

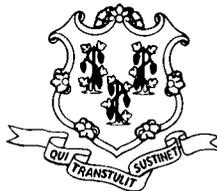


Keeping Connecticut Healthy

**THE BURDEN OF CARDIOVASCULAR DISEASE
IN CONNECTICUT**

2006 Surveillance Report

DECEMBER 2006



State of Connecticut
Department of Public Health
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INTRODUCTION

Cardiovascular diseases involve the body’s vascular system, which is responsible for supplying oxygen and nutrients to the body’s organs and cells. The most common forms of cardiovascular disease are coronary heart disease and cerebrovascular disease. Essential hypertension, congestive heart failure, and atherosclerosis are other common cardiovascular diseases. Cardiovascular diseases (CVD) are of great public health concern because more than one-third of all deaths in the United States and Connecticut are due to CVD and because prevention efforts have shown such great potential in reducing CVD morbidity, mortality, and disability.¹

Coronary heart disease and cerebrovascular disease deaths have shown decreasing trends over time in the United States and Connecticut.² Despite advances in treatment, however, the number of congestive heart failure deaths has increased steadily in Connecticut and the United States most likely because people are surviving heart attacks experienced earlier in life.³ Approximately 59% of all congestive heart failure deaths in Connecticut occur to persons aged 85 or older. In contrast, only 39% of all coronary heart disease deaths and 46% of all cerebrovascular disease deaths occur in persons 85 and older.⁴

THE BURDEN OF CARDIOVASCULAR DISEASE IN CONNECTICUT

Mortality

Cardiovascular diseases accounted for 11,365 Connecticut resident deaths in 2002, or about 38% of all deaths for the period.⁵ In contrast, cancer deaths comprised 24%, chronic lower respiratory disease comprised 5%, unintentional injuries comprised 4%, and diabetes comprised 2% of all Connecticut resident deaths in 2002 (Table 1).

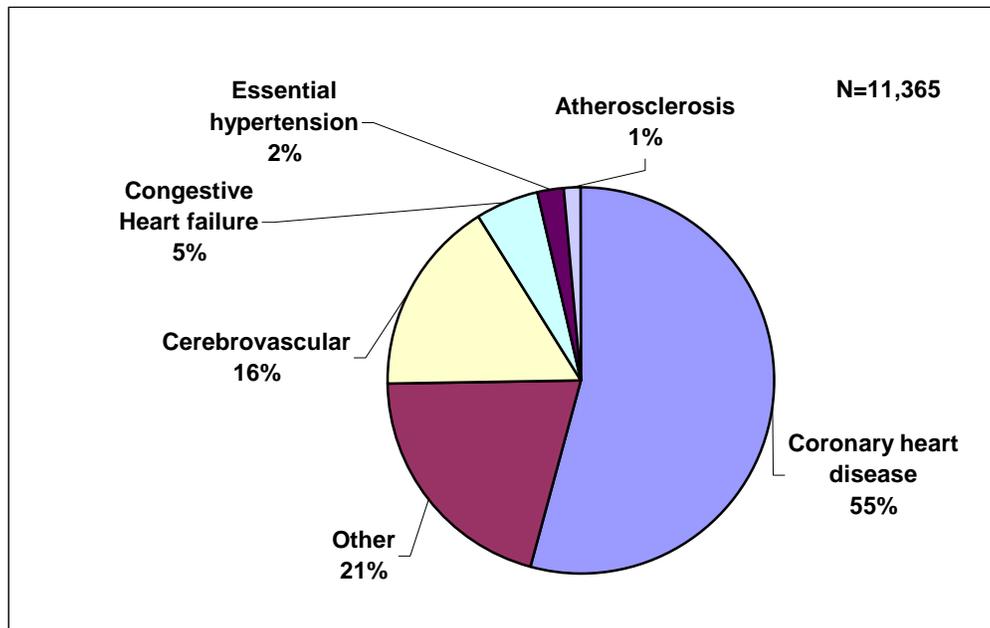
Table 1. CONNECTICUT RESIDENT DEATHS – 2002

- 30,055 Deaths from All Causes
- 11,365 Cardiovascular Disease Deaths
- 7,130 Cancer Deaths
- 1,452 Chronic Lower Respiratory Disease Deaths
- 1,155 Unintentional Injury Deaths
- 674 Diabetes Deaths

Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

The major cardiovascular diseases are coronary heart disease and cerebrovascular disease or “stroke.” Stroke is the most severe clinical manifestation of cerebrovascular disease, and we use the terms interchangeably in this report. Coronary heart disease, accounts for 55% of all CVD deaths, and includes hypertensive heart disease and ischemic heart disease.⁶ Stroke is responsible for about 16% of cardiovascular deaths in Connecticut, and includes two major types - ischemic stroke and hemorrhagic stroke.⁷ Congestive heart failure accounts for 5% of all CVD deaths, while essential hypertension and atherosclerosis account for 3% of all CVD deaths in Connecticut (Figure 1).

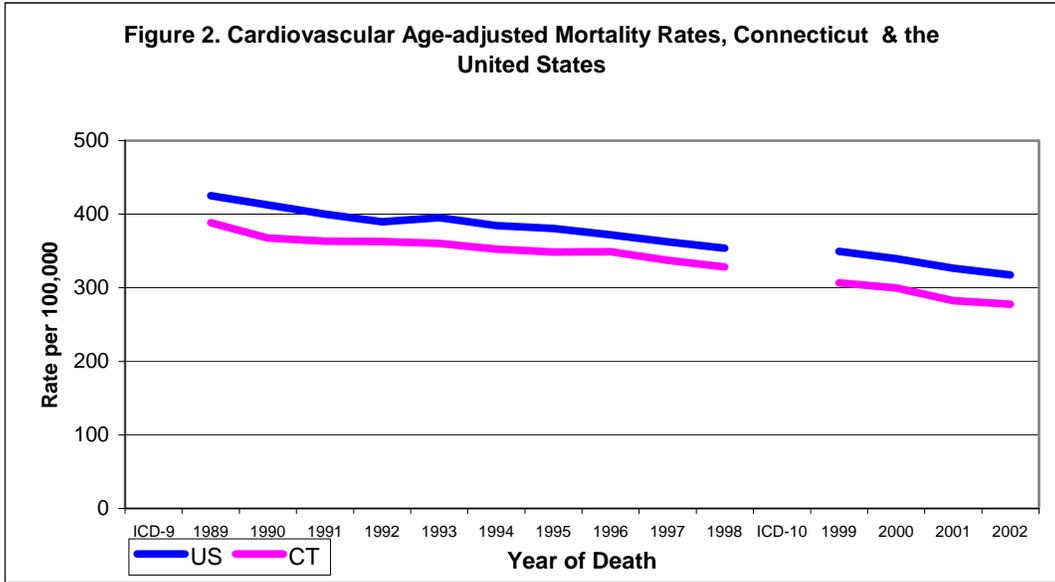
Figure 1. Cardiovascular Disease Deaths, Connecticut Residents - 2002



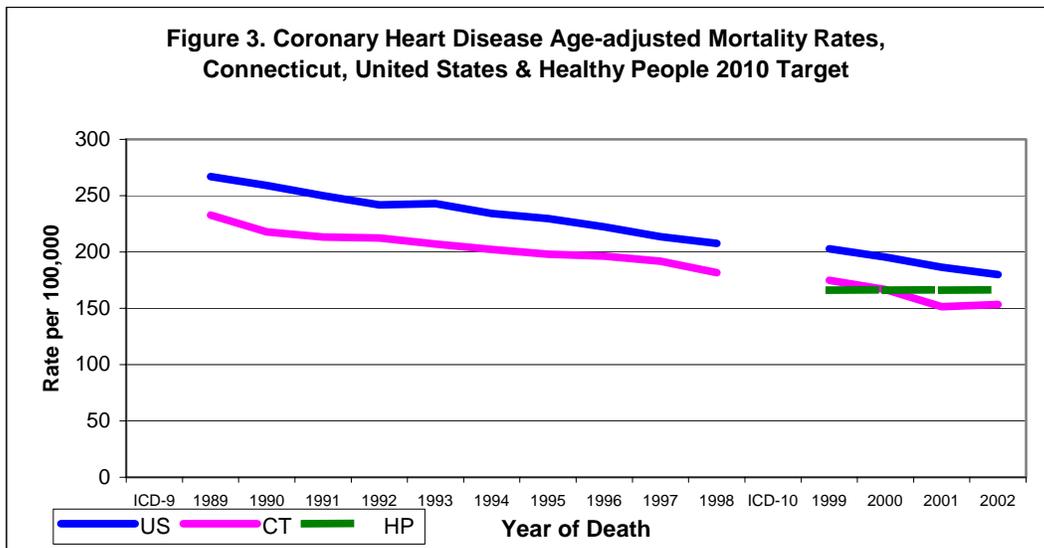
Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Trends in Mortality

Between 1989 and 1998, cardiovascular disease (CVD) and coronary heart disease (CHD) death rates decreased significantly for all Connecticut residents ($p < .001$). This continuing decrease in Connecticut CVD and CHD mortality mirrors a similar decline in CVD and CHD mortality nationwide.⁸ CVD and CHD death rates for Connecticut residents have been consistently lower than those for the United States population (Figures 2 and 3). Connecticut resident CHD death rates from 1999 to 2002 (ranging from 175 to 153 per 100,000) have been very close to the *Healthy People 2010* target of 166 per 100,000 population (Figure 3).⁹

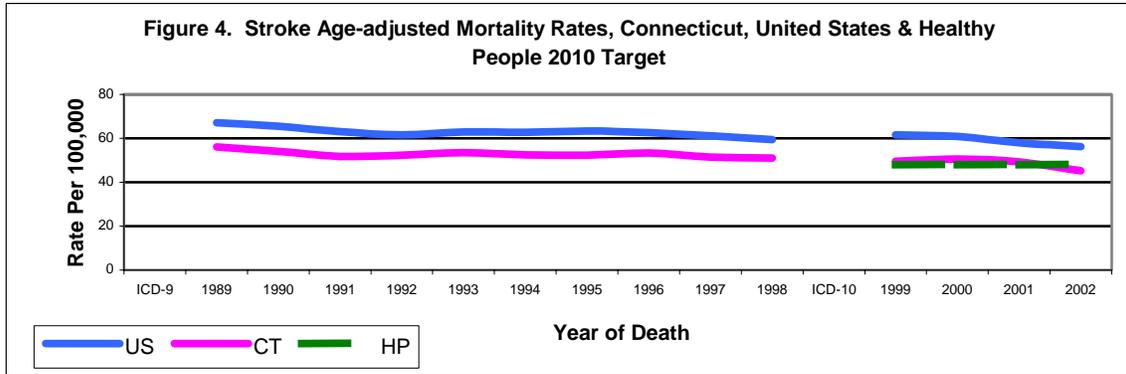


Sources: Centers for Disease Control and Prevention, 2005; Connecticut Department of Public Health, 2005. **Note:** Rates are adjusted to the 2000 US standard million population. Classification includes deaths with ICD-9 codes: 390-459.9 (1989 to 1998); ICD-10 codes: I00, I78.9 (1999 to 2002).



