

# **The Burden of Cardiovascular Disease in North Carolina**

## June 2009 Update

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# Cardiovascular Disease

## CARDIOVASCULAR DISEASE DEATHS

### *In Brief: CVD Deaths*

- Cardiovascular disease (CVD) includes the 1<sup>st</sup> and 3<sup>rd</sup> 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 31% of all deaths in North Carolina.
- Nearly 1 in 5 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.<sup>1</sup>
- Each day, CVD kills nearly 2,400 Americans. That is an average of one death due to CVD every 37 seconds.<sup>1</sup>

### *Statewide*

- Cardiovascular disease includes the 1<sup>st</sup> and 3<sup>rd</sup> leading causes of death in N.C., heart disease and stroke (Figure 1.1).
- In 2007, cardiovascular disease caused 23,645 deaths among North Carolinians, 31% of all deaths in that year (Figure 1.1).
- North Carolina's 2005 age-adjusted total CVD death rate is the 20th highest among the 50 states and Washington, D.C. (ICD-10 codes: I00-I99;Q20-Q28).<sup>2</sup>
- North Carolina's 2005 age-adjusted cardiovascular disease death rate of 285.1 per 100,000 was slightly higher than the national rate of 277.3 per 100,000 (Figure 1.2 and Table 1.1).
- Cardiovascular disease includes the 2<sup>nd</sup> and 5<sup>th</sup> leading causes of total years of potential life lost in N.C., heart disease and stroke.<sup>3</sup>

### ***Trends over Time***

- Cardiovascular disease death rates in N.C. declined only 14.2% between 1990 and 2000 (an average annual decline of 1.5%) and hardly declined at all in the late 1990s. Between 2000 and 2005, however, those rates declined by 22.3%, with an average annual decline of 4.9% (Figure 1.2 and Table 1.1).
- Cardiovascular disease death rates declined faster in N.C. between 2000 and 2005 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).
- 19.7% of total cardiovascular disease deaths among North Carolinians occur among those younger than 65, somewhat higher than the national percentage of 16.9% (Table 1.2).

### ***Men and Women***

- In N.C., cardiovascular disease death rates are higher among men than among women. In 2005, the cardiovascular disease death rate was 343.4 among men and 240.4 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).
- Cardiovascular disease death rates have declined more rapidly over time among men than among women (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. (2005: 12,896 cardiovascular disease deaths among women, 11,759 among men).<sup>2</sup>
- Men are more likely to die of cardiovascular disease at a younger age than are women. Among men, 27.8% of total CVD deaths occur before age 65, compared to 12.5% 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 N.C., 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, 41% of total CVD deaths occur before age 65, compared with 24% among white men. Among African American women, 22% of CVD deaths occur before age 65, compared with 10% among white women (Figure 1.7 and Table 1.2).

### ***Geography***

- A map of 2001-2005 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 10.8% to 29.8% (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 (20.7%) and lowest in the Southwest Region (15.3%) (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, 80.7 million Americans (37.1% of the entire U.S. population) have some type of cardiovascular disease. Approximately 37.9 million of those with CVD are men and 42.7 million are women.<sup>1</sup>
- In 1999, more than 5 million Americans reported having a disability, such as functional limitations or difficulty carrying out activities of daily living, as the result of heart trouble, hardening of the arteries, a stroke or high blood pressure.<sup>4</sup>

### ***Statewide***

- In 2006, there were 165,330 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 1,867 per 100,000 in 2006 (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 2006 (Figure 1.10 and Table 1.5).
- In 2006, CVD hospitalization rates were higher for men than for women in all age groups (Figure 1.11).
- Nearly 1 in 2 (48%) males and 1 in 3 (34%) 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.
- Total hospital charges for CVD in N.C. more than doubled between 1995 and 2006, and currently exceed \$4.5 billion annually.

### *Nationwide*

- In the United States, the direct and indirect costs for cardiovascular disease were estimated to total \$448.5 billion for 2008 (Figure 1.14).<sup>1</sup>

### *Statewide*

- Total hospital charges for CVD in N.C. currently exceed \$4.5 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 \$27,000 (Figure 1.16 and Table 1.5).

### *Trends over Time*

- In N.C., total hospital charges for CVD more than doubled between 1995 and 2006, climbing from \$1.8 billion to more than \$4.5 billion annually (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 2006, the average charge per stay for CVD hospitalizations in N.C. rose from \$12,887 to \$27,412, while the annual number of CVD hospitalizations has remained relatively stable (Figure 1.16 and Table 1.5).

### *Men and Women*

- Total hospital charges for CVD in N.C. are currently higher for males (\$2.6 billion) than for females (1.9 billion) and have been climbing at a slightly faster rate for males than for females (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. is currently higher for males (\$30,228) than for females (\$24,368) and has been climbing at a slightly faster rate for men than for women (Figure 1.16 and Table 1.5).

# Stroke

## STROKE DEATHS

### *In Brief: Stroke Deaths*

- Stroke is the 3<sup>rd</sup> 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 6<sup>th</sup> 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 substantially higher than the U.S. rate and the Healthy People 2010 target.
- Historically in N.C., men have had higher stroke death rates than women; however, since about 1995 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 is the 3<sup>rd</sup> leading cause of death in N.C. (Figure 2.1).<sup>1</sup>
- In 2007, stroke caused 4,335 deaths among North Carolinians, 5.7% of all deaths in that year (Figure 2.1).<sup>5</sup>
- The state's 2005 age-adjusted stroke death rate is the 6<sup>th</sup> highest among the 50 states and Washington, D.C.<sup>2</sup>
- The state's 2005 age-adjusted stroke death rate of 57.4 per 100,000 was 23.2% higher than the national rate of 46.6 per 100,000 (Figure 2.2 and Table 2.1).
- Stroke is the 5<sup>th</sup> leading cause of total years of life lost in N.C., resulting in an estimated 22,335 years of life lost during 2005.<sup>3</sup>

### *Trends over Time*

- Stroke death rates in N.C. declined only 8.2% between 1990 and 2000 (an average annual decline of less than 1%), but have since declined by 26.9% between 2000 and 2005, an average annual decline of 6.1% (Figure 2.3 and Table 2.1).
- Stroke death rates declined faster in N.C. between 2000 and 2005 than they did in the U.S. overall (Figure 2.3 and Table 2.1).

- North Carolina's 2005 stroke death rate of 57.4 per 100,000 is still above the Healthy People 2010 target of 50 per 100,000. The state will need to maintain an annual decline of at least 3% to reach that target (Figure 2.2).

### *Age*

- Stroke death rates in N.C. increase with age (Figure 2.4).
- 14.1% of stroke deaths among North Carolinians occur among those younger than 65, slightly higher than the national percentage of 12.5% (Table 2.2).

### *Men and Women*

- Historically in N.C., men have had higher stroke death rates than women; however, since about 1995, rates among men have declined more rapidly than those for women. As a result, the 2005 stroke death rate among men (58.8 per 100,000) is now very similar to that for women (55.5 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. (2005: 2,954 stroke deaths among women, 1,907 among men).<sup>2</sup>
- Men are more likely to die of stroke at a younger age than are women. Among men, 20.2% of stroke deaths occur before age 65, compared to 10.3% among women in 2001-05 (Table 2.2).

