The Burden of Cardiovascular Disease in North Carolina
September 2012 Update

Samuel N. Tchwenko, MD, MPH
Heart Disease & Stroke Prevention Branch
Chronic Disease & Injury Section
Division of Public Health
North Carolina Department of Health and Human Services

For electronic copies and periodic updates, please visit www.startwithyourheart.com.
# Table of Contents

Acknowledgments ......................................................................................................................... ii

## Cardiovascular Disease
- Cardiovascular Disease Deaths .......................................................................................... 1
- Cardiovascular Disease Morbidity & Disability ...................................................................... 4
- Cardiovascular Disease Costs & Economics .......................................................................... 5

## Stroke
- Stroke Deaths .......................................................................................................................... 7
- Stroke Morbidity & Disability ................................................................................................. 11
- Stroke Costs & Economics ..................................................................................................... 13
- Knowledge of Stroke Symptoms & Emergency Action ......................................................... 15

## Heart Disease
- Heart Disease Deaths ............................................................................................................ 19
- Heart Disease Morbidity & Disability .................................................................................... 22
- Heart Disease Costs & Economics ......................................................................................... 23

## Coronary Heart Disease
- Coronary Heart Disease Deaths ........................................................................................ 25
- Coronary Heart Disease Morbidity & Disability ................................................................... 28
- Coronary Heart Disease Costs & Economics ....................................................................... 30
- Knowledge of Heart Attack Symptoms & Emergency Action ............................................. 31

## Heart Failure
- Heart Failure Deaths ............................................................................................................. 36
- Congestive Heart Failure Morbidity & Disability ................................................................. 38
- Congestive Heart Failure Costs & Economics .................................................................. 40

## High Blood Pressure
- Blood Pressure Screening .................................................................................................... 42
- Hypertension Prevalence ...................................................................................................... 44
- Hypertension Treatment & Control ..................................................................................... 48

## High Blood Cholesterol
- Cholesterol Screening ......................................................................................................... 51
- High Cholesterol Prevalence ............................................................................................... 54
- High Cholesterol Treatment & Control ................................................................................. 57

## Other Risk Factors
- Physical Activity ..................................................................................................................... 58
- Nutrition .................................................................................................................................. 59
- Tobacco Use ......................................................................................................................... 60
- Overweight & Obesity .......................................................................................................... 61
- Diabetes ................................................................................................................................ 63
- Atrial Fibrillation ................................................................................................................... 64

## References ........................................................................................................................... 65
Acknowledgments

We would like to thank:

- The entire staff of the Heart Disease and Stroke Prevention (HDSP) Branch of the N.C Division of Public Health for their support and very helpful reviews, especially:
  - Audrey Foster, Social and Clinical Research Assistant at HDSP, for her dedication and attention to detail as well as for the remarkable effort she put into abstracting data, entering numbers and outputs into tables and figures, editing with a fine-toothed comb, and doing so much more to ensure that this document was of utmost quality.

- All staff of the NC State Center for Health Statistics (SCHS) for ensuring high quality, useful and accessible data for many of the data sources that were used to produce this document, especially:
  - Karen Knight, Director of SCHS, for her leadership and facilitation of collaboration between the Heart Disease and Stroke Prevention Program and SCHS.
  - Kathleen Jones-Vessey, Head of the Statistical Services Unit of the SCHS, for her willingness to go the extra mile to make all requested data available to us in a timely manner and for her helpful review.
  - James Cassell and Harry Herrick of the Survey Operations Team of SCHS, for making data from the N.C. Behavioral Risk Factor Surveillance System (BRFSS) available and for their willingness to perform supplemental analysis to meet the needs of the Heart Disease and Stroke Prevention Program.
  - Vito Di Bona of the Survey Operations Team of SCHS, for his availability and willingness to provide a full orientation to the Child Health Assessment and Monitoring Program (CHAMP) data.
  - Allison Hayes of the Health Services Analysis Team of SCHS, for providing all the hospital discharge data.
  - Tim Whitmire of the Health Services Analysis Team of SCHS for running the necessary analysis, to provide us with the most recent Medicaid data.

- Sara Huston, Chronic Disease Epidemiologist, Maine Center for Disease Control & Prevention and former Epidemiologist for HDSP, for her unmatched dedication in ensuring a seamless transition for the new data unit staff of HDSP as well as her willingness to review this document.
• Sam Thompson and Parvati Potru for reviewing the "Other Risk Factors" chapter and providing helpful suggestions.
Without their efforts, the publication of this document would not have been possible.
Cardiovascular Disease

**CARDIOVASCULAR DISEASE DEATHS**

**In Brief: CVD Deaths**

- Cardiovascular disease (CVD) includes the second and fourth leading causes of death in North Carolina — heart disease and stroke — and is also a major cause of premature death and years of potential life lost.
- CVD causes almost 30 percent of all deaths in North Carolina.
- One in five CVD deaths among North Carolinians occurs among those younger than 65.
- If all forms of major CVD were eliminated, life expectancy in the U.S. would rise by nearly seven years.
- Significant racial and geographic disparities in CVD mortality exist in N.C.

**Nationwide**

- If all forms of major cardiovascular disease (CVD) were eliminated, life expectancy in the U.S. would rise by nearly seven years.¹
- Each day, CVD kills nearly 2,300 Americans. That is an average of one death due to CVD every 38 seconds.¹

**Statewide**

- Cardiovascular disease includes the second and fourth leading causes of death in N.C., heart disease and stroke (Figure 1.1).
- In 2010, cardiovascular disease caused 23,232 deaths among North Carolinians, almost 30 percent of all deaths in that year (Figure 1.1).
- North Carolina's 2008 age-adjusted major CVD (ICD-10 codes: I00-I78) death rate is the 21st highest among the 50 states and Washington, D.C.²
- North Carolina’s 2008 age-adjusted major cardiovascular disease death rate of 251.8 per 100,000 was slightly higher than the national rate of 243.5 per 100,000 (Figure 1.2 and Table 1.1).
- Cardiovascular disease includes the second and third leading causes of total years of potential life lost in N.C., heart disease and stroke.³
Trends over Time

- Cardiovascular disease death rates in N.C. declined only 14.2 percent between 1990 and 2000 (an average annual decline of 1.5 percent) and hardly declined at all in the late 1990s. Between 2000 and 2008, however, those rates declined by 31.4 percent, with an average annual decline of 4.6 percent (Figure 1.2 and Table 1.1).
- Cardiovascular disease death rates declined slightly faster in N.C. between 2000 and 2008 than they did in the U.S. overall (Figure 1.2 and Table 1.1).

Age

- Cardiovascular disease death rates in North Carolina increase with age (Figure 1.3).
- Between 2004-2008, 21.5 percent of total cardiovascular disease deaths in North Carolina occurred among those younger than 65, compared to the national average of 18.3 percent (Table 1.2).

Men and Women

- In North Carolina, cardiovascular disease death rates are higher among men than among women. In 2008, the cardiovascular disease death rate was 304.7 among men and 210.2 among women (Figure 1.4 and Table 1.1).
- CVD death rates are higher among men than women in all age groups (Figure 1.3).
- During the 1980’s and 1990’s, cardiovascular disease death rates declined more rapidly over time among men than among women, but since 2000 have declined at similar rates for both genders (Figure 1.4 and Table 1.1).
- The total number of cardiovascular disease deaths each year is higher among women than men in N.C. (2008: 12,098 cardiovascular disease deaths among women, 11,422 among men).
- Men are more likely to die of cardiovascular disease at a younger age than are women. Among men, 29.8 percent of total CVD deaths occur before age 65, compared to 13.7 percent among women (Table 1.2).
Racial and Ethnic Groups

- African American North Carolinians have higher cardiovascular disease death rates than do White North Carolinians (Figure 1.5 and Table 1.1). The disparities in death rates between African Americans and whites have persisted over time (Figure 1.5).
- In North Carolina, African American men have the highest age-adjusted cardiovascular disease death rates, followed by white men. African American women have slightly lower CVD death rates than white men, and white women have the lowest rates (Figure 1.6 and Table 1.1).
- African American North Carolinians are more likely to die of cardiovascular disease at younger ages than their white counterparts. Among African American men, 43.2 percent of total CVD deaths occur before age 65, compared with 25.9 percent among White men. Among African American women, 24.7 percent of CVD deaths occur before age 65, compared with 10.4 percent among White women (Figure 1.7 and Table 1.2).

Geography

- A map of 2004-2008 CVD death rates by county in N.C. shows that higher CVD death rates are clustered primarily in eastern N.C. (Figure 1.8 and Table 1.3).
- The percentage of CVD deaths occurring before age 65 varies across counties, ranging from 11.5 to 29.6 percent (Table 1.4). Among Heart Disease & Stroke Prevention (HDSP) Program Regions, the percentage of CVD deaths occurring before age 65 is highest in the East Region (21.9 percent) and lowest in the Southwest Region (17.0 percent) (Table 1.4).
**CARDIOVASCULAR DISEASE MORBIDITY & DISABILITY**

**In Brief: CVD Morbidity**

- Cardiovascular disease results in substantial morbidity and disability among North Carolinians and among Americans in general.
- After remaining essentially unchanged from 1995 to 2000, CVD hospitalization rates have been declining since 2001.
- The highest CVD hospitalization rates are clustered primarily in eastern N.C., a pattern similar to that of CVD death rates.

**Nationwide**

- Currently, 82.6 million Americans (36.2 percent of the entire U.S. population) have some type of cardiovascular disease. Approximately 39.9 million of those with CVD are men and 42.7 million are women. ⁴
- In 2005, almost 5 million Americans reported having a disability, such as functional limitations or difficulty carrying out activities of daily living, as a result of heart trouble, stroke or high blood pressure. ⁵

**Statewide**

- In 2010, there were 162,329 hospitalizations in N.C. for cardiovascular disease (Figure 1.9 and Table 1.5).

**Trends over Time**

- Age-adjusted hospitalization rates of CVD in N.C. changed very little between 1995 to 2000, but those rates then declined from 2,119 per 100,000 in 2001 to 1,611.2 per 100,000 in 2010 (Figure 1.10 and Table 1.5).

**Age**

- CVD hospitalization rates in N.C. increase with increasing age (Figure 1.11).
- Forty percent of all CVD hospitalizations in N.C. occur in people younger than 65 years of age (Figure 1.12).

**Men and Women**

- Both the age-adjusted CVD hospitalization rate and the annual number of CVD hospitalizations are higher for men than for women in N.C. (Figure 1.10 and Table 1.5).
• Age-adjusted CVD hospitalization rates decreased among both men and women between 2001 and 2010 (Figure 1.10 and Table 1.5).

• In 2010, CVD hospitalization rates were similar among men and women in the <25 year and 25-34 year age groups and higher for men than for women in all other age groups (Figure 1.11).

• Nearly one in two (46 percent) males and one in three (34 percent) females hospitalized for CVD are younger than 65 years of age (Figure 1.12).

**Geography**

• The highest CVD hospitalization rates are clustered primarily in eastern N.C., a pattern similar to that of CVD death rates (Figure 1.13 and Table 1.6).

### CARDIOVASCULAR DISEASE COSTS & ECONOMICS

**In Brief: CVD Costs**

• The mortality, morbidity and disability caused by cardiovascular disease have a large economic impact in terms of both direct and indirect costs. Direct costs are those associated with hospital care, physician and nursing services, and medications. Indirect costs include lost productivity due to morbidity and mortality and are more difficult to estimate.

• After adjusting for inflation, total hospital charges for CVD in N.C. increased by more than 76 percent between 1995 and 2010, and currently exceed $5.7 billion annually.

**Nationwide**

• In the United States, the direct and indirect costs for cardiovascular disease were estimated to total $297.7 billion in 2008 (Figure 1.14). 4

**Statewide**

• Total hospital charges for CVD in N.C. currently exceed $5.7 billion annually (Figure 1.15 and Table 1.5). These N.C. cost estimates are direct hospital charges only and do not include either indirect costs or other healthcare charges.

• The average charge per hospital stay for CVD in N.C. currently exceeds $35,000 (Figure 1.16 and Table 1.5).
**Trends over Time**

- In North Carolina, after adjusting for inflation, total hospital charges for CVD increased by more than 76 percent between 1995 and 2010, climbing from $3.3 billion to more than $5.7 billion in 2011 dollars (Figure 1.15 and Table 1.5).

- The climb in total hospital charges for CVD has been driven mainly by increases in the average charge per stay for CVD hospitalizations. Between 1995 and 2010, the average charge per stay for CVD hospitalizations in N.C. rose from $23,393 to $35,489 in 2011 dollars, while the annual number of CVD hospitalizations has remained relatively stable, increasing only by about 1,500 cases per year over the same period (Figure 1.16 and Table 1.5).

**Men and Women**

- Total hospital charges for CVD in N.C. are higher for males than for females ($3.3 billion vs. $2.5 billion in 2010, respectively) (Figure 1.15 and Table 1.5). This is due to a combination of a greater number of annual CVD hospitalizations and a higher average charge per stay for CVD hospitalizations for males compared to females (Table 1.5).

