American Stroke
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A Division of American
Heart Association

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Heart Disease and Stroke Statistics — 2005 Update

Our guide to current statistics and

the supplement to our "Heart and Stroke Facts"

Statistical Fact Sheets

Information for the population groups and risk factors listed below is available at **americanheart.org**. Click on "Publications & Resources," then "Statistics," then "Statistical Fact Sheets."

Populations

African Americans and Cardiovascular Diseases — Statistics

American Indians or Alaska Natives and Cardiovascular Diseases — Statistics

Asian or Pacific Islanders and Cardiovascular Diseases — Statistics

Baby Boomers and Cardiovascular Diseases — Statistics

Hispanics or Latinos and Cardiovascular Diseases — Statistics

International Cardiovascular Disease Statistics [includes death rates by country]

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Women and Cardiovascular Diseases — Statistics

Youth and Cardiovascular Diseases — Statistics

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Diabetes Mellitus — Statistics

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Metabolic Syndrome — Statistics

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Physical Inactivity — Statistics

Tobacco — Statistics

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Out-of-Hospital Cardiac Deaths by State — Statistics

Peripheral Arterial Disease — Statistics

Sudden Deaths From Cardiac Arrest — Statistics

(Throughout this publication, statistics relating to sudden death from cardiac arrest are highlighted in pink.)

Understanding and Using American Heart Association Statistics

Venous Thromboembolism — Statistics

Check Our Web Sites

For more information on cardiovascular diseases including stroke, see **americanheart.org** and **StrokeAssociation.org**.

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About These Statistics

All statistics are for the most recent year available. Prevalence, mortality and hospitalizations are computed for 2002 unless otherwise noted. Incidence estimates come from specific studies and remain the same until new studies become available. "Total mention mortality" is for 2001. Economic costs are for 2005. Due to late release of mortality data, some mortality are not updated to 2002. **U.S. and state death rates and prevalence rates are age-adjusted (unless otherwise specified) per 100,000 population using the 2000 U.S. standard as the base.**

Do not compare the prevalence or incidence statistics with those in past issues of this publication. It can lead to serious misinterpretation of time trends.

If you have questions about statistics or any points made in this booklet, please contact the Biostatistics Program Coordinator at the National Center, Nancy.Haase@heart.org, 214-706-1423. Direct media inquiries to News Media Relations at inquiries@heart.org or 214-706-1173.

We do our utmost to ensure that this booklet is error-free. If we discover errors after publication, we'll provide corrections at our Web site, **americanheart.org**. Click on "Publications & Resources," then "Statistics," then "Heart Disease and Stroke Statistics — 2005 Update."

Acknowledgement

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Overweight and Obesity

Now commonly described as modern epidemics, overweight and obesity together represent the No. 2 preventable cause of death in the United States, second only to cigarette smoking. Today, nearly seven of every 10 U.S. adults are overweight, and about three of every 10 are obese. And among children, overweight and obesity are also rising at an alarming rate.

- Since 1991, the prevalence of obesity has increased 75 percent.
- Obesity has increased among every ethnic group.
- The estimated annual cost of obesity-related diseases in the United States is about $100 billion.

For more information on overweight and obesity, see page 39.

Physical Inactivity

Physical inactivity, a risk factor for cardiovascular disease (CVD), is becoming increasingly prevalent. More than ever, Americans are turning down or missing out on important opportunities to stay in shape. And while our level of activity declines, our rates of heart disease increase.

- 38.6 percent of United States adults report no leisure-time physical activity.
- The relative risk of coronary heart disease associated with physical inactivity ranges from 1.5 to 2.4, which is comparable to high blood cholesterol, high blood pressure or cigarette smoking.

For more information on physical inactivity, see page 37.

Women and Cardiovascular Disease

According to an American Heart Association survey, only 13 percent of women consider CVD their greatest health risk. But statistics show that no disease, not even cancer, claims as many women's lives as CVD. It causes about a death a minute among females —nearly half a million female lives every year. That's more lives than are claimed by the next six causes of death combined.

Information on women and cardiovascular disease is included throughout this publication.

Stroke

About 700,000 Americans will have a stroke this year — that's someone every 45 seconds. Stroke is our nation's No. 3 killer and a leading cause of severe, long-term disability. Some population groups, including African Americans, American Indians or Alaska Natives, and Mexican Americans, have a higher than average risk. Recent studies also indicate that the risk of stroke may be higher in women during pregnancy and the six weeks following childbirth.

For more information on stroke, see page 16.

Children and Cardiovascular Disease

CVD ranks as the No. 2 cause of death (behind certain accidents) for children under age 15. And in 2002 about 210,000 cardiovascular procedures were performed on people age 15 or younger.

Thousands of babies are born each year with congenital cardiovascular defects. These defects claim more lives than any other kind of congenital defects — about 2,200 lives a year of children under age 15. About 1 million Americans alive today have congenital cardiovascular defects — and about 25 percent are children.

Most CVD in children is due to congenital cardiovascular malformations. However, more and more children are also developing many preventable risk factors for cardiovascular diseases — such as high blood pressure (page 21), smoking (page 32), high blood cholesterol (page 35), physical inactivity (page 37), overweight (page 39), and the metabolic syndrome (page 44).

For more information on congenital cardiovascular defects, see page 24.

(ICD/9 390–459, 745–747) (ICD/10 I00–I99, Q20–Q28;
see Glossary for details and definitions)

Population Group	Prevalence 2002	Mortality 2002#	Hospital Discharges 2002	Cost 2005
Total population	70,100,000 (34.2%)	927,448	6,373,000	$393.5 billion
Total males	32,500,000 (34.4%)	433,825 (46.8%)*	3,209,000	—
Total females	37,600,000 (33.9%)	493,623 (53.2%)*	3,164,000	—
White males	34.3%	375,392	—	—
White females	32.4%	428,461	—	—
Black males	41.1%	48,993	—	—
Black females	44.7%	56,721	—	—
Mexican-American males	29.2%	—	—	—
Mexican-American females	29.3%	—	—	—

Note: (—) = data not available.

* These percentages represent the portion of total mortality that is males vs. females.

*Sources: **Prevalence:** NHANES (1999–02), CDC/NCHS and NHLBI; data for white and black males and females are for non-Hispanics. Total population data include children; percentages for racial/ethnic groups are age-adjusted for Americans age 20 and older. These data are based on self reports. **Mortality:** CDC/NCHS; data for white and black males and females include Hispanics; data include congenital cardiovascular disease. **Hospital discharges:** CDC/NCHS; data include people both living and dead. Cost: NHLBI; data include direct and indirect costs for 2005.*

— Preliminary mortality.

Prevalence

Of the 70,100,000 Americans with one or more types of cardiovascular disease (CVD), 27,000,000 are estimated to be age 65 or older. (National Health and Nutrition Examination Survey [NHANES 1999–2002], CDC/NCHS. Bullet points below are also from NHANES 1999–2002 unless otherwise noted.)

The following are the latest estimates of prevalence for these conditions. Due to overlap, it is not possible to add these conditions to arrive at a total.

- High blood pressure (HBP) — 65,000,000. (Defined as systolic pressure 140 mm Hg or greater and/or diastolic pressure 90 mm Hg or greater, taking antihypertensive medication or being told at least twice by a physician or other health professional that you have high blood pressure.)
- Coronary heart disease — 13,000,000.
  - Myocardial infarction (heart attack) — 7,100,000.
  - Angina pectoris (chest pain) — 6,400,000.

- Congestive heart failure — 4,900,000.
- Stroke —5,400,000.
- Congenital cardiovascular defects — 1,000,000. (Unpublished NHIS survey data, 1993–95, CDC/NCHS)
- 1 in 4 males and females has some form of CVD. (NHANES 2001–02, CDC/NCHS)
- The following prevalences are for people age 18 and older: (NHIS [2001], CDC/NCHS, *Vital and Health Statistics,* Series 10, No. 219, Feb. 2004)
  - Among whites only, 12.2 percent have heart disease, 20.1 percent have hypertension and 2.4 percent have had a stroke.
  - Among blacks or African Americans only, 9.6 percent have heart disease, 26.7 percent have hypertension and 2.9 percent have had a stroke.
  - Among Hispanics or Latinos, 6.1 percent have heart disease, 14.5 percent have hypertension and 1.8 percent have had a stroke.
  - Among Asians, 5.4 percent have heart disease, 13.5 percent have hypertension and 2.2 percent have had a stroke.
  - Among Native Hawaiians or other Pacific Islanders, 1.6 percent have heart disease, 14.5 percent have hypertension and 6.3 percent have had a stroke.
  - Among American Indians or Alaska Natives, 12.6 percent have heart disease, 25.0 percent have hypertension and 1.1 percent have had a stroke.

Incidence

- Based on the NHLBI's Framingham Heart Study (FHS) in its 44-year follow-up of participants and the 20-year follow-up of their offspring… (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)
  - The average annual rates of first major cardiovascular events rise from 7 per 1,000 men at ages 35–44 to 68 per 1,000 at ages 85–94. For women, comparable rates occur 10 years later in life. The gap narrows with advancing age.
  - Under age 75, a higher proportion of CVD events due to coronary heart disease (CHD) occur in men than in women, and a higher proportion of events due to congestive heart failure (CHF) occur in women than in men.
- The aging of the population will undoubtedly result in an increased incidence of chronic diseases, including coronary artery disease, heart failure and stroke. *(Circulation* 2002;106:1602–5)
  - The U.S. Census estimates that there will be 40 million Americans age 65 and older in 2010.

— There's been an explosive increase in the prevalence of obesity and type 2 diabetes. Their related complications — hypertension, hyperlipidemia and atherosclerotic vascular disease — also have increased.

— An alarming increase in unattended risk factors in the younger generations will continue to fuel the cardiovascular epidemic for years to come.

- Among American Indian men ages 45–74, the incidence of CVD ranges from 1.5 to 2.8 percent. Among women it ranges from 0.9 to 1.5 percent. *(Strong Heart Study Data Book,* NIH, NHLBI, Nov. 2001)

- Among American Indians ages 65–74, the annual rates per 1,000 population of new and recurrent heart attacks are 6.8 for men and 2.2 for women (SHS[1991–98], NHLBI)

Mortality

CVD accounted for 38.0 percent of all deaths or 1 of every 2.6 deaths in the United States in 2002. CVD mortality was nearly 60 percent of "total mortality." This means that of over 2,400,000 deaths from all causes, CVD was listed as a primary or contributing cause on about 1,400,000 death certificates.

- Since 1900 CVD has been the No. 1 killer in the United States every year but 1918. Nearly 2,600 Americans die of CVD each day, an average of 1 death every 34 seconds. CVD claims about as many lives each year as the next 5 leading causes of death combined, which are cancer, chronic lower respiratory diseases, accidents, diabetes mellitus, and influenza and pneumonia.

- Other causes of death in 2002 — cancer 557,271; accidents 106,742; Alzheimer's disease 58,866; HIV (AIDS) 14,095.

- The 2002 preliminary CVD death rates were 380.4 for males and 273.4 for females. Cancer death rates were 238.9 for males and 163.1 for females. Breast cancer claimed the lives of 41,514 females in 2002; lung cancer claimed 67,542. The death rates were 25.6 for breast cancer and 41.6 for lung cancer. 1 in 30 female deaths is from breast cancer, while 1 in 2.5 is from CVD.

- Over 150,000 Americans killed by CVD each year are under age 65. In 2002, 32 percent of deaths from CVD occurred prematurely (i.e., before age 75, the approximate average life expectancy in that year).

- The 2002 overall preliminary death rate from CVD was 320.5. The rates were 373.8 for white males and 492.5 for black males; 265.6 for white females and 368.1 for black females. From 1992 to 2002 death rates from CVD (ICD/10 I00–I99) declined 18.0 percent. In the same 10-year period actual CVD deaths increased 0.8 percent.

- Based on revised 2000 population data, the average life expectancy of people born in the United States is now 77.3 years. According to the CDC/NCHS, if all forms of major CVD were eliminated, life expectancy would rise by almost 7 years. If all forms of cancer were eliminated, the gain would be 3 years. According to the same study, the probability at birth of eventually dying from major CVD (I00–I78) is 47 percent, and the chance of dying from cancer is 22 percent. Additional probabilities are 3 percent for accidents, 2 percent for diabetes and 0.7 percent for HIV. *(U.S. Decennial Life Tables for 1989–91,* Vol. 1, No. 4, Sept. 1999)

- The CDC estimates that each year 400,000 to 460,000 people die of heart disease in an emergency department or before reaching a hospital, which accounts for over 60 percent of all cardiac deaths. Heart disease death in this study included deaths from all forms of heart disease (Diseases of the Heart) and congenital malformations of the heart (I00–I09, I11, I13, I20–I51, Q20–Q24). *(Morbidity and Mortality Weekly Report [MMWR],* Vol. 51, No. 6, Feb. 15, 2002, CDC/NCHS) See the **Out-of-Hospital Cardiac Deaths by State** fact sheet, instructions on page 1a.

- In 2001, the number of premature deaths (<65 years) from diseases of the heart (I00–I09, I11, I13, I20–I51) was greatest among American Indians or Alaska Natives (36 percent) and blacks (31.5 percent) and lowest among whites (14.7 percent). Premature death was higher for Hispanics (23.5 percent) than non-Hispanics (16.5 percent), and for males (24 percent) than females (10 percent). Hispanic whites (23.3 percent) had lower proportions than Hispanic blacks (27.5 percent), and non-Hispanic whites (14.4 percent) had lower proportions than non-Hispanic blacks (31.5 percent). (Behavioral Risk Factor Surveillance System, CDC/NCHS, *MMWR,* Vol. 53, No. 6, Feb. 20, 2004, CDC/NCHS)

- Yearly totals of out-of-hospital death (ICD/9 codes: 390–398, 402, and 404–429) in people ages 15 to 34 rose from 2,719 in 1989 to 3,000 in 1996. Alarmingly, though the numbers are very small, the death rate increased by 30 percent in young women. Death rates were also higher among young African Americans than among Caucasians. *(Sudden Cardiac Death in U.S. Young Adults, 1989–96,* CDC, 2001)

- Age-adjusted death rates for Diseases of the Heart from 1990 to 1998 declined 15 percent for non-Hispanic whites, 11 percent for non-Hispanic blacks, 17 percent for Hispanics, 14 percent for Asian or Pacific Islanders and 8 percent for American Indians or Alaska Natives. In 1998 the rate for non-Hispanic blacks was 2.8 times the rate for Asian or Pacific Islanders. *(Healthy People 2000, Statistical Notes,* No. 23, CDC/NCHS, Jan. 2002)

Risk Factors

For statistics on individual CVD risk factors, see Chapter 9 beginning on page 32.

- Among adults age 18 and older, the prevalence of 2 or more risk factors increased from 23.6 percent in 1991 to 27.9 percent in 1999. It increased significantly for both men and women and for all race, ethnic, age and education groups. (BRFSS, CDC/NCHS, *Arch Intern Med* 2004;164:181–8)

— Among persons with 2 risk factors in 1999, the most common combination was HBP and high cholesterol (23.9 percent).

— Among those with 3 risk factors, the most common combination was HBP, high cholesterol and obesity (32.5 percent).

— Among those with 4 risk factors, about 43 percent had the combination of HBP, high cholesterol, obesity and smoking. Another 40 percent had HBP, high cholesterol, obesity and diabetes. These risk factor combinations were also the most common combinations in earlier years.

- Black and Mexican-American women have higher prevalence of CVD risk factors than white women of comparable socioeconomic status (SES). (NHANES III [1988–94], CDC/NCHS, *JAMA* 1998;280:356–62)

- Among American Indians or Alaska Natives age 18 and older, 63.7 percent of men and 61.4 percent of women have one or more CVD risk factors (hypertension, current cigarette smoking, high blood cholesterol, obesity or diabetes). If data on physical inactivity had been included in this analysis, the prevalence of risk factors probably would have been higher. (BRFSS [1997], CDC/NCHS)

- Data from the BRFSS survey on adults 18 and older, from 1991–2001, showed the prevalence of reported HBP, high cholesterol, diabetes and obesity increased. The prevalence of smoking remained nearly the same, and the prevalence of no known risk factors for diseases of the heart and stroke declined. As a result, the national burden of Diseases of the Heart and stroke is expected to increase. (MMWR, Vol. 53(01);4–7, CDC/NCHS)

- Data from the BRFSS study of the CDC/NCHS showed that young women and men, ages 18 to 24, had poor health profiles and experienced adverse changes from 1990 to 2000. After adjustment for education and income, these young people had the highest prevalence of smoking (34–36 percent current smokers among whites); the largest increases in smoking (10–12 percent among whites and 9 percent among Hispanic women); large increases in obesity (4–9 percent increase in all groups). All groups had high levels of sedentary behavior (approximately 20–30 percent) and low vegetable or fruit intake (approximately 35–50 percent). In contrast, older Hispanics and older black men, ages 65–74, showed some of the most positive changes. They had the largest decreases in smoking (Hispanic women), largest decreases in sedentary behavior (Hispanic women and black men), and largest increases in vegetable or fruit intake (Hispanic women and black men). *(Am J Health Promot* 2004;19[1]:19–27)

- Data from the Chicago Heart Association Detection Project (1967–73) showed that in younger women (age 18–39) with favorable levels for all five major risk factors (blood pressure, serum cholesterol, BMI, diabetes and smoking), CHD and CVD are rare, and long-term and all-cause mortality are much lower compared with others. (JAMA 2004;292:1588-92)

Hospital/Physician/Nursing Home Visits

- From 1979 to 2002 the number of Americans discharged from short-stay hospitals with CVD as the first listed diagnosis increased 30 percent. In 2002 CVD ranked highest among all disease categories in hospital discharges. (National Hospital Discharge Survey: 2001, CDC/NCHS)

- In 2002 there were 80,092,000 physician office visits with a primary diagnosis of CVD. (National Ambulatory Medical Care Survey, 2002 Summary, CDC/NCHS)

- In 2002 there were 4,648,000 visits to emergency departments with a primary diagnosis of CVD. (National Hospital Ambulatory Medical Care Survey, 2002 Emergency Department Summary. CDC/NCHS)

- In 1999, 23 percent of nursing home residents age 65 or older had a primary diagnosis of CVD at admission. This was the highest disease category for these residents. (1999 National Nursing Home Survey, USDHHS, June 2002)

- In 2002 there were 6,024,000 outpatient department visits with a primary diagnosis of CVD. (National Hospital Ambulatory Medical Care Survey, 2002 Outpatient Department Summary. CDC/NCHS)

Cost

- In 2005 the estimated direct and indirect cost of CVD is $393.5 billion. See page 53 for more detailed information.

- In 1999, $26.3 billion in program payments were made to Medicare beneficiaries discharged from short-stay hospitals, with a principal diagnosis of cardiovascular disease. That was an average of $7,883 per discharge. *(Health Care Financing Review, 2001 Medicare and Medicaid Statistical Supplement,* CMS, April 2003)

- A study of the 1987 National Medicaid Expenditure Survey and the 2000 Medical Expenditure Panel Survey, Household Component, showed the 15 most costly medical conditions, and the estimated percent increase in total healthcare spending for each condition from 1987–2000. The following are some of the top 15 conditions, by order of rank, and their percentage impact on health care spending:

  heart disease (1) +8.06 percent; cancer (4) +5.36 percent; hypertension (5) +4.24 percent; cerebrovascular disease (7) +3.52 percent; diabetes (9) +2.37 percent; and kidney disease (15) +1.03 percent.

Operations and Procedures

- In 2002 an estimated 6,813,000 inpatient cardiovascular operations and procedures were performed in the United States; 4.0 million were performed on males and 2.8 million were performed on females. For more data, see pages 51 and 52. (CDC/NCHS)

Deaths From Diseases of the Heart
United States: 1900–2002
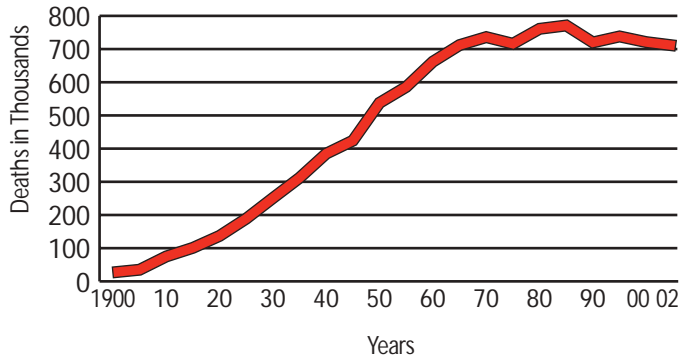
Note: See Glossary on page 58 for an explanation of "Diseases of the Heart." Total cardiovascular disease data are not available for much of the period covered by this chart.

Source: CDC/NCHS.

Percentage Breakdown of Deaths From Cardiovascular Diseases
United States: 2002 Preliminary

0.4% Congenital Cardiovascular Defects
13% Other
53% Coronary Heart Disease
0.4% Rheumatic Fever/ Rheumatic Heart Disease
4% Diseases of the Arteries
5% High Blood Pressure
6% Congestive Heart Failure
18% Stroke
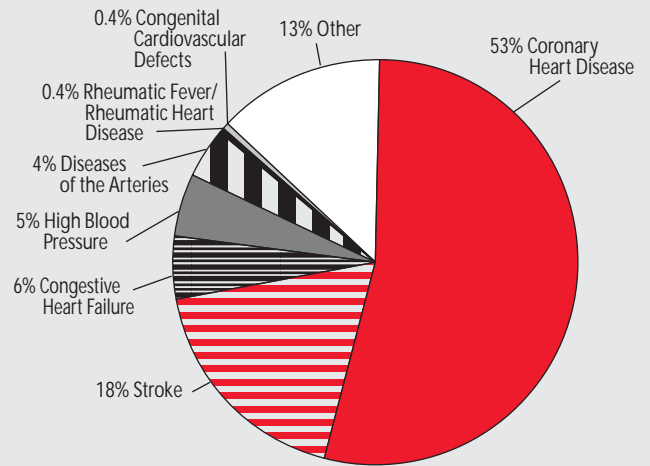
Source: CDC/NCHS .

Hospital Discharges for Cardiovascular Diseases
United States: 1970–2002
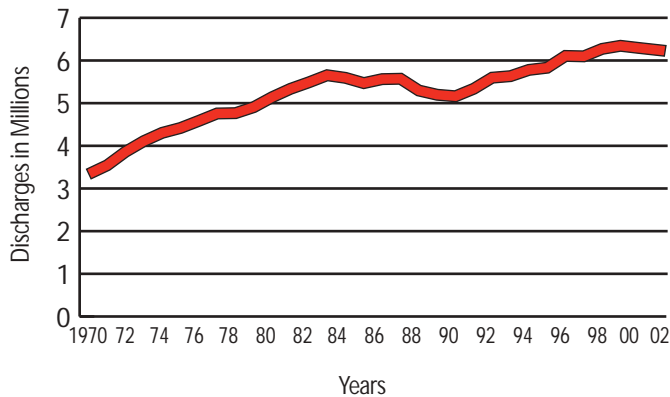
Note: Hospital discharges include people both living and dead.

Source: CDC/NCHS.

Prevalence of Cardiovascular Diseases in Americans Age 20 and Older by Age and Sex
NHANES: 1999–2002

Men
Women

Ages	Men	Women
20-34	11.2	6.2
35-44	22.9	17.6
45-54	36.2	36.6
55-64	52.9	56.5
65-74	68.5	75.0
75+	77.8	86.4
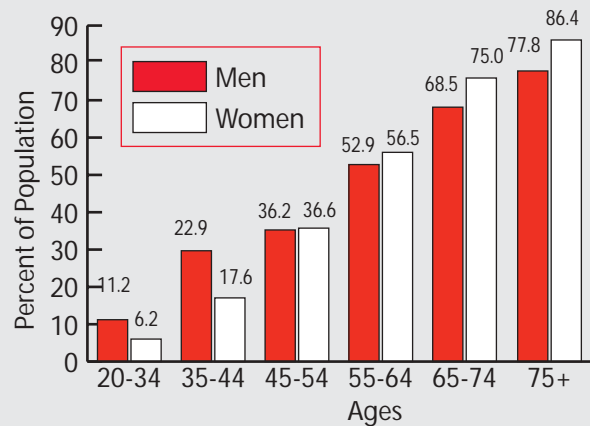
Source: CDC/NCHS and NHLBI. These data include CHD, CHF, stroke and hypertension.

Leading Causes of Death for All Males and Females
United States: 2002
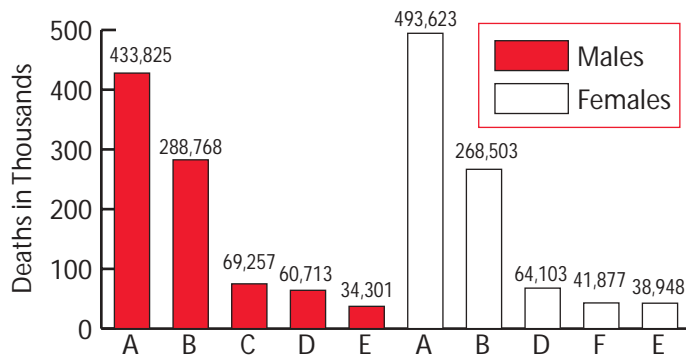
A Total CVD (Preliminary)
B Cancer
C Accidents
D Chronic Lower Respiratory Diseases
E Diabetes Mellitus
F Alzheimer's Disease

Source: CDC/NCHS.

Leading Causes of Death for Black or African-American Males and Females
United States: 2002
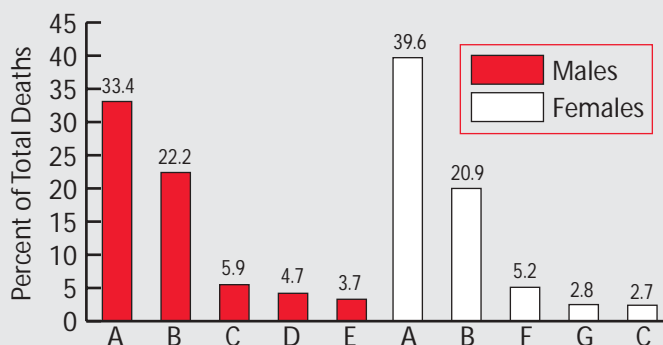
A Total CVD (Preliminary)
B Cancer
C Accidents
D Assault (Homicide)
E HIV (AIDS)
F Diabetes Mellitus
G Nephritis, Nephrotic Syndrome and Nephrosis

Note: Using "Diseases of the Heart, and Stroke," which do not constitute total CVD, the percentages of the "A" bars would be 30.6 for males and 36.0 for females.

Source: CDC/NCHS.

Leading Causes of Death for White Males and Females
United States: 2002
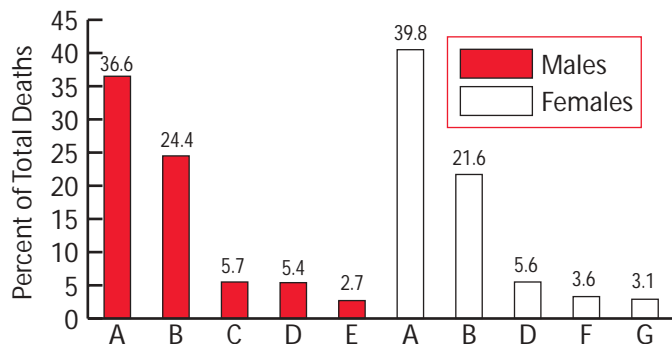
A Total CVD (Preliminary)
B Cancer
C Accidents
D Chronic Lower Respiratory Diseases
E Diabetes Mellitus
F Alzheimer's Disease
G Influenza and Pneumonia

Note: Using "Diseases of the Heart, and Stroke," which do not constitute total CVD, the percentages of the "A" bars would be 34.1 for males and 36.8 for females.

Source: CDC/NCHS.

Leading Causes of Death for Hispanic or Latino Males and Females
United States: 2002
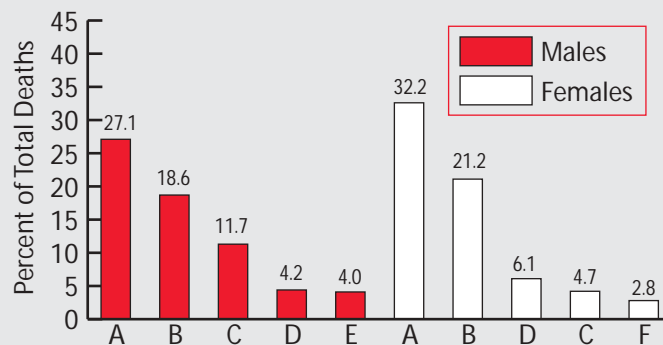
A Diseases of the Heart, and Stroke
B Cancer
C Accidents
D Diabetes Mellitus
E Assault (Homicide)
F Chronic Lower Respiratory Disease

Source: CDC/NCHS.

Leading Causes of Death for Asian or Pacific Islander Males and Females
United States: 2002
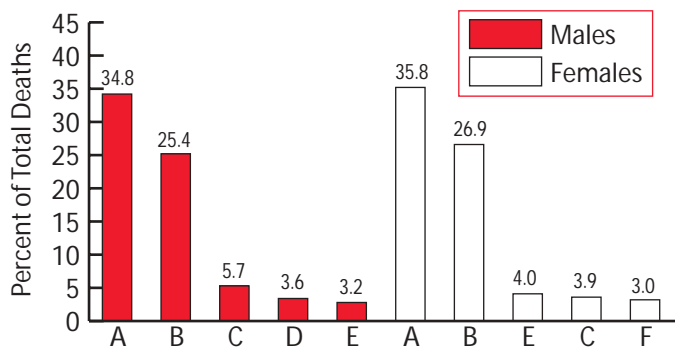
A Diseases of the Heart, and Stroke
B Cancer
C Accidents
D Chronic Lower Respiratory Diseases
E Diabetes Mellitus
F Influenza and Pneumonia

Note: "Asian or Pacific Islander" is a heterogeneous category that includes people at high CVD risk (South Asian) and people at low CVD risk (Japanese). More specific data on these groups aren't available.

Source: CDC/NCHS.

Leading Causes of Death for American Indian or Alaska Native Males and Females
United States: 2002
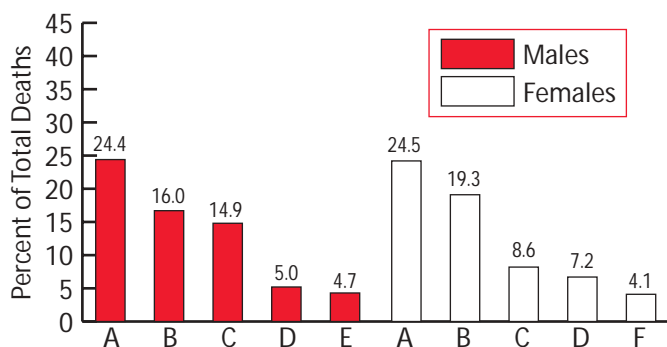
A Diseases of the Heart, and Stroke
B Cancer
C Accidents
D Diabetes Mellitus
E Chronic Liver Disease and Cirrhosis
F Chronic Lower Respiratory Diseases

Source: CDC/NCHS.

Age-Adjusted Death Rates for Coronary Heart Disease, Stroke, and Lung and Breast Cancer for White and Black Females
United States: 2002
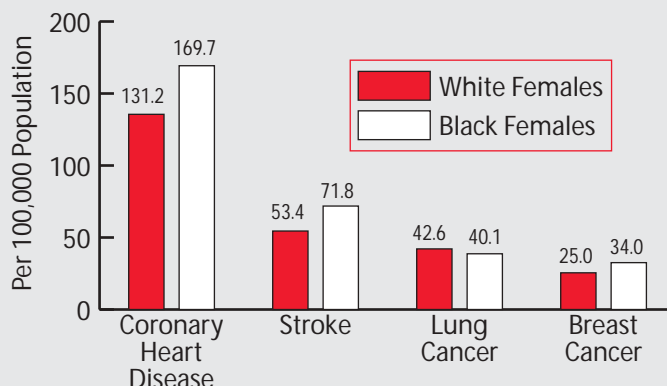
Source: CDC/NCHS

Cardiovascular Disease Mortality Trends for Males and Females
United States: 1979-2002

Source: CDC/NCHS.