### *Racial and Ethnic Groups*

- African American and American Indian North Carolinians have higher stroke death rates than do white North Carolinians (Figure 2.6). The disparities in death rates between African Americans and whites have persisted over time (Figure 2.7 and Table 2.1).
- In N.C., 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, 35% of stroke deaths occur before age 65, compared with 15% among white men; 20% of stroke deaths among African American women occur before age 65, compared with 7% 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 2007, stroke was the 3<sup>rd</sup> leading cause of death among N.C. African Americans, and the 4<sup>th</sup> leading cause of death among N.C. whites and N.C. American Indians. Stroke was also the 9<sup>th</sup> leading cause of death among N.C. Hispanics.<sup>5</sup>

### ***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.<sup>6-8</sup>
- 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.<sup>9-11</sup> The causes of the Stroke Buckle, however, are largely unknown and have historically been underinvestigated.<sup>12</sup>
- 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 greater than those of the rest of the nation,<sup>10</sup> resulting in an estimated 1,200 excess stroke deaths in these 153 counties each year.<sup>11</sup>
- A map of 2003-2007 stroke death rates by county in N.C. shows the higher stroke death rates clustered primarily in the coastal plain region and along the Virginia border (Figure 2.10 and Table 2.3).<sup>5</sup>
- The percentage of stroke deaths occurring before age 65 varies across counties, ranging from 4.2% to 25.6%. Among HDSP Regions, the percentage of stroke deaths occurring

before age 65 is highest in the Northeast Region (15.4%) and lowest in the Southwest Region (9.3%) (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 195,000 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, 5.8 million Americans have had a stroke; approximately 2.3 million of these stroke survivors are men and 3.4 million are women.<sup>1</sup>
- Each year, 780,000 Americans have a stroke.<sup>1</sup>
- In 1999, more than 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.<sup>4</sup>

### *Statewide*

- In 2006, there were 27,838 hospitalizations in N.C. for stroke, accounting for 17% of all cardiovascular disease hospitalizations (Table 2.5 and Figure 2.11).
- According to the 2007 N.C. Behavioral Risk Factor Surveillance System (BRFSS), a statewide telephone survey of non-institutionalized adults, 2.9% of N.C. adults — more than 195,000 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 316.4 in 2006 (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).
- One-third (34.7%) 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 (10.7%) (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 females than for males (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 <25 and 45-84 year age groups, and are similar for men and women in the 25-44 and 85+ year age groups (Figure 2.13).

### ***Racial and Ethnic Groups***

- Self-reported history of stroke among N.C. adults is somewhat, but not significantly, higher among African Americans (3.6%) and American Indians (5.1%) than whites (2.9%) (Figure 2.16 and Table 2.6).
- Self-reported history of stroke was higher among non-Hispanic North Carolinians (3.1%) than among Hispanic North Carolinians (0.7%) and Hispanic North Carolinians who speak only Spanish (0.0%) (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 (4.9%) (Figure

2.17 and Table 2.6) and in the “less than \$15,000” income group (8.6%) (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).
- Self-reported history of stroke varies across North Carolina regions. In 2007, the Eastern region of N.C. had the highest rate (3.9%), while the Piedmont region had the lowest rate (2.4%) (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 at \$1.05 billion each year.
- Total hospital charges for stroke in N.C. currently exceed \$588 million annually and have been steadily rising.

### ***Nationwide***

- In the United States during 2008, the total direct and indirect costs of stroke were estimated to be \$65.5 billion (Figure 2.20).<sup>1</sup>
- The average lifetime cost of a stroke is estimated at \$103,576 per stroke event.<sup>13</sup>

### ***Statewide***

- An analysis of the economic burden of stroke (which included the direct costs of initial hospitalization, subsequent hospitalizations, inpatient and outpatient physician costs, and drug costs) estimated conservatively that stroke costs N.C. \$1.05 billion each year.<sup>14</sup>
- Total hospital charges for stroke in N.C. currently exceed \$588 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 \$21,000 (Figure 2.22 and Table 2.5).
- In N.C., Medicaid costs due to stroke currently exceed \$279 million annually, more than \$7,400 per N.C. Medicaid beneficiary with a history of stroke.<sup>15</sup>

### ***Trends over Time***

- In N.C., total hospital charges for stroke climbed from \$271 million in 1995 to more than \$588 million in 2006 (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 1995 and 2006, the average charge per stay for stroke hospitalizations in N.C. rose from \$10,929 to \$21,155 (Figure 2.22 and Table 2.5).

### ***Men and Women***

- Total hospital charges for stroke in N.C. are currently higher for females (\$307 million) than for males (\$282 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 (\$21,623) than for females (\$20,743) (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% 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 2007 N.C. BRFSS, 87.3% of N.C. adults say they would call 911 if they thought someone was having a stroke (Figure 2.23 and Table 2.6).
- In 2007, only 19.5% of N.C. adults knew all the stroke symptoms (Figure 2.23 and Table 2.6).
- In 2007, only 17.6% of N.C. adults correctly identified all stroke symptoms **and** said they would call 911 if they thought someone was having a stroke (Figure 2.23 and Table 2.6).
- Three warning signs of stroke were each correctly identified by more than 80% 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 2.24).
- Less than 75% 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 2.24).
- Only 37.4% of N.C. adults knew that sudden chest pain or discomfort is not a symptom of stroke (Figure 2.24).

### *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 2007 (Figure 2.23).
- Knowledge of three stroke symptoms – 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 – increased somewhat between 2005 and 2007 (Figure 2.24).
- Knowledge that chest pain is not a symptom of a stroke increased between 2001 and 2005 (Figure 2.24).

### *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 (83.4%) than those in other age groups (Figure 2.15 and Table 2.6).

### ***Men and Women***

- In 2007, 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 (10.1%), American Indians (15.7%), Asians (13.0%), and those in other racial groups (7.6%) than among whites (23.4%) (Figure 2.16 and Table 2.6).
- Hispanic North Carolinians were less likely to know all stroke symptoms (9.2%) than were non-Hispanic North Carolinians (20.3%), and knowledge of stroke symptoms was particularly low among Hispanics who spoke only Spanish (7.2%) (Table 2.6).
- Hispanic North Carolinians were less likely to say they would call 911 if they thought someone was having a stroke (68.9%) than were non-Hispanic North Carolinians (88.9%) (Table 2.6).
- Knowledge of the need to call 911 for a stroke was similar among whites (89.3%), African Americans (88.0%), and American Indians (90.5%), and was slightly, but not significantly, lower among Asians (83.2%). Those of other race groups were less likely to say they would call 911 if they thought someone was having a stroke (68.9%) than were whites (89.3%) (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 (6.1%) and highest in the “college graduate” group (30.1%) (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 (8.1%) and highest in the “\$75,000+” income group (30.7%) (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 (84.7%) than those in the “\$75,000+” income group (90.4%) (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 (5.5%) and highest in the “college graduate” group (27.3%) (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 (7.1%) and highest in the “\$75,000+” income group (28.4%) (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 2.25).
- 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 2.26).
- 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 2.27).
- Knowledge of individual stroke symptoms was similar among those with and without a history of stroke (Figure 2.28).