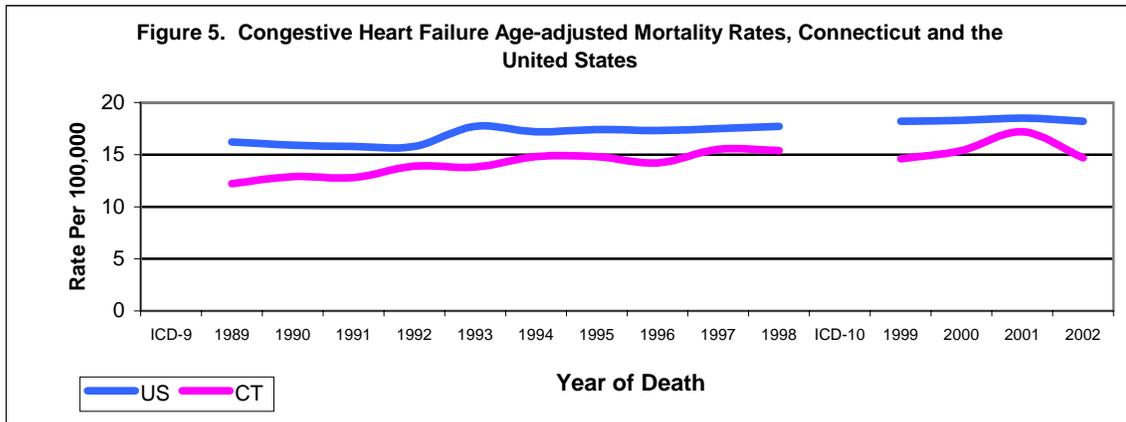
Sources: Centers for Disease Control and Prevention, 2005; Connecticut Department of Public Health, 2005. **Note:** Rates are adjusted to the 2000 US standard million population. Classification includes deaths with ICD-9 codes: 402,410-414, 429.2 (1989 to 1998); ICD-10 codes: I11, I20-25 (1999 to 2002).

Between 1989 and 1998 age-adjusted stroke mortality rates did not change significantly for the Connecticut population as a whole. Connecticut death rates from stroke have been consistently lower than those of the U.S., and very close to the *Healthy People 2010* target of 48 per 100,000 population (Figure 4).^{10,11}



Sources: Centers for Disease Control and Prevention, 2005; Connecticut Department of Public Health, 2005.
Note: Rates are adjusted to the 2000 US standard million population. Classification includes deaths with ICD-9 codes: 430-438 (1989 to 1998); ICD-10 codes: I60-69 (1999 to 2002).

Between 1989 and 1998 congestive heart failure (CHF) age-adjusted mortality rates increased significantly for the Connecticut population as a whole ($p < .01$). There is no *Healthy People 2010* target for congestive heart failure (Figure 5).



Sources: Centers for Disease Control and Prevention, 2005; Connecticut Department of Public Health, 2005.
Note: Rates are adjusted to the 2000 US standard million population. Classification includes deaths with ICD-9 code: 428.0 (1989 to 1998); ICD-10 codes: I50.0 (1999 to 2002).

Mortality by Gender

Approximately 55% of all Connecticut resident CVD deaths in 2002 were female. While more females than males die from CVD in Connecticut, males have higher age-adjusted mortality rates (Table 2).¹² In 2002, Connecticut males had a 45% higher death rate due to CVD compared with females and a 60% higher death rate due to CHD ($p < .001$ for both comparisons). Connecticut males and females had equivalent rates of death due to stroke and congestive heart failure in 2002.

Table 2. Cardiovascular Diseases Deaths and Age-adjusted Mortality Rates (AAMR) per 100,000 population - Connecticut Residents, 2002

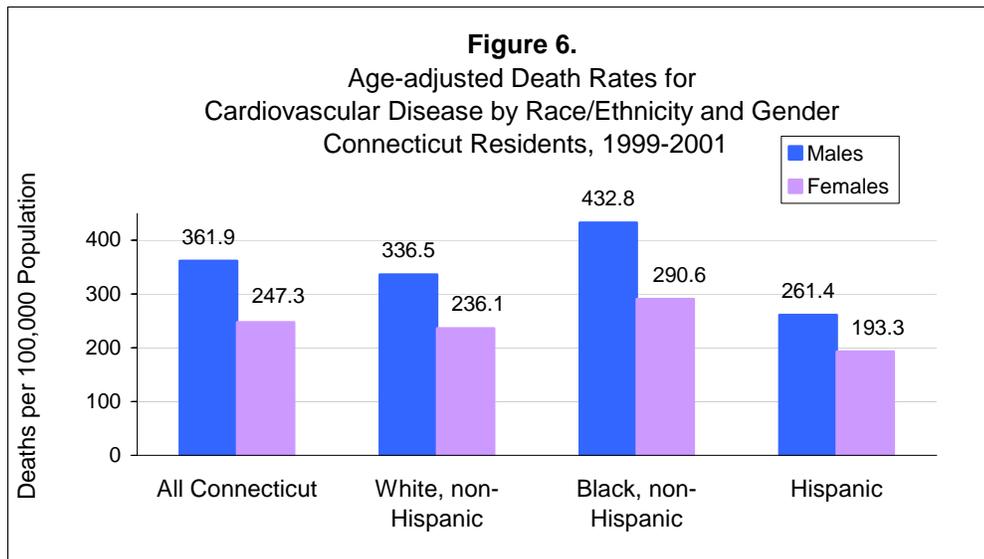
Cause of Death	All		Male		Female	
	Deaths	AAMR	Deaths	AAMR	Deaths	AAMR
All Cardiovascular Diseases	11,365	277.8	5,139	337.0	6,226	231.7
Coronary Heart Disease	6,246	153.3	2,998	195.3	3,248	120.2
Stroke	1,867	45.2	684	45.2	1,183	44.3
Congestive Heart Failure	629	14.7	240	16.6	389	13.4

Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Mortality by Race/Ethnicity and Gender

Cardiovascular Disease

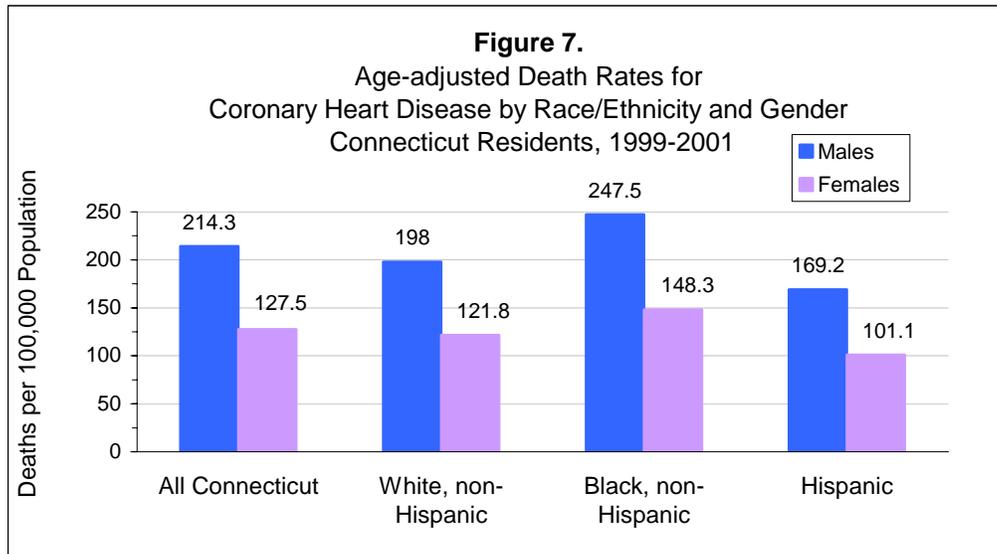
Age-adjusted CVD death rates differ by race, ethnicity and gender with Black (non-Hispanic) males and females having significantly higher CVD death rates compared with White (non-Hispanic) males and females, respectively ($p < .001$ for both comparisons). Hispanic males and females have significantly lower death rates due to CVD than do White males and females ($p < .01$ for both comparisons) [Figure 6].¹³ CVD death rates declined significantly for White and Black males and White females between 1989-91 and 1996-98 ($p < .01$ for all comparisons). CVD death rates did not change significantly for other subpopulation groups during this time period.¹⁴



Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Coronary Heart Disease

Coronary heart disease death rates differ by race, ethnicity, and gender with Black (non-Hispanic) males and females having significantly higher CHD death rates compared with White (non-Hispanic) males and females, respectively ($p < .01$ for both comparisons). White and Hispanic males do not have significantly different death rates due to CHD. White females have significantly higher CHD death rates compared with Hispanic females ($p < .05$) [Figure 7].¹⁵ CHD death rates declined significantly among White males and females between 1989-91 and 1996-98 ($p < .001$), while CHD death rates did not change significantly for other subpopulation groups during this time period.¹⁶



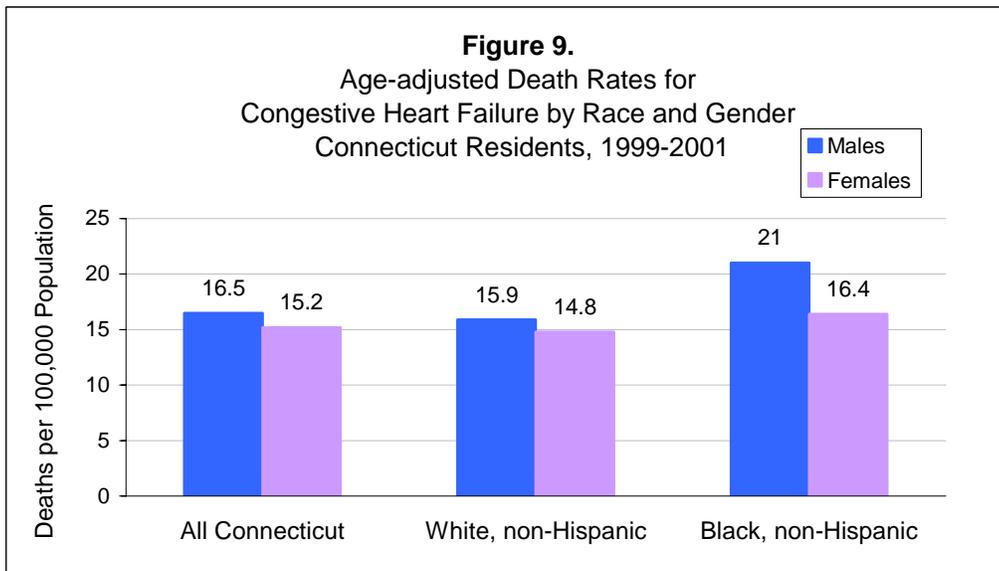
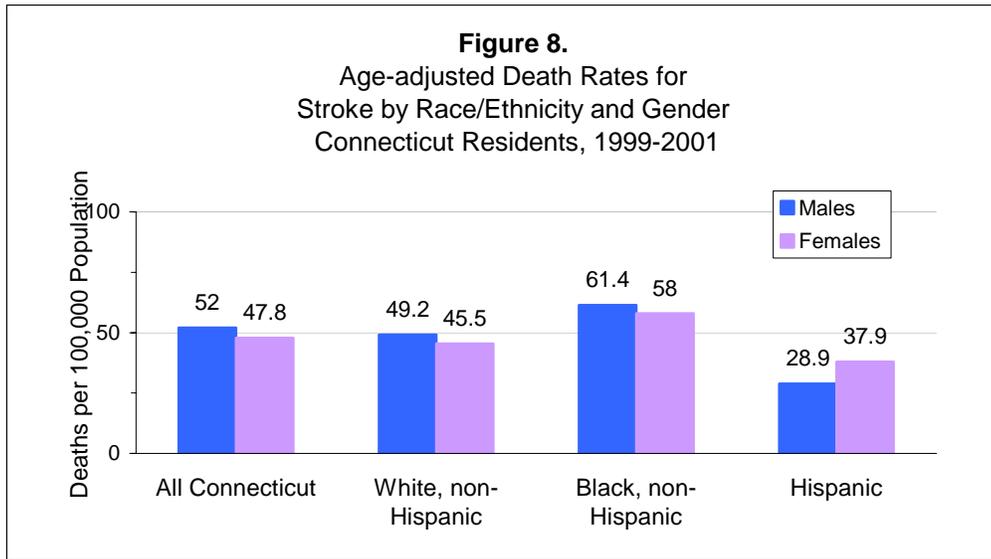
Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Stroke

