

American Heart Association 

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American Stroke Association

A Division of American Heart Association

# Heart Disease and Stroke Statistics — 2004 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](http://americanheart.org). Click on “Publications & Resources,” then “Statistics,” then “Statistical Fact Sheets.”

## Populations

- African Americans and Cardiovascular Diseases — Statistics
- American Indians/Alaska Natives and Cardiovascular Diseases — Statistics
- Asian/Pacific Islanders and Cardiovascular Diseases — Statistics
- Baby Boomers and Cardiovascular Diseases — Statistics
- Hispanics/Latinos and Cardiovascular Diseases — Statistics
- International Cardiovascular Disease Statistics [includes death rates by country]**
- Men and Cardiovascular Diseases — Statistics
- Older Americans and Cardiovascular Diseases — Statistics
- Whites and Cardiovascular Diseases — Statistics
- Women and Cardiovascular Diseases — Statistics
- Youth and Cardiovascular Diseases — Statistics

## Risk Factors

- Diabetes Mellitus — Statistics
- High Blood Cholesterol and Other Lipids — Statistics
- High Blood Pressure — Statistics
- Overweight and Obesity — Statistics
- Physical Inactivity — Statistics
- Tobacco — Statistics

## Miscellaneous

- Cardiovascular Procedures — Statistics
- Congenital Cardiovascular Defects — Statistics
- Death Rates by State — Statistics
- Hospital Discharges for Cardiovascular Diseases — Statistics
- Leading Causes of Death — Statistics
- Nutrition and Cardiovascular Diseases — Statistics
- Out-of-Hospital Cardiac Deaths by State — 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

## Check Our Web Sites

For more information on cardiovascular diseases including stroke, see [americanheart.org](http://americanheart.org) and [StrokeAssociation.org](http://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 2001 unless otherwise noted. Incidence estimates come from specific studies and remain the same until new studies become available. “Total mention mortality” is for 2000. Economic costs are for 2004. **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 mistakes.**

If you have questions about statistics or any points made in this booklet, please contact the Biostatistics Consultant 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](http://americanheart.org). Click on “Publications & Resources,” then “Statistics,” then “Heart Disease and Stroke Statistics — 2004 Update.”

## Acknowledgement

We would like to thank the members of the Council on Epidemiology and Prevention’s Committee on Statistics and the Stroke Statistics Committee for their contributions to this booklet.

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# Women, Children and Cardiovascular Diseases

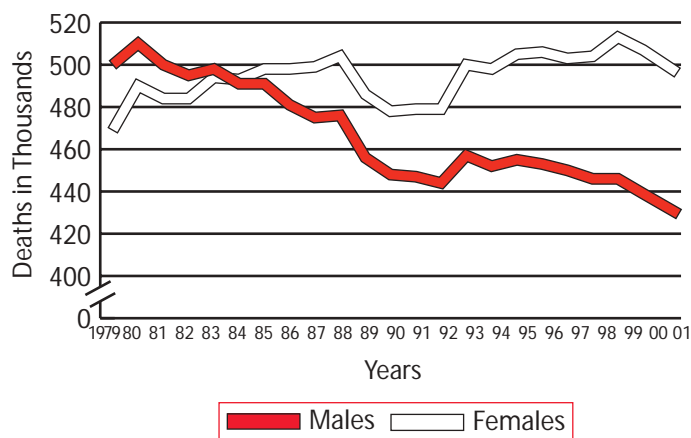
Cardiovascular diseases are pervasive — and so are myths about them.

One of the enduring half-truths about CVD is that “heart disease is a man’s disease.” The fact is, cardiovascular diseases are devastating to women, too.

In terms of total deaths, in every year since 1984, CVD has claimed the lives of more females than males. And the gap between male and female deaths is wide, as the graph below shows.

## Cardiovascular Disease Mortality Trends for Males and Females

United States: 1979-2001



Source: CDC/NCHS.

The harsh fact is, cardiovascular diseases are the No. 1 killer of women and men. **These diseases cause about a death a minute among females — claiming nearly half a million female lives every year. That’s more lives than the next 7 causes of death combined.** Starting at age 75, the prevalence of CVD among women is higher than among men.

Another myth is that “CVD only affects old people.” While older people are at higher risk, such a sweeping generalization overlooks a staggering number of young victims. CVD ranks as the No. 3 cause of death (behind certain conditions originating in the perinatal period and accidents) for children under age 15. And in 2001 about 197,000 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, but children can develop other forms of CVD, such as high blood pressure and end-stage renal disease. And that’s not all.

- In 2000 in the United States, about 1,300 hospitalizations were for children under age 20 with acute or subacute bacterial endocarditis; 600 with acute myocarditis; 1,500 with acute pericarditis; and 2,600 with chronic pericarditis.
- About 7,700 hospitalizations were for children with arrhythmia, including 5,000 with supraventricular tachycardia and 2,700 with ventricular tachycardia.
- About 4,800 hospitalizations were for children with cardiomyopathy, and 400 with hypertrophic cardiomyopathy.
- About 150 hospitalizations were for children with acute rheumatic fever including carditis, and 1,900 with chronic rheumatic fever.
- Kawasaki disease, an inflammatory disease that occurs nearly exclusively in children, can result in coronary artery damage if not treated promptly. In 2000 there were about 4,300 hospitalizations for Kawasaki disease.

Note: These estimates are based on a national survey of hospital discharges, but given their relatively small numbers, their precision is highly variable.

Stroke among children is a serious and largely unrecognized problem, killing many and leaving others with often severe deficits. Strokes in children occur disproportionately in infants, particularly among those under age 1. For more data on stroke in children, see page 15.

Cardiovascular diseases exact a devastating toll on our kids. The statistics above only hint at the problem.

When it comes to cardiovascular disease, myths that promote complacency promote disease. We all need to know these three truths: Cardiovascular disease is a man’s disease. Cardiovascular disease is a woman’s disease. And cardiovascular disease is a child’s disease, too.

Statistics showing the impact of cardiovascular diseases and risk factors on women and children appear throughout this book and in the At-a-Glance Summary Tables. For more information, see our Statistical Fact Sheets, **Congenital Cardiovascular Defects, Women and Cardiovascular Diseases** and **Youth and Cardiovascular Diseases**. Instructions to find them on our Web site are on the inside front cover.

# Cardiovascular Diseases

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

Population Group	Prevalence 2001	Mortality 2001	Hospital Discharges 2001	Cost 2004
Total population	64,400,000 (22.6%)	931,108	6,226,000	\$368.4 billion
Total males	31,100,000 (21.5%)	432,245 (46.4%)*	3,058,000	—
Total females	33,300,000 (22.4%)	498,863 (53.6%)*	3,168,000	—
White males	30.0%	374,280	—	—
White females	23.8%	433,867	—	—
Black males	40.5%	48,939	—	—
Black females	39.6%	56,821	—	—
Mexican-American males	28.8%	—	—	—
Mexican-American females	26.6%	—	—	—

Note: (—) = data not available.

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

Sources: **Prevalence:** NHANES III (1988-94), CDC/NCHS; 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. **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 2004.

## Prevalence

Of the 64,400,000 Americans with one or more types of cardiovascular disease (CVD), 25,300,000 are estimated to be age 65 and older. (National Health and Nutrition Examination Survey III [NHANES III, 1988-94], CDC/NCHS. Bullet points below are also from NHANES III unless otherwise noted.)

- High blood pressure — 50,000,000. (Defined as systolic pressure 140 mm Hg or greater and/or diastolic pressure 90 mm Hg or greater, or taking antihypertensive medication.)
- Coronary heart disease — 13,200,000.
  - Myocardial infarction (heart attack) — 7,800,000.
  - Angina pectoris (chest pain) — 6,800,000.
- Congestive heart failure — 5,000,000.
- Stroke — 4,800,000.
- Congenital cardiovascular defects — 1,000,000. (Unpublished NHIS survey data, 1993-95, CDC/NCHS)
- 1 in 5 males and females has some form of CVD.

## 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*. 10<sup>th</sup> 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;106:1602-1605)
  - 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)

## Mortality

CVD accounted for 38.5 percent of all deaths or 1 of every 2.6 deaths in the United States in 2001. CVD mortality was about 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 1,408,000 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 more lives each year than 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 2001 — cancer 553,768; accidents 101,537; Alzheimer's disease 53,852; HIV (AIDS) 14,175.

- The 2001 CVD death rates were 391.4 for males and 281.7 for females. Cancer death rates were 243.7 for males and 164.7 for females. Breast cancer claimed the lives of 41,394 females in 2001; lung cancer claimed 65,632. The death rates were 26.0 for breast cancer and 41.0 for lung cancer. 1 in 30 women's deaths is from breast cancer, while 1 in 2.5 is from CVD.
- Almost 150,000 Americans killed by CVD each year are under age 65. In 2001, 32 percent of deaths from CVD occurred prematurely (i.e., before age 75, the approximate average life expectancy in that year).
- The 2001 overall death rate from CVD was 329.6. The rates were 384.3 for white males and 510.5 for black males; 273.6 for white females and 376.6 for black females. From 1991 to 2001 death rates from CVD (ICD/10 I00-I99) declined 9.2 percent. In the same 10-year period actual CVD deaths increased 0.9 percent.
- Declines in death rates from cardiovascular diseases are largely responsible for the recent major improvement in life expectancy. Based on revised 2000 population data, the average life expectancy of people born in the United States is now 77.2 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 (ICD/9 390-448) 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 inside front cover.
- 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. Alarming, 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/Pacific Islanders and 8 percent for American Indians/Alaska Natives. In 1998 the rate for non-Hispanic blacks was 2.8 times the rate for Asian/Pacific Islanders. (*Healthy People 2000, Statistical Notes*, No. 23, CDC/NCHS, Jan. 2002)

## Risk Factors

For statistics on individual CVD risk factors, see Chapter 7 beginning on page 26.

- Black and Mexican-American women have higher CVD risk factors than white women of comparable socioeconomic status (SES). (NHANES III [1988-94], CDC/NCHS, *JAMA*. 1998;280:356-362)
- Among American Indians/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 activity had been included in this analysis, the prevalence of risk factors probably would have been higher. (Behavioral Risk Factor Surveillance System [BRFSS, 1997], CDC/NCHS)

## Hospital/Physician/Nursing Home Visits

- From 1979 to 2001 the number of Americans discharged from short-stay hospitals with CVD as the first listed diagnosis increased 27 percent. In 2001 CVD ranked highest among all disease categories in hospital discharges. (National Hospital Discharge Survey: 2001, CDC/NCHS)
- In 2001 there were 71,075,000 physician office visits and 5,627,000 outpatient department visits with a primary diagnosis of CVD. (National Hospital Ambulatory Medical Care Survey, 2001, CDC/NCHS)
- In 2001 there were 4,214,000 visits to emergency departments with a primary diagnosis of CVD. (National Hospital Ambulatory Medical Care Survey, 2001, CDC/NCHS)
- In 1999, 23 percent of nursing home residents age 65 and 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)

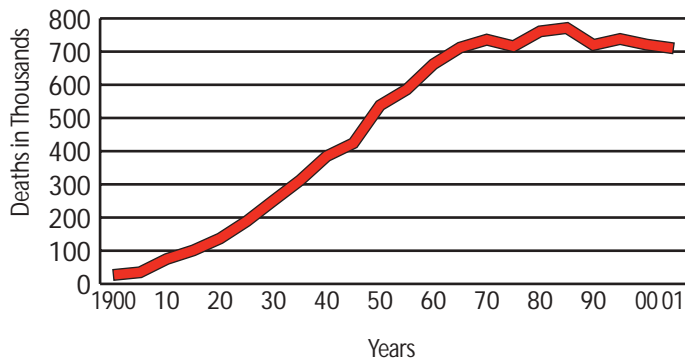
## Cost

- In 2004 the estimated direct and indirect cost of CVD is \$368.4 billion. See page 42 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, Apr. 2003)

## Operations and Procedures

- In 2001 an estimated 6,188,000 inpatient cardiovascular operations and procedures were performed in the United States; 3.6 million were performed on males and 2.6 million were performed on females. For more data, see pages 40-41. (CDC/NCHS)

**Deaths From Diseases of the Heart**  
United States: 1900-2001

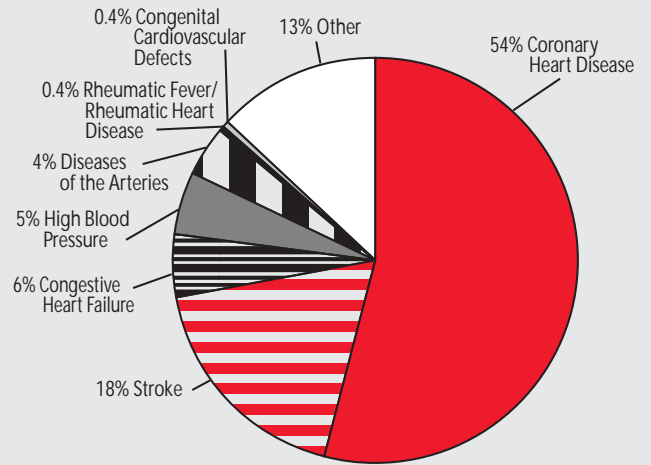


Note: See Glossary on page 47 for an explanation of "Diseases of the Heart." Total cardiovascular disease data are not available for much of the period covered by this chart.

