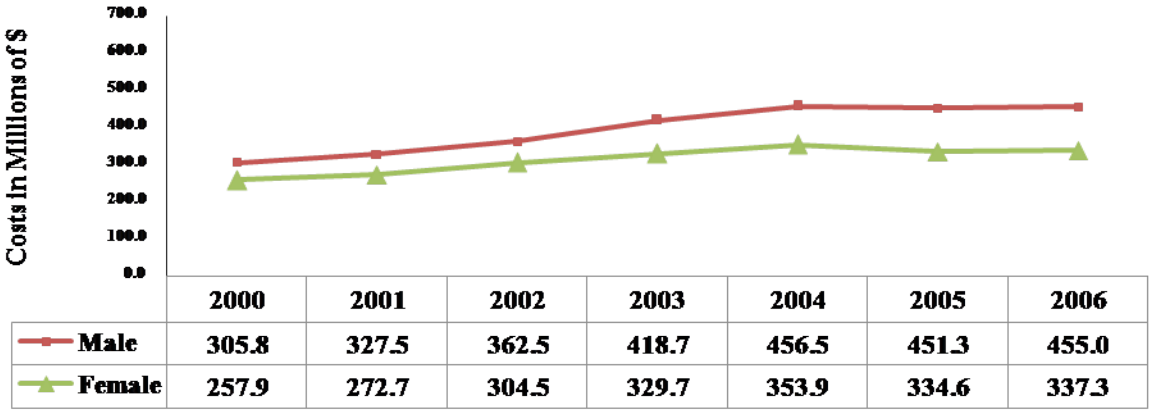


Figure 7.7: Total Cost of Hospitalizations for Heart Disease by Gender



While the number of hospital discharges for heart disease are decreasing for both men and women, the total costs associated with those hospitalizations are increasing.

The number and total cost of hospital discharges for stroke are presented in Figures 7.8 and 7.9.

Figure 7.8: Number of Hospitalizations for Stroke by Gender

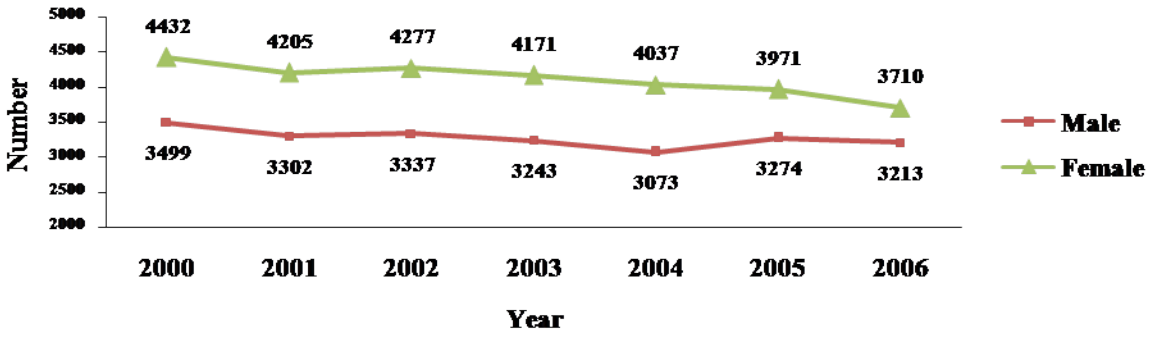
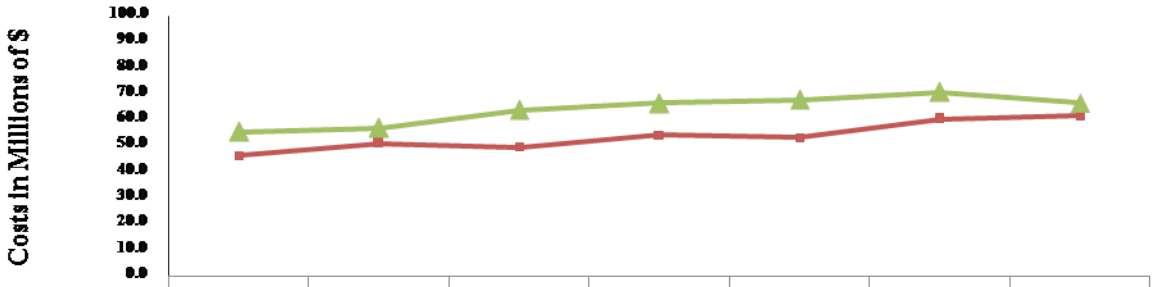


Figure 7.9: Total Cost of Hospitalizations for Stroke by Gender



	2000	2001	2002	2003	2004	2005	2006
Male	46.4	50.9	49.5	54.1	53.1	60.3	61.5
Female	55.5	56.9	63.8	66.4	67.7	70.6	66.6

While the number of hospital discharges for stroke are decreasing for both men and women, the total costs associated with those hospitalizations are increasing for men and appear to be leveling off for women.

An analysis of hospital discharges for cardiovascular disease, heart disease, and stroke by payor was also conducted. The results are presented in Figures 7.10-7.12.

Figure 7.10: Percent of Hospital Discharges for All Diseases of the Circulatory System by Payor, 2006

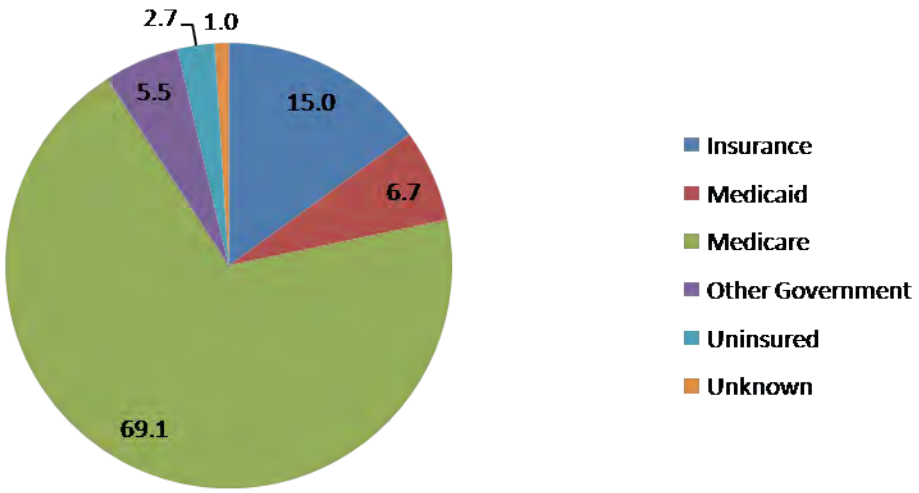


Figure 7.11: Percent of Hospital Discharges for Heart Disease by Payor, 2006

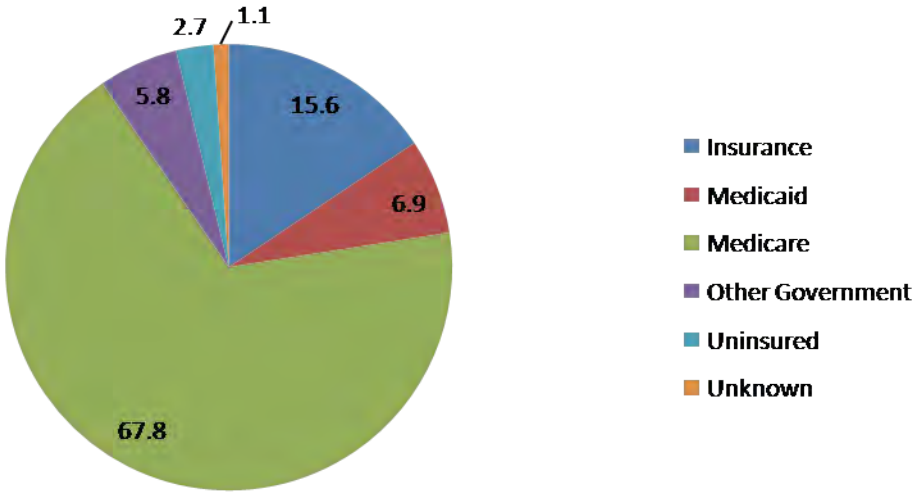
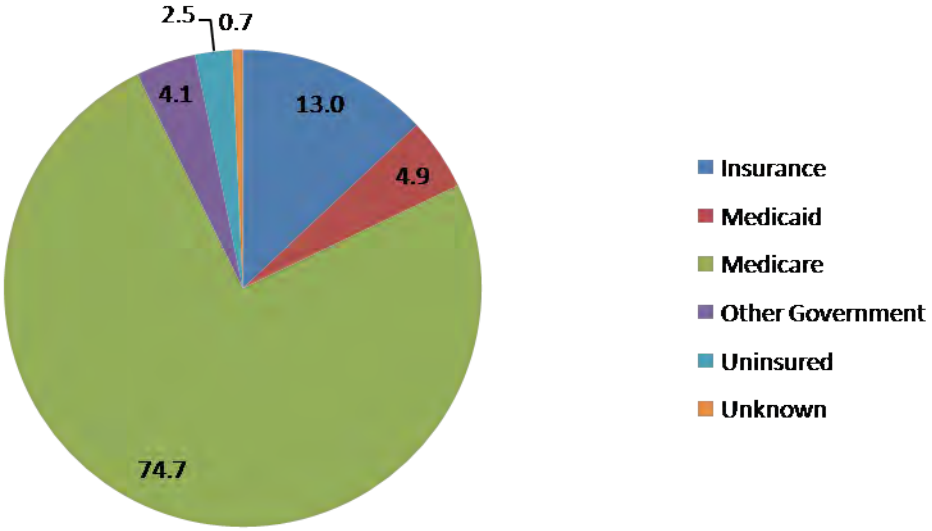


Figure 7.12: Percent of Hospital Discharges for Stroke by Payor, 2006



A majority of hospital stays for cardiovascular disease, heart disease, and stroke are paid for by Medicare.

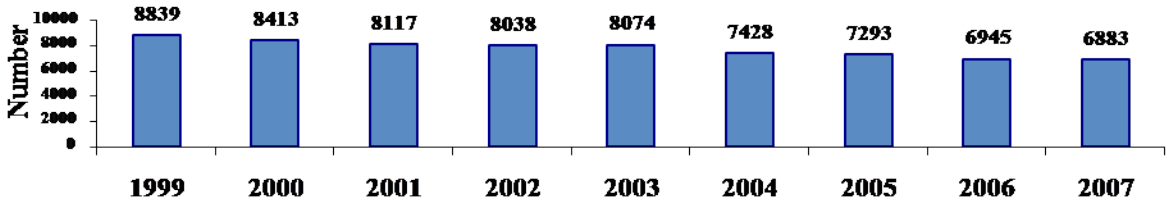
Chapter 8

Cardiovascular Disease Mortality

Mortality rates for death due to cardiovascular disease are presented for all diseases of the circulatory system (ICD-10 codes I00-I99), heart disease (ICD-10 codes I00-I09, I11, I13, I20-I51), acute myocardial infarction (ICD-10 codes I21-I22), coronary heart disease (ICD-10 codes I11, I20-I25), heart failure (ICD-10 code I50), and stroke (ICD-10 codes I60-I69).

As seen in Figure 8.1, the number of deaths due to all types of cardiovascular disease has been declining over the past decade. In 2007, there were a total of 6,883 deaths due to cardiovascular disease in West Virginia, almost 2,000 fewer deaths as compared to 1999 (a 22.1% decline).

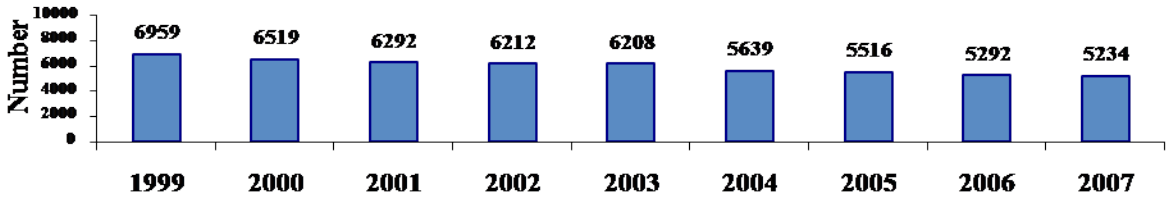
Figure 8.1: Number of All Cause Cardiovascular Disease Deaths per Year



Source: Health Statistics Center (HSC) Vital Records

In order to more fully understand the impact of cardiovascular diseases in West Virginia, mortality rates are also presented for specific cardiovascular diseases including heart disease, acute MI, coronary heart disease, heart failure, and stroke. As seen in Figure 8.2, the number of heart disease deaths in West Virginia has also been declining over the past decade. Approximately 1,700 fewer heart disease deaths occurred in 2007 as compared to 1999 (a 24.8% decline).

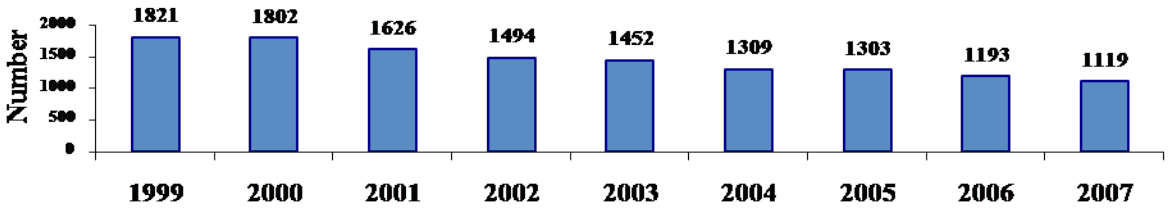
Figure 8.2: Number of Heart Disease Deaths per Year



Source: HSC Vital Records

The number of deaths resulting from acute myocardial infarction (MI) has steadily declined with approximately 700 fewer deaths occurring in 2007 as compared to 1999 (a 38.6% decline).

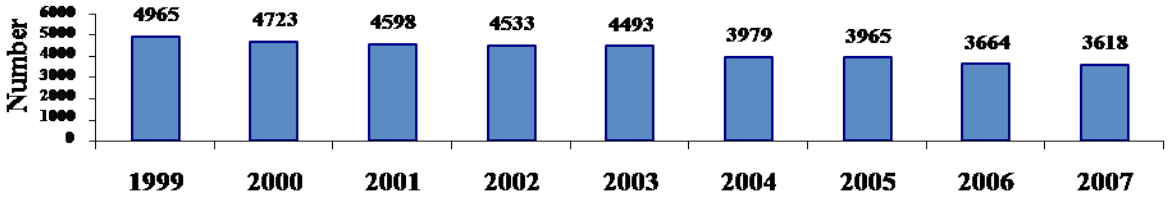
Figure 8.3: Number of Acute MI Deaths per Year



Source: HSC Vital Records

Deaths due to coronary heart disease have also declined resulting in about 1,350 fewer deaths between 1999 and 2007 (a 27.1% decline).