- The average charge per stay for CVD hospitalizations in N.C. for 2010 was $39,335 for males compared to $31,358 for females and has been increasing since 1999 for both men and women, even after adjusting for inflation (Figure 1.16 and Table 1.5).
Stroke

**STROKE DEATHS**

*In Brief: Stroke Deaths*

- Stroke is the fourth leading cause of death in North Carolina and is also a major cause of premature death and years of life lost.
- N.C. has the seventh highest stroke death rate in the nation and is part of the Stroke Belt and the Stroke Buckle, areas of the U.S. that historically have had the highest stroke death rates.
- While N.C.’s stroke death rate is on the decline, it remains higher than the U.S. rate.
- Historically in N.C., men have had higher stroke death rates than women; however, between 1995 and 2002, rates among men have declined more rapidly than those for women. As a result, age-adjusted stroke death rates among men and women are now similar.
- Significant racial and geographic disparities in stroke mortality exist in N.C.

**Statewide**

- Stroke was the fourth leading cause of death in N.C. in 2010 (Figure 2.1). Stroke had been the third leading cause of death in N.C. for many years, but dropped to fourth in 2008 because the number of chronic lower respiratory disease deaths increased, making it the third leading cause. In 2009 stroke once again overtook chronic lower respiratory disease as the 3rd leading cause of death before dropping to fourth due to a rise in lower respiratory disease deaths as well as a slight drop in total number of stroke deaths in 2010. Even though stroke has once more fallen to the fourth leading cause of death in NC, it is possible (although impossible to predict) that stroke and chronic lower respiratory disease may continue to alternate as the third and fourth leading causes of death for some number of years to come. This fluctuation is due to the relatively small (less than 300 deaths) difference in the total number of deaths caused by stroke and chronic lower respiratory disease.
- In 2010, stroke caused 4,281 deaths among North Carolinians, 5.4 percent of all deaths in that year (Figure 2.1).
- The state's 2008 age-adjusted stroke death rate is the seventh highest (down from sixth in 2006) among the 50 states and Washington, D.C.²
- The state’s 2008 age-adjusted stroke death rate of 50.2 per 100,000 was higher than the national rate of 40.7 per 100,000 (Figure 2.3 and Table 2.1).
- Stroke is the sixth leading cause of total years of life lost in N.C., resulting in an estimated 23,695 years of life lost during 2009.³

**Trends over Time**
- Stroke death rates in N.C. declined only 8.2 percent between 1990 and 2000 (an average annual decline of less than 1 percent), but have since declined by 36.1 percent between 2000 and 2008, an average annual decline of 5.4 percent (Figure 2.3 and Table 2.1).
- Stroke death rates declined faster in N.C. between 2000 and 2008 than they did in the U.S. overall (Figure 2.3 and Table 2.1).
- North Carolina’s 2009 age-adjusted stroke death rate of 46.6 per 100,000 was below both the National Healthy People 2010 target of 50 per 100,000 and the NC Healthy People 2010 target of 48 per 100,000. The state will need to maintain an annual decline of at least 3.2 percent to reach the National Healthy People 2020 target of 33.8 per 100,000 (Figure 2.2).

**Age**
- Stroke death rates in N.C. increase with age (Figure 2.4).
- In North Carolina, 15.8 percent of stroke deaths occur among those younger than 65, slightly higher than the national percentage of 14.1 percent (Table 2.2).

**Men and Women**
- Stroke is the third leading cause of death among women and the fourth leading cause of death among men.⁶
- Historically in N.C., men have had higher stroke death rates than women; however, between 1995 and 2002, rates among men declined more rapidly than those for women, with rates among men falling to the level of those for women. As a result, the 2008 age-adjusted stroke death rate among men (51.4 per 100,000) is quite similar to that for women (48.5 per 100,000) (Figure 2.5 and Table 2.1).
• Stroke death rates are similar between men and women in the <45 year age group, higher among men than women in the 45-84 year age groups, and are higher among women than men in the 85+ year age group (Figure 2.4).
• The total number of stroke deaths each year is higher among women than men in N.C. (2008: 2,788 stroke deaths among women, 1,849 among men). ²
• Men are more likely to die of stroke at a younger age than are women. Among men, 22.4 percent of stroke deaths occur before age 65, compared to 11.4 percent among women in 2004-08 (Table 2.2).

Racial and Ethnic Groups

• African American North Carolinians have higher stroke death rates than do white North Carolinians (Figure 2.7). The disparities in death rates between African Americans and whites have persisted over time (Figure 2.7 and Table 2.1).
• In North Carolina, African American men currently have the highest age-adjusted stroke death rates, followed by African American women. White men and women have similar age-adjusted stroke death rates, both lower than those of African American men and women (Figure 2.8 and Table 2.1).
• Stroke death rates have declined among African American men and women and white men and women since 2000 (Figure 2.8 and Table 2.1).
• African American North Carolinians are more likely to die of stroke at younger ages than their white counterparts. Among African American men, 38.8 percent of stroke deaths occur before age 65, compared with 16 percent among white men; 22.6 percent of stroke deaths among African American women occur before age 65, compared with 7.8 percent among white women (Figure 2.9 and Table 2.2).
• Hispanic North Carolinians have much lower stroke death rates than non-Hispanic North Carolinians (Figure 2.6).
• In 2010, stroke was the third leading cause of death among N.C. African Americans, the fourth leading cause of death among N.C. whites, the seventh leading cause of death among N.C. American Indians and the ninth leading cause of death among N.C. Hispanics. ⁶
**Geography**

- N.C. is part of the Stroke Belt, an 8- to 12-state region (typically including Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee, and often including Florida, Indiana, Kentucky, Virginia, as well as Washington, D.C.) that historically has had substantially higher stroke death rates than the rest of the nation. 7-9

- The eastern counties of N.C. are part of the Buckle of the Stroke Belt, the coastal plains region of Georgia (Ga.), South Carolina (S.C.), and North Carolina (N.C.) that has consistently had the very highest stroke death rates in the nation for at least the past 30 years. 10-12 The causes of the Stroke Buckle, however, are largely unknown and have historically been under-investigated. 13

- For residents of the Stroke Buckle in N.C., S.C., and Ga., stroke death rates among 35- to 54-year-olds are more than twice that of the rest of the nation, and those for 55- to 74-year-olds are 1.7 times as high as those of the rest of the nation, 11 resulting in an estimated 1,200 excess stroke deaths in these 153 counties each year. 12

- A map of 2006-2010 stroke death rates by county in N.C. shows the higher stroke death rates clustered primarily in the eastern counties and coastal plain region (Figure 2.10 and Table 2.3). 14

- The percentage of stroke deaths occurring before age 65 varies across counties, ranging from 3.7 to 30.2 percent. Among HDSP Regions, the percentage of stroke deaths occurring before age 65 is highest in the Northeast Region (17.5 percent) and lowest in the Southwest Region (11.2 percent) (Table 2.4).
STROKE MORBIDITY & DISABILITY

In Brief: Stroke Morbidity

- Stroke results in substantial morbidity and disability among North Carolinians and Americans in general.
- Stroke is a leading cause of serious, long-term disability in the United States. A stroke can result in loss of physical and cognitive functions, inability to care for one's self, inability to communicate, and a need for ongoing care.
- Stroke hospitalization rates have declined in N.C. since 1997.
- More than 220,000 adult North Carolinians have a history of stroke.
- The highest stroke hospitalization rates are clustered primarily in the coastal plains region of N.C., a pattern similar to that of stroke death rates.

Nationwide

- Currently, 7 million Americans have had a stroke; approximately 2.8 million of these stroke survivors are men and 4.2 million are women.4
- Each year, 795,000 Americans have a stroke.4
- In 2005, almost 1.1 million Americans reported having a disability, such as functional limitations or difficulty carrying out activities of daily living, as the result of a stroke.3

Statewide

- In 2010, there were 29,429 hospitalizations in N.C. for stroke, accounting for 18.1 percent of all cardiovascular disease hospitalizations (Table 2.5 and Figure 2.11).
- According to the 2010 N.C. Behavioral Risk Factor Surveillance System (BRFSS), a statewide telephone survey of non-institutionalized adults, 3.1 percent of N.C. adults — more than 220,000 people — have a history of stroke (Table 2.6). Since this survey excludes people living in long-term care facilities and people who had difficulty communicating over the phone, this is likely to be an underestimate of the true prevalence of stroke.
**Trends over Time**

- Age-adjusted hospitalization rates for stroke in N.C. rose from 365.0 per 100,000 population in 1995 to 389.9 in 1997, but have since declined to 292.2 in 2010 (Figure 2.12 and Table 2.5). Rates for males and females show similar trends.

**Age**

- Stroke hospitalization rates in N.C. increase with increasing age (Figure 2.13).
- More than one-third (36.8 percent) of all stroke hospitalizations in N.C. occur in people younger than 65 years of age (Figure 2.14).
- Self-reported history of stroke among N.C. adults increases with increasing age and is highest in the 75+ year age group (13.1 percent) (Figure 2.15 and Table 2.6).

**Men and Women**

- Age-adjusted stroke hospitalization rates are higher for men than for women in N.C. (Figure 2.12 and Table 2.5), however, the number of hospitalizations is higher for women than for men (Table 2.5).
- Age-adjusted stroke hospitalization rates have been declining for both men and women since 2001 (Figure 2.12 and Table 2.5)
- Stroke hospitalization rates are higher for men than women in the age groups between 45 and 84 years, similar for men and women in the <25 and 35-44 year age groups, and slightly higher for women than men in the 25-34 and 85+ year age groups (Figure 2.13).
Racial and Ethnic Groups

- Self-reported history of stroke among N.C. adults is higher among African Americans (3.8 percent) than whites (3.0 percent). (Figure 2.16 and Table 2.6).

Socio-economic Groups

- Self-reported history of stroke among N.C. adults decreases with increasing education and income and is highest in the “less than high school” education group (5.4 percent) (Figure 2.17 and Table 2.6) and in the “less than $15,000” income group (5.9 percent) (Figure 2.18 and Table 2.6).

Geography

- The highest stroke hospitalization rates are clustered primarily in the coastal plains region of N.C., a pattern similar to that of stroke death rates (Figure 2.19 and Table 2.7).
- In 2010, self-reported history of stroke did not vary much across North Carolina regions. The Western region of N.C. had the highest rate (3.5 percent), while the Piedmont region had the lowest rate (2.8 percent), but this difference was not statistically significant (Table 2.6).

STROKE COSTS & ECONOMICS

In Brief: Stroke Costs

- The mortality, morbidity and disability caused by stroke have a large economic impact in terms of both direct and indirect costs. Direct costs are those associated with hospital care, physician and nursing services, and medications. Indirect costs include lost productivity due to morbidity and mortality and are more difficult to estimate.
- Direct costs due to stroke in N.C. are estimated be at least $1.05 billion each year.
- Total hospital charges for stroke in N.C. have been steadily rising over the past 15 years and currently exceed $825 million annually.

Nationwide

- In the United States during 2008, the total direct and indirect costs of stroke were estimated to be $34.3 billion (Figure 2.20).
- The average lifetime cost of a stroke is estimated at $103,576 per stroke event.
Statewide

- Total hospital charges for stroke in N.C. currently exceed $825 million annually (Figure 2.21 and Table 2.5). These N.C. cost estimates are direct hospital charges only and do not include either indirect costs or other healthcare charges.
- The average charge per hospital stay for stroke in N.C. currently exceeds $28,000 (Figure 2.22 and Table 2.5).
- In North Carolina, Medicaid costs due to stroke currently exceed $177 million annually, more than $4,500 per N.C. Medicaid beneficiary with a history of stroke (Figure 2.23). 16

Trends over Time

- In North Carolina, after adjusting for inflation, total hospital charges (in 2011 dollars) for stroke climbed from $493 million in 1995 to more than $825 million in 2010 (Figure 2.21 and Table 2.5). These N.C. cost estimates are direct hospital charges only and do not include either indirect costs or other healthcare charges.
- Between 2000 and 2010, the average charge per stay (adjusted to 2011 dollars) for stroke hospitalizations in N.C. rose from $18,515 to $28,037 (Figure 2.22 and Table 2.5).

Men and Women

- Total hospital charges for stroke in N.C. are currently higher for females ($414 million) than for males ($385 million). This is due primarily to the higher number of stroke hospitalizations among females, as the average charge per stay for stroke is actually higher for males ($28,668) than for females ($27,478) (Figures 2.21, 2.22, and Table 2.5).
- Total hospital charges for stroke and the average charge per stay have been climbing at similar rates for males and females in N.C. (Figures 2.21, 2.22, and Table 2.5).
# Knowledge of Stroke Symptoms & Emergency Action

**In Brief: Stroke Knowledge**

- Although most N.C. adults say they would call 911 if they thought someone was having a stroke, the overwhelming majority do not know all the stroke symptoms and would not recognize a stroke if it were occurring.
- Only 17.6 percent of N.C. adults know all the stroke symptoms **and** say they would call 911 if they thought someone was having a stroke.
- N.C. adults who have a history of hypertension or previous stroke, which puts them at high risk for stroke, are no more likely to know all the symptoms of stroke than those who do not have such a history.
- Substantial disparities in stroke symptom knowledge exist between age, race, ethnicity, and socioeconomic groups in N.C.