Age-adjusted stroke death rates differ somewhat by race, ethnicity and gender. Stroke death rates (1999-2001) of Black and White males are not significantly different; however, they are significantly higher than Hispanic male stroke death rates ($p < .01$ for both comparisons). Black females have significantly higher age-adjusted stroke death rates compared with White and Hispanic females ($p < .05$ for both comparisons). Age-adjusted stroke death rates of White and Hispanic females are not significantly different (Figure 8).¹⁷ Age-adjusted stroke death rates declined significantly for Black males between 1989-91 and 1996-98 ($p < .05$), but did not change significantly for other subpopulation groups during this time period.¹⁸

Congestive Heart Failure

Age-adjusted congestive heart failure (CHF) death rates do not differ significantly by race and gender (Figure 9). There were too few deaths among Connecticut Hispanic residents (N=30) in the period 1999-2001 to calculate stable mortality rate estimates. Age-adjusted CHF death rates increased significantly for all Connecticut residents between 1989-91 and 1996-98 ($p < .01$); the increase was significant for Black and White females but not for other subpopulation groups during this time period.¹⁹



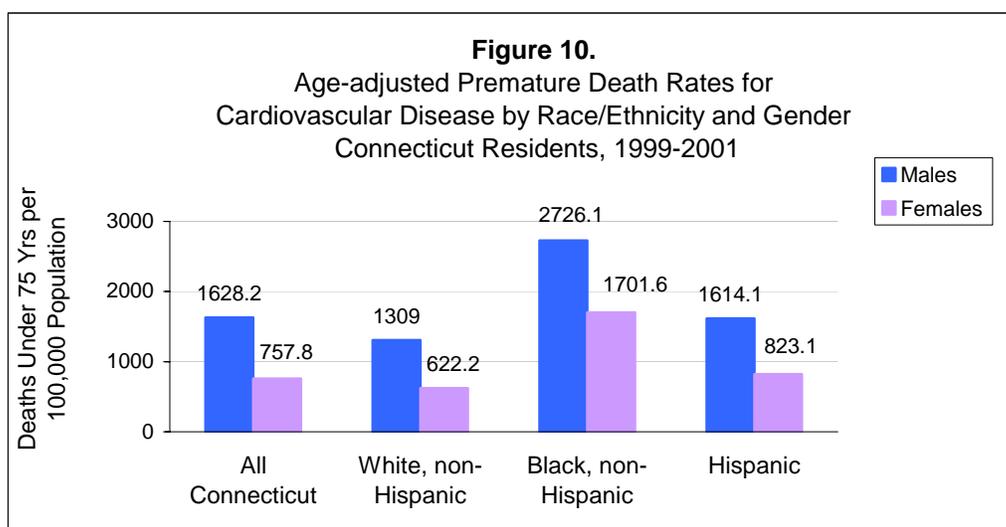
Source for Figures 8 and 9: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Premature Mortality by Race/Ethnicity and Gender

Premature mortality, defined as the “years of potential life lost before age 75,” emphasizes deaths that occur at younger ages. For example, a person who dies at age 45 is considered to have lost 30 years of life, and a person who dies at 70 is considered to have lost 5 years of life.²⁰

Cardiovascular Disease

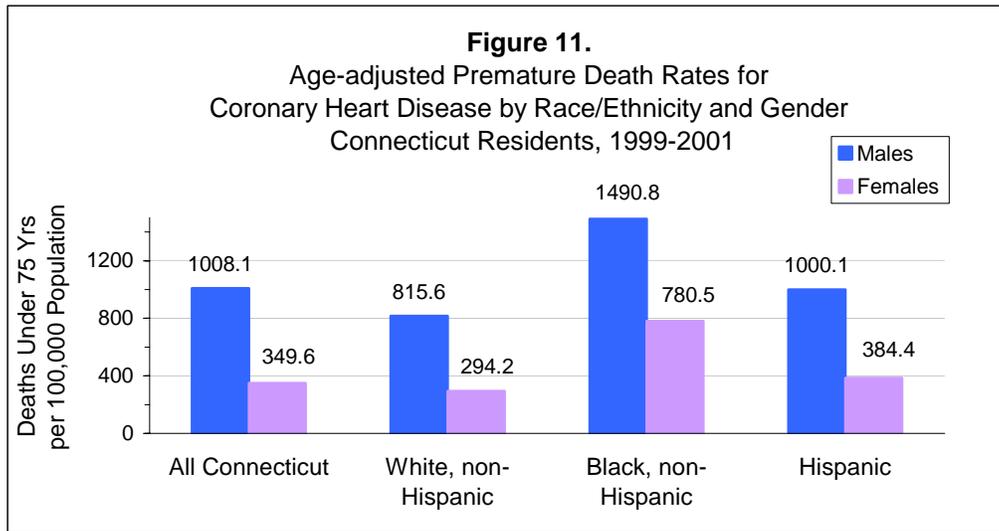
Black (non-Hispanic) residents have significantly higher age-adjusted premature CVD mortality rates (under 75 years) compared with White (non-Hispanic) and Hispanic residents ($p < .001$) [1999-2001 data](Figure 10).²¹ CVD time-trend analyses show that age-adjusted premature CVD death rates declined significantly for the entire population ($p < .001$) between 1989-91 and 1996-98. CVD death rates declined significantly for White and Black males and White females ($p < .01$ for all comparisons), but did not change significantly for other subpopulation groups during this time period.²²



Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Coronary Heart Disease

Black (non-Hispanic) residents have significantly higher age-adjusted premature coronary heart disease (CHD) mortality rates (under 75 years) compared with White (non-Hispanic) and Hispanic residents (1999-2001 data). Age-adjusted premature CHD mortality rates of White and Hispanic residents are not significantly different (Figure 11).²³ CHD time-trend analyses show that age-adjusted premature CHD death rates declined significantly for White males and females between 1989-91 and 1996-98, but did not change significantly for other subpopulation groups during this time period.²⁴



Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

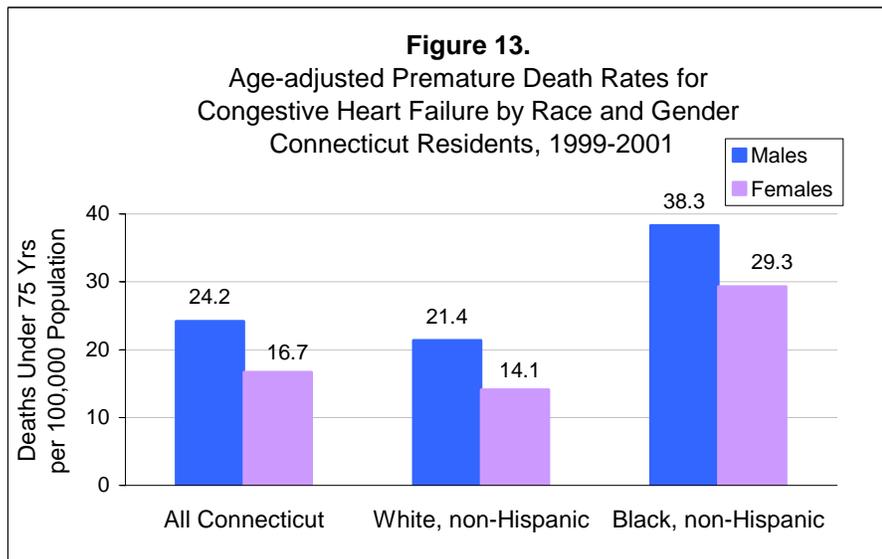
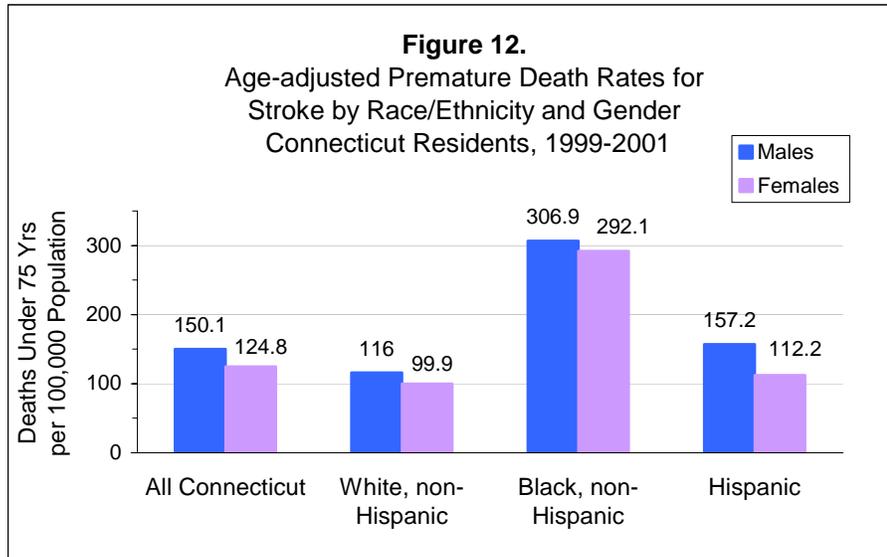
Stroke

Age-adjusted premature stroke death rates differ somewhat by race, ethnicity and gender. Black males have significantly higher premature stroke death rates (1999-2001 data) than do White and Hispanic males ($p < .01$ for both comparisons). Age-adjusted premature stroke death rates of White and Hispanic males are not significantly different. Black females have significantly higher premature stroke death rates compared with White and Hispanic females ($p < .01$ for both comparisons). Age-adjusted premature stroke death rates of White and Hispanic females are not significantly different (Figure 12).²⁵ Time trend analyses show that age-adjusted premature stroke death rates declined significantly among Black males between 1989-91 and 1996-98, but did not change significantly for other subpopulation groups during this time period.²⁶

Congestive Heart Failure

Age-adjusted premature CHF mortality rates (under 75 years) of White and Black residents are not significantly different (1999-2001 data).²⁷ There were insufficient numbers of CHF deaths among Hispanics to calculate reliable premature mortality rates (Figure 13).

Age-adjusted premature CHF death rates increased significantly for the entire population ($p < .01$) between 1989-91 and 1996-98. This increase was significant for White females ($p < .001$) and Black females ($p < .05$), but not for other subpopulation groups during this time period.²⁸



Source for Figures 12 and 13: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Morbidity

During 2002, there were 62,174 discharges from Connecticut hospitals for all cardiovascular diseases. This represents 20% of all hospital discharges (excluding pregnancy and childbirth related discharges) and 23% of all hospital billing charges in the state. Approximately 34% of all cardiovascular disease discharges were due to coronary heart disease (CHD), 12% were for stroke discharges, and 16% were for discharges with congestive heart failure. The median length of stay for CHD, stroke, and congestive heart failure was three, four, and four days, respectively. The median length of stay for all hospital discharges in Connecticut during the same period was three days.²⁹

Hospitalization Rates by Gender

Connecticut males have significantly higher rates of hospitalizations for all cardiovascular diseases, coronary heart disease, stroke, and congestive heart failure compared with Connecticut females ($p < .05$). More females than males, however, are hospitalized for stroke and congestive heart failure [Table 3].³⁰

Table 3. Cardiovascular Diseases Hospitalizations and Age-adjusted Hospitalization Rates (AAHR) per 100,000 population - Connecticut Residents by Gender, 2002

Cause of Death	All		Male		Female	
	Number	AAHR	Number	AAHR	Number	AAHR
All Cardiovascular Diseases	62,174	1,630.2	33,097	2,059.3	29,077	1,289.1
Coronary Heart Disease	21,178	561.2	12,954	791.4	8,224	372.7
Stroke	7,618	198.3	3,618	227.7	4,000	174.5
Congestive Heart Failure	10,076	255.9	4,656	299.9	5,420	224.8

Source: Connecticut Department of Public Health, Connecticut Hospital Discharge Abstract and Billing Data Base, 2005.