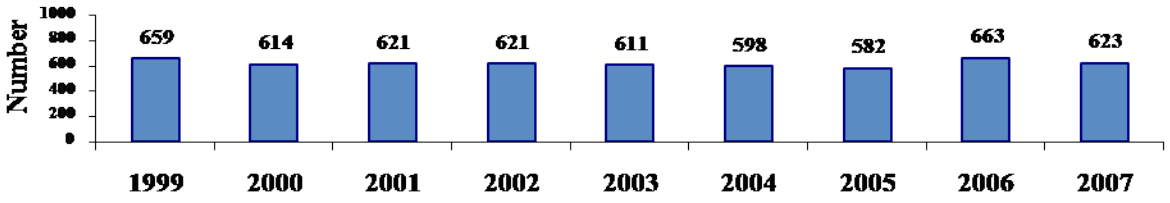
Figure 8.4: Number of Coronary Heart Disease Deaths per Year



Source: HSC Vital Records

The number of deaths due to heart failure has remained relatively stable over the past decade.

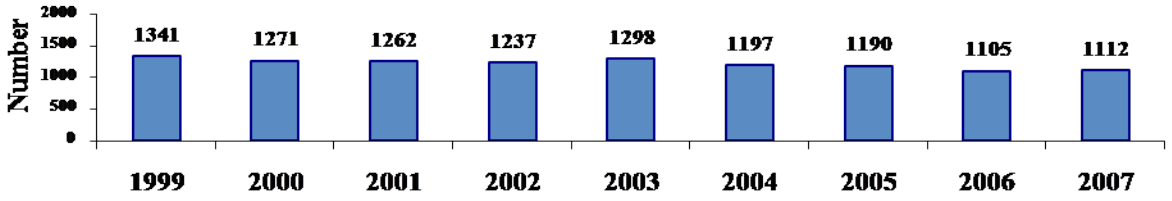
Figure 8.5: Number of Heart Failure Deaths per Year



Source: HSC Vital Records

The number of stroke related deaths has declined slightly over the past decade with about 200 fewer deaths in 2007 as compared to 1999 (a 17.1% decline).

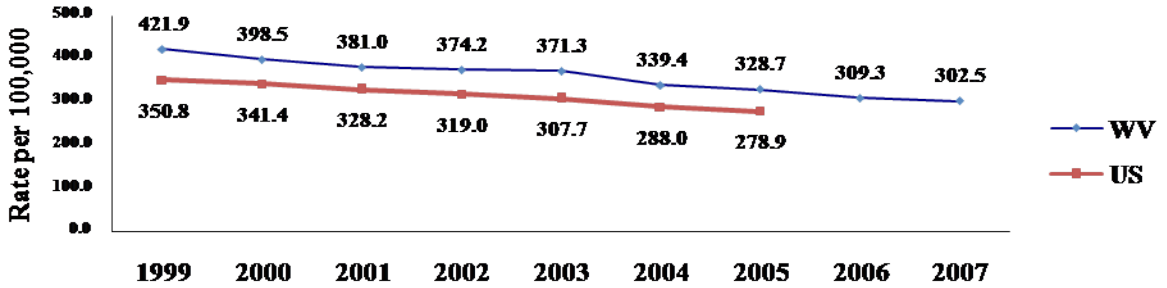
Figure 8.6: Number of Stroke Deaths per Year



Source: HSC Vital Records

Age adjusted cardiovascular disease mortality rates for West Virginia have significantly declined over the past nine years. For the year 2007, the age adjusted cardiovascular disease mortality rate was 302.5 deaths per 100,000 population.

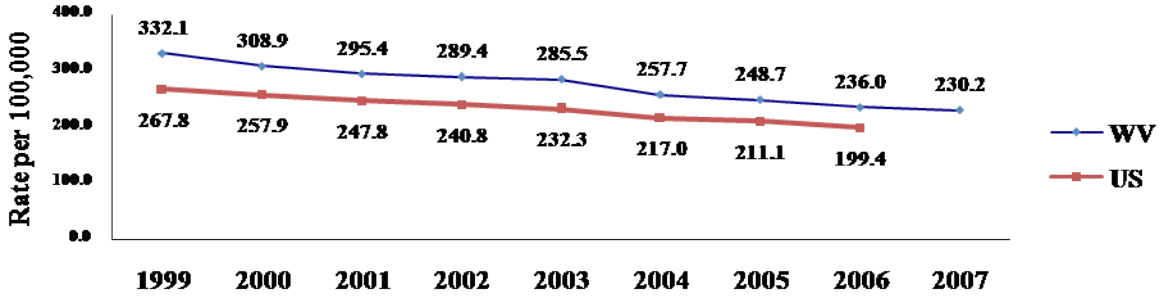
Figure 8.7: Age-adjusted All Cause Cardiovascular Disease Mortality Rates



Source: HSC Vital Records

Age adjusted heart disease mortality rates have also significantly decreased over the past decade. The age adjusted heart disease mortality rate for 2007 was 230.2 per 100,000.

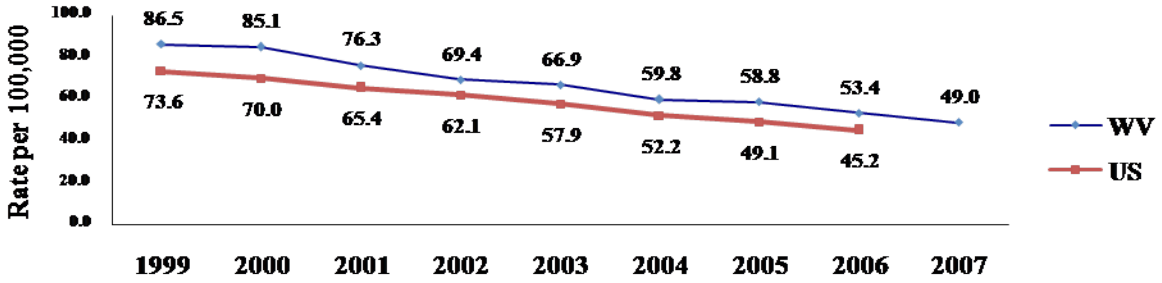
Figure 8.8: Age-adjusted Heart Disease Mortality Rates



Source: HSC Vital Records

The age adjusted mortality rate for acute MI significantly decreased between 1999 and 2007. The mortality rate for 2007 was 49.0 per 100,000.

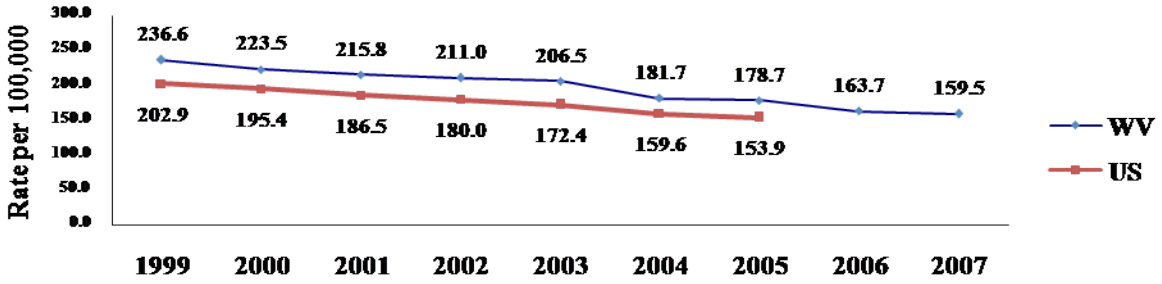
Figure 8.9: Age-adjusted Acute MI Mortality Rates



Source: HSC Vital Records

The age adjusted CHD mortality rate significantly decreased since 1999. The 2007 rate is 159.5 per 100,000.

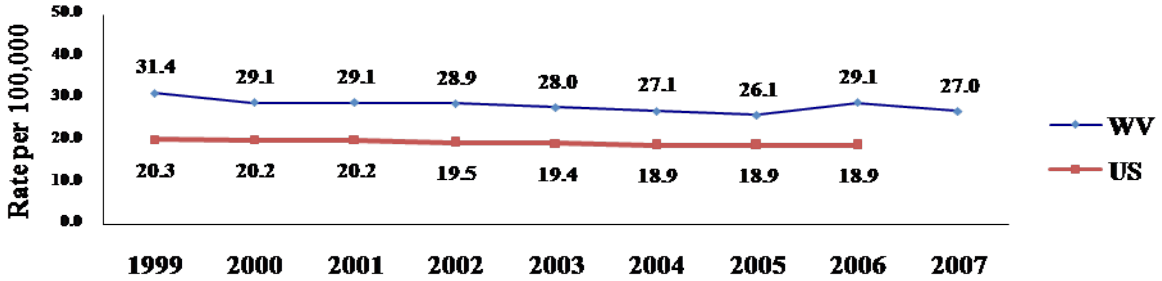
Figure 8.10: Age-adjusted Coronary Heart Disease Mortality Rates



Source: HSC Vital Records

There have been no significant changes in heart failure mortality rates over the past decade.

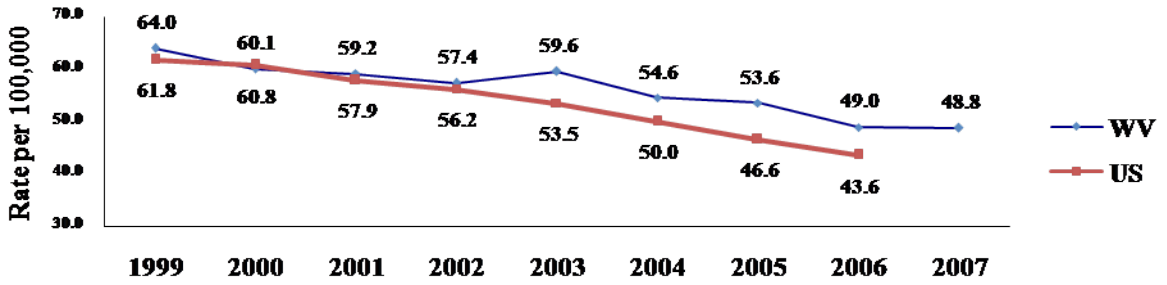
Figure 8.11: Age-adjusted Heart Failure Mortality Rates



Source: HSC Vital Records

The age adjusted mortality rate due to stroke has significantly decreased over the past nine years. The age adjusted stroke mortality rate for 2007 was 48.8 deaths per 100,000 population.

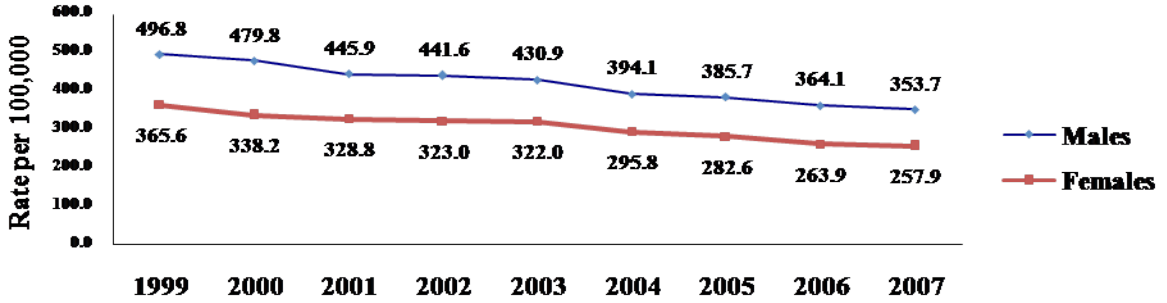
Figure 8.12: Age-adjusted Stroke Mortality Rates



Source: HSC Vital Records

As displayed in Figure 8.13, the age adjusted cardiovascular disease mortality rates have declined for both men and women in West Virginia. There are significant differences in the mortality rates for men and women with men having higher cardiovascular disease rates than women for all years.

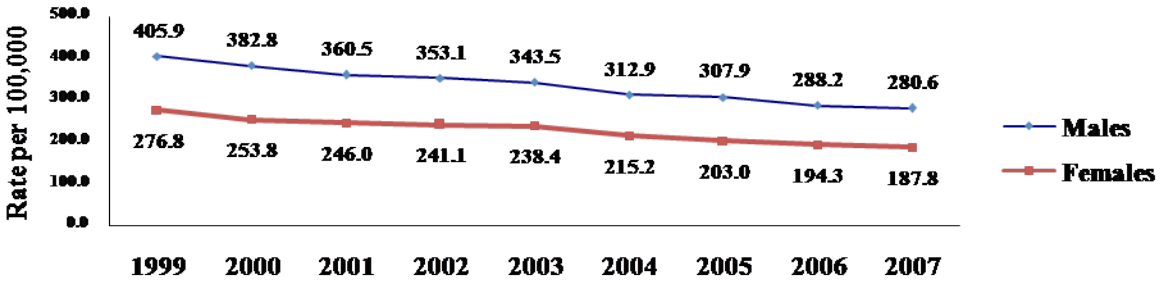
Figure 8.13: Age-adjusted All Cause Cardiovascular Disease Mortality Rates by Gender



Source: HSC Vital Records

Figure 8.14 shows that age adjusted heart disease mortality rates have declined for both men and women. There is a significant difference in the rates for men and women with higher rates for men than women.

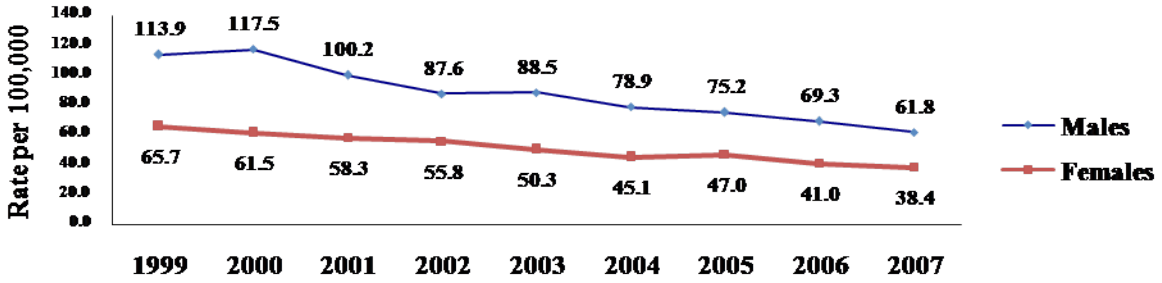
Figure 8.14: Age-adjusted Heart Disease Mortality Rates by Gender



Source: HSC Vital Records

Figure 8.15 shows that age adjusted mortality rates due to acute MI have declined and there is a significant difference between male and female rates with males being higher.

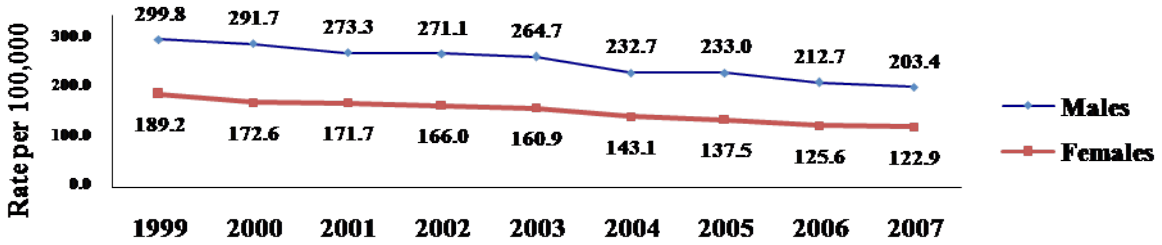
Figure 8.15: Age-adjusted Acute MI Mortality Rates by Gender



Source: HSC Vital Records

The age adjusted coronary heart disease mortality rate has also declined over time for men and women. Rates for males are significantly higher than for females.