**Statewide**

- According to the 2009 N.C. BRFSS, 88.2 percent of N.C. adults say they would call 911 if they thought someone was having a stroke (Figure 2.24 and Table 2.6).
- In 2009, only 21.6 percent of N.C. adults knew all the stroke symptoms (Figure 2.24 and Table 2.6).
- In 2009, only 19.4 percent of N.C. adults correctly identified all stroke symptoms **and** said they would call 911 if they thought someone was having a stroke (Figure 2.24 and Table 2.6).
- Three warning signs of stroke were each correctly identified by more than 85 percent of N.C. adults: sudden confusion or trouble speaking; sudden numbness or weakness of face, arm, or leg, especially on one side; and sudden trouble walking, dizziness, or loss of balance (Figure 2.25).
- Less than 75 percent of N.C. adults correctly identified sudden trouble seeing in one or both eyes and severe headache with no known cause as symptoms of stroke (Figure 2.25).
- Only 39 percent of N.C. adults knew that sudden chest pain or discomfort is not a symptom of stroke (Figure 2.25).
**Trends over Time**

- Knowledge of all stroke symptoms and the need to call 911 for stroke did not change significantly in N.C. between 2001 and 2009 (Figure 2.24).
- Knowledge that chest pain is not a symptom of a stroke increased between 2001 and 2009 (Figure 2.25).

**Age**

- North Carolinians in the oldest (65-74 and 75+ years) and youngest (18-24 years) age groups were the least likely to know all the stroke symptoms (Figure 2.15 and Table 2.6).
- Those in the 75+ year age group were less likely to say they would call 911 if they thought someone was having a stroke (83.8 percent) than those in other age groups (Figure 2.15 and Table 2.6).

**Men and Women**

- In 2009, knowledge of stroke symptoms and the need to call 911 for stroke was significantly higher among women than men (Table 2.6).

**Racial and Ethnic Groups**

- Knowledge of all stroke symptoms was lower among African Americans (1.2 percent), American Indians (11.6 percent), Asians (14.3 percent), and those in other racial groups (10.8 percent) than among whites (25.5 percent) (Figure 2.16 and Table 2.6).
- Hispanic North Carolinians were less likely to know all stroke symptoms (9.2 percent) than were non-Hispanic North Carolinians (22.4 percent), and knowledge of stroke symptoms was particularly low among Hispanics who spoke only Spanish (4.5 percent) (Table 2.6).
- Hispanic North Carolinians were just as likely to say they would call 911 if they thought someone was having a stroke (84.3 percent) as were non-Hispanic North Carolinians (88.4 percent) (Table 2.6).
- Knowledge of the need to call 911 for a stroke was similar among whites (88.3 percent), African Americans (88.9 percent), American Indians (93.9 percent), Asians (80.6 percent) and those of other racial groups (84.6 percent) (Figure 2.16 and Table 2.6).
Socio-economic Groups

- Knowledge of all stroke symptoms increased with increasing years of education and was lowest in the “less than high school” group (8.2 percent) and highest in the “college graduate” group (32.3 percent) (Figure 2.17 and Table 2.6).
- Knowledge of all stroke symptoms increased with increasing household income and was lowest in the “less than $15,000” income group (9.9 percent) and highest in the “$75,000+” income group (33.1 percent) (Figure 2.18 and Table 2.6).
- Those in the “less than high school” education group were less likely to say they would call 911 if they thought someone was having a stroke than those in the other education groups (Figure 2.17 and Table 2.6).
- Those in the “less than $15,000” income group were less likely to say they would call 911 if they thought someone was having a stroke (84.4 percent) than those in the “$75,000+” income group (90.2 percent) (Figure 2.18 and Table 2.6).
- The percentage of adults who knew all the stroke symptoms and the need to call 911 increased with increasing years of education and was lowest in the “less than high school” education group (6.4 percent) and highest in the “college graduate” group (30.0 percent) (Figure 2.17 and Table 2.6).
- The percentage of adults who knew all the stroke symptoms and the need to call 911 increased with increasing household income and was lowest in the “less than $15,000” income group (11.3 percent) and highest in the “$75,000+” income group (33.2 percent) (Figure 2.18 and Table 2.6).

Other High-Risk Groups

- Although people with hypertension are at high risk for stroke, knowledge of all stroke symptoms and the need to call 911 was no higher among people with diagnosed hypertension than among those without hypertension (Figure 2.26).
- Looking at knowledge of individual stroke symptoms, North Carolinians with diagnosed hypertension were more likely than those without hypertension to correctly identify severe headache with no known cause and sudden confusion or trouble speaking as stroke symptoms, but were less likely to know that chest pain is not a stroke symptom. Knowledge of the other stroke symptoms was similar between those with diagnosed hypertension and those without hypertension (Figure 2.27).
• Similarly, people with a self-reported history of stroke were no more likely to know all the stroke symptoms than those without a history of stroke, and were actually less likely to say they would call 911 if they thought someone was having a stroke (Figure 2.28).
• Knowledge of individual stroke symptoms was similar among those with and without a history of stroke (Figure 2.29).

**Geography**

• Knowledge of stroke symptoms varies across N.C. regions. Knowledge of all the stroke symptoms was lowest in the Eastern region (19.5 percent) and highest in the Piedmont region (22.5 percent) (Table 2.6).
• Knowledge of the need to call 911 for stroke was relatively similar across N.C. regions (Table 2.6).
Heart Disease

HEART DISEASE DEATHS

In Brief: Heart Disease Deaths

- Heart disease includes coronary heart disease, heart failure, and other types of heart diseases.
- In 2010, heart disease was the second leading cause of death in N.C.
- Heart disease is also a major cause of premature death and years of life lost.
- Heart disease causes 22 percent of all deaths in North Carolina.
- One in five heart disease deaths among North Carolinians occurs before age 65.
- Significant racial and geographic disparities in heart disease mortality exist in N.C.

Statewide

- In 2010, heart disease was the second leading cause of death in N.C. 6 (Figure 3.1). The year 2006 was the first time in nearly 90 years that heart disease dropped from the leading cause of death in North Carolina, to the second leading cause of death behind cancer. 14 This was due to declines in heart disease death rates in N.C. from the late nineties to early two thousands at a faster pace than the declines observed in cancer death rates. From 2006 to 2007, heart disease death rates continued to decline but at a slower pace compared to cancer death rates causing heart disease to reclaim the spot as the number one killer of North Carolinians in both 2007 and 2008. Even though heart disease has once more fallen to the second leading cause of death in NC, it is possible (although impossible to predict) that heart disease and cancer may continue to alternate as the first and second leading causes of death for some number of years to come. This fluctuation is due to the relatively small (less than 1,000 deaths) difference in the total number of deaths caused by cancer and heart disease.
- In 2010, heart disease caused 17,090 deaths among North Carolinians, 22 percent of all deaths in that year (Figure 3.1). 6
- North Carolina's 2008 age-adjusted heart disease death rate is the 25th highest among the 50 states and Washington, D.C. 2
- North Carolina’s 2008 age-adjusted heart disease death rate of 184.9 per 100,000 is similar to the national rate of 186.5 per 100,000 (Figure 3.2 and Table 3.1).
• Heart disease is the second leading cause of total years of life lost in N.C., resulting in an estimated 124,791 years of life lost during 2009.  

Trends over Time
• Heart disease death rates in N.C. declined fairly steadily between 1990 and 2000 (an average annual decline of 1.9 percent), and have since declined more quickly (an average annual decline of 4.4 percent) between 2000 and 2008 (Figure 3.2 and Table 3.1).
• Heart disease death rates declined slightly faster in N.C. between 2000 and 2008 than they did in the U.S. overall (Figure 3.2 and Table 3.1).

Age
• Heart disease death rates in N.C. increase with increasing age (Figure 3.3).
• In North Carolina, 22.8 percent of heart disease deaths occur among those younger than 65, higher than the national percentage of 19.0 percent (Table 3.2).

Men and Women
• Heart disease is the second leading cause of death among both men and women in N.C.  
• In North Carolina, heart disease death rates are higher among men than among women. In 2008, the heart disease death rate was 235.7 among men and 146.3 among women (Figure 3.4 and Table 3.1).
• Heart disease death rates are higher among men than women in all age groups (Figure 3.3).
• Until about 1999, heart disease death rates declined more rapidly over time among men than among women. Since then, declines in heart disease death rates have been similar among men and women (Figure 3.4 and Table 3.1).
• During each year from 1997 to 2003, the annual number of heart disease deaths was higher among women than men in N.C., but since 2004 there have been more heart disease deaths among men than women each year. In 2010, there were 8,970 heart disease deaths among men and 8,120 heart disease deaths among women in N.C.  
• Men are more likely to die of heart disease at a younger age than are women. Among men, 31.3 percent of heart disease deaths occur before age 65, compared to 14.1 percent among women in 2004-08 (Table 3.2).
**Racial and Ethnic Groups**

- African American North Carolinians have higher heart disease death rates than white North Carolinians (Figure 3.5 and Table 3.1). The disparity in death rates between African Americans and whites has persisted over time (Figure 3.5 and Table 3.1).

- In North Carolina, African American men have the highest age-adjusted heart disease death rates, followed by white men and then by African American women. White women have the lowest age-adjusted heart disease death rates (Figure 3.6 and Table 3.1).

- African American North Carolinians are more likely to die of heart disease at younger ages than their white counterparts. Among African American men, 44.3 percent of heart disease deaths occur before age 65, compared with 27.7 percent among white men; 25.4 percent of heart disease deaths among African American women occur before age 65, compared with 10.9 percent among white women (Figure 3.7 and Table 3.2).

- In 2010, heart disease was the second leading cause of death among N.C. whites and N.C. African Americans, and was the leading cause of death among N.C. American Indians. Heart disease was also the second leading cause of death among N.C. Hispanics. 6

**Geography**

- A map of 2006-2010 heart disease death rates by county in N.C. shows the highest death rates clustered mostly in eastern N.C. (Figure 3.8 and Table 3.3). 14

- The percentage of heart disease deaths occurring before age 65 varies across counties, ranging from 11.8 to 30.1 percent. Among HDSP Regions, the percentage of heart disease deaths occurring before age 65 is highest in the East Region (23.4 percent) and lowest in the Southwest Region (18.6 percent) (Table 3.4).
HEART DISEASE MORBIDITY & DISABILITY

In Brief: Heart Disease Morbidity

- Heart disease results in substantial morbidity and disability among North Carolinians and among Americans in general.
- Heart disease hospitalization rates have declined in N.C. since 2001.
- More than 100,000 hospitalizations for heart disease occur in N.C. each year, accounting for nearly 70 percent of all cardiovascular disease hospitalizations.
- Forty percent of all hospitalizations for heart disease in N.C. occur in people younger than 65 years of age.
- The highest heart disease hospitalization rates are clustered mostly in eastern N.C., a pattern similar to that of heart disease death rates.

Nationwide

- Currently, 16.3 million Americans age 20 years or older have coronary heart disease and about 5.7 million have heart failure (many may have both). \(^4\)
- In 2005, almost three million Americans reported having a disability, such as functional limitations or difficulty carrying out activities of daily living, as the result of heart trouble. \(^5\)

Statewide

- In 2010, there were 108,013 hospitalizations in N.C. for heart disease (including coronary heart disease, congestive heart failure, and other heart diseases), accounting for 66.5 percent of all cardiovascular disease hospitalizations (Figure 3.9 and Table 3.5).

Trends over Time

- Age-adjusted hospitalization rates for heart disease in N.C. rose from 1,405.7 per 100,000 population in 1995 to 1,520.8 in 1998, and have since declined to 1071.0 in 2010 (Figure 3.10 and Table 3.5).

Age

- Heart disease hospitalization rates in N.C. increase with increasing age (Figure 3.11).
- Forty percent of all heart disease hospitalizations in N.C. occur in people younger than 65 years of age (Figure 3.12).
Men and Women

- Age-adjusted heart disease hospitalization rates are higher for North Carolina males than for females (Figure 3.10 and Table 3.5), as are the total number of heart disease hospitalizations (Table 3.5).
- Age-adjusted heart disease hospitalization rates declined for both males and females between 2001 and 2007 (Figure 3.10 and Table 3.5).
- Heart disease hospitalization rates are higher for males than for females in all age groups except for the <25 year age group, where rates are similar for males and females (Figure 3.11).
- Nearly one in two (45.8 percent) males and one in three (32.5 percent) females hospitalized for heart disease are younger than 65 years of age (Figure 3.12).