Hospitalization Rates by Race and Ethnicity

Black (non-Hispanic) Connecticut residents have significantly higher rates of hospitalizations than both White (non-Hispanic) and Hispanic residents for all cardiovascular diseases, coronary heart disease, stroke, and congestive heart failure ($p < .05$ for all comparisons). Hispanic residents have significantly higher rates of hospitalizations than Whites for all cardiovascular diseases and for congestive heart failure; however, Hispanic-White differences in hospitalizations for CHD and stroke are not significantly different (Table 4).³¹

Table 4. Cardiovascular Diseases Hospitalizations and Age-adjusted Hospitalization Rates (AAHR) per 100,000 population - Connecticut Residents by Race/Ethnicity, 2002

Cause of Death	All Residents		White, Non-Hisp		Black, Non-Hisp		Hispanic	
	Number	AAHR	Number	AAHR	Number	AAHR	Number	AAHR
All Cardiovascular Diseases	62,174	1,630.2	52,631	1,54.9	4,783	2,081.8	2,639	1,718.9
Coronary Heart Disease	21,178	561.2	18,032	538.7	1,153	495.2	912	597.4
Stroke	7,618	198.3	6,479	187.0	642	287.4	267	173.4
Congestive Heart Failure	10,076	255.9	8,459	233.4	921	415.6	522	398.2

Source: Connecticut Department of Public Health, Connecticut Hospital Discharge Abstract and Billing Data Base, 2005.

Coronary Heart Disease Treatment: Revascularization Procedures

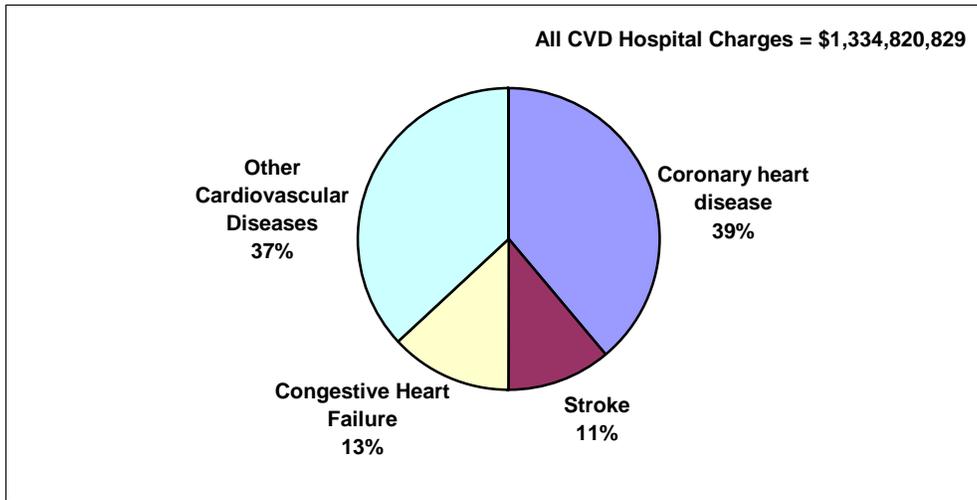
Surgical interventions—coronary artery bypass graft surgery (bypass surgery or CABG), valvular surgery, and percutaneous transluminal coronary angioplasty (angioplasty or PTCA)—are commonly used to treat coronary artery disease. These revascularization procedures provide a new, additional, or augmented blood supply to the heart. Use of these procedures nationally and in Connecticut has increased with the development of this technology.³² In 2002, there were 5,812 hospital discharges receiving PTCA, 3,000 receiving CABG, and 1,178 receiving valvular surgery in Connecticut. Revascularization procedures can be effective, but costly. In 2002, median charges for PTCA, CABG, and valvular surgery were \$22,200, \$40,776, and \$53,869 for Connecticut residents.³³

Economic Costs

The estimated national annual cost for the medical management of cardiovascular disease is \$403.1 billion in 2006, or \$1,352 per person.³⁴ This estimate includes direct medical costs and indirect costs associated with lost productivity from illness and death. Both heart disease and stroke can accrue enormous indirect costs. They are major causes of disability and the ability to live independently, and they can severely impact the quality of life for individuals and families. Assuming that per person costs are the same in Connecticut as they are nationwide, the estimated economic burden of CVD in our state is about \$4.7 billion. A large portion of these costs is attributable to inpatient hospitalizations.

Total Connecticut CVD hospital charges in 2002 were about \$1.3 billion, with a median charge of \$13,500 (Figure 14). About 39% of total CVD hospitalization charges were for CHD, 11% were for stroke, and 13% were for congestive heart failure hospitalizations. Median hospital charges were \$17,662 for coronary heart disease, \$12,013 for stroke, and \$11,248 for congestive heart failure. In contrast, the median charge for all hospital discharges in Connecticut was \$8,451.³⁵

Figure 14. Cardiovascular Disease Hospital Charges, Connecticut Residents - 2002



Source: Connecticut Department of Public Health, Connecticut Hospital Discharge Abstract and Billing Data Base, 2005.

Risk Factors for Cardiovascular Diseases

Risk factors for cardiovascular diseases include non-modifiable (increasing age, family history) and modifiable (high blood pressure, high cholesterol, smoking, diabetes, obesity, physical inactivity) factors (Table 5). Increasing age is a key risk factor for heart disease, stroke, and congestive heart failure. About 86% of all heart disease deaths in Connecticut occur among those aged 65 and older (1999-2001 data). For men, major increases in heart disease mortality rates begin in the 35-to-39-year-old age group; for women, major increases in mortality begin at ages 55 to 59. About 92% of all stroke deaths and 96% of all congestive heart failure deaths in Connecticut occur among persons aged 65 and older (1999-2001 data).³⁶ A family history of heart disease and stroke increases one's risk of developing these diseases. A combination of inherited characteristics and behavioral patterns (similar dietary, smoking, and activity habits, for example) are thought to explain increased risk within families.^{37, 38}

Lower socioeconomic position (SEP) is an important risk marker for cardiovascular disease (CVD). SEP is commonly measured by personal income, household income, or educational attainment level. Persons of lower SEP have higher CVD morbidity and mortality than do middle- or upper-income persons. Behavioral risk factors such as smoking, hypertension, and obesity are more prevalent in lower SEP persons and may explain some of the observed disparity;^{39,40} however, other factors, like neighborhood socioeconomic environment, appear to have effects on individuals' risk for CVD.^{41,42} Low-income neighborhood environments may contribute to increased CVD risk and poorer health outcomes because of such factors like poorer air quality, fewer food choices, and lower quality and/or lack of public services.⁴³ Lower-income persons tend to have less access to, and/or less effectively use, preventive health services that are important to the early detection and treatment of hypertension.⁴⁴ While low-socioeconomic

position may be considered “modifiable” in the sense that people can move in and out of poverty during a lifetime or over generations, it is not usually within a given individual’s control to change his or her social position or neighborhood environment.

Table 5. RISK FACTORS FOR CARDIOVASCULAR DISEASE

Modifiable Factors	Non-Modifiable Factors
<ul style="list-style-type: none">• high blood pressure• high cholesterol• smoking• diabetes• obesity• physical inactivity	<ul style="list-style-type: none">• increasing age• family history

Modifiable Risk Factors

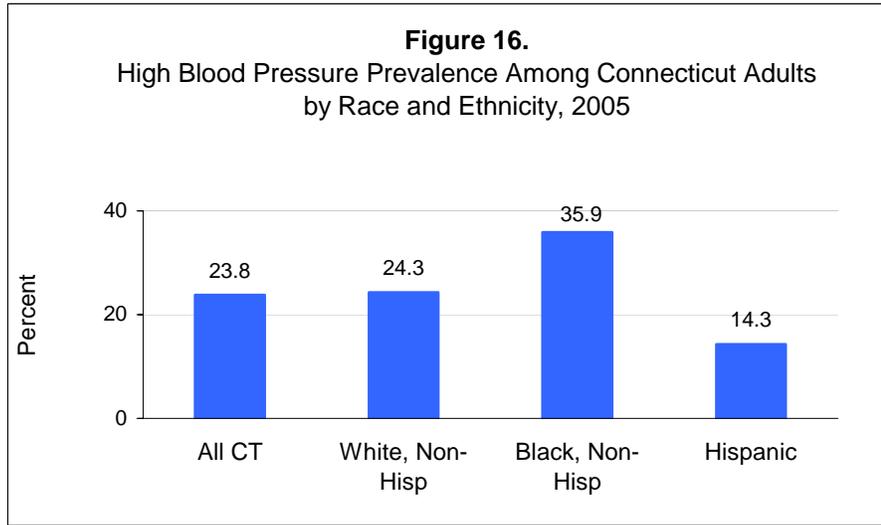
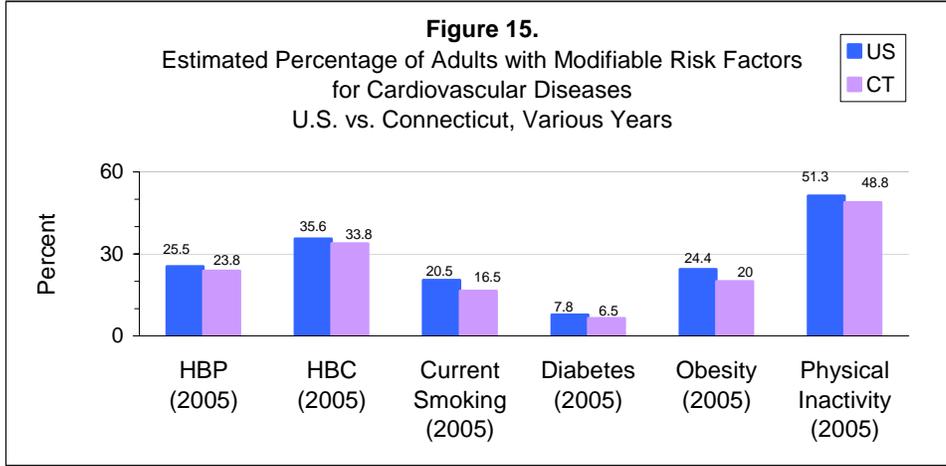
Current Connecticut Behavioral Risk Factor Surveillance (BRFSS) data show that about one out of three Connecticut adults report having one or more modifiable risk factors for cardiovascular disease. Following are summaries of the five main risk factors (high blood pressure, high blood cholesterol, tobacco use, diabetes, and obesity) for coronary heart disease and stroke. Dyslipidemias had been traditionally regarded as a risk factor for CHD but not for cerebrovascular disease; however, several recent studies have established a direct relationship between increased serum lipids and stroke risk.⁴⁵

High Blood Pressure

High blood pressure (HBP) is a major risk factor for heart attack and the most important modifiable risk factor for stroke. People with elevated blood pressure (≥ 140 mm Hg systolic / 90 mmHg diastolic) are 2 to 4 times more likely to develop CHD as are people with normal blood pressure.⁴⁶ About 26% of all stroke mortality is attributable to high blood pressure.⁴⁷ New federal guidelines classify normal blood pressure as below 120/80 mm Hg and readings from 120/80 Hg up to 140/90 mmHg as prehypertensive.⁴⁸