Source: CDC/NCHS.

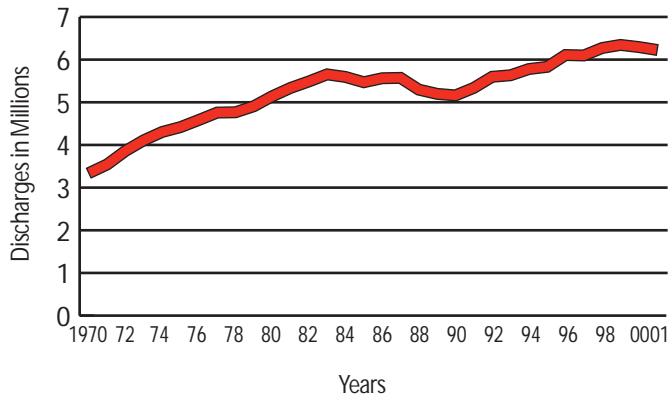
**Percentage Breakdown of Deaths From Cardiovascular Diseases**

United States: 2001



Source: CDC/NCHS.

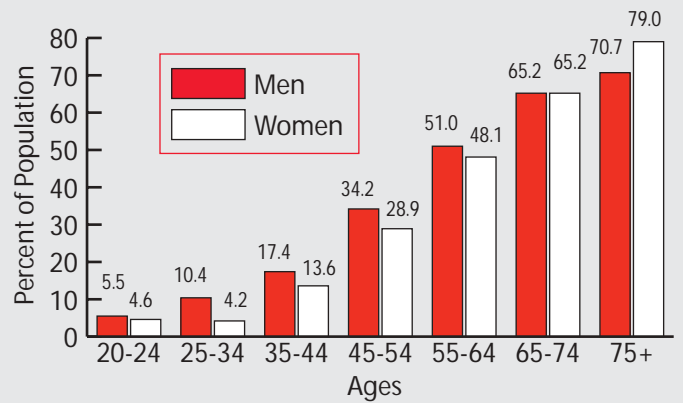
**Hospital Discharges for Cardiovascular Diseases**  
United States: 1970-2001



Note: Hospital discharges include people both living and dead.

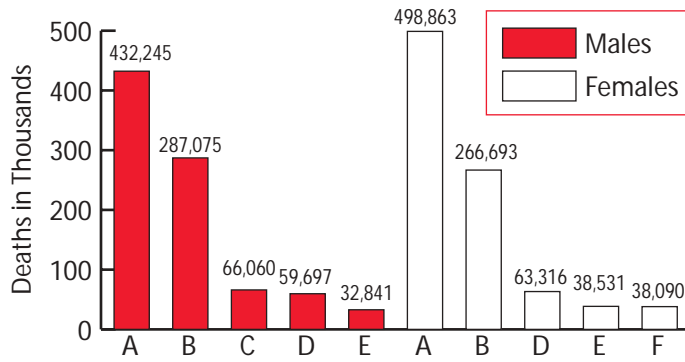
Source: CDC/NCHS.

**Prevalence of Cardiovascular Diseases in Americans Age 20 and Older by Age and Sex**  
NHANES III: 1988-94



Source: CDC/NCHS. These data include CHD, CHF, stroke and hypertension.

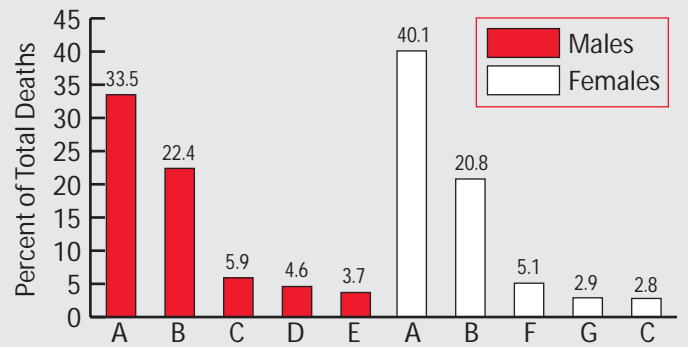
**Leading Causes of Death for All Males and Females**  
United States: 2001



- A Total CVD
- 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: 2001

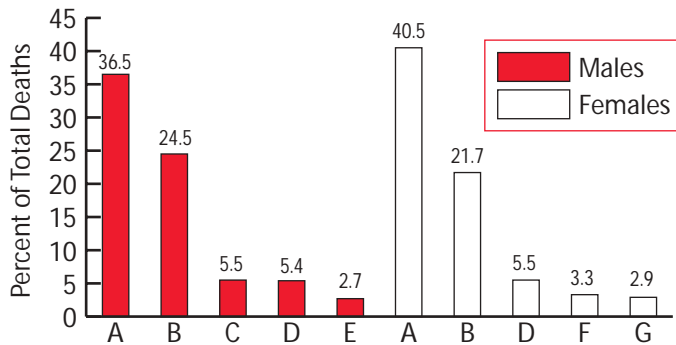


- A Total CVD
- B Cancer
- C Accidents
- D Assault (Homicide)
- E HIV (AIDS)
- F Diabetes Mellitus
- G Nephritis, Nephrotic Syndrome and Nephrosis

Note: Using "Diseases of the Heart, and Stroke," which do not constitute total CVD, the percentages of the "A" bars would be 30.8 for males and 36.5 for females.

Source: CDC/NCHS.

**Leading Causes of Death for White Males and Females**  
United States: 2001

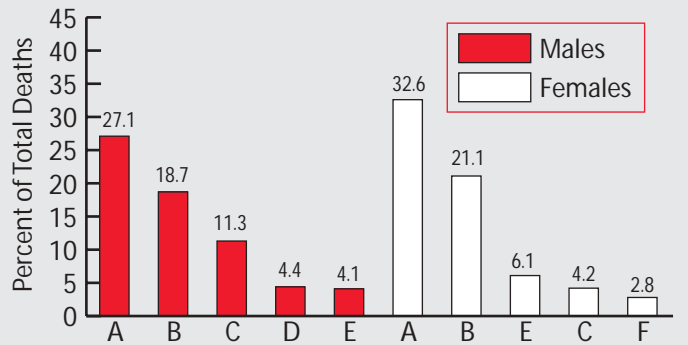


- A Total CVD
- B Cancer
- C Accidents
- D Chronic Lower Respiratory Diseases
- E Diabetes Mellitus
- F Alzheimer's Disease
- G Influenza and Pneumonia

Note: Using "Diseases of the Heart, and Stroke," which do not constitute total CVD, the percentages of the "A" bars would be 34.5 for males and 37.6 for females.

Source: CDC/NCHS.

**Leading Causes of Death for Hispanic or Latino Males and Females**  
United States: 2001

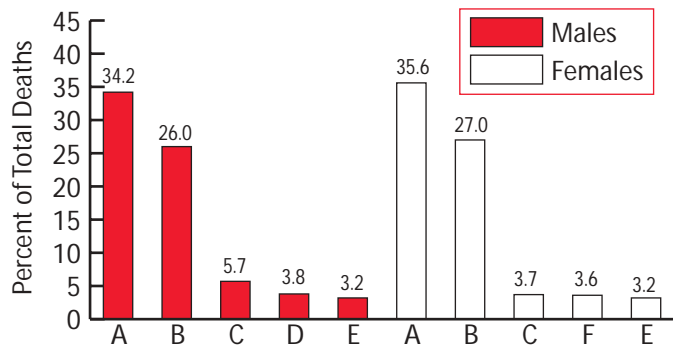


- A Diseases of the Heart, and Stroke
- B Cancer
- C Accidents
- D Assault (Homicide)
- E Diabetes Mellitus
- F Influenza and Pneumonia

Source: CDC/NCHS.

### Leading Causes of Death for Asian/Pacific Islander Males and Females

United States: 2001



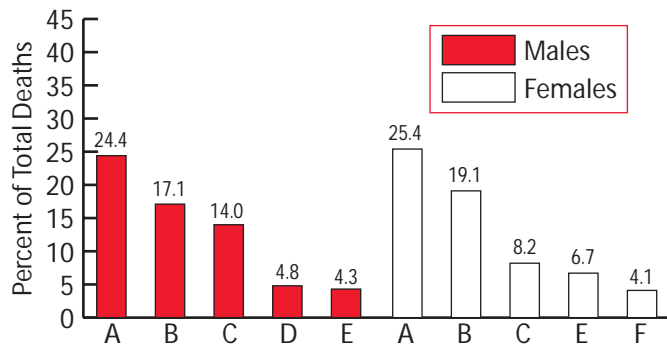
- A Diseases of the Heart, and Stroke
- B Cancer
- C Accidents
- D Chronic Lower Respiratory Diseases
- E Influenza and Pneumonia
- F Diabetes Mellitus

Note: "Asian/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/Alaska Native Males and Females

United States: 2001

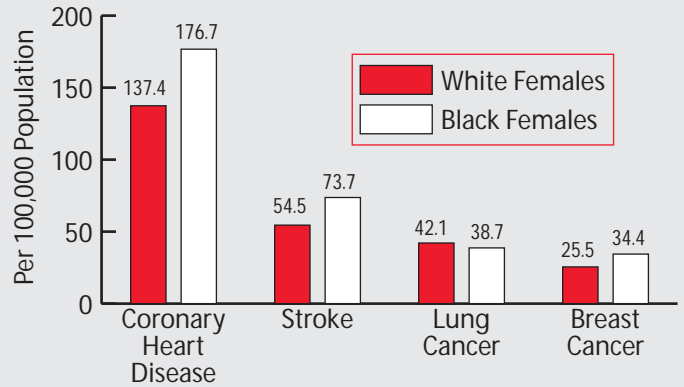


- A Diseases of the Heart, and Stroke
- B Cancer
- C Accidents
- D Chronic Liver Disease and Cirrhosis
- E Diabetes Mellitus
- F Chronic Lower Respiratory Diseases

Source: CDC/NCHS.

### Age-Adjusted Death Rates for Coronary Heart Disease, Stroke, and Lung and Breast Cancer for White and Black Females

United States: 2001



Source: CDC/NCHS.

## 2000 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](http://americanheart.org). See inside front cover for instructions.

State	Total Cardiovascular Disease*			Coronary Heart Disease**			Stroke#		
	Rank##	Death Rate	Percent Change <sup>+</sup> 1990 to 2000	Rank##	Death Rate	Percent Change <sup>+</sup> 1990 to 2000	Rank##	Death Rate	Percent Change <sup>+</sup> 1990 to 2000
Alabama	47	393.6	-12.8	17	162.6	-22.6	40	65.7	-11.5
Alaska	12	295.0	-12.6	5	126.9	-29.6	42	65.9	+7.0
Arizona	7	288.2	-18.8	23	169.3	-21.8	11	53.7	-4.1
Arkansas	46	382.3	-10.9	36	194.0	-21.2	51	78.9	-7.2
California	27	326.2	-18.4	32	189.4	-24.1	26	59.0	-14.0
Colorado	5	275.2	-19.1	6	127.8	-35.7	12	55.5	-3.5
Connecticut	17	304.8	-17.7	21	167.2	-23.0	6	49.3	-9.6
Delaware	31	340.3	-19.1	40	195.7	-25.3	8	49.9	-15.6
District of Columbia	44	380.0	-11.4	27	182.5	+6.6	9	50.4	-26.6
Florida	19	309.4	-16.3	35	193.1	-19.8	5	48.8	-11.6
Georgia	45	382.0	-15.7	20	166.7	-29.0	47	70.1	-11.6
Hawaii	4	272.9	-16.6	2	116.5	-27.1	19	57.5	-8.2
Idaho	13	296.0	-14.9	11	149.7	-24.4	34	62.1	-8.7
Illinois	33	347.3	-19.0	38	194.5	-27.4	31	60.1	-9.3
Indiana	38	367.0	-16.2	34	191.3	-25.5	45	67.2	-8.1
Iowa	24	317.5	-17.0	39	195.0	-20.9	21	58.5	-5.7
Kansas	26	323.3	-16.2	15	156.5	-25.9	29	59.4	-6.3
Kentucky	48	393.6	-12.4	44	202.8	-20.9	39	65.5	-7.6
Louisiana	43	375.7	-19.4	31	187.8	-30.3	36	63.4	-12.1
Maine	20	313.3	-20.3	25	173.4	-27.1	17	56.7	-2.2
Maryland	32	347.1	-15.3	30	187.5	-20.0	32	60.1	+0.6
Massachusetts	9	289.8	-22.6	10	148.2	-32.0	4	47.6	-13.0
Michigan	41	373.7	-15.3	45	210.0	-26.1	33	60.3	-8.3
Minnesota	2	257.0	-26.6	3	121.2	-39.3	15	56.5	-17.9
Mississippi	52	439.2	-11.6	48	214.9	-22.4	46	68.1	-10.4
Missouri	40	373.1	-12.2	46	212.4	-17.4	37	63.6	-2.8
Montana	8	288.5	-17.2	7	128.5	-28.1	24	58.8	-11.3
Nebraska	14	296.4	-22.4	9	137.9	-33.8	18	56.7	-8.5
Nevada	29	336.8	-22.6	24	169.3	-28.3	27	59.0	-0.4
New Hampshire	21	314.6	-19.3	33	190.6	-19.4	16	56.6	-8.6
New Jersey	30	339.1	-16.5	42	198.8	-23.8	2	46.4	-16.7
New Mexico	3	269.6	-20.4	12	153.1	-22.5	10	51.3	-4.7
New York	36	354.0	-20.5	52	240.4	-24.7	1	39.0	-24.0
North Carolina	39	368.6	-14.5	29	186.4	-26.4	49	75.2	-8.0
North Dakota	11	294.2	-20.4	19	165.0	-19.0	20	58.2	-9.0
Ohio	37	365.7	-15.8	43	202.7	-23.2	22	58.5	-5.1
Oklahoma	51	413.8	-7.5	51	232.7	-8.8	43	66.5	-2.2
Oregon	10	294.1	-21.1	8	136.6	-35.3	48	75.1	+5.3
Pennsylvania	34	352.1	-17.4	37	194.3	-26.7	14	56.4	-8.2
Puerto Rico	1	253.1	—	4	123.1	—	7	49.8	—
Rhode Island	23	316.0	-20.9	47	214.0	-16.6	3	47.3	-14.2
South Carolina	42	373.9	-18.0	28	185.2	-25.8	52	80.8	-10.7
South Dakota	22	314.7	-18.0	22	169.0	-29.2	28	59.1	-1.0
Tennessee	50	398.2	-12.5	50	227.5	-17.3	50	76.0	-7.6
Texas	35	352.7	-13.7	41	197.0	-18.8	38	64.0	-6.1
Utah	6	280.0	-18.5	1	114.6	-35.7	25	58.8	-6.7
Vermont	18	307.1	-18.2	26	173.5	-27.4	13	56.0	-6.4
Virginia	28	334.8	-20.9	16	160.7	-28.0	41	65.7	-10.8
Washington	16	301.1	-18.8	14	154.6	-25.5	44	66.5	-4.4
West Virginia	49	395.6	-14.6	49	223.6	-20.0	23	58.7	-4.9
Wisconsin	25	321.9	-18.0	18	164.0	-29.6	35	63.3	-6.4
Wyoming	15	297.8	-19.6	13	153.4	-21.2	30	59.7	-9.5
Total United States		345.3	-16.5		188.9	-24.8		58.7	-10.1