Geography

- The highest heart disease hospitalization rates are clustered mostly in eastern N.C., a pattern similar to that of heart disease death rates (Figure 3.13 and Table 3.6)

Heart Disease Costs & Economics

In Brief: Heart Disease Costs

- The mortality, morbidity and disability caused by heart disease have a large economic impact in terms of both direct and indirect costs. Direct costs are those associated with hospital care, physician and nursing services, and medications. Indirect costs include lost productivity due to morbidity and mortality and are more difficult to estimate.
- Total hospital charges for heart disease in N.C. are currently over $4.1 billion annually.

Nationwide

- In the United States during 2008, the total direct and indirect costs of heart disease were estimated to be $190.3 billion (Figure 3.14).4
Statewide

- Total hospital charges for heart disease in N.C. are currently over $4.1 billion annually (Figure 3.15 and Table 3.5). These N.C. cost estimates are direct hospital charges only and do not include either indirect costs or other healthcare charges.
- The average charge per hospital stay for heart disease in N.C. currently exceeds $38,000 (Figure 3.16 and Table 3.5).
- In North Carolina, Medicaid costs due to heart disease currently exceed $231 million annually, more than $2,200 per N.C. Medicaid beneficiary with a history of heart disease (Figure 3.17).

Trends over Time

- In North Carolina, after adjusting for inflation, total hospital charges for heart disease increased by almost 80 percent between 1995 and 2010, climbing from $2.3 billion to $4.1 billion in 2010 dollars (Figure 3.15 and Table 3.5).
- The average charge per stay for heart disease hospitalizations in N.C. (in 2011 dollars) rose from $24,171 in 1995 to $38,201 in 2010.

Men and Women

- Total hospital charges for heart disease in N.C. are currently higher for men ($2.4 billion) than for women ($1.6 billion) and climbed at a faster rate for men than for women between 2000 and 2010 (Figure 3.15 and Table 3.5).
- The average charge per stay for heart disease hospitalizations in N.C. is currently higher for men ($42,619) than for women ($33,160) (Figure 3.16 and Table 3.5).
Coronary Heart Disease

**In Brief: Coronary Heart Disease Deaths**

- Coronary heart disease is one type of heart disease and includes heart attack (also known as myocardial infarction or MI), angina, and other atherosclerotic or ischemic heart diseases.
- Coronary heart disease causes 13 percent of all deaths in North Carolina.
- Almost One in four coronary heart disease deaths among North Carolinians occurs before age 65.
- Significant racial and geographic disparities in coronary heart disease mortality exist in N.C.
- As of 2008, the coronary heart disease death rates for North Carolinians of all major racial and ethnic groups had declined below the Healthy People 2010 target.

**Statewide**

- In 2010, coronary heart disease caused 10,507 deaths among North Carolinians, 13 percent of all deaths in that year (Figure 4.1).
- North Carolina’s 2008 age-adjusted coronary heart disease death rate is the 25th highest among the 50 states and Washington, D.C. ²
- North Carolina’s 2008 age-adjusted coronary heart disease death rate of 118.1 per 100,000 is slightly lower than the national rate of 123.1 per 100,000 (Figure 4.2 and Table 4.1).

**Trends over Time**

- Coronary heart disease death rates in N.C. declined fairly steadily between 1990 and 2000 (an average annual decline of 2.9 percent), and have since declined more quickly (an average annual decline of 5.6 percent per year between 2000 and 2008) (Figure 4.2 and Table 4.1).
- Coronary heart disease death rates declined slightly faster in N.C. between 2000 and 2008 than they did in the U.S. overall (Figure 4.2 and Table 4.1).
- In 2008, North Carolina’s coronary heart disease death rate for the Healthy People 2010 Objective 12-1 (coronary heart disease deaths; ICD-10 codes I11, I20-I25) of 126.0 per
100,000 was below the target of 156 per 100,000 (Figures 4.3 and 4.6). If coronary heart disease death rates continue to decline at an average pace of 5.6 percent per year as they did between 2000 and 2008, North Carolina should attain the Healthy People 2020 objective (HDS-2) of 100.8 coronary heart disease deaths per 100,000 well before the year 2020.

**Age**
- Coronary heart disease death rates in N.C. increase with age (Figure 4.4).
- In North Carolina, 23.2 percent of coronary heart disease deaths occur among those younger than 65, higher than the national percentage of 18.5 percent (Table 4.2).

**Men and Women**
- In North Carolina, coronary heart disease death rates are higher among men than among women. In 2008, the coronary heart disease death rate was 160.1 among men and 86.8 among women (Figure 4.5 and Table 4.1).
- Coronary heart disease death rates are higher among men than women in all age groups (Figure 4.4).
- Coronary heart disease death rates declined more rapidly over time among men than among women until about 1999. Since 2000, declines in coronary heart disease death rates have been slightly faster among women than among men (Figure 4.5 and Table 4.1).
- The total number of coronary heart disease deaths each year is higher among men than women in N.C. (2008: 6,124 coronary heart disease deaths among men, 4,989 among women).²
- Men are more likely to die of coronary heart disease at a younger age than are women. Among men, 31.4 percent of coronary heart disease deaths occur before age 65, compared to 13.3 percent among women in 2004-08 (Table 4.2).

**Racial and Ethnic Groups**
- Both American Indian and African American North Carolinians have higher coronary heart disease death rates than do white North Carolinians (Figure 4.6).
- The coronary heart disease death rates for North Carolinians of all the major racial and ethnic groups have declined to below the Healthy People 2010 target (Figure 4.6).
- Before 1985, coronary heart disease death rates were actually lower among African American North Carolinians than among white North Carolinians. Because coronary
heart disease death rates declined faster for whites than for African Americans during the 1970’s and 1980’s, however, African American North Carolinians now have higher coronary heart disease death rates than their white counterparts. This disparity in coronary heart disease death rates between African Americans and whites has persisted since 1988 (Figure 4.7 and Table 4.1).

- In North Carolina, African American men currently have the highest age-adjusted coronary heart disease death rates, followed closely by white men. African American women have lower coronary heart disease death rates than white men, and white women have lower rates than African American women (Figure 4.8 and Table 4.1).
- African American North Carolinians are more likely to die of coronary heart disease at younger ages than their white counterparts. Among African American men, 42 percent of coronary heart disease deaths occur before age 65, compared with 29 percent among white men; 22 percent of coronary heart disease deaths among African American women occur before age 65, compared with 11 percent among white women (Figure 4.9 and Table 4.2).
- Hispanic North Carolinians have much lower coronary heart disease death rates than non-Hispanic North Carolinians (Figure 4.6).

**Geography**

- A map of 2004-2008 coronary heart disease death rates by county in N.C. shows the highest death rates clustered mostly in eastern N.C. and along the South Carolina border (Figure 4.10 and Table 4.3).
- The percentage of coronary heart disease deaths occurring before age 65 varies across counties, ranging from 10.2 to 35.0 percent. Among HDSP Regions, the percentage of stroke deaths occurring before age 65 is highest in the East Region (23.6 percent) and lowest in the Southwest Region (21.1 percent) (Table 4.4).
**CORONARY HEART DISEASE MORBIDITY & DISABILITY**

*In Brief: Coronary Heart Disease Morbidity*

- Coronary heart disease results in substantial morbidity and disability among North Carolinians and Americans in general.
- Almost 40,000 hospitalizations for coronary heart disease occurred in N.C. in 2010, accounting for nearly a quarter of all cardiovascular disease hospitalizations.
- Nearly 50 percent of all coronary heart disease hospitalizations in N.C. occur in people younger than 65 years of age.
- More than 440,000 North Carolinians have a history of coronary heart disease.

**Nationwide**

- Currently, 16.3 million Americans have some type of coronary heart disease. 4
- Among all Americans, 8.5 million have had a heart attack; approximately 5 million of these heart attack survivors are men and 3.5 million are women. 1
- Each year, 935,000 Americans have a heart attack. 1
- People who survive a heart attack have a substantially increased risk of illness and death (a 1.5-15 times higher risk, depending on gender and clinical outcome) than does the general population. 1

**Statewide**

- In 2010, there were 39,022 hospitalizations in N.C. for coronary heart disease, accounting for 24 percent of all cardiovascular disease hospitalizations (Figure 4.11 and Table 4.5).
- According to the 2010 N.C. Behavioral Risk Factor Surveillance System (BRFSS), a statewide telephone survey of non-institutionalized adults, 7.1 percent of N.C. adults — more than 515,000 people — have a history of coronary heart disease (Table 4.6). Since this survey excludes people living in long-term care facilities, this is likely to be an underestimate of the true prevalence of coronary heart disease.

**Trends over Time**

- Age-adjusted hospitalization rates for coronary heart disease in N.C. rose from 743.8 per 100,000 population in 1995 to 789.9 in 1996, and have since declined to 377.9 in 2010 (Figure 4.12 and Table 4.5).
Age

- Overall, coronary heart disease hospitalization rates in N.C. increase with increasing age (Figure 4.13).
- In North Carolina, 47 percent of all coronary heart disease hospitalizations occur in people younger than 65 years of age (Figure 4.14).
- Self-reported history of coronary heart disease among N.C. adults is lowest in the 18-24, 25-34, and 35-44 year age groups, increases with increasing age, and is highest in the 75+ year age group (24.5 percent) (Figure 4.15 and Table 4.6).

Men and Women

- Age-adjusted coronary heart disease hospitalization rates are higher for men than for women in N.C. (Figure 4.12 and Table 4.5), as are the number of hospitalizations (Table 4.5).
- Age-adjusted coronary heart disease hospitalization rates declined for both males and females between 1996 and 2010 (Figure 4.12 and Table 4.5).
- Coronary heart disease hospitalization rates are higher for men than for women in all age groups (Figure 4.13).
- Among both N.C. men and women, coronary heart disease hospitalization rates increase with increasing age (Figure 4.13).
- Self-reported history of coronary heart disease among N.C. adults is higher among men (8.2 percent) than women (6.1 percent) (Table 4.6).

Racial and Ethnic Groups

- Self-reported history of coronary heart disease among N.C. adults is similar for whites (7.6 percent), African Americans (7.2 percent), and American Indians (7.9 percent) (Figure 4.16 and Table 4.6).

Socio-economic Groups

- Self-reported history of coronary heart disease among N.C. adults decreases with increasing education and income and is highest in the “less than high school” education group (12.1 percent) and in the “less than $15,000” income group (12.8 percent) (Figures 4.17 and 4.18 and Table 4.6).
**Geography**

- The highest coronary heart disease hospitalization rates in N.C. are clustered mainly in a band running through eastern N.C. (Figure 4.19 and Table 4.7).
- Self-reported history of coronary heart disease varies across North Carolina regions. In 2010, the Piedmont N.C. region had a lower rate (5.8 percent) than either the Western N.C. region (9.7 percent) or the Eastern N.C. region (8.8 percent) (Table 4.6).

---

**Coronary Heart Disease Costs & Economics**

**In Brief: Coronary Heart Disease Costs**

- The mortality, morbidity and disability caused by coronary heart disease have a large economic impact in terms of both direct and indirect costs. Direct costs are those associated with hospital care, physician and nursing services, and medications. Indirect costs include lost productivity due to morbidity and mortality and are more difficult to estimate.
- Total hospital charges for heart disease in N.C. currently exceed $2 billion annually.
- The average charge for a coronary heart disease hospital stay in N.C. currently exceeds $50,000 and has been rising over time.

**Nationwide**

- In the United States during 2010, the total direct and indirect costs of coronary heart disease are estimated to be $177.1 billion (Figure 4.20). ¹

**Statewide**

- Total hospital charges for coronary heart disease in N.C. currently exceed $2 billion annually (Figure 4.21 and Table 4.5). These N.C. cost estimates are direct hospital charges only and do not include either indirect costs or other healthcare charges.
- The average charge per hospital stay for coronary heart disease in N.C. currently exceeds $50,000 (Figure 4.22 and Table 4.5).
**Trends over Time**

- In North Carolina, after adjusting for inflation, total hospital charges for coronary heart disease increased between 1995 and 2004, climbing from 1.5 billion to over 2.1 billion in 2011 dollars. Since 2004, total hospital charges have leveled off and actually decreased somewhat to about 2 billion since 2007 (Figure 4.21 and Table 4.5).

- Recent leveling off and decreasing in total hospital charges for coronary heart disease has been driven mainly by decreases in the number of hospitalizations, as the average charge per stay in N.C. has been increasing. Even after adjusting for inflation, the average charge per stay for coronary heart disease hospitalizations in N.C. rose more than 80 percent between 1997 and 2010, from $28,430 to $51,725 in 2011 dollars, while the annual number of coronary heart disease hospitalizations has decreased substantially in recent years (Figure 4.22 and Table 4.5).

**Men and Women**

- Total hospital charges for coronary heart disease in N.C. are currently higher for men ($1.34 billion) than for women ($677 million) (Figure 4.21 and Table 4.5).