Approximately 24% of Connecticut adults report that they have high blood pressure compared with about 25% of adults nationwide (Figure 15).⁴⁹ The risks for hypertension-related cardiovascular disease increase markedly with age, as does the prevalence of hypertension, and drug treatment for high blood pressure.⁵⁰ Black Connecticut adults experience high blood pressure more than White and Hispanic adults. About 36% of Black Connecticut adults report

that they were told they had hypertension compared with 24% of White, and 14% of Hispanic adults in Connecticut (Figure 16).⁵¹

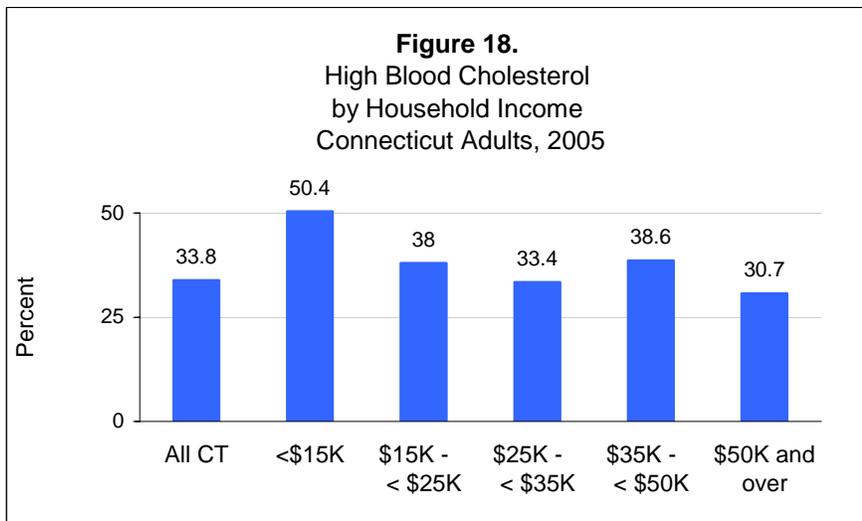
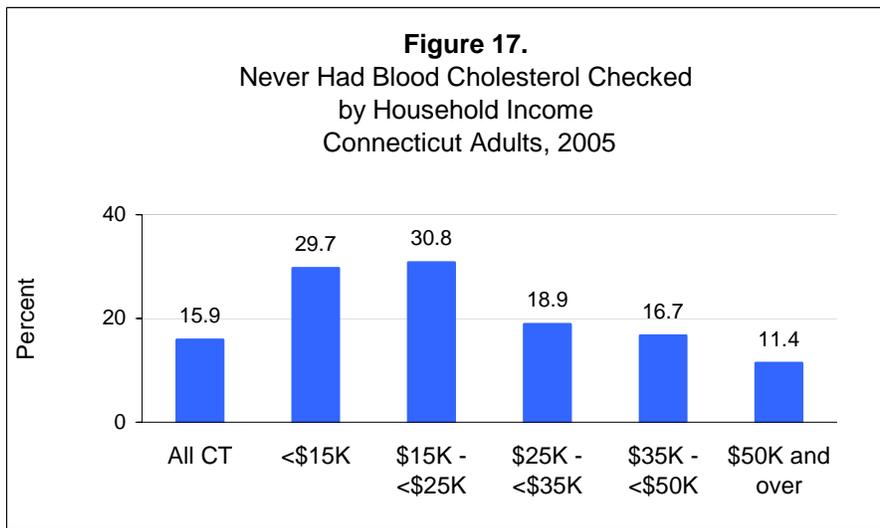


Source for Figures 15 and 16: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

High Blood Cholesterol

High blood cholesterol (HBC) is considered a major risk factor for heart disease and a moderate risk factor for stroke. The Centers for Disease Control and Prevention estimates that more than 80% of people with high blood cholesterol do not have it under control. A 10% decrease in total blood cholesterol levels may reduce the incidence of coronary heart disease by as much as 30%.⁵² Studies have found that stroke risk can be reduced with cholesterol-lowering medication among persons with higher cholesterol levels and persons with coronary artery disease.⁵³

Connecticut adults compare favorably to adults nationwide in terms of cholesterol screening and blood cholesterol levels. In 2005, 80% of Connecticut adults reported having had their blood cholesterol screened within the last five years compared with 73% of adults in the U.S.⁵⁴ About 34% of Connecticut adults were told they had high blood cholesterol (HBC) compared with about 36% of adults nationwide (Figure 15).⁵⁵ Lower-income Connecticut adults are more likely to report that they have never had their blood cholesterol checked compared with higher income adults (Figure 17). Among Connecticut adults who have had their cholesterol checked, lower-income residents are also more likely to report high blood cholesterol compared with higher-income adults in Connecticut (Figure 18).

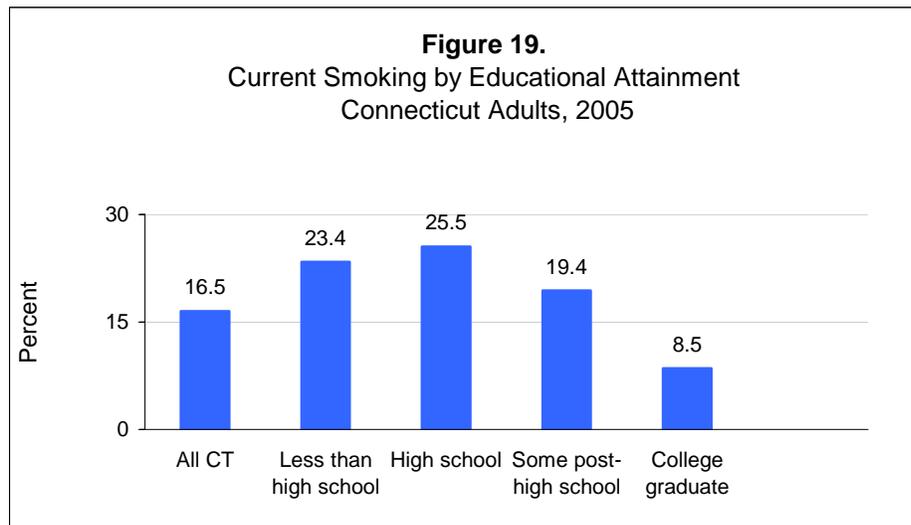


Source for Figures 17 and 18: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

Smoking

Cigarette smoking is a major modifiable risk factor for cardiovascular diseases. Smoking causes reduced blood vessel elasticity by increasing arterial wall stiffness. Smoking increases the risk of heart attack two-fold. Smokers have higher CHD mortality rates than non-smokers and their risk of death increases with greater number of cigarettes smoked. Current smokers have more than twice the risk of stroke compared with those who have never smoked.⁵⁶ Approximately 18% of strokes are attributable to current cigarette smoking.⁵⁷ People who stop smoking decrease their stroke risk and their risk of CHD mortality.⁵⁸

In 2005, about 16% of Connecticut adults reported being current smokers compared with about 20% of adults nationwide (Figure 15). Connecticut adult smokers are more likely to be younger, with lower incomes, and less educated. For example, 31% of Connecticut adults 18 to 24 years old smoke compared with only 20% of those aged 45 to 54, and 7% of those aged 65 and older. About 30% of adults with household incomes under \$15,000 smoke, compared with 14% of adults with household incomes of \$50,000 or more. About 23% of adults with less than a high school education smoke compared with only about 8% of adults who graduated from college (Figure 19).⁵⁹



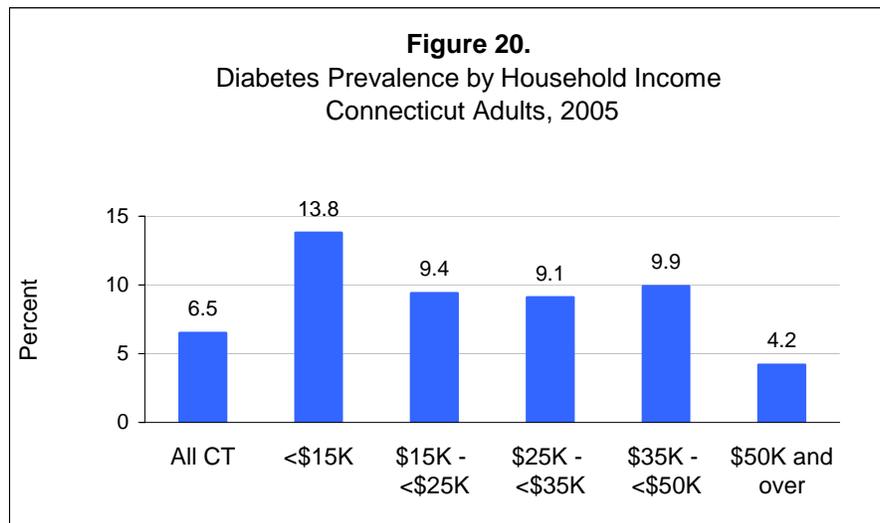
Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

Diabetes

In recent years, diabetes has been recognized as a major risk factor for cardiovascular disease. Cardiovascular disease (CVD) is the primary cause of death for persons with diabetes, accounting for about 65% of mortality. Increased cardiovascular risk precedes the formal diagnosis of type 2 diabetes by many years.⁶⁰ Diabetic persons are 2 to 4 times more likely to develop coronary heart disease than the rest of the population and are at much greater risk of having a stroke.^{61, 62} People with diabetes often have high blood pressure and high cholesterol and are overweight, increasing their risk for CVD even more.⁶³

About 6.5% of Connecticut adults have been diagnosed with diabetes compared with almost 8% of adults nationwide (Figure 15).⁶⁴ Lower-income people are at higher risk of diabetes than are higher-income people. For example, approximately 14% of Connecticut adults with household incomes under \$15,000 report having diabetes, compared with 4% of Connecticut adults with household incomes over \$50,000 (Figure 20).⁶⁵

Diabetes self-management education is essential because improperly controlled diabetes can result in cardiovascular disease, kidney disease, blindness and loss of limb. It is, therefore, a particular concern that 52% of Connecticut adults with diabetes reported that they had never taken a course to manage the disease.⁶⁶



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

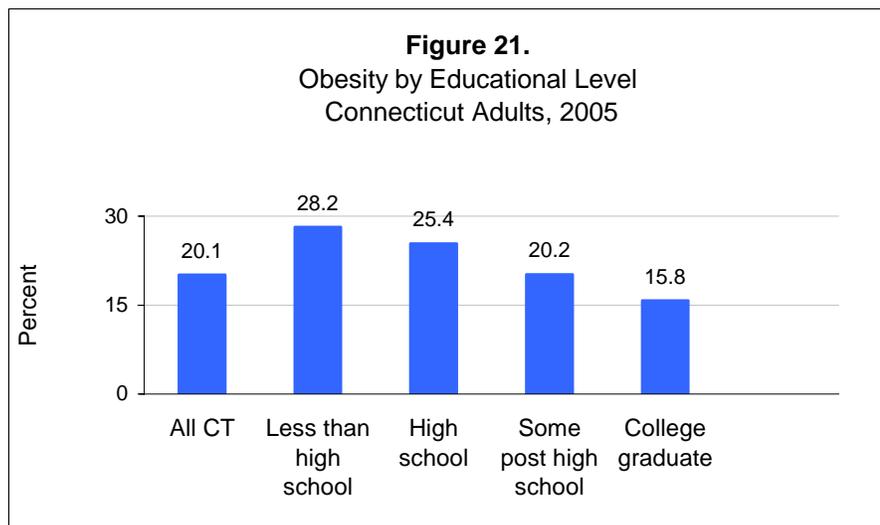
Obesity

Body mass index (BMI), or weight adjusted for height, is a widely used screening method for obesity. Medical guidelines identify normal/desirable weight as a BMI under 25, overweight as a BMI of 25 to 29.9, and obese as a BMI of 30 or more.⁶⁷ The prevalence of overweight and obesity has been increasing in the United States since the mid 1980s.⁶⁸ High calorie diets, along with less physical activity, in our society have contributed to the obesity epidemic.⁶⁹