### ***Geography***

- Knowledge of stroke symptoms varies across N.C. regions. Knowledge of all the stroke symptoms was lowest in the Eastern region (16.8%) and highest in the Piedmont region (20.8%) (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 2007, heart disease was the number-one 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 23% of all deaths in North Carolina.
- 1 in 5 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 2007, heart disease was the number-one leading cause of death in N.C. (Figure 3.1).<sup>5</sup> In the previous year, 2006, for the first time in nearly 90 years, heart disease was not the leading cause of death in North Carolina, but instead cancer was the leading cause of death, and heart disease was the 2<sup>nd</sup> leading cause of death.<sup>16</sup> This was due to dramatic declines in heart disease death rates in N.C. in recent years. Cancer death rates have also been declining, but not as rapidly as heart disease death rates. From 2006 to 2007, both heart disease and cancer death rates declined at about the same rate, but slightly faster for cancer than heart disease. Since the difference in the number of deaths due to cancer and heart disease is currently relatively small, it is possible (although impossible to predict) that they may change position as the 1<sup>st</sup> and 2<sup>nd</sup> leading causes of death for some number of years.
- In 2007, heart disease caused 17,500 deaths among North Carolinians, 23% of all deaths in that year (Figure 3.1).<sup>5</sup>
- North Carolina's 2005 age-adjusted heart disease death rate is the 25th highest among the 50 states and Washington, D.C.<sup>2</sup>
- North Carolina's 2005 age-adjusted heart disease death rate of 207.2 per 100,000 is similar to the national rate of 211.1 per 100,000 (Figure 3.2 and Table 3.1).
- Heart disease is the 2nd leading cause of total years of life lost in N.C., resulting in an estimated 105,982 years of life lost during 2005.<sup>3</sup>

### ***Trends over Time***

- Heart disease death rates in N.C. declined fairly steadily between 1990 and 2000 (an average annual decline of 1.9%), and have since declined more quickly (an average annual decline of 4.7%) between 2000 and 2005 (Figure 3.2 and Table 3.1).
- Heart disease death rates declined slightly faster in N.C. between 2000 and 2005 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).
- 21.1% of heart disease deaths among North Carolinians occur among those younger than 65, higher than the national percentage of 17.7% (Table 3.2).

### ***Men and Women***

- Heart disease is the leading cause of death among N.C. women and is the 2<sup>nd</sup> leading cause of death among N.C. men.<sup>5</sup>
- In N.C., heart disease death rates are higher among men than among women. In 2005, the heart disease death rate was 260.6 among men and 167.0 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).
- Heart disease death rates have declined more rapidly over time among men than among 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 in 2004 and 2005 there were slightly more heart disease deaths among men than women. In 2005, there were 8,916 heart disease deaths among men and 8,849 heart disease deaths among women in N.C.<sup>2</sup>
- Men are more likely to die of heart disease at a younger age than are women. Among men, 29.4% of heart disease deaths occur before age 65, compared to 12.9% among women in 2001-05) (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 N.C., 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, 42% of heart disease deaths occur before age 65, compared with 26% among white men; 23% of heart disease deaths among African American women occur before age 65, compared with 10% among white women (Figure 3.7 and Table 3.2).
- In 2007, heart disease was the leading cause of death among N.C. whites and N.C. American Indians, and was the 2<sup>nd</sup> leading cause of death among N.C. African Americans. Heart disease was also the 3<sup>rd</sup> leading cause of death among N.C. Hispanics.<sup>5</sup>

### ***Geography***

- A map of 2003-2007 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).<sup>5</sup>
- The percentage of heart disease deaths occurring before age 65 varies across counties, ranging from 11.1% to 31.5%. Among HDSP Regions, the percentage of heart disease deaths occurring before age 65 is highest in the East Region (22.4%) and lowest in the Southwest Region (16.9%) (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% 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, 16.0 million Americans have coronary heart disease and 5.3 million Americans have heart failure (many may have both).<sup>1</sup>
- In 1999, more than 3.2 million Americans reported having a disability, such as functional limitations or difficulty carrying out activities of daily living, as the result of heart trouble or hardening of the arteries.<sup>4</sup>

### *Statewide*

- In 2006, there were 113,067 hospitalizations in N.C. for heart disease (including coronary heart disease, congestive heart failure, and other heart diseases), accounting for 68.4% 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 1,274.8 in 2006 (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 2006 (Figure 3.10 and Table 3.5).
- Heart disease hospitalization rates are higher for males than for females in all age groups (Figure 3.11).
- Nearly 1 in 2 (46.9%) males and 1 in 3 (32.3%) 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. currently exceed \$3.3 billion annually and have been steadily rising.

### *Nationwide*

- In the United States during 2008, the total direct and indirect costs of heart disease were estimated to be \$287.3 billion (Figure 3.14).<sup>1</sup>

### *Statewide*

- Total hospital charges for heart disease in N.C. currently exceed \$3.3 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 \$29,000 (Figure 3.16 and Table 3.5).
- In N.C., Medicaid costs due to heart disease currently exceed \$152 million annually, more than \$1,300 per N.C. Medicaid beneficiary with a history of heart disease.<sup>15</sup>

### ***Trends over Time***

- In N.C., total hospital charges for heart disease more than doubled between 1995 and 2006, climbing from \$1.3 billion to \$3.3 billion (Figure 3.15 and Table 3.5).
- Between 1995 and 2006, the average charge per stay for heart disease hospitalizations in N.C. rose from \$13,316 to \$29,427 (Figure 3.16 and Table 3.5).

### ***Men and Women***

- Total hospital charges for heart disease in N.C. are currently higher for men (\$2.0 billion) than for women (\$1.4 billion) and have been climbing at a faster rate for men than for women (Figure 3.15 and Table 3.5).
- The average charge per stay for heart disease hospitalizations in N.C. is currently higher for men (\$32,521) than for women (\$25,845) and has been climbing at a slightly faster rate for men than for women (Figure 3.16 and Table 3.5).

# Coronary Heart Disease

## CORONARY HEART DISEASE DEATHS

### *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 15% of all deaths in North Carolina.
- 1 in 5 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.
- The coronary heart disease death rate for white North Carolinians has declined below the Healthy People 2010 target, while rates for African American North Carolinians remain above the Healthy People 2010 target.

### *Statewide*

- In 2007, coronary heart disease caused 11,188 deaths among North Carolinians, 15% of all deaths in that year (Figure 4.1).
- North Carolina's 2005 age-adjusted coronary heart disease death rate is the 25th highest among the 50 states and Washington, D.C.<sup>2</sup>
- North Carolina's 2005 age-adjusted coronary heart disease death rate of 137.4 per 100,000 is slightly lower than the national rate of 144.4 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%), and have since declined more quickly (an average annual decline of 6.1% per year between 2000 and 2005) (Figure 4.2 and Table 4.1).
- Coronary heart disease death rates declined slightly faster in N.C. between 2000 and 2005 than they did in the U.S. overall (Figure 4.2 and Table 4.1).
- In 2005, North Carolina's rate for the Healthy People 2010 Objective 12-1 (coronary heart disease deaths; ICD-10 codes I11, I20-I25) of 147 per 100,000 remains below the

target of 162, although rates for N.C. African Americans still remain higher than the target (Figures 4.3 and 4.6).

### ***Age***

- Coronary heart disease death rates in N.C. increase with age (Figure 4.4).
- 21.1% of coronary heart disease deaths among North Carolinians occur among those younger than 65, higher than the national percentage of 17.0% (Table 4.2).

### ***Men and Women***

- In N.C., coronary heart disease death rates are higher among men than among women. In 2005, the coronary heart disease death rate was 183.6 among men and 103.6 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 have declined more rapidly over time among men than among women (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. (2005: 6,315 coronary heart disease deaths among men, 5,486 among women).<sup>2</sup>
- Men are more likely to die of coronary heart disease at a younger age than are women. Among men, 29.2% of coronary heart disease deaths occur before age 65, compared to 12.0% among women in 2001-05 (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 rate for white North Carolinians has already declined to below the Healthy People 2010 target, while rates for African American North Carolinians remain above 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 have declined faster for whites than for African Americans, 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, but that gap appears to be closing somewhat in the past few years (Figure 4.7 and Table 4.1).