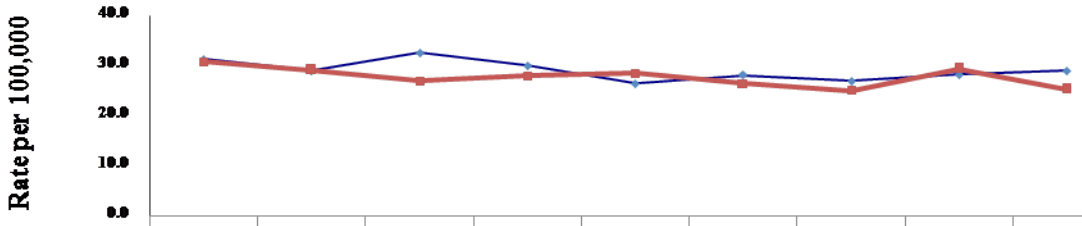
Figure 8.16: Age-adjusted Coronary Heart Disease Mortality Rates by Gender



Source: HSC Vital Records

As displayed in Figure 8.17, the age adjusted heart failure mortality rates have not changed over time and there is not a difference in rates for the males and females.

Figure 8.17: Age-adjusted Heart Failure Mortality Rates by Gender

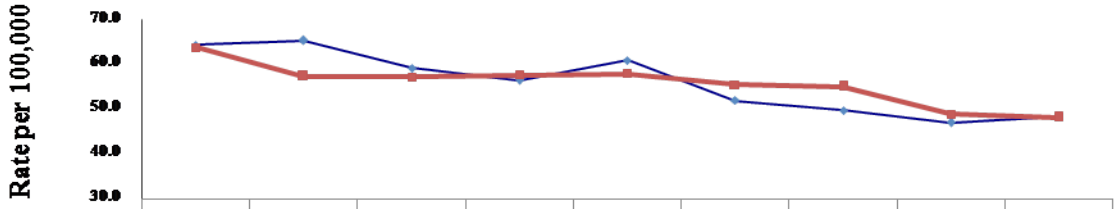


	1999	2000	2001	2002	2003	2004	2005	2006	2007
Males	31.4	29.1	32.7	30.1	26.5	28.2	27.0	28.3	29.1
Females	30.9	29.2	27.0	28.1	28.5	26.5	25.1	29.4	25.3

Source: HSC Vital Records

Although the age adjusted stroke mortality rates have been declining over time for both men and women, there is no significant difference between men and women in stroke mortality rate.

Figure 8.18: Age-adjusted Stroke Mortality Rates by Gender



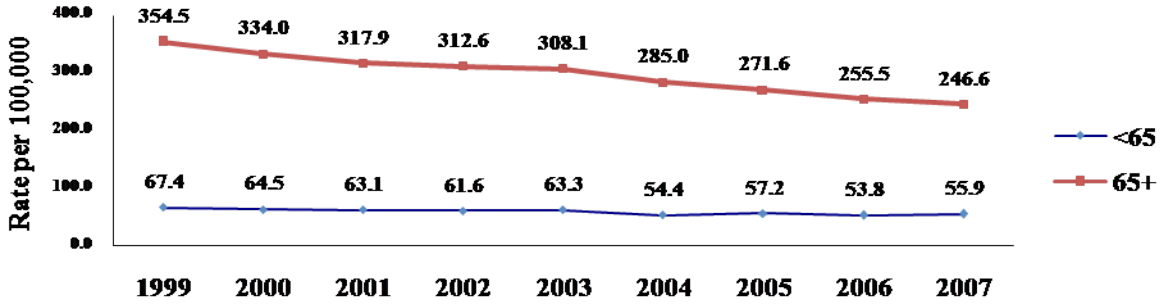
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Males	64.4	65.4	59.3	56.5	61.0	52.0	49.8	47.0	48.5
Females	63.9	57.4	57.3	57.7	58.0	55.6	55.1	48.9	48.2

Source: HSC Vital Records

Because age is a factor related to cardiovascular disease death, age adjusted mortality rates were calculated for two age groups, less than 65 and age 65 and older.

Figure 8.19 shows that there is a significant decline in all cause cardiovascular disease for both age groups. There are also significant differences between the two age groups with rates being higher for the 65 and older age group.

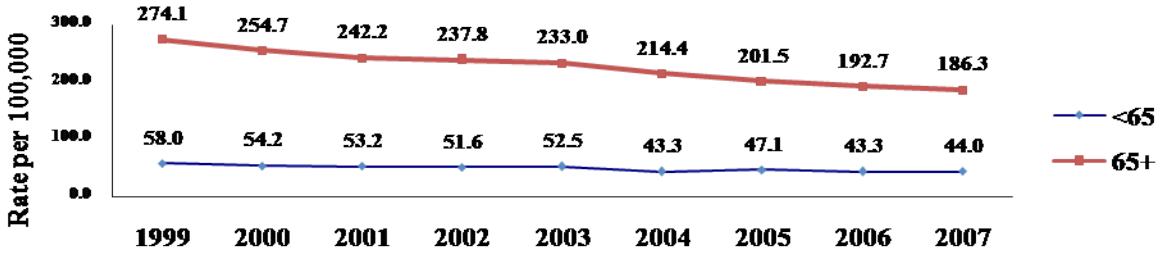
Figure 8.19: Age-adjusted All Cause Cardiovascular Disease Mortality Rates by Age Group



Source: HSC Vital Records

Figure 8.20 shows that there is a significant decline in heart disease mortality rates for both age groups. There is also a significant difference between the two age groups with rates being higher for the 65 and older age group.

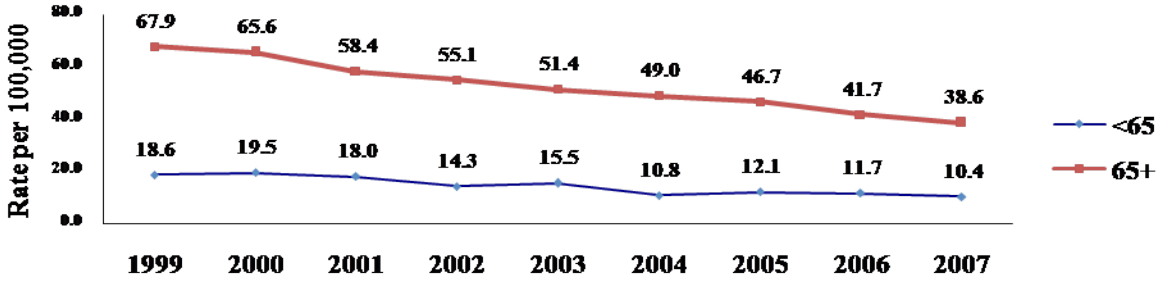
Figure 8.20: Age-adjusted Heart Disease Mortality Rates by Age Group



Source: HSC Vital Records

Figure 8.21 indicates a significant decline in acute MI mortality rates for both age groups. There is also a significant difference between the two age groups with rates being higher for the 65 and older age group.

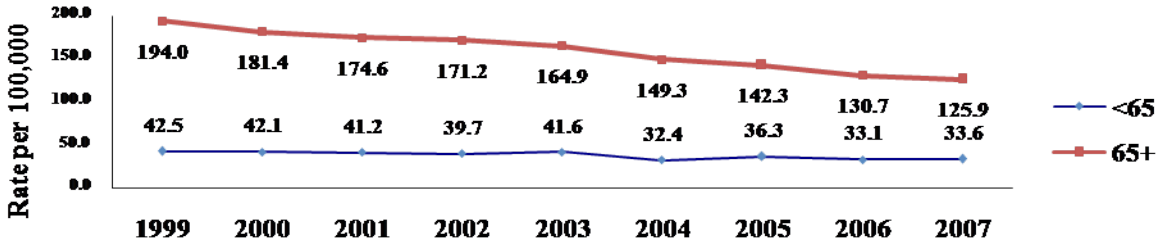
Figure 8.21: Age-adjusted Acute MI Mortality Rates by Age Group



Source: HSC Vital Records

Figure 8.22 shows that there is a significant decline in coronary heart disease mortality rates for both age groups. There is also a significant difference between the two age groups with rates being higher for the 65 and older age group.

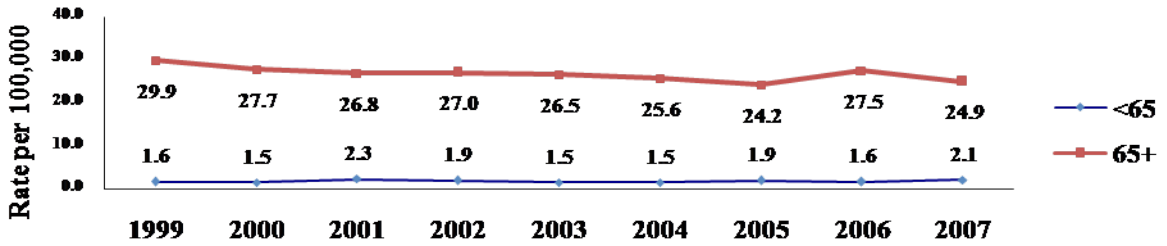
Figure 8.22: Age-adjusted Coronary Heart Disease Mortality Rates by Age Group



Source: HSC Vital Records

Figure 8.23 displays the age adjusted mortality rates due to heart failure. The results indicate that while there is a significant decline in rates for the 65 and older age group only, there is no change in rates among the less than 65 age group. The results also indicate that there is a significant difference between the two age groups.

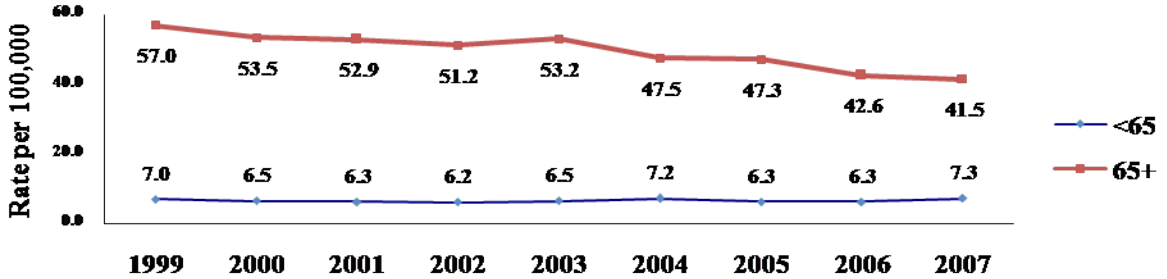
Figure 8.23: Age-adjusted Heart Failure Mortality Rates by Age Group



Source: HSC Vital Records

Figure 8.24 shows a significant decline in age adjusted stroke mortality rates for the 65 and older age group only. There is no significant change for the less than 65 age group. The results also indicate a significant difference between the two age groups with rates highest among those aged 65 and older.

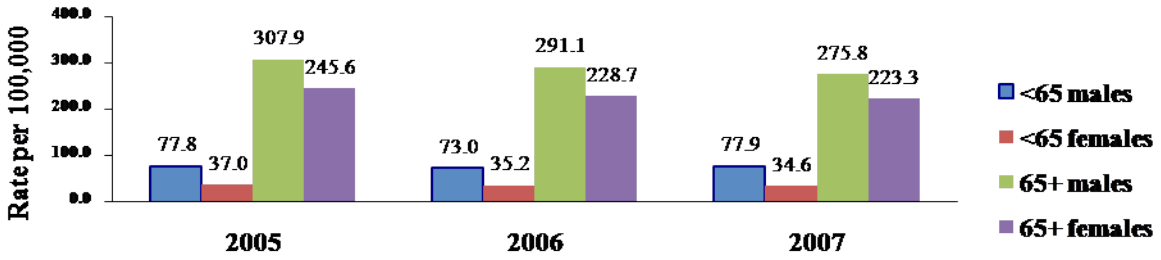
Figure 8.24: Age-adjusted Stroke Mortality Rates by Age Group



Source: HSC Vital Records

Analyses were also conducted for gender and age combined. Figure 8.25 displays the age adjusted mortality rates for all cause cardiovascular disease. The results indicate that there is a significant gender difference for both the less than 65 and 65 and older age groups. In both age groups, male rates are significantly higher than female rates.

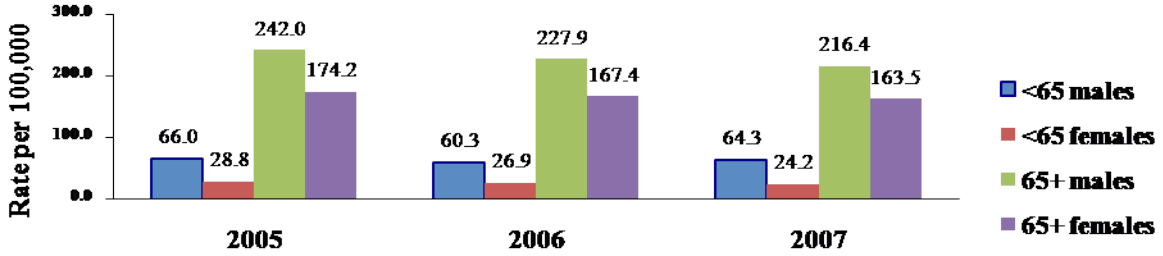
Figure 8.25: Age-adjusted All Cause Cardiovascular Disease Mortality Rates by Age Group and Gender



Source: HSC Vital Records

Figure 8.26 displays the age adjusted heart disease mortality rates. The results indicate that there is a significant gender difference for both the less than 65 and 65 and older age groups. In both age groups, male rates are significantly higher than female rates.

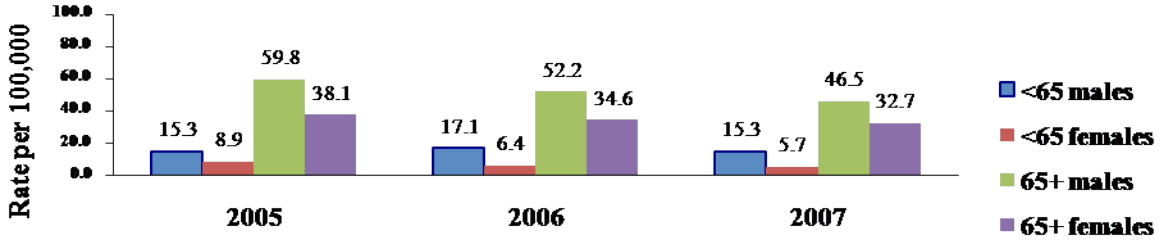
Figure 8.26: Age-adjusted Heart Disease Mortality Rates by Age Group and Gender



Source: HSC Vital Records

Figure 8.27 shows a significant gender difference for both the less than 65 and 65 and older age groups for age adjusted acute MI mortality rates. In both age groups, male rates are significantly higher than female rates.

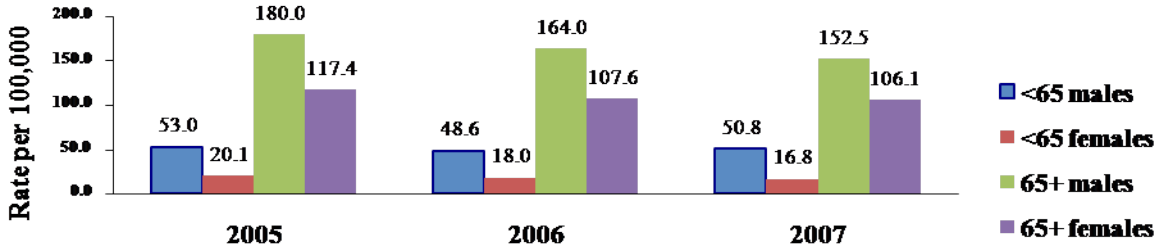
Figure 8.27: Age-adjusted Acute MI Mortality Rates by Age Group and Gender



Source: HSC Vital Records

Figure 8.28 shows a significant gender difference for both the less than 65 and 65 and older age groups for age adjusted mortality rates due to coronary heart disease. In both age groups, male rates are significantly higher than female rates.