- The average charge per stay for coronary heart disease hospitalizations in N.C. is higher for men ($55,819) than for women ($45,168) (Figure 4.22 and Table 4.5).

**Knowledge of Heart Attack Symptoms & Emergency Action**

**In Brief: Heart Attack Knowledge**

- Although most N.C. adults say they would call 911 if they thought someone was having a heart attack, the overwhelming majority do not know all the heart attack symptoms and would not recognize a heart attack if it were occurring.

- Only 12 percent of N.C. adults know all the heart attack symptoms and say they would call 911 if they thought someone was having a heart attack.

- N.C. adults who have a history of coronary heart disease, which puts them at high risk for heart attack, are more likely to know all the symptoms of heart attack than those with no diagnosed coronary heart disease, but the level of knowledge is still very low.

- Substantial disparities in heart attack knowledge exist between age, race, ethnicity and socioeconomic groups in N.C.
Statewide

- According to the 2009 N.C. BRFSS, 88.2 percent of N.C. adults said they would call 911 if they thought someone was having a heart attack (Figure 4.23 and Table 4.6).
- In 2009, only 14 percent of N.C. adults knew all the heart attack symptoms (Figure 4.23 and Table 4.6).
- In 2009, only 12.5 percent of N.C. adults correctly identified all heart attack symptoms and said they would call 911 if they thought someone was having a heart attack (Figure 4.23 and Table 4.6).
- Three warning signs of heart attack were each correctly identified by more than 80 percent of N.C. adults: chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath (Figure 4.24).
- Only about 65 percent of N.C. adults correctly identified feeling weak, lightheaded or faint as a symptom of heart attack (Figure 4.24).
- Only 55.6 percent of N.C. adults correctly identified pain or discomfort in the jaw, neck or back as a symptom of heart attack (Figure 4.24). Only 40 percent of N.C. adults knew that sudden trouble seeing in one or both eyes is not a symptom of heart attack (Figure 4.24).

Trends over Time

- Knowledge of all heart attack symptoms increased slightly, but not significantly, in N.C. between 2001 and 2007 (Figure 4.23).
- Knowledge of the need to call 911 for heart attack did not change significantly in N.C. between 2001 and 2009 (Figure 4.23).
- Knowledge that sudden trouble seeing is not a symptom of heart attack increased significantly between 2001 and 2007 but remained virtually unchanged between 2007 and 2009 (Figure 4.24).

Age

- North Carolinians in the youngest (18-34 years) age groups were significantly less likely to know all heart attack symptoms than those ages 35-64 (Figure 4.15 and Table 4.6). Knowledge of all heart attack symptoms also decreased with age after the 55-64 year age group (Figure 4.15 and Table 4.6).
• Those in the 75+ year age group were less likely to say they would call 911 if they thought someone was having a heart attack (83.8 percent) than those in other age groups (Figure 4.15 and Table 4.6).

**Men and Women**

• In 2009, knowledge of heart attack symptoms and the need to call 911 for heart attack was significantly higher among women than men (Table 4.6).

**Racial and Ethnic Groups**

• Knowledge of all heart attack symptoms was lower among African Americans (6.7 percent), Asians (9.1 percent), and those of other racial groups (4.4 percent) than among whites (17.1 percent) (Figure 4.16 and Table 4.6).

• Hispanic North Carolinians were less likely to know all heart attack symptoms (2.9 percent) than were non-Hispanic North Carolinians (14.9 percent), and knowledge of heart attack symptoms was particularly low among Hispanics who spoke only Spanish (0.1 percent) (Table 4.6).

• Hispanic North Carolinians were as likely to say they would call 911 if they thought someone was having a heart attack (84.3 percent) as were non-Hispanic North Carolinians (88.4 percent) (Table 4.6).

• Knowledge of the need to call 911 for a heart attack was similar among the major racial and ethnic groups (Figure 4.16 and Table 4.6).

**Socio-economic Groups**

• Knowledge of all heart attack symptoms increased with increasing years of education and was lowest in the “less than high school” group (5.2 percent) and highest in the “college graduate” group (20.2 percent) (Figure 4.17 and Table 4.6).

• Knowledge of all heart attack symptoms increased with increasing household income and was lowest in the “less than $15,000” income group (6.5 percent) and highest in the “$75,000+” income group (19.6 percent) (Figure 4.18 and Table 4.6).

• Those in the “less than high school” education group were less likely to say they would call 911 if they thought someone was having a heart attack than those in the other education groups (Figure 4.17 and Table 4.6).
• Those in the “less than $15,000” income group were less likely to say they would call 911 if they thought someone was having a heart attack (84.4 percent) than those in the “$75,000+” income group (90.2 percent) (Figure 4.18 and Table 4.6).

• The percentage of adults who knew all the heart attack symptoms and the need to call 911 increased with increasing years of education and was lowest in the “less than high school” education group (3.5 percent) and highest in the “college graduate” group (18.2 percent) (Figure 4.17 and Table 4.6).

• The percentage of adults who knew all the heart attack symptoms and the need to call 911 increased with increasing household income and was lowest in the “less than $15,000” income group (5.8 percent) and highest in the “$75,000+” income group (17.8 percent) (Figure 4.18 and Table 4.6).

Other High-Risk Groups

• N.C. adults with a history of coronary heart disease, who are at high risk for a new or recurrent heart attack, were more likely to know all the heart attack symptoms (15.8 percent) than those with no coronary heart disease history (11.0 percent) (Figure 4.24).

• North Carolinians with a history of coronary heart disease were significantly more likely to correctly identify pain or discomfort in the jaw, neck or back as a symptom of heart attack (61.3 percent) than those with no coronary heart disease history (47.0 percent) (Figure 4.25).

• N.C. adults with a history of coronary heart disease were also more likely to know that sudden trouble seeing is not a symptom of a heart attack (46.8 percent) than those with no coronary heart disease history (39.4 percent) (Figure 4.25).

• North Carolinians with a history of coronary heart disease were slightly less likely to say they would call 911 if they thought someone was having a heart attack (84.5 percent) than those without a history of coronary heart disease (87.6 percent) (Figure 4.24).
**Geography**

- Knowledge of heart attack symptoms varies across North Carolina regions. Knowledge of all the heart attack symptoms was lowest in Onslow County (10.1 percent) and highest in Johnston and Wake counties (20.4 and 17.0 percent, respectively) (Table 4.6).

- Looking across Area Health Education Center (AHEC) regions, knowledge of all the heart attack symptoms was lowest in the South East and Southern Regional AHEC regions (both 11.9 percent) and highest in the Area L AHEC region (17.2 percent, respectively) (Table 4.6).

- Knowledge of all the heart attack symptoms was lower in the Eastern N.C. region (13.4 percent) than in either the Piedmont (14.2 percent) or Western (14.5 percent) regions (Table 4.6).

- Knowledge of the need to call 911 for heart attack was relatively similar across North Carolina regions (Table 4.6).
Heart Failure

Heart Failure Deaths

In Brief: Heart Failure Deaths

- Heart failure is one type of heart disease; more than 90 percent of heart failure deaths are specified as congestive heart failure deaths. The terms “heart failure” and “congestive heart failure” are often used interchangeably.
- Heart failure occurs when damage to the heart muscle results in a decrease in the heart's ability to fill and pump blood throughout the body.
- A heart attack, hypertension, heart valve disease, and other conditions that damage the heart muscle can lead to heart failure.
- Heart failure kills more than 1,600 North Carolinians annually.
- Eight percent of heart failure deaths among North Carolinians occur before age 65.
- One in four heart failure deaths among N.C. African American men occur before age 65.
- Significant racial disparities in heart failure mortality exist in N.C.
- The counties with the highest heart failure death rates are scattered across the state.

Statewide

- In 2010, heart failure caused 1,659 deaths among North Carolinians, 2 percent of all deaths in that year (Figure 5.1).
- North Carolina’s 2008 age-adjusted heart failure death rate is the 25th highest among the 50 states and Washington, D.C. ²
- North Carolina’s 2008 age-adjusted heart failure death rate of 17.5 per 100,000 is similar to the national rate of 16.9 per 100,000 (Figure 5.2 and Table 5.1).

Trends over Time

- Heart failure death rates in N.C. generally increased from 16.3 per 100,000 in 1992 to 20.2 per 100,000 in 2003 (Figure 5.2 and Table 5.1). While this increase was slow, U.S. heart failure rates were relatively stable during the same period. From 2003 to 2008, heart failure death rates in N.C. declined slightly, from 20.2 per 100,000 to 17.5 per 100,000 (Figure 5.2 and Table 5.1).
Age

- Heart failure death rates in N.C. increase with increasing age (Figure 5.3).
- In North Carolina, 8.7 percent of heart failure deaths occur among those younger than 65, higher than the national percentage of 7.4 percent (Table 5.2).

Men and Women

- In North Carolina, heart failure death rates are slightly higher among men than among women (Figure 5.4 and Table 5.1). In 2008, the heart failure death rate was 19.5 among men and 16.0 among women (Table 5.1).
- Heart failure death rates are higher among men than women in the <65, 65-74 and 75-84 year age groups, but higher among women than men in the 85+ year age group (Figure 5.3).
- The total number of heart failure deaths each year is higher among women than men in N.C. (2008: 950 heart failure deaths among women, 657 among men).²
- Men are more likely to die of heart failure at a younger age than are women. Among men, 12.7 percent of heart failure deaths occur before age 65, compared to 6.1 percent among women in 2004-08 (Table 5.2).

Racial and Ethnic Groups

- Currently in N.C., age-adjusted heart failure death rates are similar among African American and white North Carolinians (Figure 5.5 and Table 5.1).
- From 1998 to 2003, age-adjusted heart failure death rates rose more steeply for African American men than for white men (Figure 5.6 and Table 5.1). As a result, African American men currently have the highest age-adjusted heart failure death rates, followed by white men, African American women, and white women (Figure 5.6 and Table 5.1). Since 2003, heart failure death rates have begun to decline among African American men (Figure 5.6 and Table 5.1).
- African American North Carolinians are more likely to die of heart failure at relatively young ages than are their white counterparts. Twenty-seven percent of heart failure deaths among African American men and 15.9 percent among African American women occur before age 65, compared with 9.5 percent among white men and 4.1 percent among white women (Figure 5.7 and Table 5.2).
Geography

- A map of 2003-2008 heart failure death rates by county in N.C. shows that the counties with the highest death rates are scattered throughout the state (Figure 5.8 and Table 5.3).

Congestive Heart Failure Morbidity & Disability

**In Brief: Congestive Heart Failure Morbidity**

- Congestive heart failure results in substantial morbidity and disability among North Carolinians and Americans in general.
- Mortality among those with heart failure is very high. More than half of those diagnosed with heart failure die within five years.
- Almost 8,000 hospitalizations for congestive heart failure occurred in N.C. in 2010, accounting for 5 percent of all cardiovascular disease hospitalizations.
- Thirty percent of all congestive heart failure hospitalizations in N.C. occur in people younger than 65 years of age.
- Age-adjusted hospitalization rates for congestive heart failure have declined substantially in N.C. since 2003.
- As of 2008, North Carolina’s rates for each of the three congestive heart failure Healthy People 2010 Objectives had fallen below the 2010 target.

Nationwide

- Currently, 5.7 million Americans have heart failure; approximately 3.1 million are men and 2.6 million are women. 4
- Each year, 670,000 Americans age 45 years and older develop heart failure. 1
- Prior hypertension and heart attack are two major risk factors for heart failure that contribute to a large proportion of heart failure cases. 1
- Among those having a first heart attack at 40 to 69 years of age, 7 percent of men and 12 percent of women will develop heart failure within five years; at 70 years of age or more, 22 percent of men and 25 percent of women will develop heart failure within five years. 1
- Mortality among those with heart failure is very high. More than half of those diagnosed with heart failure die within five years. 17
Statewide

- In 2010, there were 7,840 hospitalizations in N.C. for congestive heart failure, accounting for 4.8 percent of all cardiovascular disease hospitalizations (Figure 5.9 and Table 5.4).
- Based on 2008 data, N.C.’s rates for each of the three congestive heart failure Healthy People 2010 Objectives are below the 2010 target (Figure 5.10).

Trends over Time

- Age-adjusted hospitalization rates for congestive heart failure in N.C. rose from 308.6 per 100,000 population in 1995 to 353.6 in 1998, and have since declined to 79.0 in 2010 (Figure 5.11 and Table 5.4).

Age

- Congestive heart failure hospitalization rates in N.C. increase with increasing age (Figure 5.12).
- In North Carolina, 30.9 percent of all congestive heart failure hospitalizations in N.C. occur in people younger than 65 years of age (Figure 5.13).

Men and Women

- While age-adjusted congestive heart failure hospitalization rates are higher for N.C. men than for women (Figure 5.11 and Table 5.4), the number of hospitalizations is higher for women than for men (Table 5.4).
- Congestive heart failure hospitalization rates are similar among men and women in the <25 year age group and are higher for men than women in all other age groups (Figure 5.12).