2001 Age-Adjusted Death Rates for Total Cardiovascular Disease, Coronary Heart Disease and Stroke by State (includes District of Columbia and Puerto Rico)

Maps showing age-adjusted death rates by state for cardiovascular disease, coronary heart disease and stroke are available in the **Death Rates by State** fact sheet at **americanheart.org.** See page 1a for instructions.

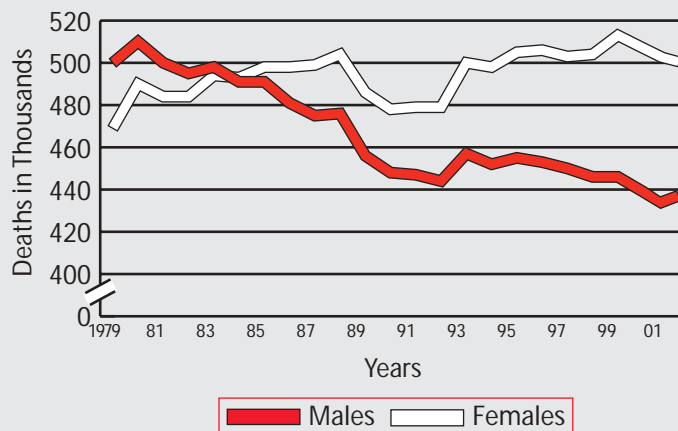| State	Total Cardiovascular Disease*			Coronary Heart Disease**			Stroke[#]		
	Rank[##]	Death Rate	Percent Change[+] 1991 to 2001	Rank[##]	Death Rate	Percent Change[+] 1991 to 2001	Rank[##]	Death Rate	Percent Change[+] 1991 to 2001
Alabama	49	379.4	−14.2	22	154.8	−22.2	44	66.0	−10.0
Alaska	9	276.8	−14.3	5	118.7	−30.2	23	57.4	+2.0
Arizona	6	272.6	−19.2	18	151.7	−24.2	6	48.2	−10.6
Arkansas	45	377.5	−11.9	39	186.0	−23.8	52	75.9	−11.5
California	27	313.9	−18.5	33	180.3	−24.4	34	61.2	−12.6
Colorado	5	267.9	−19.0	6	121.9	−35.4	16	53.9	−8.2
Connecticut	12	285.5	−21.5	13	146.5	−26.7	9	49.6	−12.0
Delaware	30	325.6	−22.5	43	192.9	−23.8	8	49.2	−18.2
District of Columbia	47	379.0	−8.7	50	218.1	+18.8	3	46.4	−30.6
Florida	21	300.8	−15.8	35	181.5	−21.2	5	47.6	−14.7
Georgia	43	364.0	−16.8	19	153.1	−31.0	46	67.4	−12.8
Hawaii	2	256.2	−18.0	1	101.7	−29.2	31	59.8	−7.9
Idaho	15	289.4	−17.8	11	136.8	−27.3	40	64.7	−11.1
Illinois	31	331.3	−21.7	31	178.9	−30.0	27	58.4	−13.3
Indiana	39	346.1	−17.7	29	174.4	−27.7	37	63.8	−11.6
Iowa	23	305.7	−19.6	30	177.3	−24.4	28	58.8	−7.9
Kansas	26	310.1	−15.8	14	148.7	−26.7	32	60.3	−6.2
Kentucky	48	379.0	−13.3	41	191.2	−21.9	39	64.4	−8.8
Louisiana	44	368.5	−19.8	36	182.3	−30.2	41	64.8	−13.2
Maine	20	296.8	−22.3	21	153.5	−29.9	17	54.7	−4.5
Maryland	32	332.0	−14.7	38	184.5	−19.1	30	59.6	+0.1
Massachusetts	10	280.2	−20.7	12	139.9	−32.2	7	48.6	−13.5
Michigan	42	357.0	−16.6	46	201.9	−26.2	26	58.2	−11.9
Minnesota	1	247.5	−27.2	3	113.2	−39.8	14	52.5	−23.1
Mississippi	52	424.2	−16.0	45	197.8	−25.2	48	70.5	−9.1
Missouri	41	355.9	−14.1	42	192.2	−20.7	35	61.6	−6.8
Montana	8	274.4	−19.5	4	116.2	−29.9	25	57.7	−14.4
Nebraska	18	292.7	−22.9	7	124.9	−37.2	22	57.3	−10.6
Nevada	34	336.3	−20.7	23	156.7	−31.8	18	55.1	−1.0
New Hampshire	24	307.2	−17.4	32	180.1	−21.6	12	52.0	−14.2
New Jersey	28	315.5	−19.7	40	187.2	−24.8	2	44.2	−20.0
New Mexico	7	273.4	−18.3	16	150.9	−21.4	10	49.6	−11.9
New York	36	340.0	−22.4	52	227.6	−27.5	1	38.4	−25.3
North Carolina	35	339.5	−20.1	28	170.6	−28.2	49	71.3	−12.5
North Dakota	19	296.0	−13.9	27	162.9	−18.3	33	60.4	−11.9
Ohio	40	352.5	−16.8	44	193.5	−23.8	24	57.4	−6.1
Oklahoma	51	391.6	−8.7	51	220.6	−9.2	43	65.6	−2.9
Oregon	13	285.8	−17.4	8	128.5	−34.9	47	69.5	−3.0
Pennsylvania	33	334.0	−19.6	34	180.4	−28.3	19	55.5	−10.6
Puerto Rico	4	265.8	—	9	130.1	—	13	52.2	—
Rhode Island	25	309.5	−17.8	47	202.5	−16.7	4	47.4	−18.4
South Carolina	38	344.1	−22.8	26	160.4	−30.4	51	75.0	−15.3
South Dakota	14	288.9	−22.4	24	158.2	−31.0	15	52.5	−5.4
Tennessee	46	377.7	−13.6	49	211.9	−19.2	50	72.3	−11.6
Texas	37	340.8	−13.1	37	183.8	−20.5	38	63.8	−8.0
Utah	3	262.7	−20.7	2	108.0	−35.4	21	56.4	−8.5
Vermont	17	292.6	−20.5	25	158.5	−31.6	11	50.2	−11.7
Virginia	29	317.5	−22.5	15	150.4	−28.7	42	65.4	−11.0
Washington	16	290.3	−18.5	17	151.2	−23.8	45	67.2	−7.1
West Virginia	50	382.6	−16.1	48	209.7	−21.6	29	59.4	−5.4
Wisconsin	22	304.4	−19.9	20	153.1	−29.9	36	61.7	−11.3
Wyoming	11	282.5	−16.9	10	136.2	−24.0	20	56.1	−15.1
Total United States		328.1	−18.8		177.8	−25.6		57.9	−11.4

Note: (—) = data not available.
* Total cardiovascular disease is defined here as ICD/10 I00–I99.
** Coronary heart disease is defined here as ICD/10 I20–I25.
[#] Stroke is defined here as ICD/10 I60–I69.
[##] Rank is lowest to highest.
[+] Percent change is based on log linear slope of rates for each year, 1990–2001. For computing percent change, the death rates in 2001 were comparability modified using the comparability ratio 1.0588 for stroke.
Source: NCHS compressed mortality file for the years 1979 to 2001.

Charts showing death rates for total cardiovascular disease, coronary heart disease, stroke and total deaths in selected countries are included in the **International Cardiovascular Disease Statistics** fact sheet at **americanheart.org.** See page 1a for instructions.

Coronary Heart Disease, Acute Coronary Syndrome and Angina Pectoris

3

Coronary Heart Disease

(ICD/9 410–414, 429.2) (ICD/10 I20–I25; see Glossary for details and definitions)

Population Group	Prevalence CHD 2002	Prevalence MI 2002	New and Recurrent Heart Attacks and Fatal CHD	New and Recurrent MI	Mortality CHD 2002	Mortality MI 2002	Hospital Discharges CHD 2002	Cost CHD 2005
Total population	13,000,000 (6.9%)	7,100,000 (3.5%)	1,200,000	865,000	494,382	179,514	2,125,000	$142.1 billion
Total males	7,100,000 (8.4%)	4,100,000 (5.0%)	715,000	520,000	252,760 (51.1%)*	93,830 (52.3%)*	1,249,000	—
Total females	5,900,000 (5.6%)	3,000,000 (2.3%)	485,000	345,000	241,622 (48.9%)*	85,684 (47.7%)*	875,000	—
White males	8.9%	5.1%	650,000	—	223,262	83,288	—	—
White females	5.4%	2.4%	425,000	—	211,908	74,634	—	—
Black males	7.4%	4.5%	65,000	—	24,322	8,680	—	—
Black females	7.5%	2.7%	60,000	—	25,852	9,642	—	—
Mexican-American males	5.6%	3.4%	—	—	—	—	—	—
Mexican-American females	4.3%	1.6%	—	—	—	—	—	—
Hispanics or Latinos**	4.8%	—	—	—	—	—	—	—
Asians**	5.0%	—	—	—	—	—	—	—
American Indians or Alaska Natives**	3.6%	—	—	—	—	—	—	—

Note: CHD = coronary heart disease; includes acute myocardial infarction, other acute ischemic (coronary) heart disease, angina pectoris, atherosclerotic cardiovascular disease, and all other forms of heart disease. MI = myocardial infarction (heart attack).
(—) = data not available.

*   These percentages represent the portion of total mortality that is males vs. females.

** NHIS (2002) — data are for Americans age 18 and older.

*Sources: **Prevalence:** NHANES (1999–02), CDC/NCHS and NHLBI; data for white and black males and females are for non-Hispanics. Total population data are for Americans age 20 and older; percentages for racial/ethnic groups are age-adjusted for age 20 and older. These data are based on self report. **Incidence:** ARIC (1987–2000), NHLBI. **Mortality:** CDC/NCHS; data for white and black males and females include Hispanics. **Hospital discharges:** CDC/NCHS; data include people both living and dead. **Cost:** NHLBI; data include direct and indirect costs for 2005.*

Prevalence

- Coronary heart disease rates in women after menopause are 2–3 times those of women the same age before menopause. (FHS, NHLBI, 44-year follow-up of participants and 20-year follow-up of their offspring)

- Among Americans ages 40–74, NHANES data found the age-adjusted prevalence of self-reported MI and ECG-MI (verified by electrocardiogram) to be higher among men than women, but angina prevalence to be higher in women than men. Age-adjusted rates of self-reported MI increased among African-American men and women and Mexican-American men, but decreased among white men and women. (Ethnicity & Disease, Vol. 13, p. 85–93, Winter 2003.)

Incidence

- This year an estimated 700,000 Americans will have a new coronary attack. About 500,000 will have a recurrent attack. (Atherosclerosis Risk in Communities [ARIC, 1987–2000, NHLBI] It is estimated that an additional 175,000 silent first heart attacks occur each year.)

- The estimated incidence of myocardial infarction (MI) (ICD/9 410) (ICD/10 I21, I22) is 565,000 new attacks and 300,000 recurrent attacks annually. (ARIC, 1987–2000, NHLBI)

- The average age of a person having a first heart attack is 65.8 for men and 70.4 for women. (ARIC and CHS, NHLBI)

- Based on the NHLBI's FHS in its 44-year follow-up of participants and the 20-year follow-up of their offspring: (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)

  — CHD comprises more than half of all cardiovascular events in men and women under age 75.

  — The lifetime risk of developing CHD after age 40 is 49 percent for men and 32 percent for women.

  — The incidence of CHD in women lags behind men by 10 years for total CHD and by 20 years for more serious clinical events such as MI and sudden death.

- In the NHLBI's ARIC study, average age-adjusted CHD incidence rates per 1,000 person-years were: white men, 12.5; black men, 10.6; white women, 4.0; and black women, 5.1. Incidence rates excluding revascularization procedures were: white men, 7.9; black men, 9.2; white women, 2.9; and black women, 4.9. Hypertension was a particularly powerful risk factor for CHD in black persons, especially in black women. Diabetes was a weaker predictor of CHD in black than in white persons. *(Arch Intern Med* 2002;162:2565–71)

- The annual rates per 1,000 population of new heart attack (MI or CHD death) in non-black men are 19.2 for ages 65–74, 28.3 for ages 75–84, and 50.6 for age 85 and older. For non-black women in the same age groups the rates are 6.8, 14.2 and 33.2, respectively. For black men the rates are 21.6, 27.9 and 57.1, and for black women the rates are 8.6, 17.6 and 24.8, respectively. (CHS [1989–2000], NHLBI)

- Combining the rates for possible and definite CHD shows that 17 to 25 of every 100 American Indian men ages 45 to 74 had some evidence of heart disease. *(Strong Heart Study Data Book,* NIH, NHLBI, Nov. 2001)

- Among American Indians ages 65–74, the annual rates per 1,000 population of new and recurrent heart attacks are 6.8 for men and 2.2 for women. (SHS [1991–98], NHLBI)

Mortality

Coronary heart disease caused 1 of every 5 deaths in the United States in 2002. CHD total mention mortality — 656,000. MI total mention mortality — 225,000.

- CHD is the *single* largest killer of American males and females. About every 26 seconds an American will suffer a coronary event, and about every minute someone will die from one. About 41 percent of the people who experience a coronary attack in a given year, will die from it.

- About 335,000 people a year die of CHD in an emergency department or before reaching a hospital. Most of these are sudden deaths caused by cardiac arrest, usually resulting from ventricular fibrillation. (See also Arrhythmias, page 28.)

- A study of 1,275 HMO enrollees aged 50 to 79 years, who had cardiac arrest (CA), showed the incidence of out-of-hospital CA was 6.0/1,000 subject-years in subjects with any clinically recognized heart disease compared to 0.8/1,000 subject-years in subjects without heart disease. In subgroups with heart disease, incidence was 13.6/1,000 subject-years in subjects with prior MI and 21.9/1,000 subject-years in subjects with heart failure. *(Am J Cardiol* 2004;93:1455–60)

- An analysis of data from the FHS from 1950 to 1999 showed that overall CHD death rates decreased by 59 percent. Nonsudden CHD death decreased by 64 percent, and sudden cardiac death fell by 49 percent. These trends were seen in men and women, in subjects with and without a prior history of CHD, and in smokers and nonsmokers. *(Circulation* 2004;110:522–7)

- From 1992 to 2002 the death rate from CHD declined 26.5 percent, but the actual number of deaths declined only 9.9 percent. In 2002 the overall CHD death rate was 170.8 per 100,000 population. The death rates were 220.5 for white males and 250.6 for black males, and 131.2 for white females and 169.7 for black females. 1999 death rates for CHD were 138.4 for Hispanics, 123.9 for American Indians or Alaska Natives and 115.5 for Asian or Pacific Islanders. (CDC/NCHS)

- Over 83 percent of people who die of CHD are age 65 or older. (CDC/NCHS)

- The estimated average number of years of life lost due to a heart attack is 11.5. (NHLBI)

- Based on data from the FHS study of the NHLBI: (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)

  — 25 percent of men and 38 percent of women will die within 1 year after having an initial recognized MI. In part because women have heart attacks at older ages than men do, they're more likely to die from them within a few weeks. Almost half of men and women under age 65 who have a heart attack (MI) die within 8 years.

  — 50 percent of men and 64 percent of women who died suddenly of CHD had no previous symptoms of this disease.

  — Between 70 and 89 percent of sudden cardiac deaths

occur in men, and the annual incidence is 3 to 4 times higher in men than in women. However, this disparity decreases with advancing age.

— People who've had a heart attack have a sudden death rate that's 4–6 times that of the general population.

— Sudden cardiac death accounts for 19 percent of sudden deaths in children between 1 and 13 years of age and 30 percent between 14 and 21 years. The overall incidence is low, 600 cases per year.

• According to data from the National Registry of Myocardial Infarction (NRMI), (www.nrmi.org/nrmi_data.html)

— From 1990–1999, in-hospital AMI mortality declined from 11.2 percent to 9.4 percent. *(J Am Coll Cardiol* 2000;2056–63)

— Mortality increases for every 30 minutes that elapse before a patient with ST-segment elevation is recognized and treated. *(Am J Cardiol* 2000;85:5B–9B)

— Women under 50 are twice as likely to die after an AMI than men in the same age group. *(NEJM* 1999;341:217–25)

Risk Factors

• A study of men and women in three prospective cohort studies found that antecedent major CHD risk factor exposures were very common among those who developed CHD. About 90 percent of the CHD patients have prior exposure to at least one of these major risk factors, which include high total blood cholesterol levels or current medication with cholesterol-lowering drugs, hypertension or current medication with blood pressure-lowering drugs, current cigarette use, and clinical report of diabetes. *(JAMA* 2003;290:891–7)

• According to a study of 52 countries (INTERHEART), nine easily measured and potentially modifiable risk factors account for over 90 percent of the risk of an initial acute MI. The effect of these risk factors is consistent in men and women, across different geographic regions, and by ethnic group, making the study applicable worldwide. These nine risk factors include cigarette smoking, abnormal blood lipid levels, hypertension, diabetes, abdominal obesity, a lack of physical activity, low daily fruit and vegetable consumption, alcohol overconsumption, and psychosocial index. *(Lancet* 2004;364:937–52)

• A study of over 3,000 members of the FHS offspring cohort without CHD showed that among men with 10-year predicted risk for CHD of ≥ 20 percent, failure to reach target heart rate and ST-segment depression both more than doubled the risk of an event, and each MET (metabolic equivalent) increment in exercise capacity reduced risk by 13 percent. *(Circulation* 2004;110:1920–5)

• Low CHD risk is defined as blood pressure less than 120/80 mm Hg, cholesterol less than 200 mg/dL and not currently smoking. Age-adjusted prevalence was estimated in nondiabetic persons without a history of MI participating in four NHANES surveys conducted in 1971–75, 1976–80,

1988–94, and 1999–2000. (Manolio TA, et al. U.S. trends in prevalence of low coronary risk. National Health and Nutrition Examination Surveys. *Circulation* 2004;109:32. Abstract P108.)

— The prevalence of low risk rose from 6 percent in 1971–75 to 17 percent in 1988–94 and 1999–2000.

— Prevalence of low risk was about twice as high in women as in men throughout the period.

— Prevalence was initially higher in whites than in blacks (7 percent vs. 3 percent in 1971–75); it increased more with time in blacks (17 percent vs. 15 percent in 1999–2000).

— Prevalence of low risk in 1999–2000 was lowest in those ages 65–74 (3 percent) and was progressively greater at younger ages (29 percent at ages 25–34), with similar increases in prevalence over time across age groups.

— The greatest changes in the components of low risk from 1971 to 2000 were in prevalence of favorable diastolic blood pressure (38 to 71 percent), compared to favorable systolic blood pressure (32 to 47 percent), nonsmoking (60 to 79 percent), and favorable cholesterol (33 to 46 percent).

• Taking into account CHD risk factors in combination provides a very potent predictor of 10-year risk of CHD compared with individual risk factors. Among participants age 20–79 in the NHANES III study of the CDC/NCHS, without self-reported CHD, stroke, peripheral vascular disease and diabetes, 81.7 percent had a 10-year risk for CHD of <10 percent, 15.5 percent had a risk of 10–20 percent, and 2.9 percent had a risk of >20 percent. 40.3 percent of men and 8.2 percent of women age 60 and over were at "intermediate risk (10–20 percent)." The proportion of participants with a 10-year risk of CHD of >20 percent increased with advancing age and was higher among men than women but varied little with race or ethnicity. *(J Am Coll Cardiol* 2004;43:1791–6)

Aftermath

• Depending on their gender and clinical outcome, people who survive the acute stage of a heart attack have a chance of illness and death that's 1.5–15 times higher than that of the general population. The risk of another heart attack, sudden death, angina pectoris, heart failure and stroke — for both men and women — is substantial. (FHS, NHLBI) (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)

• A study conducted by the Mayo Clinic found that cardiac rehabilitation after a heart attack is underused, particularly in women and the elderly. Women were 55 percent less likely than men to participate in cardiac rehabilitation, and older study patients were less likely than younger participants. Only 32 percent of men and women aged 70 or older participated in cardiac rehabilitation, in comparison to 66 percent of 60- to 69-year-olds and 81 percent of those under age 60. *(J Am Coll Cardiol* 2004;44(5):988–96)

- Within 6 years after a recognized heart attack (MI)… (FHS, NHLBI) (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)

  - 18 percent of men and 35 percent of women will have another heart attack.

  - 7 percent of men and 6 percent of women will experience sudden death.

  - About 22 percent of men and 46 percent of women will be disabled with heart failure.

  - 8 percent of men and 11 percent of women will have a stroke.

Hospital Discharges

- From 1979 to 2002 the number of Americans discharged from short-stay hospitals with CHD as the first listed diagnosis increased 22 percent. (CDC/NCHS)

- From 1990–1999, the median duration of hospital stay related to acute myocardial infarction dropped from 8.3 days to 4.3 days, according to an analysis of the NRMI. Findings were similar for both patients receiving primary PTCA and those receiving thrombolytic therapy. *(J Am Coll Cardiol* 2000;2056–63)

Cost

- In 2005 the estimated direct and indirect cost of CHD is $142.1 billion. See page 53 for more detailed information.

- In 1999, $10.7 billion was paid to Medicare beneficiaries for CHD ($10,336 per discharge for acute MI; $11,270 per discharge for coronary atherosclerosis; and $3,472 per discharge for other CHD). *(Health Care Financing Review, 2001 Medicare and Medicaid Statistical Supplement,* CMS, April 2003)

Operations and Procedures

- In 2002 an estimated 1,204,000 angioplasty procedures, 515,000 bypass procedures, 1,463,000 diagnostic cardiac catheterizations, 63,000 implantable defibrillators and 199,000 pacemaker procedures were performed in the United States. For more data, see pages 51 and 52. (CDC/NCHS)

Acute Coronary Syndrome

(ICD/9 codes 410, 411)

The term 'acute coronary syndrome' (ACS) is increasingly used to describe patients who present with either acute myocardial infarction or unstable angina (UA). (Unstable angina is chest pain or discomfort that's unexpected and usually occurs while at rest. The discomfort may be more severe and prolonged than typical angina or be the first time a person has angina.)

- 942,000 is a conservative estimate for the number of people with ACS discharged from hospitals in 2002. Of these, an estimated 543,000 are male and 399,000 are female. This estimate is derived by adding the first listed hospital discharges for myocardial infarction (818,000) to those for unstable angina (124,000). (CDC/NCHS)

- When including secondary discharge diagnoses, the corresponding number of hospital discharges was 1,673,000 unique hospitalizations for ACS, 973,000 for MI and 728,000 for UA (28,000 hospitalizations received both diagnoses). (CDC/NCHS)

Decisions regarding medical and interventional treatments are based on specific findings noted when a patient presents with ACS. Such patients are classified clinically into one of three categories according to the presence or absence of ST segment elevation on the presenting electrocardiogram and abnormal ("positive") elevations of myocardial enzymes such as troponins, as follows:

- ST elevation myocardial infarction (STEMI)

- non-ST elevation myocardial infarction

- unstable angina

Studies evaluating the percentage of ACS patients who have STEMI range from 30 to 45 percent. (NRMI-4 Steering Committee; *J Am Coll Cardiol* 2003;41[suppl. A]:365A–366A)

These are only preliminary estimates, in part because of dramatically changing practices in the unstable angina discharge diagnosis in the past decade. Factors affecting the UA diagnosis include changes in reimbursement policies, the advent of more sensitive assays for myocardial injury (leading to increased diagnosis of MI over unstable angina), and greater care of patients in same-day "chest pain units" and same-day catheterization procedures.

Estimated 10-Year CHD Risk in 55-Year-Old Adults According to Levels of Various Risk Factors
Framingham Heart Study
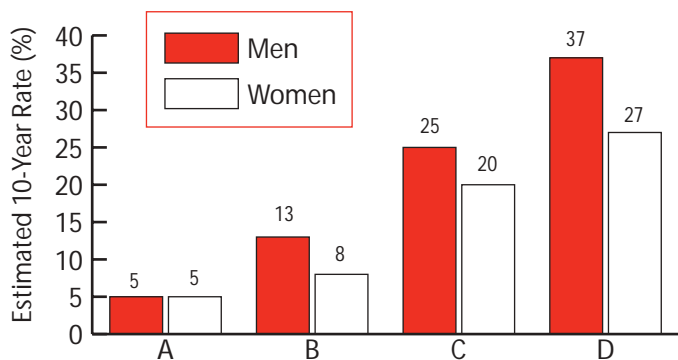
	A	B	C	D
Blood Pressure (mm Hg)	120/80	140/90	140/90	140/90
Total Cholesterol (mg/dL)	200	240	240	240
HDL Cholesterol (mg/dL)	50	50	40	40
Diabetes	No	No	Yes	Yes
Cigarettes	No	No	No	Yes

mm Hg = millimeters of mercury
mg/dL = milligrams per deciliter of blood

Source: Wilson PWF, et al. Prediction of coronary heart disease using risk factor categories. Circulation. 1998;97:1837–1847.

Annual Number of Americans Having Diagnosed Heart Attack by Age and Sex
ARIC: 1987–2000
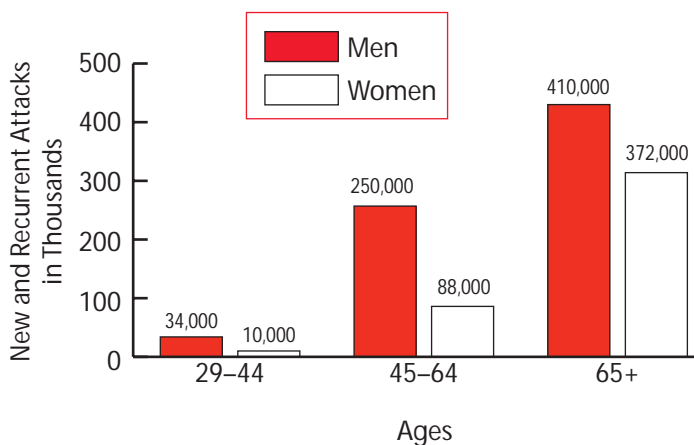
Source: Extrapolated from rates in the NHLBI's ARIC surveillance study, 1987–2000. These data don't include silent MIs.

Annual Rate of First Heart Attacks by Age, Sex and Race
ARIC: 1987–2000
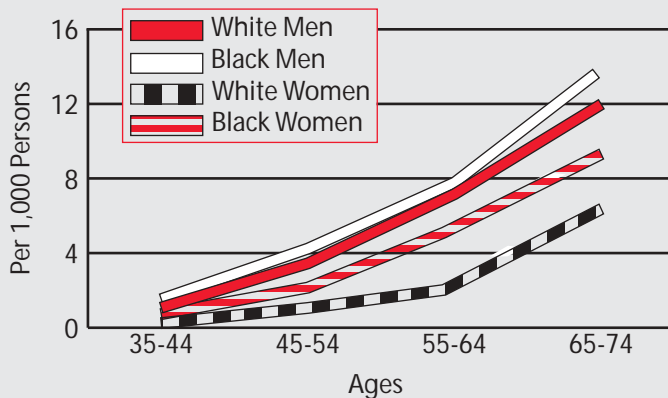
Source: NHLBI's ARIC surveillance study, 1987–2000.

Prevalence of Coronary Heart Disease by Age and Sex
NHANES: 1999–2002
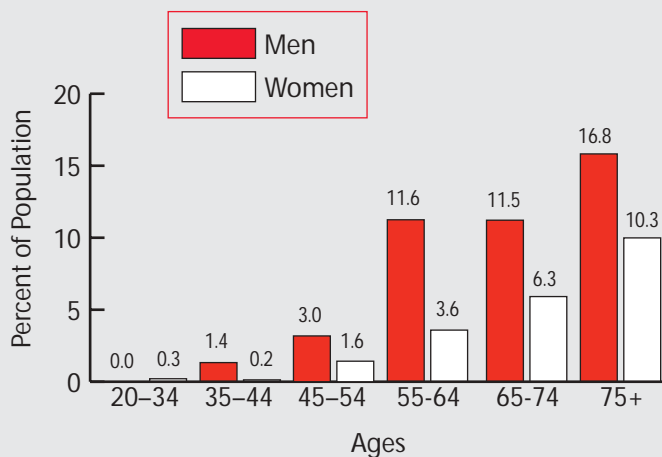
Source: CDC/NCHS and NHLBI.

Hospital Discharges for Coronary Heart Disease by Sex
United States: 1970–2002
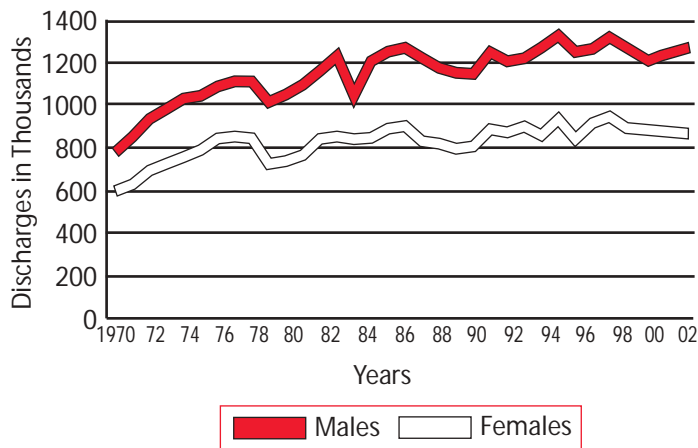
Note: Hospital discharges include people both living and dead.

Source: CDC/NCHS.

Angina Pectoris

(ICD/9 413) (ICD/10 I20)

Population Group	Prevalence 2002	Incidence of Stable Angina	Hospital Discharges — 2002*
Total population	6,400,000 (3.8%)	400,000	58,000
Total males	3,100,000 (4.2%)	—	23,000
Total females	3,300,000 (3.6%)	—	35,000
White males	4.5%	—	—
White females	3.5%	—	—
Black males	3.1%	—	—
Black females	4.7%	—	—
Mexican-American males	2.4%	—	—
Mexican-American females	2.2%	—	—

Note: Angina pectoris is chest pain or discomfort due to insufficient blood flow to the heart muscle. Stable angina is predictable chest pain on exertion or under mental or emotional stress.

(—) = data not available.

*Sources: **Prevalence:** NHANES (1999–02), CDC/NCHS and NHLBI; data for white and black males and females are for non-Hispanics; percentages for racial/ethnic groups are age-adjusted for Americans age 20 and older. **Incidence:** FHS, NHLBI. **Hospital discharges:** CDC/NCHS; data include people both living and dead.*

* There were 166,000 days of care for discharges from short-stay hospitals in 2001.

Prevalence

- A study of four national cross-sectional health examination studies found that, among Americans ages 40–74, the age-adjusted prevalence of angina pectoris (AP) was higher among women than men. Increases in the prevalence of AP occurred for Mexican-American men and women, and African-American women, but were not statistically significant for the latter. *(Ethnicity & Disease* 2003;13:85–93)

Incidence

- Only 20 percent of coronary attacks are preceded by long-standing angina. (44-year follow-up of participants and 20-year follow-up of their offspring, FHS, NHLBI) (Hurst W. *The Heart, Arteries and Veins* 10th ed. New York, NY: McGraw-Hill; 2002)

- The annual rates per 1,000 population of new and recurrent episodes of angina for non-black men are 44.3 for ages 65–74, 56.4 for ages 75–84, and 42.6 for age 85 and older. For non-black women in the same age groups the rates are 18.8, 30.8 and 19.8, respectively. For black men the rates are 26.1, 52.2 and 43.5, and for black women the rates are 29.4, 37.7 and 15.2, respectively. (CHS, NHLBI)

Mortality

A small number of deaths due to coronary heart disease are coded as being from angina pectoris. These are included as a portion of total deaths from CHD.