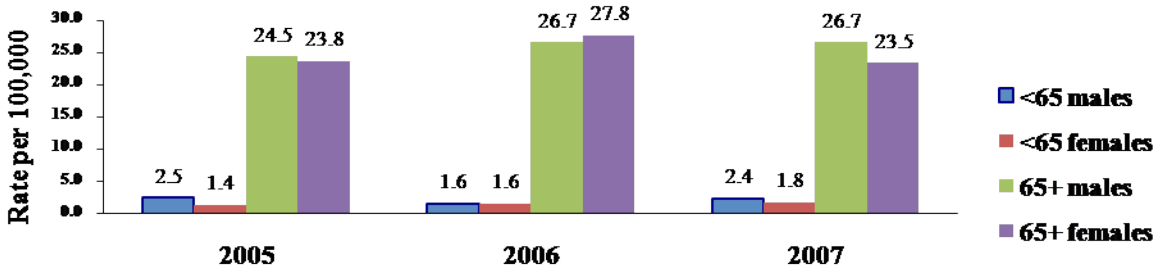
Figure 8.28: Age-adjusted Coronary Heart Disease Mortality Rates by Age Group and Gender



Source: HSC Vital Records

Figure 8.29 displays the age adjusted mortality rates for heart failure. Analyses indicate that there is no gender difference for either the less than 65 age group or 65 and older age group.

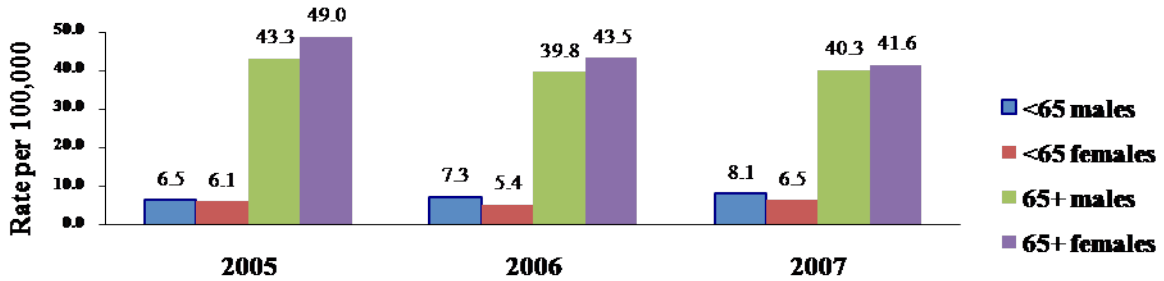
Figure 8.29: Age-adjusted Heart Failure Mortality Rates by Age Group and Gender



Source: HSC Vital Records

Figure 8.30 displays the age adjusted stroke mortality rates by gender and age group. Analyses indicate that there is no gender difference for either the less than 65 age group or 65 and older age group.

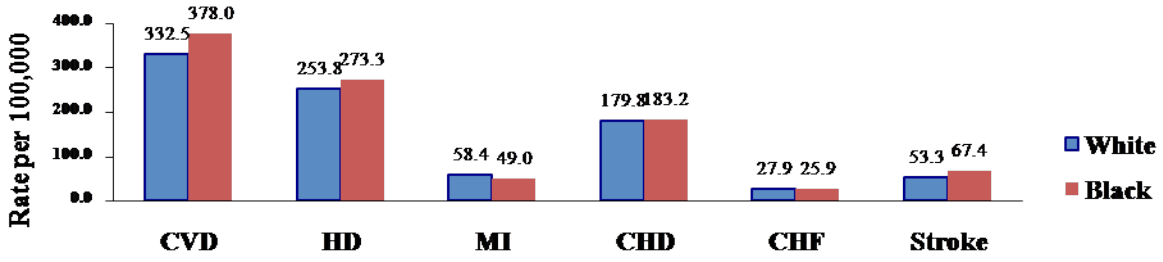
Figure 8.30: Age-adjusted Stroke Mortality Rates by Age Group and Gender



Source: HSC Vital Records

Mortality rates were also analyzed to determine race differences in cardiovascular disease deaths. Due to the low number of cardiovascular disease deaths among the black population in West Virginia, data was combined for a five year period (2003-2007). Figure 8.31 displays the age adjusted cardiovascular disease mortality rates for whites as compared to blacks. The results for all cause cardiovascular disease, heart disease, acute MI, coronary heart disease, heart failure, and stroke indicate that there are no significant racial differences in cardiovascular disease mortality.

Figure 8.31: Age-adjusted Cardiovascular Disease Mortality Rates by Race, 2003-2007



Source: HSC Vital Records

Geographic differences in heart disease and stroke mortality are presented in Figures 8.32 and 8.33. The highest heart disease mortality rates are located in southern, eastern, and northern counties while the lowest heart disease mortality rates are located in western and eastern panhandle counties. No discernable geographic pattern of stroke mortality can be determined.

Figure 8.32: Heart Disease Mortality Rates by County, 2003-2007

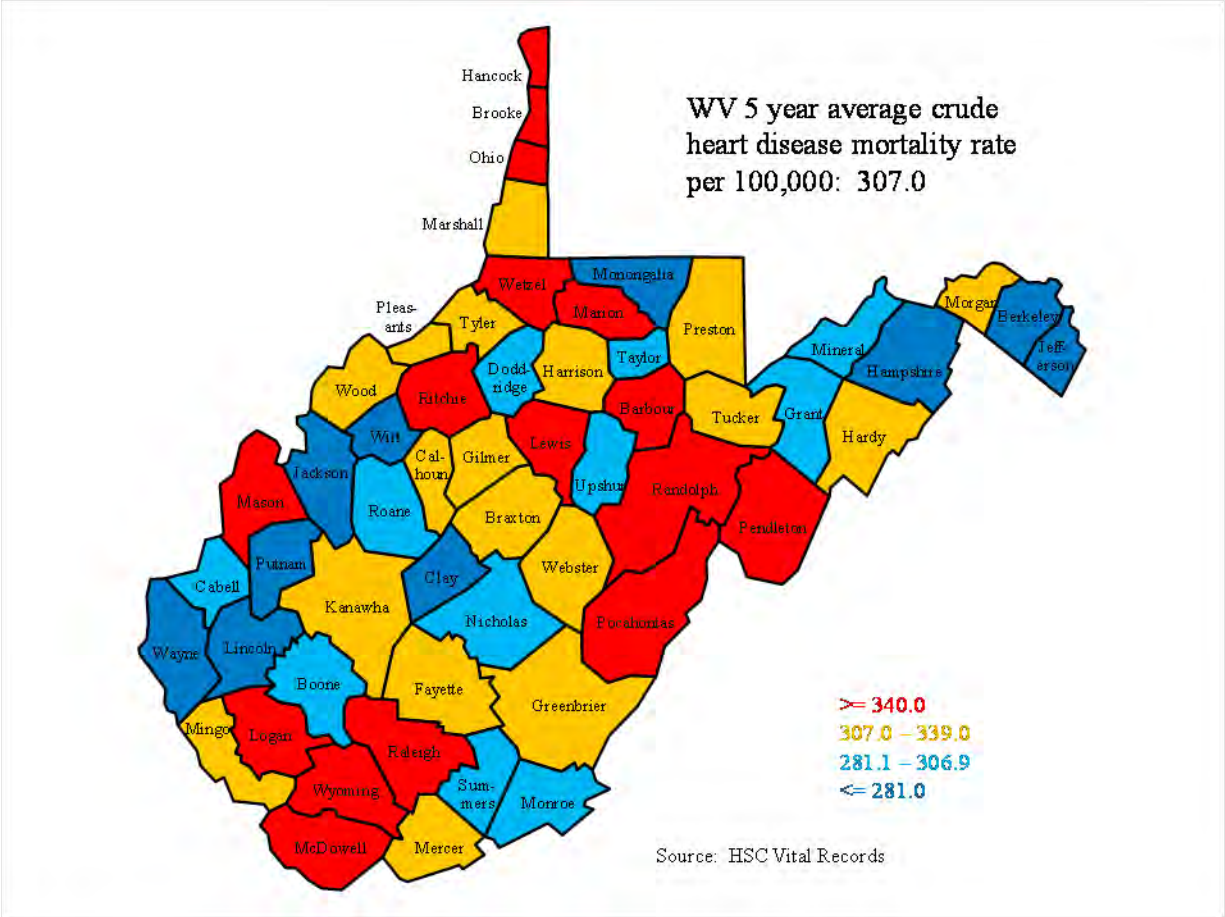
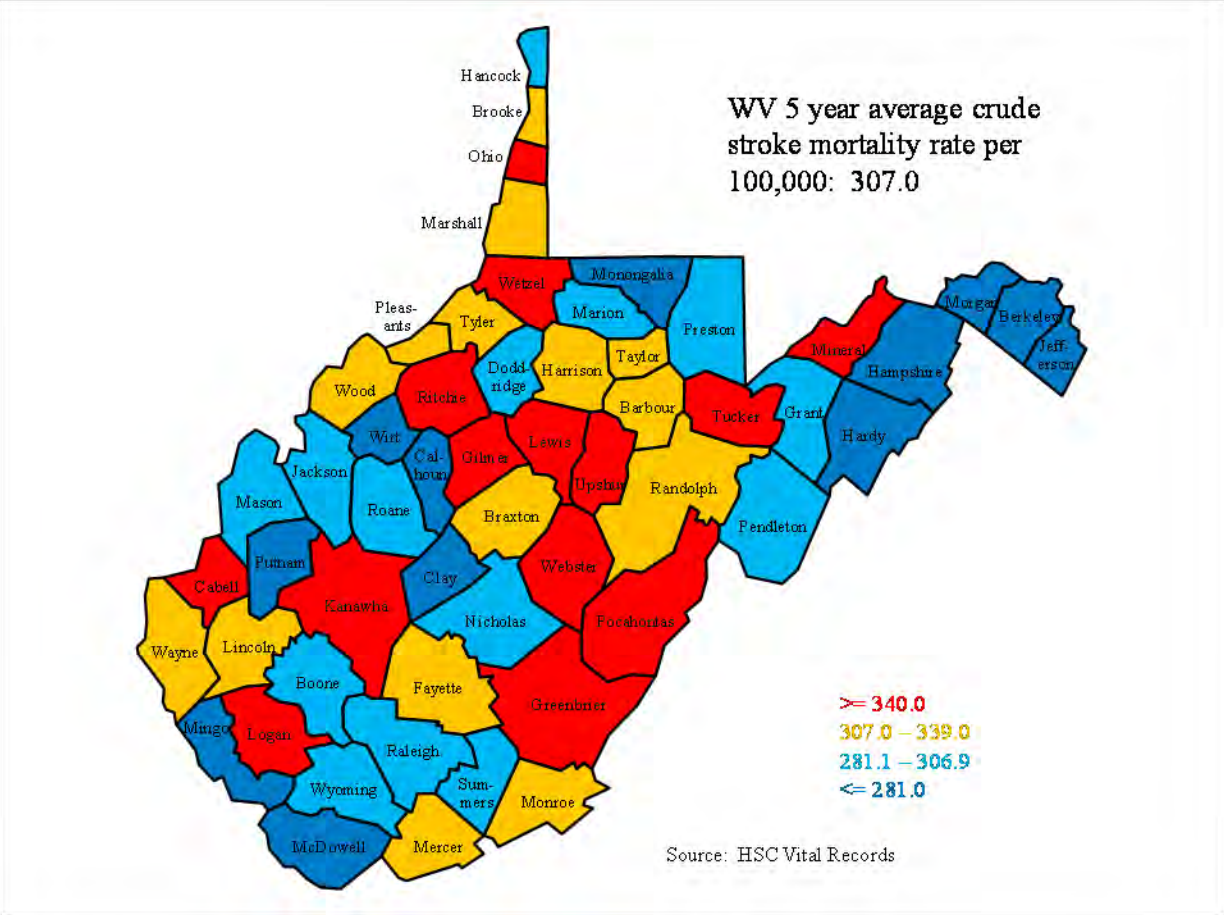


Figure 8.33: Stroke Mortality Rates by County, 2003-2007



Conclusion

The Burden of Cardiovascular Disease in West Virginia

The burden of cardiovascular disease in West Virginia remains high.

- West Virginia has the third highest prevalence of hypertension in the nation (33.3%)
- West Virginia ranks first in the prevalence of high cholesterol in the U.S. (42.4%)
- 6% of WV adults have survived a heart attack (second in the nation)
- 3.2% of WV adults have survived a stroke though this is not different than the U.S.
- 12.6% of WV adults have some form of cardiovascular disease (highest in the U.S.)
- The prevalence of diabetes, asthma, arthritis, and disability is higher among those with cardiovascular disease than in the general population
- Although cardiovascular disease hospitalization rates are decreasing, costs are increasing
- Although cardiovascular disease mortality rates are decreasing, heart disease and stroke remain the number one and the number four leading cause of death in West Virginia.

Expansion of the cardiovascular disease surveillance system is necessary in order to more fully define the burden of CVD in West Virginia. For example, data is needed for quality of care, emergency response, and ER visits. Expanded data is also needed for special populations such as children, Medicare recipients, and Medicaid recipients as well as race data and data related to persons using community health clinics.

Priority Populations for Intervention

Cardiovascular surveillance data are used to define the burden of cardiovascular disease in West Virginia, identify health disparities, and determine priority populations for intervention. Based on the prevalence of risk factors and cardiovascular disease, hospitalization rates, and mortality rates, several priority populations have been identified in West Virginia. These priority populations include elderly adults (age 65 and older), adult women (related to prevalence of MI), adult men (related to CVD, heart disease, acute MI mortality), residents with low socioeconomic status (especially females), and West Virginians living in the southern area of the state.

This information is used by the West Virginia Cardiovascular Health Program (CVH) and the CVH Council to guide the planning and implementation of activities and interventions to address cardiovascular health in the state.

Conclusion

The mission of the CVH Program is to establish environments and policies that promote heart health in West Virginia by addressing the following six priority areas:

- addressing the control of high blood pressure and
- high blood cholesterol primarily in adults and older adults
- increasing knowledge of signs and symptoms for heart attack and stroke and the importance of calling 9-1-1
- improving emergency response
- improving quality of heart disease and stroke care
- eliminating disparities, focusing on health care and worksite settings

Over the next year, the CVH Program and the CVH Council will develop a new strategic plan for addressing cardiovascular health in West Virginia. This plan will outline goals, objectives, and activities related to reducing the burden of cardiovascular disease in the state and among the priority populations. Additionally, this surveillance report will be used by community members, public health researchers, public health professionals, health care providers, decision makers, emergency response personnel and policy makers to plan public health efforts in order to prevent and control cardiovascular disease in West Virginia.