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, 1990-2000. For computing percent change, the death rates in 2000 were comparability modified using the comparability ratios: 0.9981 for CVD; 0.9990 for CHD and 1.0588 for stroke.

Source: NCHS compressed mortality file for the years 1979 to 2000.

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](http://americanheart.org). See inside front cover 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 2001	Prevalence MI 2001	New and Recurrent Heart Attacks and Fatal CHD	New and Recurrent MI	Mortality CHD 2001	Mortality MI 2001	Hospital Discharges CHD 2001	Cost CHD 2004
Total population	13,200,000 (6.4%)	7,800,000 (3.5%)	1,200,000	865,000	502,189	184,757	2,090,000	\$133.2 billion
Total males	6,500,000 (6.9%)	4,800,000 (5.1%)	715,000	520,000	254,005 (50.6%)*	95,875 (52.0%)*	1,199,000	—
Total females	6,700,000 (6.0%)	3,000,000 (2.1%)	485,000	345,000	248,184 (49.4%)*	88,882 (48.0%)*	891,000	—
White males	6.9%	5.2%	650,000	—	224,464	85,280	—	—
White females	5.4%	2.0%	425,000	—	218,072	77,663	—	—
Black males	7.1%	4.3%	65,000	—	24,593	8,717	—	—
Black females	9.0%	3.3%	60,000	—	26,340	9,864	—	—
Mexican-American males	7.2%	4.1%	—	—	—	—	—	—
Mexican-American females	6.8%	1.9%	—	—	—	—	—	—

Note: CHD = coronary heart disease; includes heart attack, angina pectoris (chest pain) or both. MI = myocardial infarction (heart attack).

\* These percentages represent the portion of total mortality that is males vs. females. (—) = data not available.

Sources: **Prevalence:** NHANES III (1988-94), CDC/NCHS; 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. **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 2004.

### 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.

- The estimated incidence of MI (ICD/9 410) (ICD/10 I21, I22) is 565,000 new attacks and 300,000 recurrent attacks annually. (Atherosclerosis Risk in Communities [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*. 10<sup>th</sup> 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.

### 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. These data represent Americans hospitalized with definite or probable MI or fatal CHD, not including silent MIs.)

— 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 incidence rates per 1000 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;162:2565-2571)
- 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 more than 1 of every 5 deaths in the United States in 2001. CHD total mention mortality — 669,000. MI total mention mortality — 233,000.

- 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 42 percent of the people who experience a coronary attack in a given year will die from it.
- About 340,000 people a year die of CHD in an ED or before reaching a hospital. Most of these are sudden deaths caused by cardiac arrest, usually resulting from ventricular fibrillation. (See also Arrhythmias, page 20.)
- In 2001 the overall CHD death rate was 177.8 per 100,000 population. The death rates were 228.4 for white males and 262.0 for black males, and 137.4 for white females and 176.7 for black females. 1999 death rates for CHD were 138.4 for Hispanics, 123.9 for American Indians/Alaska Natives and 115.5 for Asian/Pacific Islanders. From 1991 to 2001 the death rate from CHD declined 26.0 percent, but the actual number of deaths declined only 9.4 percent. (CDC/NCHS)
- 84 percent of people who die of CHD are age 65 or older.
- About 80 percent of CHD mortality in people under age 65 occurs during the first attack. (FHS, NHLBI)
- 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. (FHS, NHLBI)

- The estimated average number of years of life lost due to a heart attack is 11.5. (CDC/NCHS; NHLBI)
- 50 percent of men and 64 percent of women who died suddenly of CHD had no previous symptoms of this disease. (FHS, NHLBI)
- 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. (Hurst W. *The Heart, Arteries and Veins*. 10<sup>th</sup> ed. New York, NY: McGraw-Hill; 2002)
- People who've had a heart attack have a sudden death rate that's 4-6 times that of the general population. (FHS, NHLBI)
- 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. (Hurst W. *The Heart, Arteries and Veins*. 10<sup>th</sup> ed. New York, NY: McGraw-Hill; 2002)

## ● 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)
- Within 6 years after a recognized heart attack (MI)... (FHS, NHLBI)
  - 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.
- About two-thirds of heart attack patients don't make a complete recovery, but 88 percent of those under age 65 are able to return to their usual work. The outlook for people who have an unrecognized attack is about the same or worse. (FHS, NHLBI)
- CHD is the leading cause of premature, permanent disability in the U.S. labor force, accounting for 19 percent of disability allowances by the Social Security Administration. (FHS, NHLBI)

## ● Hospital Discharges

- From 1979 to 2001 the number of Americans discharged from short-stay hospitals with CHD as the first listed diagnosis increased 27 percent. (CDC/NCHS)

## Cost

- In 2004 the estimated direct and indirect cost of CHD is \$133.2 billion. See page 42 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, Apr. 2003*)

## Operations and Procedures

- In 2001 an estimated 1,051,000 angioplasty procedures, 516,000 bypass procedures, 1,314,000 diagnostic cardiac catheterizations, 46,000 implantable defibrillators and 177,000 pacemaker procedures were performed in the United States. For more data, see pages 40-41. (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.)

- 928,000 is a conservative estimate for the number of people with ACS discharged from hospitals in 2001. This estimate is derived by adding the first listed hospital discharges for myocardial infarction (795,000) to those for unstable angina (133,000). (CDC/NCHS)
- When including secondary discharge diagnoses, the corresponding number of hospital discharges was 1,680,000 unique hospitalizations for ACS, 959,000 for MI and 758,000 for UA (37,000 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:

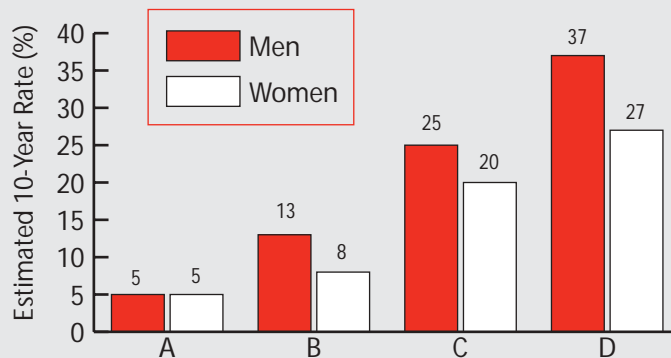
- ST elevation myocardial infarction (STEMI)
- non-ST elevation myocardial infarction
- unstable angina

Studies evaluating the percentage of ACS patients who have STEMI range from 30 to 45 percent. (National Registry of Myocardial Infarction [NRFMI-4] Steering Committee; *JACC*. 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

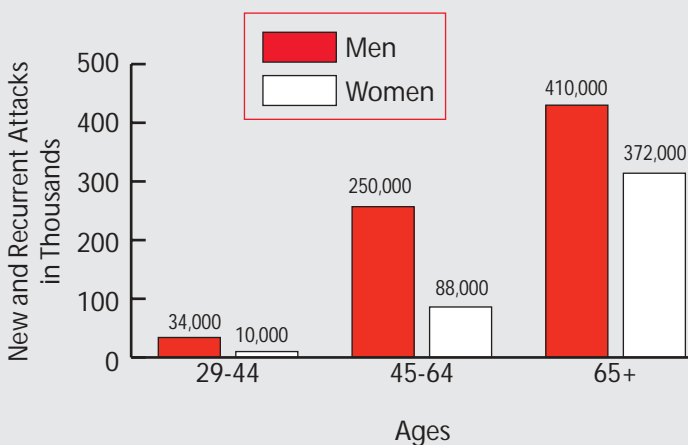


	A	B	C	D
Blood Pressure (mm Hg)	120/80	140/90	140/90	140/90
Total Cholesterol (mg/dL)	200	240	240	240
HDL Cholesterol (mg/dL)	50	50	40	40
Diabetes	No	No	Yes	Yes
Cigarettes	No	No	No	Yes

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

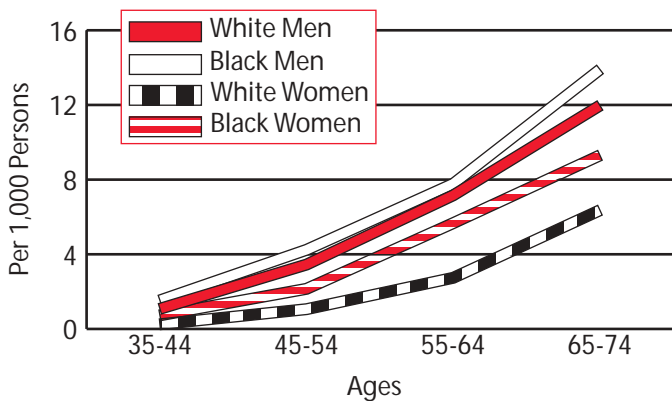
Source: Wilson PWF, et al. Prediction of coronary heart disease using risk factor categories. *Circulation*. 1998;97:1837-1847.

**Annual Number of Americans Having Diagnosed Heart Attack by Age and Sex**  
ARIC: 1987-2000



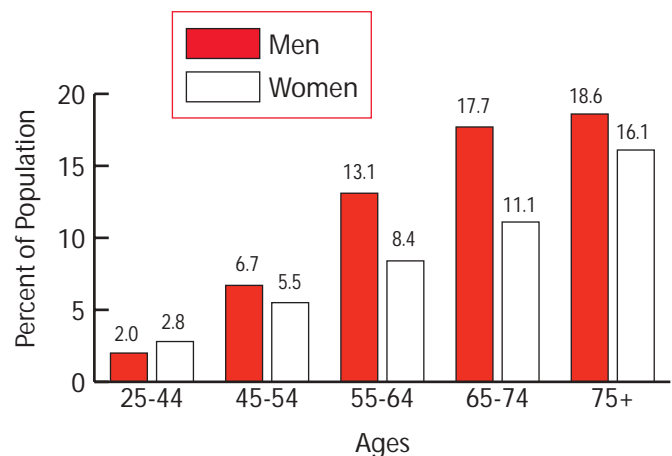
Source: Extrapolated from rates in the NHLBI's ARIC surveillance study, 1987-2000. These data don't include silent MIs.

### Annual Rate of First Heart Attacks by Age, Sex and Race ARIC: 1987-2000



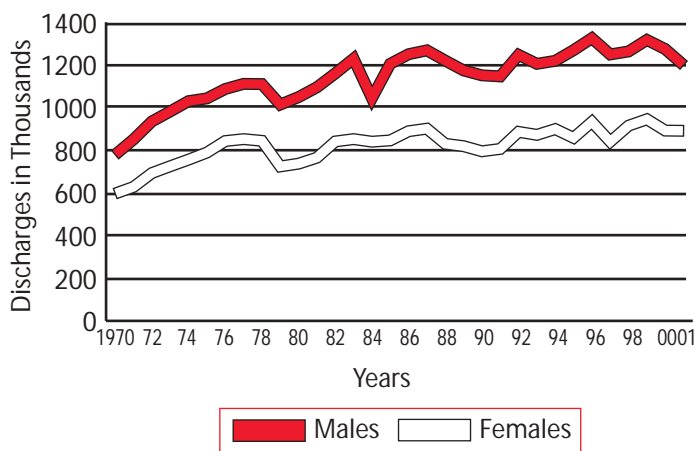
Source: NHLBI's ARIC surveillance study, 1987-2000.