- In N.C., 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, 39% of coronary heart disease deaths occur before age 65, compared with 27% among white men; 20% of coronary heart disease deaths among African American women occur before age 65, compared with 10% 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 2001-2005 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 10.0% to 35.4%. Among HDSP Regions, the percentage of stroke deaths occurring before age 65 is highest in the East Region (21.8%) and lowest in the Southwest Region (18.2%) (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.
- More than 47,000 hospitalizations for coronary heart disease occur in N.C. each year, accounting for nearly 30% of all cardiovascular disease hospitalizations.
- Nearly 50% of all coronary heart disease hospitalizations in N.C. occur in people younger than 65 years of age.
- More than 480,000 North Carolinians have a history of coronary heart disease.

### *Nationwide*

- Currently, 16.0 million Americans have some type of coronary heart disease.<sup>1</sup>
- 8.1 million Americans have had a heart attack; approximately 5.0 million of these heart attack survivors are men and 3.0 million are women.<sup>1</sup>
- Each year, 920,000 Americans have a heart attack.<sup>1</sup>
- About 310,000 people each year die of coronary heart disease in an emergency department or before reaching a hospital.<sup>1</sup>
- People who survive a heart attack have a substantially increased risk of another heart attack, sudden death, heart failure and stroke (a 1.5-15 times higher risk, depending on gender and clinical outcome) than does the general population.<sup>1</sup>

### *Statewide*

- In 2006, there were 47,715 hospitalizations in N.C. for coronary heart disease, accounting for 29% of all cardiovascular disease hospitalizations (Figure 4.11 and Table 4.5).
- According to the 2007 N.C. Behavioral Risk Factor Surveillance System (BRFSS), a statewide telephone survey of non-institutionalized adults, 6.9% of N.C. adults — more than 480,000 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 529.1 in 2006 (Figure 4.12 and Table 4.5).

### ***Age***

- Overall, coronary heart disease hospitalization rates in N.C. increase with increasing age until the 75-84 year age group, and then decline somewhat in the 85+ age group (Figure 4.13).
- 47% of all coronary heart disease hospitalizations in N.C. 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 (22.5%) (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 2006 (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 N.C. women, coronary heart disease hospitalization rates increase with increasing age, while among N.C. men the rates increase only to the 75-84 year age group and then decline in the 85+ year age group (Figure 4.13).
- Self-reported history of coronary heart disease among N.C. adults is higher among men (8.1%) than women (5.8%) (Table 4.6).

### ***Racial and Ethnic Groups***

- Self-reported history of coronary heart disease among N.C. adults is similar for whites (7.4%), American Indians (7.7%), and those of other racial groups (6.9%). The rates

among African Americans (5.2%) and Asians (1.4%) are slightly lower than those for whites (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 (12.0%) and in the “less than \$15,000” income group (16.0%) (Figures 4.17 and 4.18 and Table 4.6).

### ***Geography***

- The highest coronary heart disease hospitalization rates are clustered mostly in two bands in N.C., one running through eastern N.C. and the other running from the Virginia border in western N.C. south to the South Carolina border (Figure 4.19 and Table 4.7).
- Self-reported history of coronary heart disease varies across North Carolina regions. In 2007, the Western N.C. region had the highest rate (8.6%), while the Piedmont N.C. region had the lowest rate (6.3%) (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. are currently nearly \$1.8 billion annually and have been rising.
- The average charge for a coronary heart disease hospital stay in N.C. currently exceeds \$37,000.

### ***Nationwide***

- In the United States during 2008, the total direct and indirect costs of coronary heart disease were estimated to be \$156.4 billion (Figure 4.20).<sup>1</sup>

### *Statewide*

- Total hospital charges for coronary heart disease in N.C. are currently nearly \$1.8 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 \$37,000 (Figure 4.22 and Table 4.5).

### *Trends over Time*

- In N.C., total hospital charges for coronary heart disease doubled between 1995 and 2006, climbing from \$800 million to \$1.8 billion (Figure 4.21 and Table 4.5).
- Between 1995 and 2006, the average charge per stay for coronary heart disease hospitalizations in N.C. rose from \$15,759 to \$37,717 (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 (\$1.17 billion) than for women (\$629 million) and have been climbing at a faster rate for men than for women (Figure 4.21 and Table 4.5).
- The average charge per stay for coronary heart disease hospitalizations in N.C. is currently higher for males (\$40,198) than for females (\$33,830) and has been climbing at a slightly faster rate for men than for women (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 10% 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 2007 N.C. BRFSS, 87.3% 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 2007, only 11.3% of N.C. adults knew all the heart attack symptoms (Figure 4.23 and Table 4.6).
- In 2007, only 10.5% 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% 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 60% of N.C. adults correctly identified feeling weak, lightheaded or faint as a symptom of heart attack (Figure 4.24).
- Only 48% 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% 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 2007 (Figure 4.23).
- Knowledge of four heart attack symptoms – feeling weak, lightheaded or faint; chest pain or discomfort; pain in arms or shoulder; and shortness of breath – actually decreased between 2001 and 2005, but have all increased slightly from 2005 to 2007 (Figure 4.24).
- Knowledge that sudden trouble seeing is not a symptom of heart attack increased significantly between 2001 and 2007 (Figure 4.24).
- Knowledge that pain in the jaw, neck or back is a heart attack symptom did not change significantly between 2001 and 2007 (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 (83.4%) than those in other age groups (Figure 4.15 and Table 4.6).

### *Men and Women*

- In 2007, 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 (6.0%), Asians (4.5%), and those of other racial groups (2.3%) than among whites (13.8%) (Figure 4.16 and Table 4.6).
- Hispanic North Carolinians were less likely to know all heart attack symptoms (3.3%) than were non-Hispanic North Carolinians (12.0%), and knowledge of heart attack symptoms was particularly low among Hispanics who spoke only Spanish (0.8%) (Table 4.6).
- Hispanic North Carolinians were less likely to say they would call 911 if they thought someone was having a heart attack (68.9%) than were non-Hispanic North Carolinians (88.9%) (Table 4.6).
- Knowledge of the need to call 911 for a heart attack was similar among whites (89.3%), African Americans (88.0%), and American Indians (90.5%), and was slightly, but not significantly, lower among Asians (83.2%). Those of other race groups were less likely to say they would call 911 if they thought someone was having a heart attack (68.9%) than were whites (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 (5.1%) and highest in the “college graduate” group (16.2%) (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” and “\$15,000-24,999” income groups (6.5% and 5.9%, respectively) and highest in the “\$75,000+” income group (15.9%) (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 (84.7%) than those in the “\$75,000+” income group (90.4%) (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 (4.9%) and highest in the “college graduate” group (14.7%) (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” and “\$15,000-24,999” income groups (5.9% and 5.3%, respectively) and highest in the “\$75,000+” income group (14.8%) (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%) than those with no coronary heart disease history (11.0%) (Figure 4.25).
- 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%) than those with no coronary heart disease history (47.0%) (Figure 4.26).

- 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%) than those with no coronary heart disease history (39.4%) (Figure 4.26).
- 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%) than those without a history of coronary heart disease (87.6%) (Figure 4.25).

### ***Geography***

- Knowledge of heart attack symptoms varies across North Carolina regions. Knowledge of all the heart attack symptoms was lowest in Robeson County (5.6%) and highest in Cabarrus and Orange counties (14.8% and 14.5%, respectively) (Table 4.6).
- Looking across Area Health Education Center (AHEC) regions, knowledge of all the heart attack symptoms was lowest in the Area L AHEC region (7.3%) and highest in the Greensboro and Mountain AHEC regions (13.1% and 12.6%, respectively) (Table 4.6).
- Knowledge of all the heart attack symptoms was lower in the Eastern N.C. region (9.6%) than in either the Piedmont (11.8%) or Western (12.8%) 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% 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 1,500 North Carolinians annually.
- 8% of heart failure deaths among North Carolinians occur before age 65.
- 1 in 4 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 2007, heart failure caused 1,534 deaths among North Carolinians, 2% of all deaths in that year (Figure 5.1).
- North Carolina's 2005 age-adjusted heart failure death rate is the 31st highest among the 50 states and Washington, D.C.<sup>2</sup>
- North Carolina's 2005 age-adjusted heart failure death rate of 17.8 per 100,000 is similar to the national rate of 18.9 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 2005, however, heart failure death rates in N.C. declined two years in a row, from 20.2 per 100,000 to 17.8 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).
- 8.1% of heart failure deaths among North Carolinians occur among those younger than 65, higher than the national percentage of 6.9% (Table 5.2).