For more information about the Cardiovascular Health Program, call 304-558-0644 or view the website at www.wvcvh.org.

For more information about the West Virginia Health Statistics Center, call 304-558-9100 or view the website at www.wvdhhr.org/bph/hsc.

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Appendix A

Methodology

BRFSS Estimates

Prevalence calculated from surveys such as the Behavioral Risk Factor Surveillance System (BRFSS) are considered estimates since they are based on responses from a sample of the population of interest, rather than the entire population. Confidence intervals account for sampling and non-sampling errors in data collection and are an indication of the reliability and precision of an estimate. They represent the range of values among which the true value of an estimate would be found. This report includes 95% confidence intervals (95% CI). Confidence intervals are mainly affected by the number of responses or events that the estimate is based upon. Estimates based on a small number of responses or events typically have large confidence intervals.

Hospitalization and Mortality Rates

A rate is a measure of some event, disease, or condition in relation to a unit of population, along with some specification of time. Rates are calculated by dividing the number of events in a given time period by the number of people at risk of experiencing that event in that time period. Counts of events or conditions are obtained from multiple sources including vital records and administrative databases. Population counts are obtained from the U.S. Census Bureau. Rates are typically presented and interpreted per 10,000 or 100,000 population. Age adjustment is a method for standardizing rates to eliminate the effects of population changes or differences. Specifically, age adjustment eliminates differences in rates that are due to differences in the age composition of the population.

Statistical Significance

"Significant" is the term used to describe prevalence estimates or rates that have been tested and found to be statistically different. Statistically significant differences between prevalence estimates or rates are traditionally determined using statistical tests such as t-test, ANOVA, or chi-square test. Often when analyzing results of a survey with a large number of respondents, such as the BRFSS, statistical tests will indicate significant differences even when the difference is small. Therefore, this report uses a more conservative method for determining significance. Two prevalence estimates or rates are said to be significantly different when the 95% confidence intervals associated with each of the rates or prevalence estimates do not overlap.

Reliability

Reliability refers to the precision of a prevalence estimate or rate. If a rate or prevalence estimate is termed reliable, there is confidence that the same, or very similar, number would be obtained if the data were to be collected again within the same time period and under similar circumstances. Rates or estimates that are determined to be unreliable may not reflect the true prevalence and are therefore not included in this report. Based on CDC recommendations and criteria for determining reliability, this report includes estimates and rates based on methods such as combining several years of data or creating categories for demographic information in order to increase the reliability of estimates and rates.

Appendix B

Data Tables

Table 1.1. Current Cigarette Smoking Among Adults

Year	%	95% CI
2000	26.1	24.2-28.0
2001	28.2	26.4-30.0
2002	28.4	26.6-30.2
2003	27.3	25.5-29.1
2004	26.9	25.1-28.7
2005	26.7	24.9-28.5
2006	25.7	23.9-27.5
2007	26.9	25.1-28.7

Table 1.2. Smokeless Tobacco Use Among Adults

Year	%	95% CI
2000	8.8	7.5-10.2
2001	8.2	7.0-9.4
2002	8.4	7.2-9.6
2003	7.7	6.6-8.9
2004	8.1	6.9-9.4

Table 1.3. No Leisure Time Physical Activity Among Adults

Year	%	95% CI
2000	33.6	31.5-35.7
2001	31.7	29.9-33.5
2002	28.4	26.7-30.1
2003	28.0	26.3-29.7
2004	24.5	22.9-26.1
2005	28.5	26.8-30.2
2006	25.6	23.9-27.3
2007	28.2	26.6-29.8

Table 1.4. Moderate Physical Activity Among Adults

Year	%	95% CI
2001	48.0	45.9-50.1
2003	42.7	40.7-44.7
2005	39.4	37.4-41.4
2007	45.9	44.1-47.7

Table 1.5. Vigorous Physical Activity Among Adults

Year	%	95% CI
2001	19.5	17.8-21.2
2003	19.1	17.5-20.7
2005	17.6	16.0-19.2
2007	19.2	17.6-20.8

Table 1.6. Less Than Five Servings of Fruits and Vegetables per Day Among Adults

Year	%	95% CI
2000	78.6	76.7-80.5
2002	78.7	77.1-80.3
2003	81.3	79.8-82.8
2005	80.0	78.5-81.5
2007	80.3	78.9-81.7

Table 1.7. Heavy and Binge Drinking Among Adults

Year	Heavy Drinking		Binge Drinking	
	%	95% CI	%	95% CI
2001	3.0	2.3-3.7	9.4	8.1-10.7
2002	4.5	3.6-5.4	11.4	10.1-12.8
2003	3.1	2.3-3.9	11.1	9.8-12.4
2004	2.9	2.2-3.6	9.7	8.4-11.1
2005	3.1	2.4-3.8	9.1	7.9-10.3
2006	3.2	2.4-4.0	11.2	9.8-12.6
2007	3.4	2.7-4.1	9.8	8.6-11.0

Appendix B

Table 2.1. Overweight and Obesity Among Adults

Year	Overweight		Obese	
	%	95% CI	%	95% CI
2000	36.5	34.3-38.7	23.2	21.3-25.1
2001	37.9	35.9-39.9	25.1	23.3-26.9
2002	36.1	34.2-38.0	27.6	25.8-29.4
2003	34.0	32.2-35.8	27.7	25.9-29.5
2004	36.4	34.5-38.3	27.6	25.9-29.3
2005	34.8	33.0-36.6	30.6	28.8-32.4
2006	36.0	34.1-37.9	31.0	29.2-32.8
2007	37.7	35.9-39.5	30.3	28.7-31.9

Table 2.2. Prevalence of Diabetes Among Adults

Year	%	95% CI
2000	7.6	6.5-8.7
2001	8.8	7.7-9.9
2002	10.2	9.1-11.3
2003	9.8	8.7-10.9
2004	10.9	9.7-12.1
2005	10.4	9.3-11.5
2006	12.1	11.0-13.2
2007	10.8	9.8-11.8

Table 2.3. Oral Health Among Adults

Year	No teeth cleaning in past year		Missing 6 or more teeth	
	%	95% CI	%	95% CI
2002	36.9	34.8-39.0	33.8	32.0-35.5
2004	36.0	34.0-38.1	31.9	30.2-33.6
2006	37.3	35.2-39.4	31.3	29.6-32.9

Table 2.4. Prevalence of Hypertension Among Adults

Year	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
1999	31.0	29.1-32.9				
2001	32.5	30.7-34.3	32.5	29.7-35.4	32.4	30.1-34.8
2002	33.1	31.3-34.9	33.8	31.0-36.6	32.5	30.3-34.7
2003	33.6	31.8-35.4	35.0	32.2-37.8	32.3	30.0-34.5
2005	31.4	29.7-33.1	30.9	28.2-33.6	31.9	29.8-34.1
2007	33.3	31.6-34.9	35.0	32.4-37.5	31.6	29.7-33.6

Table 2.5. Prevalence of Hypertension by Population Characteristics

Characteristic	2005		2007	
	%	95% CI	%	95% CI
Age Group				
18-24	5.4	1.7-9.1	11.6	5.8-17.4
25-34	10.9	7.7-14.0	12.3	8.9-15.7
35-44	19.3	15.8-22.9	19.8	16.5-23.1
45-54	35.2	31.3-39.1	33.9	30.4-37.3
55-64	47.7	43.5-52.0	48.9	45.5-52.4
65+	57.5	54.0-61.0	60.1	57.1-63.0
Education				
< HS	43.3	38.7-47.9	45.2	40.6-49.8
high school	32.1	29.4-34.8	36.2	33.6-38.8
some college	27.1	23.7-30.6	28.1	24.9-31.3
4+ yr college	24.3	20.9-27.6	25.1	22.1-28.0
Income				
< $15,000	41.8	37.2-46.4	43.7	39.0-48.3
$15,000-$24,999	38.8	34.6-42.9	38.7	34.8-42.5
$25,000-$34,999	31.5	26.7-36.2	35.8	31.1-40.6
$35,000-$49,999	27.4	23.1-31.7	31.4	27.5-35.4
$50,000-$74,999	22.3	18.2-26.4	27.9	23.8-32.0
$75,000+	23.1	18.6-27.6	22.5	18.6-26.3

Table 2.6. Prevalence of Hypertension by Gender and Population Characteristics, 2007

Characteristic	Males		Females	
	%	95% CI	%	95% CI
Age Group				
18-24	14.8	5.8-23.9	8.1	1.0-15.3
25-34	14.6	9.1-20.2	10.0	6.1-13.8
35-44	24.1	18.7-29.5	15.6	11.6-19.5
45-54	39.9	34.5-45.3	28.3	24.0-32.6
55-64	51.4	46.2-56.6	46.4	41.9-50.9
65+	57.6	52.7-62.5	61.9	58.2-65.5
Education				
< HS	40.2	33.2-47.1	50.3	44.5-56.1
high school	37.9	33.8-42.1	34.5	31.3-37.7
some college	30.9	25.7-36.0	25.8	21.7-29.9
4+ yr college	29.5	24.7-34.3	21.2	17.6-24.8
Income				
< $15,000	46.8	38.6-55.0	41.5	36.2-46.9
$15,000-$24,999	38.5	32.2-44.7	38.8	34.0-43.6
$25,000-$34,999	37.3	30.0-44.6	34.2	28.3-40.2
$35,000-$49,999	34.5	28.1-40.8	28.7	23.8-33.7
$50,000-$74,999	33.4	27.5-39.3	22.2	16.5-28.0
$75,000+	28.0	22.2-33.9	14.3	10.5-18.2

Table 2.7. Prevalence of Hypertension by County

County	%	95% CI
WV Prevalence	32.8	32.0-33.5
Berkeley	26.3	22.9-29.8
Brooke	33.8	26.8-40.7
Cabell	29.7	26.1-33.3
Fayette	30.6	25.8-35.3
Hancock	26.0	20.4-31.5
Harrison	32.1	28.2-36.0
Jefferson	26.2	21.5-30.9
Kanawha	33.2	30.8-35.5
Logan	39.4	33.5-45.3
McDowell	42.4	34.9-49.9
Marion	30.5	26.2-34.9
Marshall	28.4	22.6-34.1
Mason	31.4	25.4-37.3
Mercer	35.5	31.1-39.8
Mingo	41.8	35.3-48.3
Monongalia	22.5	19.2-25.8
Ohio	28.1	23.2-32.9
Putnam	32.3	27.8-36.8
Raleigh	33.7	29.7-37.8
Randolph	35.5	28.5-42.5
Upshur	24.4	18.7-30.0
Wayne	34.2	29.0-39.5
Wood	32.2	28.7-35.6
Wyoming	36.9	29.7-44.0
Boone, Lincoln	39.6	34.7-44.5
Greenbrier, Summers, Monroe	35.6	31.4-39.7
Braxton, Nicholas, Webster	32.9	28.4-37.4
Hardy, Pendleton, Pocahontas	32.8	26.9-38.7
Calhoun, Clay, Gilmer, Roane	35.0	29.6-40.3
Jackson, Wirt	32.5	27.3-37.6
Doddridge, Lewis, Ritchie	34.1	28.4-39.8
Pleasants, Tyler, Wetzel	31.5	25.8-37.3
Barbour, Taylor	33.4	27.5-39.4
Preston, Tucker	29.2	24.2-34.1
Grant, Mineral	32.3	26.9-37.7
Hampshire, Morgan	32.2	27.2-37.2

Table 2.8. Prevalence of High Cholesterol Among Adults

Year	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
1999	37.1	34.6-39.6				
2001	37.7	35.6-39.8				
2002	40.7	38.6-42.8	41.1	37.7-44.5	40.3	37.7-42.9
2003	38.1	36.1-40.1	33.8	30.7-36.9	41.7	39.1-44.4
2005	39.9	37.9-41.9	39.8	36.6-43.1	40.0	37.5-42.5
2007	42.4	40.6-44.2	42.4	39.5-45.3	42.4	40.1-44.7

Table 2.9. Prevalence of High Cholesterol by Population Characteristics

Characteristic	2005		2007	
	%	95% CI	%	95% CI
Age Group				
18-24	9.1	2.7-15.5	9.8	1.7-17.9
25-34	16.9	12.4-21.4	21.5	16.2-26.8
35-44	35.0	30.1-39.9	32.5	28.0-37.0
45-54	43.3	39.1-47.6	43.7	39.9-47.5
55-64	52.9	48.5-57.3	58.4	54.9-61.9
65+	50.6	46.9-54.2	53.1	50.0-56.2
Education				
< HS	49.0	43.9-54.2	55.7	50.8-60.7
high school	40.8	37.6-44.0	44.4	41.4-47.3
some college	38.4	34.2-42.7	37.9	34.2-41.5
4+ yr college	33.3	29.3-37.4	36.3	32.7-39.9
Income				
< $15,000	51.0	45.7-56.3	54.8	49.7-59.8
$15,000-$24,999	46.2	41.4-51.0	46.4	42.0-50.9
$25,000-$34,999	40.7	35.2-46.2	44.0	38.7-49.3
$35,000-$49,999	35.0	30.0-40.1	40.9	36.3-45.5
$50,000-$74,999	34.0	29.1-39.0	38.5	34.0-42.9
$75,000+	32.3	27.0-37.6	33.0	28.6-37.4

Table 2.10. Prevalence of High Cholesterol by Gender and Population Characteristics, 2007

Characteristic	Males		Females	
	%	95% CI	%	95% CI
Age Group				
18-24	14.0	0.5-27.5	4.8	0.0-11.3
25-34	26.9	18.0-35.9	16.3	10.7-22.0
35-44	38.9	31.8-45.9	26.1	20.6-31.5
45-54	43.6	37.7-49.4	43.8	38.8-48.8
55-64	57.2	51.9-62.5	59.7	55.1-64.2
65+	47.4	42.3-52.5	57.3	53.5-61.1
Education				
< HS	54.4	46.9-61.9	57.0	50.6-63.4
high school	41.5	37.0-46.1	47.2	43.5-50.9
some college	38.4	32.3-44.5	37.4	32.9-41.9
4+ yr college	41.1	35.4-46.9	31.9	27.6-36.3
Income				
< $15,000	53.2	44.4-61.9	55.9	49.9-62.0
$15,000-$24,999	45.3	38.1-52.6	47.3	41.7-52.9
$25,000-$34,999	40.9	33.0-48.8	47.3	40.3-54.3
$35,000-$49,999	46.7	39.3-54.1	36.1	30.6-41.7
$50,000-$74,999	43.7	37.0-50.4	33.1	27.5-38.7
$75,000+	36.4	30.1-42.8	28.0	22.4-33.5