### Prevalence of Coronary Heart Disease by Age and Sex NHANES III: 1988-94



Source: CDC/NCHS.

### Hospital Discharges for Coronary Heart Disease by Sex United States: 1970-2001



Note: Hospital discharges include people both living and dead.

Source: CDC/NCHS.

## Angina Pectoris

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

Population Group	Prevalence 2001	Incidence of Stable Angina	Hospital Discharges - 2001
Total population	6,800,000 (3.5%)	400,000	74,000
Total males	2,600,000 (2.7%)	—	31,000
Total females	4,200,000 (4.3%)	—	43,000
White males	2.6%	—	—
White females	3.9%	—	—
Black males	3.1%	—	—
Black females	6.2%	—	—
Mexican-American males	4.1%	—	—
Mexican-American females	5.5%	—	—

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 III (1988-94), CDC/NCHS; 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.

### ● Prevalence

- Significantly more women than men have angina, both in total numbers and as an age-adjusted percentage. (NHANES III [1988-94], CDC/NCHS)
- 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.

### ● Incidence

- Only 20 percent of coronary attacks are preceded by long-standing angina. The percentage is lower if the infarction is silent or unrecognized. (44-year follow-up of participants and 20-year follow-up of their offspring, FHS, NHLBI)
- 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.

# Stroke

(ICD/9 430-438) (ICD/10 I60-I69)

4

Population Group	Prevalence 2001	Incidence New and Recurrent Attacks	Mortality 2001	Hospital Discharges 2001	Cost 2004
Total population	4,800,000 (2.0%)	700,000	163,538	931,000	\$53.6 billion
Total males	2,100,000 (2.3%)	327,000 (47%)*	63,177 (38.6%)*	391,000	—
Total females	2,700,000 (1.7%)	373,000 (53%)*	100,361 (61.4%)*	539,000	—
White males	2.2%	277,000	53,428	—	—
White females	1.5%	312,000	87,037	—	—
Black males	2.5%	50,000	7,907	—	—
Black females	3.2%	61,000	11,095	—	—
Mexican-American males	2.3%	—	—	—	—
Mexican-American females	1.3%	—	—	—	—

Note: (—) = data not available.

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

Sources: **Prevalence:** NHANES (1988-94), CDC/NCHS; 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. **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 2004.

## 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;33:1209-1213)
- The prevalence of TIAs 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 Epi*. 1993;3:504-507) (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)

## 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 incident rate ratio 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)
- 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. Blacks have almost twice the risk of first-ever stroke compared with whites. (GCNKSS, FHS, ARIC)
- 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 HHP, 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 2001. About 50 percent of these deaths occurred out of hospital. Total mention mortality — about 282,000.

- 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;30:736-743; *Stroke*. 1999;30:2517-2522)

- From 1991 to 2001 the stroke death rate fell 3.4 percent, but the actual number of stroke deaths rose 7.7 percent. (CDC/NCHS)
- The 2001 overall death rate for stroke was 57.9. Death rates were 56.5 for white males and 85.4 for black males, and 54.5 for white females and 73.7 for black females. 1999 death rates for stroke were 40.0 for Hispanics, 39.7 for American Indians/Alaska Natives and 52.4 for Asian/Pacific Islanders. (CDC/NCHS)
- Because women live longer than men, more women than men die of stroke each year. Women accounted for 61.4 percent of U.S. stroke deaths in 2001.
- 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/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/Alaska Natives had higher risk ratios than did whites for all three stroke subtypes. (*Am J Epi.* 2001;154:1057-1063)
- The Harvard Alumni Study showed a decrease in total stroke risk in men who were highly physically active (RR = 0.82). (*Stroke.* 1998;29:2049-2054)
- For women in the Nurses' Health Study, relative risks 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;283:2961-2967)
- 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;29:380-387)

## ● Aftermath

- 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;333:1581-1587)
- Stroke is a leading cause of serious, long-term disability in the United States. (*MMWR*, Vol. 50, No. 7, Feb. 23, 2001, CDC/NCHS)
- 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.* 10<sup>th</sup> 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:
  - 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.

## ● 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;289:343-346)
- TIAs carry a substantial short-term risk of stroke, hospitalization for cardiovascular events and death. Of 1,707 TIA patients evaluated in the 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, TIA lasting longer than 10 minutes. (*JAMA.* 2000;284:2901-2906)
- 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;259:1025-1029)
- Atrial fibrillation (AF) is an independent risk factor for stroke, increasing risk about 5-fold. For details, see Arrhythmias on page 20.
- Physical activity reduces stroke risk. Results from the Physician's Health Study showed a decrease in stroke risk associated with vigorous exercise among men (relative risk of total stroke = 0.86 for exercise 5 times a week or more). (*Stroke.* 1999;30:1-6)

## Hospital Discharges

- From 1979 to 2001 the number of Americans discharged from short-stay hospitals with stroke as the first listed diagnosis increased 25 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;32:2221-2226. 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;21:131-141)

## Cost

- In 2004 the estimated direct and indirect cost of stroke is \$53.6 billion. See page 42 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, Apr. 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;27:1459-1466)
- In a population study of stroke costs within 30 days of an acute event, the average cost for mild ischemic strokes was \$13,019 and \$20,346 for severe ischemic strokes (4 or 5 on the Ranking Disability Scale). (*Neurology*. 1996;46:861-869)
- Inpatient hospital costs for an acute stroke event account for 70 percent of the first-year post-stroke costs.
- The largest components of acute care costs were room charges (50 percent), medical management (21 percent) and diagnostic costs (19 percent). (*Stroke*. 1999;30:724-728)
- 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.
- 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;30:724-728; *Arch Intern Med*. 2003;163)

## Operations and Procedures

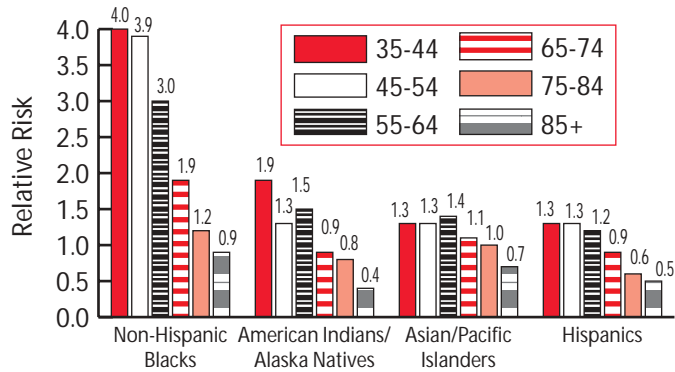
- In 2001 an estimated 128,000 endarterectomy procedures were performed in the United States. Carotid endarterectomy is the most frequently performed surgical procedure to prevent stroke. For more data, see pages 40-41. (CDC/NCHS)

## 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]:116-123)
- 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]:250-255; *Neurology*. 1998;51[1]:169-176)
- 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]:316-324)
- Compared to the stroke risk of white children, black children have an increased relative risk of 2.12, Hispanics a decreased 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]:189-194)
- Despite current treatment, 1 out of 10 children with ischemic stroke will have a recurrence within 5 years. (*Lancet*. 2002;360:1540-1545)
- 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]:116-123)
- 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;59:34-39)
  - 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.

### Risk for Stroke Mortality Among Racial/Ethnic Groups Compared With Non-Hispanic Whites, by Age

United States: 1997

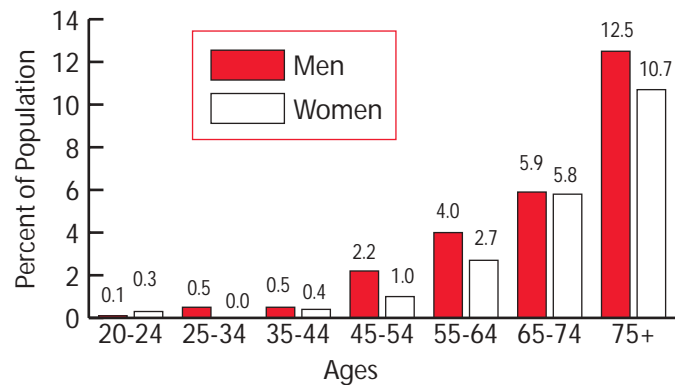


Note: Values greater than 1.0 indicate populations with higher relative risks. Values less than 1.0 indicate lower relative risks.

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.

### Prevalence of Stroke by Age and Sex

NHANES III: 1988-94

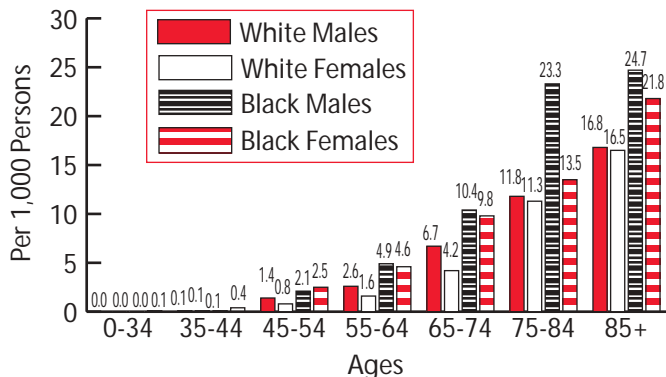


Source: CDC/NCHS.

### Annual Rate of First Cerebral Infarction by Age, Sex and Race

Greater Cincinnati/Northern Kentucky Stroke Study: 1993-94

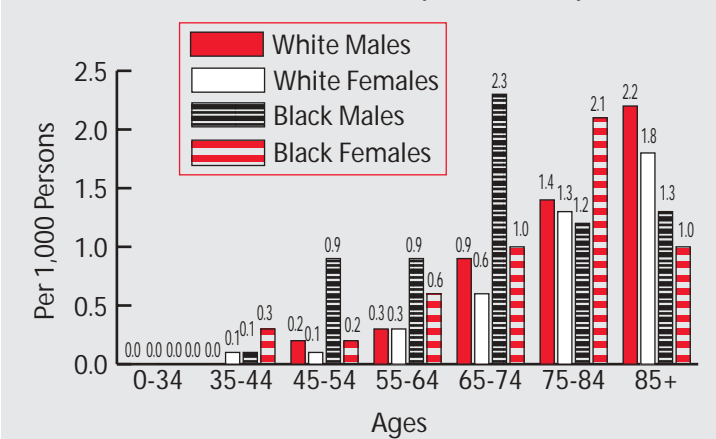
Greater Cincinnati/Northern Kentucky Stroke Study: 1993-94



Source: Unpublished data from the GCNKSS.

### Annual Rate of First Intracerebral Hemorrhage by Age, Sex and Race

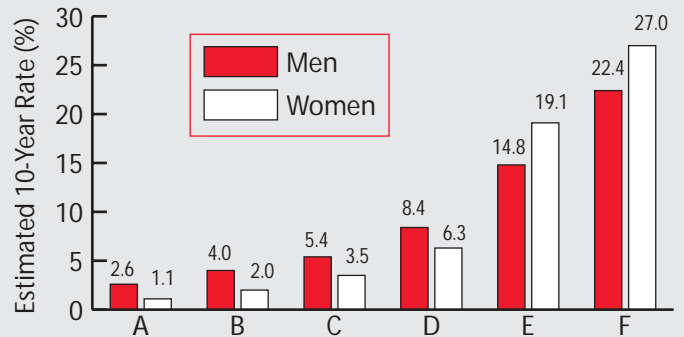
Greater Cincinnati/Northern Kentucky Stroke Study: 1993-94



Source: Unpublished data from the GCNKSS.

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

Framingham Heart Study



	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: Wolf PA, et al. Probability of stroke: a risk profile from the Framingham Study. Stroke. 1991;22:312-318.

# High Blood Pressure

(ICD/9 401-404) (ICD/10 I10-I15)

Population Group	Prevalence 2001	Mortality 2001	Hospital Discharges 2001	Cost 2004
Total population	50,000,000 (32.8%)	46,765	486,000	\$55.5 billion
Total males	33.1%	18,874 (40.4%)*	194,000	—
Total females	32.1%	27,891 (59.6%)*	292,000	—
White males	32.2%	13,508	—	—
White females	29.5%	21,398	—	—
Black males	41.6%	4,904	—	—
Black females	44.7%	5,936	—	—
Mexican males	34.5%	—	—	—
Mexican females	29.9%	—	—	—
Total Hispanics**	18.6%	—	—	—
Total Asian/Pacific Islanders**	16.3%	—	—	—
Total American Indians/Alaska Natives**	20.7%	—	—	—

Note: (—) = data not available.

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

Sources: **Prevalence:** *Health, United States, 2003, NHANES IV (1999-2000), CDC/NCHS; data are age-adjusted for age 20 and older. Rates are for white only and black or African-American only.*

\*\* *BRFSS (1997), 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 2004.*

## 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, or taking antihypertensive medicine. “Prehypertension” is systolic pressure of 120-139 mm Hg, or diastolic pressure of 80-89 mm Hg, or both.