### *Men and Women*

- In N.C., heart failure death rates are slightly higher among men than among women (Figure 5.4 and Table 5.1). In 2005, the heart failure death rate was 18.5 among men and 17.1 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. (2005: 931 heart failure deaths among women, 562 among men).<sup>2</sup>
- Men are more likely to die of heart failure at a younger age than are women. Among men, 12.6% of heart failure deaths occur before age 65, compared to 5.6% among women in 2001-05 (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, white women, and African American 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-five percent of heart failure deaths among African American men and 13% among African American women occur before age 65, compared with 9% among white men and 4% among white women (Figure 5.7 and Table 5.2).

## ***Geography***

- A map of 2000-2005 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.
- People diagnosed with heart failure are six to nine times more likely to suffer sudden cardiac death than the general population.
- More than 25,000 hospitalizations for congestive heart failure occur in N.C. each year, accounting for 16% of all cardiovascular disease hospitalizations.
- 32% of all congestive heart failure hospitalizations in N.C. occur in people younger than 65 years of age.
- North Carolina's rates for each of the three congestive heart failure Healthy People 2010 Objectives are well above the 2010 target, and more rapid declines in those rates are required to reach the targets.

## ***Nationwide***

- Currently, 5.3 million Americans have heart failure; approximately 2.7 million are men and 2.7 million are women.<sup>1</sup>
- Each year, 660,000 Americans develop heart failure.<sup>17</sup>
- About 22% of men and 46% of women who survive a heart attack will be disabled with heart failure within six years.<sup>1</sup>
- Among those under age 65 who have heart failure, 80% of the men and 70% of the women will die within eight years.<sup>1</sup>
- People diagnosed with heart failure are six to nine times more likely to suffer sudden cardiac death than the general population.<sup>1</sup>

## ***Statewide***

- In 2006, there were 25,600 hospitalizations in N.C. for congestive heart failure, accounting for 15% of all cardiovascular disease hospitalizations (Figure 5.9 and Table 5.4).

- While N.C.'s rates for each of the three congestive heart failure Healthy People 2010 Objectives are similar to or lower than the corresponding U.S. rates, they are still well above the 2010 target (Figure 5.10). To reach the 2010 targets, N.C. will need to achieve a 35% decrease in the rate for the 65-74 year age group, a 34% decrease for the 75-84 year age group, and a 23% decrease for the 85+ year age group in the four years between 2006 and 2010.

### ***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 292.9 in 2006 (Figure 5.11 and Table 5.4).
- While hospitalization rates for congestive heart failure in N.C. are currently declining, a faster rate of decline is required to meet the Healthy People 2010 targets. To reach the 2010 targets, N.C. will need to achieve an average annual decline of 10.5% in the 65-74 year age group (the decline from 2005 to 2006 was only 7.4%); a 10.0% annual decline in the 75-84 year age group (the decline from 2005 to 2006 was only 2.9%); and a 6.5% annual decline in the 85+ year age group (the decline from 2005 to 2006 was only 2.0%) in the four years between 2006 and 2010.

### ***Age***

- Congestive heart failure hospitalization rates in N.C. increase with increasing age (Figure 5.12).
- 32% 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).
- Age-adjusted congestive heart failure hospitalization rates have decreased more rapidly for women than for men since 2003 (Figure 5.11 and 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.
- Total hospital charges for congestive heart failure in N.C. more than doubled between 1995 and 2006, and currently exceed \$530 million annually.
- The average charge for a congestive heart failure hospital stay in N.C. currently exceeds \$20,000.

### ***Nationwide***

- In the United States during 2008, the direct and indirect costs of heart failure were estimated to be \$34.8 billion (Figure 5.15).<sup>1</sup> 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 \$530 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 \$20,000 (Figure 5.17 and Table 5.4).
- In N.C., Medicaid costs due to congestive heart failure currently exceed \$58 million dollars annually, more than \$3,500 per N.C. Medicaid beneficiary with a history of heart failure.<sup>15</sup>

### ***Trends over Time***

- In N.C., total hospital charges for congestive heart failure more than doubled between 1995 and 2005, climbing from \$190 million to more than \$530 million, but that increase leveled off considerably between 2005 and 2006, increasing only from \$530 million to \$532 million (Figure 5.16 and Table 5.4).
- Between 1995 and 2005, the average charge per stay for congestive heart failure hospitalizations in N.C. rose from \$9,159 to \$20,582, but that increase also leveled off between 2005 and 2006, increasing only slightly from \$20,582 to \$20,814 (Figure 5.17 and Table 5.4).

### ***Men and Women***

- While total hospital charges for congestive heart failure in N.C. have historically been higher for women than for men, they have climbed more quickly for men than for women in the last few years, so that total charges are now higher for men (\$292 million) than for women (\$240 million) (Figure 5.16 and Table 5.4). This is partly due to recent decreases in the number of congestive heart failure hospitalizations among women, as well as faster increases in average charge per stay for congestive heart failure among men in recent years (Table 5.4).
- The average charge per stay for congestive heart failure hospitalizations in N.C. is currently higher for men (\$23,112) than for women (\$18,562) and has been climbing at a faster rate for men than for women. The increase in average charge per stay for both men and women slowed considerably between 2005 and 2006. (Figure 5.17 and Table 5.4).

# High Blood Pressure

## BLOOD PRESSURE SCREENING

### *In Brief: Blood Pressure Screening*

- More than 94% of North Carolina 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 4<sup>th</sup> 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 2005, more than 94% of North Carolina adults reported having had their blood pressure checked at least once within the past two years, similar to the 95% among U.S. adults in 1999 (the last year for which U.S. data are available) (Figure 6.1 and Table 6.1).
- In 1999 (the last year for which data were available for all states), North Carolina had the 4<sup>th</sup> best rate of blood pressure screening among the 50 states.<sup>18</sup>

### *Trends over Time*

- Blood pressure screening rates declined from 96.8% in 1991 to a low of 93.9% in 1997, rose back to 96.7% in 2001, and have since declined to 94.9% in 2005 (Figure 6.1 and Table 6.1). This decline is likely to be due in part to the inclusion of Spanish speakers in the survey beginning in 2005. As a group, Spanish speakers have lower hypertension screening rates, and their inclusion has resulted in a more accurate estimate of the hypertension screening rate among the entire adult North Carolina population.

### *Age*

- Blood pressure screening rates in North Carolina are lowest among the 18-24, 25-34, and 35-44 year age groups (91.1%, 93.7% and 93.1%, respectively) and highest among the 65-74 and 75+ year age groups (98.2% and 98.5%, 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% in 1991 to 90.2% in 1997,

while rates for women remained more stable, around 97%. Although screening rates among men have since increased to 92.6%, this remains lower than the 97.1% among women (Figure 6.3 and Table 6.1).

- In 2005, white women and African-American women in North Carolina had the highest blood pressure screening rates (97.3% and 97.2%, respectively), followed by African-American men (95.1%) and white men (94.0%) (Figure 6.4 and Table 6.1).