Table 2.11. Prevalence of High Cholesterol by County

County	%	95% CI
WV Prevalence	39.8	38.9-40.7
Berkeley	35.9	31.6-40.3
Brooke	38.5	30.7-46.3
Cabell	38.7	34.3-43.0
Fayette	35.5	29.8-41.2
Hancock	37.3	30.4-44.3
Harrison	37.8	33.1-42.5
Jefferson	27.1	22.0-32.2
Kanawha	40.0	37.3-42.7
Logan	44.3	37.6-51.1
McDowell	49.7	40.9-58.5
Marion	32.0	27.4-36.7
Marshall	39.7	32.6-46.8
Mason	38.4	31.5-45.3
Mercer	42.6	37.6-47.5
Mingo	39.7	32.7-46.6
Monongalia	30.8	26.5-35.2
Ohio	38.4	32.4-44.4
Putnam	40.1	34.8-45.4
Raleigh	37.2	32.6-41.8
Randolph	33.4	26.2-40.7
Upshur	42.4	34.1-50.8
Wayne	41.9	35.4-48.3
Wood	38.1	34.2-42.0
Wyoming	43.8	35.4-52.2
Boone, Lincoln	44.4	38.9-50.0
Greenbrier, Summers, Monroe	43.0	38.2-47.8
Braxton, Nicholas, Webster	39.7	34.4-45.0
Hardy, Pendleton, Pocahontas	43.3	36.3-50.2
Calhoun, Clay, Gilmer, Roane	43.8	37.8-49.7
Jackson, Wirt	42.1	35.9-48.3
Doddridge, Lewis, Ritchie	43.4	37.1-49.6
Pleasants, Tyler, Wetzel	39.7	32.9-46.6
Barbour, Taylor	41.8	35.0-48.6
Preston, Tucker	36.2	30.4-42.1
Grant, Mineral	45.3	38.8-51.7
Hampshire, Morgan	40.8	34.9-46.6

Table 2.12. Aspirin therapy by Gender and Population Characteristics, 2007

Characteristic	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
Age Group						
25-34			8.9	4.3-13.6	4.6	2.1-7.0
35-44	13.6	10.5-16.6	15.5	10.8-20.1	11.7	7.8-15.7
45-54	29.5	26.2-32.9	34.2	28.9-39.5	25.2	21.0-29.4
55-64	43.9	40.4-47.3	48.0	42.8-53.2	39.8	35.3-44.2
65+	57.8	54.9-60.8	62.2	57.4-67.1	54.6	50.9-58.3
Education						
< HS	36.4	32.1-40.8	33.4	26.9-39.8	39.5	33.9-45.1
high school	28.8	26.4-31.2	29.0	25.4-32.6	28.6	25.6-31.6
some college	22.2	19.5-25.0	25.1	20.6-29.8	19.8	16.6-23.0
4+ yr college	28.6	25.5-31.8	35.9	30.7-41.2	22.2	18.6-25.7
Income						
< $15,000	36.6	32.1-41.0	36.4	28.6-44.2	36.7	31.4-42.0
$15,000-$24,999	32.2	28.6-35.9	32.9	27.1-38.8	31.6	27.1-36.2
$25,000-$34,999	28.9	24.5-33.3	29.8	23.1-36.4	28.0	22.2-33.8
$35,000-$49,999	28.2	24.4-32.0	35.6	29.1-42.0	21.7	17.5-25.9
$50,000-$74,999	23.6	20.0-27.2	30.1	24.5-35.8	17.0	12.7-21.2
$75,000+	21.2	17.8-24.6	24.4	19.4-29.3	16.7	12.5-20.9

Table 3.1. Prevalence of Heart Attack/MI Among Adults

Year	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
2002	5.6	4.9-6.4	5.8	4.7-7.2	5.4	4.5-6.5
2003	7.4	6.5-8.4	9.5	7.9-11.1	5.5	4.5-6.6
2004	6.8	5.9-7.7	8.6	7.0-10.2	5.1	4.1-6.1
2005	7.0	6.1-7.9	8.5	7.0-10.0	5.5	4.5-6.6
2006	7.5	6.6-8.3	9.2	7.8-10.6	5.9	4.9-6.9
2007	6.0	5.3-6.7	7.6	6.4-8.9	4.4	3.6-5.1

Table 3.2. Prevalence of Heart Attack/MI by Population Characteristics

Characteristic	2006		2007	
	%	95% CI	%	95% CI
Age Group				
25-34	0.3	0.0-0.7	0.9	0.0-1.9
35-44	2.9	1.3-4.5	2.8	1.3-4.3
45-54	5.6	3.9-7.3	4.5	3.0-5.9
55-64	12.3	9.8-14.8	8.5	6.6-10.5
65+	19.2	16.5-21.9	15.7	13.5-18.0
Education				
< HS	17.7	14.6-20.7	12.8	10.1-15.5
high school	6.8	5.5-8.2	5.9	4.8-7.1
some college	5.4	3.9-6.9	4.6	3.4-5.8
4+ yr college	3.3	2.0-4.6	2.8	1.8-3.9
Income				
< $15,000	13.8	10.9-16.8	13.6	10.6-16.6
$15,000-$24,999	10.8	8.5-13.2	9.7	7.5-11.9
$25,000-$34,999	9.2	6.5-11.8	4.6	2.9-6.3
$35,000-$49,999	3.9	2.2-5.7	5.0	3.4-6.6
$50,000-$74,999	2.7	1.2-4.2	2.7	1.4-4.0
$75,000+	2.5	1.3-3.8	1.7	0.6-2.7

Table 3.3. Prevalence of Heart Attack/MI by Gender and Population Characteristics, 2007

Characteristic	Males		Females	
	%	95% CI	%	95% CI
Age Group				
25-34	1.8	0.0-3.8		
35-44	4.5	1.8-7.3	1.1	0.0-2.3
45-54	5.4	3.0-7.7	3.6	1.9-5.3
55-64	11.9	8.7-15.2	5.2	3.1-7.3
65+	20.6	16.4-24.8	12.2	9.8-14.5
Education				
< HS	15.4	10.9-19.9	10.2	7.2-13.2
high school	7.3	5.4-9.2	4.6	3.3-5.8
some college	5.8	3.6-8.0	3.6	2.3-4.9
4+ yr college	4.7	2.6-6.7	1.2	0.4-2.0
Income				
< $15,000	16.8	11.0-22.7	11.4	8.3-14.6
$15,000-$24,999	13.8	9.8-17.7	6.1	4.0-8.3
$25,000-$34,999	6.3	3.4-9.3	2.7	1.0-4.5
$35,000-$49,999	8.0	4.8-11.1	2.4	1.0-3.7
$50,000-$74,999	4.1	1.8-6.4	1.3	0.1-2.4
$75,000+	2.4	0.7-4.0	0.7	0.0-1.4

Table 3.3. 3.4. Prevalence of Angina/CHD Among Adults

Year	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
2002	7.3	6.4-8.2	6.9	5.7-8.4	7.6	6.5-8.9
2003	8.7	7.7-9.7	9.4	7.8-11.0	8.1	6.9-9.4
2004	7.6	6.6-8.5	7.7	6.3-9.2	7.4	6.2-8.5
2005	8.2	7.3-9.2	7.9	6.4-9.3	8.6	7.3-9.8
2006	8.3	7.4-9.2	8.8	7.4-10.2	7.9	6.8-9.0
2007	7.6	6.8-8.4	7.9	6.7-9.1	7.3	6.3-8.3

Table 3.5. Prevalence of Angina/CHD by Population Characteristics

Characteristic	2006		2007	
	%	95% CI	%	95% CI
Age Group				
18-24			0.6	0.0-1.8
25-34	0.4	0.0-0.9	0.8	0.0-1.7
35-44	3.2	1.5-4.8	2.5	1.2-3.8
45-54	6.3	4.5-8.0	7.1	5.3-8.9
55-64	15.0	12.4-17.6	11.6	9.3-13.8
65+	20.7	17.9-18.5	19.0	16.5-21.4
Education				
< HS	15.6	12.7-18.5	12.9	10.2-15.5
high school	8.4	7.0-9.8	7.9	6.5-9.2
some college	6.6	4.9-8.2	6.4	5.0-7.9
4+ yr college	4.9	3.4-6.4	4.8	3.5-6.2
Income				
< $15,000	15.6	12.5-18.7	15.0	12.0-18.0
$15,000-$24,999	12.0	9.5-14.5	10.4	8.2-12.5
$25,000-$34,999	10.6	7.8-13.4	6.6	4.6-8.6
$35,000-$49,999	5.4	3.4-7.4	7.1	4.9-9.4
$50,000-$74,999	5.1	3.2-6.9	5.0	3.3-6.8
$75,000+	3.6	2.1-5.2	3.3	1.9-4.7

Table 3.6. Prevalence of Angina/CHD by Gender and Population Characteristics, 2007

Characteristic	Males		Females	
	%	95% CI	%	95% CI
Age Group				
18-24			1.2	0.0-3.6
25-34			1.6	0.0-3.5
35-44	2.2	0.5-3.8	2.8	0.8-4.8
45-54	7.2	4.5-9.9	7.0	4.6-9.4
55-64	14.3	10.7-18.0	8.8	6.3-11.4
65+	21.8	17.5-26.0	16.9	14.1-19.7
Education				
< HS	13.4	9.3-17.4	12.3	9.1-15.6
high school	7.6	5.7-9.4	8.2	6.3-10.0
some college	6.5	4.2-8.8	6.3	4.5-8.2
4+ yr college	6.1	3.8-8.4	3.6	2.1-5.2
Income				
< $15,000	16.6	11.0-22.1	13.9	10.6-17.2
$15,000-$24,999	12.2	8.6-15.8	8.7	6.2-11.3
$25,000-$34,999	7.3	4.2-10.4	5.9	3.3-8.4
$35,000-$49,999	7.0	4.0-10.0	7.2	4.0-10.5
$50,000-$74,999	4.7	2.4-7.0	5.4	2.7-8.1
$75,000+	4.2	2.1-6.3	2.0	0.4-3.5

Table 3.7. Prevalence of Stroke Among Adults

Year	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
2002	3.1	2.6-3.8	3.2	2.4-4.3	3.1	2.4-3.9
2003	4.2	3.5-4.8	3.1	2.1-4.0	5.1	4.2-6.1
2004	3.1	2.5-3.7	2.8	1.9-3.6	3.4	2.6-4.2
2005	3.4	2.7-4.0	2.6	1.7-3.5	4.1	3.2-4.9
2006	4.2	3.5-4.8	3.9	2.9-4.8	4.5	3.6-5.4
2007	3.2	2.7-3.7	2.7	2.0-3.4	3.7	3.0-4.4

Table 3.8. Prevalence of Stroke by Population Characteristics

Characteristic	2006		2007	
	%	95% CI	%	95% CI
Age Group				
25-34	0.5	0.0-1.2	0.5	0.0-1.0
35-44	1.9	0.5-3.2	0.9	0.2-1.6
45-54	3.1	1.9-4.3	2.2	1.2-3.1
55-64	5.2	3.6-6.8	3.7	2.4-5.0
65+	12.0	9.7-14.3	9.9	8.0-11.7
Education				
< HS	10.4	7.9-12.9	5.8	4.1-7.6
high school	4.0	3.0-5.1	3.5	2.6-4.3
some college	2.8	1.7-3.9	2.5	1.7-3.4
4+ yr college	1.1	0.5-1.8	1.8	1.0-2.6
Income				
< $15,000	10.3	7.7-13.0	8.0	5.8-10.2
$15,000-$24,999	6.3	4.5-8.1	5.0	3.4-6.5
$25,000-$34,999	3.9	2.1-5.7	2.4	1.2-3.7
$35,000-$49,999	1.3	0.4-2.3	2.4	1.3-3.5
$50,000-$74,999	1.9	0.7-3.0	1.5	0.5-2.4
$75,000+	0.9	0.2-1.7	0.8	0.2-1.3

Table 3.9. Prevalence of Stroke by Gender and Population Characteristics, 2007

Characteristic	Males		Females	
	%	95% CI	%	95% CI
Age Group				
25-34			0.9	0.0-2.0
35-44	0.3	0.0-0.8	1.6	0.3-2.8
45-54	2.9	1.1-4.6	1.5	0.6-2.4
55-64	3.1	1.3-4.9	4.4	2.6-6.2
65+	9.1	6.2-12.1	10.4	8.1-12.7
Education				
< HS	4.8	2.3-7.3	6.9	4.5-9.3
high school	2.8	1.6-3.9	4.1	3.0-5.3
some college	2.2	0.9-3.4	2.8	1.6-4.0
4+ yr college	1.6	0.4-2.8	1.9	0.8-3.0
Income				
< $15,000	9.1	5.1-13.2	7.2	4.9-9.5
$15,000-$24,999	4.8	2.3-7.3	5.2	3.3-7.1
$25,000-$34,999	2.4	0.7-4.1	2.5	0.7-4.3
$35,000-$49,999	2.6	0.9-4.4	2.2	0.8-3.6
$50,000-$74,999	0.7	0.0-1.8	2.2	0.5-3.9
$75,000+	0.6	0.0-1.3	1.0	0.0-2.0

Table 3.10. Prevalence of any CVD by Population Characteristics, 2007

Characteristic	%	95% CI
Age Group		
18-24	0.6	0.0-1.8
25-34	2.1	0.7-3.6
35-44	5.2	3.3-7.2
45-54	10.7	8.5-12.8
55-64	18.1	15.4-20.7
65+	31.9	29.0-34.8
Education		
< HS	23.0	19.6-26.5
high school	12.7	11.1-14.4
some college	10.4	8.6-12.2
4+ yr college	7.5	5.9-9.2
Income		
< $15,000	25.8	22.0-29.6
$15,000-$24,999	18.1	15.3-20.9
$25,000-$34,999	10.6	8.1-13.2
$35,000-$49,999	11.4	8.8-14.0
$50,000-$74,999	7.5	5.4-9.7
$75,000+	4.6	2.9-6.2

Table 3.11. Prevalence of any CVD by Gender and Population Characteristics, 2007

Characteristic	Males		Females	
	%	95% CI	%	95% CI
Age Group				
18-24			1.2	0.0-3.6
25-34	1.8	0.0-3.8	2.5	0.4-4.7
35-44	5.7	2.8-8.5	4.8	2.3-7.3
45-54	11.2	7.8-14.5	10.2	7.4-13.1
55-64	21.4	17.2-25.7	14.7	11.5-17.9
65+	34.9	30.0-39.8	29.7	26.3-33.1
Education				
< HS	23.7	18.3-29.2	22.3	18.0-26.6
high school	12.3	9.9-14.7	13.2	11.0-15.5
some college	10.0	7.2-12.9	10.7	8.4-13.1
4+ yr college	9.8	6.9-12.7	5.6	3.7-7.4
Income				
< $15,000	29.0	21.9-36.1	23.7	19.4-28.0
$15,000-$24,999	20.0	15.4-24.7	16.4	13.0-19.8
$25,000-$34,999	13.0	8.9-17.1	8.1	5.1-11.2
$35,000-$49,999	12.4	8.6-16.3	10.5	6.9-14.1
$50,000-$74,999	7.6	4.6-10.6	7.5	4.4-10.6
$75,000+	5.8	3.2-8.3	2.8	1.0-4.6