- 1 in 5 Americans (and 1 in 4 adults) has HBP. (NHANES III [1988-94], CDC/NCHS)
- About 22 percent of American adults or about 45 million people have “prehypertension.” (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure [JNC 7, 1999-2000])
- 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)

- A higher percentage of men than women have HBP until age 55. From ages 55-74 the percentage of women is slightly higher; after that a much higher percentage of women have HBP than men do. (*Health, United States, 2003, 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 V and VI])
- About half of people who have a first heart attack and two-thirds who have a first stroke have blood pressures higher than 160/95 mm Hg. (FHS, NHLBI)
- 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 V and VI)
- 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 V and VI)
- Within the African-American community, rates of hypertension vary substantially. (NHANES III [1988-94], *Prev Med.* 2002;35:303-312)
  - 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)
- 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;275:1557-1562)
- 73 percent of Japanese-American men ages 71-93 have HBP. (HBP, NHLBI)

- 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;162:2325-2332)
- Among American Indians ages 45-74, the percentage of men and women being treated by a physician for HBP ranged from 45 to 56 percent for men and 57 to 65 percent for women. Of these, 52 to 57 percent of men and 48 to 60 percent of women were under control. (SHS [1989-92], NHLBI)
- Among American Indians ages 45-74, 26.8 percent of men and 27.5 percent of women have HBP (defined as systolic blood pressure of 160 mm Hg or higher or diastolic blood pressure of 95 mm Hg or higher on one occasion or reported to be currently taking antihypertensive medication). (SHS [1989-92], NHLBI)

## Mortality

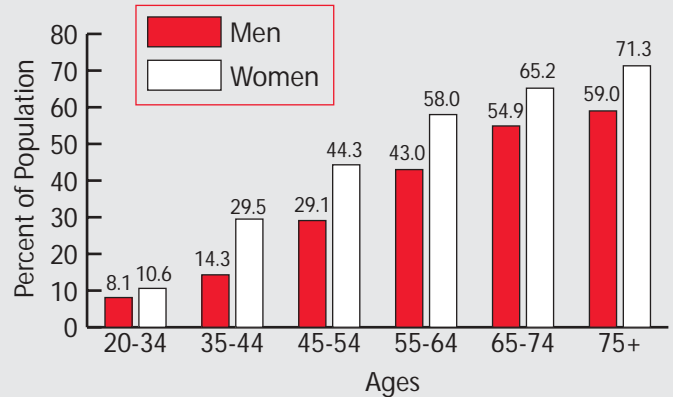
Total mention mortality — HBP was listed as a primary or contributing cause of death in about 251,000 of over 2,400,000 U.S. deaths in 2000.

- From 1991 to 2001 the age-adjusted death rate from HBP increased 36.4 percent, but the actual number of deaths rose 53.0 percent.
- The 2001 overall death rate from HBP was 16.5. Death rates were 13.7 for white males, 47.8 for black males, 13.4 for white females and 38.9 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 V and VI)

## Cost

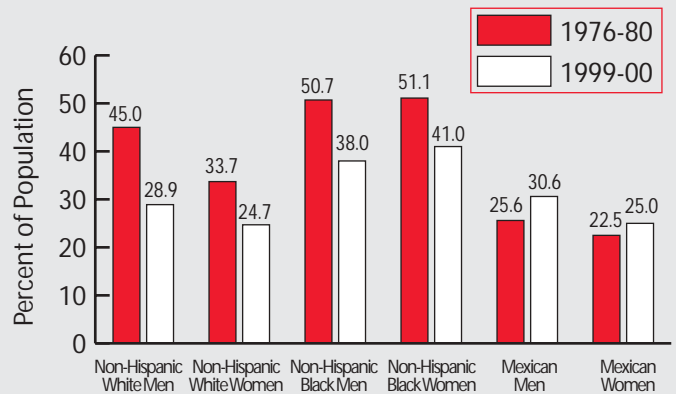
- In 2004 the estimated direct and indirect cost of high blood pressure is \$55.5 billion. See page 42 for more detailed information.

**Prevalence of High Blood Pressure in Americans Age 20 and Older by Age and Sex**  
NHANES IV: 1999-2000



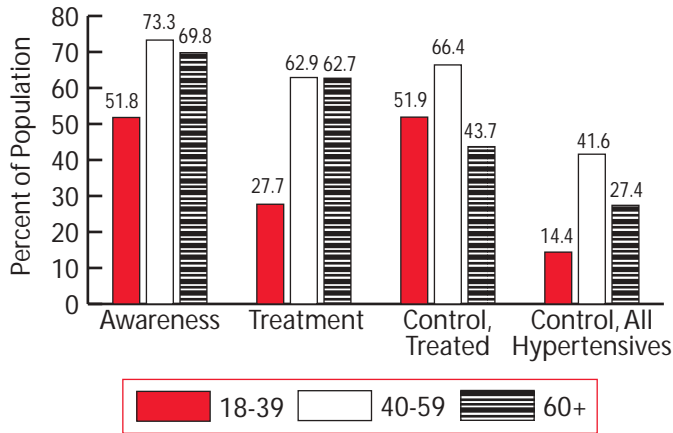
Source: CDC/NCHS.

**Age-Adjusted Prevalence Trends for High Blood Pressure in Americans Ages 20-74 by Race/Ethnicity, Sex and Survey**  
NHANES II & IV: 1976-80 and 1999-2000



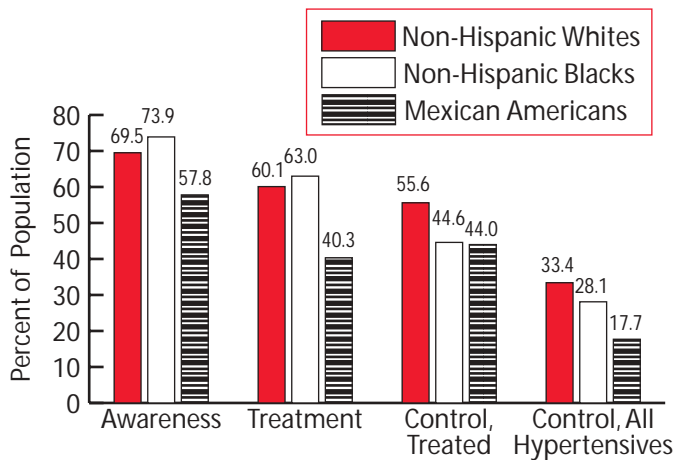
Source: CDC/NCHS. Data based on a single measure of blood pressure. *Health, United States, 2003.*

### Extent of Awareness, Treatment and Control of High Blood Pressure by Age NHANES IV: 1999-2000



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 IV: 1999-2000



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. 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 largest 5-year age group for incidence is ages 70-74; for prevalence, it's ages 65-69. 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.

- In 2000 an estimated 96,200 new cases of ESRD were diagnosed.
- The incidence of reported ESRD therapy has almost doubled in the past 10 years. (NHLBI from [usrds.org](http://www.usrds.org) Web site)
- 378,862 patients were being treated for ESRD by the end of 2000.
- 72,342 patients died from ESRD in 2000.
- More than 13,500 kidney transplants were performed in 2000.
- Diabetes continues to be the most common reported cause of ESRD.

## 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.
- 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 32 percent of treated ESRD patients.

# Other Cardiovascular Diseases

Mortality, prevalence and death rate data in this section are for 2001 unless otherwise noted. 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 — 484,000 of over 2,400,000 U.S. deaths. Hospital discharges — 786,000. 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, Apr. 2003)

**Atrial fibrillation** and flutter (ICD/9 427.3) (ICD/10 I48). Mortality — 9,451. Total mention mortality — 71,000. Prevalence — about 2,200,000. Hospital discharges — 416,000.

- Men are more likely than women to have AF regardless of age.
- The rate of AF increases from less than 1 percent among persons less than 60 years to about 10 percent among persons age 80 and older.
- Among older adults the prevalence is higher in whites than in blacks.
- The age-standardized death rate (per 100,000) has increased dramatically in recent years from 27.6 in 1980 to 69.8 in 1998.
- 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).
- From 1985 through 1999, AF first-listed diagnosis hospitalizations increased 144 percent and all-listed increased 190 percent.
- 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).
- AF is an independent risk factor for stroke, increasing risk about 5-fold. The risk for stroke attributable to AF increases with age.
- AF is responsible for about 15-20 percent of all strokes.
- 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.
- 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.

**Tachycardia** (ICD/9 427.0,1,2) (ICD/10 I47.0,1,2,9). Mortality — 6,496. Total mention mortality — 8,000. Hospital discharges — 95,000.

- **Paroxysmal supraventricular tachycardia** (ICD/9 427.0) (ICD/10 I47.1). Mortality — 137. Hospital discharges — 33,000.

**Ventricular fibrillation** (ICD/9 427.4) (ICD/10 I49.0). Mortality — 1,406. Total mention mortality — 15,900. Hospital discharges — 7,000. 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 340,000 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 — 39,414. Total mention mortality — 122,200. Hospital discharges — 274,000.

**Aortic aneurysm** (ICD/9 441) (ICD/10 I71). Mortality — 15,234. Total mention mortality — 21,900. Hospital discharges — 63,000.

**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 — 72,100. Hospital discharges — 110,000. 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.

**Other diseases of arteries** (ICD/9 442-448) (ICD/10 I72-I78). Mortality — 10,084. Hospital discharges — 101,000.

- **Kawasaki disease** (ICD/9 446.1) (ICD/10 M30.3). Total mention mortality — 7. Up to 2,500 cases of Kawasaki disease are diagnosed yearly. Hospital discharges — 5,000, primary plus secondary diagnoses.
  - About 80 percent of Kawasaki disease patients are under age 5; most are under age 2. Children older than 8 years are rarely affected.
  - Kawasaki disease occurs more often among boys (63 percent) and among those of Asian ancestry.
  - 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.

**Peripheral arterial disease (PAD)** affects 8 to 12 million Americans and is associated with significant morbidity and mortality.

- 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.

## Bacterial Endocarditis

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

Total mention mortality — 2,343. Hospital discharges — 20,000, primary plus secondary diagnoses.

## Cardiomyopathy

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

Mortality — 26,863. Total mention mortality — 55,300. Hospital discharges — 41,000.

- 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)
- 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). The overall incidence of cardiomyopathy was 1.13 cases per 100,000 in children younger than 18 years of age. In children under 1 year the incidence was 8.34 and in children from 1 year to 18 years old it was 0.70 per 100,000. The annual incidence was 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).
- Recent studies show that 36 percent of young athletes who die suddenly have probable or definite hypertrophic cardiomyopathy.

## Congenital Cardiovascular Defects

(ICD/9 745-747) (ICD/10 Q20-Q28)

Population Group	Mortality 2001	Hospital Discharges 2001
Total population	4,109	59,000
Total males	2,199 (53.5%)*	31,000
Total females	1,910 (46.5%)*	23,000
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%)
- transposition of the great arteries (10-11%)
- atrioventricular septal defects (4-10%)
- coarctation of the aorta (8-11%)
- hypoplastic left heart syndrome (4-8%)
- 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.

## ● 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 below.

- 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 bicommissural 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. (*JACC*. 2002;39:1890-1900; *AJC*. 1984;53:849-855)
- 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. (*JACC*. 1995;26:1545-1548; *Arch Dis Child Fetal Neonatal Ed*. 1999;81:F61-63) These defects nearly never require treatment, so they aren't included in the Table below.

### 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
Bicommissural aortic valve	13.7	54,800
Other defects detected after first year	Unknown	Unknown
Total	Unknown	Unknown

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

## Mortality

Total mention mortality — 6,300.

- 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;103:2376-2381)
- From 1991 to 2001 death rates for congenital cardiovascular defects declined 28.6 percent, while the actual number of deaths declined 26.4 percent.

## Hospitalizations

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

## Congestive Heart Failure

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

Population Group	Prevalence 2001	Incidence (New Cases)	Mortality 2001	Hospital Discharges 2001	Cost 2004
Total population	5,000,000 (2.2%)	550,000	52,828	995,000	\$28.8 billion
Total males	2,500,000 (2.5%)	—	19,805 (37.5%)*	444,000	—
Total females	2,500,000 (1.9%)	—	33,023 (62.5%)*	551,000	—
White males	2.3%	—	17,782	—	—
White females	1.5%	—	29,942	—	—
Black males	3.5%	—	1,802	—	—
Black females	3.1%	—	2,797	—	—

Note: (—) = data not available.

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

Sources: **Prevalence:** NHANES III (1988-94), CDC/NCHS; data for white and black males and females are for non-Hispanics; percentages are age-adjusted for Americans age 20 and older. **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 2004.

### 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. 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*. 9<sup>th</sup> ed. New York, NY: McGraw-Hill; 1998)
  - 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;106:3068-3072)
  - 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 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)

### Mortality

Total mention mortality — 266,400.

- 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 1979 to 2001 CHF deaths increased 155 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.