Geography

- The highest congestive heart failure hospitalization rates are clustered mostly in the eastern counties of North Carolina (Figure 5.14 and Table 5.5).
CONGESTIVE HEART FAILURE COSTS & ECONOMICS

In Brief: Congestive Heart Failure Costs

- The mortality, morbidity and disability caused by congestive heart failure have a large economic impact in terms of both direct and indirect costs. Direct costs are those associated with hospital care, physician and nursing services, and medications. Indirect costs include lost productivity due to morbidity and mortality and are more difficult to estimate.
- The average charge for a congestive heart failure hospital stay in N.C. currently exceeds $22,000.

Nationwide

- In the United States during 2010, the direct and indirect costs of heart failure were estimated to be $39.2 billion (Figure 5.15). This figure does not include data on lost productivity due to morbidity, which were not available for heart failure.

Statewide

- Total hospital charges for congestive heart failure in N.C. currently exceed $180 million annually (Figure 5.16 and Table 5.4). These N.C. cost estimates are direct hospital charges only and do not include either indirect costs or other healthcare charges.
- The average charge per hospital stay for congestive heart failure in N.C. currently exceeds $22,000 (Figure 5.17 and Table 5.4).
- In North Carolina, Medicaid costs due to congestive heart failure currently exceed $75 million dollars annually, more than $2,700 per N.C. Medicaid beneficiary with a history of heart failure (Figure 5.18).

Trends over Time

- In North Carolina, after adjusting for inflation, total hospital charges for congestive heart failure increased 90 percent between 1995 and 2005, climbing from $346 million to more than $657 million in 2011 dollars. Since 2005, however, total hospital charges have decreased markedly to $181 million in 2007 (Figure 5.16 and Table 5.4).
• Recent declines in total hospital charges for congestive heart failure seem to be caused by recent declines in both hospitalizations and average charge per stay. Average charge per stay for congestive heart failure, adjusted for inflation, increased between 1999 and 2005, from $15,494 to $25,489 in 2011 dollars, but have more recently declined to $22,918 in 2010. In addition, the number of hospitalizations for congestive heart failure has been declining since 2003 (Figure 5.17 and Table 5.4).

**Men and Women**

• Total hospital charges for congestive heart failure in N.C. are currently higher for men ($96 million) than for women ($84 million) (Figure 5.16 and Table 5.4).

• The average charge per stay for congestive heart failure hospitalizations in N.C. is also higher for men ($25,442) than for women ($20,896) (Figure 5.17 and Table 5.4).

• The average charge per stay for congestive heart failure hospitalizations rose substantially for both men and women between 1999 and 2005, even after adjusting for inflation. Since 2005, however, the average charge per stay has declined sharply for men while it has not declined, but instead leveled off, for women (Figure 5.17 and Table 5.4).
High Blood Pressure

BLOOD PRESSURE SCREENING

In Brief: Blood Pressure Screening

- More than 95 percent of N.C. adults had their blood pressure checked by a health care professional within the past two years.
- In 1999 (the last year for which data were available for all states), North Carolina has the fourth best rate of blood pressure screening among the 50 states.
- Significant racial and ethnic disparities in blood pressure screening exist in N.C.

Statewide

- In 2009, more than 95.4 percent of N.C. adults reported having had their blood pressure checked at least once within the past two years, similar to the 95 percent among U.S. adults in 1999 (the last year for which U.S. data are available) (Figure 6.1 and Table 6.1).

Trends over Time

- Blood pressure screening rates declined from 96.8 percent in 1991 to a low of 93.9 percent in 1997, but have since risen and currently stand at 95.4 percent for 2009 (Figure 6.1 and Table 6.1).

Age

- Blood pressure screening rates in North Carolina are lowest among the 18-24, 25-34, and 35-44 year age groups (93.4, 92.0 and 94.4 percent, respectively) and highest among the 65-74 and 75+ year age groups (99.1 and 99.0 percent, respectively) (Figure 6.2 and Table 6.2).

Men and Women

- Blood pressure screening rates in North Carolina have been lower among men than women. Screening rates among men declined from 96.0 percent in 1991 to 90.2 percent in 1997, while rates for women remained more stable, around 97 percent. Although screening rates among men have since increased to 93.4 percent, this remains lower than the 97.4 percent among women (Figure 6.3 and Table 6.1).

- In 2009, white women, African-American women and African-American men in North Carolina had the highest blood pressure screening rates (97.8, 97.4 and 97.0 percent, respectively), followed by white men (94.5 percent) (Figure 6.4 and Table 6.1).
Racial and Ethnic Groups

- Blood pressure screening rates are similar for Whites (96.3 percent), African Americans (97.2 percent), Asians (96.0 percent), and American Indians (92.6 percent) in North Carolina, but are significantly lower among those of other racial groups (82.1 percent) (Figure 6.5 and Table 6.2).
- Blood pressure screening rates are significantly lower among Hispanic North Carolinians who spoke only Spanish (74.0 percent) than among English-speaking Hispanic (97.4 percent) and non-Hispanic North Carolinians (96.4 percent) (Table 6.2).
- Blood pressure screening rates among both whites and African American North Carolinians have decreased slightly, but not significantly, between 2001 and 2009 (Figure 6.6 and Table 6.1).

Socio-economic Groups

- Blood pressure screening rates in North Carolina are lowest in the lowest education groups and increase with increasing education, from 89.3 percent in the “less than high school” education group to 97.7 percent in the “college graduate” education group (Figure 6.7 and Table 6.2).
- Blood pressure screening rates in North Carolina are highest in the “$50,000-74,999” and “$75,000+” income groups (98.1 and 98.0 percent, respectively) compared to those in the lower income groups (Figure 6.8 and Table 6.2).

Geography

- Blood pressure screening rates do not vary much across North Carolina regions. The Wake, Eastern and Mountain AHEC regions currently have the lowest blood pressure screening rates (93.5, 93.9 and 93.7 percent, respectively) among N.C. AHEC regions, and Durham County currently has the lowest blood pressure screening rate (91.4 percent) among N.C. counties. (Table 6.2).
**Hypertension Prevalence**

*In Brief: Hypertension Prevalence*

- There are no data on hypertension prevalence based upon actual physical measurements of blood pressure among North Carolinians. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.

- Hypertension prevalence estimates in N.C. are based upon self-reports of having been diagnosed with hypertension. These data underestimate the true prevalence of hypertension, because 22 percent of people who have hypertension do not know they have hypertension.

- Thirty-one percent of N.C. adults report having been diagnosed with hypertension, which is slightly higher than the national rate of 28.7 percent.

- N.C. has the 13th highest diagnosed hypertension prevalence rate for adults among the 50 states and Washington, D.C.

- Significant racial and geographic disparities in diagnosed hypertension prevalence exist in N.C.

- High blood pressure among children is a serious and emerging national public health issue.

*Nationwide*

- One-third of American adults, 74.5 million people, have high blood pressure ("hypertension"), and another 25 percent, or 53.6 million people, have pre-hypertension (systolic blood pressure of 120-130 mmHg or diastolic blood pressure of 80-89 mmHg). ¹

- Twenty-two percent of American adults who have high blood pressure do not know they have high blood pressure. ¹

- African Americans in the U.S. have some of the highest hypertension prevalence rates in the world; 43.0 percent of African American men and 44.8 percent of African American women have high blood pressure.¹

- In the United States during 2010, the total direct and indirect costs of hypertension were estimated to be $76.6 billion (Figure 6.9). ¹
**Statewide**

- There are no data on hypertension prevalence based upon actual physical measurements of blood pressure among North Carolinians. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
- There are data from the N.C. BRFSS on the percentage of North Carolinians who report being told by a health care professional that they have hypertension. These data, however, are limited in that almost one in four people who have hypertension do not know they have it. Of all American adults who have hypertension, only 78 percent know they have it.\(^1\)
- Among N.C. adults, 31.5 percent have been told by a healthcare professional that they have high blood pressure, slightly higher than 28.7 percent among U.S. adults (Figure 6.10 and Table 6.3).
- In 2009, N.C. had the 13\(^{th}\) highest diagnosed hypertension prevalence rate for adults among the 50 states and Washington, D.C.\(^18\)
- In 2010, the estimated prevalence of high blood pressure among N.C. children ages 3-17 years was 0.9 percent (Table 6.4), similar to the estimated prevalence of diabetes among N.C. children (0.6 percent) from the same survey.\(^19,20\) This data is based upon parental report and is likely to be an underestimate of the true prevalence of high blood pressure among N.C. children.
- In North Carolina, Medicaid costs due to hypertension currently exceed $189 million annually, more than $1,100 per N.C. Medicaid beneficiary with a history of hypertension (Figure 6.11).\(^16\)

**Trends over Time**

- The prevalence of diagnosed hypertension in North Carolina increased steadily and nearly doubled from 17.0 percent in 1993 to 29.2 percent in 2005. Though still on the rise, this increase seems to have leveled off, reaching 31.5 percent in 2009 (Figure 6.10 and Table 6.3).

**Age**

- The prevalence of diagnosed hypertension increases with age among adults, from 7.0 percent among the 18-24 year age group to 65.7 percent among the 75+ year age group (Figure 6.2 and Table 6.5).
High blood pressure among children is a serious and emerging public health issue. High blood pressure in children is strongly correlated with being overweight, and the percentage of children with high blood pressure in the U.S. appears to be increasing as the percent of children and youth who are overweight increases as a result of the obesity epidemic. In 2010, the estimated prevalence of high blood pressure among N.C. children ages 3-17 years was 0.9 percent (Table 6.4), similar to the estimated prevalence of diabetes among N.C. children (0.6 percent) from the same survey. This data is based upon parental report and is likely to be an underestimate of the true prevalence of high blood pressure among N.C. children.

**Men and Women**

- Diagnosed hypertension prevalence rates are comparable between women and men in North Carolina (Table 6.5).
- Diagnosed hypertension prevalence rates increased steadily for both men and women in North Carolina between 1993 and 2003, and have since not changed much for either men or women (Figure 6.12 and Table 6.3).

**Racial and Ethnic Groups**

- Diagnosed hypertension prevalence rates are significantly higher for African Americans than for whites in North Carolina (41.0 percent vs. 31.1 percent) (Figure 6.5 and Table 6.5).
- Diagnosed hypertension prevalence rates are higher for African Americans than for whites in every age group; they are slightly higher for African Americans in the 18-34 year age groups, and significantly higher in the 35-44, 45-54, 55-64, 65-74 and 75+ year age groups (Figure 6.13).
- African American women have the highest prevalence of diagnosed hypertension (42.3 percent), followed by African American men (39.4 percent), white men (33.0 percent) and white women (29.4 percent) (Figure 6.4 and Table 6.3).
- Diagnosed hypertension prevalence rates are not significantly different between American Indians (38.1 percent) and whites (31.1 percent) (Figure 6.5 and Table 6.5).
- Diagnosed hypertension prevalence rates among Asians and those of other racial groups are lower than those among whites, American Indians, and African Americans (Figure 6.5 and Table 6.5).
• Diagnosed hypertension prevalence rates are significantly lower among Hispanic North Carolinians (13.3 percent), particularly among those who speak only Spanish (9.1 percent), than among non-Hispanic North Carolinians (33.0 percent) (Table 6.5).

• Though increasing at a slower pace for Whites since 2003 and since 2005 for African Americans, diagnosed hypertension prevalence rates have been on the rise for both Whites and African Americans since the early nineties. (Figure 6.14 and Table 6.3).

**Socio-economic Groups**

• Diagnosed hypertension prevalence rates are highest in the lowest education groups and decrease with increasing education. Thirty-eight percent of those in the “less than high school” education group have high blood pressure, and the diagnosed hypertension prevalence rate decreases to 25.1 percent among those in the “college graduate” education group (Figure 6.7 and Table 6.5).

• Diagnosed hypertension prevalence rates are highest in the lowest income groups and decrease with increasing income. More than 40 percent of those in the “less than $15,000” income group have high blood pressure, and the diagnosed hypertension prevalence rate decreases to 24.3 percent among those in the “$75,000+” income group (Figure 6.8 and Table 6.5).

**Geography**

• Diagnosed hypertension prevalence rates do vary across North Carolina regions. Johnston, Orange, Randolph and Wake counties have the lowest diagnosed hypertension prevalence rates with estimates just below 26 percent while Cumberland, Davidson and New Hannover counties have the highest rates, more than 35 percent (Table 6.5).

• Looking at diagnosed hypertension prevalence rates by Area Health Education Center (AHEC) regions shows that the South East and Eastern AHEC regions have the highest rate of diagnosed hypertension (35.5 and 35.0 percent respectively), while Wake and Charlotte AHEC regions have the lowest rates (27.2 and 29.8 percent, respectively (Table 6.5).