Table 3.12. Prevalence of CVD by County

County	%	95% CI
WV Prevalence	13.5	13.0-14.0
Berkeley	10.1	8.0-12.3
Brooke	10.5	6.4-14.7
Cabell	12.8	10.4-15.1
Fayette	12.9	9.9-16.0
Hancock	11.9	8.2-15.6
Harrison	11.6	9.2-13.9
Jefferson	7.8	5.3-10.3
Kanawha	11.9	10.4-13.3
Logan	18.0	14.0-22.0
McDowell	17.5	12.4-22.5
Marion	11.0	8.3-13.7
Marshall	14.8	10.5-19.1
Mason	13.4	9.3-17.6
Mercer	17.2	14.0-20.4
Mingo	19.4	14.6-24.1
Monongalia	7.3	5.4-9.2
Ohio	14.6	11.0-18.1
Putnam	10.9	8.3-13.5
Raleigh	14.6	11.9-17.4
Randolph	14.7	9.4-20.0
Upshur	12.0	8.0-15.9
Wayne	13.6	10.3-16.9
Wood	14.1	11.6-16.6
Wyoming	20.3	14.5-26.0
Boone, Lincoln	15.8	12.4-19.2
Greenbrier, Summers, Monroe	16.3	13.4-19.3
Braxton, Nicholas, Webster	14.9	11.7-18.1
Hardy, Pendleton, Pocahontas	11.0	7.7-14.4
Calhoun, Clay, Gilmer, Roane	12.7	9.6-15.8
Jackson, Wirt	15.5	11.6-19.4
Doddridge, Lewis, Ritchie	14.8	10.9-18.6
Pleasants, Tyler, Wetzel	10.6	7.2-14.0
Barbour, Taylor	13.9	10.1-17.8
Preston, Tucker	8.4	5.6-11.2
Grant, Mineral	13.3	9.7-16.8
Hampshire, Morgan	12.0	8.9-15.1

Table 4.1. Use of Hypertension Meds, 2007

Characteristic	Total		Females	
	%	95% CI	%	95% CI
Age Group				
35-44	72.8	64.6-81.0		
45-54	85.5	80.9-90.1	84.2	77.0-91.4
55-64	90.0	86.9-93.1	91.2	87.4-94.9
65+	96.1	94.5-97.7	97.9	96.6-99.1

Table 4.2. Doctor Advised to Change Eating Habits to Lower High Blood Pressure, 2007

Characteristic	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
Age Group						
35-44	73.3	65.0-81.6				
45-54	68.8	63.0-74.5	73.1	65.2-81.1	63.2	54.8-71.7
55-64	68.5	63.9-73.1	68.7	62.0-75.5	68.2	62.0-74.4
65+	52.2	48.3-56.0	51.5	44.9-58.1	52.6	47.9-57.3

Table 4.3. Doctor Advised Take Medication to Lower High Blood Pressure, 2007

Characteristic	Total	
	%	95% CI
Age Group		
35-44	84.3	77.6-91.1
45-54	93.2	90.2-96.2
55-64	93.8	91.2-96.4
65+	95.8	94.1-97.4

Table 4.4. Doctor Advised to Exercise to Lower High Blood Pressure, 2007

Characteristic	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
Age Group						
35-44	76.1	68.0-84.0				
45-54	70.6	65.0-76.3	74.0	66.2-81.8	66.4	58.1-74.7
55-64	72.3	67.7-76.8	69.1	62.2-75.9	75.8	70.1-81.5
65+	58.3	54.5-62.1	60.4	54.0-66.9	56.9	52.3-61.6
Education						
< HS	57.0	51.0-63.1			59.0	51.9-66.1
high school	67.4	63.4-71.3	69.0	62.9-75.1	65.6	60.7-70.5
some college	72.8	67.3-78.2	71.0	63.0-79.1	74.5	67.1-81.9
4+ yr college	70.8	64.9-76.6	74.4	66.6-82.1	66.1	57.3-75.0
Income						
< $15,000	60.1	54.0-66.3			61.6	54.5-68.7
$15,000-$24,999	59.0	53.0-65.0			57.9	50.7-65.0
$25,000-$34,999	75.9	69.7-82.0	74.0	64.7-83.2	77.9	69.9-86.0
$35,000-$49,999	68.4	61.7-75.1	60.1	49.6-70.5	77.6	70.2-85.1
$50,000-$74,999	79.8	73.3-86.3	79.0	70.2-87.7	80.9	71.5-90.4
$75,000+	75.7	68.0-83.3	80.2	71.3-89.0		

Table 4.5. Changed Eating Habits to Lower High Blood Pressure, 2007

Characteristic	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
Age Group						
35-44	73.3	64.9-81.6				
45-54	70.1	64.2-76.0	70.5	62.4-78.7	69.5	60.9-78.1
55-64	72.6	68.2-77.1	65.9	59.0-72.9	80.1	74.8-85.3
65+	62.5	58.8-66.2	59.3	52.9-65.8	64.6	60.2-69.1

Table 4.6. Increased Exercise to Lower High Blood Pressure, 2007

Characteristic	Total		Males		Females	
	%	95% CI	%	95% CI	%	95% CI
Age Group						
35-44	71.7	63.2-80.1				
45-54	69.6	63.7-75.4	71.1	63.2-79.0	67.6	59.0-76.2
55-64	61.0	56.1-65.8	61.1	53.9-68.4	60.7	54.2-67.3
65+	60.6	56.8-64.3	66.9	60.8-73.0	56.3	51.6-61.0
Education						
< HS	48.1	42.0-54.3			46.4	39.1-53.7
high school	64.5	60.3-68.6	65.4	58.8-72.1	63.4	58.5-68.3
some college	67.6	61.1-74.1	73.5	65.4-81.5	61.7	51.9-71.5
4+ yr college	71.9	66.1-77.7	70.3	62.0-78.6	73.9	65.9-81.9
Income						
< $15,000	50.4	44.1-56.7			50.0	42.5-57.6
$15,000-$24,999	61.7	55.8-67.6			62.2	55.3-69.0
$25,000-$34,999	63.9	56.4-71.4				
$35,000-$49,999	69.2	62.8-75.7	70.1	60.6-79.7	68.3	59.7-76.9
$50,000-$74,999	75.6	66.8-84.4	75.9	66.8-84.9		

Table 4.7. Prevalence of Smoking Among Those with Poor CVH, 2007

	%	95% CI
Heart Attack	25.4	19.9-30.9
CHD	23.4	18.7-28.1
Stroke	22.1	15.6-28.5
CVD	23.3	19.6-27.0
HBP	19.6	17.2-21.9
HCh	21.7	19.5-24.0

Table 4.8. Prevalence of Physical Inactivity and Inadequate Nutrition Among Those with Poor CVH, 2007

	Physical Inactivity		Inadequate Nutrition	
	%	95% CI	%	95% CI
Heart Attack	39.9	34.0-45.8	83.9	79.5-88.2
CHD	42.2	37.0-47.5	77.1	72.7-81.6
Stroke	46.7	39.0-54.3	80.6	74.6-86.5
CVD	42.1	38.1-46.2	79.7	76.3-83.0
HBP	35.8	33.1-38.5	80.4	78.2-82.6
HCh	33.7	31.2-36.2	79.6	77.3-81.8

Table 5.1. Prevalence of Hypertension and High Cholesterol Among Those with Poor CVH, 2007

	Hypertension		High Cholesterol	
	%	95% CI	%	95% CI
Heart Attack	64.4	58.4-70.3	67.9	62.1-73.7
CHD	71.7	66.9-76.5	65.3	60.1-70.5
Stroke	64.4	56.9-71.9	59.9	52.0-67.7
CVD	65.3	61.3-69.3	63.7	59.5-67.8

Table 5.2. Prevalence of Overweight and Obesity Among Those with Poor CVH, 2007

	Overweight		Obesity	
	%	95% CI	%	95% CI
Heart Attack	34.8	29.0-40.5	41.6	35.5-47.7
CHD	32.8	27.9-37.8	36.6	31.4-41.8
Stroke	38.0	30.3-45.7	25.1	18.5-31.7
CVD	35.4	31.4-39.4	36.0	31.9-40.0
HBP	37.4	34.6-40.1	41.8	39.0-44.6
HCh	39.9	37.2-42.6	38.0	35.3-40.6

Table 5.3. Prevalence of Diabetes, Asthma, and Arthritis Among Those with Poor CVH, 2007

	Diabetes		Asthma		Arthritis	
	%	95% CI	%	95% CI	%	95% CI
Heart Attack	35.7	29.9-41.5	15.6	11.2-19.9	63.9	58.0-69.9
CHD	30.0	25.1-34.8	19.8	15.7-23.9	64.5	59.4-69.7
Stroke	31.0	23.8-38.1	15.6	10.1-21.1	63.3	55.7-70.8
CVD	30.8	27.0-34.6	16.2	13.2-19.2	63.6	59.6-67.7
HBP	22.3	20.1-24.4	12.8	10.9-14.7	54.0	51.2-56.8
HCh	19.3	17.3-21.3	12.0	10.-13.8	50.5	47.9-53.2

Table 5.4. Prevalence of Poor Oral Health Among Those with Poor CVH, 2007

	No Teeth Cleaning		Lost 6 or More Teeth	
	%	95% CI	%	95% CI
Heart Attack	46.3	38.6-54.0	74.7	69.6-79.8
CHD	42.2	35.3-49.0	67.3	62.1-72.5
Stroke	55.6	45.5-65.8	71.4	64.1-78.6
CVD	45.2	39.8-50.7	68.9	65.0-72.9

Table 6.1. Prevalence of Fair/Poor Health and Disability Among Those with Poor CVH, 2007

	Fair/Poor Health		Disability	
	%	95% CI	%	95% CI
Heart Attack	65.3	59.6-71.0	59.6	53.8-65.5
CHD	59.2	53.9-64.5	57.4	52.1-62.7
Stroke	62.4	55.0-69.9	62.8	55.4-70.2
CVD	57.6	53.5-61.7	57.0	52.9-61.1
HBP	37.6	35.0-40.2	39.3	36.6-42.0
HCh	32.7	30.3-35.2	35.3	32.8-37.9

Table 6.2. Prevalence of Lack of Emotional Support and Life Satisfaction Among Those with Poor CVH, 2007

	Lack of Emotional Support		Lack of Life Satisfaction	
	%	95% CI	%	95% CI
Heart Attack	11.4	7.2-15.6	12.8	8.6-17.0
CHD	11.7	8.3-15.0	14.4	10.8-18.0
Stroke	13.0	8.1-17.9	15.8	10.2-21.4
CVD	12.6	9.8-15.4	13.0	10.2-15.7
HBP	8.7	4.2-10.2	10.9	9.1-12.7
HCh	8.4	7.0-9.9	9.0	7.5-10.5

Table 6.3. Prevalence of Health Care Access Among Those with Poor CVH, 2007

	No Health Care Coverage		Cannot Afford Medical Care	
	%	95% CI	%	95% CI
Heart Attack	9.2	5.2-13.2	17.6	12.7-22.4
CHD	5.6	3.3-7.9	17.7	13.7-21.7
Stroke	6.4	2.5-10.3	17.9	11.8-24.0
CVD	7.7	5.3-10.1	17.9	14.7-21.2
HBP	10.1	8.2-11.9	14.6	12.7-16.6
HCh	10.5	8.6-12.3	14.9	12.9-16.8

Table 6.4. Prevalence of Medical Care Access Among Those with Poor CVH, 2007

	No Primary Care Doctor		No Routine Checkup in Past Year	
	%	95% CI	%	95% CI
Heart Attack	8.2	4.6-11.8	10.5	6.3-14.6
CHD	4.2	2.2-6.1	9.6	6.6-12.6
Stroke	5.4	2.2-8.6	9.6	4.9-14.4
CVD	6.6	4.5-8.7	10.7	8.0-13.4
HBP	9.2	7.4-11.0	12.1	10.1-14.2
HCh	9.8	8.0-11.6	12.5	10.6-14.3

Table 8.1. All Cause Cardiovascular Disease Deaths, Age Adjusted Mortality Rates, and 95% Confidence Intervals

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Total									
1999	8839	421.9	413.0-430.7	1338	67.4	63.8-71.0	7501	354.5	346.4-362.5
2000	8413	398.5	390.0-404.0	1299	64.5	61.0-68.0	7114	334.0	326.4-341.8
2001	8117	381.0	372.7-389.3	1283	63.1	59.6-66.5	6834	317.9	310.4-325.5
2002	8038	374.2	366.0-382.4	1272	61.6	58.2-65.0	6766	312.6	305.2-320.1
2003	8074	371.3	363.2-379.5	1329	63.3	59.8-66.7	6745	308.1	300.7-315.4
2004	7428	339.4	331.7-347.2	1157	54.4	51.2-57.6	6271	285.0	278.0-292.1
2005	7293	328.7	321.1-336.3	1259	57.2	53.9-60.4	6034	271.6	264.7-278.4
2006	6945	309.3	302.0-316.6	1203	53.8	50.7-56.9	5742	255.5	248.9-262.1
2007	6883	302.5	295.3-309.7	1262	55.9	52.8-59.1	5621	246.6	240.1-253.0
Males									
1999	3972	496.8	480.9-512.7	885	91.0	85.0-97.0	3087	405.7	391.0-420.4
2000	3889	479.8	464.3-495.3	883	89.3	83.4-95.2	3006	390.5	376.2-404.8
2001	3690	445.9	431.2-460.6	872	87.2	81.4-93.0	2818	358.7	345.1-372.2
2002	3675	441.6	427.0-456.2	859	84.6	78.9-90.3	2816	357.0	343.6-370.5
2003	3705	430.9	416.7-445.0	858	82.9	77.3-88.5	2847	348.0	335.0-361.0
2004	3385	394.1	380.6-407.6	753	72.2	67.0-77.4	2632	321.9	309.4-334.4
2005	3402	385.7	372.5-398.9	844	77.8	72.5-83.2	2558	307.9	395.8-320.0
2006	3284	364.1	351.4-376.7	804	73.0	67.9-78.1	2480	291.1	279.5-302.6
2007	3257	353.7	341.3-366.0	864	77.9	72.6-83.2	2393	275.8	264.7-286.9

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Females									
1999	4867	365.6	355.2-375.9	453	44.6	40.5-48.7	4414	321.0	311.5-330.4
2000	4524	338.2	328.3-348.1	416	40.5	36.6-44.5	4108	297.7	288.5-306.8
2001	4427	328.8	319.1-338.6	411	39.7	35.8-43.5	4016	289.2	280.2-298.1
2002	4363	323.0	313.3-332.7	413	39.3	35.5-43.2	3950	283.6	274.8-292.5
2003	4369	322.0	312.4-331.7	471	44.1	40.1-48.2	3898	277.9	269.2-286.7
2004	4043	295.8	286.6-305.0	404	37.0	33.4-40.7	3639	258.7	250.3-267.2
2005	3891	282.6	273.6-291.6	415	37.0	33.4-40.7	3476	245.6	237.4-253.8
2006	3661	263.9	255.3-272.6	399	35.2	31.7-38.7	3262	228.7	220.8-236.6
2007	3626	257.9	249.4-266.4	398	34.6	31.1-38.1	3228	223.3	215.5-231.1

Table 8.2. Heart Disease Deaths, Age Adjusted Mortality Rates, and 95% Confidence Intervals