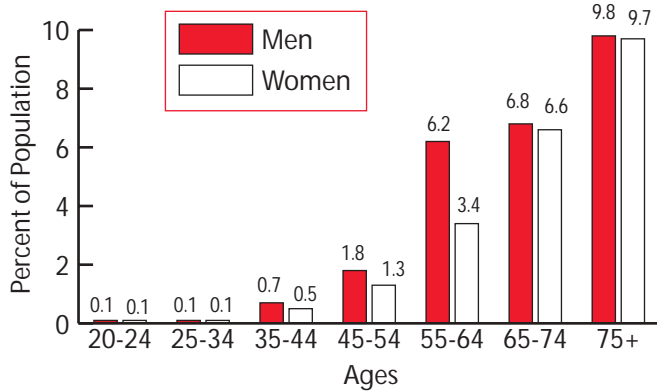
### Hospital Discharges

- Hospital discharges for CHF rose from 377,000 in 1979 to 995,000 in 2001, an increase of 164 percent.

### Cost

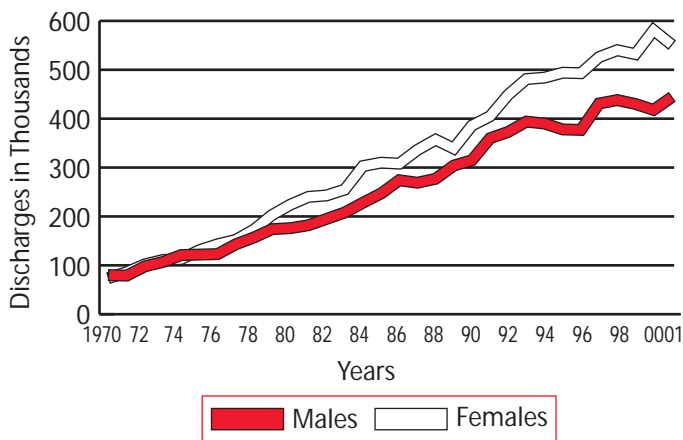
- In 2004 the estimated direct and indirect cost of CHF in the United States is \$28.8 billion. See page 42 for details.
- In 1999, \$3.6 billion (\$5,456 per discharge) was paid to Medicare beneficiaries for CHF. (*Health Care Financing Review, 2001 Medicare and Medicaid Statistical Supplement*, CMS, Apr. 2003)

## Prevalence of Congestive Heart Failure by Age and Sex NHANES III: 1988-94



Source: CDC/NCHS.

## Hospital Discharges for Congestive Heart Failure by Sex United States: 1970-2001



Note: Hospital discharges include people both living and dead.

Source: CDC/NCHS.

## Rheumatic Fever/ Rheumatic Heart Disease

(ICD/9 390-398) (ICD/10 I00-I09)

Population Group	Mortality 2001	Hospital Discharges 2001
Total population	3,489	48,000
Total males	1,031 (29.6%)*	19,000
Total females	2,458 (70.4%)*	24,000
White males	910	—
White females	2,176	—
Black males	86	—
Black females	216	—

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*. 9<sup>th</sup> ed. New York, NY: McGraw-Hill; 1998)

## Mortality

Total mention mortality — about 7,200.

- In 1950 about 15,000 Americans (adjusted for changes in ICD codes) died of RF/RHD compared with about 3,500 today.
- From 1991 to 2001 the death rate from RF/RHD fell 37.5 percent, while actual deaths declined 28.6 percent.
- The 2001 overall death rate for RF/RHD was 1.2. Death rates were 0.9 for white males and 0.7 for black males, 1.5 for white females and 1.3 for black females.

## Operations and Procedures

- In 2001 an estimated 82,000 valve procedures were performed in the United States. For more data, see pages 40-41. (CDC/NCHS)

## Valvular Heart Disease

(ICD/9 424) (ICD/10 I34-I38)

Mortality — 19,737. Total mention mortality — 42,100. Hospital discharges — 90,000.

- Aortic valve disorders (ICD/9 424.1) (ICD/10 I35). Mortality — 12,380. Total mention mortality — about 26,300. Hospital discharges — 46,000.
- Mitral valve disorders (ICD/9 424.0) (ICD/10 I34). Mortality — 2,865. Total mention mortality — about 7,000. Hospital discharges — 41,000.
  - 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 — 24.
- Tricuspid valve disorders (ICD/9 424.2) (ICD/10 I36). Mortality — 3. Total mention mortality — 32.

## 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.
- Caucasians and African Americans have a significantly higher incidence than Hispanics and Asian/Pacific Islanders.
- 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.
- 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.
- 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.

**Deep vein thrombosis** (ICD/9 451.1) (ICD/10 I80.2). Mortality — 2,730. Total mention mortality — 9,400. Hospital discharges — 7,000.

- 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.
- Death occurs in about 6 percent of DVT cases within one month of diagnosis.

**Pulmonary embolism** (ICD/9 415.1) (ICD/10 I26). Mortality — 8,627. Total mention mortality — 25,791. Hospital discharges — 92,000.

- 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 47 for definition.) Heavy cigarette smoking and high blood pressure were also identified as risk factors for PE.
- Death occurs in about 12 percent of PE cases within one month of diagnosis.
- 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).
- 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.
- The age-adjusted rate of deaths with **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.

## Tobacco

Population Group	Prevalence 2001
Total population	48,100,000 (22.8%)
Total males	25,600,000 (25.2%)
Total females	22,600,000 (20.7%)
White males	25.1%
White females	21.7%
Black or African-American males	27.6%
Black or African-American females	18.0%
Hispanic or Latino males	23.2%
Hispanic or Latino females	12.5%
Asian only males	21.3%
Asian only females	6.9%
American Indian/Alaska Native only males	32.0%
American Indian/Alaska Native only females	36.9%

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

Source: *Health, United States, 2003, CDC/NCHS.*

## Prevalence

- Since 1965 smoking in the United States has declined by over 40 percent among people age 18 and older. (*Health, United States, 2003, CDC/NCHS*)
- In 2001, 38.5 percent of male students in grades 9-12 and 29.5 percent of female students reported current tobacco use; 22.1 percent of males and 8.5 percent of females reported current cigar use; and 14.8 percent of males and 1.9 percent of females reported current smokeless tobacco use. (*Youth Risk Behavior Surveillance [YRBS], United States, 2001, MMWR, Vol. 51, No. SS-4, June 28, 2002, CDC/NCHS*)
- In 1996 about 15 million children and adolescents under age 18 were exposed to environmental tobacco smoke in the home. (*MMWR, Vol. 46, No. 44, Nov. 7, 1997, 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;281:1006-1013*)
- From 1980 to 2002 the percentage of high school seniors who smoked in the past month decreased 12.5 percent. For males it decreased 2.2 percent, and for females it decreased 23.7 percent. For whites it decreased 0.3 percent, while for blacks or African Americans there was a 55.2 percent decrease. (*Health, United States, 2003, CDC/NCHS*)
- About 5 million American men and women use chewing tobacco. The prevalence varies widely by region and sociodemographic factors. (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/Pacific Islanders and 7.8 for American Indians/Alaska Natives.
  - For women the percentages are 0.3 for whites, 2.9 for blacks, 0.1 for Hispanics, almost none for Asian/Pacific Islanders and 1.2 for American Indians/Alaska Natives.
  - Use rates increase as years of education decrease for both men and women.
- Among Americans age 18 and older, 25.2 percent of men and 20.7 percent of women are smokers, putting them at increased risk of heart attack and stroke. (*Health, United States, 2003, 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 and Alaska Native only, 28.5 for Native Hawaiian and other Pacific Islander only, 13.6 for Asian only and 22.9 for Hispanic or Latino, any race. (*Health, United States, 2003, CDC/NCHS*)
- Among American Indians ages 45-74, 40.5 percent of men and 29.3 percent of women are current smokers. (SHS [1989-92], NHLBI)
- 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*)
- 47.7 percent of working adults age 17 and older who don't use tobacco report exposure to environmental tobacco smoke at home or at work. (*JAMA. 1995;273:402-407*)
- 37.4 percent of nonsmoking adults are exposed to environmental tobacco smoke at home or at work. The ethnic breakdown is 37.4 percent of non-Hispanic whites, 36.9 percent of non-Hispanic blacks and 35.1 percent of Mexican Americans. (NHANES III [1988-91], CDC/NCHS, *JAMA. 1996;275:1233-1240*)

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

## Incidence

- An estimated 3.2 million Americans tried their first cigarette in 1997; most of these new users (2.3 million) were ages 12 to 17.
- An estimated 1.7 million Americans began smoking cigarettes daily in 1998. More than half of these new smokers were younger than age 18. This translates to more than 4,000 new regular smokers per day, including more than 2,000 youths.
- After increasing since the early 1990s, the number of 12- to 17-year-olds initiating daily smoking dropped significantly between 1997 and 1998, from 1.1 million in 1997 to 864,000 in 1998. (National Household Survey on Drug Abuse, analyzed by CDC/NCHS and the Substance Abuse and Mental Health Services Administration)

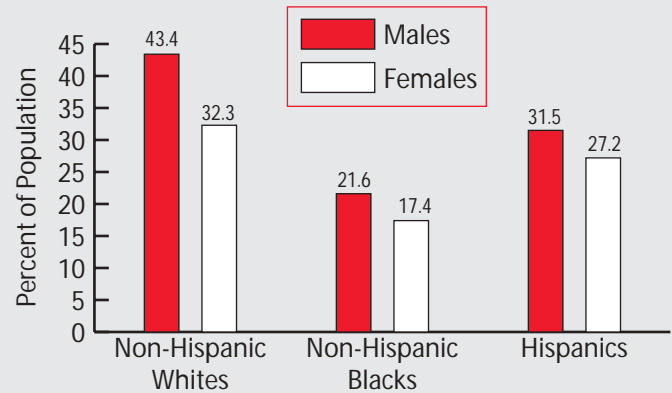
## Mortality

- 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)
- The risk of death from CHD increases by up to 30 percent among those exposed to environmental tobacco smoke at home or work.

## Cost

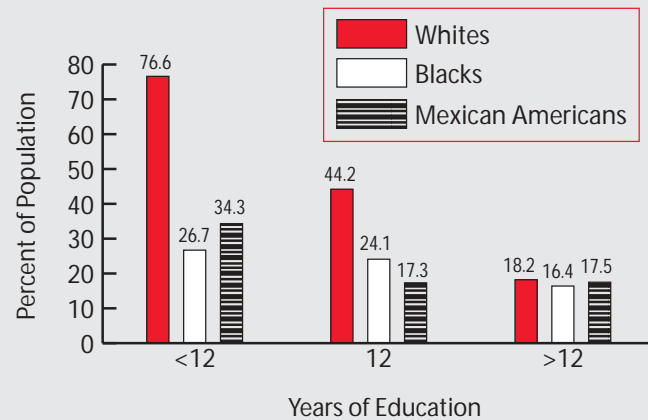
- Smoking costs Americans over \$157 billion annually in health-related economic costs. This estimate includes adult smoking-attributable productivity costs and medical expenditures, and smoking-attributable neonatal medical expenditures. (*MMWR*, Vol. 51, No. 14, April 12, 2002, CDC/NCHS)

### Prevalence of High School Students Using any Tobacco Product Within the Last 30 Days by Race/Ethnicity and Sex United States: 2001



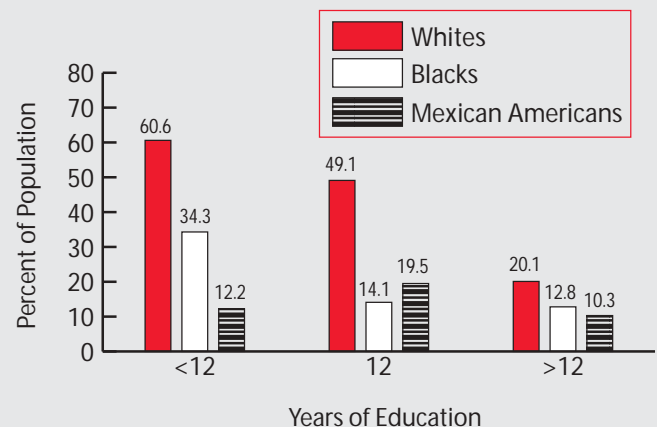
Source: YRBS, United States, 2001, *MMWR*, Vol. 51, No. SS-4, June 28, 2002, CDC/NCHS.

### Prevalence of Current Smoking for Men Ages 18-24 by Education and Race/Ethnicity NHANES III: 1988-94



Source: Ethnic variation in cardiovascular disease risk factors among children and young adults: findings from the Third National Health and Nutrition Examination Survey, 1988-1994. *JAMA*. 1999;281:1006-1013.

### Prevalence of Current Smoking for Women Ages 18-24 by Education and Race/Ethnicity NHANES III: 1988-94



Source: *JAMA*. 1999;281:1006-1013.

## High Blood Cholesterol and Other Lipids

Population Group	Prevalence of Total Cholesterol 200 mg/dL or higher 2001	Prevalence of Total Cholesterol 240 mg/dL or higher 2001	Prevalence of LDL Cholesterol 130 mg/dL or higher 2001	Prevalence of HDL Cholesterol less than 40 mg/dL 2001
Total population*	104,700,000 (50.7%)	37,000,000 (18.3%)	93,000,000 (45.8%)	53,600,000 (26.4%)
Total males*	49,200,000 (50.4%)	16,500,000 (17.2%)	47,300,000 (48.5%)	38,000,000 (39.0%)
Total females*	55,500,000 (50.9%)	20,500,000 (19.1%)	45,700,000 (43.3%)	15,700,000 (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 males	54.3%	17.8%	43.6%	40.1%
Mexican females	44.7%	13.9%	41.6%	18.4%
Total Hispanics#	—	25.6%	—	—
Total Asian/Pacific Islanders#	—	27.3%	—	—
Total American Indians/ Alaska Natives, Alaska#	—	26.0%	—	—
Total American Indians/ Alaska Natives, Oklahoma#	—	28.6%	—	—
Total American Indians/ 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.