3

4 Stroke

(ICD/9 430–438) (ICD/10 I60–I69)

Population Group	Prevalence 2002	Incidence New and Recurrent Attacks	Mortality 2002	Hospital Discharges 2002	Cost 2005
Total population	5,400,000 (2.6%)	700,000	162,672	942,000	$56.8 billion
Total males	2,400,000 (2.5%)	327,000 (47%)*	62,622 (38.5%)*	432,000	—
Total females	3,000,000 (2.6%)	373,000 (53%)*	100,050 (61.5%)*	509,000	—
White males	2.3%	277,000	52,959	—	—
White females	2.6%	312,000	86,760	—	—
Black males	4.0%	50,000	7,828	—	—
Black females	3.9%	61,000	11,028	—	—
Mexican-American males	2.6%	—	—	—	—
Mexican-American females	1.8%	—	—	—	—
Hispanic or Latino**	2.4%	—	—	—	—
Asian**	2.4%	—	—	—	—
American Indian or Alaska Native**	4.6%	—	—	—	—

Note: (–) = data not available.

* These percentages represent the portion of total incidence or mortality that is males vs. females.

** NHIS (2002) — data are for Americans age 18 and older.

*Sources: **Prevalence:** NHANES (1999–2002), CDC/NCHS and NHLBI; data for white and black males and females are for non-Hispanics. Total population data include children; percentages for racial/ethnic groups are age-adjusted for Americans age 20 and older. These data are based on self report. **Incidence:** FHS, GCNKSS, ARIC. **Mortality:** CDC/NCHS; data for white and black males and females include Hispanics. **Hospital discharges:** CDC/NCHS; data include people both living and dead. **Cost:** NHLBI; data include direct and indirect costs for 2005.*

Prevalence

- From the early 1970s to early 1990s, the estimated number of noninstitutionalized stroke survivors increased from 1.5 million to 2.4 million. *(Stroke* 2002;33:1209–13)

- The prevalence of transient ischemic attacks (TIA) in men is 2.7 percent for ages 65–69 and 3.6 percent for ages 75–79. (A TIA, or transient ischemic attack, is a mini-stroke that lasts less than 24 hours.) For women, TIA prevalence is 1.6 percent for ages 65–69 and 4.1 percent for ages 75–79. *(Ann Epidemiol* 1993;3:504–7) (CHS, NHLBI)

- The prevalence of stroke in American Indian men ages 45–74 ranges from 0.2 to 1.4 percent and in women from

0.2 to 0.7 percent. *(Strong Heart Study Data Book,* NIH, NHLBI, Nov. 2001)

- The prevalence of silent cerebral infarction between ages 55 to 64 is about 11 percent. This prevalence increases to 22 percent between ages 65 to 69, 28 percent between ages 70 to 74, 32 percent between ages 75 to 79, 40 percent between ages 80 to 85, and 43 percent above age 85. Applying these rates to 1998 U.S. population estimates results in an estimated 13 million people with prevalent silent stroke. *(Stroke* 1998;29:913–7; *Radiology* 2002;202:47–54)

Incidence

- On average, every 45 seconds someone in the United States has a stroke.

- Each year about 700,000 people experience a new or recurrent stroke. About 500,000 of these are first attacks, and 200,000 are recurrent attacks. (GCNKSS, FHS, ARIC)

- Each year about 40,000 more women than men have a stroke. (CHS, NHLBI)

- Men's stroke incidence rates are 1.25 times greater than women's. The difference in incidence rates between the sexes is somewhat larger at younger ages but nonexistent at older ages. The male/female incidence was 1.59 for ages 65–69; 1.46 for ages 70–74; 1.35 for ages 75–79 and 0.74 for age 80 and older. (CHS, NHLBI)

- Of all strokes, 88 percent are ischemic, 9 percent are intracerebral hemorrhage, and 3 percent are subarachnoid hemorrhage. (GCNKSS, FHS, ARIC)

- Blacks have almost twice the risk of first-ever stroke compared with whites. The age-adjusted stroke incidence rates (per 100,000) for first-ever strokes are 167 for white males, 138 for white females, 323 for black males and 260 for black females. (GCNKSS, FHS, ARIC)

- The Brain Attack Surveillance in Corpus Christi project (BASIC) clearly demonstrated an increased incidence of stroke among Mexican Americans compared with non-Hispanic whites in this community. The crude cumulative incidence was 168/10,000 in Mexican Americans and 136/10,000 in non-Hispanic whites. Specifically, Mexican Americans have an increased incidence of intracerebral hemorrhage and subarachnoid hemorrhage than non-Hispanic whites adjusted for age, as well as an increased incidence of ischemic stroke and TIA at younger ages when compared with non-Hispanic whites. *(Am J Epidemiol* 2004;160:376–83)

- The age-adjusted annual incidence rate (per 1,000) for total stroke in Japanese-American men has declined markedly from 5.1 to 2.4; for thromboembolic stroke, from 3.5 to 1.9; and for hemorrhagic stroke, from 1.1 to 0.6. The estimated average annual declines are 5 percent for total stroke, 3.5 percent for thromboembolic stroke, and 4.3 percent for hemorrhagic stroke. The decline in stroke mortality in the HHP target population was similar to that reported for U.S. white males ages 60–69 during the same period. (During the 1969–88 follow-up period of the Honolulu Heart Program, NHLBI)

- Among American Indians ages 65–74, the annual rates per 1,000 population of new and recurrent strokes are 15.2 for men and 7.9 for women. (SHS [1991–98], NHLBI)

Mortality

Stroke accounted for more than 1 of every 15 deaths in the United States in 2002. About 50 percent of these deaths occurred out of hospital. Total mention mortality — about 275,000.

- When considered separately from other cardiovascular diseases, stroke ranks No. 3 among all causes of death, behind diseases of the heart and cancer. (CDC/NCHS)

- On average, every 3 minutes someone dies of a stroke.

- 8–12 percent of ischemic strokes and 37–38 percent of hemorrhagic strokes result in death within 30 days. (*Stroke* 1999;30:736–43; *Stroke* 1999;30:2517–22)

- From 1992 to 2002 the stroke death rate fell 13.8 percent, but the actual number of stroke deaths rose 6.9 percent. (CDC/NCHS)

- The 2002 overall death rate for stroke was 56.2. Death rates were 54.2 for white males and 81.7 for black males; and 53.4 for white females and 71.8 for black females. 1999 death rates for stroke were 40.0 for Hispanics, 52.4 for Asian or Pacific Islanders, and 39.7 for American Indians or Alaska Natives. (CDC/NCHS)

- Because women live longer than men, more women than men die of stroke each year. Women accounted for 61.5 percent of U.S. stroke deaths in 2002.

- From 1995 to 1998 age-standardized mortality rates for ischemic stroke, subarachnoid hemorrhage and intracerebral hemorrhage were higher among blacks than whites. Death rates from intracerebral hemorrhage were also higher among Asian or Pacific Islanders than among whites. All minority populations had higher death rates from subarachnoid hemorrhage than did whites. Among adults ages 25–44, blacks and American Indians or Alaska Natives had higher risk ratios than did whites for all three stroke subtypes. (*Am J Epidemiol* 2001;154:1057–63)

Risk Factors

- In 2000, 70 percent of respondents correctly named at least one established stroke warning sign vs. 57 percent in 1995. 72 percent correctly named at least one established risk factor vs. 68 percent in 1995. Groups of people with the highest risk and incidence of stroke — i.e., persons at least 75 years old, blacks and men — were the least knowledgeable about warning signs and risk factors. (*JAMA* 2003;289:343–6)

- TIAs carry a substantial short-term risk of stroke, hospitalization for cardiovascular events and death. Of 1,707 TIA patients evaluated in the emergency department (ED) of a large health care plan, 180 patients or 10 percent developed stroke within 90 days. 91 patients or 5 percent did so within 2 days. Predictors of stroke: more than 60 years of age, having diabetes mellitus, focal symptoms of weakness or speech impairment, and TIA lasting longer than 10 minutes. (*JAMA* 2000;284:2901–6)

- The relative risk of stroke in heavy smokers (more than 40 cigarettes a day) is twice that of light smokers (less than 10 cigarettes per day). Stroke risk decreases significantly after two years and is at the level of nonsmokers by five years after cessation of cigarette smoking. (*JAMA* 1988;259:1025–9)

- Atrial fibrillation (AF) is an independent risk factor for stroke, increasing risk about 5-fold. For details, see Arrhythmias on page 28. (*Stroke* 1991;22:983–8)

- In adults over 55, the lifetime risk for stroke is greater than 1 in 6. Women have a higher risk than men, perhaps due to their survival advantage. Blood pressure (BP) is a powerful determinant of stroke risk. Subjects with BP less than 120/80 mm Hg have about half the lifetime risk of stroke, compared to subjects with hypertension. (FHS, NHLBI, Seshadri, et al. *Lifetime Risk of Stroke: Results from the Framingham Study*)

Physical Activity

- Physical activity reduces stroke risk. Results from the Physicians' Health Study showed a lower stroke risk associated with vigorous exercise among men (relative risk [RR] of total stroke = 0.86 for exercise 5 times a week or more). (*Stroke* 1999;30:1–6) The Harvard Alumni Study showed a decrease in total stroke risk in men who were highly physically active (RR = 0.82). (*Stroke* 1998;29:2049–54)

- For women in the Nurses' Health Study, RR for total stroke from the lowest to the highest physical activity levels were: 1.00 (reference), 0.98, 0.82, 0.74 and 0.66, respectively. (*JAMA* 2000;283:2961–7)

- The Northern Manhattan Study — which included whites, blacks and Hispanics, and men and women in an urban setting — showed a decrease in ischemic stroke risk associated with physical activity levels across all racial/ethnic and age groups, and for each gender (odds ratio = 0.37). (*Stroke* 1998;29:380–7)

- The Baltimore-Washington Cooperative Young Stroke Study found the risk of ischemic stroke or intracerebral hemorrhage during pregnancy and the first six weeks postpartum was 2.4 times greater than for nonpregnant women of similar age and race. The risk of ischemic stroke during pregnancy was not increased during pregnancy per se, but was increased 8.7-fold during the six weeks postpartum. Intracerebral hemorrhage showed a small relative risk (RR) of 2.5 during pregnancy, but increased dramatically to an RR of 28.3 in the six weeks postpartum. The excess risk of stroke (all types except subarachnoid hemorrhage) attributable to the combined pregnant/post-pregnant period was 8.1 per 100,000 pregnancies. *(NEJM* 1996;335:768–74)

- Using Swedish administrative data, it was found that ischemic stroke and intracerebral hemorrhage, including subarachnoid hemorrhage, are increased in association with pregnancy. The postpartum period and particularly the three days surrounding delivery were times of increased risk. However, overall risks for stroke in association with pregnancy was low. (Sources were used to compare the risk of stroke among women in the third trimester of pregnancy, around delivery [from 2 days before to 1 day after delivery], and the puerperium [from 2 days to 6 complete weeks after delivery] to the risk of stroke among nonpregnant and early pregnant [up to the first 27 gestational weeks] women. Subarachnoid hemorrhage, as well as ischemic stroke and intracerebral hemorrhage, are increased in association with pregnancy. The postpartum period and particularly the three days surrounding delivery were times of increased risk.) *(Epidemiology* 2001;12:456–60)

- Data from the HHP found that in elderly Japanese men ages 71–93, low concentrations of HDL cholesterol were more likely to be associated with a future risk of thromboembolic stroke than were high concentrations. *(Am J Epidemiol* 2004;160:150–7)

Aftermath

- Stroke is a leading cause of serious, long-term disability in the United States. *(MMWR,* Vol. 50, No.7, Feb. 23, 2001, CDC/NCHS)

- The median time from stroke onset to arrival in an ER is between 3 and 6 hours, according to a study of at least 48 unique reports of prehospital delay time for patients with stroke, TIA or stroke-like symptoms. The study included data from 17 countries, including the United States. Improved clinical outcome at 3 months was seen for patients with acute ischemic stroke when intravenous thrombolytic treatment was started within 3 hours of the onset of symptoms. *(NEJM* 1995;333:1581–7)

- In 1999 more than 1,100,000 American adults reported difficulty with functional limitations, activities of daily living, etc., resulting from stroke. *(MMWR,* Vol. 50, No. 7, Feb. 23, 2001, CDC/NCHS)

- According to the NHLBI's FHS… (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)
  - 14 percent of persons who survive a first stroke or TIA will have another one within 1 year.
  - 22 percent of men and 25 percent of women who have an initial stroke die within a year. This percentage is higher among people age 65 and older.
  - 51 percent of men and 53 percent of women under age 65 who have a stroke die within 8 years.
  - The length of time to recover from a stroke depends on its severity. 50 to 70 percent of stroke survivors regain functional independence, but 15 to 30 percent are permanently disabled. 20 percent require institutional care at three months after onset.

- In the NHLBI's FHS, among ischemic stroke survivors who were at least 65 years old, these disabilities were observed at 6 months post-stroke: *(J Stroke Cerebrovasc Dis* 2003;12:119–26)
  - 50 percent had some hemiparesis.
  - 30 percent were unable to walk without some assistance.
  - 26 percent were dependent in activities of daily living.
  - 19 percent had aphasia.
  - 35 percent had depressive symptoms.
  - 26 percent were institutionalized in a nursing home.

Hospital Discharges

- From 1979 to 2002 the number of Americans discharged from short-stay hospitals with stroke as the first listed diagnosis increased 26 percent. (CDC/NCHS)

- During 1988–97 the age-adjusted stroke hospitalization rate increased 18.6 percent (from 560 to 664 per 100,000), while total hospitalizations increased 38.6 percent (from 592,811 to 821,760). Hospitalization rates did not change for ages 35–64 but increased for persons age 65 and older. This increase was greater for men than for women. The average length of hospital stay fell from 11.1 to 6.2 days. Total person-days in hospital decreased 22 percent. *(Stroke* 2001;32:2221–6. Stroke in this study includes ICD/9 431–434 and 436–438. The American Heart Association uses 430–438.)

- Between 1980 and 1999 the hospital discharge rates for stroke increased for blacks and whites; the in-hospital mortality rates decreased for both black and white patients. Generally, the risk of a stroke hospitalization was more than 70 percent greater for blacks than for whites. Both groups were similar in terms of in-hospital mortality rates. *(Neuroepidemiology* 2002;21:131–41)

Cost

- In 2005 the estimated direct and indirect cost of stroke was $56.8 billion. See page 53 for more detailed information.

- In 1999, $3.4 billion ($5,692 per discharge) was paid to Medicare beneficiaries discharged from short-stay hospitals for stroke. *(Health Care Financing Review, 2001 Medicare and Medicaid Statistical Supplement,* CMS, April 2003)

- The mean lifetime cost of ischemic stroke in the United States is estimated at $140,048. This includes inpatient care, rehabilitation and follow-up care necessary for lasting deficits. (All numbers converted to 1999 dollars using the medical component of CPI.) *(Stroke* 1996;27:1459–66)

- In a population study of stroke costs within 30 days of an acute event, the average cost was $13,019 for mild ischemic strokes and $20,346 for severe ischemic strokes (4 or 5 on the Ranking Disability Scale). *(Neurology* 1996;46:861–9)

- Inpatient hospital costs for an acute stroke event account for 70 percent of the first-year post-stroke costs. *(Stroke* 1996;27:1459–66)

- The largest components of acute care costs were room charges (50 percent), medical management (21 percent) and diagnostic costs (19 percent). *(Stroke* 1999;30:724–8)

- Mortality within seven days, subarachnoid hemorrhage, and stroke while hospitalized for another condition are associated with higher costs in the first year. Conversely, lower costs are associated with mild cerebral infarctions or residence in a nursing home prior to the stroke. *(Neurology* 1996;46:861–9)

- Demographic variables (age, sex and insurance status) are not associated with stroke cost. Severe strokes (NIHSS score greater than 20) cost twice as much as mild strokes, despite similar diagnostic testing. Co-morbidities such as ischemic heart disease and atrial fibrillation predict higher costs. *(Stroke* 1999;30:724–8; *Arch Intern Med* 2003;163)

Operations and Procedures

- In 2002 an estimated 134,000 endarterectomy procedures were performed in the United States. Carotid endarterectomy is the most frequently performed surgical procedure to prevent stroke. For more data, see pages 51 and 52. (CDC/NCHS)

Stroke in Children

- Stroke in children has a peak in the perinatal period. In the National Hospital Discharge Survey from 1980–1998, the rate of stroke for infants less than 30 days old (per 100,000 live births per year) was 26.4, with rates of 6.7 for hemorrhagic stroke and 17.8 for ischemic stroke *(Pediatrics* 2002;109[1]:116–23)

- The Greater Cincinnati/Northern Kentucky Stroke Study found the stroke rate per 100,000 for children ages 1–14 was 2.7. The rate of ischemic stroke and intracerebral hemorrhage is similar in this age group. *(J Child Neurol* 1993;8[3]:250–5; *Neurology* 1998;51[1]:169–76)

- Stroke in childhood and young adulthood has a disproportionate impact on the affected patients, their family and society, compared to stroke at older ages. Outcome of childhood stroke was a moderate or severe deficit in 42 percent of cases. *(J Child Neurol* 2000;15[5]:316–24)

- Compared to the stroke risk of white children, black children have a higher relative risk of 2.12, Hispanics a lower relative risk of 0.76, and Asians have a similar risk. Boys have a 1.28-fold higher risk of stroke than girls. There are no ethnic differences in stroke severity or case-fatality, but boys have a higher case-fatality rate for ischemic stroke. The increased risk among blacks is not explained by the presence of sickle cell disease, nor is the excess risk among boys explained by trauma. *(Neurology* 2003;61[2]:189–94)

- Despite current treatment, 1 out of 10 children with ischemic stroke will have a recurrence within 5 years. *(Lancet* 2002;360:1540–5)

- Cerebrovascular disorders are among the top 10 causes of death in children, with rates highest in the first year of life. Stroke mortality in children under 1 year of age has remained the same over the last 40 years. *(Pediatrics* 2002;109[1]:116–23)

- From 1979 to 1998 in the United States, childhood mortality from stroke declined by 58 percent overall, with reductions in all major subtypes. *(Neurology* 2002;59:34–9)

  — Ischemic stroke decreased by 19 percent, subarachnoid hemorrhage (SAH) by 79 percent, and intracerebral hemorrhage (ICH) by 54 percent.

  — Black ethnicity was a risk factor for mortality from all stroke types.

  — Male sex was a risk factor for mortality from SAH and ICH but not from ischemic stroke.

- Sickle cell disease is the most important cause of ischemic stroke among African-American children. The Stroke Prevention Trial in Sickle Cell Anemia (STOP) demonstrated the efficacy of blood transfusions for primary stroke prevention in high-risk children with sickle cell disease in 1998. First admission rates for stroke in California among persons under age 20 with sickle cell disease showed a dramatic decline subsequent to the publication of the STOP study. For the study years 1991–1998, 93 children with sickle cell disease were admitted to California hospitals with a first stroke; 92.5 percent were ischemic and 7.5 percent were hemorrhagic. The first-stroke rate was 0.88 per 100 person-years during 1991–1998, compared to 0.50 in 1999 and 0.17 in 2000 (p< 0.005 for trend). *[Neurology* 1998;51(1):169–76] [Blood 2004;103(6):2391–6]

Risk of Stroke in Women in the Third Trimester, Peri- and Post-Partum Period Versus Risk of Nonpregnant Women and Women in the First 2 Trimesters

Values (Relative Risk by Stroke Subtype):
- Third Trimester: Ischemic Stroke 2.2, Intracerebral Hemorrhage 0.3, Subarachnoid Hemorrhage 0.8
- Around Delivery: Ischemic Stroke 33.8, Intracerebral Hemorrhage 95.0, Subarachnoid Hemorrhage 46.9
- Puerperium: Ischemic Stroke 8.3, Intracerebral Hemorrhage 11.7, Subarachnoid Hemorrhage 1.8

Legend: Ischemic Stroke, Intracerebral Hemorrhage, Subarachnoid Hemorrhage

Source: Epidemiology 2001;12:456–60.

Risk for Stroke Mortality Among Racial/Ethnic Groups Compared With Non-Hispanic Whites, by Age
United States: 1997

Legend: 35-44, 45-54, 55-64, 65-74, 75-84, 85+

Values (Relative Risk):
- Non-Hispanic Blacks: 4.0, 3.9, 3.0, 1.9, 1.2, 0.9
- Hispanics: 1.3, 1.3, 1.2, 0.9, 0.6, 0.5
- Asian/Pacific Islanders: 1.3, 1.3, 1.4, 1.1, 1.0, 0.7
- American Indians/Alaska Natives: 1.9, 1.3, 1.5, 0.9, 0.8, 0.4
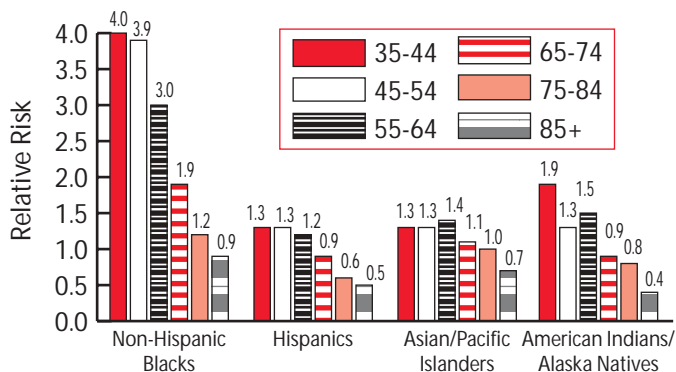
Note: Values greater than 1.0 indicate populations with higher relative risks. Values less than 1.0 indicate lower relative risks.

Source: Age-specific excess deaths associated with stroke among racial/ethnic minority populations – United States, 1997, MMWR, Vol. 49, No. 5, Feb.11, 2000, CDC/NCHS and NHLBI.

Prevalence of Stroke by Age and Sex
NHANES: 1999–2002

Values (Percent of Population):
- 20-34: Men 0.4, Women 0.3
- 35-44: Men 1.1, Women 0.8
- 45-54: Men 1.2, Women 2.1
- 55-64: Men 3.1, Women 3.0
- 65-74: Men 6.6, Women 6.3
- 75+: Men 12.0, Women 11.5
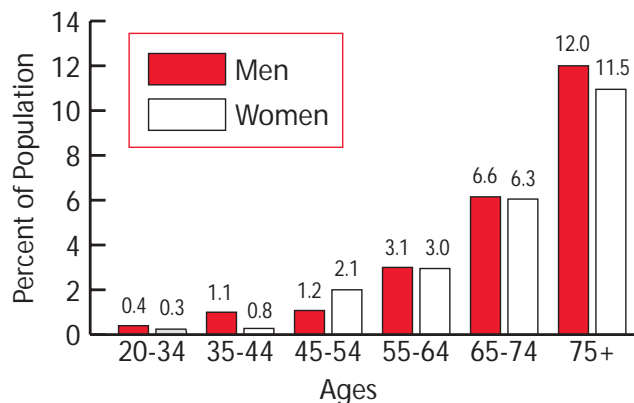
Source: CDC/NCHS and NHLBI.

Annual Rate of First Cerebral Infarction by Age, Sex and Race
Greater Cincinnati/Northern Kentucky Stroke Study: 1993–94

Legend: White Males, White Females, Black Males, Black Females

Values (Per 1,000 Persons):
- 0-34: 0.0, 0.0, 0.0, 0.1
- 35-44: 0.1, 0.1, 0.1, 0.4
- 45-54: 1.4, 0.8, 2.1, 2.5
- 55-64: 2.6, 1.6, 4.9, 4.6
- 65-74: 6.7, 4.2, 10.4, 9.8
- 75-84: 11.8, 11.3, 23.3, 13.5
- 85+: 16.8, 16.5, 24.7, 21.8
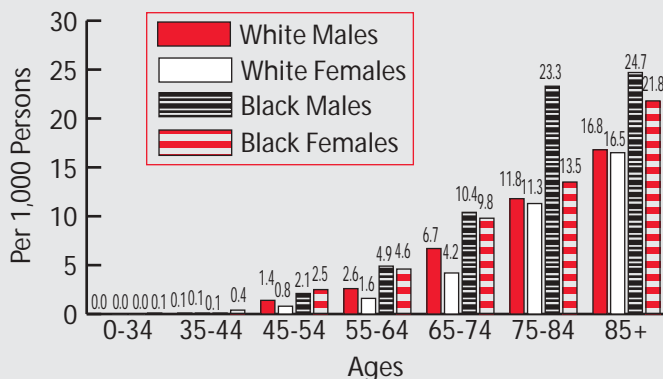
Source: Unpublished data from the GCNKSS.

Annual Rate of First Intracerebral Hemorrhage by Age, Sex and Race
Greater Cincinnati/Northern Kentucky Stroke Study: 1993–94

Legend: White Males, White Females, Black Males, Black Females

Values (Per 1,000 Persons):
- 35-44: 0.0, 0.1, 0.1, 0.3
- 45-54: 0.2, 0.1, 0.9, 0.2
- 55-64: 0.3, 0.3, 0.9, 0.6
- 65-74: 0.9, 0.6, 2.3, 1.0
- 75-84: 1.4, 1.3, 1.2, 2.1
- 85+: 2.2, 1.8, 1.3, 1.0
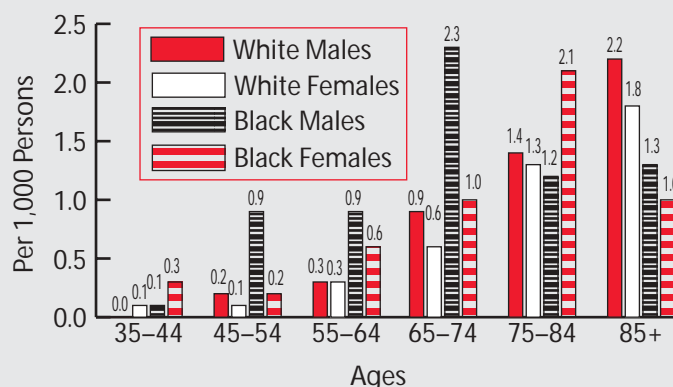
Source: Stroke 2004;35:426–431.

Estimated 10-Year Stroke Risk in 55-Year-Old Adults According to Levels of Various Risk Factors
Framingham Heart Study

Legend: Men, Women

Values (Estimated 10-Year Rate %):
- A: Men 2.6, Women 1.1
- B: Men 4.0, Women 2.0
- C: Men 5.4, Women 3.5
- D: Men 8.4, Women 6.3
- E: Men 14.8, Women 19.1
- F: Men 22.4, Women 27.0

	A	B	C	D	E	F
Systolic BP*	95–105	130–148	130–148	130–148	130–148	130–148
Diabetes	No	No	Yes	Yes	Yes	Yes
Cigarettes	No	No	No	Yes	Yes	Yes
Prior Atrial Fibrillation	No	No	No	No	Yes	Yes
Prior CVD	No	No	No	No	No	Yes
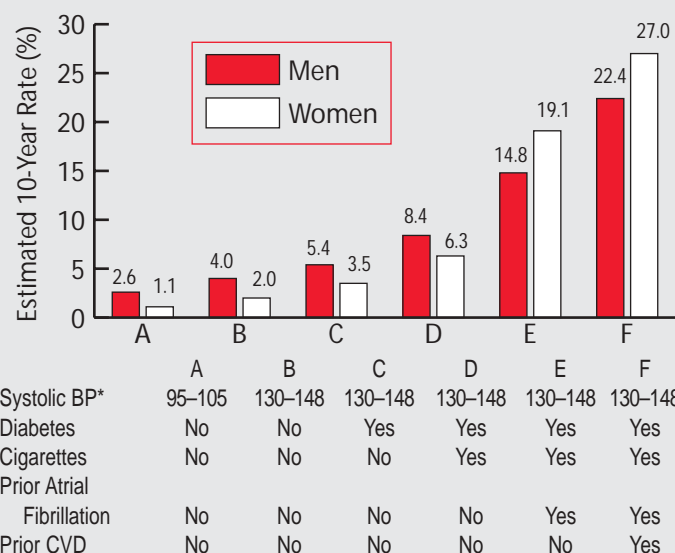
* Blood pressures are in millimeters of mercury (mm Hg).

Source: Stroke. 1991;22:312–318.

(ICD/9 401–404) (ICD/10 I10–I15)

Population Group	Prevalence 2002	Mortality 2002	Hospital Discharges 2002	Cost 2005
Total population	65,000,000 (32.3%)	49,707	535,000	$59.7 billion
Total males	29,400,000 (31.5%)	20,512 (41.3%)*	224,000	—
Total females	35,600,000 (32.8%)	29,195 (58.7%)*	312,000	—
White males	30.6%	14,713	—	—
White females	31.0%	22,329	—	—
Black males	41.8%	5,268	—	—
Black females	45.4%	6,311	—	—
Mexican-American males	27.8%	—	—	—
Mexican-American females	28.7%	—	—	—
Hispanic or Latino**	18.2%	—	—	—
Asian**	16.7%	—	—	—
American Indians or Alaska Natives**	21.2%	—	—	—

Note: (–) = data not available.

* These percentages represent the portion of total mortality that is males vs. females.

*Sources: **Prevalence:** NHANES (1999–2002), (Hypertension. 2004;44:398–404) and NHLBI; data are age-adjusted for age 20 and older. Rates are for non-Hispanics.** NHIS (2002), CDC/NCHS; data are for Americans age 18 and older. **Mortality:** CDC/NCHS; data for white and black males and females include Hispanics. **Hospital discharges:** CDC/NCHS; data include people both living and dead. **Cost:** NHLBI; data include direct and indirect costs for 2005.*

Prevalence

- High blood pressure (HBP) is defined as:
  — systolic pressure of 140 mm Hg or higher, or diastolic pressure of 90 mm Hg or higher
  — taking antihypertensive medicine
  — being told at least twice by a physician or other health professional that you have high blood pressure

- "Prehypertension" is systolic pressure of 120–139 mm Hg, or diastolic pressure of 80–89 mm Hg, and both not taking antihypertensive medication, or not being told on two occasions by a doctor or other health professional that you have hypertension.

- Nearly 1 in 3 adults has HBP. *(Hypertension 2004;44:398–404)*

- About 28 percent of American adults age 18 and older or about 59 million people, have "prehypertension." (NHANES 1999–2002, CDC/NCHS, NHLBI)

- Overall, 39 percent of persons were normotensive, 31 percent were prehypertensive, and 29 percent were hypertensive. The age-adjusted prevalence of prehypertension was greater in men (39 percent) than in women (23.1 percent). African Americans aged 20 to 39 years had a higher prevalence of prehypertension (37.4 percent) than whites (32.2 percent) and Mexican Americans (30.9 percent), but their prevalence was lower at older ages because of a higher prevalence of hypertension. *(Arch Intern Med 2004;164:2113–8)*

- Of those with HBP, 30 percent don't know they have it; 34 percent are on medication and have it controlled; 25 percent are on medication but don't have their HBP under control; and 11 percent aren't on medication. (JNC 7; NHANES III)

- A higher percentage of men than women have HBP until age 55. After that a much higher percentage of women have HBP than men do. (CDC/NCHS)

- HBP is 2–3 times more common in women taking oral contraceptives, especially in obese and older women, than in women not taking them. (Fifth and Sixth Reports of the JNC [JNC 5 and 6])

- About half of people who have a first heart attack and two-thirds who have a first stroke have blood pressure higher than 160/95 mm Hg. (FHS, NHLBI) (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2002)

- People with systolic blood pressure of 160 mm Hg or higher and/or diastolic blood pressure of 95 mm Hg or higher have a relative risk for stroke about 4 times greater than for those with normal blood pressure. *(Hypertens Res 1994;17[suppl. 1]:S23–S32)*

- The prevalence of HBP among blacks and whites in the southeastern United States is greater and death rates from stroke are higher than among those in other regions. (JNC 5 and 6)

- Hypertension precedes the development of congestive heart failure (CHF) in 91 percent of cases. HBP is associated with 2–3 times higher risk for developing CHF. (FHS, NHLBI, *JAMA* 1996;275:1557–62)

Race/Ethnicity and HBP

- The prevalence of hypertension in blacks in the United States is among the highest in the world. Compared with whites, blacks develop HBP earlier in life and their average blood pressures are much higher. As a result, compared with whites, blacks have a 1.3 times greater rate of nonfatal stroke, a 1.8 times greater rate of fatal stroke, a 1.5 times greater rate of heart disease death and a 4.2 times greater rate of end-stage kidney disease. (JNC 5 and 6)

- Within the African-American community, rates of hypertension vary substantially. (NHANES III [1988–94], *Prev Med* 2002;35:303–12)

  — Those with the highest rates are more likely to be middle-aged or older, less educated, overweight or obese, physically inactive, and to have diabetes.