• The Eastern region of N.C. has a higher diagnosed hypertension prevalence rate (34.7 percent) compared to the Piedmont and Western regions (30.3 and 30.5 percent, respectively) (Table 6.5).
**Hypertension Treatment & Control**

**In Brief: Hypertension Treatment & Control**

- There are no data on actual blood pressure control rates among North Carolinians with hypertension. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
- The only data related to hypertension treatment and control in North Carolina is the percent of adults with diagnosed hypertension who report current use of anti-hypertensive medications.
- Eighty-one percent of N.C. adults with diagnosed hypertension report current use of anti-hypertensive medications, similar to the U.S. rate.
- Use of anti-hypertensive medication was historically lowest among African American men, but has been moving up over the last decade and was comparable to use of anti-hypertensive medication in White men in 2009.
- Hispanic North Carolinians with diagnosed hypertension are less likely to report current use of anti-hypertensive medications than non-Hispanic North Carolinians.

**Nationwide**

- In the U.S., only 78 percent of those with hypertension are aware that they have high blood pressure and only 68 percent of people with hypertension are being treated for their hypertension. Less than half (44 percent) of those with hypertension have their blood pressure under control. ¹

**Statewide**

- There are no data on actual blood pressure control rates among North Carolinians with hypertension. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
- There are data from the N.C. BRFSS on the percentage of North Carolinians with hypertension who are taking medication to control their blood pressure. These data, however, are limited in that taking medication does not mean that blood pressure is under control, and medication use is only measured among people who know they have hypertension. Of all American adults who have hypertension, only 78 percent know they
have it and, despite the fact that 68 percent are currently being treated for hypertension, only 44 percent have their blood pressure under control.  

- Among N.C. adults who have been diagnosed with hypertension, 81.6 percent report that they are taking medication to control their blood pressure, higher than the 75.5 percent among U.S. adults in 2003 (the most recent U.S. data available) (Figure 6.15 and Table 6.6).

**Trends over Time**

- The percentage of people with hypertension who report taking anti-hypertensive medications increased significantly between 2001 (74.9 percent) and 2007 (82.3 percent) (Figure 6.15 and Table 6.6).

**Age**

- The percentage of people with hypertension who report taking anti-hypertensive medications increases with age, from 22.6 percent among the 18-24 year age group to more than 90 percent among the 65-74 and 75+ year age groups (Figure 6.2 and Table 6.5).

**Men and Women**

- Use of anti-hypertensive medications increased significantly among both men and women between 2001 and 2007 (Figure 6.15 and Table 6.6)
- Despite these increases, the percentage of men with hypertension who report taking anti-hypertensive medications (77.3 percent) remains significantly lower than the percentage of women (85.7 percent). (Figure 6.15 and Table 6.6).

**Racial and Ethnic Groups**

- The percentage of North Carolinians with hypertension who report taking anti-hypertensive medications is similar for whites (82.1 percent)) and African Americans (85.7 percent) (Figure 6.5 and Table 6.5).
- Use of anti-hypertensive medications increased among both African Americans and whites in North Carolina from 2001 to 2007 with a slight drop in both groups between 2007 and 2009 (Figure 6.15 and Table 6.6).
- Historically, African American men were the least likely to be taking anti-hypertensive medications. However in 2009, use of anti-hypertensive medication in African American men (80.4 percent) was slightly higher than among White men (79.1 percent). African
American women continue to have the highest rates of anti-hypertensive medication use. (Figure 6.4 and Table 6.6).

- Current use of anti-hypertensive medications is significantly lower for those in other racial groups (56.1 percent) than for whites (82.1 percent), and African Americans (85.7 percent) (Figure 6.5 and Table 6.5).

- The rate of anti-hypertensive medication use appears lower among Asians than among whites and African Americans, although this estimate may be unreliable due to the small number of Asians interviewed for the survey who had diagnosed hypertension (n=26) (Figure 6.5 and Table 6.5).

- Hispanic North Carolinians (especially Spanish-speaking Hispanics) with hypertension are less likely to report taking anti-hypertensive medications than are non-Hispanic North Carolinians (Table 6.5).

**Socio-economic Groups**

- Current use of anti-hypertensive medications does not vary much between education groups (Figure 6.7 and Table 6.5).

- Current use of anti-hypertensive medications does not vary in a statistically meaningful way by income level. (Figure 6.8 and Table 6.5).
High Blood Cholesterol

**CHOLESTEROL SCREENING**

*In Brief: Cholesterol Screening*

- Seventy-eight percent of N.C. adults had their blood cholesterol checked by a health care professional at least once within the past five years.
- Cholesterol screening rates increased substantially in North Carolina from less than 70 percent in the nineties to 78 percent in 2007 and 2009.
- Cholesterol screening rates are low (less than 65 percent) among N.C. adults less than 35 years of age, despite current recommendations that all adults age 20 years and older have their cholesterol checked once every five years.
- Cholesterol screening rates in North Carolina are currently significantly lower among men than women.
- Substantial increases in the cholesterol screening rates among African Americans in North Carolina between 2005 and 2007 have nearly eliminated the previously existing disparity in screening rates between African American and whites, but it remains to be seen if this will be sustained over time.
- Significant racial, ethnic, and socioeconomic disparities in blood cholesterol screening still exist in N.C.

*Statewide*

- In 2009, 78.3 percent of N.C. adults reported having had their blood cholesterol checked at least once within the past five years, comparable to the 77 percent among U.S. adults (Figure 7.1 and Table 7.1).
- In 2009, North Carolina had the 21st best rate of blood cholesterol screening among the 50 states and Washington, D.C.24

*Trends over Time*

- Cholesterol screening rates in N.C. increased substantially from 72.0 percent in 2005 to 78.0 percent in 2007 and remained stable in 2009 at 78.3 percent, the highest rate of screening to date. Prior to this increase, cholesterol screening rates had not improved much in N.C. since 1999, and had actually declined between 2001 and 2005 (Figure 7.1 and Table 7.1).
Age

- Cholesterol screening rates in N.C. increase with age from 38.1 percent in the 18-24 year age group to 96.3 percent in the 65-74 year age group and 96.0 percent in the 75+ year age group (Figure 7.2 and Table 7.2).

Men and Women

- Cholesterol screening rates in N.C. are significantly lower among men than women. In 2009, 75.2 percent of N.C. men had had their cholesterol checked within the past five years, compared to 81.2 percent of N.C. women (Table 7.1).
- Screening rates for both men and women increased substantially between 2005 and 2007 (Figure 7.3 and Table 7.1).
- In 2009, white women had the highest cholesterol screening rates (83.3 percent), followed by white men (80.8 percent), African American women (79.3 percent) and African American men (75.7 percent) (Figure 7.4 and Table 7.1).

Racial and Ethnic Groups

- In 2009, cholesterol screening rates were similar for whites (82.1 percent), African Americans (77.7 percent), and Asians (79.3 percent). American Indians (66.2 percent) and those of other racial groups (44.6 percent) had significantly lower screening rates compared to whites (Figure 7.5 and Table 7.2).
- Cholesterol screening rates are significantly lower among Hispanic North Carolinians (45.5 percent), particularly among those who speak only Spanish (25.4 percent), than among non-Hispanic North Carolinians (80.9 percent) (Table 7.2).
- Cholesterol screening rates historically have been lower among African American North Carolinians than among whites, but rates among African Americans increased rapidly between 1999 and 2003 and again between 2005 and 2007, so that the rates since 2007 are now similar between the two groups (Figure 7.6 and Table 7.1).
- This increase in cholesterol screening among African Americans occurred among both men and women, so that the screening rate for African American women is now similar to that for white women (83.3 and 79.3 percent, respectively), and the rate for African American men is now similar to that for white men (75.7 and 80.8 percent, respectively) (Figure 7.7 and Table 7.1).
Socio-economic Groups

- Cholesterol screening rates are lowest in the lowest education group and increase with increasing education. Only 60 percent of those in the “less than high school” education group have had their cholesterol checked in the past five years, and the screening rate increases to 89.2 percent among those in the “college graduate” education group (Figure 7.8 and Table 7.2).

- Cholesterol screening rates are lowest in the lowest two income groups and increase with increasing income over $25,000. Less than 75 percent of those in the two lowest income groups (under $25,000) have had their cholesterol checked in the past five years; the screening rate increases to 88.5 percent among those in the “$75,000+” income group (Figure 7.9 and Table 7.2).

Geography

- Cholesterol screening rates do vary somewhat across North Carolina counties and regions. Randolph County currently has the lowest cholesterol screening rate (71.0 percent), while Pitt County currently has the highest cholesterol screening rate (84.4 percent) (Table 7.2).

- Among AHEC regions, the South East AHEC region has the lowest cholesterol screening rate (75.0 percent), while the Southern Regional AHEC region has the highest rate (81.6 percent) (Table 7.2).
HIGH CHOLESTEROL PREVALENCE

In Brief: High Cholesterol Prevalence

- There are no data on high cholesterol prevalence based upon actual clinical measurements of blood lipids among North Carolinians. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
- Forty percent of N.C. adults report having been diagnosed with high cholesterol, which is slightly higher than the U.S. rate.
- N.C. has the seventh highest diagnosed high cholesterol prevalence rate among the 50 states and Washington, D.C.
- The prevalence of diagnosed high cholesterol in North Carolina has been increasing steadily since 1995.
- Significant socioeconomic disparities in diagnosed high cholesterol prevalence exist in N.C.

Nationwide

- Nearly half (47 percent) of American adults – 102.2 million people – have a total cholesterol of 200 mg/dL or higher, while 35.7 million people (16.2 percent) have a total cholesterol of 240 mg/dL or higher. ¹
- Almost one-third (32.6 percent) of American adults have an LDL ("bad") cholesterol of 130 mg/dL or higher, and 16.2 percent have an HDL ("good") cholesterol below 40 mg/dL. ¹

Statewide

- There are no data on high cholesterol prevalence based upon actual clinical measurements of blood lipids among North Carolinians. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
- There are data from the N.C. BRFSS on the percentage of North Carolinians who report being told by a health care professional that they have high cholesterol. These data, however, are limited in that many people with high cholesterol may not know that they
have it and because data on high total cholesterol, high LDL cholesterol, or low HDL cholesterol is not specifically collected.

- Forty percent of N.C. adults have been told by a healthcare professional that they have high cholesterol, slightly higher than the 37.5 percent of U.S. adults (Figure 7.10 and Table 7.3).
- In 2009, N.C. had the seventh highest diagnosed high blood cholesterol prevalence rate among the 50 states and Washington, D.C.\textsuperscript{24}

**Trends over Time**

- The prevalence of diagnosed high cholesterol in North Carolina has increased steadily from 23.9 percent in 1995 to 40.0 percent in 2009, and at a similar rate as in the U.S. overall (Figure 7.10 and Table 7.3).

**Age**

- The prevalence of diagnosed high cholesterol increases from 13.2 percent among the 18-24 year age group to 58.0 percent among the 65-74 year age group, and then decreases somewhat to 52.4 percent in the 75+ year age group (Figure 7.2 and Table 7.2).

**Men and Women**

- Diagnosed high cholesterol prevalence rates are slightly higher among men (41.7 percent) than among women (38.5 percent) in N.C. (Table 7.2).
- Diagnosed high cholesterol prevalence rates have increased for both men and women in N.C. since 1995 (Figure 7.11 and Table 7.3).

**Racial and Ethnic Groups**

- In 2009, diagnosed high cholesterol prevalence rates were not significantly different between whites (41.0 percent), African Americans (38.5 percent), Asians (31.9 percent), American Indians (35.6 percent), and those of other races (32.4 percent) in N.C. (Figure 7.5 and Table 7.2).
- Diagnosed high cholesterol prevalence rates are currently not significantly different between African American men (40.3 percent), African American women (37.2 percent), white women (39.3 percent), and white men (42.9 percent) (Figure 7.4 and Table 7.3).
- Diagnosed high cholesterol prevalence rates are lower among Hispanic North Carolinians (29.0 percent) than among non-Hispanic North Carolinians (40.5 percent) (Table 7.2).
• Diagnosed high cholesterol prevalence rates have been increasing among white North Carolinians since 1995, and among African American North Carolinians since 1997 (Figure 7.12 and Table 7.3).

**Socio-economic Groups**

• Diagnosed high cholesterol prevalence rates are highest in the lowest education groups and decrease with increasing education. Almost half (49.1 percent) of those in the “less than high school” education group have high cholesterol; the diagnosed high cholesterol prevalence rate decreases to 34.3 percent among those in the “college graduate” education group (Figure 7.8 and Table 7.2).

• The prevalence of diagnosed high cholesterol decreased with increasing household income; it was highest in the “less than $15,000” income group (48.0 percent) and lowest in the “$35,000-49,999” and “$75,000+” income groups (36.2 and 33.4 percent, respectively) (Figure 7.9 and Table 7.2).

**Geography**

• Diagnosed high cholesterol prevalence rates do vary across North Carolina regions. Durham and Orange counties have the lowest diagnosed high cholesterol prevalence rates (32.0 and 32.3 percent, respectively), both significantly lower than the overall state rate (41.0 percent), while Forsyth county has the highest rate of diagnosed high cholesterol (44.6 percent) (Table 7.2).
**High Cholesterol Treatment & Control**

**In Brief: High Cholesterol Treatment & Control**

- There are no data on high cholesterol treatment, adherence, or control rates among North Carolinians with high cholesterol. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
- Of Americans who require some type of treatment for their lipid level, less than half are receiving treatment.