Source for total cholesterol 200 mg/dL or higher: NHANES IV (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.

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

### Prevalence

For information on dietary cholesterol, total fat, saturated fat and other factors that affect blood cholesterol levels, see Nutrition, pages 36-37.

- Among children and adolescents ages 4-19 (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)
- Beginning at age 45, a higher percentage of women than men have total blood cholesterol of 200 mg/dL or higher. (NHANES IV [1999-2000], CDC/NCHS)
- Among elderly Japanese-American men, 42 percent have total cholesterol levels of 200 mg/dL or higher or are taking cholesterol-lowering medication. (HHP, Fourth Examination [1991-93], NHLBI)
- 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)
- Among American Indians ages 45-74, 37.7 percent of men and 37.6 percent of women have total blood cholesterol levels of 200 mg/dL or higher. Of these, 8.6 percent of men and 12.7 percent of women have levels of 240 mg/dL or higher. (SHS [1989-92], NHLBI)
- For American Indians ages 45-74, the percent of men with LDL 130 mg/dL or higher ranged from 18 to 38 percent. For women it ranged from 18 to 33 percent. The percent with HDL less than 40 mg/dL was 43 to 50 percent for men and 24 to 31 percent for women. (SHS [1989-92], NHLBI)

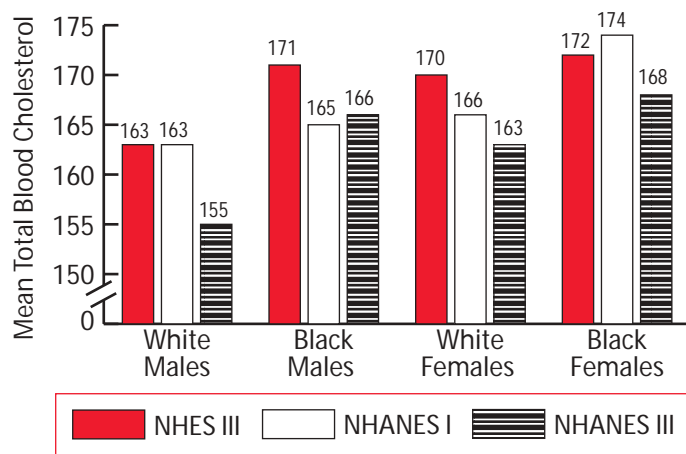
## Adherence

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 6 months to one year before a benefit from treatment becomes apparent.

### Trends in Mean Total Blood Cholesterol Among Adolescents Ages 12-17 by Sex, Race and Survey

NHES III, NHANES I & III: 1966-70, 1971-74, 1988-94



Source: CDC/NCHS. Hickman TB, et al. Distributions and trends of serum lipid levels among United States children and adolescents ages 4-19 years: data from the Third National Health and Nutrition Examination Survey. *Prev Med*. 1998;27:879-890.

## LDL (Bad) Cholesterol

- 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.
- 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.

- The mean level of HDL cholesterol for American adults age 20 and older is 50.7 mg/dL. (NHANES III [1988-94], CDC/NCHS)
- 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.
- 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-C (53 mg/dL or greater in men and 67 mg/dL or greater in women). (FHS, NHLBI)

## Physical Inactivity

Population Group	Prevalence 1998
White males	32.5%
White females	36.2%
Black males	44.1%
Black females	55.2%
Hispanic males	48.9%
Hispanic females	57.4%
Asian/Pacific Islander males	30.9%
Asian/Pacific Islander females	45.5%

Note: Data for white, black and Asian/Pacific Islander males and females are for non-Hispanics. Prevalence is the percentage of population who report no leisure-time physical activity.

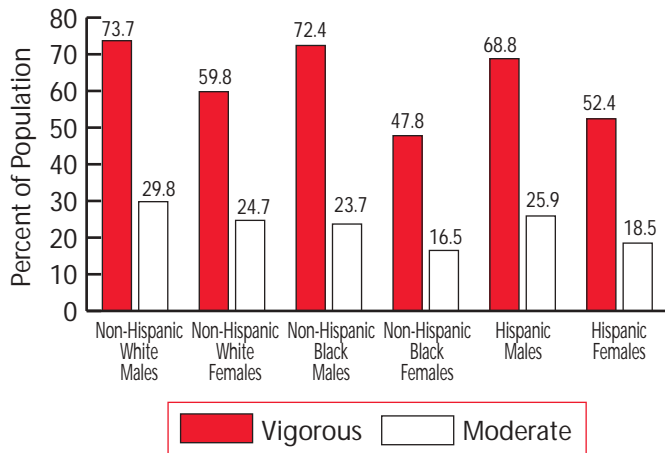
Sources: NHIS (1997-98), CDC/NCHS; data are age-adjusted for Americans age 18 and older.

### Prevalence

The following data are based on *leisure-time* physical activity.

- In 2000-01, data from the BRFSS study of the CDC showed that 54.6 percent of Americans age 18 and older were not active enough to meet physical activity recommendations. (*MMWR*, Vol. 52, No.32, CDC/NCHS).
- In 1997-98, 38.3 percent of Americans age 18 or older reported no physical activity. 61.7 percent engaged in at least some physical activity. 22.7 percent engaged in light-moderate physical activity at least 5 times per week. (*Advance Data*, No. 325, April 7, 2002, CDC/NCHS)
  - Men, young people, non-Hispanic whites and Asian/Pacific Islander non-Hispanic adults were more likely to engage in at least some physical activity compared with women, older people and non-Hispanic blacks and Hispanics.
  - People who were college-educated, in higher income brackets or living in the West had a higher prevalence of recommended activity.
  - Married women were more likely than women in any other marital status group to engage in at least some physical activity.
- Based on data from the 1997-2003 NHIS surveys of the CDC/NCHS...
  - 31.3 percent of U.S. adults age 18 and older engaged in regular leisure-time activity.
  - For age groups 18-24 and 25-64, women were less likely than men to engage in regular leisure-time physical activity.
  - The age-sex-adjusted percent of adults who engaged in regular leisure-time physical activity was 34.0 percent for non-Hispanic whites, 26.4 percent for non-Hispanic blacks and 21.1 percent for Hispanics.
- 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;273:402-407)
- 51.7 percent of high school students were enrolled in physical education classes in 2001, but only 32.2 percent attended classes daily. (*MMWR*, Vol. 51, No. SS-4, June 28, 2002, CDC/NCHS)
- In 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 were significantly less likely than non-Hispanic white children to report involvement in organized activities, as were children with parents who had 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;347:709-715)
  - 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.
- Physical inactivity is more prevalent among women than men, among blacks and Hispanics than whites, among older than younger adults and among the less affluent than the more affluent. (*Physical Activity and Health*, U.S. Surgeon General's Report, 1996)
- 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;283:2961-2967)
- 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;91:1254-1257)
  - 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).
- Among American Indians ages 45-74, 16.8 percent of men and 19.6 percent of women report no physical activity during the past year. (SHS [1989-92], NHLBI)

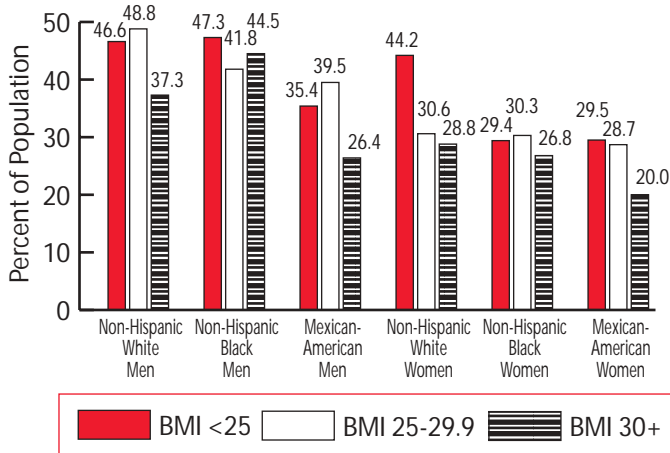
**Prevalence of Students in Grades 9-12 Who Participated in Sufficient Vigorous or Moderate Physical Activity During the Past 7 Days by Race/Ethnicity and Sex**  
United States: 2001



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: YRBS, United States, 2001, MMWR, Vol. 51, No. SS-4, June 28, 2002, CDC/NCHS.

**Prevalence of Moderate or Vigorous Physical Activity in Americans Age 20 and Older by Sex, Race/Ethnicity and BMI**  
NHANES III: 1988-94



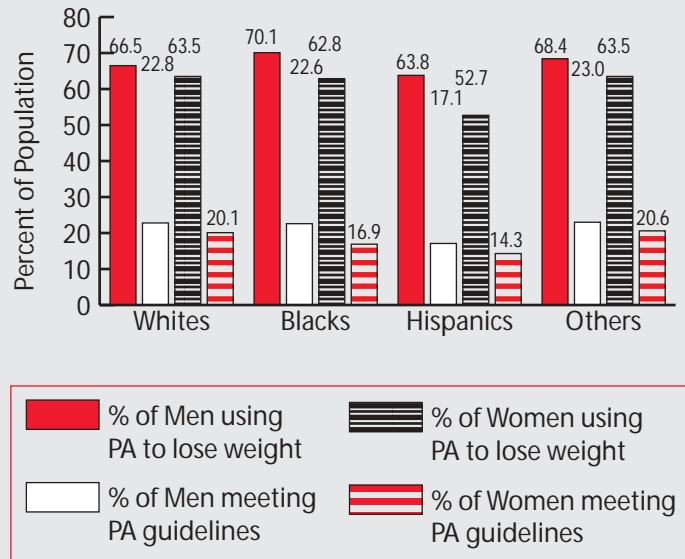
Note: BMI indicates body mass index: weight in kilograms divided by height in meters squared (kg/m<sup>2</sup>).

Source: CDC/NCHS.

**Cost**

- The annual cost for diseases associated with physical inactivity is \$76 billion. (CDC)

**Leisure-time Physical Activity (PA) Patterns Among Overweight Adults by Race/Ethnicity and Sex**  
BRFSS: 1998



Source: MMWR, Vol. 49, No. 15, April 21, 2000, CDC/NCHS.

## Overweight and Obesity

Population Group	Prevalence of Overweight and Obesity in Adults 2001	Prevalence of Obesity in Adults 2001	Prevalence of Overweight in Children Ages 6-11 2001	Prevalence of Overweight in Adolescents Ages 12-19 2001
Total population	130,760,000 (64.5%)	61,980,000 (30.5%)	3,800,000 (15.3%)	5,000,000 (15.5%)
Total males	65,250,000 (67.2%)	26,630,000 (27.5%)	2,000,000 (16.0%)	2,600,000 (15.5%)
Total females	65,510,000 (61.9%)	35,350,000 (33.4%)	1,800,000 (14.5%)	2,400,000 (15.5%)
White only males	67.4%	27.3%	11.9%	13.0%
White only females	57.3%	30.1%	12.0%	12.2%
Black or AA only males	60.7%	28.1%	17.6%	20.5%
Black or AA only females	77.3%	49.7%	22.1%	25.7%
Mexican males	74.7%	28.9%	27.3%	27.5%
Mexican females	71.9%	39.7%	19.6%	19.4%
Hispanic males*	66.2%	21.8%	—	—
Hispanic females*	56.6%	23.3%	—	—
Asian/Pacific Islander males*	36.7%	7.1%	—	—
Asian/Pacific Islander females*	27.1%	5.8%	—	—
American Indian/Alaska Native males**	25.9%	35.5%	—	—
American Indian/Alaska Native females**	31.3%	41.2%	—	—

Note: AA = African-American. BMI (body mass index) = weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). Data for white, black or African-American, and Asian/Pacific Islander males and females are for non-Hispanics. (—) = data not available.

Overweight in adults is BMI 25.0-29.9. Obesity in adults is BMI 30.0 or higher. Overweight in children is BMI 95<sup>th</sup> percentile of the CDC 2000 growth chart.

Sources: NHANES IV (1999-2000), CDC/NCHS (except as noted below); data in adults are for age 20 and older. *Health, United States, 2003*.

\* NHIS (1997-98), CDC/NCHS; data are for Americans age 18 and older.

\*\* SHS (1989-92), NHLBI; data are for ages 45-74.

For this group, overweight is BMI 27.8-31.0 for men and 27.3-32.2 for women; obesity is BMI 31.1 or higher for men and 32.3 or higher for women.