  — Those with the lowest rates are more likely to be younger, but also overweight or obese.

  — Those with uncontrolled HBP who are not on antihypertensive medication tend to be male, younger and have infrequent contact with a physician.

- Compared with white women, black women have an 85 percent higher rate of ambulatory medical care visits for HBP. (Utilization of Ambulatory Medical Care by Women: United States, 1997–98, NCHS, 2001)

- The awareness, treatment and control of HBP among those in the Cardiovascular Health Study (CHS) age 65 and older improved during the 1990s. The percentages who were aware of and treated for HBP were higher among blacks than among whites. Prevalences with HBP under control were similar. For both groups combined, the control of BP to lower than 140/90 mm Hg increased from 37 percent in 1990 to 49 percent in 1999. Improved control was achieved by an increase in antihypertensive medications per person and by increasing the proportion of the CHS population treated for hypertension from 34.5 percent to 51.1 percent. (CHS, NHLBI, *Arch Intern Med* 2002;162:2325–32)

- A study of children and adolescents from 1988–94 to 1999–2000, among ages 8 through 17 showed that among non-Hispanic blacks, mean systolic blood pressure (BP) levels increased 1.6 mm Hg among girls and 2.9 mm Hg among boys, when compared with non-Hispanic whites. Among Mexican Americans, girls' systolic BP increased 1.0 mm Hg and boys' increased 2.7 mm Hg higher when compared with non-Hispanic whites. *(JAMA* 2004;291:2107–13)

Mortality

Total mention mortality — HBP was listed as a primary or contributing cause of death in about 261,000 of over 2,400,000 U.S. deaths in 2002.

- From 1992 to 2002 the age-adjusted death rate from HBP increased 26.8 percent, and the actual number of deaths rose 56.6 percent.

- The 2002 overall death rate from HBP was 17.1. Death rates were 14.4 for white males, 49.6 for black males, 13.7 for white females and 40.5 for black females.

- As many as 30 percent of all deaths in hypertensive black men and 20 percent of all deaths in hypertensive black women may be due to HBP. (JNC 5 and 6)

Cost

- In 2005 the estimated direct and indirect cost of high blood pressure is $59.7 billion. See page 53 for more detailed information.

Prevalence of High Blood Pressure in Americans by Age and Sex
NHANES: 1999–2002
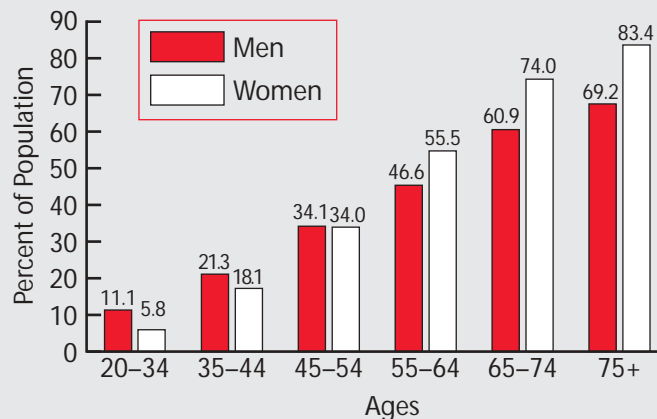
Source: CDC/NCHS and NHLBI.

Age-Adjusted Prevalence Trends for High Blood Pressure in Americans Ages 20–74 by Race/Ethnicity, Sex and Survey
NHANES: 1976–80, 1988–94 and 1999–2002
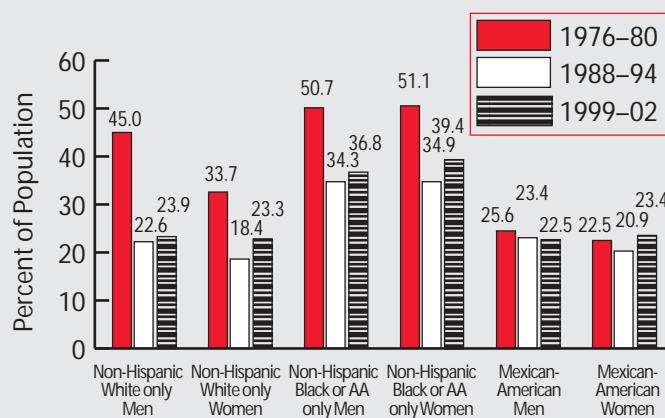
Source: CDC/NCHS . Data based on a single measure of blood pressure.

Extent of Awareness, Treatment and Control of High Blood Pressure by Age
NHANES: 1999–2000
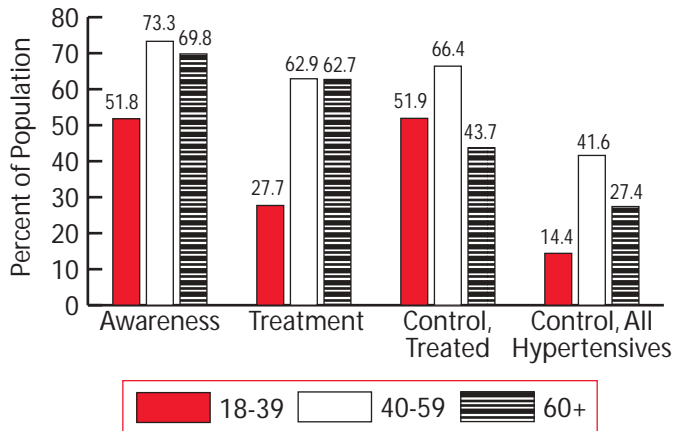
Legend: 18-39 | 40-59 | 60+

Source: Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. JAMA. 2003;290:199–206.

Extent of Awareness, Treatment and Control of High Blood Pressure by Race/Ethnicity
NHANES: 1999–2000
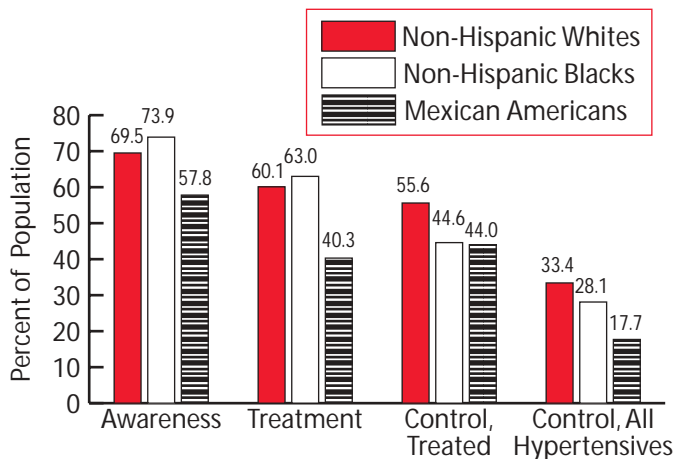
Legend: Non-Hispanic Whites | Non-Hispanic Blacks | Mexican Americans

Source: Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. JAMA. 2003;290:199–206.

End-Stage Renal Disease (ESRD)

(ICD/10 N18.0)

ESRD (also called end-stage kidney disease) is a condition closely related to high blood pressure, and occurs when the kidneys can no longer function normally on their own. When this happens, patients are required to undergo treatment such as kidney dialysis or a kidney transplant. ESRD morbidity rates vary dramatically among different age, race, ethnicity and sex population groups. Morbidity rates tend to increase with age, then fall off for the oldest age group. The age group with the highest incidence rate is ages 75–79; for prevalence rates, it's ages 70–74. Chronic kidney disease (categorized in stages by level of estimated glomerular filtration rate and urine proteins) which eventually progresses to ESRD is also a substantial public health burden in the United States. The excess CVD risk in people with chronic renal disease is caused, in part, by a higher prevalence of CVD risk factors in this group than in the general population. The main factors include older age, high blood pressure, high blood cholesterol and lipids, diabetes and physical inactivity. An independent, graded association was observed between a reduced estimated glomerular filtration rate (GFR, an indicator of kidney function) and the risk of death, cardiovascular events, and hospitalization in a large, community-based population of over 1 million men and women. (*NEJM* 2004;351:1296–305)

- The incidence of reported ESRD has almost doubled in the past 10 years. (NHLBI from usrds.org Web site)
- In 2002, 100,359 new cases of ESRD were reported.
- Over 424,000 patients were being treated for ESRD by the end of 2002.
- 79,812 patients died from ESRD in 2002.
- More than 15,700 kidney transplants were performed in 2002.
- Diabetes continues to be the most common reported cause of ESRD.
- An estimated 11 percent or 19.2 million American adults have between stage 1–4 chronic kidney disease. *(Am J Kidney Dis* 2003;41(1):1–12)
- 3.2 percent of the Medicare population had a diagnosis of chronic kidney disease between 1996 and 1997, representing 63.6 percent of persons who progressed to ESRD after one year. (Kidney International Supplement 2003;(87):S24–S31)

Age, Sex, Race and Ethnicity

- The average incidence rates for pediatric ESRD are more than twice as high among children ages 15–19 as for children ages 10–14. The rates are more than 3 times higher than those for children ages 0–4 and 5–9.
- Children with pediatric ESRD have high transplantation rates. More than 44 percent of children starting therapy received a transplant during the first year of therapy, compared with 10 percent of patients ages 20–64 at ESRD incidence.
- The median age of the prevalent population is 58.1 years (59.2 for whites, 56.1 for blacks, 56.7 for Hispanics, 58.9 for Asians and 57.5 for Native Americans). (USRDS 2004 Annual Data Report. NIH, NIDDK)
- Treatment of ESRD is more common in men than in women.
- Blacks and Native Americans have much higher rates of ESRD than whites and Asians. Blacks represent 29 percent of treated ESRD patients.

Congenital Cardiovascular Defects

6

(ICD/9 745–747) (ICD/10 Q20–Q28)

Population Group	Mortality 2001	Hospital Discharges 2002
Total population	4,109	51,000
Total males	2,199 (53.5%)*	25,000
Total females	1,910 (46.5%)*	25,000
White males	1,759	—
White females	1,493	—
Black males	363	—
Black females	339	—

Note: (–) = data not available.

* These percentages represent the portion of total mortality that is males vs. females.

Sources: **Mortality:** *CDC/NCHS; data for white and black males and females include Hispanics.* **Hospital discharges:** *CDC/NCHS; data include people both living and dead.*

Congenital cardiovascular defects, also known as congenital heart defects, are structural problems arising from abnormal formation of the heart or major blood vessels. At least 15 distinct types of congenital defects are recognized, with many additional anatomic variations.

Defects range in severity from tiny pinholes between chambers that are nearly irrelevant and often resolve spontaneously, to major malformations that result in fetal loss or death in infancy or childhood. Common complex defects include:

- tetralogy of Fallot (9–14 percent)
- transposition of the great arteries (10–11 percent)
- atrioventricular septal defects (4–10 percent)
- coarctation of the aorta (8–11 percent)
- hypoplastic left heart syndrome (4–8 percent)
- ventricular septal defects (VSDs), the most common defect. Many close spontaneously, but VSDs still account for 14–16% of defects requiring an invasive procedure within the first year of life. *(Perspectives in Pediatric Cardiology,* Vol. 6, Futura Publishing Company, Armonk, N.Y., 1998)

Prevalence

About 1 million Americans, or 3.4 per 1,000, reported being told by a physician that they had a congenital cardiovascular defect, according to a national interview survey in 1993–95. The current prevalence is likely to be higher, since both diagnosis and treatment for all types of defects have improved substantially over the past decade, and since some patients may have been unaware of their diagnosis at the time of the survey. (CDC/NCHS, HIS Survey, 1993–95. Unpublished data.)

Incidence

Major defects are usually apparent in the neonatal period, but minor defects may not be detected until adulthood. Thus, true measures of incidence for congenital heart disease would need to record new cases of defects presenting anytime in fetal life through adulthood. However, estimates are only available for new cases detected between birth and 30 days of life, known as birth prevalence, or as new cases detected in the first year of life only. Both of these are typically reported as cases per 1,000 live births per year, and do not distinguish between tiny defects that resolve without treatment and major malformations. To distinguish more serious defects, some studies also report new cases of sufficient severity to undergo an invasive procedure or result in death within the first year of life. Despite the absence of true incidence figures, some data are available, and are shown in the Table on the next page.

- According to the CDC, 1 in every 110 babies in the metropolitan Atlanta area was born with a congenital heart defect, including some infants with tiny defects that resolved without treatment. Some defects occur more commonly in males or females, or in whites or blacks. (MACDP, *Pediatrics* 2001;107)
- 9.0 defects per 1,000 live births are expected, or 36,000 babies per year in the United States. Of these, several studies suggest that 9,200, or 2.3 per 1,000 live births, require invasive treatment or result in death in the first year of life. (BWIS; Moller, 1998)
- Estimates are also available for bicommisural aortic valves, occurring in 13.7 per 1,000 people; these defects may not require treatment in infancy, but can cause problems later in adulthood. *(J Am Coll Cardiol* 2002;39:1890–900; *Am J Cardiol* 1984;53:849–55)
- Some studies suggest that as many as 5 percent of newborns, or 200,000 per year, are born with tiny muscular ventricular septal defects, almost all of which close spontaneously. *(J Am Coll Cardiol* 1995;26:1545–8; *Arch Dis Child Fetal Neonatal Ed* 1999;81:F61–F63) These defects nearly never require treatment, so they aren't included in the Table on the next page.

Annual Incidence of Congenital Cardiovascular Defects

Type of Presentation	Rate per 1,000 Live Births	Number
Fetal loss	Unknown	Unknown
Invasive procedure during first year	2.3	9,200
Detected during first year*	9.0	36,000
Bicommisural aortic valve	13.7	54,800
Other defects detected after first year	Unknown	Unknown
Total	Unknown	Unknown

* Includes stillbirths and pregnancy termination at less than 20 weeks gestation; includes some defects that resolve spontaneously or don't require treatment.

Mortality

- Total mention mortality — 6,100.

- Congenital cardiovascular disease is the most common cause of infant death from birth defects; 1 in 3 infants who die from a birth defect have a heart defect. (NVSS Final Data for 2000)

- The 2001 overall death rate for congenital cardiovascular defects was 1.5. Death rates were 1.6 for white males, 2.0 for black males, 1.4 for white females and 1.6 for black females. Crude infant death rates (under 1 year) were 44.0 for white babies and 56.2 for black babies.

- In 2000, 213,000 life years were lost before age 65 due to deaths from congenital cardiovascular disease. This is nearly equivalent to the life years lost from leukemia, prostate cancer and Alzheimer's disease combined. (CDC/NCHS; NHLBI)

- In 2000 over 25,000 cardiovascular operations for congenital heart disease were performed on children less than 20 years of age. Inpatient mortality after all types of cardiac surgery was 4.7 percent. However, mortality risk varies substantially for different defect types, from 0.3 percent for atrial septal defect repair to 20.1 percent for first stage palliation for hypoplastic left heart syndrome. 54 percent of operations were performed in males. In unadjusted analyses, mortality after cardiac surgery was somewhat higher for females than for males (4.8 percent versus 4.6 percent). (Healthcare Cost and Utilization Project, HCUP KID2000)

- Mortality from congenital defects has been declining. From 1979–97 age-adjusted death rates from all defects declined 39 percent, and deaths tended to occur at progressively older ages. However, 43 percent of deaths still occurred in infants less than 1 year old. Mortality varies considerably according to type of defect. *(Circulation* 2001;103:2376–81)

- From 1991 to 2001 death rates for congenital cardiovascular defects declined 27.1 percent, while the actual number of deaths declined 26.1 percent.

Hospitalizations

In 2000 over 130,000 hospitalizations, as a primary or secondary diagnosis, occurred in infants or children with congenital cardiovascular disease; hospital charges were $6.5 billion. (HCUP KID2000)

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7 Congestive Heart Failure

(ICD/9 428.0) (ICD/10 I50.0)

Population Group	Prevalence 2002	Incidence (New Cases)	Mortality 2001	Hospital Discharges 2002	Cost 2005
Total population	4,900,000 (2.3%)	550,000	52,828	970,000	$27.9 billion
Total males	2,400,000 (2.6%)	—	19,805 (37.5%)*	441,000	—
Total females	2,500,000 (2.1%)	—	33,023 (62.5%)*	529,000	—
White males	2.5%	—	17,782	—	—
White females	1.9%	—	29,942	—	—
Black males	3.1%	—	1,802	—	—
Black females	3.5%	—	2,797	—	—
Mexican-American males	2.7%	—	—	—	—
Mexican-American females	1.6%	—	—	—	—

Note: (–) = data not available.

* These percentages represent the portion of total mortality that is males vs. females.

Sources: **Prevalence:** *NHANES (1999–2002), CDC/NCHS and NHLBI; data for white and black males and females are for non-Hispanics; percentages are age-adjusted for Americans age 20 and older. These data are based on self reports.* **Incidence:** *FHS, NHLBI.* **Mortality:** *CDC/NCHS; data for white and black males and females include Hispanics.* **Hospital discharges:** *CDC/NCHS; data include people both living and dead.* **Cost:** *NHLBI; data include direct and indirect costs for 2005.*

Prevalence

- In a study conducted in Minnesota, 20.8 percent of the population had mild diastolic dysfunction, 6.6 percent had moderate diastolic dysfunction and 0.7 percent had severe diastolic dysfunction. 5.6 percent had moderate or severe diastolic dysfunction with normal ejection fraction (EF). The prevalence of any systolic dysfunction was 6.0 percent and moderate or severe systolic dysfunction was 2.0 percent. Congestive heart failure (CHF) was much more common among those with systolic or diastolic dysfunction than in those with normal ventricular function. Even among those with moderate or severe diastolic or systolic dysfunction, less than half had recognized CHF. Mild diastolic dysfunction and moderate or severe diastolic dysfunction were predictive of all-cause mortality. (*JAMA* 2003;289:194–202)

Incidence

- Based on the 44-year follow-up of the NHLBI's FHS… (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2001)
  - CHF incidence approaches 10 per 1,000 population after age 65.
  - 75 percent of CHF cases have antecedent hypertension.
  - About 22 percent of male and 46 percent of female heart attack (MI) victims will be disabled with heart failure within 6 years.
- Based on 1971 to 1996 data from the NHLBI's FHS… (*Circulation* 2002;106:3068–72)
  - At age 40, the lifetime risk of developing CHF for both men and women is 1 in 5.
  - At age 40, the lifetime risk of CHF occurring without antecedent MI is 1 in 9 for men and 1 in 6 for women.
  - The lifetime risk doubles for people with blood pressure greater than 160/90 mm Hg vs. those with pressure less than 140/90 mm Hg.
- The annual rates per 1,000 population of new and recurrent CHF events for non-black men are 21.5 for ages 65–74, 43.3 for ages 75–84, and 73.1 for age 85 and older. For non-black women in the same age groups the rates are 11.2, 26.3 and 64.9, respectively. For black men the rates are 21.1, 52.0 and 66.7, and for black women the rates are 18.9, 33.5 and 48.4, respectively. (CHS, NHLBI)
- A community-based cohort study conducted in Olmsted County, Minn., showed that the incidence of heart failure (ICD9/428) has not declined during two decades, but survival after onset had increased overall, with less improvement among women and elderly persons. (*JAMA* 2004;292:344–50)

Risk Factors

- A study of the predictors of heart failure among women with CHD found that diabetes was the strongest risk factor. Diabetic women with elevated BMI or depressed creatinine clearance were at highest risk with annual incidence rates of 7 and 13 percent respectively. Among nondiabetic women with no risk factors, the annual incidence rate was 0.4 percent. The rate increases with each additional risk factor, and nondiabetic women with 3 or more risk factors had an annual incidence of 3.4 percent. Among diabetic participants with no additional risk factors, the annual incidence of heart failure was 3.0 percent compared with 8.2

percent among diabetics with at least 3 additional risk factors. Diabetics with fasting glucose >300 mg/dL had a threefold adjusted risk of developing heart failure, compared with diabetics with controlled fasting blood sugar levels. *(Circulation* 2004;110:1424–30)

Mortality

Total mention mortality — 264,900.

- Based on the 44-year follow-up of the NHLBI's FHS…
  - 80 percent of men and 70 percent of women under age 65 who have CHF will die within 8 years.
  - After CHF is diagnosed, survival is poorer in men than in women, but fewer than 15 percent of women survive more than 8–12 years. The 1-year mortality rate is high, with 1 in 5 dying.
  - In people diagnosed with CHF, sudden cardiac death occurs at 6–9 times the rate of the general population.
- From 1992 to 2002, deaths from heart failure (ICD 428) increased 35.3 percent. In the same time period, the death rate increased 7.7 percent.
- The 2001 overall death rate for CHF was 18.7. Death rates were 19.6 for white males, 21.7 for black males, 18.1 for white females and 18.8 for black females.

Hospital Discharges

- Hospital discharges for CHF rose from 377,000 in 1979 to 970,000 in 2002, an increase of 157 percent.

Cost

- In 2005 the estimated direct and indirect cost of CHF in the United States is $27.9 billion. See page 53 for details.
- In 1999, $3.6 billion ($5,456 per discharge) was paid to Medicare beneficiaries for CHF. *(Health Care Financing Review, 2001 Medicare and Medicaid Statistical Supplement,* CMS, April 2003)

Prevalence of Congestive Heart Failure by Sex and Age
NHANES: 1999–2002
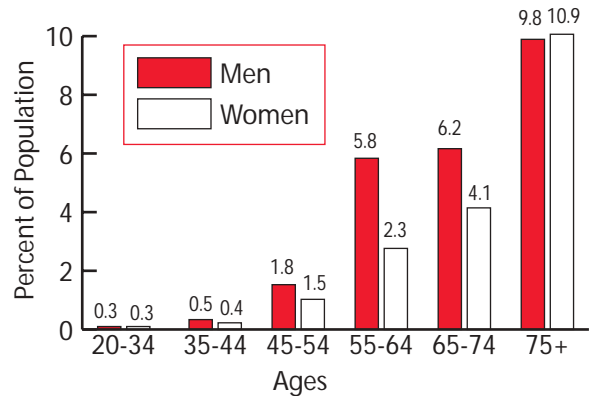
Source: CDC/NCHS and NHLBI.

Hospital Discharges for Congestive Heart Failure by Sex
United States: 1970–2002
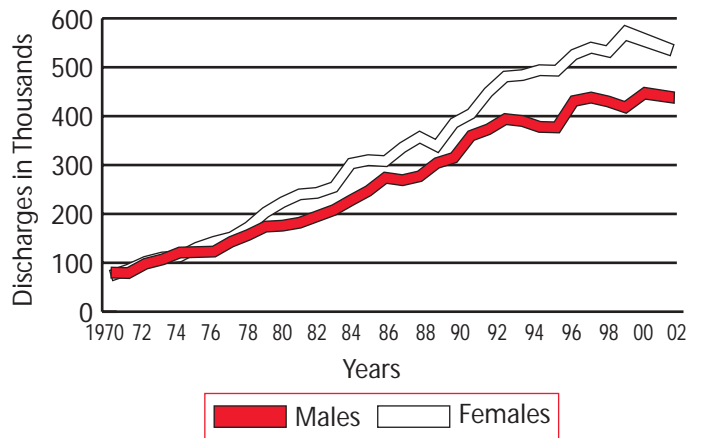
Note: Hospital discharges include people both living and dead.

Source: CDC/NCHS.

Other Cardiovascular Diseases

Mortality, prevalence and death rate data in this section are for 2001 or 2002. Total mention mortality is for 2001. Hospital discharge data are based on ICD/9 codes.

Arrhythmias (Disorders of Heart Rhythm)

(ICD/9 426, 427) (ICD/10 I46–I49)

Mortality — 37,892. Total mention mortality — 480,400 of over 2,400,000 U.S. deaths. Hospital discharges — 858,000. In 1999, $2.2 billion ($6,041 per discharge) was paid to Medicare beneficiaries for cardiac dysrhythmias. *(Health Care Financing Review, 2001 Medicare and Medicaid Statistical Supplement,* CMS, April 2003)

Atrial fibrillation and flutter (ICD/9 427.3) (ICD/10 I48). Mortality — 9,451. Total mention mortality — 73,300. Prevalence — about 2,200,000. *(MMWR,* Vol. 52, No. 7, Feb. 21, 2003, CDC/NCHS) Hospital discharges — 465,000.

- In the FHS study, the lifetime risk for development of AF is 1 in 4 for men and women 40 years of age and older. Lifetime risks for AF are high (1 in 6), even in the absence of antecedent CHF or MI. *(Circulation* 2004;110:1042–6)
- Data from the National Hospital Discharge Survey (from 1996 to 2001) on cases that included AF as a primary discharge diagnosis found that: *(Am J Cardiol* 2004;94:500–4)
  — About 44.8 percent of patients were men.
  — The mean age for men was 66.8 years vs. 74.6 for women.
  — The racial breakdown for admissions was 71.2 percent white, 5.6 percent black, and 2.0 percent other races. 20.8 percent were not specified.
  — African-American patients were much younger than patients of other races.
  — The incidence in men ranged from 20.58/100,000 persons per year for patients ages 15 to 44 to 1,077.39/100,000 persons per year for patients ages 85 and older. In women the incidence ranged from 6.64/100,000 persons per year for patients ages 15 to 44 years to 1,203.7/100,000 persons per year for those ages 85 and older.
  — From 1996 to 2001, hospitalizations with AF as the first-listed diagnosis, increased 34 percent.
- Age-adjusted death rates for AF were highest among whites (25.7) and blacks (16.4) and higher for men (34.7) than women (22.8). *(MMWR,* Vol. 52, No. 7, Feb. 21, 2003, CDC/NCHS)
- The most common diseases listed as the **primary** diagnosis for persons hospitalized with AF were congestive heart failure (11.8 percent), followed by AF (10.9 percent), CHD (9.9 percent), and stroke (4.9 percent). *(MMWR,* Vol. 52, No. 7, Feb. 21, 2003, CDC/NCHS)
- AF is an independent risk factor for stroke, increasing risk about 5-fold. The risk for stroke attributable to AF increases with age. *(Stroke* 1991;22:983–8)
- AF is responsible for about 15–20 percent of all strokes. *(JAMA* 2001;285:2370–5)
- AF is also an independent risk factor for stroke recurrence and stroke severity. A recent report showed people who had AF and were not treated with anticoagulants had a 2.1-fold increase in risk for recurrent stroke and a 2.4-fold increase in risk for recurrent severe stroke. *(Am J Med* 2003;114:206–10)
- People who have strokes caused by AF have been reported as 2.23 times more likely to be bedridden compared to those who have strokes from other causes. *(Neuroepidemiology* 2003;22:118–23)
- Participants in the FHS Offspring Study of the NHLBI were examined between 1984 to 1987 and monitored for 10 years. Data show that symptoms of anger and hostility were predictive of 10-year incidence of AF in men. *(Am J Epidemiol* 2004;159:950–8)
- Participants in the FHS study of the NHLBI were followed from 1968–1999. At age 40, lifetime risks for AF were 26.0 percent for men and 23.0 percent for women. At 80 years, lifetime risks for AF were 22.7 percent for men and 21.6 percent for women. In further analysis, counting only those who had development of AF without prior or concurrent congestive heart failure or MI, lifetime risk for AF was approximately 16 percent. *(Circulation* 2004;110:1042–6)
- **Tachycardia** (ICD/9 427.0,1,2) (ICD/10 I47.0,1,2,9). Mortality — 6,496. Total mention mortality — 7,500. Hospital discharges — 87,000.
- **Paroxysmal supraventricular tachycardia** (ICD/9 427.0) (ICD/10 I47.1). Mortality — 137. Hospital discharges — 30,000.

Ventricular fibrillation (ICD/9 427.4) (ICD/10 I49.0). Mortality — 1,406. Total mention mortality — 14,500. Hospital discharges — 8,000. Ventricular fibrillation is listed as the cause of relatively few deaths, but the overwhelming number of sudden cardiac deaths from coronary disease (estimated at about 335,000 per year) is thought to be from ventricular fibrillation.

Arteries, Diseases of

(ICD/9 440–448) (ICD/10 I70–I79) (Includes peripheral arterial disease)

Mortality — 38,748 Total mention mortality — 118,300. Hospital discharges — 272,000.

Aortic aneurysm (ICD/9 441) (ICD/10 I71). Mortality — 15,234. Total mention mortality — 21,100. Hospital discharges — 61,000.

Atherosclerosis (ICD/9 440) (ICD/10 I70) is a process that leads to a group of diseases characterized by a thickening of artery walls. Mortality — 14,086. Total mention mortality — 68,900. Hospital discharges — 111,000. Atherosclerosis causes many deaths from heart attack and stroke and accounts for nearly three-fourths of all deaths from CVD. (FHS, NHLBI)

- In 1999 U.S. community hospitals billed $26.2 billion for coronary atherosclerosis, more than for any other condition. (AHRQ Electronic Newsletter, June 14, 2002)

Other diseases of arteries (ICD/9 442–448) (ICD/10 I72–I78). Mortality — 10,084. Hospital discharges — 100,000.

- Kawasaki disease (ICD/9 446.1) (ICD/10 M30.3). Total mention mortality — 6. Up to 2,500 cases of Kawasaki disease are diagnosed yearly. Hospital discharges — 6,000, primary plus secondary diagnoses. *[Pediatr Infect Dis J 1994;13(8)]*
  - About 80 percent of Kawasaki disease patients are under age 5; most are under age 2. Children older than 8 years are rarely affected. (*NEJM* 1998;339:93–104)
  - Kawasaki disease occurs more often among boys (63 percent) and among those of Asian ancestry. (*Pediatr Infect Dis J* 1994;13:8)
  - The highest incidence in the United States is in Hawaii. A hospitalization rate of 47.7 per 100,000 children under age 5 was reported during the mid-1990s. In the continental United States, the estimated incidence is from 9 to 19 per 100,000 children. (*Pediatrics* 2003;112:495–501)

Peripheral arterial disease (PAD) affects 8 to 12 million Americans and is associated with significant morbidity and mortality. (*JAMA* 2001;286:1317–24; *NEJM* 1992;326:381–6)

- A study from the NHANES 1999–2000 data found that PAD affects about 5 million adults. Prevalence increases dramatically with age and disproportionately affects blacks (*Circulation* 2004;110:738–43). However, the measurement of systolic blood pressure utilizing the right arm only and the omission of queries for surgical procedures to correct PAD in this study led to an underestimate of the true PAD prevalence. Experts in the field generally agree that PAD affects approximately 8 to 12 million Americans (*JAMA* 200;286:1317–24; *NEJM* 1992;326:381–6).