### ***Racial and Ethnic Groups***

- Blood pressure screening rates are similar for Whites (95.7%), African Americans (96.2%), Asians (93.2%), and American Indians (96.1%) in North Carolina, but are significantly lower among those of other racial groups (83.1%) (Figure 6.5 and Table 6.2).
- Blood pressure screening rates are significantly lower among Hispanic North Carolinians who spoke only Spanish (76.9%) than among English-speaking Hispanic (96.4%) and non-Hispanic North Carolinians (96.2%) (Table 6.2).
- Blood pressure screening rates among both whites and African American North Carolinians have decreased slightly, but not significantly, between 2001 and 2005 (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 88.8% in the “less than high school” education group to 97.9% 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 97.9%, 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 Mountain AHEC region (excluding Buncombe County) currently has the lowest blood pressure screening rate (91.3%) among N.C. counties/regions, and Cumberland County currently has the highest blood pressure screening rate (98.1%) among N.C.

counties/regions; both are significantly different from the state overall rate (94.9%) (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 28% of people who have hypertension do not know they have hypertension.
- 29% of N.C. adults report having been diagnosed with hypertension, which is similar to the national rate of 27.5%.
- N.C. has the 14<sup>th</sup> highest diagnosed hypertension prevalence rate for adults among the 50 states and Washington, D.C.
- The prevalence of diagnosed hypertension among adults in North Carolina nearly doubled between 1993 and 2005, but that increase seems to have leveled off between 2005 and 2007.
- 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, 73 million people, have high blood pressure ("hypertension"), and another 37%, or 69.7 million people, have pre-hypertension (systolic blood pressure of 120-130 mmHg or diastolic blood pressure of 80-89 mmHg).<sup>1</sup>
- 28.2% of American adults who have high blood pressure do not know they have high blood pressure.<sup>1</sup>

- African Americans in the U.S. have some of the highest hypertension prevalence rates in the world; 42.6% of African American men and 46.6% of African American women have high blood pressure.<sup>1</sup>
- In the United States during 2008, the total direct and indirect costs of hypertension were estimated to be \$69.4 billion (Figure 6.9).<sup>1</sup>

### ***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 a third of people who have hypertension do not know they have it. Of all American adults who have hypertension, only 72% know they have it.<sup>1</sup>
- 28.8% of North Carolina adults have been told by a healthcare professional that they have high blood pressure, similar to the 27.5% of U.S. adults (Figure 6.10 and Table 6.3).
- In 2007, N.C. had the 14<sup>th</sup> highest diagnosed hypertension prevalence rate for adults among the 50 states and Washington, D.C.<sup>19</sup>
- In 2007, the estimated prevalence of high blood pressure among N.C. children ages 3-17 years was 0.7% (Table 6.4), similar to the estimated prevalence of diabetes among N.C. children (0.6%) from the same survey.<sup>20</sup> 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 N.C., Medicaid costs due to hypertension currently exceed \$487 million annually, more than \$2,100 per N.C. Medicaid beneficiary with a history of hypertension.<sup>15</sup>

### ***Trends over Time***

- The prevalence of diagnosed hypertension in North Carolina increased steadily and nearly doubled from 17.0% in 1993 to 29.2% in 2005, but this increase seems to have leveled off, with a slight decline to 28.8% in 2007 (Figure 6.10 and Table 6.3).

## *Age*

- The prevalence of diagnosed hypertension increases with age among adults, from 5.5% among the 18-24 year age group to 62.6% 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.<sup>21-23</sup> 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.<sup>21-23</sup> In 2007, the prevalence of high blood pressure among N.C. children ages 3-17 years was estimated at 0.7% (Table 6.4), similar to the estimated prevalence of diabetes among N.C. children (0.6%) from the same survey.<sup>20</sup> 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 slightly, but not significantly, higher among women than 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 6.11 and Table 6.3).

## *Racial and Ethnic Groups*

- Diagnosed hypertension prevalence rates are significantly higher for African Americans than for whites in North Carolina (39.8% vs. 28.2%) (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 6.12). Rates for African Americans are 1.65 times higher than for whites in the 35-44 year age group, 1.80 times higher in the 45-54 year age group, 1.49 times higher in the 55-64 year age group, 1.34 times higher in the 65-74 year age group, and 1.30 times higher in the 75+ year age group.

- African American women have the highest prevalence of diagnosed hypertension (42.8%), followed by African American men (36.5%), white men (28.5%) and white women (27.9%) (Figure 6.4 and Table 6.3).
- Diagnosed hypertension prevalence rates are similar for American Indians (29.5%) and whites (28.2%) (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 (12.7%), particularly among those who speak only Spanish (9.1%), than among non-Hispanic North Carolinians (30.1%) (Table 6.5).
- Diagnosed hypertension prevalence rates increased among African American North Carolinians between 1991 and 2005, and among white North Carolinians between 1993 and 2003, but those increases have since leveled off for both groups (Figure 6.13 and Table 6.3).

### ***Socio-economic Groups***

- Diagnosed hypertension prevalence rates are highest in the lowest education groups and decrease with increasing education. 33.9% of those in the “less than high school” education group have high blood pressure, and the diagnosed hypertension prevalence rate decreases to 23.4% 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% of those in the “less than \$15,000” income group have high blood pressure, and the diagnosed hypertension prevalence rate decreases to 21.3% 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. Mecklenburg and Wake counties have the lowest diagnosed hypertension prevalence

rates (24.2% and 22.3%, respectively), while Guilford and Wayne counties have the highest rates, more than 34% (Table 6.5).

- Looking at diagnosed hypertension prevalence rates by Area Health Education Center (AHEC) regions shows that the Area L AHEC region has the highest rate of diagnosed hypertension (37.5%), while Wake and Charlotte AHEC regions have the lowest rates (24.8% and 27.5%, respectively (Table 6.5).
- The Eastern and Western regions of N.C. have higher diagnosed hypertension prevalence rates (30.8% and 30.9%, respectively) compared to the Piedmont region (27.4%) (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.
- 82% of North Carolina adults with diagnosed hypertension report current use of anti-hypertensive medications, similar to the U.S. rate.
- The use of anti-hypertensive medications among adults with diagnosed hypertension has increased significantly in N.C. between 2001 and 2007.
- Use of anti-hypertensive medication is lower among African American men than among white men or African American or white women, and this disparity has not improved over time.
- 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 72% of those with hypertension are aware that they have high blood pressure and only 61% of people with hypertension are being treated for their

hypertension. Only about one-third (35%) of those with hypertension have their blood pressure under control.<sup>1</sup>

### ***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 72% know they have it and, despite the fact that 61% are currently being treated for hypertension, only 35% have their blood pressure under control.<sup>1</sup>
- 82.3% of North Carolina adults who have been diagnosed with hypertension report that they are taking medication to control their blood pressure, higher than the 75.5% among U.S. adults in 2003 (the most recent U.S. data available) (Figure 6.14 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%) and 2007 (82.3%) (Figure 6.14 and Table 6.6).