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Total									
1999	6959	332.1	324.2-339.9	1151	58.0	54.6-61.3	5808	274.1	267.0-281.1
2000	6519	308.9	301.4-316.4	1091	54.2	50.9-57.4	5428	254.7	248.0-261.5
2001	6292	295.4	288.1-302.7	1085	53.2	50.1-56.4	5207	242.2	235.6-248.8
2002	6212	289.4	282.1-296.6	1065	51.6	48.5-54.7	5147	237.8	231.3-244.3
2003	6208	285.5	278.4-292.6	1107	52.5	49.4-55.7	5101	233.0	226.6-239.4
2004	5639	257.7	250.9-264.4	923	43.3	40.5-46.1	4716	214.4	208.3-220.5
2005	5516	248.7	242.1-255.2	1040	47.1	44.2-50.1	4476	201.5	195.6-207.4
2006	5292	236.0	229.6-242.4	963	43.3	40.5-46.1	4329	192.7	186.9-198.4
2007	5234	230.2	224.0-236.5	989	44.0	41.2-46.8	4245	186.3	180.7-191.9
Males									
1999	3283	405.9	391.6-420.1	782	80.5	74.9-86.2	2501	325.3	312.2-338.4
2000	3124	382.8	369.0-396.6	774	78.4	72.8-83.9	2350	304.4	291.8-317.1
2001	2990	360.5	347.3-373.7	752	75.2	69.8-80.6	2238	285.3	273.3-297.4
2002	2955	353.1	340.1-366.1	759	74.7	69.4-80.1	2196	278.4	266.5-290.3
2003	2979	343.5	331.0-356.1	744	71.7	66.5-76.9	2235	271.9	260.4-283.3
2004	2699	312.9	300.9-325.0	621	59.4	54.7-64.1	2078	253.6	242.5-264.6
2005	2731	307.9	296.2-319.7	716	66.0	61.1-70.9	2015	242.0	231.3-252.7
2006	2605	288.2	277.0-299.5	662	60.3	55.6-65.0	1943	227.9	217.7-238.2
2007	2590	280.6	269.7-291.6	711	64.3	59.5-69.1	1879	216.4	206.5-226.2

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Females									
1999	3676	276.8	267.8-285.9	369	36.2	32.5-39.9	3307	240.6	232.4-248.8
2000	3395	253.8	245.2-262.4	317	30.8	27.4-34.3	3078	223.0	215.1-230.9
2001	3302	246.0	237.5-254.4	333	32.0	28.5-35.4	2969	214.0	206.3-221.7
2002	3257	241.1	232.8-249.5	306	29.1	25.8-32.4	2951	212.0	204.3-219.7
2003	3229	238.4	230.1-246.7	363	33.9	30.4-37.4	2866	204.5	197.0-212.0
2004	2940	215.2	207.4-223.1	302	27.6	24.5-30.8	2638	187.6	180.4-194.8
2005	2785	203.0	195.4-210.6	324	28.8	25.6-32.0	2461	174.2	167.2-181.1
2006	2687	194.3	186.8-201.7	301	26.9	23.8-30.0	2386	167.4	160.6-174.2
2007	2644	187.8	180.5-195.0	278	24.2	21.3-27.1	2366	163.5	156.9-170.2

Table 8.3. Acute Myocardial Infarction (MI) Deaths, Age Adjusted Mortality Rates, and 95% Confidence Intervals

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Total									
1999	1821	86.5	82.5-90.5	372	18.6	16.7-20.5	1449	67.9	64.4-71.4
2000	1802	85.1	81.2-89.0	395	19.5	17.6-21.5	1407	65.6	62.2-69.0
2001	1626	76.3	72.6-80.0	368	18.0	16.1-19.8	1258	58.4	55.1-61.6
2002	1494	69.4	65.9-72.9	298	14.3	12.7-15.9	1196	55.1	52.0-58.2
2003	1452	66.9	63.4-70.3	325	15.5	13.8-17.2	1127	51.4	48.4-54.4
2004	1309	59.8	56.6-63.1	231	10.8	9.4-12.2	1078	49.0	46.1-51.9
2005	1303	58.8	55.6-62.0	268	12.1	10.6-13.5	1035	46.7	43.9-49.6
2006	1193	53.4	50.3-56.4	263	11.7	10.3-13.2	930	41.7	39.0-44.3
2007	1119	49.0	46.2-51.9	246	10.4	9.1-11.7	873	38.6	36.1-41.2
Males									
1999	960	113.9	106.5-121.2	274	28.0	24.7-31.3	686	85.8	79.3-92.4
2000	995	117.5	110.0-125.0	301	30.3	26.9-33.7	694	87.2	80.5-93.9
2001	855	100.2	93.3-107.1	264	26.3	23.1-29.5	591	73.9	67.8-80.0
2002	754	87.6	81.2-94.0	211	20.7	17.9-23.5	543	66.9	61.2-72.7
2003	786	88.5	82.2-94.9	228	22.2	19.3-25.1	558	66.3	60.7-71.9
2004	696	78.9	72.9-84.9	168	16.0	13.5-18.4	528	62.9	57.5-68.4
2005	674	75.2	69.4-80.9	166	15.3	13.0-17.7	508	59.8	54.5-65.1
2006	644	69.3	63.9-74.8	190	17.1	14.7-19.6	454	52.2	47.3-57.0
2007	588	61.8	56.7-66.8	176	15.3	13.0-17.6	412	46.5	42.0-51.0

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	Year	# Deaths	Rate	95% CI	Year	# Deaths
Females									
1999	861	65.7	61.3-70.1	98	9.6	7.8-11.7	763	56.1	52.1-60.1
2000	807	61.5	57.2-65.8	94	9.1	7.4-11.2	713	52.4	48.5-56.2
2001	771	58.3	54.2-62.5	104	9.8	7.9-11.7	667	48.5	44.8-52.2
2002	740	55.8	51.7-59.9	87	8.1	6.5-10.0	653	47.7	44.0-51.4
2003	666	50.3	46.4-54.2	97	8.9	7.2-10.8	569	41.4	38.0-44.8
2004	613	45.1	41.5-48.7	63	5.8	4.4-7.4	550	39.4	36.0-42.7
2005	629	47.0	43.3-50.7	102	8.9	7.1-10.6	527	38.1	34.9-41.4
2006	549	41.0	37.6-44.5	73	6.4	5.1-8.1	476	34.6	31.5-37.7
2007	531	38.4	35.1-41.7	70	5.7	4.4-7.2	461	32.7	29.7-35.7

Table 8.4. Coronary Heart Disease Deaths, Age Adjusted Mortality Rates, and 95% Confidence Intervals

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Total									
1999	4965	236.6	230.0-243.2	849	42.5	39.7-45.4	4116	194.0	188.1-200.0
2000	4723	223.5	217.1-229.9	851	42.1	39.3-44.9	3872	181.4	175.7-187.1
2001	4598	215.8	209.5-222.0	842	41.2	38.4-44.0	3756	174.6	169.0-180.2
2002	4533	211.0	204.8-217.1	824	39.7	37.0-42.5	3709	171.2	165.7-176.8
2003	4493	206.5	200.5	880	41.6	38.8-44.3	3613	164.9	159.6-170.3
2004	3979	181.7	176.1-187.4	694	32.4	30.0-34.8	3285	149.3	144.2-154.4
2005	3965	178.7	173.1-184.2	805	36.3	33.8-38.9	3160	142.3	137.4-147.3
2006	3664	163.7	158.4-169.1	733	33.1	30.6-35.5	2931	130.7	125.9-135.4
2007	3618	159.5	154.3-164.7	755	33.6	31.1-36.0	2863	125.9	121.3-130.6
Males									
1999	2448	299.8	287.6-312.0	606	62.1	57.1-67.0	1842	237.7	226.6-248.9
2000	2416	291.7	279.7-303.6	633	63.9	58.9-68.9	1783	227.7	216.9-238.6
2001	2292	273.3	261.9-284.8	607	60.5	55.7-65.4	1685	212.8	202.4-223.2
2002	2293	271.1	259.7-282.4	610	59.9	55.1-64.7	1683	211.2	200.9-221.5
2003	2320	264.7	253.7-275.6	616	59.3	54.6-64.0	1704	205.3	195.4-215.2
2004	2027	232.7	222.3-243.0	488	46.4	42.2-50.6	1539	186.3	176.8-195.7
2005	2081	233.0	222.8-243.3	577	53.0	48.6-57.4	1504	180.0	170.8-189.2
2006	1941	212.7	203.0-222.3	533	48.6	44.4-52.8	1408	164.0	155.4-172.7
2007	1895	203.4	194.1-212.6	559	50.8	46.5-55.1	1336	152.5	144.3-160.8

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Females									
1999	2517	189.2	181.8-196.7	243	23.7	20.7-26.7	2274	165.5	158.7-172.3
2000	2307	172.6	165.5-179.7	218	21.1	18.3-23.9	2089	151.5	145.0-158.1
2001	2306	171.7	164.6-178.8	235	22.4	19.6-25.3	2071	149.3	142.8-155.7
2002	2240	166.0	159.1-173.0	214	20.2	17.4-22.9	2026	145.9	139.5-152.2
2003	2173	160.9	154.1-167.7	264	24.3	21.3-27.3	1909	136.6	130.4-142.7
2004	1952	143.1	136.7-149.5	206	18.8	16.2-21.4	1746	124.3	118.4-130.2
2005	1884	137.5	131.2-143.8	228	20.1	17.5-22.8	1656	117.4	111.7-123.0
2006	1723	125.6	119.5-131.6	200	18.0	15.4-20.5	1523	107.6	102.2-113.1
2007	1723	122.9	117.0-128.7	196	16.8	14.4-19.2	1527	106.1	100.7-111.5

Table 8.5. Heart Failure Deaths, Age Adjusted Mortality Rates, and 95% Confidence Intervals

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Total									
1999	659	31.4	29.0-33.8	32	1.6	1.1-2.2	627	29.9	27.5-32.2
2000	614	29.1	26.8-31.4	30	1.5	1.0-2.1	584	27.7	25.4-29.9
2001	621	29.1	26.8-31.4	48	2.3	1.7-3.1	573	26.8	24.6-29.0
2002	621	28.9	26.6-31.1	39	1.9	1.3-2.6	582	27.0	24.8-29.2
2003	611	28.0	25.8-30.2	32	1.5	1.0-2.1	579	26.5	24.3-28.7
2004	598	27.1	25.0-29.3	34	1.5	1.1-2.1	564	25.6	23.5-27.7
2005	582	26.1	24.0-28.2	43	1.9	1.4-2.6	539	24.2	22.1-26.2
2006	663	29.1	26.9-31.3	39	1.6	1.1-2.2	624	27.5	25.4-29.7
2007	623	27.0	24.9-29.1	49	2.1	1.6-2.8	574	24.9	22.8-26.9
Males									
1999	234	31.4	27.2-35.5	17	1.7	1.0-2.7	217	29.7	25.6-33.7
2000	211	29.1	25.0-33.1	16	1.6	0.9-2.6	195	27.5	23.5-31.4
2001	247	32.7	28.5-36.8	29	2.9	1.9-4.1	218	29.8	25.8-33.8
2002	228	30.1	26.1-34.1	25	2.4	1.6-3.6	203	27.7	23.8-31.5
2003	209	26.5	22.8-30.1	19	1.8	1.1-2.8	190	24.7	21.1-28.3
2004	227	28.2	24.5-32.0	20	1.7	1.1-2.7	207	26.5	22.8-30.2
2005	222	27.0	23.4-30.6	26	2.5	1.6-3.7	196	24.5	21.0-27.69
2006	235	28.3	24.6-32.0	19	1.6	1.0-2.5	216	26.7	23.1-30.3
2007	251	29.1	25.5-32.8	28	2.4	1.6-3.5	223	26.7	23.2-30.2

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Females									
1999	425	30.9	28.0-33.9	15	1.4	0.8-2.3	410	29.5	26.6-32.4
2000	403	29.2	26.3-32.1	14	1.3	0.7-2.2	389	27.9	25.1-30.7
2001	374	27.0	24.2-29.7	19	1.8	1.1-2.7	355	25.2	22.6-27.8
2002	393	28.1	25.3-30.9	14	1.3	0.7-2.2	379	26.7	24.0-29.4
2003	402	28.5	25.7-31.3	13	1.2	0.6-2.1	389	27.3	24.6-30.0
2004	371	26.5	23.7-29.2	14	1.3	0.7-2.2	357	25.2	22.5-27.8
2005	360	25.1	22.5-27.7	17	1.4	0.8-2.2	343	23.8	21.2-26.3
2006	428	29.4	26.6-32.2	20	1.6	1.0-2.5	408	27.8	25.1-30.5
2007	372	25.3	22.7-27.9	21	1.8	1.1-2.8	351	23.5	21.0-26.0

Table 8.6. Stroke Deaths, Age Adjusted Mortality Rates, and 95% Confidence Intervals

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Total									
1999	1341	64.0	60.6-67.5	139	7.0	5.8-8.2	1202	57.0	53.8-60.3
2000	1271	60.1	56.8-63.4	132	6.5	5.4-7.7	1139	53.5	50.4-56.6
2001	1262	59.2	55.9-62.4	126	6.3	5.2-7.4	1136	52.9	49.8-56.0
2002	1237	57.4	54.2-60.6	129	6.2	5.1-7.3	1108	51.2	48.2-54.2
2003	1298	59.6	56.4-62.9	134	6.5	5.4-7.6	1164	53.2	50.1-56.2
2004	1197	54.6	51.5-57.7	152	7.2	6.0-8.3	1045	47.5	44.6-50.4
2005	1190	53.6	50.6-56.7	137	6.3	5.2-7.4	1053	47.3	44.5-50.2
2006	1105	49.0	46.1-51.9	145	6.3	5.3-7.4	960	42.6	39.9-45.3
2007	1112	48.8	46.0-51.7	165	7.3	6.2-8.4	947	41.5	38.9-44.2
Males									
1999	486	64.4	58.5-70.3	76	7.8	6.1-9.7	410	56.6	51.0-62.3
2000	507	65.4	59.6-71.3	59	5.9	4.5-7.6	448	59.5	53.9-65.2
2001	482	59.3	53.9-64.7	78	7.9	6.2-9.8	404	51.4	46.3-56.5
2002	459	56.5	51.2-61.8	55	5.3	4.0-7.0	404	51.1	46.0-56.2
2003	503	61.0	55.5-66.4	71	7.0	5.5-8.8	432	54.0	48.8-59.1
2004	437	52.0	47.1-57.0	79	7.6	6.0-9.5	358	44.5	39.8-49.1
2005	427	49.8	45.0-54.6	70	6.5	5.1-8.2	357	43.3	38.8-47.9
2006	418	47.0	42.5-51.6	81	7.3	5.8-9.0	337	39.8	35.5-44.1
2007	438	48.5	43.9-53.1	90	8.1	6.5-10.0	348	40.3	36.1-44.6

	All Ages			<65			65+		
Year	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI	# Deaths	Rate	95% CI
Females									
1999	855	63.9	59.6-68.2	63	6.3	4.8-8.1	792	57.6	53.6-61.6
2000	764	57.4	53.3-61.5	73	7.2	5.6-9.0	691	50.3	46.5-54.0
2001	780	57.3	53.3-61.4	48	4.7	3.5-6.3	732	52.6	48.8-56.4
2002	778	57.7	53.6-61.7	74	7.1	5.5-8.9	704	50.6	46.9-54.4
2003	795	58.0	53.9-62.0	63	5.9	4.6-7.6	732	52.0	48.2-55.8
2004	760	55.6	51.6-59.6	73	6.8	5.3-8.5	687	48.8	45.2-52.5
2005	763	55.1	51.2-59.1	67	6.1	4.7-7.8	696	49.0	45.4-52.7
2006	687	48.9	45.2-52.6	64	5.4	4.2-6.9	623	43.5	40.0-46.9
2007	674	48.2	44.5-51.8	75	6.5	5.1-8.2	599	41.6	38.3-45.0

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