- PAD affects 12–20 percent of Americans age 65 and older (4.5–7.6 million). By 2050 the prevalence could reach 9.6–16 million among those age 65 and older and 19 million overall. Despite its prevalence and cardiovascular risk implications, only 25 percent of PAD patients are undergoing treatment. (*J Vasc Interv Radiol* 2002;13:7–11)

- Based on current epidemiologic projections, 27 million people in Europe and North America have PAD. An estimated 10.5 million are symptomatic and 16.5 million are asymptomatic. The prevalence of asymptomatic PAD was estimated in one study to be as high as 20 percent of the adult population. (*Arch Intern Med* 2003;163)

- In the general population, only about 10 percent of persons with PAD have the classic symptoms of intermittent claudication (IC). About 40 percent do not complain of leg pain, while the remaining 50 percent have a variety of leg symptoms different from classic claudication. (*JAMA* 2001;286:11, 1317–24; *Circulation* 1985;71:516–22)

- The risk factors for PAD are similar to those for CHD, although diabetes and cigarette smoking are particularly strong risk factors for PAD. (*Am J Epidemiol* 1989;129:1110–9)

- Persons with PAD have impaired function and quality of life. This is true even for persons who do not report leg symptoms. Furthermore, PAD patients, including those who are asymptomatic, experience significant decline in lower extremity functioning over time. (*Ann Intern Med* 2002;136:873–83; *JAMA* 2004;292:453–61)

- PAD is a marker for systemic atherosclerotic disease. Persons with PAD, compared to those without, have 4–5 times the risk of dying of a CVD event, resulting in 2–3 times higher total mortality risk. (*NEJM* 1992;326:381–6; *JAMA* 1993;270:487–9)

- In the Framingham Heart Study (FHS), the incidence of PAD was based on symptoms of IC in subjects ages 29–62. Annual incidence of IC per 10,000 subjects at risk rose from 6 in men and 3 in women ages 30–44 to 61 in men and 54 in women ages 65–74. (*Clin Cornerstone* 2002;4:1–15)

- Several studies have evaluated both symptomatic and asymptomatic PAD using the ABI. The prevalence of asymptomatic PAD was 25.5 percent among 1,537 participants of the Systolic Hypertension in the Elderly Program (SHEP). (*Clin Cornerstone* 2002;4:1–15)

- In the FHS the annual mortality rate was almost 4 times greater in subjects with IC. In a major cohort study, investigators observed a 3.1 times higher risk for all-cause mortality compared with patients without PAD. In addition, PAD patients had a 5.9 times higher risk for death from CVD complications and a 6.6 times higher risk for death from CHD specifically. (*Clin Cornerstone* 2002;4:1–15; *NEJM* 1992;326:381–6)

- In the Genetic Epidemiology Network of Arteriopathy (GENOA) study of the NHLBI, a comparison between African Americans and non-Hispanic whites found that after

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adjusting for age, African Americans had a greater preva-lence of PAD (women 34 percent vs. 22 percent; men 33 percent vs. 11 percent). *(Vasc Med* 2003 Nov;8(4):237–42)

- Data from NHANES, 1999–2000 (CDC/NCHS), show that even low blood levels of lead and cadmium may increase the risk of PAD. Exposure to these two metals is possible through cigarette smoke. The risk was 2.8 for high levels of cadmium and 2.9 for high levels of lead. The odds ratio of PAD for current smokers was 4.13 compared to people who had never smoked. *(Circulation* 2004;109:3196–201)

Bacterial Endocarditis

(ICD/9 421.0) (ICD/10 I33.0)

Total mention mortality — 2,421. Hospital discharges — 17,000, primary plus secondary diagnoses.

Cardiomyopathy

(ICD/9 425) (ICD/10 I42)

Mortality — 26,863. Total mention mortality — 54,600. Hospital discharges — 36,000.

- 87 percent of cases are congestive or dilated cardiomyopathy. 50 percent of patients with dilated cardiomyopathy are alive 5 years after their initial diagnosis; 25 percent are alive 10 years after the diagnosis. (Facts About Cardiomyopathy, NIH, NHLBI, 1995)
- Mortality from cardiomyopathy is highest in older persons, men and blacks. (FHS, NHLBI)
- Tachycardia-induced cardiomyopathy develops slowly and appears reversible, but recurrent tachycardia causes rapid decline in left ventricular function and development of heart failure. Sudden death is possible. *(Circulation* 2004;110:247–52)
- Since 1996 the NHLBI's Pediatric Cardiomyopathy Registry has collected data on all children with newly diagnosed cardiomyopathy in New England and the Central Southwest (Texas, Oklahoma and Arkansas). *(NEJM* 2003;348:1647–55)
  - The overall incidence of cardiomyopathy is 1.13 cases per 100,000 in children younger than age 18.
  - In children under 1 year the incidence is 8.34 and in children from 1 year to age 18 it's 0.70 per 100,000.
  - The annual incidence is lower in white than black children; higher in boys than girls; higher in New England (1.44 per 100,000) than in the Central Southwest (0.98 per 100,000).
- Studies show that 36 percent of young athletes who die suddenly have probable or definite hypertrophic cardiomyopathy. *(JAMA* 1996;276:199–204)

Rheumatic Fever/Rheumatic Heart Disease

(ICD/9 390–398) (ICD/10 I00–I09)

Population Group	Mortality 2002	Hospital Discharges 2002
Total population	3,579	52,000
Total males	1,078 (30.1%)*	19,000
Total females	2,501 (69.9%)*	33,000
White males	950	—
White females	2,254	—
Black males	93	—
Black females	159	—

Note: (–) = data not available.

* These percentages represent the portion of total mortality that is males vs. females.

Sources: **Mortality:** *CDC/NCHS; data for white and black males and females include Hispanics.* **Hospital discharges:** *CDC/NCHS; data include people both living and dead.*

Incidence

- Many operations on heart valves are related to rheumatic heart disease (RHD).
- The incidence of rheumatic fever (RF) remains higher in African Americans, Puerto Ricans, Mexican Americans and American Indians. (Hurst W. *The Heart, Arteries and Veins.* 10th ed. New York, NY: McGraw-Hill; 2001)

Mortality

- Total mention mortality —6,975
- In 1950 about 15,000 Americans (adjusted for changes in ICD codes) died of RF/RHD compared with about 3,500 today.
- From 1992 to 2002 the death rate from RF/RHD fell 23.5 percent, while actual deaths declined 39.1 percent.
- The 2002 overall death rate for RF/RHD was 1.2. Death rates were 0.9 for white males and 0.8 for black males, 1.5 for white females and 1.0 for black females.

Valvular Heart Disease

(ICD/9 424) (ICD/10 I34–I38)

Mortality — 19,737. Total mention mortality — 42,060. Hospital discharges — 98,000.

- Aortic valve disorders (ICD/9 424.1) (ICD/10 I35). Mortality — 12,380. Total mention mortality — about 26,200. Hospital discharges — 56,000.
- Mitral valve disorders (ICD/9 424.0) (ICD/10 I34). Mortality — 2,865. Total mention mortality — about 7,000. Hospital discharges — 39,000.
  - The NHLBI's FHS reports that among people ages 26–84, prevalence is about 1–2 percent and equal between women and men.
- Pulmonary valve disorders (ICD/9 424.3) (ICD/10 I37). Mortality — 12. Total mention mortality — 34.
- Tricuspid valve disorders (ICD/9 424.2) (ICD/10 I36). Mortality — 3. Total mention mortality — 46.

Operations and Procedures

- In 2002 an estimated 93,000 valve procedures were performed in the United States. For more data, see pages 51 and 52. (CDC/NCHS)

Venous Thromboembolism

- Venous thromboembolism (VTE) occurs for the first time in about 100 persons per 100,000 each year in the United States. About one-third of patients with symptomatic VTE manifest pulmonary embolism (PE), whereas two-thirds manifest deep vein thrombosis (DVT) alone. (*Circulation* 2003;107:I-4–I-8)
- Caucasians and African Americans have a significantly higher incidence than Hispanics and Asian or Pacific Islanders. (*Circulation* 2003;107:I-4–I-8)
- In studies conducted in Worcester, Mass., and Olmsted County, Minn., the incidence of VTE was about 1 in 1,000. In both studies VTE was more common in men; for each 10-year increase in age, the incidence doubled. By extrapolation, it's estimated that more than 250,000 patients are hospitalized annually with VTE. (*NEJM* 1998;339:93–104)
- The crude incidence rate per 1,000 person-years was 0.80 in the ARIC study, 2.15 in CHS and 1.08 in the combined cohort. Half of the participants who developed incident VTE were women and 72 percent were white. (*Am J Med* 2002;113:636–42)
- Over 200,000 new cases of VTE occur annually. Of these, 30 percent die within three days; one-fifth suffer sudden death due to PE. About 30 percent develop recurrent VTE within 10 years. Independent predictors for recurrence include increasing age, obesity, malignant neoplasm and extremity paresis. (*Seminars in Thrombosis and Hemostasis.* Vol. 28, Suppl. 2, 2002)

- Data from the ARIC study of the NHLBI showed the 28-day fatality from DVT is 9 percent; from PE, 15 percent; from idiopathic DVT or PE, 5 percent; from secondary non-cancer-related DVT or PE, 7 percent; and secondary cancer-related DVT or PE, 25 percent. (*Am J Med* 2004;117(1):19–25)
- **Deep vein thrombosis** (ICD/9 451.1) (ICD/10 I80.2). Mortality — 2,730. Total mention mortality — 10,200. Hospital discharges — 8,000.
- A review of nine studies conducted in the United States and Sweden showed that the mean incidence of first DVT in the general population was 5.04 per 10,000 person-years. The incidence was similar in males and females and increased dramatically with age from about 2–3 per 10,000 person-years at ages 30–49 to 20 at ages 70–79. (*Eur J Vasc Endovasc Surg* 2003;25:1–5)
- Death occurs in about 6 percent of DVT cases within one month of diagnosis. (*Circulation* 2003;107:I-4–I-8)
- **Pulmonary embolism** (ICD/9 415.1) (ICD/10 I26). Mortality — 8,627. Total mention mortality — 26,400. Hospital discharges — 99,000.
- In the Nurses Health Study, nurses age 60 or older in the highest BMI quintile had the highest rates of pulmonary embolism. (BMI is body mass index; see Glossary on page 58 for definition.) Heavy cigarette smoking and high blood pressure were also identified as risk factors for PE. (*NEJM* 1998;339:93–104)
- Death occurs in about 12 percent of PE cases within one month of diagnosis. (*Circulation* 2003;107:I-4–I-8)
- A study of Medicare recipients age 65 and older reported 30-day case fatality rates in patients with PE. Overall, men had higher fatality rates than women (13.7 percent vs. 12.8 percent), and blacks had higher fatality rates than whites (16.1 percent vs. 12.9 percent). (*NEJM* 1998;339:93–104)
- In the International Cooperative Pulmonary Embolism Registry, the three-month mortality rate was 17.5 percent. In contrast, the overall three-month mortality rate in the Prospective Investigation of Pulmonary Embolism Diagnosis was 15 percent, but only 10 percent of deaths during one year of follow-up were ascribed to PE. (*NEJM* 1998;339:93–104)
- The age-adjusted rate of deaths from **pulmonary thromboembolism** (PTE) decreased from 191 per million in 1979 to 94 per million in 1998 overall, decreasing 56 percent for men and 46 percent for women. During this time the age-adjusted mortality rates for blacks were consistently 50 percent higher than those for whites, and those for whites were 50 percent higher than those for people of other races (Asian, American Indian, etc.). Within racial strata, mortality rates were consistently 20 to 30 percent higher among men than among women. (*Arch Intern Med* 2003;163:1711–7)

Tobacco

Cigarette Smoking, Overall Prevalence

Population Group	Prevalence 2002
Total population	48,500,000 (22.5%)
Total males	26,300,000 (25.2%)
Total females	21,200,000 (20.0%)
White males	25.2%
White females	20.7%
Black or African-American males	27.0%
Black or African-American females	18.5%
Hispanic or Latino males #	23.2%
Hispanic or Latino females #	12.5%
Asian only males #	21.3%
Asian only females #	6.9%
American Indian or Alaska Native only males #	32.0%
American Indian or Alaska Native only females #	36.9%

Note: Data are crude percentages for age 18 and older.

— Data are for 1999–2001.

Source: Health, United States, 2003 & 2004, CDC/NCHS.

Cigarette Smoking, Prevalence by Race/Ethnicity, Age and Sex

Population Group	Ages 12–17 Males	Ages 12–17 Females	Age 18 and older Males	Age 18 and older Females
Non-Hispanic:				
White	14.9%	17.2%	29.1%	25.9%
Black	8.2%	5.9%	30.1%	22.2%
Hispanic:	11.4%	10.2%	29.2%	17.3%
Mexican	11.4%	10.6%	29.8%	15.6%
Puerto Rican	11.2%	10.4%	34.2%	27.3%
Central or South American	9.9%	9.3%	26.3%	16.9%
Cuban	14.3%	10.0%	21.1%	17.5%
Asian:	8.8%	7.3%	24.1%	9.1%
Chinese	6.3%	5.4%	19.3%	5.9%
Filipino	5.8%	8.9%	—	6.9%
Japanese	—	—	18.3%	—
Asian Indian	10.1%	6.8%	20.0%	3.0%
Korean	13.8%	7.3%	—	—
Vietnamese	—	8.0%	—	—
American Indian or Alaska Native	29.5%	26.3%	40.9%	40.0%
Hawaiian or Other Pacific Islander	7.0%	NR	NR	NR
TOTAL	13.3%	14.2%	29.2%	24.1%

Note:(—) = data not available; NR = data considered unreliable.

Source: Percentage of persons ages 12–17 and age 18 and older reporting cigarette use during the preceding month, by race/ethnicity and sex: National Survey on Drug Use and Health, U.S., 1999–2001, MMWR, Vol. 53, No. 3, Jan. 30, 2004, CDC/NCHS.

Prevalence

Youth

- In 2003 for grades 9–12, 30.3 percent of male students and 24.6 percent of female students reported current tobacco use; 19.9 percent of males and 9.4 percent of females reported current cigar use; and 11.0 percent of males and 2.2 percent of females reported current smokeless tobacco use. (Youth Risk Behavior Surveillance [YRBS], United States, 2003, *MMWR,* Vol. 53, No. SS-2, May 21, 2004, CDC/NCHS)

- About 80 percent of people who use tobacco begin before age 18. The most common age of initiation is 14 to 15. *(MMWR,* Vol. 48, No. 31, Aug. 1999, CDC/NCHS)

- White youths ages 18–24 from families with lower educational attainment report substantially higher smoking rates than black and Mexican-American youths from families with similar educational attainment. 77 percent of young white men and 61 percent of young white women are smokers compared with 35 percent of minority youth. *(JAMA* 1999;281:1006–13)

- From 1980 to 2002 the percentage of high school seniors who smoked in the past month decreased 12.5 percent. This percentage decreased by 2.2 percent in males, 23.7 percent in females, 0.3 percent in whites and 55.2 percent in blacks or African Americans. *(Health, United States,* 2003, CDC/NCHS)

- An estimated 150,000–300,000 children younger than 18 months of age have respiratory tract infections because of exposure to secondhand smoke. (CDC/NCHS)

- Children's exposure to secondhand smoke, as indicated by cotinine levels, dropped between 1988–94 and 1999–2000. Overall, 64 percent of children ages 4–11 had cotinine in their blood in 1999–2000, down from 88 percent in 1988–94. In 1999–2000, 86 percent of non-Hispanic black children ages 4–11 had cotinine in their blood compared to 63 percent of non-Hispanic white children and 49 percent of Mexican-American children. The percentage of homes with children under age 7 in which someone smokes on a regular basis decreased from 29 percent in 1994 to 19 percent in 1999. *(America's Children: Key National Indicators of Well-Being,* 2003. Federal Interagency Forum on Child and Family Statistics, Washington, D.C.: U.S. Government Printing Office)

- Among children under age 18, an estimated 22 percent are exposed to secondhand smoke in their homes, with estimates ranging from 11.7 percent in Utah to 34.2 percent in Kentucky. (*MMWR,* Vol. 46, No. 44, 1997, CDC/NCHS)

Adults

- Since 1965 smoking in the United States has declined by 47 percent among people age 18 and older. (*Health, United States,* 2004, CDC/NCHS)

- Among Americans age 18 and older, 25.2 percent of men and 20.0 percent of women are smokers, putting them at increased risk of heart attack and stroke. (*Health, United States,* 2004, CDC/NCHS)

- Use of any tobacco product in 2001 was 31.3 percent for white only, 27.7 for black or African-American only, 44.9 for American Indian or Alaska Native only, 28.5 for Native Hawaiian or other Pacific Islander only, 13.6 for Asian only and 22.9 for Hispanic or Latino, any race. (*Health, United States,* 2003, CDC/NCHS)

- Smoking prevalence is higher among those with 9–11 years of education (35.4 percent) compared with those with more than 16 years of education (11.6 percent). It's highest among persons living below the poverty level (33.3 percent) compared with other income groups. (*MMWR,* Vol. 48, No. 43, 1999, CDC/NCHS)

- About 60 percent of people in the U.S. have biological evidence of secondhand smoke exposure. (*Second National Report on Human Exposure to Environmental Chemicals: Tobacco Smoke.* CDC/NCHS 2003:80)

- Data from the BRFSS study of the CDC/NCHS show that more than one-third of white men and women ages 18–24 smoked, the highest rate among all the groups covered in the survey in 2000. Those young people and Hispanic women the same age had the largest increases in smoking rates from 1990–2000. More than half of men and women ages 18–24 from all ethnic groups failed to quit smoking in 2000. Younger white women and men ages 18–44 had higher overall risk levels for noncommunicable diseases, probably due to increased smoking and obesity. (*Am J Health Promot* 2004;19(1):19)

- According to the World Health Organization (WHO), 1 year after quitting, the risk of CHD decreases by 50 percent. Within 15 years, the relative risk of dying from CHD for an ex-smoker approaches that of a long-time (lifetime) nonsmoker. (World No-Tobacco Day 1998, www.who.ch/ntday/ntday98)

Incidence

- A survey conducted in 2002 found that an estimated 1.4 million Americans began smoking cigarettes daily in 2001. This translates to close to 4,000 new regular smokers per day, including more than 2,000 youths under age 18. (National Survey on Drug Use and Health, samhsa.gov)

- Information from the CDC Health Effects of Cigarette Smoking Fact Sheet, February 2004:

— Cigarette smokers are 2–4 times more likely to develop CHD than nonsmokers.

— Cigarette smoking approximately doubles a person's risk for stroke.

— Cigarette smokers are more than 10 times as likely as nonsmokers to develop peripheral vascular disease (PVD).

Mortality

- From 1995 to 1999 an average of 442,398 Americans died each year of smoking-related illnesses. 33.5 percent of these deaths were cardiovascular-related. (*MMWR,* Vol. 51, No. 14, 2002, CDC/NCHS)

- About 35,000 nonsmokers die from CHD each year as a result of exposure to environmental tobacco smoke. (*MMWR,* Vol. 51, No. 14, 2002, CDC/NCHS)

- On average, male smokers die 13.2 years earlier than male nonsmokers, and female smokers die 14.5 years earlier than female nonsmokers(Surgeon General's Health Consequences of Smoking 2004)

- Current cigarette smoking is a powerful independent predictor of sudden cardiac death in patients with CHD. (Arch Intern Med 2003;163:2301–5)

- Cigarette smoking results in a 2-to-3 fold risk of dying from CHD. (Tobacco-Related Mortality, Fact Sheet. CDC.gov/tobacco. Feb. 2004)

Health Consequences

- Data from *The Health Consequences of Smoking, 2004 — A Report of the Surgeon General* (CDC/NCHS): A study of women younger than 44 years of age found there was a strong dose-relationship for MI, with a risk of 2.5 for those smoking 1 to 5 cigarettes per day, rising to 74.6 for those smoking more than 40 cigarettes per day, compared with nonsmokers.

- Another study on female smokers found the highest risk (6.8) for MI was in women younger than 55 years of age.

- One-third of those who receive percutaneous coronary artery vascularization are current smokers, and 50 to 60 percent continue to smoke after the procedure.

- Cigarette smoking remains a major cause of stroke in the U.S. The evidence is sufficient to infer a causal relationship between smoking and subclinical atherosclerosis.

- From 61.3 percent to 82.1 percent of adults report that their workplace has a smoke-free policy. (BRFSS [1999], CDC/NCHS)

- The 2004 Health Consequences of Smoking Report of the Surgeon General states that the risk of stroke decreases steadily after smoking cessation. Former smokers have the same risk as nonsmokers after 5 to 15 years. (www.cdc.gov/tobacco/sgr/sgr_2004/Factsheets/3.htm)

Chewing Tobacco

- About 5 million American men and women use chewing tobacco. (NHANES III [1988–94], CDC/NCHS)
  - Rates are highest in the South and rural areas.
  - Men use chewing tobacco at 10 times the rate for women. For men, the percentages who use chewing tobacco are 6.8 for whites, 3.1 for blacks, 1.5 for Hispanics, 1.2 for Asian or Pacific Islanders and 7.8 for American Indians or Alaska Natives.
  - For women the percentages are 0.3 for whites, 2.9 for blacks, 0.1 for Hispanics, almost none for Asian or Pacific Islanders and 1.2 for American Indians or Alaska Natives.
  - Use rates increase as years of education decrease for both men and women.

Cost

- Direct medical costs and lost productivity costs associated with smoking total an estimated $155 billion per year. (CDC/NCHS)

Prevalence of High School Students In Grades 9–12 Reporting Current Cigarette Smoking by Sex and Race/Ethnicity
YRBS: 2003
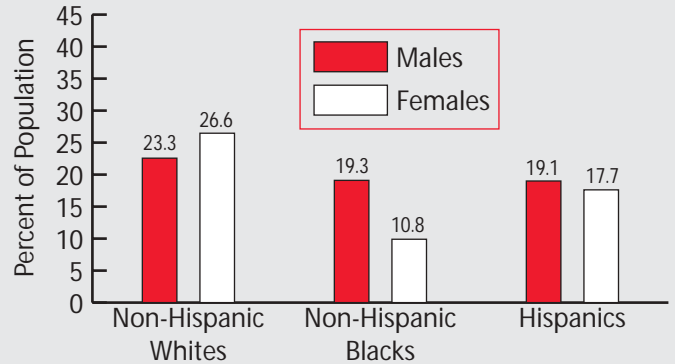
Source: MMWR, Vol. 53, (23); 499–502, June 18, 2004, CDC/NCHS.

Prevalence of Current Smoking for Americans Age 18 and older By Race/Ethnicity and Sex
NHIS: 2002
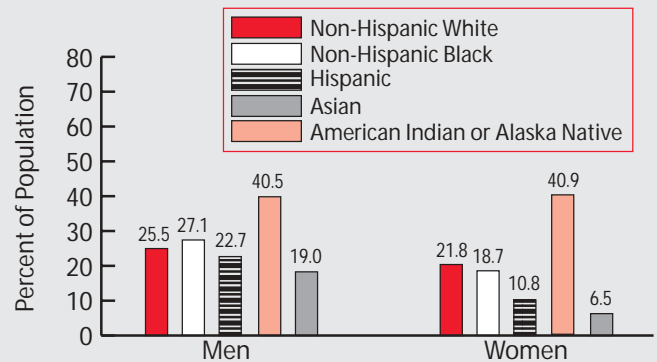
Source: MMWR, Vol. 53, (20); 427–431, May 28, 2004, CDC/NCHS.

High Blood Cholesterol and Other Lipids

Population Group	Prevalence of Total Cholesterol 200 mg/dL or higher 2002	Prevalence of Total Cholesterol 240 mg/dL or higher 2002	Prevalence of LDL Cholesterol 130 mg/dL or higher 2002	Prevalence of HDL Cholesterol less than 40 mg/dL 2002
Total population*	106,900,000 (50.7%)	37,700,000 (18.3%)	95,000,000 (45.8%)	54,700,000 (26.4%)
Total males*	50,400,000 (50.4%)	16,900,000 (17.2%)	48,600,000 (48.5%)	39,000,000 (39.0%)
Total females*	56,500,000 (50.9%)	20,800,000 (19.1%)	46,400,000 (43.3%)	15,900,000 (14.9%)
White males**	51.0%	17.8%	49.6%	40.5%
White females**	53.6%	19.9%	43.7%	14.5%
Black males**	37.3%	10.6%	46.3%	24.3%
Black females**	46.4%	17.7%	41.6%	13.0%
Mexican-American males	54.3%	17.8%	43.6%	40.1%
Mexican-American females	44.7%	13.9%	41.6%	18.4%
Total Hispanics#	—	25.6%	—	—
Total Asian or Pacific Islanders#	—	27.3%	—	—
Total American Indians or Alaska Natives, Alaska#	—	26.0%	—	—
Total American Indians or Alaska Natives, Oklahoma#	—	28.6%	—	—
Total American Indians or Alaska Natives, Washington#	—	26.5%	—	—

Note: mg/dL = milligrams per deciliter of blood. Prevalence of Total Cholesterol 200 mg/dL or higher includes people with total cholesterol of 240 mg/dL or higher. In adults, levels of 200–239 mg/dL are considered borderline-high risk. Levels of 240 mg/dL or higher are considered high risk.

(—) = data not available.

* Total population data for total cholesterol are for Americans age 20 and older. Data for LDL cholesterol, HDL cholesterol and all racial/ethnic groups are age-adjusted for age 20 and older.

** Data for 240 mg/dL for whites are white only and for blacks are black or African-American only.

BRFSS (1997), MMWR, Vol. 49, No. SS-2, March 24, 2000, CDC/NCHS; data are for Americans age 18 and older.

Source for total cholesterol 200 mg/dL or higher: NHANES (1999 to 2000), Circulation. 2003;107:2185–2189; 240 mg/dL or higher data from Health, United States, 2003, CDC/NCHS; LDL and HDL cholesterol: NHANES III (1988–94), CDC/NCHS.

Prevalence

For information on dietary cholesterol, total fat, saturated fat and other factors that affect blood cholesterol levels, see Nutrition, pages 46–47.

Youth

- Among children and adolescents ages 4–19 years (NHANES III [1988–94], CDC/NCHS):
  — Females have significantly higher average total cholesterol and low-density lipoprotein (LDL) cholesterol (bad cholesterol) than do males.
  — Non-Hispanic black children and adolescents have significantly higher mean total cholesterol, LDL (bad) cholesterol and HDL (good) cholesterol levels when compared with non-Hispanic white and Mexican-American children and adolescents.

- Among children and adolescents ages 4–19, the mean total blood cholesterol level is 165 mg/dL. For boys it's 163 mg/dL and for girls it's 167 mg/dL. The racial/ethnic breakdown is (NHANES III [1988–94], CDC/NCHS):
  — For non-Hispanic whites, 162 mg/dL for boys and 166 mg/dL for girls.
  — For non-Hispanic blacks, 168 mg/dL for boys and 171 mg/dL for girls.
  — For Mexican Americans, 163 mg/dL for boys and 165 mg/dL for girls.

- About 10 percent of adolescents ages 12–19 have total cholesterol levels exceeding 200 mg/dL. (NHANES III [1988–94], CDC/NCHS)

Adults

- Beginning at age 45, a higher percentage of women than men have total blood cholesterol of 200 mg/dL or higher. (NHANES [1999–2000], CDC/NCHS)

- The prevalence of cholesterol screening during the preceding 5 years increased from 67.3 percent in 1991 to 70.8 percent in 1999. The age-standardized prevalence of high blood cholesterol awareness among persons screened increased from 25.7 percent in 1991 to 28.6 percent in 1999. (BRFSS, *MMWR,* Vol. 50, No. 35, Sept. 7, 2001, CDC/NCHS)

- A 10-percent decrease in total cholesterol levels (population-wide) may result in an estimated 30-percent reduction in the incidence of CHD. *(MMWR,* Vol. 49, No. 33, Aug. 25, 2000, CDC/NCHS)

Adherence

Based on data from the Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III [ATP III], NHLBI):

- Less than half of persons who qualify for any kind of lipid-modifying treatment for CHD risk reduction are receiving it.

- Less than half of even the highest-risk persons, those who have symptomatic CHD, are receiving lipid-lowering treatment.

- Only about a third of treated patients are achieving their LDL goal; less than 20 percent of CHD patients are at their LDL goal.

- Only about half of the people who are prescribed a lipid-lowering drug are still taking it six months later; after 12 months this falls to 30–40 percent. This is especially troubling, because it takes six months to one year before a benefit from treatment becomes apparent.

Trends in Mean Total Blood Cholesterol Among Adolescents Ages 12–17 by Race, Sex and Survey
NHES III: 1966–70, NHANES I & III: 1971–74, 1988–94
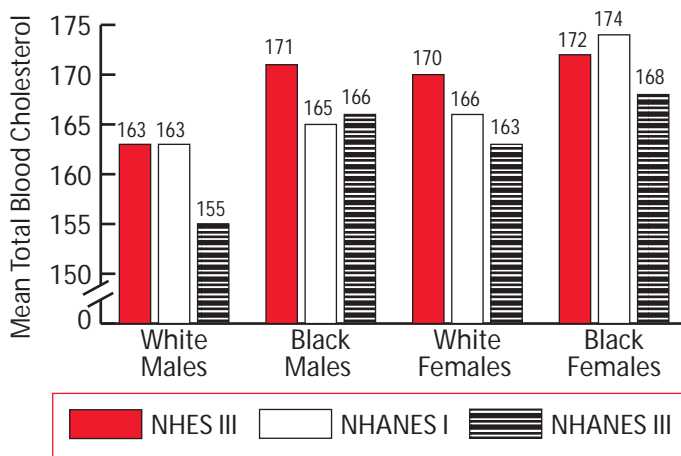
Source: CDC/NCHS. Prev Med. 1998;27:879–890.

LDL (Bad) Cholesterol

Youth

- Mean LDL cholesterol levels among children and adolescents ages 12–19 are (NHANES III [1988–94], CDC/NCHS):

— Among non-Hispanic whites, 91 mg/dL for boys and 100 mg/dL for girls.

— Among non-Hispanic blacks, 99 mg/dL for boys and 102 mg/dL for girls.

— Among Mexican Americans, 93 mg/dL for boys and 92 mg/dL for girls.

Adults

- The mean level of LDL cholesterol for American adults age 20 and older is 127 mg/dL. Levels of 130–159 mg/dL are considered borderline high. Levels of 160–189 mg/dL are classified as high, and levels of 190 mg/dL and higher are very high. (NHANES III [1988–94], CDC/NCHS)

— Among non-Hispanic whites, 20.4 percent of men and 17.0 percent of women have an LDL cholesterol level of 160 mg/dL or higher.

— Among non-Hispanic blacks, 19.3 percent of men and 18.8 percent of women have an LDL cholesterol level of 160 mg/dL or higher.

— Among Mexican Americans, 16.9 percent of men and 14.0 percent of women have an LDL cholesterol level of 160 mg/dL or higher.

HDL (Good) Cholesterol

The higher a person's HDL cholesterol level is, the better. Less than 40 mg/dL in adults is low HDL cholesterol, a risk factor for heart disease and stroke.

Youth

- Mean HDL cholesterol levels among children and adolescents ages 4–19 are (NHANES III [1988–94], CDC/NCHS):

— Among non-Hispanic whites, 48 mg/dL for boys and 50 mg/dL for girls.

— Among non-Hispanic blacks, 55 mg/dL for boys and 56 mg/dL for girls.

— Among Mexican Americans, 51 mg/dL for boys and 52 mg/dL for girls.

Adults

- The mean level of HDL cholesterol for American adults age 20 and older is 50.7 mg/dL. (NHANES III [1988–94], CDC/NCHS)

- Men and women who have low HDL cholesterol and high total cholesterol levels have the highest risk of heart attack. However, men with HDL levels of 37 mg/dL or lower or women whose levels are 47 mg/dL or lower are at a high risk regardless of their total cholesterol level. Conversely, those with high levels of total cholesterol have lower risks of heart attack when they also have higher levels of HDL cholesterol (53 mg/dL or greater in men and 67 mg/dL or greater in women). (FHS, NHLBI)

Physical Inactivity

Population Group	Prevalence 1999–2001
Total Population	38.6%
Total Males	35.8%
Total Females	41.0%
White only males	34.4%
White only females	38.3%
Black or African-American males	45.1%
Black or African-American females	55.1%
American Indian or Alaska Native only males	42.5%
American Indian or Alaska Native only females	55.5%
Hispanic or Latino males	52.6%
Hispanic or Latino females	57.2%
Asian only males	33.4%
Asian only females	42.6%
Native Hawaiian or other Pacific Islander males	38.5%
Native Hawaiian or other Pacific Islander females	27.1%

Note: Prevalence is the percentage of population who report no leisure-time physical activity.

Source: NHIS (1999–2001), CDC/NCHS; data are age-adjusted for Americans age 18 and older.