### ***Age***

- The percentage of people with hypertension who report taking anti-hypertensive medications increases with age, from 13.4% among the 18-24 year age group to more than 90% 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 6.14 and Table 6.6)
- Despite these increases, the percentage of men with hypertension who report taking anti-hypertensive medications (78.8%) remains significantly lower than the percentage of women (85.4%). (Figure 6.14 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 (84.1%), African Americans (82.1%), and American Indians (87.7%) (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 (Figure 6.14 and Table 6.6).
- African American men are the least likely to be taking anti-hypertensive medications (75.8%) compared to African American women (86.9%) and white men and women (81.8% and 86.3%, respectively) (Figure 6.4 and Table 6.6). This disparity has not improved between 2001 and 2007 (Figure 6.15 and Table 6.6).
- Current use of anti-hypertensive medications is significantly lower for those in other racial groups (43.8%) than for whites (84.1%), African Americans (82.1%), and American Indians (87.7%) (Figure 6.5 and Table 6.5).
- The rate of anti-hypertensive medication use appears lower among Asians than among whites, African Americans, and American Indians, although this estimate may be unreliable due to the small number of Asians interviewed for the survey who had diagnosed hypertension (n=21) (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 is lowest in the “\$25,000-34,999” income group (74.6%) and highest in the “less than \$15,000” income group and the “\$75,000+” income group (85.0% and 85.9%, respectively) (Figure 6.8 and Table 6.5).

### ***Geography***

- The percentage of people with diagnosed hypertension who report currently taking anti-hypertensive medications varies across North Carolina regions. The Coastal AHEC

region has the highest rate (91.9%), while the Charlotte and Greensboro AHEC regions have the lowest rates (77.0% and 78.5%, respectively) (Table 6.5).

# High Blood Cholesterol

## CHOLESTEROL SCREENING

### *In Brief: Cholesterol Screening*

- 78% of North Carolina 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 between 2005 and 2007, from 72% to 78%.
- Cholesterol screening rates are low (less than 65%) among North Carolina 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.<sup>24</sup>
- 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 2007, 78% of North Carolina adults reported having had their blood cholesterol checked at least once within the past five years, slightly higher than the 75% among U.S. adults (Figure 7.1 and Table 7.1).
- In 2007, North Carolina had the 17<sup>th</sup> best rate of blood cholesterol screening among the 50 states and Washington, D.C.<sup>25</sup>

### *Trends over Time*

- Cholesterol screening rates in N.C. increased substantially from 72.0% in 2005 to 78.0% in 2007, 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 39.3% in the 18-24 year age group to 95.8% in the 65-74 year age group and 95.3% 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 2007, only 74.8% of N.C. men had had their cholesterol checked within the past five years, compared to 81.0% 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 2007, white women and African American women had the highest cholesterol screening rates (83.5% and 83.0%, respectively), followed by white men (79.3% and African American men (77.3%) (Figure 7.4 and Table 7.1).

### *Racial and Ethnic Groups*

- In 2007, cholesterol screening rates were similar for whites (81.5%), African Americans (80.2%), Asians (78.3%), and American Indians (82.1%), while screening rates were lower among those of other racial groups (41.9%) (Figure 7.5 and Table 7.2).
- Cholesterol screening rates are significantly lower among Hispanic North Carolinians (42.7%), particularly among those who speak only Spanish (31.6%), than among non-Hispanic North Carolinians (81.0%) (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 in 2007 are now similar between the two groups (80.2% among African Americans and 81.5% among whites) (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 (83.0% and 83.5%, respectively), and the rate for African American men is now similar to that for white men (77.3% and 79.3%, 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 63.9% 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 87.6% among those in the “college graduate” education group (Figure 7.8 and Table 7.2).
- Cholesterol screening rates are lowest in the lowest three income groups and increase with increasing income over \$35,000. Less than 75% of those in the three lowest income groups (under \$35,000) have had their cholesterol checked in the past five years; the screening rate increases to 88.5% 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. Robeson County currently has the lowest cholesterol screening rate (68.6%), while New Hanover County currently has the highest cholesterol screening rate (85.2%); both are significantly different from the state overall rate (78.0%) (Table 7.2).
- Among AHEC regions, Southern Regional has the lowest cholesterol screening rate (72.7%), while the Charlotte AHEC region has the highest rate (81.0%) (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.
- Nearly 40% North Carolina adults report having been diagnosed with high cholesterol, which is slightly higher than the U.S. rate.
- N.C. has the 7<sup>th</sup> 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 (48%) of American adults – 106.7 million people – have a total cholesterol of 200 mg/dL or higher, while 37.2 million people (17%) have a total cholesterol of 240 mg/dL or higher.<sup>1</sup>
- Almost one-third (32.5%) of American adults have an LDL ("bad") cholesterol of 130 mg/dL or higher, and 16.7% have an HDL ("good") cholesterol below 40 mg/dL.<sup>1</sup>

### *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.

- Nearly 40% of N.C. adults have been told by a healthcare professional that they have high cholesterol, slightly higher than the 37.5% of U.S. adults (Figure 7.10 and Table 7.3).
- In 2007, N.C. had the 7<sup>th</sup> highest diagnosed high blood cholesterol prevalence rate among the 50 states and Washington, D.C.<sup>25</sup>

### ***Trends over Time***

- The prevalence of diagnosed high cholesterol in North Carolina has increased steadily from 23.9% in 1995 to 39.6% in 2007, 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 12.6% among the 18-24 year age group to 60.1% among the 65-74 year age group, and then decreases somewhat to 51.1% 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 (41.3%) than among women (38.1%) 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 2007, diagnosed high cholesterol prevalence rates were similar among whites (40.6%), African Americans (38.1%), Asians (40.4%), and American Indians (39.1%) in N.C., while the diagnosed high cholesterol prevalence rate among those of other races was slightly – but not significantly – lower (30.8%) (Figure 7.5 and Table 7.2).
- Diagnosed high cholesterol prevalence rates are currently similar among African American men (38.2%), African American women (38.1%), and white women (38.7%), but are slightly higher among white men (42.7%) (Figure 7.4 and Table 7.3).
- Diagnosed high cholesterol prevalence rates are slightly lower among Hispanic North Carolinians (31.7%) than among non-Hispanic North Carolinians (40.0%) (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 (47.9%) of those in the “less than high school” education group have high cholesterol; the diagnosed high cholesterol prevalence rate decreases to 35.3% 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 (49.8%) and lowest in the “\$50,000-74,999” and “\$75,000+” income groups (35.2% and 36.2%, 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 (27.3% and 28.5%, respectively), both significantly lower than the overall state rate (39.6%), while Robeson county has the highest rate of diagnosed high cholesterol (46.1%) (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.<sup>1</sup>

- 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.<sup>1</sup>

***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 North Carolina adults, 44.0% currently engage in the recommended amount of physical activity, 21.6% eat five or more servings of fruits and vegetables daily, 22.9% are current smokers, 64.6% are either overweight or obese, and 9.1% have been diagnosed with diabetes.
- Among North Carolina high school students, 44.3% currently engage in the recommended amount of physical activity, 14.8% eat five or more servings of fruits and vegetables daily, 19.0% are current cigarette smokers, 12.8% are obese, and 17.1% are overweight.

### PHYSICAL ACTIVITY

- In 2007, 24.3% of North Carolina adults did not engage in any leisure-time physical activity, similar to the 22.6% among U.S. adults (Figure 8.1 and Table 8.1).
- In 2007, only 44.0% of North Carolina 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 49.5% among U.S. adults (Figure 8.1 and Table 8.1).
- In 2007, 44.3% of North Carolina high school students engaged in the recommended amount of physical activity (60 or more minutes of physical activity per day on five or more of the past seven days), higher than the 34.7% among U.S. high school students (Figure 8.2 and Table 8.2).
- In 2007, 35.3% of North Carolina high school students watched three or more hours of television on an average school day, similar to the 35.4% among U.S. high school students (Figure 8.2 and Table 8.2).
- Public health interventions related to physical activity 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](http://www.eatsmartmovemorenc.com).