Obesity is considered a metabolic disorder, which can be explained by a combination of hereditary and environmental factors. Obesity has been found to independently predict coronary atherosclerosis. Left ventricular hypertrophy, right heart changes and systemic hypertension are more common in those who are obese. While comorbidities relating obesity to coronary heart disease increase as BMI increases, body fat distribution is also an important factor.⁷⁰ For example, abdominal obesity places individuals at higher risk for health problems, including high blood pressure, high blood cholesterol, high triglycerides, diabetes, heart disease and stroke.⁷¹ Obesity increases the risk of fatal and non-fatal stroke. Among females, increasing BMI is associated with increased risk of stroke. Among males, abdominal obesity, rather than BMI, is closely related to stroke risk.⁷²

An estimated 20% of Connecticut adults are obese compared with about 24% of adults nationwide (Figure 15).⁷³ Approximately 38% of Connecticut adults are overweight, and 42% are normal or desired weight.⁷⁴ Adults with less education are more likely to be obese than adults with more education in Connecticut. For example, an estimated 28% of adults with less than a high school education are obese, compared with only 16% of college-educated Connecticut adults (Figure 21).⁷⁵ African American (non-Hispanic) females are more likely to be obese compared with White (non-Hispanic) and Hispanic females. An estimated 39% of African American adult females in Connecticut are obese, compared with 26% of Hispanic adult females, and 17% of White adult females (data not shown). There are no significant differences in obesity among Connecticut adult males by race or Hispanic ethnicity.⁷⁶

Connecticut adults who are obese are significantly more likely to report that they are in poorer health compared with non-obese adults. Twenty percent of obese adults reported that they were in fair or poor health compared with about 10% of those who were overweight or of healthy weight (data not shown).⁷⁷



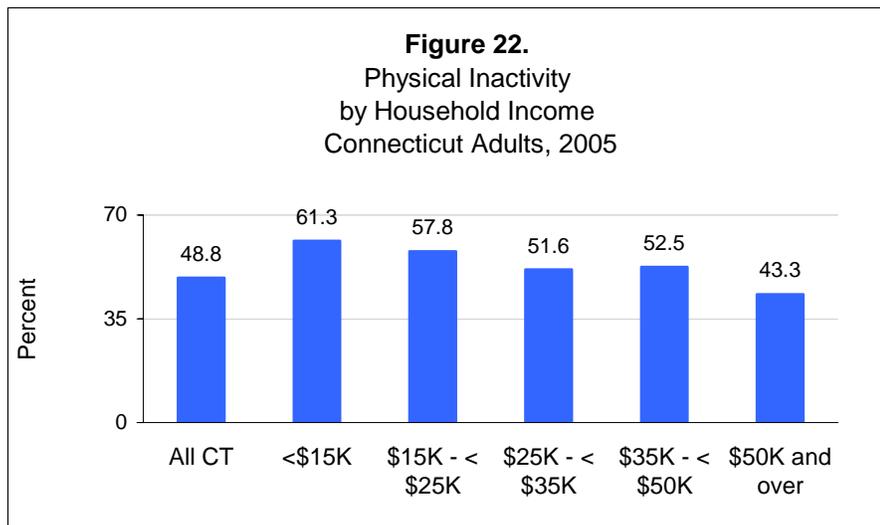
Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

Physical Inactivity

Physical inactivity and poor diet are associated with an increased risk of a number of chronic health conditions including cardiovascular disease, diabetes, some cancers, high blood pressure, overweight and obesity, back problems, and osteoporosis.^{78, 79} Physical inactivity indirectly increases the risk of stroke because it is associated with high blood pressure.

The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) recommend that all adults should engage in “at least 30 minutes of moderate-intensity physical activity on five or more days of the week.”⁸⁰ Approximately 49% of Connecticut adults report having less than thirty minutes of moderate physical activity five or more days per week (Figure 22).

Physical inactivity increases with age. About 59% of Connecticut adults 65 and older do not meet the recommended CDC/ACSM activity levels compared with 34% of Connecticut adults aged 18 to 24 (data not shown). Lower-income adults are also more likely to be physically inactive compared with higher-income adults. About 61% of Connecticut adults with incomes of less than \$15,000 per year are inactive compared with 43% of Connecticut adults earning \$50,000 or more per year (Figure 22).⁸¹



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

Co-Prevalence of Cardiovascular Risk Factors

Coronary heart disease and stroke share a common set of risk factors that are usually found among those who develop one or both of these diseases. For example, research has shown that 84% of those having both diabetes and hypertension were also found to have dyslipidemia (abnormal lipid levels),⁸² and that the relative risk of ischemic heart disease, stroke, and all-cause mortality increases linearly with the number of metabolic risk factors (overweight, high blood

pressure, high fasting glucose, and high total cholesterol).⁸³ Approximately 52% of Connecticut adults report having 2 or more and 25% report having 3 or more modifiable risk factors for CVD.⁸⁴ The co-prevalence of risk factors contributes to the complexity of disease management.

Recognizing the Signs and Symptoms of Heart Attack and Stroke

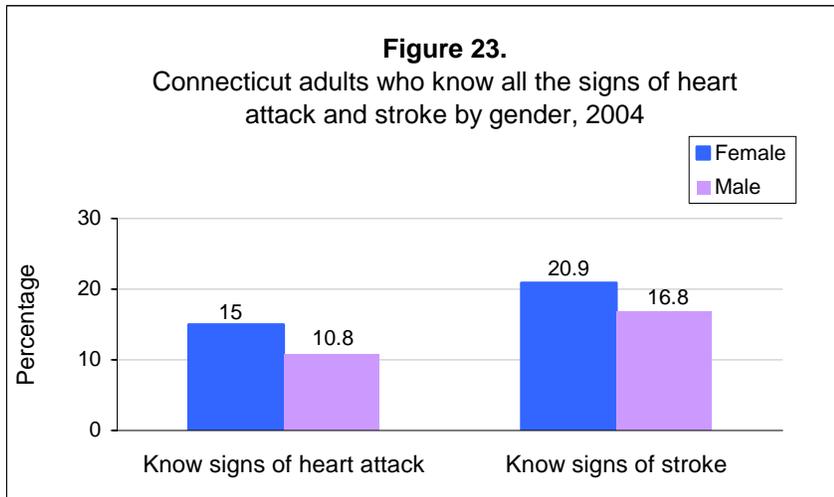
The *Healthy People 2010* national objectives for both heart disease and stroke include increasing the proportion of persons who are aware of the early warning symptoms and signs of heart attack and stroke and the necessity of calling 911 when persons are suffering from either of these conditions.⁸⁵ Early recognition and calling 911 increase the likelihood of immediate emergency transport to the hospital and timely medical care that can reduce disability and death.

Table 6. WARNING SIGNS FOR HEART ATTACK AND STROKE

Heart Attack	Stroke
<ul style="list-style-type: none"> • Jaw, neck, back pain • Lightheaded, faint • Shortness of breath • Arm or shoulder discomfort • Chest pain or discomfort 	<ul style="list-style-type: none"> • Severe headache with no known cause • Trouble seeing in one or both eyes • Trouble walking, dizziness, or loss of balance • Confusion, trouble speaking • Sudden numbness/weakness of face, arm, or leg

Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2004.

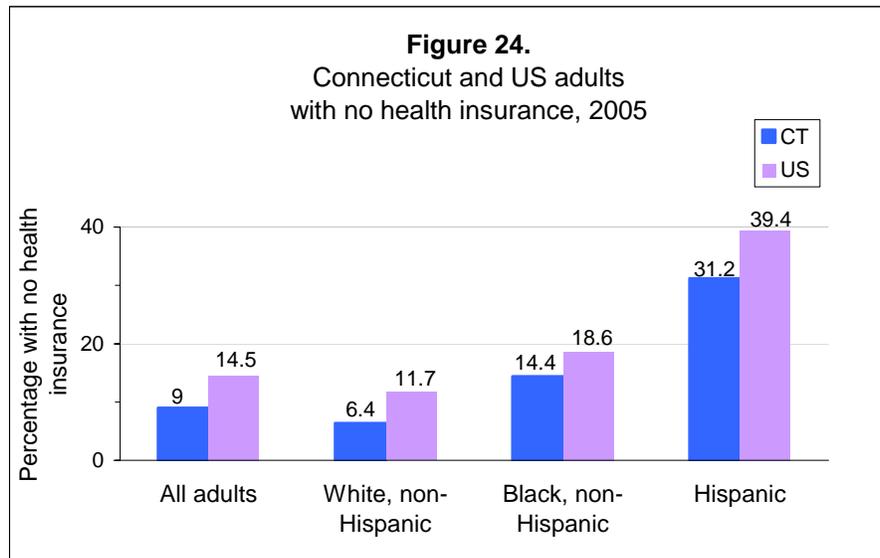
The percentage of Connecticut adults who know all the warning signs and symptoms for heart attack and stroke tends to be very low. About 13% of Connecticut adults know all the proper heart attack signs and 19% know all the proper stroke signs. Women tend to be more knowledgeable than men about signs and symptoms of heart attack and stroke. About 15% of Connecticut females know all heart attack signs compared with about 11% of males ($p < .05$). About 21% of Connecticut females know all stroke signs compared with about 17% of males ($p < .001$) [Figure 23].



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2005.

Access to Health Care

Access to health care is key to the prevention, treatment, and management of heart disease and stroke. People without health insurance are less likely than others to have a usual source of care, to receive preventive health care services, and appropriate medical management of chronic conditions. About 9% of Connecticut adults aged 18 and over do not have health insurance compared with almost 15% of adults nationwide. Hispanic adults in Connecticut are least likely to report having health insurance (about 31%), followed by Black adults (14%), and White adults (6%). Comparable national figures show that about 39% of Hispanic adults, 19% of Black adults, and 12% of White adults nationwide reported having no health insurance (Figure 24).⁸⁶ The health status of the entire Connecticut population is compromised when large numbers of residents are uninsured, and it imposes a significant additional financial burden on our state.



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2006.

Targeting High-Risk Populations

The high co-prevalence of risk factors for cardiovascular disease indicates the need to address all these risk factors rather than each factor individually in public health interventions. A special emphasis needs to be placed on adults with diabetes, whose high percentages of high blood pressure, overweight and obesity increase their risk for developing cardiovascular disease. Second, screening for high blood pressure, high cholesterol, and overweight is necessary to address the high co-prevalence of these three factors. Third, smoking cessation, cholesterol and blood pressure control would greatly benefit those with multiple risk factors, especially for those with diabetes (Table 7).

Table 7. TARGETING HIGH-RISK POPULATIONS

- Address multiple risk factors together
- Emphasize risk factor interventions among adults with diabetes
- Screen for high blood pressure, high cholesterol, and overweight
- Emphasize smoking cessation, blood cholesterol management, and blood pressure control

Black Connecticut residents have higher coronary heart disease death and premature mortality rates compared with White and Hispanic Connecticut residents. Black females have higher stroke death rates, and Black males and females have higher premature stroke mortality rates compared with the respective White and Hispanic populations. Black Connecticut residents have significantly higher rates of some important modifiable risk factors for cardiovascular diseases, such as high blood pressure, diabetes, and overweight/obesity (females only) compared with White and Hispanic Connecticut residents. Lower-income residents are also more likely to have higher rates of high blood pressure, high cholesterol, diabetes, current smoking, obesity, and physical inactivity compared with higher-income residents. Targeted public health interventions are warranted for all Connecticut residents with multiple risk factors, and special emphasis should address risk factor reduction among Black and lower-income Connecticut residents.