Prevalence

Youth

- In 2003, 58.5 percent of male and 52.8 percent of female high school students, grades 9–12, were enrolled in physical education (PE) classes. 30.5 percent of males and 26.4 percent of females attended classes daily and 84.5 percent of males and 75.3 percent of females exercised or played sports during an average PE class. *(MMWR,* Vol. 53, No. SS-2, May 21, 2004, CDC/NCHS)

- 2002 data from the Youth Media Campaign Longitudinal Study (YMCLS) of the CDC showed that 61.5 percent of children ages 9–13 don't participate in any organized physical activity (PA) during their nonschool hours and that 22.6 percent don't engage in any free-time PA. Non-Hispanic black and Hispanic children are significantly less likely than non-Hispanic white children to report involvement in organized activities, as are children with parents who have lower incomes and education levels. *(MMWR,* Vol. 52, No. 33, Aug. 22, 2003, CDC/NCHS)

- By the age of 16 or 17, 31 percent of white girls and 56 percent of black girls report no habitual leisure-time activity. *(NEJM* 2002;347:709–15)

    — Lower levels of parental education are associated with

greater decline in activity for white girls at both younger and older ages. For black girls, this association is seen only at the older ages.

— Cigarette smoking is associated with decline in activity among white girls. Pregnancy is associated with decline in activity among black girls but not among white girls.

— A higher BMI is associated with greater decline in activity among girls of both races.

Adults

Prevalences of no leisure-time physical activity by race and sex, in adults age 18 and older: (BRFSS [2002], *MMWR,* Vol. 53, No. 4, Feb. 6, 2004, CDC/NCHS)

Population Group	Men	Women
Non-Hispanic whites	19.2	23.2
Non-Hispanic blacks	27.7	36.0
Hispanics	35.2	40.1
Asian or Pacific Islanders	19.9	28.0
American Indians or Alaska Natives	26.3	29.8

- 2001–2003 data from the BRFSS study of the CDC/NCHS showed that among Asians and Native Hawaiian or Other Pacific Islanders, 21.2 percent of men and 27.0 percent of women reported no leisure-time physical activity. Of these, 21.5 percent were overweight (BMI 25.0–29.9) and 23.8 were obese (BMI 30.0 and over). *(MMWR,* Vol. 53, No. 33; 756–760, August 27, 2004)

- Based on data from the 1999–2001 NHIS survey of the CDC/NCHS… *(Vital and Health Statistics,* Series 10, No. 219, Feb. 2004)

    — 31.3 percent of U.S. adults age 18 and older engage in any regular leisure-time physical activity (PA).

    — Men (64.2 percent) were more likely than women (59.0 percent) to engage in at least some leisure-time PA.

    — Engaging in any PA declined steadily with age from 39.7 percent of adults ages 18–24 to 15.6 percent age 75 and older.

    — Engaging in any regular leisure-time PA was more prevalent among white adults (32.7 percent) than among Asian adults (27.8 percent) and black adults (23.9 percent).

    — Non-Hispanic white adults (65.7 percent) were more likely than non-Hispanic black adults (49.3 percent) and Hispanic adults (45.0 percent) to engage in at least some leisure-time PA.

    — Adults with a graduate degree (80.6 percent) were about twice as likely as adults with less than a high school diploma (41.0 percent) to engage in at least some leisure-time PA.

    — Adults who had incomes four times the poverty level or more (39.9 percent) were about twice as likely as adults with incomes below the poverty level (22.6 percent) to engage in any regular PA.

    — Widowed adults (23.6 percent) were less likely than

never-married adults (33.0 percent), married adults (31.1 percent), and divorced or separated adults (29.1 percent) to engage in regular PA.

— Adults living in the West (65.3 percent) were more likely than adults living in the South (56.4 percent) to engage in at least some leisure-time PA.

- The relative risk of CHD associated with physical inactivity ranges from 1.5 to 2.4, an increase in risk comparable to that observed for high blood cholesterol, high blood pressure or cigarette smoking. *(JAMA* 1995;273:402–7)

- A recent study of over 72,000 female nurses indicates that moderate-intensity physical activity such as walking is associated with a substantial reduction in risk of total and ischemic stroke. *(JAMA* 2000;283:2961–7)

- The prevalence of physical inactivity during leisure time among Mexican Americans is higher than in the general population. (NHANES III [1988–94], CDC/NCHS, *Am J Public Health* 2001;91:1254–7)

  — The prevalence of physical inactivity among those whose main language is English is 15 percent of men and 28 percent of women. This is similar to that of the general population (17 percent of men and 27 percent of women).

  — Those whose main language is Spanish have the highest prevalence of physical inactivity (38 percent of men and 58 percent of women).

Cost

- The annual estimated cost for diseases associated with physical inactivity in 2000 was $76 billion. (CDC)

Prevalence of Students in Grades 9–12 Who Participated in Sufficient Vigorous or Moderate Physical Activity During the Past 7 Days by Race/Ethnicity and Sex
YRBS: 2003
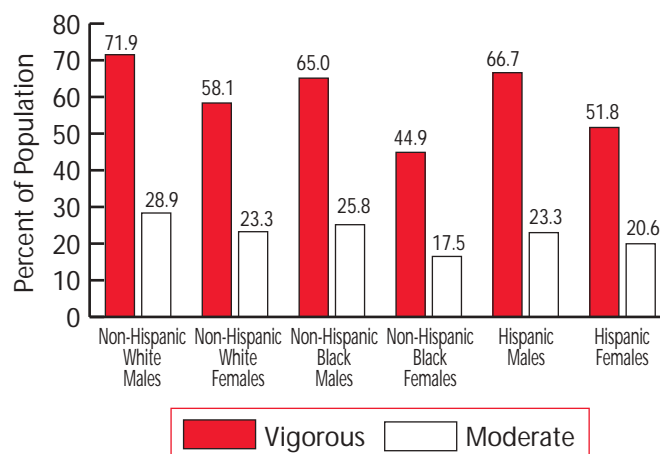
Note: "Vigorous activity" is defined as activity causing sweating and hard breathing for at least 20 minutes on 3 or more of the 7 days. "Moderate activity" is defined as activities such as walking or bicycling lasting for at least 30 minutes on 5 or more of the 7 days.

Source: MMWR, Vol. 53, No. SS-2, May 21, 2004, CDC/NCHS.

Prevalence of Moderate or Vigorous Physical Activity in Americans Age 20 and Older by Race/Ethnicity, Sex, and BMI
NHANES III: 1988–94
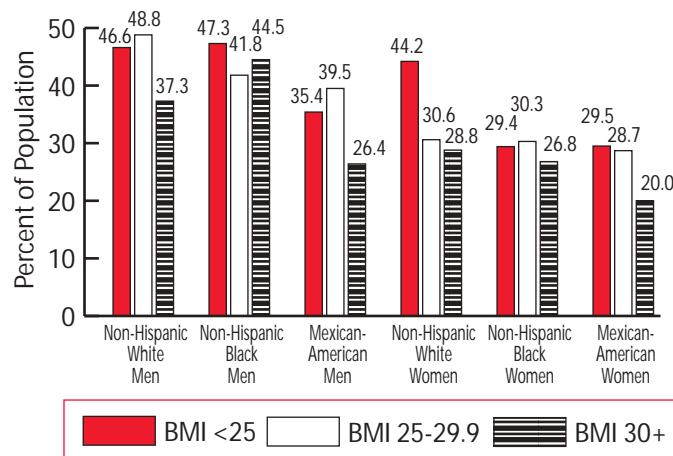
Note: BMI indicates body mass index: weight in kilograms divided by height in meters squared (kg/m^2).

Source: CDC/NCHS.

Overweight and Obesity

Population Group	Prevalence of Overweight in Children Ages 6–11 2002	Prevalence of Overweight in Adolescents Ages 12–19 2002	Prevalence of Overweight and Obesity in Adults 2002	Prevalence of Obesity in Adults 2002
Total population	3,890,000 (15.8%)	5,290,000 (16.1%)	134,750,000 (65.1%)	63,120,000 (30.4%)
Total males	2,130,000 (16.9%)	2,820,000 (16.7%)	68,590,000 (68.8%)	27,480,000 (27.6%)
Total females	1,760,000 (14.7%)	2,470,000 (15.4%)	66,160,000 (61.6%)	35,640,000 (33.2%)
White males	14.0%	14.6%	69.4%	28.2%
White females	13.1%	12.7%	57.2%	30.7%
Black males	17.0%	18.7%	62.9%	27.9%
Black females	22.8%	23.6%	77.2%	49.0%
Mexican American males	26.5%	24.7%	73.1%	27.3%
Mexican American females	17.1%	19.9%	71.7%	38.4%
Hispanics or Latinos*	—	—	65.2%	25.4%
Asians*	—	—	34.5%	7.0%
American Indians or Alaska Natives*	—	—	61.7%	31.3%

Note: BMI (body mass index) = weight in kilograms divided by height in meters squared (kg/m^2).
Data for white, black or African-American, and Asian or Pacific Islander males and females are for non-Hispanics.
(—) = data not available.
Overweight in adults is BMI 25 and higher. Obesity in adults is BMI 30.0 or higher. Overweight in children is BMI 95th percentile or higher of the CDC 2000 growth chart.

* NHIS (2002), CDC/NCHS; data are for Americans age 18 and older.

Sources: NHANES (1999–2002), (JAMA. 2004;291:2847–50); CDC/NCHS data in adults are for age 20 and older. Data are for non-Hispanics.

Prevalence

Youth

- An estimated 9,180,000 children and adolescents ages 6–19 are considered overweight or obese, based on the 95th percentile or higher of body mass index (BMI) values in the 2000 CDC growth chart for the United States. (NHANES [1999–2002], CDC/NCHS)

- Based on data from NHANES (1999–2002), the prevalence of overweight in children ages 6–11 increased from 4.2 percent to 15.8 percent compared with data from 1963–65. The prevalence of overweight in adolescents ages 12–19 increased from 4.6 percent to 16.1 percent. (CDC/NCHS)

- Over 10 percent of preschool children between the ages of 2 and 5 are overweight, up from 7 percent in 1994. (NHANES [1999–2002], CDC/NCHS; JAMA 2004;291:2847–50)

- — Among preschool children, the following are overweight: 8.6 percent of non-Hispanic whites, 8.8 percent of non-Hispanic blacks and 13.1 percent of Mexican Americans.

- — Among children ages 6–11, the following are overweight: 13.5 percent of non-Hispanic whites, 19.8 percent of non-Hispanic blacks and 21.8 percent of Mexican Americans.

- — Among adolescents ages 12–19, the following are overweight: 13.7 percent of non-Hispanic whites, 21.1 percent of non-Hispanic blacks and 22.5 percent of Mexican Americans.

- — In addition, the data show that another 31 percent of children and teens ages 6 to 19 are considered at risk of becoming overweight (BMI from the 85th to the 95th percentile).

Adults

- The age-adjusted prevalence of overweight (BMI of 25.0 or higher) increased from 55.9 percent in NHANES III (1988–94) to 65.1 percent in NHANES (1999–2002). The prevalence of obesity (BMI of 30.0 or higher) also increased during this period from 22.9 percent to 30.4 percent. Extreme obesity (BMI of 40.0 or higher) increased from 2.9 percent to 4.9 percent. (JAMA 2004;291:2847–50)

- Since 1991 the prevalence of those who are obese increased 75 percent. Among states in 2001, Mississippi had the highest rate of obesity and Colorado had the lowest. (BRFSS, CDC/NCHS)

- Data from the BRFSS study of the CDC/NCHS showed that in participants ages 18–24, studied from 1990–2000, obesity increased among every ethnic group, especially in black women. Almost 20 percent of black women were obese by ages 18–24, increasing to over 35 percent by ages 25–44. Between one-third and one-half of those surveyed ate fewer than three servings of fruit and vegetables a day, although older black men and older Hispanic men and women improved dramatically in that regard between 1990 and 2000. (Am J Health Promot 2004;19(1):19)

- Abdominal obesity is an independent risk factor for ischemic stroke in all race ethnic groups with an odds ratio about 3 times greater when comparing the first and fourth quartiles. This effect was larger for those under age 65 (OR=4.4) than over age 65 (OR=2.2). (NOMASS) (Stroke 2003;34:1586–92)

- Among American Indians or Alaska Natives, single-race adults, age 18 and older, the following are overweight or obese: (NHIS [1999–2001], CDC/NCHS, Vital and Health Statistics, Series 10, No. 219, Feb. 2004)

- — 76.6 percent of men and 61.1 percent of women are overweight (BMI of 25 or more).

- — Overall, 34.6 percent are overweight but not obese and 34.2 percent are obese. Among these, 38.0 and 38.6 percent respectively were men and 31.3 and 29.7 percent respectively were women.

- A recent comparison of risk factors in both the HHP and FHS showed a BMI increase around 3 kg/m² raised the risk of hospitalized thromboembolic stroke by 10–30 percent. *(Stroke* 2002;33:230–7)

- In 1998–99, surveys of people in 8 states and the District of Columbia by the BRFSS study of the CDC/NCHS indicated that obesity rates are significantly higher among people with disabilities, especially blacks and those ages 45–64. *(MMWR,* Vol. 51, No. 36, Sept. 13, 2002, CDC/NCHS)

- Data from the FHS showed that overweight and obesity were associated with large decreases in life expectancy. Forty-year-old female nonsmokers lost 3.3 years and 40-year-old male nonsmokers lost 3.1 years of life expectancy because of overweight. In 40-year-old nonsmokers, females lost 7.1 years and males lost 5.8 years due to obesity. Obese female smokers lost 7.2 years and obese male smokers lost 6.7 years when compared to normal-weight nonsmokers. *(Ann Intern Med* 2003;138:24–32)

Mortality

- Each year an estimated 300,000 U.S. adults die of causes related to obesity. *(JAMA* 1999;282:1530–8)

- Obesity profoundly affects life span. A 20-year-old white male with a BMI greater than 45 is estimated to have 13 years of life lost (YLL) due to obesity. A 20-year-old white woman with a BMI greater than 45 is estimated to have 8 YLL due to obesity. For black men the estimate is 20 YLL and for black women the estimate is 5 YLL. *(JAMA* 2003;289:187–93)

Cost

- Nationally, the estimated annual cost attributable to obesity-related diseases is about $100 billion. *(MMWR,* Vol. 51, No. 36, Sept. 13, 2002, CDC/NCHS)

- Among children and adolescents, annual hospital costs related to obesity were $127 million during 1997–99. (CDC) ("Preventing Obesity and Chronic Diseases Through good Nutrition and Physical Activity," www.cdc.gov/nccdphp/pe_factsheets)

Prevalence of Overweight Among Students in Grades 9–12 by Sex and Race/Ethnicity
YRBS: 2003
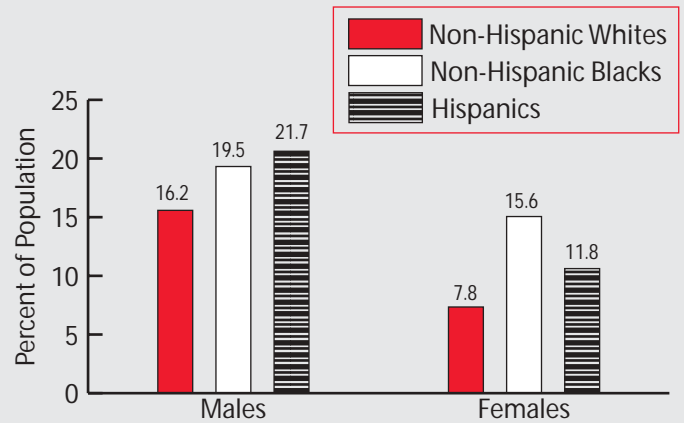
Source: BMI 95th percentile or higher by age and sex of the CDC 2000 growth chart. MMWR, *Vol. 53, No. SS-2, May 21, 2004, CDC/NCHS.*

Age-Adjusted Prevalence of Obesity in Americans Ages 20–74 by Sex and Survey
NHES 1960–62; NHANES: 1971–74, 1976–80, 1988–94 and 1999–2002
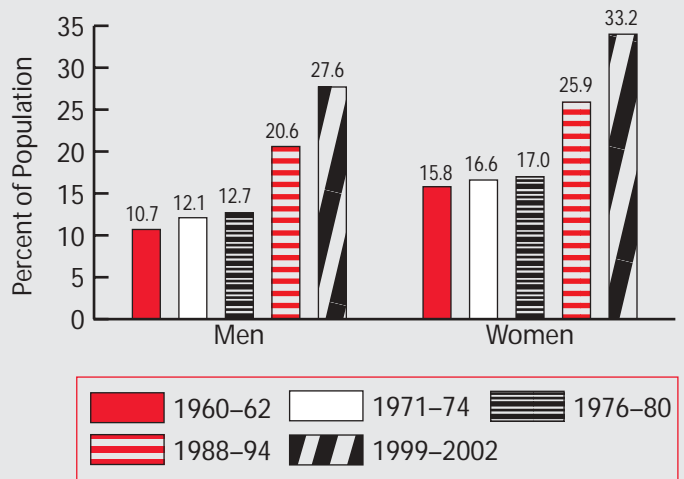
Note: Obesity is defined as a BMI of 30.0 or higher.

Source: CDC/NCHS.

Diabetes Mellitus

(ICD/9 250) (ICD/10 E10–E14)

Population Group	Prevalence of Physician-Diagnosed Diabetes — 2002	Prevalence of Undiagnosed Diabetes — 2002	Prevalence of Pre-Diabetes 2002	Incidence of Diagnosed Diabetes	Mortality 2002	Hospital Discharges 2002
Total population	13,900,000 (6.7%)	5,900,000 (2.8%)	14,500,000 (7.0%)	1,300,000	73,249	577,000
Total males	6,800,000 (7.2%)	2,900,000 (2.9%)	8,500,000 (8.9%)	—	34,301 (46.8%)*	283,000
Total females	7,000,000 (6.3%)	3,000,000 (2.7%)	6,000,000 (5.4%)	—	38,948 (53.2%)*	294,000
White males	6.2%	3.0%	8.6%	—	28,110	—
White females	4.7%	2.7%	4.6%	—	30,349	—
Black males	10.3%	1.3%	8.3%	—	5,207	—
Black females	12.6%	6.1%	5.9%	—	7,480	—
Mexican-American males	10.4%	3.5%	8.7%	—	—	—
Mexican-American females	11.3%	1.8%	7.2%	—	—	—
Hispanics or Latinos**	9.4%	—	—	—	—	—
Asians**	6.3%	—	—	—	—	—
American Indians or Alaska Natives**	16.0%	—	—	—	—	—

Note: Undiagnosed diabetes is defined here for those whose fasting glucose is 126 mg/dL or higher but who did not report being told they had diabetes by a health care provider. Pre-diabetes is a fasting blood glucose of 100 to less than 126 mg/dL (impaired fasting glucose). Pre-diabetes also includes impaired glucose tolerance.

(—) = data not available.

  * These percentages represent the portion of total mortality that is males vs. females.

** NHIS (2002), CDC/NCHS; data are for Americans age 18 and older.

*Sources: **Prevalence:** NHANES [1999–2002], CDC/NCHS and NHLBI; data for white and black males and females are for non-Hispanics; percentages for racial/ethnic groups are age-adjusted for Americans age 20 and older. **Incidence:** NIDDK estimates. **Mortality:** CDC/NCHS; data for white and black males and females include Hispanics. **Hospital discharges:** CDC/NCHS; data include people both living and dead.*

Prevalence

- The prevalence of diabetes increased by 8.2 percent from 2000 to 2001. Since 1990 the prevalence of those diagnosed with diabetes increased 61 percent. In 2001 Alabama had the highest rate of diagnosed diabetes (10.5 percent) and Minnesota had the lowest (5.0 percent). *(JAMA 2003;289:76–9)*

- During 1994–2002 the age-adjusted prevalence of diabetes increased 54.0 percent for U.S. adults, from 4.8 to 7.3 percent, and increased 33.2 percent from 11.5 to 15.3 percent among American Indian or Alaska Native adults. The overall age-adjusted prevalence for American Indian or Alaska Native adults was more than twice that of U.S. adults overall. *(MMWR, Vol. 52, No. 30, Aug. 1, 2003, CDC/NCHS)*

- Based on data from the NHANES studies of the CDC/NCHS, in 1976–80, total diabetes prevalence in African Americans ages 40 to 74 was 8.9 percent; in 1988–94 the rate was 18.2 percent, a doubling of the rate in just 12 years. In 1988–94 among people ages 40 to 74, the prevalence rate was 18.2 percent for African Americans compared to 11.2 percent for whites. *(Diabetes Care 1998;21:518–24)*

- Data from the NHANES (1999–2000) study of the CDC/NCHS showed a disproportionately high prevalence of diabetes in non-Hispanic blacks and Mexican Americans when compared to non-Hispanic whites. For previously diagnosed diabetes the percentage was 11.7 for non-Hispanic blacks and 9.6 for Mexican Americans compared to 4.8 for non-Hispanic whites. For undiagnosed diabetes the percentages were 3.2, 2.4 and 2.6, respectively. For impaired fasting glucose the percentages were 6.3, 6.7 and 5.7, respectively. *(MMWR,* Vol. 52(35);833–7, CDC/NCHS)

- In the NHANES III study of the CDC/NCHS, prevalence in Hispanic Americans ages 40 to 74, the rate was 11.2 percent for non-Hispanic whites, but 20.3 percent for Mexican Americans. (niddk.nih.gov, 2004)

- BRFSS data in selected areas, 1998–2002, showed that diabetes disproportionately affects Hispanics in the U.S. and Puerto Rico. Hispanics were twice as likely to have diabetes as non-Hispanic whites of similar age (9.8 percent vs. 5.0 percent). This disparity, however, varied by geographic location — it was lowest in Florida and higher in California, Texas, and Puerto Rico. Among Hispanic adults in California, Florida, Illinois, New York/New Jersey, Puerto Rico and Texas, the overall prevalence of diabetes was 7.4 percent; it ranged from 6.2 percent in Illinois and New York/New Jersey to 9.3 percent in Puerto Rico. *(MMWR 2004;53(40):941–4)*

- About 15 percent of American Indians or Alaska Natives who receive care from the Indian Health Service have been diagnosed with diabetes. On average, American Indians or Alaska Natives are 2.6 times as likely to have diagnosed diabetes as non-Hispanic whites of the same age. (niddk.nih.gov, 2004)

- The prevalence of diabetes for all age groups worldwide was estimated to be 2.8 percent in 2000 and a projected 4.4 percent in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. [*Diabetes Care* 2004;27(5)]

- Type 2 diabetes may account for 90 to 95 percent of all diagnosed cases of diabetes. (niddk.nih.gov, 2004)

- In April 2004, the USDHHS announced that about 40 percent of U.S. adults ages 40–74, or 41 million, currently have pre-diabetes, a condition that raises a person's risk of developing type 2 diabetes, heart disease and stroke. Many don't know that they are at risk or that they have pre-diabetes. (National Diabetes Education Program, May 2004 E-Newsletter).

- In the U.S. each year, over 13,000 children are diagnosed with type 1 diabetes. Increasingly, healthcare providers are finding more and more children and teens with type 2 diabetes. Some clinics report that one-third to one-half of all new cases of childhood diabetes are now type 2. African American, Hispanic or Latino and American Indian children who are obese and have a family history of type 2 diabetes are at especially high risk for this type of diabetes. (niddk.nih.gov, 2004)

- The risk of diabetes for Mexican Americans and non-Hispanic blacks is almost twice that for non-Hispanic whites. (NHANES III [1988–94], CDC/NCHS, *Diabetes Care* 1998;21:518–24)

- Analysis of data collected in Hawaii from 1996 to 2000 showed that Native Hawaiians were 2.5 times more likely to have diabetes than non-Hispanic white residents of similar age. (niddk.nih.gov, 2004)

- Diabetes is twice as common in Mexican American and Puerto Rican adults as in non-Hispanic whites. The prevalence of diabetes in Cuban Americans is lower, but still higher than that of non-Hispanic whites. (niddk.nih.gov, 2004)

Mortality

Total mention mortality — 218,100.

- The 2002 overall death rate from diabetes was 25.4. Death rates were 26.8 for white males, 49.4 for black males, 20.3 for white females and 48.6 for black females.

- From two-thirds to three-fourths of people with diabetes mellitus die of some form of heart or blood vessel disease.

- Heart disease death rates among adults with diabetes are 2 to 4 times higher than the rates for adults without diabetes. (diabetes.niddk.nih.gov)

- Death rates for people with diabetes are 27 percent higher for African Americans compared with whites. (niddk.nih.gov, 2004)

Aftermath

- The age-adjusted prevalence of major CVD for women with diabetes is twice that for women without diabetes, and the age-adjusted major CVD hospital discharge rate for women with diabetes is almost four times the rate for women without diabetes. *(MMWR,* Vol. 50, No. 43, Nov. 2, 2001, CDC/NCHS)

- A population-based study of over 13,000 men and women in Denmark showed that in people with type 2 diabetes, the relative risk (RR) of first, incident and admission for MI was increased 1.5–4.5 fold in women and 1.5–2 fold in men. The RR of first, incident and admission for stroke was increased 2–6.5 fold in women and 1.5–2 fold in men, with a significant difference between the sexes. In both men and women the RR of death was increased 1.5–2 times. *(Arch Intern Med* 2004;164:1422–6)

- Diabetes increases the risk of stroke, with the RR ranging from 1.8 to almost 6.0. *(Stroke* 2001;32:280–99)

- Diabetes is one of the most important risk factors for stroke in women. In the FHS and in several European studies, the impact of diabetes on stroke risk is greater in women than in men. *(Stroke* 2001;32:280–99; *Neuroepidemiology* 1999;18:1–14)

- Compared with white women, black women have a 138 percent higher rate of ambulatory medical care visits for diabetes. (Utilization of Ambulatory Medical Care by Women: United States, 1997–98. NCHS, 2001)

- Based on data from the CDC Diabetes Surveillance System, 1997–2000:

  — In 2000 the age-standardized prevalence of any self-reported CV condition among persons with diabetes age 35 and older was 37.5 percent for white men, 32.2 percent for white women, 31.4 percent for black men, 34.0 percent for black women, 23.9 percent for Hispanic men and 22.9 percent for Hispanic women.

  — In 2000 the self-reported prevalence of any CV condition was 28.8 per 100 diabetic population among persons ages 35–64, 45.7 per 100 among persons ages 65–74, and 53.5 per 100 persons age 75 and older.

  — In 2000, among persons with diabetes age 35 and older, 37.2 percent reported being diagnosed with a CV condition, (i.e., CHD, stroke or other CV condition).

  — In 2000, among persons with diabetes age 35 and older, the age-standardized prevalence of self-reported CHD, angina or heart attack, was almost three times that of self-reported stroke (22.1 percent vs. 8.0 percent).

— In 2000, 4.4 million persons age 35 and older with diabetes reported being diagnosed with a CV condition. 2.9 million were diagnosed with CHD (i.e., self-reported CHD, angina or heart attack) and 1.1 million reported being diagnosed with a stroke.

Risk

• Among U.S. adults with diabetes, data from the NHANES surveys from 1971–74 to 1999–2000, showed that mean total cholesterol declined from 5.95 mmol/liter to 5.48 mmol/liter. The proportion with high cholesterol decreased from 72 to 55 percent. Mean blood pressure declined from 146/86 mm Hg to 134/72 mm Hg. The proportion with HBP decreased from 64 to 37 percent, and smoking prevalence decreased from 32 to 17 percent. Although these trends are encouraging, still one of two people with diabetes had high cholesterol, one of three had HBP, and one of six was a smoker. *(Am J Epidemiol* 2004;160:531–9)

• Data from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the NIH stated:

— Heart disease is the leading cause of diabetes-related death. Adults with diabetes have heart disease death rates about 2 to 4 times higher than adults without diabetes.

— The risk for stroke is 2 to 4 times higher among people with diabetes.

— About 73 percent of adults with diabetes have blood pressure greater than or equal to 130/80 mm Hg or use prescription medication for hypertension.

— An estimated 49–69 million adults in the United States may have insulin resistance. (Personal communication with Earl Ford, MD, CDC/NCHS, 2003) One in four of them will develop type 2 diabetes. (ndep.nih.gov)

Cost

• In 2002, the direct and indirect cost of diabetes was $132 billion. *(The Burden of Chronic Diseases and Their Risk Factors,* CDC/NCHS, Feb. 2004)

Age-Adjusted Prevalence of Physician-Diagnosed Diabetes in Americans Age 20 and Older by Sex and Race/Ethnicity
NHANES: 1999–2002
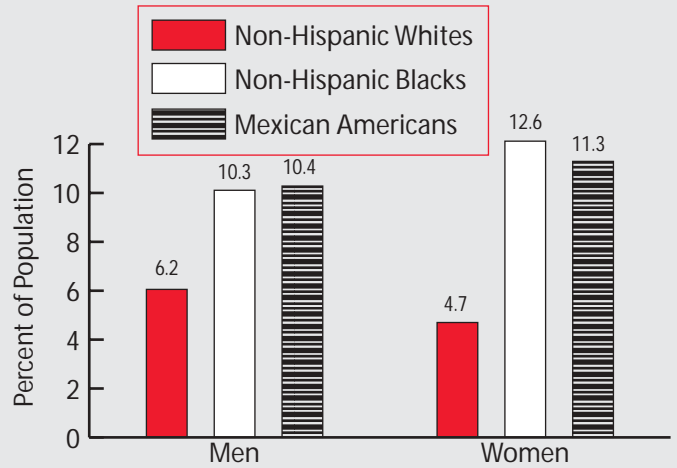
Source:CDC/NCHS and NHLBI.

Prevalence of Non-Insulin-Dependent (Type 2) Diabetes in Women* Ages 25–64 by Race/Ethnicity and Education
NHANES III: 1988–94
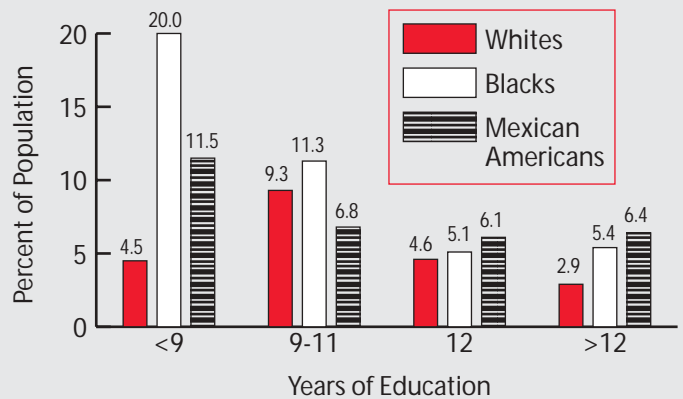
* Findings for men are similar but of lower magnitude. See: Pathways by which SES and ethnicity influence cardiovascular disease risk factors. *Annals New York Academy of Science.* 1999;896:191–209.

Source: JAMA. 1998;280:356–362.

10 Metabolic Syndrome

The Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III, NHLBI) defines the metabolic syndrome (MetS) as three or more of the following abnormalities:

- Waist circumference greater than 102 cm (40 inches) in men and 88 cm (35 inches) in women.
- Serum triglyceride level of 150 mg/dL or higher.
- High-density lipoprotein (HDL) cholesterol level less than 40 mg/dL in men and less than 50 mg/dL in women.
- Blood pressure of 130/85 mm Hg or higher.
- Fasting glucose level of 110 mg/dL or higher.

People with MetS are at increased risk for developing diabetes and cardiovascular disease as well as increased mortality from CVD and all causes.

Prevalence of Metabolic Syndrome Among Adolescents:

The prevalence of MetS among 12–19 year old U.S. adolescents was estimated in an analysis of NHANES III data, by applying a modification of the ATP III definition for adults. MetS during adolescence was defined as three or more of the following abnormalities:

- Serum triglyceride level of 110 mg/dL or higher.
- High-density lipoprotein (HDL) cholesterol level of 40 mg/dL or lower.
- Elevated fasting glucose of 110 mg/dL or higher.
- Blood pressure at or above the 90th percentile for age, sex and height.
- Waist circumference at or above the 90th percentile for age and sex (NHANES III data set)

An estimated 1 million 12–19 year old adolescents in the U.S. have the MetS, or 4.2 percent overall (6.1 percent of males; 2.1 percent of females). [Cook S, et al. *Arch Pediatr Adol Med* 2003;157:821–7]

- Of adolescents with MetS, 73.9 percent were overweight (BMI ≥ 95th percentile of the CDC Growth Chart), and 25.2 percent were at risk of overweight (BMI 85–94th percentile).
- The mean BMI of adolescents with the MetS (30.1 percent) was just above the 95th percentile of the CDC Growth Chart; thus they are likely to represent a fairly common clinical problem in pediatrics.