**Nationwide**

- Less than half of Americans who qualify for some type of treatment for their lipid levels to reduce their risk of coronary heart disease are receiving treatment. ¹
- Even among Americans who have symptomatic coronary heart disease, less than half are receiving treatment for their lipid levels to reduce their risk of an acute event. ¹

**Statewide**

- There are no data on high cholesterol treatment, adherence, or control rates among North Carolinians with high cholesterol. This is a serious gap in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state.
Other Risk Factors

In Brief: Other Risk Factors

- Among N.C. adults, 46.4 percent currently engage in the recommended amount of physical activity, 20.6 percent eat five or more servings of fruits and vegetables daily, 19.8 percent are current smokers, 65.3 percent are either overweight or obese, and 9.8 percent have been diagnosed with diabetes.
- Among N.C. high school students, 47.6 percent currently engage in 60 or more minutes of physical activity on at least five days of the week, 19.4 percent eat five or more servings of fruits and vegetables daily, 15.5 percent are current cigarette smokers, 12.9 percent are obese, and 15.9 percent are overweight.
- Diabetes and atrial fibrillation (a type of abnormal heart rhythm) are two other conditions that substantially increase the risk of developing cardiovascular disease. An estimated 3.3 million N.C. adults have pre-diabetes or diabetes. More than 13,000 North Carolinians are hospitalized for atrial fibrillation each year.

Physical Activity

- In 2009, 26.4 percent of N.C. adults did not engage in any leisure-time physical activity, similar to the 24.0 percent among U.S. adults (Figure 8.1 and Table 8.1).
- In 2009, only 46.4 percent of N.C. adults engaged in the recommended amount of physical activity (at least 30 minutes of moderate-intensity physical activity on five or more days of the week or at least 20 minutes of vigorous-intensity physical activity on three or more days of the week), slightly lower than the 50.6 percent among U.S. adults (Figure 8.1 and Table 8.1).
- In 2011, 47.6 percent of N.C. high school students engaged in 60 or more minutes of physical activity per day on five or more of the past seven days, similar to the 49.5 percent among U.S. high school students (Figure 8.2 and Table 8.2).
- In 2011, 34.7 percent of N.C. high school students watched three or more hours of television on an average school day, similar to the 32.4 percent among U.S. high school students (Figure 8.2 and Table 8.2).
- The Eat Smart, Move More NC Leadership Team works to change practices and environments to make it easier for North Carolinians to be more physically active. The
N.C. Division of Public Health is a member the Eat Smart, Move More NC Leadership Team. For more information, please visit www.eatsmartmovemorenc.com.


**NUTRITION**

- In 2009, only 20.6 percent of N.C. adults ate at least five fruits and vegetables daily, slightly lower than the 23.5 percent among U.S. adults (Figure 8.3 and Table 8.1).

- In 2011, only 19.4 percent of N.C. high school students ate at least five fruits and vegetables daily, lower than the 21.4 percent of U.S. high school students in 2007 (Figure 8.4 and Table 8.2).

- High dietary sodium consumption is a risk factor for high blood pressure. The 2010 Dietary Guidelines for Americans recommends that all Americans consume less than 2,300 mg of sodium per day; and that individuals with hypertension, diabetes or chronic kidney disease, African Americans and all persons 51 years or older should consume no more than 1,500 mg of sodium per day. 25

- Based on 2007 BRFSS data, the majority of N.C. adults – an estimated 70.6 percent, more than 4.5 million people – have hypertension, are African American, or are middle-aged or older, and so should consume no more than 1,500 mg of sodium per day. Only 29.4 percent of N.C. adults should follow the higher guideline of consuming no more than 2,300 mg/day of sodium.

- Most adults in the U.S. consume far more sodium than is recommended. During 2005–2006, only 9.6 percent of U.S. adults consumed sodium within dietary recommendations; for the group that was recommended to consume ≤1,500 mg/day, average intake was more than double (3,366 mg/day) the recommended limit. 26
• The Eat Smart, Move More NC Leadership Team works to change practices and environments to make it easier for North Carolinians to eat healthy. The N.C. Division of public Health is a member the Eat Smart, Move More NC Leadership Team. For more information, please visit www.eatsmartmovemorenc.com.

• Public health interventions in North Carolina related to breastfeeding and good nutrition among infants, children, and women in their child-bearing years are led by the Nutrition Services Branch in the Women’s and Children’s Health Section of the N.C. Division of Public Health. Evidence is growing that breastfeeding and good maternal, infant, and child nutrition may reduce chronic diseases later in life. For more information, please visit their Web site, www.nutritionnc.com/index.htm.


• For more data related to breastfeeding and maternal and child nutrition in North Carolina, please visit the Nutrition Services Branch’s Surveillance Data and Statistics Web page, www.nutritionnc.com/nutrsurv.htm.

**TOBACCO USE**

• In 2010, 19.8 percent of N.C. adults were current cigarette smokers, similar to the 17.3 percent among U.S. adults (Figure 8.5 and Table 8.1).

• In 2010, more than half (60.5 percent) of adult current smokers in North Carolina tried to quit smoking at least once in the previous year, higher than the 52.4 percent among U.S. adult smokers (Figure 8.5 and Table 8.1).
• In 2011, 4.2 percent of N.C. middle school students reported current cigarette smoking (smoked a cigarette on at least one of the previous 30 days), slightly lower than the 5.2 percent among U.S. middle school students in 2009 (Figure 8.6 and Table 8.2).

• In 2011, 7.4 percent of N.C. middle school students reported current use of any tobacco product, similar to the 8.2 percent among U.S. middle school students in 2009 (Figure 8.6 and Table 8.2).

• In 2011, 15.5 percent of N.C. high school students reported current cigarette smoking (smoked a cigarette on at least one of the previous 30 days), slightly lower than the 17.2 percent among U.S. high school students in 2009 (Figure 8.6 and Table 8.2).

• In 2011, 22.5 percent of N.C. high school students reported current use of any tobacco product, similar to the 23.9 percent among U.S. high school students in 2009 (Figure 8.6 and Table 8.2).

• Public health interventions related to tobacco use in North Carolina are led by the Tobacco Prevention and Control Branch in the Chronic Disease and Injury Section of the N.C. Division of Public Health. For more information, please visit their Web site, www.tobaccopreventionandcontrol.ncdhhs.gov.


• For more data related to tobacco use among children and youth in North Carolina, please visit the Tobacco Prevention and Control Branch's Research & Data Web page, www.tobaccopreventionandcontrol.ncdhhs.gov/data/index.htm.

**OVERWEIGHT & OBESITY**

• In 2010, more than a third (36.7 percent) of N.C. adults were overweight (Body Mass Index greater than 24.9 but less than 30), similar to the 36.2 percent among U.S. adults (Figure 8.7 and Table 8.1).

• More than one in four (28.6 percent) N.C. adults were obese (Body Mass Index of 30 or greater) in 2010, similar to the 27.6 percent among U.S. adults (Figure 8.7 and Table 8.1).
• Nearly two thirds (65.3 percent) of N.C. adults were either overweight or obese in 2010, similar to the 63.8 percent among U.S. adults (Figure 8.7 and Table 8.1).

• In 2011, 15.9 percent of N.C. high school students were overweight (body mass index \( \geq 85^{\text{th}} \) to \(< 95^{\text{th}} \) percentile for age and sex) and 12.9 percent were obese (body mass index \( \geq 95^{\text{th}} \) percentile for age and sex), similar to the 15.2 percent and 13.0 percent, respectively, among U.S. high school students (Figure 8.8 and Table 8.2).

• Among children seen in N.C. public health clinics, 15.6 percent of 2- to 4-year-olds, 25.8 percent of 5- to 11-year-olds, and 28.0 percent of 12- to 18-year-olds were obese (body mass index \( \geq 95^{\text{th}} \) percentile for age and sex) in 2009/2010. An additional 16.1 percent of 2- to 4-year-olds, 17.1 percent of 5- to 11-year-olds, and 18.1 percent of 12- to 18-year-olds were overweight (body mass index \( \geq 85^{\text{th}} \) to \(< 95^{\text{th}} \) percentile for age and sex). Therefore, 31.7 percent of 2- to 4-year-olds, 42.9 percent of 5- to 11-year-olds, and 46.1 percent of 12- to 18-year-olds were either overweight or obese (Figure 8.9 and Table 8.2). These data for children over 5 years of age are based on a selective sample and may not be representative of all children seen in N.C. public health clinics. Data for children in North Carolina under 5 years of age however, are reflective of the low-income population. Because these data are limited to mostly low-income children and youth, the data may not be representative of the county or state population as a whole.

• Numerous interventions related to overweight and obesity in North Carolina are led by the Eat Smart, Move More NC Leadership Team. The Physical Activity and Nutrition Branch in the Chronic Disease and Injury Section of the N.C. Division of Public Health staffs the Executive Committee of the Eat Smart, Move More NC Leadership Team. For more information, please visit www.eatsmartmovemorenc.com.

• Public health interventions in North Carolina related to maternal and child overweight and obesity are led by the Nutrition Services Branch in the Women’s and Children’s Health Section of the N.C. Division of Public Health. Breastfeeding and good maternal, infant, and child nutrition may reduce overweight and obesity in both mother and child. For more information, please visit their Web site, www.nutritionnc.com/index.htm.

• For more data related to overweight and obesity among adults in North Carolina, please visit the N.C. Behavioral Risk Factor Surveillance System Web site, www.schs.state.nc.us/SCHS/brfss, the Eat Smart, Move More NC data Web


- For more data related to maternal and child overweight in North Carolina, please visit the Nutrition Services Branch’s Surveillance Data and Statistics Web page, [www.nutritionnc.com/nutrsurv.htm](http://www.nutritionnc.com/nutrsurv.htm).

**Diabetes**

- Pre-diabetes (where blood sugar levels are higher than normal, but not high enough to make the diagnosis of diabetes) and diabetes increase the risks of developing cardiovascular disease and other complications. Modest weight loss in people with pre-diabetes can prevent or delay Type 2 Diabetes. Good glucose control in people with diabetes helps to prevent or delay diabetes complications, including cardiovascular conditions.

- In 2010, nearly one in 10 (9.8 percent) N.C. adults (18 years or older) reported having been diagnosed with diabetes, slightly higher than the 8.7 percent among U.S. adults (Figure 8.10 and Table 8.1).

- In 2010, 7.1 percent of North Carolina adults (18 years or older), about 461,000 people, self-reported having being diagnosed with pre-diabetes. However, national data from actual measurements of fasting glucose and hemoglobin A1c levels show that about 35 percent of Americans 20 years or older (an estimated 79 million people) have pre-diabetes. 27 If this same percentage is applied to the NC population, that would mean up to an estimated 2.4 million adults 20 years or older may have pre-diabetes in N.C.

- The 2011 national diabetes fact sheet estimates that about 7 million Americans age 20 years or older (about 3.2 percent of the population) have undiagnosed diabetes. 27 If this same percentage is applied to the NC population, that would mean up to an estimated 223,000 adults 20 years or older may be living with undiagnosed diabetes in N.C.
• Depending on whether we rely solely on self-reports or whether we try to extrapolate from national estimates, an estimated 1.1 to 3.4 million N.C. adults have pre-diabetes or diabetes, and many are unaware of their condition (Figure 8.11).

• Many North Carolinians have not been recently tested for high blood sugar or diabetes. Four in 10 (40.3 percent) N.C. adults without diagnosed diabetes report that they have not had a blood sugar test within the past three years. Public health interventions related to diabetes in North Carolina are led by the Diabetes Prevention and Control Branch in the Chronic Disease and Injury Section of the N.C. Division of Public Health. For more information, please visit their Web site, www.ncdiabetes.org.


**ATRIAL FIBRILLATION**

• Atrial fibrillation (AFib) is an abnormal heart rhythm in which the two upper chambers of the heart (the atria) beat in a rapid and disorganized way, quivering instead of beating effectively. An estimated 2.2 million people in the U.S. have AFib. ¹

• AFib is a strong independent risk factor for stroke and other cardiovascular diseases. People with AFib have a risk of stroke that is five times that of people without AFib. ¹

• AFib is responsible for at least 15 to 20 percent of all ischemic strokes. ¹

• AFib is a costly disease. Total AFib treatment costs in the U.S. are estimated at $6.65 billion annually. ³⁰

• In 2010, 13,383 North Carolinians were hospitalized due to AFib.

• In 2010, AFib was the underlying cause of death of 574 North Carolinians and was listed as a contributing cause of death for 294 of the 4,281 North Carolinians who died of stroke.

• Treatments are available to manage AFib and lower the risk of stroke. Improving diagnosis and management of AFib is an important strategy for stroke prevention and control.
References