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Appendix 1. Data Sources

Connecticut Vital Records Mortality Files

The Connecticut Vital Records Mortality Files are part of the state's vital statistics data base that contains records pertaining to deaths that occur within the state as well as deaths of Connecticut residents occurring in other states and Canada. Mortality statistics are compiled in accordance with the World Health Organization (WHO) regulations, which specify that deaths be classified by the current Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Deaths for the 1989-1998 period included in this report are classified by the Ninth Revision of the International Classification of Diseases [ICD-9] (World Health Organization 1977). Deaths for the 1999-2002 period are classified by the Tenth Revision of the International Classification of Diseases [ICD-10] (World Health Organization 1992).

The race-ethnicity designation is typically based on report by next of kin, a funeral director, coroner, or other official. As such, the race-ethnicity designation based on observation may be reported incorrectly. Another potential source of error is the fact that death rates are calculated using two different sources of data – the death certificate for the numerator and the Census Bureau population estimates for the denominator. Errors in under- or overcounting populations by race and ethnicity will affect the death rates reported for these groups. Mortality data are reported using racial categories that exclude persons of Hispanic origin (White, non-Hispanic and Black, non-Hispanic) and by Hispanic ethnicity (Hispanics of any race). Death Registry data follow the National Center for Health Statistics guidelines for coding race and Hispanic ethnicity.

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) survey is a state-based system of health surveys that generate information about health risk behaviors, clinical preventive practices, and health care access and use. The BRFSS, sponsored by the Centers for Disease Control and Prevention, is the world's largest telephone survey, and is conducted in all 50 states. It is an on-going random sample telephone survey of non-institutionalized adults, 18 years and older. Information from the survey is used to improve the health of people nationwide and in Connecticut. Racial and ethnic classifications are based on self-report and include White, non-Hispanic, Black, non-Hispanic, and Hispanic (including persons of any race). Other national and state-specific risk factor data and information regarding BRFSS methodology can be accessed on the CDC's BRFSS Web site at: <http://www.cdc.gov/brfss/>

Connecticut Hospital Discharge Abstract and Billing Data Base

The Connecticut Hospital Discharge Abstract and Billing Data Base is the source of inpatient hospitalization data. It is maintained by the Connecticut Office of Health Care Access, and it contains patient-level demographic, clinical, and billing data for all non-federal acute care hospitals in the state. In addition to age, gender, and town of residence, the demographic data elements include race and ethnicity. Based upon observation of the patient rather than self-reporting by the patient, race is designated as White, non-Hispanic and Black, non-Hispanic. Hispanic ethnicity includes persons of any race.

It should be noted that counts reflect hospitalizations not persons. For example, a patient admitted to a hospital on two separate occasions in 2002 would be counted twice in these data. Another limitation of the data is the fact that it is an administrative data set. It contains diagnoses and procedures based on ICD-9-CM codes. The literature contains many reports on the validity and reliability of hospital discharge data with clinical conditions emphasizing discrepancies between ICD-9-CM codes and clinical data.

Appendix 2A. ICD-10 Coding for Selected Causes of Death, 1999-2001

Cause of Death	ICD-10 Code
All Causes	A00.0 – Y89.9
All Cancers	C00 – C97
Diabetes Mellitus	E10 – E14
Cardiovascular Disease Deaths	I00-I78
Diseases of the Heart	I00 – I09, I11, I13, I20 – I51
Coronary Heart Disease	I11, I20-I25
Congestive Heart Failure	I50.0
Essential Hypertension & Hypertensive Renal Disease	I10, I12
Cerebrovascular Disease	I60 – I69
Atherosclerosis	I71
Chronic Lower Respiratory Diseases	J40 – J47
Unintentional Injuries	V01 – X59, Y85 – Y86

Source: World Health Organization. 1977. *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, based on the recommendations of the Ninth Revision Conference, 1975 (ICD-9)*. Geneva: World Health Organization.

Appendix 2B. ICD-9 Coding for Selected Causes of Death, 1989-1998

Cause of Death	ICD-9 Code
All Causes	1-E999
Cardiovascular Disease Deaths	390-459
Diseases of the Heart	390-398,402,404-429
Coronary Heart Disease	402, 410-414, 429.2
Congestive Heart Failure	428.0
Hypertension without Renal Disease	401, 403
Cerebrovascular Disease	430-438
Atherosclerosis	440

Source: World Health Organization. 1992. *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, based on the recommendations of the Tenth Revision Conference, 1992 (ICD-10)*. Geneva: World Health Organization.

Appendix 2C. ICD9-CM Coding for Selected Causes of Hospitalizations

Cause of Hospitalization	ICD-9 Code
Circulatory	390-459
Coronary Heart Disease	402, 410-414, 429.2
Congestive Heart Failure	428
Cerebrovascular Disease	430-4, 438-438

Source: Practice Management Information Corporation. 2004. *The International Classification of Diseases, Ninth Revision, Clinical Modification, 6th edition*. Los Angeles, CA.

Appendix 3A. Glossary of Statistical Terms

Age-adjusted Mortality Rates (AAMR) and Age-adjusted Hospitalization Rates (AAHR) are used to compare relative mortality and hospitalization risk, respectively, across groups and over time. They are not actual measures of risk but rather an index of risk. They are weighted statistical averages of the age-specific rates, in which the weights represent the fixed population proportions by age (Murphy 2000). The age-adjusted rates in these tables were computed by the direct method. The 1940 and 2000 U.S. standard million population distributions are shown below:

Age group	1940	2000
0-4	80,057	69,136
5-9	81,151	72,533
10-14	89,209	73,032
15-19	93,665	72,169
20-24	88,002	66,477
25-29	84,280	64,529
30-34	77,787	71,044
35-39	72,501	80,762
40-44	66,744	81,851
45-49	62,696	72,118
50-54	55,116	62,716
55-59	44,559	48,454
60-64	36,129	38,793
65-69	28,519	34,264
70-74	19,519	31,773
75-79	11,423	26,999
80-84	5,878	17,842
85+	2,765	15,508
Total	1,000,000	1,000,000

Age standardization is a technique that allows for the comparison of death rates in two or more populations. The National Center for Health Statistics (NCHS) used the 1940 standard million population in reporting national mortality statistics for over 50 years. Implementation of the new year 2000 population standard began with deaths occurring in 1999. Age-adjustment based on the year 2000 standard often results in age-adjusted death rates that are larger than those based on the 1940 standard. The new standard affects trends in age-adjusted death rates for certain causes of death and decreases race and ethnicity differentials in age-adjusted death rates (Anderson and Rosenberg 1998).

Cause-of-death classification Mortality statistics for this report were compiled in accordance with the World Health Organization (WHO) regulations, which specify that member nations classify causes of death by the current Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Deaths for the 1989-1998 period were classified by the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, Ninth Revision of the International Classification of Diseases [ICD-9] (World Health Organization 1977). Deaths for the 1999-2002 period

were classified according to the Tenth Revision of the International Classification of Diseases [ICD-10] (World Health Organization 1992).

Healthy People 2000 and **Healthy People 2010** are part of a national strategy addressing the prevention of major chronic illnesses, injuries, and infectious diseases. They are the product of an effort, involving expert working groups, a consortium of national organizations, all state health departments, and the Institute of Medicine of the National Academy of Sciences to set health objectives for the nation. After extensive national and regional hearings were conducted with a period of public review and comment, the health objectives were published in 1990 as *Healthy People 2000—National Health Promotion and Disease Prevention Objectives*. It established national objectives and served as the basis for the development of state and community plans. *Healthy People 2010* provides a comprehensive view of the nation's health in 2000, and establishes national goals and targets to be achieved by 2010, and monitors progress over time.

Hispanic origin refers to people whose origins are from Spain, the Spanish-speaking countries of Central America, South America, and the Caribbean, or persons of Hispanic origin identifying themselves as Spanish, Spanish-American, Hispanic, Hispano, or Latino. Since 1988, the Connecticut death certificate has had a separate line item for Hispanic ethnicity. Individuals identified as “Hispanic” can be of any race, and are also counted in the race breakdown as either “white,” “black,” “Asian or Pacific Islander,” “American Indian,” or other.

International Classification of Diseases (ICD-9, ICD-10) has been the internationally accepted coding system for determining cause of death since the early 1900s. It is periodically revised. The ninth revision (ICD-9) was in use from 1975 through 1998. Beginning with 1999 deaths, the tenth revision (ICD-10) is being used.

Preliminary estimates of the comparability of ICD-9 to ICD-10 have been published and indicate that the discontinuity in trends from 1998 to 1999 for some leading causes of death (septicemia, influenza and pneumonia, Alzheimer's disease, nephritis, nephrotic syndrome, and nephrosis) is substantial (Anderson, Minino, Hoyert, et al. 2001).

International Classification of Diseases, Clinical Modification (ICD-9-CM) is a coding system recommended for use in all clinical settings to describe procedures and diagnoses. It is required for reporting diagnoses and diseases to all U.S. Public Health Service and Department of Health and Human Services programs, including Medicare and Medicaid. The foundation of the ICD-9-CM is the *International Classification of Diseases, 9th Revision* published by the World Health Organization.

Population bases for computing rates are taken from the U.S. Census Bureau *Estimates of the population of states by age, sex, race, and Hispanic origin*. These data are estimates of the population of Connecticut by 5-year age groups (age 0 to 4, 5 to 9, ... 85 and over), sex (male, female), modified race (white; black; Native American including Alaska Natives; Asian and Pacific Islander) and Hispanic origin (Hispanic, non-Hispanic) for each year, July 1, 1999 through July 1, 2002.

Race refers to a population of individuals identified from a common history, nationality, or geographical place. Race is widely considered a valid scientific category, but not a valid biological or genetic category (Lewontin, 1995; Gould 1981). Available scientific evidence indicates that racial and ethnic

classifications do not capture biological distinctiveness, and that there is more genetic variation within racial groups than there is between racial groups (Williams, Lavizzo-Mourey, and Warren 1994; American Anthropological Association 1998). Contemporary race divisions result from historical events and circumstances and reflect current social realities. Thus, racial categories may be viewed more accurately as proxies for social and economic conditions that put individuals at higher risk for certain disease conditions.

Data are reported for two racial groups in Connecticut: white, non-Hispanic and black, non-Hispanic. Individuals identified as “Hispanic” can be of any race.

Socioeconomic position refers to a person’s social and economic place in a society, and is operationalized or measured by characteristics such as per capita or household income, educational attainment, or occupation. Historically, lower socioeconomic position has been strongly correlated with less favorable health outcomes such as higher death and premature mortality rates from all causes; conversely, persons of higher socioeconomic position do better on most measures of health status.

Years of potential life lost (YPLL) represents the number of years of potential life lost by each death before a predetermined end point (e.g., 65 or 75 years of age). Whereas the crude and adjusted death rates are heavily influenced by the large number of deaths among the elderly, the YPLL measure provides a picture of premature mortality by weighting deaths that occur at younger ages more heavily than those occurring at older ages. It thereby emphasizes different causes of death. Age-adjusted YPLLs are calculated using the methodology of Romeder and McWhinnie (1977).