— MetS was present in 28.7 percent of overweight adolescents (BMI ≥ 95th percentile of CDC Growth Chart) compared with 6.8 percent of at-risk of overweight adolescents, and 0.1 percent of those with BMI below the 85th percentile (P<.001).

— Among adolescents with MetS, 40.9 percent had ≥ 1 criterion; 14.2 percent had ≥ 2 criteria; 4.2 percent had ≥ 3 criteria and 0.9 percent had ≥ 4 criteria for MetS. For overweight adolescents, 88.5 percent had ≥ 1 criterion; 54.4 percent had ≥ 2 criteria; 28.7 percent had ≥ 3 criteria and 5.8 percent had ≥ 4 criteria for MetS.

- Among more than 3,400 children examined in one study, 1 in 10 had the MetS. (De Ferranti, et al. *Circulation* 2003;108:17:IV-727, Meeting Abstract #3286)

- Using a sample of adolescents from NHANES III, the overall prevalence of the MetS in moderately obese subjects was 38.7 percent and 49.7 percent in severely obese subjects. The prevalence of the MetS in severely obese black subjects was 39 percent. *(NEJM 2004;350:2362–74)*

Prevalence of Metabolic Syndrome Among Adults

- An estimated 47 million U.S. residents have the MetS. (NHANES III [1988–94], CDC/NCHS; *JAMA* 2002;287:356–9)

- The age-adjusted prevalence of the MetS for adults is 23.7 percent. (NHANES III [1988–94], CDC/NCHS; *JAMA* 2002;287:356–9)

  — The prevalence ranges from 6.7 percent among people ages 20–29 to 43.5 percent for ages 60–69 and 42.0 percent for those age 70 and older.

  — The age-adjusted prevalence is similar for men (24.0 percent) and women (23.4 percent).

  — Mexican Americans have the highest age-adjusted prevalence of the MetS (31.9 percent). The lowest prevalence is among whites (23.8 percent), African Americans (21.6 percent) and people reporting an "other" race or ethnicity (20.3 percent).

  — Among African Americans, women had about a 57 percent higher prevalence than men. Among Mexican Americans, women had a 26 percent higher prevalence than men did.

- The prevalences of people with the MetS are 24.3, 13.9 and 20.8 percent for white, black and Mexican-American men, respectively. For women the percents are 22.9, 20.9 and

27.2, respectively. (NHANES III [1988–94], CDC/NCHS; *Arch Intern Med* 2003;163)

- In a study of over 15,000 men and women, ages 45 to 64, in the ARIC study, MetS prevalence was 30 percent and 27 percent using ATP III and modified WHO definitions with substantial variation across race and gender subgroups. CHD prevalence was greater in those with than without the MetS (ATP III 7.4 percent vs. 3.6 percent; WHO 7.8 percent vs. 3.6 percent, both p<0.0001). Using either definition, subjects with the MetS were about two times more likely to have prevalent CHD than those without the syndrome after adjustment for established risk factors. Among individuals free of CVD, the average age, sex, and race/center-adjusted intima-media thickness (IMT) was greater among individuals with the syndrome [ATP III 747 vs. 704, WHO 750 vs. 705 micrometers, both p<0.0001]. These data suggest that MetS was significantly associated with the presence of CHD and carotid IMT. *(Am J Cardiol* 2004;94:1249–54)

- A follow-up study of over 19,000 men found that those with the MetS who were fit were less likely to die during the study. The total person-years of follow-up is over 190,000. Those who were deemed to be out of shape were twice as likely as those who were fit to die of CVD or any other cause. An additional study of 2,200 diabetic men found that those who were overweight yet fit had a risk similar to that of their fit, healthy peers. They estimated that moderate exercise, such as walking for 30 minutes five times per week, would be enough to achieve protective fitness levels. *(Arch Intern Med* 2004;164:1092–7)

Total Mortality Rates in U.S. Adults, Ages 30–75, With Metabolic Syndrome (MetS), With and Without Diabetes Mellitus (DM) and Pre-Existing CVD
NHANES II 1976–80 Follow-Up Study*
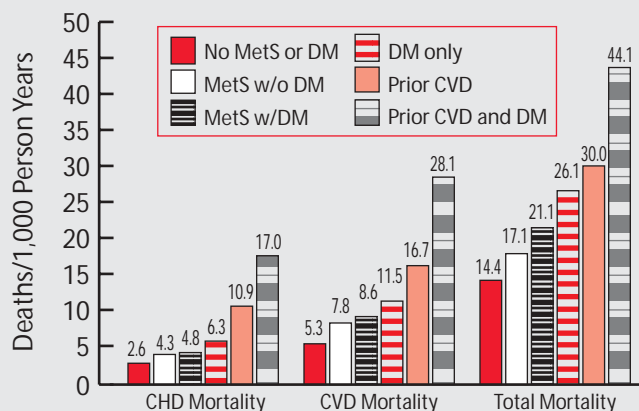
Source: Circulation *2004;110:1245–50.*

* Average of 13 years of follow-up.

11 Nutrition

Mean Dietary Intake of Energy and 10 Key Nutrients for Public Health	Total Population	Males	Females
Energy (kcal)	2,146	2,475	1,833
Protein, percent of calories	14.7%	14.9%	14.6%
Carbohydrate, percent of calories	51.9%	50.9%	52.8%
Total fat, percent of calories	32.7%	32.7%	32.6%
Saturated fat, percent of calories	11.2%	11.2%	11.1%
Cholesterol (mg)	265	307	225
Calcium (mg)	863	966	765
Folate micrograms (mcg)	361	405	319
Iron (mg)	15.2	17.2	13.4
Zinc (mg)	11.4	13.3	9.7
Sodium (mg)	3,375	3,877	2,896

Source: NHANES (1999–2000), CDC/NCHS, 2003. (Advance Data, Vital and Health Statistics, No. 334, April 17, 2003.)

- The Economic Research Service of the USDA suggests that the average daily calorie consumption in the United States in 2000 was 12 percent, or roughly 300 calories, above the 1985 level. Of that increase, grains (mainly refined grains) accounted for 46 percent, added fats 24 percent, added sugars 23 percent, fruits and vegetables 8 percent, and the meat and dairy groups together declined 1 percent. Per capita availability of total dietary fat, after remaining steady from 1985 to 1999, jumped 6 percent in 2000. American diets are also low in whole grains and other nutritious foods. (ers.usda.gov/briefing/consumption)

- Between 1965 and 1991 among U.S. adults age 18 and older, total daily calories declined from 2,049 to 1,807, but then rebounded to 2,000 calories in 1996. This contributed to the marked increase in obesity levels in the past decade. *(Prev Med* 2001;32:245–54)

- In 1999–2000, among children ages 2 to 6, 20 percent had a good diet, 74 percent had a diet that needed improvement, and 6 percent had a poor diet. For those ages 7 to 12, 8 percent had a good diet, 79 percent had a diet that needed improvement, and 13 percent had a poor diet. (America's Children: Key National Indicators of Well-Being, 2003. Federal Interagency Forum on Child and Family Statistics, Washington, DC: U.S. Government Printing Office)

Fat/Meat Consumption

- Between 1965 and 1996 among adults, total fat as a proportion of daily calorie intake fell steadily from 39.1 to 33.1 percent. Saturated fat fell from 14.4 to 11.0 percent. However, total calorie intake increased between 1991 and 1996. Over the same period daily total fat consumption rose from 70.9 grams (g) to 74.8 g. *(Prev Med* 2001;32:245–54)

- The average daily intake of total fat in the United States is 81.4 grams (96.5 g for males and 67.3 g for females). (NHANES III [1988–94], CDC/NCHS)
  - For non-Hispanic whites the average is 82.7 grams (99.0 g for males and 67.4 g for females).
  - For non-Hispanic blacks the average is 82.0 grams (94.6 g for males and 71.2 g for females).
  - For Mexican Americans the average is 77.6 grams (88.0 g for males and 66.5 g for females).

- The average daily intake of saturated fat in the United States is 27.9 grams (33.1 g for males and 23.0 g for females). (NHANES III [1988–94], CDC/NCHS)
  - For non-Hispanic whites the average is 28.4 grams (34.1 g for males and 23.1 g for females).
  - For non-Hispanic blacks the average is 27.5 grams (31.7 g for males and 23.8 g for females).
  - For Mexican Americans the average is 26.7 grams (30.1 g for males and 23.1 g for females).

- The proportion of fat calories from beef, pork, dairy products and eggs fell from 50 percent in 1965 to 33 percent in 1994–96. The proportion of fat calories from poultry increased from 4 percent to 7 percent. Calories from fruits and vegetables rose from 8 percent to 13 percent. *(Prev Med* 2001;32:245–54)

- In 1994–96, pizza, Mexican food, Chinese food, hamburgers, French fries and cheeseburgers accounted for 10.8 percent of total fat intake. These six foods accounted for only 1.9 percent of fat intake in 1965. *(Prev Med* 2001;32:245–54)

- The major sources of saturated fat in the diet are red meat, butter, whole milk and eggs. Intake of these foods has fallen markedly since 1965. The decline in whole milk consumption from 21.3 gallons in 1972–76 to 8.2 gallons in 1997 accounts for most of the reduction in saturated fat. *(Prev Med* 2001;32:245–54)

- According to USDA data, in 2001 total meat consumption (red meat, poultry and fish) amounted to 194 pounds per person, 16 pounds above the level in 1970. Each American consumed an average of 21 pounds less red meat (mostly beef) than in 1970, 34 pounds more poultry and 3.4 pounds more fish. (ers.usda.gov/briefing/consumption)

Cholesterol

- The average daily intake of dietary cholesterol in the United States is 269.6 mg. For males it's 323.5 mg and for females it's 218.9 mg. (NHANES III [1988–94], CDC/NCHS)
  - For non-Hispanic whites the average is 259.3 milligrams (312.6 mg for males and 209.1 mg for females).
  - For non-Hispanic blacks the average is 297.9 milligrams (358.8 mg for males and 245.6 mg for females).
  - For Mexican Americans the average is 316.2 milligrams (365.9 mg for males and 263.8 mg for females).

Fiber

- The recommended daily intake of dietary fiber is 25 grams or more. Americans consume a daily average of 15.6 grams of dietary fiber (17.8 g for males and 13.6 g for females). (NHANES III [1988–94], CDC/NCHS)
  - For non-Hispanic whites the average is 15.8 grams (18.1 g for males and 13.7 g for females).
  - For non-Hispanic blacks the average is 13.4 grams (15.0 g for males and 12.0 g for females).
  - For Mexican Americans the average is 18.5 grams (21.0 g for males and 15.9 g for females).
- Analysis of participants in the Cardiovascular Health Study (CHS) showed that cereal fiber consumption late in life was associated with lower risk of incident CVD, supporting recommendations for elderly people to increase consumption of dietary cereal fiber. *(JAMA* 2003;289:1659–66)

Fruits/Vegetables

- In 2000, 81 percent of men and 73 percent of women reported eating fewer than five servings of fruits and vegetables a day. More than 60 percent of young people eat too much fat, and less than 20 percent eat the recommended five or more servings of fruits and vegetables each day. (CDC/NCHS, BRFSS, 2000)

- Only 22.7 percent of adults consumed fruits and vegetables at least 5 times a day in 1996. This was an increase from 19.0 percent in 1990. (BRFSS [1990–96], CDC/NCHS)
- The highest proportion of adults who consumed fruits and vegetables at least 5 times a day were those age 65 and older, whites, college graduates, those actively engaged in leisure-time physical activity, and nonsmokers. *(Prev Med* 2001;32:245–54)
- The percentage of men who consumed fruits and vegetables at least 5 times a day increased from 16.5 percent in 1990 to 19.1 percent in 1996. The percentage of women increased from 21.3 percent in 1990 to 26.2 percent in 1996. *(Am J Public Health* 2000;90:777–81)
- From 1990 to 1996 the percentage of obese adults who consumed at least 5 servings of fruits and vegetables a day dropped from 16.8 percent to 15.4 percent. *(Prev Med* 2001;32:245–54)
- Recent studies support the intake of up to 9 servings of fruits and vegetables per day. *(NEJM* 1997;336:1117–24)
- In 2003, the percentage of students in grades 9–12 who reported eating fruits and vegetables 5 or more times per day was 23.6 percent for males and 20.3 percent for females. (YRBS, U.S., 2003, MMWR, Vol. 53, No. SS-2, May 21, 2004, CDC/NCHS)
  - Black students (24.5 percent) were more likely than white students (20.2 percent) to have eaten 5 or more servings per day. This racial/ethnic difference was significantly higher for male students.

Costs

- Each year over $33 billion in medical costs and $9 billion in lost productivity due to heart disease, cancer, stroke and diabetes are attributed to diet. (CDC)

12 Quality of Care

The Institute of Medicine defines quality of care as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." *(Crossing the quality chasm: a new health system for the 21st century. National Academy Press, 2001.)* This section of the Update highlights national data on rates of compliance with quality measures for several cardiovascular conditions.

National Medicare and Medicaid Data

In 2003 the Centers for Medicare and Medicaid Services published national data on quality of cardiovascular care indicators for hospitalized Medicare beneficiaries in 2000–01. Only patients who were candidates for each quality indicator were considered (i.e., patients with contraindications to a given therapy were not considered).

Acute myocardial infarction	Percent of inpatients
Aspirin within 24 hours of admission	85%
Aspirin at discharge	86%
Beta blocker within 24 hours of admission	69%
Beta blocker at discharge	79%
ACE inhibitor for patients with LVEF <40%	74%
Smoking cessation advice given	43%
Median time for thrombolysis	45 minutes
Median time to primary angioplasty	107 minutes

Heart failure	Percent of inpatients
Evaluation of LVEF	70%
ACE inhibitor for patients with LVEF <40%	68%

Stroke	Percent of inpatients
Warfarin for atrial fibrillation	57%
Antithrombotic therapy for stroke or TIA	84%

Overall, the improvement for these specific quality indicators between 1998–99 and 2000–01 was very modest, 2–7 percent.

National Veterans Health Administration Data

The VA collects national quality performance data related to cardiovascular disease. Aggregate data from 158 VA hospitals from January 1, 2003 to January 1, 2004 are listed below *(Office of Quality and Performance, Veterans Health Administration).* Only patients who were candidates for each quality indicator were considered (i.e., patients with contraindications to a given therapy were not considered).

Acute myocardial infarction	Percent of inpatients
Aspirin within 24 hours of admission	96%
Aspirin at discharge	98%
Beta blocker within 24 hours of admission	94%
Beta blocker at discharge	98%
ACE inhibitor for patients with LVEF <40%	92%
Smoking cessation advice given	87%

Heart failure	Percent of inpatients
Documentation of LVEF	99%
ACE inhibitor for patients with LVEF <40%	92%
Complete discharge instructions	76%
Smoking cessation advice given	76%

Hypertension	Percent of inpatients
Blood pressure at goal (<140/90)	68%

Cholesterol	Percent of outpatients
Cholesterol screening in all patients	91%
Cholesterol measured after acute MI	94%
LDL cholesterol <130 mg/dL after acute MI	78%

National Managed Care Data

For 2003, the National Committee for Quality Assurance reported on 5 quality-of-care performance measures for cardiovascular disease prevention and treatment (The State of Health Care Quality 2003, Industry Trends and Analysis, NCQA). Note that NCQA data is reported voluntarily by participating managed care plans, and that performance data apply to patients receiving medical care from providers participating in specific managed care plans in the United States.

Use of beta blockers after a heart attack

- In 2002, 93.5 percent of heart attack survivors enrolled in commercial managed care plans were receiving a beta blocker at the time of discharge from the hospital, an increase from 62 percent in 1996. If all practices were performed at the 90th percentile level, an additional 1,726 deaths could be avoided each year.

Cholesterol screening in patients with coronary heart disease

- In 2002, 79 percent of patients enrolled in commercial managed care plans and hospitalized for heart attack, bypass surgery or angioplasty were screened for LDL cholesterol between 60 and 365 days after discharge. This proportion represented an increase from 59 percent in 1998.

Cholesterol control in patients with coronary heart disease

- In 2002, 61 percent of patients enrolled in commercial managed care plans and hospitalized for heart attack, bypass surgery or angioplasty were treated to an LDL cholesterol goal of less than 130 mg/dL. This proportion represented an increase from 45 percent in 1999. If all practices were performed at the 90th percentile level, 6,500 deaths could be avoided each year. Note that this treatment goal is less aggressive than the LDL goal of less than 100 mg/dL endorsed by the American Heart Association and the National Cholesterol Education Program.

Control of high blood pressure

- In 2002, 58 percent of adults enrolled in commercial managed care plans and diagnosed with high blood pressure were controlled to levels less than140/90 mm Hg. This proportion represented an increase from 40 percent in 1999. More than 28,000 lives could be saved and nearly 50,000 strokes could be prevented each year if everyone with diagnosed hypertension received care at rates seen at the 90th percentile (68 percent control).

Control of diabetes

- In 2002, 33 percent of adults enrolled in commercial managed plans and diagnosed with diabetes were poorly controlled (HbA1c >9.5 or not tested). This proportion represented a decrease from 38 percent in 1998. (The AHA diabetes management goal is to reduce HbA1c to less than 7 percent.)

Advising smokers to quit

- In 2002, 68 percent of smokers enrolled in commercial managed care plans were advised to quit, an increase from 59 percent in 1996. Nearly 2,700 lives could be saved each year if all Americans smokers were advised to quit at the rates seen in plans at the 90th percentile.

American Heart Association GWTG-CAD Program

Get With The Guidelines[SM] (GWTG) is a national quality improvement initiative of the American Heart Association to help hospitals redesign systems of care to improve guidelines adherence in patients admitted with a cardiovascular or stroke event.

The table below summarizes baseline pre-intervention performance on the selected quality indicators. These were collected from 30 consecutive patients from 398 hospitals.

Performance indicator	Percent of inpatients
Aspirin at discharge	91%
Beta blocker at discharge	79%
ACE inhibitor at discharge	57%
Lipid therapy at discharge	60%
Lipid therapy at discharge if LDL >100 mg/dL	72%
Blood pressure therapy at discharge	70%
Smoking cessation counseling	65%
Referral to cardiac rehabilitation	47%

These data demonstrate the treatment gaps for each of the quality-of-care indicators. GWTG aims to bridge these gaps in care. Information on GWTG can be found on this Web site.

National Heart Failure Data

The ADHERE (Acute Decompensated HEart Failure National REgistry) Registry is a national observational registry of patients hospitalized with acutely decompensated heart failure. Hospitals from all regions of the country participate, including community, tertiary and academic. The demographics of the 260 hospitals participating are representative of the nation's hospitals as a whole. The Joint Commission on Accreditation of Health Care Organizations (JCAHO) has created, tested and validated a set of heart failure core quality-of-care measures.

Mean performance of the JCAHO quality indicators from 40,046 patients enrolled August 2003 through July 2004 from these 260 U.S. hospitals was as follows:

JCAHO Performance indicators	Percent of inpatients
Complete set of discharge instructions	47%
Measure of LV function	87%
ACE inhibitor at discharge for patients with LVEF < 40 percent, no contraindications	74%
Smoking cessation counseling, current smokers	64%
Additional measures	
ACE inhibitor and/or ARB at discharge for patients with LVEF < 40 percent, no contraindications	82%
Beta blockers at discharge for patients with LVEF < 40 percent, no contraindications	73%

These patients were hospitalized with a primary diagnosis of heart failure. The mean age was 72.1 years and 52 percent of them were female. 58 percent of HF patients had a history of coronary artery

disease. Mechanical ventilation was required in 4.0 percent of patients. In-hospital mortality was 3.8 percent and mean length of hospital stay was 5.8 days (median 4.3 days).

Further information on the ADHERE registry can be found at adhereregistry.com.

National Acute Coronary Syndrome Data

CRUSADE (Can Rapid Stratification of Unstable Angina Patients Suppress ADverse Outcomes with Early Implementation of the ACC/AHA Guidelines?) is a national quality improvement initiative designed to increase adherence to guideline-recommended care for patients hospitalized with non-ST-segment elevation myocardial infarction or unstable angina. Over 440 hospitals participate nationwide. Treatment measures from the CRUSADE registry from a data set of 40,530 patients who were enrolled in the registry from July 2003 through June 2004 are as follows:

Acute Medications* (within 24 hrs)	Overall	'Leading' Centers (Top 25%)	'Lagging' Centers (Bottom 25%)
Aspirin	94%	97%	89%
Beta blocker	85%	92%	76%
Heparin, Any	86%	92%	75%
Glycoprotein IIb-IIIa Inhibitor, Any	42%	57%	24%
Discharge Medications**			
Aspirin	92%	97%	83%
Clopidogrel	66%	73%	52%
Beta blocker	88%	93%	78%
ACE-I, Overall	60%	68%	48%
ACE-I, Among Recommended#	63%	71%	51%
Lipid-lowering Agent, Overall	74%	82%	60%
Lipid-lowering Agent, Recommended+	84%	89%	75%
Procedures***			
Cardiac Catheterization, Overall	73%	89%	59%
Cardiac Catheterization, Within 48 hours of Presentation	53%	69%	40%

*   Excluding patients with contraindications to these therapies

**   Excluding patients with contraindications, transfers out, and deaths

\#   Including only patients with history of hypertension, diabetes, CHF, and LVEF<40%

\+   Including only patients with history of hyperlipidemia or LDL>100mg/dL

*** Excluding patients with contraindications to cardiac catheterization

Note that not all of the treatment measures reported above are established quality indicators. Further information on the CRUSADE registry can be found at its Web site (www.CRUSADEQI.com).

Medical Procedures and Costs 13

From 1979 to 2002 the total number of cardiovascular operations and procedures increased 470 percent.

Cardiac Catheterization

- From 1979 to 2002 the number of cardiac catheterizations increased 389 percent.

- An estimated 1,463,000 inpatient cardiac catheterizations were performed in 2002.

- The average total charge for patients hospitalized for diagnostic cardiac catheterization increased from $11,232 in 1993 to $16,838 in 2000. The total number of patients increased from 626,690 to 693,472, while the average length of stay decreased from 4.7 days to 3.6 days. (Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, HCUPnet, 2000. hcup.ahrq.gov)

Coronary Artery Bypass Surgery

In the United States in 2002, the NCHS estimates that 515,000 of these procedures were performed on 306,000 patients.

Heart Transplants

In 2003, 2,057 heart transplants were performed in the United States. There are 291 organ transplant centers in the United States, 173 of which perform heart transplants.

- In the United States, 74 percent of heart transplant patients are male, 74 percent are white, 21 percent are ages 35–49, and 47 percent are ages 50–64.

- In 2002 the 1-year survival rate was 86.8 percent, and the 2-year rate was 80.9 percent. In 2003, the 1-year survival rate was 86.9 percent.

- As of 10/31/04, there were 3,366 heart patients on the transplant waiting list.

Trends in Heart Transplants
UNOS: 1968–2003
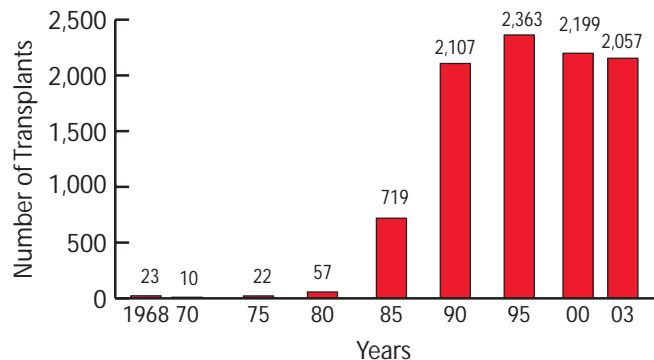
Source: United Network for Organ Sharing (UNOS), scientific registry data.

Percutaneous Transluminal Coronary Angioplasty (PTCA)

- An estimated 657,000 PTCA procedures were performed on 640,000 patients in 2002 in the United States. From 1987 to 2002 the number of procedures increased 324 percent.

- In 2002, 66 percent of PTCA procedures were performed on men; 50 percent were performed on people age 65 and older.

- The rate of coronary stent insertion increased 147 percent between 1996 and 2000. Among the elderly, this procedure increased 168 percent during the same period. The rate of stent insertion also more than doubled for the population 45–64 years of age, increasing from 157 to 318 per 100,000. (*Health Care in America: Trends in Utilization.* CDC/NCHS 2003.)

2002 National HCUP Statistics

Data from the latest Healthcare Cost and Utilization Project (HCUP) provide data for the mean charges and in-hospital death rate for the following (hcup.ahrq.gov):

Procedure	Mean Charges	In-Hospital Death Rate
Coronary artery bypass graft	$60,853	2.4%
PTCA	28,558	0.9%
Diagnostic cardiac catheterization	17,763	1.0%
Cardiac pacemaker or cardioverter defibrillator	40,852	1.7%
Endarterectomy, vessel of head and neck	16,890	0.4%
Heart valves	85,187	5.8%

2002 data from the Healthcare Cost and Utilization Project (HCUP) provide the national bill for the top 100 CCS (Clinical Classifications Software) diagnoses treated in U.S. hospitals (hcup.ahrq.gov):

Primary Diagnosis	Rank	National Bill
Coronary atherosclerosis	1	$38.4 billion
Acute MI	2	27.8 billion
Congestive HF, nonhypertensive	4	21.8 billion
Cardiac dysrhythmias	8	14.3 billion
Acute cerebrovascular disease	9	13.9 billion

Estimated* Inpatient Cardiovascular Operations, Procedures and Patient Data by Sex, Age and Region

United States: 2002 (in Thousands)

Operations/Procedures/Patients (ICD/9 Code)		Total	Sex Male	Female	<15	Age 15–44	45–64	65+	Region# Northeast	Midwest	South	West
Angioplasty (36.0)	Procedures	1,204	802	402	—	76	517	608	211	323	416	254
PTCA (36.01, .02, .05) (a)	Procedures	657	434	223	—	37	283	331	110	182	223	130
	Patients	640	423	217	—	41	278	321	112	175	221	132
Stenting (36.06)	Procedures	537	363	174	—	34	228	273	95	138	186	118
Cardiac Revascularization (Bypass) (36.1–36.3) (b)	Procedures	515	373	142	—	19	217	279	104	117	204	90
	Patients	306	219	88	—	12	128	166	60	68	125	54
Diagnostic Cardiac Catheterizations (37.2) (a)	Procedures	1,463	884	579	10	123	597	732	281	342	585	255
Endarterectomy (38.12)	Procedures	134	79	56	—	—	33	101	33	29	55	17
Implantable Defibrillators (37.94–.99)	Procedures	63	45	11	—	—	21	36	13	14	20	9
Open-Heart Surgery (c)	Procedures	709	476	233	30	41	261	368	160	150	258	127
Pacemakers (37.8) (d)	Procedures	199	101	99	—	—	21	172	50	36	78	36
Valves (35.1, .2, .99) (e)	Procedures	93	49	44	—	9	19	56	25	15	25	18
Total Vascular and Cardiac Surgery and Procedures (35–39)**		**6,813**	**3,967**	**2,845**	**210**	**681**	**2,384**	**3,538**	**1,370**	**1,463**	**2,601**	**1,378**

Note: (–) = data not available.

*   Breakdowns are not available for some procedures, so entries for some categories don't add to totals. These data include codes where the estimated number of procedures is fewer than 5,000. Categories of such small numbers are considered unreliable by CDC/NCHS and in some cases may have been omitted.
** Totals include procedures not shown here.
\#   Regions: Northeast — Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont
    Midwest — Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
    South — Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia
    West — Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming
(a) — Does not include procedures in the outpatient or other non-hospitalized setting; thus, excludes some cardiac catheterizations and PTCAs.
(b) — Because one or more procedure codes are required to describe the specific bypass procedure performed, it's impossible from this (mixed) data to determine the average number of grafts per patient.
(c) — Includes valves, bypass and 101,000 "other" open-heart procedures. (Codes 35 [less 35.1–35.2, 35.4, 35.96, 35.99]; 36 [less 36.0–36.1]; 37.1, 37.3–37.5.)
(d) — There are additional insertions, revisions and replacements of pacemaker leads, including those associated with temporary (external) pacemakers.
(e) — Open heart valvuloplasty without replacement; replacement of heart valve; other operations on heart valves.

Source: Health Resources Utilization Branch, CDC/NCHS. Estimates are based on a sample of inpatient records from short-stay hospitals in the United States (National Hospital Discharge Survey).

Trends in Cardiovascular Operations and Procedures
United States: 1979–2002
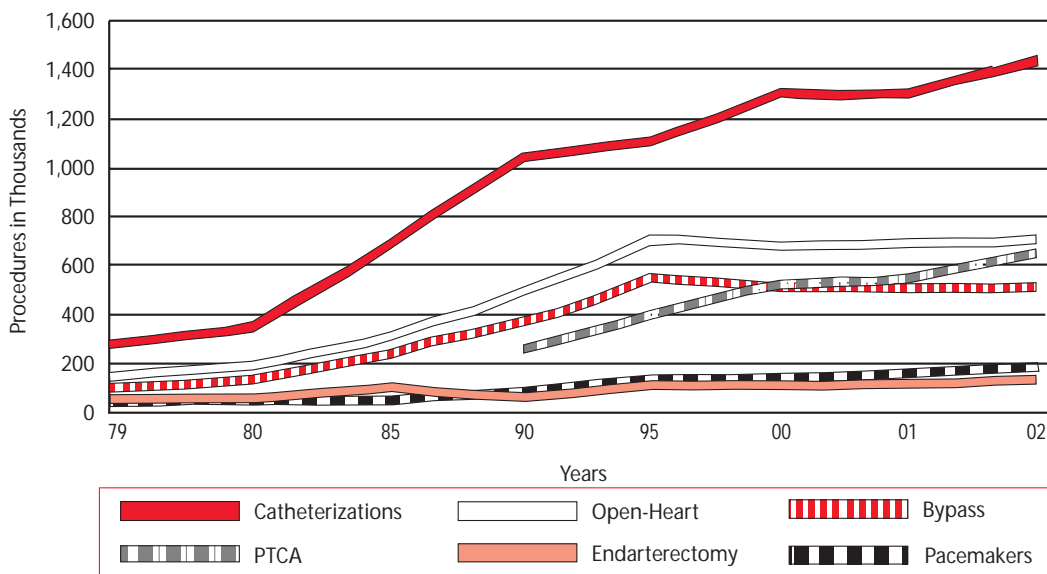
Source: CDC/NCHS.

The cost of cardiovascular diseases and stroke in the United States in 2005 is estimated at $393.5 billion. This figure includes health expenditures (direct costs, which include the cost of physicians and other professionals, hospital and nursing home services, the cost of medications, home health care and other medical durables) and lost productivity resulting from morbidity and mortality (indirect costs). By comparison, in 2004 the estimated cost of all cancers was $190 billion ($69 billion in direct costs, $17 billion in morbidity indirect costs and $104 billion in mortality indirect costs). In 1999 the estimated cost of HIV infections was $28.9 billion ($13.4 billion direct and $15.5 billion indirect).