- For more data related to physical activity among adults in North Carolina, please visit the N.C. Behavioral Risk Factor Surveillance System Web site, [www.schs.state.nc.us/SCHS/brfss](http://www.schs.state.nc.us/SCHS/brfss), and the Eat Smart, Move More NC data Web page, [www.eatsmartmovemorenc.com/Data/Data.html](http://www.eatsmartmovemorenc.com/Data/Data.html).
- For more data related to physical activity among children and youth in North Carolina, please visit the Youth Risk Behavior Surveillance System's Web site, <http://apps.nccd.cdc.gov/yrbss/SelHealthTopic.asp?Loc=NC>, and the Eat Smart, Move More NC data Web page, [www.eatsmartmovemorenc.com/Data/Data.html](http://www.eatsmartmovemorenc.com/Data/Data.html).

## NUTRITION

- In 2007, only 21.6% of North Carolina adults ate at least five fruits and vegetables daily, slightly lower than the 24.4% among U.S. adults (Figure 8.3 and Table 8.1).
- In 2007, only 14.8% of North Carolina high school students ate at least five fruits and vegetables daily, lower than the 21.4% of U.S. high school students (Figure 8.4 and Table 8.2).
- Public health interventions in North Carolina related to nutrition and chronic diseases, including cardiovascular disease, 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](http://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](http://www.nutritionnc.com/index.htm).
- For more data related to nutrition among adults in North Carolina, please visit the N.C. Behavioral Risk Factor Surveillance System Web site, [www.schs.state.nc.us/SCHS/brfss](http://www.schs.state.nc.us/SCHS/brfss), and the Eat Smart, Move More NC data Web page, [www.eatsmartmovemorenc.com/Data/Data.html](http://www.eatsmartmovemorenc.com/Data/Data.html).

- For more data related to nutrition among children and youth in North Carolina, please visit the Youth Risk Behavior Surveillance System's Web site, <http://apps.nccd.cdc.gov/yrbss/SelHealthTopic.asp?Loc=NC>, and the Eat Smart, Move More NC data Web page, [www.eatsmartmovemorenc.com/Data/Data.html](http://www.eatsmartmovemorenc.com/Data/Data.html).
- 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](http://www.nutritionnc.com/nutrsurv.htm).

## TOBACCO USE

- In 2007, 22.9% of North Carolina adults were current cigarette smokers, similar to the 19.8% among U.S. adults (Figure 8.5 and Table 8.1).
- In 2007, more than half (56.8%) of North Carolina adult current smokers tried to quit smoking at least once in the previous year, similar to the 57.3% among U.S. adult smokers in 2006 (Figure 8.5 and Table 8.1).
- In 2007, 4.5% of North Carolina middle school students reported current cigarette smoking (smoked a cigarette on at least one of the previous 30 days), slightly lower than the 6.3% among U.S. middle school students in 2006 (Figure 8.6 and Table 8.2).
- In 2007, 9.1% of North Carolina middle school students reported current use of any tobacco product, similar to the 9.5% among U.S. middle school students in 2006 (Figure 8.6 and Table 8.2).
- In 2007, 19.0% of North Carolina high school students reported current cigarette smoking (smoked a cigarette on at least one of the previous 30 days), similar to the 19.7% among U.S. high school students in 2006 (Figure 8.6 and Table 8.2).
- In 2007, 26.6% of North Carolina high school students reported current use of any tobacco product, similar to the 25.6% among U.S. high school students in 2006 (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](http://www.tobaccopreventionandcontrol.ncdhhs.gov).

- For more data related to tobacco use among adults in North Carolina, please visit the N.C. Behavioral Risk Factor Surveillance System Web site, [www.schs.state.nc.us/SCHS/brfss](http://www.schs.state.nc.us/SCHS/brfss), and the Tobacco Prevention and Control Branch's Research & Data Web page, [www.tobaccopreventionandcontrol.ncdhhs.gov/data/index.htm](http://www.tobaccopreventionandcontrol.ncdhhs.gov/data/index.htm).
- 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](http://www.tobaccopreventionandcontrol.ncdhhs.gov/data/index.htm).

## OVERWEIGHT & OBESITY

- In 2007, more than a third (35.9%) of North Carolina adults were overweight, similar to the 36.6% among U.S. adults (Figure 8.7 and Table 8.1).
- More than one in four (28.7%) North Carolina adults were obese in 2007, similar to the 26.3% among U.S. adults (Figure 8.7 and Table 8.1).
- Nearly two thirds (64.6%) of North Carolina adults were either overweight or obese in 2007, similar to the 62.9% among U.S. adults (Figure 8.7 and Table 8.1).
- In 2007, 17.1% of North Carolina high school students were overweight (body mass index  $\geq$ 85th to  $<$ 95th percentile for age and sex) and 12.8% were obese (body mass index  $\geq$ 95th percentile for age and sex), similar to the 15.8% and 13.0%, respectively, among U.S. high school students (Figure 8.8 and Table 8.2).
- Among children seen in North Carolina public health clinics, 15.3% of 2- to 4-year-olds, 24.9% of 5- to 11-year-olds, and 29.9% of 12- to 18-year-olds were obese (body mass index  $\geq$ 95th percentile for age and sex) in 2007. An additional 15.8% of 2- to 4-year-olds, 16.9% of 5- to 11-year-olds, and 17.7% of 12- to 18-year-olds were overweight (body mass index  $\geq$ 85th to  $<$ 95th percentile for age and sex). Therefore, 31.0% of 2- to 4-year-olds, 41.8% of 5- to 11-year-olds, and 47.6% of 12- to 18-year-olds were either overweight or obese (Figure 8.9 and Table 8.2).
- Public health 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](http://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](http://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](http://www.schs.state.nc.us/SCHS/brfss), the Eat Smart, Move More NC data Web page, [www.eatsmartmovemorenc.com/Data/Data.html](http://www.eatsmartmovemorenc.com/Data/Data.html), and the Burden of Obesity In N.C. Web page, [www.eatsmartmovemorenc.com/ObesityInNC/ObesityInNC.html](http://www.eatsmartmovemorenc.com/ObesityInNC/ObesityInNC.html).
- For more data related to overweight and obesity among children and youth in North Carolina, please visit the Youth Risk Behavior Surveillance System's Web site, <http://apps.nccd.cdc.gov/yrbss/SelHealthTopic.asp?Loc=NC> (select "dietary behaviors"), the Eat Smart, Move More NC data Web page, [www.eatsmartmovemorenc.com/Data/Data.html](http://www.eatsmartmovemorenc.com/Data/Data.html), and the Burden of Obesity In N.C. Web page, [www.eatsmartmovemorenc.com/ObesityInNC/ObesityInNC.html](http://www.eatsmartmovemorenc.com/ObesityInNC/ObesityInNC.html).
- 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 prevents or delays Type 2 Diabetes. Good glucose control in people with diabetes helps to prevent or delay diabetes complications, including cardiovascular conditions.

- In 2007, nearly one in 10 (9.1%) North Carolina adults reported having been diagnosed with diabetes, slightly higher than the 8.0% among U.S. adults (Figure 8.10 and Table 8.1).
- An estimated 1.256 million North Carolinians have pre-diabetes or diabetes, and many are unaware of their condition (Figure 8.11). Thirty-eight percent of North Carolina adults report they have never had a diabetes blood test.<sup>26</sup>
- 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](http://www.ncdiabetes.org).
- For more data related to diabetes in North Carolina, please visit the N.C. Behavioral Risk Factor Surveillance System Web site, [www.schs.state.nc.us/SCHS/brfss](http://www.schs.state.nc.us/SCHS/brfss), and the Diabetes Prevention and Control Branch's Facts & Figures Web page, [www.ncdiabetes.org/factsFigures/index.asp](http://www.ncdiabetes.org/factsFigures/index.asp).

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