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Appendix 3B. Glossary of Medical Terms

Atherosclerosis: A disease that affects the arteries, particularly those supplying the heart, the brain, the aorta, and the lower extremities. Atherosclerosis underlies the occurrence of heart attacks, many strokes, peripheral arterial disease, and ruptures of the aorta. **Source:** Centers for Disease Control and Prevention. 2006. *A Public Health Action Plan to Prevent Heart Disease and Stroke, Appendix A*. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm

Cardiovascular Diseases (CVD): Diseases of the circulatory system, which include acute myocardial infarction, ischemic heart disease, valvular heart disease, peripheral vascular disease, arrhythmias, high blood pressure and stroke. **Source:** World Health Organization Collaborating Centre on Surveillance of Cardiovascular Diseases. *The Growing Burden of Heart Disease and Stroke*. (n.d.). Retrieved 1/2/2006: <http://www.cvdinfobase.ca/cvdbook/En/Glossary.htm>

Coronary Heart Disease (CHD): A form of heart disease resulting from impaired circulation in one or more coronary arteries. Common clinical manifestations of CHD include chest pain (angina pectoris) or heart attack.” **Source:** Centers for Disease Control and Prevention. 2006. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm

Cerebrovascular Disease: A disease of one or more blood vessels in the brain, which often results in the sudden development of a focal neurologic deficit, or stroke. Stroke, or a “brain attack” is the most severe clinical manifestation of cerebrovascular disease. **Source:** World Health Organization Collaborating Centre on Surveillance of Cardiovascular Diseases. *The Growing Burden of Heart Disease and Stroke*. Retrieved 1/2/2006: <http://www.cvdinfobase.ca/cvdbook/En/Glossary.htm>

Congestive Heart Failure: The inability of the heart to maintain adequate pumping function, which can be caused by a number of factors, such as untreated hypertension, heart attacks, or infections. Heart failure increases the risk for other cardiovascular disease events and often results in physical disability. Congestive Heart Failure is commonly referred to as “heart failure.” **Sources:** World Health Organization Collaborating Centre on Surveillance of Cardiovascular Diseases. *The Growing Burden of Heart Disease and Stroke*. Retrieved 1/2/2006: <http://www.cvdinfobase.ca/cvdbook/En/Glossary.htm>; The Cleveland Clinic Information Center. 2004. *Hypertension Glossary*. Retrieved 1/3/2007: <http://www.clevelandclinic.org/health/health-info/docs/3800/3846.asp?index=12273>; Centers for Disease Control and Prevention. 2006. *A Public Health Action Plan to Prevent Heart Disease and Stroke, Appendix A*. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm.

Coronary Artery Bypass Graft: Commonly referred to as "CABG" (pronounced "cabbage"). CABG is the most commonly performed "open heart" operation in the United States, and is a procedure to bypass blockages or obstructions of the coronary arteries, which cause chest pain or “angina.” The majority of people report relief of their symptoms of angina after surgery. Symptoms may recur, and a small percentage of people will require repeat surgery, typically 10 or more years after the original operation. **Source:** The Society of Thoracic Surgeons. 2006. *What is Coronary Artery Bypass Grafting (CABG)?* Retrieved 1/3/2007: <http://www.sts.org/sections/patientinformation/adultcardiacsurgery/cabg/>

Diabetes (or diabetes mellitus): A metabolic disorder that results from the body’s insufficient production or utilization of insulin. The most common types of diabetes includes “Type 1 diabetes,” formerly known as “juvenile diabetes,” and “Type 2 diabetes,” formerly known as “adult-onset diabetes.” Long-term effects of diabetes include cardiovascular complications. **Source:** Centers for Disease Control and Prevention. 2006. *A Public Health Action Plan to Prevent Heart Disease and Stroke, Appendix A*. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm

Dyslipidemia: A disorder of lipoprotein metabolism, such as an overproduction or deficiency of lipoprotein. Dyslipidemia is often manifested by elevated levels of total cholesterol, the "bad" or low-density lipoprotein (LDL) cholesterol, and the triglyceride concentrations, as well as decreased levels of the "good" or high-density lipoprotein (HDL) cholesterol concentration in the blood. **Source:** MedicineNet.com. *Definition of Dyslipidemia*. Retrieved 1/3/2007: <http://www.medterms.com/script/main/art.asp?articlekey=33979>

Essential Hypertension: "high blood pressure that does not have an apparent cause — The vast majority (95 percent) of high blood pressure is essential hypertension." **Source:** The Cleveland Clinic Information Center. 2004. Hypertension Glossary. Retrieved 1/3/2007: <http://www.clevelandclinic.org/health/health-info/docs/3800/3846.asp?index=12273>

Heart Failure: See Congestive Heart Failure.

Hemorrhagic Stroke: Hemorrhagic stroke involves bleeding within the brain that damages nearby brain tissue. A common cause of hemorrhagic stroke is the bursting of an aneurysm (a weak spot in an artery wall). Hemorrhagic stroke is often associated with high blood pressure. About 20% of all strokes are hemorrhagic. **Source:** MedlinePlus. 2006. *Hemorrhagic Stroke*. Retrieved 1/2/2007: <http://www.nlm.nih.gov/medlineplus/ency/article/000761.htm>

High Blood Cholesterol: Cholesterol is a substance found in all cells of the body; it is carried in lipoproteins, made of fat (lipid) on the inside and proteins on the outside. Low-density lipoprotein (LDL) cholesterol is sometimes called "bad cholesterol" because it leads to a buildup of cholesterol in arteries. The higher the LDL level in the blood, the greater one's chance of getting heart disease. The buildup of cholesterol in the arteries is called plaque, which over time causes the narrowing of the arteries, or "atherosclerosis." Some plaques can burst, releasing fat and cholesterol into the bloodstream, which may cause the blood to clot and block the flow of blood. This blockage can cause angina or a heart attack. Lowering one's cholesterol level decreases the chance of having a plaque burst and a subsequent heart attack. Lowering cholesterol may also slow down, reduce, or even stop plaque from building up. **Source:** National Heart, Lung and Blood Institute. 2006. *What is Cholesterol? What is High Blood Cholesterol?* Retrieved 1/3/2007: http://www.nhlbi.nih.gov/health/dci/Diseases/Hbc/HBC_WhatIs.html

High Blood Pressure: A condition in which the pressure in the arterial circulation system is greater than clinically recommended, that is, a systolic pressure greater than or equal to 140 mm Hg or a diastolic pressure greater than or equal to 90 mm Hg. High blood pressure is associated with increased risk for heart disease, stroke, and chronic kidney disease. **Source:** Centers for Disease Control and Prevention. 2006. *A Public Health Action Plan to Prevent Heart Disease and Stroke, Appendix A*. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm

Hypertensive Heart Disease: An abnormality in the structure and function of the heart caused by long-standing high blood pressure. A common, clinical manifestation of hypertensive heart disease is heart failure. **Source:** Centers for Disease Control and Prevention. 2006. *A Public Health Action Plan to Prevent Heart Disease and Stroke, Appendix A*. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm

Ischemic Heart Disease: A condition in which heart muscle is damaged or works inefficiently because of an absence or deficiency of its blood supply. Ischemic heart disease is most often caused by atherosclerosis, and includes angina pectoris, acute myocardial infarction, chronic ischemic heart disease, and sudden death. **Source:** World Health Organization Collaborating Centre on Surveillance of Cardiovascular Diseases. *The Growing Burden of Heart Disease and Stroke*. Retrieved 1/2/2006: <http://www.cvdinfobase.ca/cvdbook/En/Glossary.htm>

Ischemic Stroke: The most common type of stroke that occurs when too little blood reaches an area of the brain usually due to a clot that has blocked a blood vessel. An ischemic stroke can sometimes lead to a brain hemorrhage. About 80% of strokes are ischemic strokes, **Source:** MedlinePlus. 2006. *Hemorrhagic Stroke*. Retrieved 1/2/2007: <http://www.nlm.nih.gov/medlineplus/ency/article/000761.htm>

Obesity: Defined in terms of body mass index (BMI), and calculated as body weight in kilograms (1 kg = 2.2 lbs) divided by height in meters (1 m = 39.37 in) squared. Adults with a BMI of greater than or equal to 30.0 kg/m² are considered "obese," and those with a BMI of 25–29.9 kg/m² are considered "overweight." **Source:** Centers for Disease Control and Prevention. 2006. *A Public Health Action Plan to Prevent Heart Disease and Stroke, Appendix A*. Retrieved 1/2/2007: http://www.cdc.gov/dhdsp/library/action_plan/full_appendix_a.htm

Classification of Overweight and Obesity in Adults According to BMI.		
Obesity is classified as BMI ≥ 30 kg/m ² .		
Classification	BMI (kg/m²)	Risk of Health Problems
Underweight	< 18.5	Low (but risk of other clinical problems increased)
Normal range	18.5-24.9	Average
Overweight	25.0-29.9	Mildly increased
Obese	≥ 30.0	
Class I	30.0-34.9	Moderate
Class II	35.0-39.9	Severe
Class III	≥ 40.0	Very severe
Note that these values are age-independent and correspond to the same degree of fatness across different populations.		

Source: World Health Organization Collaborating Centre on Surveillance of Cardiovascular Diseases. *The Growing Burden of Heart Disease and Stroke*. Retrieved 1/2/2006: <http://www.cvdinfo.ca/cvdbook/En/Glossary.htm>

Percutaneous Transluminal Coronary Angioplasty: Coronary angioplasty is a medical procedure that restores blood flow through a narrowed or blocked artery in the heart (coronary artery). The coronary arteries can become narrowed and blocked due to buildup of a material called plaque on the inner walls, which reduces the flow of blood through the artery and can lead, over time, to coronary artery disease and heart attack. During an angioplasty procedure, a balloon or other device is threaded through a blood vessel in the arm or groin up to the site of a narrowing or blockage. The balloon is then inflated to push the plaque outward against the wall of the artery, which widens the artery and restores the blood flow. Coronary angioplasty is currently a common medical procedure with more than 1 million done in the United States every year. **Sources:** National Heart, Lung and Blood Institute. 2006. *What Is Coronary Angioplasty?* Retrieved 1/3/2007: http://www.nhlbi.nih.gov/health/dci/Diseases/Angioplasty/Angioplasty_WhatIs.html

Mayoclinic.com. 2006. *Coronary angioplasty and stenting: Opening clogged heart arteries*. Retrieved 1/3/2007: <http://www.mayoclinic.com/health/angioplasty/HQ00485>

Serum (Blood) Lipids: Cholesterol and triglycerides are two forms of lipid, or fat in the body. Patients with elevated triglyceride levels typically have other major risk factors for heart disease (obesity, diabetes, and/or high blood pressure), but no study has yet proven that high triglyceride levels are an independent risk factor for heart disease. Recent evidence strongly suggests that an elevated triglyceride level is a significant risk factor for cardiac disease - especially when it is elevated as part of the "metabolic syndrome X." **Source:** About: Heart Disease. *Cholesterol and Triglycerides*. Retrieved 1/3/2007: <http://heartdisease.about.com/cs/cholesterol/a/choltri.htm>

Stroke: The most common clinical manifestation of cerebrovascular disease. Stroke describes an interruption of the blood supply in the brain that results in damaged brain tissue. It can be caused by clots or by bleeding in the brain from a ruptured blood vessel or a significant injury. **Source:** The Cleveland Clinic Information Center. 2004. *Hypertension Glossary*. Retrieved 1/3/2007: <http://www.clevelandclinic.org/health/health-info/docs/3800/3846.asp?index=12273>

Valvular Surgery: A surgical procedure consisting of two types: 1) **Valve repair surgery**, which involves repair to a faulty heart valve, typically without the use of artificial parts, and 2) **Valve replacement surgery**, which involves complete replacement of the native valve, and is used if valve repair is not considered a good option. The replacement valve can either be mechanical or biological. Although mechanical valves are durable and can last a lifetime, persons receiving valve replacement require lifelong treatment with a blood-thinning medication, which help prevent clots from forming on the mechanical valve. Biologic (or tissue) valves are made of human or animal tissue. They traditionally needed to be replaced after about 10 years, but newer valves have been shown to last as long as 17 years. **Source:** Cleveland Clinic. 2005. *Heart Valve Surgery*. Retrieved 1/3/2007: <http://www.clevelandclinic.org/heartcenter/pub/guide/disease/valve/valvetreatment.htm>