Estimated Direct and Indirect Costs (in Billions of Dollars) of Cardiovascular Diseases and Stroke
United States: 2005
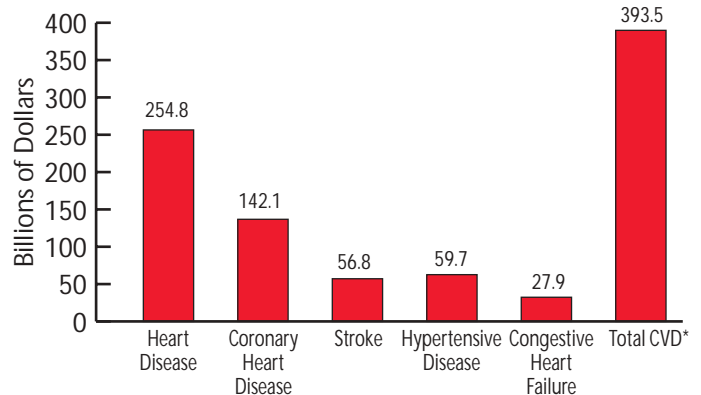
Estimated Direct and Indirect Costs (in Billions of Dollars) of Cardiovascular Diseases and Stroke
United States: 2005

	Heart Diseases**	Coronary Heart Disease	Stroke	Hypertensive Disease	Congestive Heart Failure	Total Cardiovascular Disease*
Direct Costs						
Hospital	$77.7	$39.9	$14.8	$6.0	$14.7	$109.8
Nursing Home	19.1	10.0	13.2	3.9	3.6	39.3
Physicians/Other Professionals	18.5	10.4	2.9	10.4	1.9	36.0
Drugs/Other Medical Durables	19.4	9.0	1.2	22.3	2.9	45.9
Home Health Care	4.8	1.4	2.9	1.6	2.2	10.9
Total Expenditures*	**$139.5**	**$70.7**	**$35.0**	**$44.2#**	**$25.3**	**$241.9**
Indirect Costs						
Lost Productivity/Morbidity	21.4	9.4	6.3	7.5	—	34.8
Lost Productivity/Mortality##	93.9	62.0	15.5	8.0	2.6	116.8
Grand Totals*	**$254.8**	**$142.1**	**$56.8**	**$59.7**	**$27.9**	**$393.5**

Note: (–) = data not available.

* Totals do not add up due to rounding and overlap.

** This category includes coronary heart disease, congestive heart failure, part of hypertensive disease, cardiac dysrhythmias, rheumatic heart disease, cardiomyopathy, pulmonary heart disease, and other or ill-defined "heart" diseases.

\# Tom Hodgson and Liming Cai (*Medical Care* 2001) estimated that healthcare expenditures attributed to hypertension that could be allocated to cardiovascular complications and other diagnoses totaled $108 billion in 1997.

\#\# Lost future earnings of persons who will die in 2005, discounted at 3 percent.

Sources: *Hodgson TA, Cohen AJ. Medical care expenditures for selected circulatory diseases: opportunities for reducing national health expenditures. Medical Care. 1999;37:994–1012.*

National Health Expenditures Amounts, and Average Annual Percent Change, by Type of Expenditure: Selected Calendar Years 1990–2013 (cms.hhs.gov).

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All estimates prepared by Thomas Thom, NHLBI.

At-a-Glance Summary Tables
Men and Cardiovascular Diseases

Diseases and Risk Factors	Total Population	Total Males	White Males	Black Males	Mexican-American Males
Total CVD					
Prevalence 2002	70.1 M (34.2%)	32.5 M (34.4%)	34.3%	41.1%	29.2%
Mortality 2002 (preliminary)	927.4K	433.8 K	375.4 K	49.0 K	—
Coronary Heart Disease					
Prevalence 2002 CHD	13.0 M (6.9%)	7.1 M (8.4%)	8.9%	7.4%	5.6%
Prevalence 2002 MI	7.1 M (3.5%)	4.1 M (5.0%)	5.1%	4.5%	3.4%
Prevalence 2002 AP	6.4 M (3.8%)	3.1 M (4.2%)	4.5%	3.1%	2.4%
New and recurrent CHD*	1.2 M	715.0 K	650.0 K	65.0 K	—
New and recurrent MI	865.0 K	520.0 K	—	—	—
Incidence AP (stable angina)	400.0 K	—	—	—	—
Mortality 2002 CHD	494.4 K	252.8 K	223.3 K	24.3 K	—
Mortality 2002 MI	179.5 K	93.8 K	83.3 K	8.7 K	—
Stroke					
Prevalence 2002	5.4 M (2.6%)	2.4 M (2.5%)	2.3%	4.0%	2.6%
New and recurrent attacks	700.0 K	327.0 K	277.0 K	50.0 K	—
Mortality 2002	162.7 K	62.6 K	53.0 K	7.8 K	—
High Blood Pressure					
Prevalence 2002	65.0 M (32.3%)	29.4M (31.5%)	30.6%	41.8%	27.8%
Mortality 2002	49.7 K	20.5 K	14.7 K	5.3 K	—
Congestive Heart Failure					
Prevalence 2002	4.9 M (2.3%)	2.4 M (2.6%)	2.5%	3.1%	2.7%
Mortality 2001	52.8 K	19.8 K	17.8 K	1.8 K	—
Tobacco					
Prevalence 2002	48.5 M (22.5%)	26.3 M (25.2%)	25.2%	27.0%	—
Blood Cholesterol					
Prevalence 2002:					
Total cholesterol 200 mg/dL+	106.9 M (50.7%)	50.4 M (50.4%)	51.0%	37.3%	54.3%
Total cholesterol 240 mg/dL+	37.7 M (18.3%)	16.9 M (17.2%)	17.8%	10.6%	17.8%
LDL cholesterol 130 mg/dL+	95.0 M (45.8%)	48.6 M (48.5%)	49.6%	46.3%	43.6%
HDL cholesterol <40 mg/dL	54.7 M (26.4%)	39.0 M (39.0%)	40.5%	24.3%	40.1%
Physical Inactivity					
Prevalence 1999–2001	38.6%	35.8%	34.4%	45.1%	—
Overweight and Obesity					
Prevalence 2002:					
Overweight BMI 25.0 or higher	134.8 M (65.1%)	68.6 M (68.8%)	69.4%	62.9%	73.1%
Obesity BMI 30.0 or higher	63.1 M (30.4%)	27.5 M (27.6%)	28.2%	27.9%	27.3%
Diabetes Mellitus					
Prevalence 2002:					
Physician-diagnosed diabetes	13.9 M (6.7%)	6.8 M (7.2%)	6.2%	10.3%	10.4%
Undiagnosed diabetes	5.9 M (2.8%)	2.9 M (2.9%)	3.0%	1.3%	3.5%
Pre-diabetes	14.5 M (7.0%)	8.5 M (8.9%)	8.6%	8.3%	8.7%
Incidence	1.3M	—	—	—	—
Mortality	73.2 K	34.3 K	28.1 K	5.2 K	—

Note: AP = angina pectoris (chest pain); BMI = body mass index; CHD = coronary heart disease; includes heart attack, angina pectoris (chest pain) or both; CVD = cardiovascular disease; K = thousands; M = millions; MI = myocardial infarction (heart attack); mg/dL = milligrams per deciliter; (—) = data not available.

* New and recurrent heart attacks and fatal CHD.

*Sources: See expanded version of the 2005 statistical update, at **americanheart.org/statistics**. For data on men in other ethnic groups, see other chapters and Statistical Fact*

Diseases and Risk Factors	Total Population	Total Females	White Females	Black Females	Mexican-American Females
Total CVD					
Prevalence 2002	70.1 M (34.2%)	37.6 M (33.9%)	32.4%	44.7%	29.3%
Mortality 2002 (preliminary)	927.4 K	493.6 K	428.5 K	56.7 K	—
Coronary Heart Disease					
Prevalence 2002 CHD	13.0 M (6.9%)	5.9 M (5.6%)	5.4%	7.5%	4.3%
Prevalence 2002 MI	7.1 M (3.5%)	3.0 M (2.3%)	2.4%	2.7%	1.6%
Prevalence 2002 AP	4.8 M (3.8%)	3.3 M (3.6%)	3.5%	4.7%	2.2%
New and recurrent CHD*	1.2 M	485.0 K	425.0 K	60.0 K	—
New and recurrent MI	865.0 K	345.0 K	—	—	—
Incidence AP (stable angina)	400.0 K	—	—	—	—
Mortality 2002 CHD	494.4 K	241.6 K	211.9 K	25.9 K	—
Mortality 2002 MI	179.5 K	85.7 K	74.6 K	9.6 K	—
Stroke					
Prevalence 2002	5.4 M (2.6%)	3.0 M (2.6%)	2.6%	3.9%	1.8%
New and recurrent attacks	700.0 K	373.0 K	312.0 K	61.0 K	—
Mortality 2002	162.7 K	100.1 K	86.8 K	11.0 K	—
High Blood Pressure					
Prevalence 2002	65.0 M (32.3%)	35.6M (32.8%)	31.0%	45.4%	28.7%
Mortality 2002	49.7 K	29.2 K	22.3 K	6.3 K	—
Congestive Heart Failure					
Prevalence 2002	4.9 M (2.3%)	2.5M (2.1%)	1.9%	3.5%	1.6%
Mortality 2001	52.8 K	33.0 K	29.9 K	2.8 K	—
Tobacco					
Prevalence 2002	48.5 M (22.5%)	21.2 M (20.0%)	20.7%	18.5%	—
Blood Cholesterol					
Prevalence 2002:					
Total cholesterol 200 mg/dL+	106.9 M (50.7%)	56.5 M (50.9%)	53.6%	46.4%	44.7%
Total cholesterol 240 mg/dL+	37.7 M (18.3%)	20.8 M (19.1%)	19.9%	17.7%	13.9%
LDL cholesterol 130 mg/dL+	95.0 M (45.8%)	46.4 M (43.3%)	43.7%	41.6%	41.6%
HDL cholesterol <40 mg/dL	54.7 M (26.4%)	15.9 M (14.9%)	14.5%	13.0%	18.4%
Physical Inactivity					
Prevalence 1999–2001	38.6%	41.0%	38.3%	55.1%	—
Overweight and Obesity					
Prevalence 2002:					
Overweight BMI 25.0 or higher	134.8 M (65.1%)	66.2 M (61.6%)	57.2%	77.2%	71.7%
Obesity BMI 30.0 or higher	63.1 M (30.4%)	35.6 M (33.2%)	30.7%	49.0%	38.4%
Diabetes Mellitus					
Prevalence 2002:					
Physician-diagnosed diabetes	13.9 M (6.7%)	7.0 M (6.3%)	4.7%	12.6%	11.3%
Undiagnosed diabetes	5.9 M (2.8%)	3.0 M (2.7%)	2.7%	6.1%	1.8%
Pre-diabetes	14.5 M (7.0%)	6.0 M (5.4%)	4.6%	5.9%	7.2%
Incidence	1.3 M	—	—	—	—
Mortality	73.2 K	38.9 K	30.3 K	7.5 K	—

Note: AP = angina pectoris (chest pain); BMI = body mass index; CHD = coronary heart disease; includes heart attack, angina pectoris (chest pain) or both; CVD = cardiovascular disease; K = thousands; M = millions; MI = myocardial infarction (heart attack); mg/dL = milligrams per deciliter; (—) = data not available.

* New and recurrent heart attacks and fatal CHD.

*Sources: See expanded version of the 2005 statistical update, at **americanheart.org/statistics**. For data on women in other ethnic groups, see other chapters and Statistical Fact Sheets.*

At-a-Glance Summary Tables
Ethnic Groups and Cardiovascular Diseases

Diseases and Risk Factors	Total Population	Whites		Blacks/African Americans		Mexican Americans		Hispanics/ Latinos	
		Males	Females	Males	Females	Males	Females	Males	Females
Total CVD									
Prevalence 2002	70.1 M (34.2%)	34.3%	32.4%	41.1%	44.7%	29.2%	29.3%	—	—
Mortality 2002 (preliminary)	927.4 K	375.4 K	428.5 K	49.0 K	56.7 K	—	—	—	—
Coronary Heart Disease									
Prevalence 2002 CHD	13.0 M (6.9%)	8.9%	5.4%	7.4%	7.5%	5.6%	4.3%	4.8%	
Prevalence 2002 MI	7.1 M (3.5%)	5.1%	2.4%	4.5%	2.7%	3.4%	1.6%	—	—
Prevalence 2002 AP	6.4 M (3.8%)	4.5%	3.5%	3.1%	4.7%	2.4%	2.2%	—	—
New and recurrent CHD*	1.2 M	650.0 K	425.0 K	65.0 K	60.0 K	—	—	—	—
Mortality 2002 CHD	494.4 K	223.3 K	211.9 K	24.3 K	25.9 K	—	—	—	—
Mortality 2002 MI	179.5 K	83.3 K	74.6 K	8.7 K	9.6 K	—	—	—	—
Stroke									
Prevalence 2002	5.4 M (2.6%)	2.3%	2.6%	4.0%	3.9%	2.6%	1.8%	2.4%	
New and recurrent attacks	700.0 K	277.0 K	312.0 K	50.0 K	61.0 K	—	—	—	—
Mortality 2002	162.7 K	53.0 K	86.8 K	7.8 K	11.0 K	—	—	—	—
High Blood Pressure									
Prevalence 2002	65.0 M (32.3%)	30.6%	31.0%	41.8%	45.4%	27.8%	28.7%	18.2%	
Mortality 2002	49.7 K	14.7 K	22.3 K	5.3 K	6.3 K	—	—	—	—
Congestive Heart Failure									
Prevalence 2002	4.9 M (2.3%)	2.5%	1.9%	3.1%	3.5%	2.7%	1.6%	—	—
Mortality 2001	52.8 K	17.8 K	29.9 K	1.8 K	2.8 K	—	—	—	—
Tobacco									
Prevalence 2002	48.5 M (22.5%)	25.2%	20.7%	27.0%	18.5%	—	—	23.2%**	12.5%**
Blood Cholesterol									
Prevalence 2002:									
Total cholesterol 200 mg/dL+	106.9 M (50.7%)	51.0%	53.6%	37.3%	46.4%	54.3%	44.7%	—	—
Total cholesterol 240 mg/dL+	37.7 M (18.3%)	17.8%	19.9%	10.6%	17.7%	17.8%	13.9%	25.6%	
LDL cholesterol 130 mg/dL+	95.0 K (45.8%)	49.6%	43.7%	46.3%	41.6%	43.6%	41.6%	—	—
HDL cholesterol <40 mg/dL	54.7 K (26.4%)	40.5%	14.5%	24.3%	13.0%	40.1%	18.4%	—	—
Physical Inactivity									
Prevalence 1999–2001	38.6%	34.4%	38.3%	45.1%	55.1%	—	—	52.6%	57.2%
Overweight and Obesity									
Prevalence 2002:									
Overweight BMI 25.0 or higher	134.8 M (65.1%)	69.4%	57.2%	62.9%	77.2%	73.1%	71.7%	65.2%	
Obesity BMI 30.0 or higher	63.1 M (30.4%)	28.2%	30.7%	27.9%	49.0%	27.3%	38.4%	25.4%	
Diabetes Mellitus									
Prevalence 2002:									
Physician-diagnosed diabetes	13.9 M (6.7%)	6.2%	4.7%	10.3%	12.6%	10.4%	11.3%	9.4%	
Undiagnosed diabetes	5.9 M (2.8%)	3.0%	2.7%	1.3%	6.1%	3.5%	1.8%	—	—
Pre-diabetes	14.5 M (7.0%)	8.6%	4.6%	8.3%	5.9%	8.7%	7.2%	—	—
Incidence	1.3 M	—	—	—	—	—	—	—	—
Mortality	73.2 K	28.1 K	30.3 K	5.2 K	7.5 K	—	—	—	—

Note: AP = angina pectoris (chest pain); BMI = body mass index; CHD = coronary heart disease; includes heart attack, angina pectoris (chest pain) or both; CVD = cardiovascular disease; K = thousands; M = millions; MI = myocardial infarction (heart attack); mg/dL = milligrams per deciliter; (—) = data not available.

* New and recurrent heart attacks and fatal CHD.
** Data are for 1999–2001.

*Sources: See expanded version of the 2005 statistical update, at **americanheart.org/statistics**. For data on other ethnic groups, see other chapters and Statistical Fact Sheets.*

Diseases and Risk Factors	Total Population	Total Males	Total Females	Non-Hispanic Whites		Non-Hispanic Blacks		Mexican Americans	
				Males	Females	Males	Females	Males	Females
Congenital Defects									
Mortality 2001 (all ages)	4.1 K	2.2 K	1.9 K	1.8 K	1.5 K	0.4 K	0.3 K	—	—
Mortality 2001 (< age 15)	2.1 K	1.2 K	1.0 K	—	—	—	—	—	—
Tobacco									
Prevalence ages 12–17: Current cigarette use 1999–2001	—	13.3%	14.2%	14.9%	17.2%	8.2%	5.9%	11.4%*	10.6%*
High school students (Grades 9-12): Current cigarette smoking 2003	—	21.8%	21.9%	23.3%	26.6%	19.3%	10.8%	19.1%*	17.7%*
Current cigar smoking 2003	—	19.9%	9.4%	21.3%	8.6%	19.5%	10.3%	14.9%*	12.2%*
Smokeless tobacco use 2003	—	11.0%	2.2%	13.2%	1.6%	4.1%	2.0%	6.1%*	3.3%*
Blood Cholesterol									
Ages 4–19: Mean total cholesterol mg/dL	165	163	167	162	166	168	171	163	165
Ages 4–19: Mean HDL cholesterol mg/dL	—	—	—	48	50	55	56	51	52
Ages 12–19: Mean LDL cholesterol mg/dL	—	—	—	91	100	99	102	93	92
Physical Inactivity									
Prevalence 2003 grades 9–12: Vigorous activity last 7 days	—	—	—	71.9%	58.1%	65.0%	44.9%	66.7%*	51.8%*
Moderate activity last 7 days	—	—	—	28.9%	23.3%	25.8%	17.5%	23.3%*	20.6%*
Overweight									
Prevalence 2002:									
Preschool children ages 2–5	>10%	—	—	8.6%		8.8%		13.1%	
Children ages 6–11	3.9 M (15.8%)	2.1 M (16.9%)	1.8 M (14.7%)	14.0%	13.1%	17.0%	22.8%	26.5%	17.1%
Adolescents ages 12–19	5.3 M (16.1%)	2.8 M (16.7%)	2.5 M (15.4%)	14.6%	12.7%	18.7%	23.6%	24.7%	19.9%
Students grades 9–12	—	—	—	16.2%	7.8%	19.5%	15.6%	21.7%*	11.8%*

Note: K = thousands; M = millions; mg/dL = milligrams per deciliter; overweight in children is body mass index (BMI) 95th percentile of the CDC 2000 growth chart; (—) = data not available.

* Hispanic.

*Sources: See expanded version of the 2005 statistical update, at **americanheart.org/statistics**. For more data on congenital defects, see pages 24-25, and our Statistical Fact Sheet, **Congenital Cardiovascular Defects.***

Age-Adjusted Rates — Used mainly to compare the rates of two or more communities, population groups or the nation as a whole, over time. We use a standard population (2000), so that these rates aren't affected by changes or differences in the age composition of the population.

Body Mass Index (BMI) — A mathematical formula to assess body weight relative to height. The measure correlates highly with body fat. Calculated as weight in kilograms divided by the square of the height in meters (kg/m2).

Centers for Disease Control and Prevention/National Center for Health Statistics (CDC/NCHS) — A division of the U.S. Department of Health and Human Services (USDHHS). The CDC conducts the:

- *Behavioral Risk Factor Surveillance System (BRFSS),* an ongoing study.

The NCHS conducted the:

- *National Health Examination Survey (NHES).*
- *National Health and Nutrition Examination Survey I (NHANES I, 1971–74).*
- *National Health and Nutrition Examination Survey II (NHANES II, 1976–80).*
- *National Health and Nutrition Examination Survey III (NHANES III, 1988–94).* Prevalence estimates for coronary heart disease, stroke and congestive heart failure are based on the self-reported questionnaire portion of this study. Exam-based estimates are being developed.
- *National Health and Nutrition Examination Survey (NHANES, 1999–2000).*

The NCHS also conducts these ongoing studies (among others):

- *National Health Interview Survey (NHIS)*
- *National Hospital Ambulatory Medical Care Survey*
- *National Home and Hospice Care Survey*
- *National Hospital Discharge Survey*

Centers for Medicare and Medicaid Services (CMS), formerly Health Care Financing Administration (HCFA) — The federal agency that administers the Medicare, Medicaid and Child Health Insurance Programs, which provide health insurance for more than 74 million Americans.

Comparability Ratio — Provided by the NCHS to allow time-trend analysis from one ICD revision to another. It compensates for the "shifting" of deaths from one causal code number to another. Its application to mortality based on one ICD revision means that mortality is "comparability-modified" to be more comparable to mortality coded to the other ICD revision.

Coronary Heart Disease (ICD/10 codes I20–I25) — This category includes acute myocardial infarction (I21–I22); other acute ischemic (coronary) heart disease (I24); angina pectoris (I20); atherosclerotic cardiovascular disease (I25.0); and all other forms of chronic ischemic heart disease (I25.1–I25.9).

Death Rate — The relative frequency with which death occurs within some specified interval of time in a population. National death rates are computed per 100,000 population. Dividing the mortality by the population gives a crude death rate. It's restricted because it doesn't reflect a population's composition with respect to such characteristics as age, sex, race or ethnicity. Thus rates calculated within specific subgroups, such as age-specific or sex-specific rates, are often more meaningful and informative. They allow you to look at well-defined subgroups of the total population.

Diseases of the Circulatory System — ICD codes (I00–I99); included as part of what the American Heart Association calls "Cardiovascular Disease." You can obtain mortality data for states from cdc.gov/nchs, by direct communication with the CDC/NCHS, or from our National Center Biostatistics Program Coordinator on request. (See "Total Cardiovascular Disease" in this Glossary.)

Diseases of the Heart — Classification the NCHS uses in compiling the leading causes of death. Includes acute rheumatic fever/chronic rheumatic heart diseases (I00–I09); hypertensive heart disease (I11) and hypertensive heart and renal disease (I13); coronary heart disease (I20–I25); pulmonary heart disease and diseases of pulmonary circulation (I26–I28); congestive heart failure (I50.0); and other forms of heart disease (I29–I49, I50.1–I51). "Diseases of the Heart" is not equivalent to "Total Cardiovascular Disease," which we prefer to use to describe the leading causes of death. "Diseases of the Heart" represents about three-fourths of "Total Cardiovascular Disease" mortality.

Health Care Financing Administration (HCFA) — See Centers for Medicare and Medicaid Services (CMS).

Hispanic Origin — In U.S. government statistics, "Hispanic" includes persons who trace their ancestry to Mexico, Puerto Rico, Cuba, Spain, the Spanish-speaking countries of Central or South America, the Dominican Republic or other Spanish cultures, regardless of race. It doesn't include people from Brazil, Guyana, Suriname, Trinidad, Belize and Portugal because Spanish is not the first language in those countries. Much of our data are for Mexican Americans or Mexicans, as reported by government agencies or specific studies. In many cases, data for all Hispanics are more difficult to obtain.

Hospital Discharges — The number of inpatients discharged from short-stay hospitals where some type of disease was the first listed diagnosis. Discharges include people both living and dead.

ICD and ICDA Codes — A classification system in standard use in the United States. The "International Classification of Diseases, Adapted" (ICDA) is based on the "International Classification of Diseases" (ICD) published by the World Health Organization. This system is reviewed and revised about every 10 to 20 years to ensure its continued flexibility and feasibility. We are in the tenth revision (ICD/10) with the release of 1999 final mortality data.

The ICD revisions can cause considerable change in the number of deaths reported for a given disease. The NCHS provides "comparability ratios" to compensate for the "shifting" of deaths from one ICD code to another. In this booklet we use the reported mortality when we want to show one year's data. When we want to compare the number or rate of deaths with that of an earlier year, then we use the "comparability-modified" number or rate.

Incidence — An estimate of the number of new cases of a disease that develop in a population in a one-year period. For some statistics, new and recurrent attacks or cases are combined. The incidence of a specific disease is estimated by multiplying the incidence rates reported in community- or hospital-based studies by the U.S. population. **The rates change only when new data are available; they are not computed annually.**

Major Cardiovascular Diseases — Disease classification commonly reported by the NCHS; represents ICD codes I00–I78. We don't use "Major CVD" for any calculations. See "Total Cardiovascular Disease" in this Glossary.

Morbidity — Incidence and prevalence rates are both measures of morbidity, that is, measures of various effects of disease on a population.

Mortality — The total number of deaths from a given disease in a population during a specific interval of time, usually a year. These data are compiled from death certificates and sent by state health agencies to the NCHS. The process of verifying and tabulating the data takes about two years. For example, 2002 mortality statistics, the latest available, didn't become available until late 2004. Mortality is "hard" data, so it's possible to do time-trend analysis and compute percent changes over time.

National Heart, Lung, and Blood Institute (NHLBI) — An institute in the National Institutes of Health in the U.S. Department of Health and Human Services. The NHLBI conducts such studies as the:

- *Framingham Heart Study (FHS) (1948 to date).*
- *Honolulu Heart Program (HHP) (1965–97).*
- *Cardiovascular Health Study (CHS) (1988 to date).*
- *Atherosclerosis Risk in Communities (ARIC) study (1985 to date).*
- *Strong Heart Study (SHS) (1989–92; 1991–98).*

The NHLBI also publishes the reports of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. JNC 7 is the most recent.

National Institute of Neurological Disorders and Stroke (NINDS) — An institute in the National Institutes of Health in the U.S. Department of Health and Human Services. The NINDS sponsors and conducts research studies such as these:

- *Greater Cincinnati/Northern Kentucky Stroke Study (GCNKSS)*
- *Rochester (Minnesota) Stroke Epidemiology Project*
- *Northern Manhattan Stroke Study (NOMASS)*
- *Brain Attack Surveillance in Corpus Christi (BASIC) Project*

Prevalence — An estimate of the total number of cases of a disease existing in a population at a specific point in time. Prevalence is sometimes expressed as a percentage of population. Rates for specific diseases are calculated from periodic health examination surveys that government agencies conduct. Annual changes in prevalence as reported in this booklet only reflect changes in the population; **rates do not change until there's a new survey.**

NOTE: In the data tables which precede the different disease and risk factor categories, if the percentages shown are age-adjusted, they will not add to the total.

Race and Hispanic Origin — Race and Hispanic origin are reported separately on death certificates. In this publication, unless otherwise specified, deaths of Hispanic origin are included in the totals for whites, blacks, American Indians or Alaska Natives and Asian or Pacific Islanders, according to the race listed on the decedent's death certificate. Data for Hispanic persons include all persons of Hispanic origin of any race. See "Hispanic Origin" in this Glossary.

Stroke (ICD/10 codes I60–I69) — This category includes subarachnoid hemorrhage (I60); intracerebral hemorrhage (I61); other nontraumatic intracranial hemorrhage (I62); cerebral infarction (I63); stroke, not specified as hemorrhage or infarction (I64); occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction (I65); occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction (I66); other cerebrovascular diseases (I67); cerebrovascular disorders in diseases classified elsewhere (I68) and sequalae of cerebrovascular disease (I69).

Total Cardiovascular Disease (ICD/10 codes I00–I99, Q20–Q28) — This category includes rheumatic fever/rheumatic heart disease (I00–I09); hypertensive diseases (I10–I15); ischemic (coronary) heart disease (I20–I25); pulmonary heart disease and diseases of pulmonary circulation (I26–I28); other forms of heart disease (I30–I52); cerebrovascular disease (stroke) (I60–I69); atherosclerosis (I70); other diseases of arteries, arterioles and capillaries (I71–I79); diseases of veins, lymphatics and lymph nodes, not classified elsewhere (I80–I89); and other and unspecified disorders of the circulatory system (I95–I99). When data are available, we include congenital cardiovascular defects (Q20–Q28).

Total Mention Mortality — The total number of times in a given year that a disease was listed on death certificates as an underlying or contributing cause of death.

Abbreviation Guide

ACE . . . . angiotensin-converting enzyme	LV. . . . . left ventricular
ACS . . . . acute coronary syndrome	LVEF . . . . left ventricular ejection fraction
ADHERE . . . . Acute Decompensated HEart Failure National REgistry	MACDP . . . . Metropolitan Atlanta Congenital Defects Program
AED . . . . automated external defibrillator	MetS. . . . . metabolic syndrome
AF . . . . atrial fibrillation	mg/dL. . . . . milligrams per deciliter
AHA. . . . . American Heart Association	MI. . . . . myocardial infarction
AIDS . . . . acquired immune deficiency syndrome	mm Hg . . . . millimeters of mercury
AJC . . . . American Journal of Cardiology	MMWR . . . . Morbidity and Mortality Weekly Report
AP . . . . angina pectoris	NCEP . . . . National Cholesterol Education Program
ARIC . . . . Atherosclerosis Risk in Communities	NCHS. . . . . National Center for Health Statistics
ATP . . . . Adult Treatment Panel	NCQA . . . . National Committee for Quality Assurance
BMI . . . . body mass index	NEJM. . . . . New England Journal of Medicine
BP. . . . . blood pressure	NHANES . . . . National Health and Nutrition Examination Survey
BRFSS . . . . Behavioral Risk Factor Surveillance System	NHES . . . . National Health Examination Survey
BWIS . . . . Baltimore-Washington Infant Study	NHIS . . . . National Health Interview Survey
CAD . . . . coronary artery disease	NHLBI . . . . National Heart, Lung, and Blood Institute
CDC . . . . Centers for Disease Control and Prevention	NIHSS . . . . National Institutes of Health Stroke Scale
CHD . . . . coronary heart disease	NINDS . . . . National Institute of Neurological Disorders and Stroke
CHF . . . . congestive heart failure	NOMASS. . . . . Northern Manhattan Stroke Study
CHS . . . . Cardiovascular Health Study	NRMI. . . . . National Registry of Myocardial Infarction
CMS . . . . Centers for Medicare and Medicaid Services	NVSS . . . . National Vital Statistics System
CPI . . . . Consumer Price Index	OR . . . . odds ratio
CPR . . . . cardiopulmonary resuscitation	PA. . . . . physical activity
CVD . . . . cardiovascular disease	PAD . . . . peripheral arterial disease
DVT . . . . deep vein thrombosis	PTCA . . . . percutaneous transluminal coronary angioplasty
ED . . . . emergency department	PE. . . . . pulmonary embolism
EMS . . . . emergency medical services	PTE . . . . pulmonary thromboembolism
ER . . . . emergency room	PVD . . . . peripheral vascular disease
ESRD . . . . end-stage renal disease	RF. . . . . rheumatic fever
FHS . . . . Framingham Heart Study	RHD. . . . . rheumatic heart disease
GCNKSS . . . . Greater Cincinnati/Northern Kentucky Stroke Study	RR . . . . relative risk
GWTG . . . . Get With The Guidelines^{SM}	SAH . . . . subarachnoid hemorrhage
HBP . . . . high blood pressure	SCD . . . . sudden cardiac death
HCFA. . . . . Health Care Financing Administration	SES. . . . . socioeconomic status
HCUP. . . . . Healthcare Cost and Utilization Project	SHS . . . . Strong Heart Study
HDL . . . . high-density lipoprotein	STEMI . . . . ST elevation myocardial infarction
HHP . . . . Honolulu Heart Program	TIA. . . . . transient ischemic attack
HIV . . . . human immunodeficiency virus	UA . . . . unstable angina
ICD. . . . . International Classification of Diseases	UNOS. . . . . United Network for Organ Sharing
ICDA . . . . International Classification of Diseases, Adapted	USDA. . . . . United States Department of Agriculture
ICH. . . . . intracerebral hemorrhage	USDHHS . . . . United States Department of Health and Human Services
JACC . . . . Journal of the American College of Cardiology	VF . . . . ventricular fibrillation
JAMA. . . . . Journal of the American Medical Association	VSD . . . . ventricular septal defect
JCAHO. . . . . Joint Commission on Accreditation of Health Care Organizations	VTE . . . . venous thromboembolism
JNC . . . . Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure	WHO . . . . World Health Organization
	YLL . . . . years of life lost
kcal . . . . kilocalories	YMCLS . . . . Youth Media Campaign Longitudinal Study
LDL . . . . low-density lipoprotein	YRBS . . . . Youth Risk Behavior Surveillance

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For heart- or risk-related
information, call 1-800-AHA-USA1
(1-800-242-8721) or contact your
nearest office. You can also visit us
online at americanheart.org.

For stroke information, call our
American Stroke Association at
1-888-4-STROKE (1-888-478-7653),
or visit StrokeAssociation.org.
For information on life after stroke,
call and ask for the Stroke Family
Support Network.

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