## Prevalence

- An estimated 8,830,000 children and adolescents ages 6-19 are considered overweight or obese, based on the 95<sup>th</sup> percentile of body mass index (BMI) values in the 2000 CDC growth chart for the United States. (NHANES IV [1999-2000], CDC/NCHS)

- Based on data from NHANES IV (1999-2000), the prevalence of overweight in children ages 6-11 increased from 4.2 percent to 15.3 percent compared with data from 1963-65. The prevalence of overweight in adolescents ages 12-19 increased from 4.6 percent to 15.5 percent. (CDC/NCHS, October 2002)
- Over 10 percent of preschool children between the ages of 2 and 5 are overweight, up from 7 percent in 1994. (NHANES IV [1999-2000], CDC/NCHS; *JAMA*. 2002; 288:1728-1732)
  - Among preschool children, the following are overweight: 10 percent of non-Hispanic whites, 8 percent of non-Hispanic blacks and 11 percent of Mexican Americans.
  - Among children ages 6-11, the following are overweight: 12 percent of non-Hispanic whites, 20 percent of non-Hispanic blacks and 24 percent of Mexican Americans.
  - Among adolescents ages 12-19, the following are overweight: 12 percent of non-Hispanic whites and 24 percent of both non-Hispanic blacks and Mexican Americans.
  - In addition, the data show that another 15 percent of children and teens ages 6 to 19 are considered at risk of becoming overweight (BMI from the 85<sup>th</sup> to the 95<sup>th</sup> percentile).
- 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)
- The age-adjusted prevalence of overweight (BMI of 25.0 or higher) increased from 55.9 percent in NHANES III (1988-94) to 64.5 percent in NHANES IV (1999-2000). The prevalence of obesity (BMI of 30.0 or higher) also increased during this period from 22.9 percent to 30.5 percent. Extreme obesity (BMI of 40.0 or higher) increased from 2.9 percent to 4.7 percent. (*JAMA*. 2002;288:1723-1727)
  - Increases occurred for both men and women in all age groups and for non-Hispanic whites, non-Hispanic blacks and Mexican Americans.
  - Racial and ethnic groups did not differ significantly in the prevalence of obesity or overweight for men.
  - Among women, obesity and overweight prevalences were highest among non-Hispanic black women. More than half of these women age 40 and older were obese, and more than 80 percent were overweight.
- The prevalence of obesity (BMI 30 or higher) in 2001 increased 5.6 percent between 2000 and 2001. (BRFSS, CDC/NCHS)
- 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)
- A recent comparison of risk factors in both the Honolulu Heart Program and Framingham Heart Study showed a BMI increase around  $3 \text{ kg}/\text{m}^2$  raised the risk of hospitalized thromboembolic stroke 10-30 percent. (*Stroke*. 2002;33:230-237)

- The large Health Professionals Follow-up Study suggests that for men, abdominal obesity is more closely related to stroke risk (rather than BMI). For women, BMI and weight gain are independent risk factors for stroke. (*Am J Epidemiol.* 1996;144:1143-1150; *JAMA.* 1997;277:1539-1545)
- Among American Indians/Alaska Natives ages 45-74 (SHS [1989-92], NHLBI),
  - 25.9 percent of men are overweight, defined as a BMI of 27.8-31.0 kg/m<sup>2</sup>.
  - 31.3 percent of women are overweight, defined as a BMI of 27.3-32.2 kg/m<sup>2</sup>.
  - 35.5 percent of men are obese, defined as BMI of 31.1 kg/m<sup>2</sup> or higher.
  - 41.2 percent of women are obese, defined as BMI of 32.3 kg/m<sup>2</sup> or higher.

## Mortality

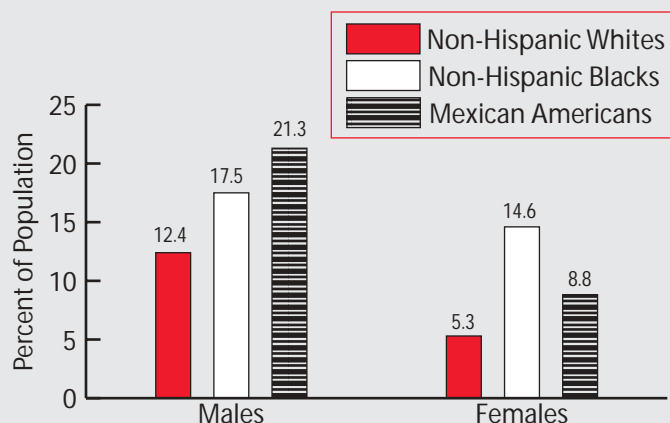
- Each year an estimated 300,000 U.S. adults die of causes related to obesity. (BRFSS, CDC/NCHS, *JAMA.* 1999;282: 1530-1538)
- Obesity profoundly affects life span. A 20-year-old white male with a BMI greater than 45 is estimated to have 13 years of life lost (YLL) due to obesity. A 20-year-old white 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; 289:187-193)

## 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)

### Prevalence of Overweight Among Students in Grades 9-12 by Sex and Race/Ethnicity

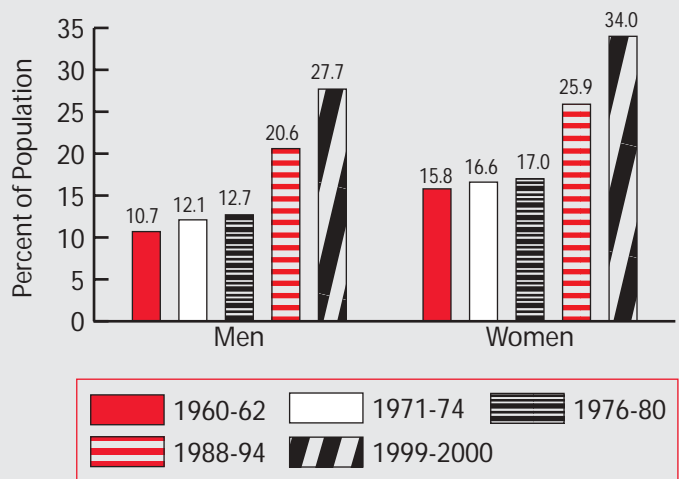
United States: 2001



Source: BMI 95<sup>th</sup> percentile or higher. YRBS, United States, 2001, *MMWR*, Vol. 51, No. SS-4, June 28, 2002, CDC/NCHS.

### Age-Adjusted Prevalence of Obesity in Americans Ages 20-74 by Sex and Survey

NHES, NHANES I, NHANES II, NHANES III, NHANES IV: 1960-62, 1971-74, 1976-80, 1988-94 and 1999-2000



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 - 2001	Prevalence of Undiagnosed Diabetes - 2001	Prevalence of Pre-Diabetes 2001	Incidence (Type 2 Diabetes)	Mortality (Diabetes) 2001	Hospital Discharges 2001
Total population	11,100,000 (5.5%)	5,900,000 (2.9%)	14,500,000 (7.1%)	798,000	71,372	562,000
Total males	5,100,000 (5.5%)	3,100,000 (3.3%)	8,800,000 (9.3%)	—	32,841 (46.0%)*	271,000
Total females	6,000,000 (5.5%)	2,800,000 (2.5%)	5,800,000 (5.3%)	—	38,531 (54.0%)*	291,000
White males	5.4%	3.0%	9.4%	—	26,917	—
White females	4.7%	2.1%	4.8%	—	30,263	—
Black males	7.6%	2.8%	8.0%	—	5,049	—
Black females	9.5%	4.7%	6.8%	—	7,256	—
Mexican-American males	8.1%	5.8%	12.1%	—	—	—
Mexican-American females	11.4%	3.9%	6.7%	—	—	—
Total Hispanics**	5.5%	—	—	—	—	—
Total Asian/Pacific Islanders**	4.6%	—	—	—	—	—
Total American Indians/Alaska Natives**	7.6%	—	—	—	—	—

Note: Undiagnosed diabetes is a fasting blood glucose of 126 mg/dL or more. Pre-diabetes is a fasting blood glucose of 110 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.

Sources: **Prevalence:** NHANES III [1988-94], CDC/NCHS; 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:** NINDS 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.

\*\* BRFSS (1997), CDC/NCHS; data are for Americans age 18 and older.

## Prevalence

- Diabetes increases the risk of stroke, with the relative risk ranging from 1.8 to almost 6.0. (*Stroke*. 2001;32:280-299)
- 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;32:280-299; *Neuroepidemiology*. 1999;18:1-14)
- 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;289:76-79)
- 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;21:518-524)
- 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/Alaska Native adults. Throughout the surveillance period, the overall age-adjusted prevalence for American Indian/Alaska Native adults was more than twice that of U.S. adults overall. (*MMWR*, Vol. 52, No. 30, Aug. 1, 2003, CDC/NCHS)
- 17 percent of Japanese-American men ages 71-93 have recognized diabetes. In addition, 19 percent have unrecognized diabetes, and 32 percent have impaired glucose tolerance (pre-diabetes). (HHP [1991-93], NHLBI)
- Compared with white women, black women have 138 percent higher rates of ambulatory medical care visits for diabetes. (Utilization of Ambulatory Medical Care by Women: United States, 1997-98. NCHS, 2001)
- 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)
- 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](http://ndep.nih.gov))
- 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.

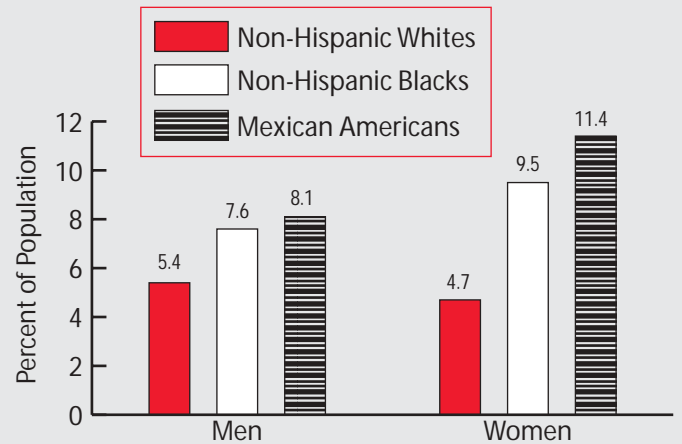
- In 2000 the self-reported prevalence of any CV condition was 28.8 per 100 diabetic population among persons ages 35-64, 45.7 per 100 among persons ages 65-74, and 53.5 per 100 persons age 75 and older.
- In 2000, among persons with diabetes age 35 and older, 37.2 percent reported being diagnosed with 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.
- Among American Indians ages 45-74, 43.5 percent of men and 52.4 percent of women have diabetes. 14.2 percent of men and 17.4 percent of women have impaired glucose tolerance (pre-diabetes). (SHS [1989-92], NHLBI)

## Mortality

Total mention mortality — 213,000.

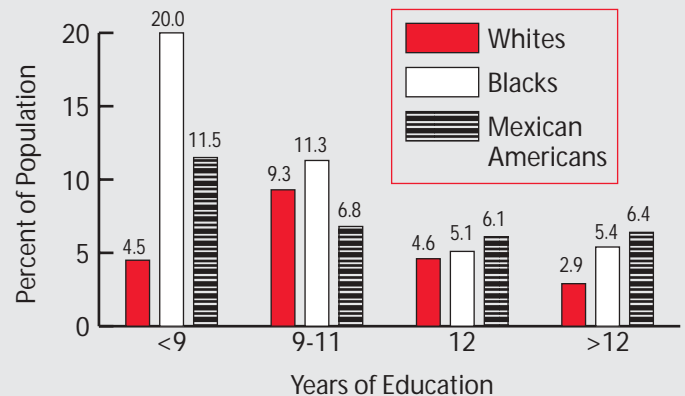
- The 2001 overall death rate from diabetes was 25.3. Death rates were 26.2 for white males, 49.9 for black males, 20.5 for white females and 48.1 for black females.
- From two-thirds to three-fourths of people with diabetes mellitus die of some form of heart or blood vessel disease.
- Heart disease death rates among adults with diabetes are 2 to 4 times higher than the rates for adults without diabetes. ([diabetes.niddk.nih.gov](http://diabetes.niddk.nih.gov))

### Age-Adjusted Prevalence of Physician-Diagnosed Diabetes in Americans Age 20 and Older by Sex and Race/Ethnicity NHANES III: 1988-94



Source: *Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults, the Third National Health and Nutrition Examination Survey, 1988-1994. Diabetes Care. 1998;21:518-524.*

### Prevalence of Non-Insulin-Dependent (Type 2) Diabetes in Women\* Ages 25-64 by Education and Race/Ethnicity 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: *Ethnic and socioeconomic differences in cardiovascular disease risk factors for women from the Third National Health and Nutrition Examination Survey, 1988-1994. JAMA. 1998;280:356-362.*

## 8

# Metabolic Syndrome

The Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III, NHLBI) defines the metabolic syndrome 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 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 the metabolic syndrome are at increased risk for developing diabetes and cardiovascular disease as well as increased mortality from CVD and all causes. Limited information is available about the prevalence of the metabolic syndrome in the United States, however.

## Prevalence

- An estimated 47 million U.S. residents have the metabolic syndrome. (NHANES III [1988-94], CDC/NCHS; *JAMA*. 2002;287:356-359)

- The age-adjusted prevalence of the metabolic syndrome for adults is 23.7 percent. (NHANES III [1988-94], CDC/NCHS; *JAMA*. 2002;287:356-359)
  - 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 metabolic syndrome (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 metabolic syndrome 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)

## 9

# 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 IV (1999-2000), CDC/NCHS, 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](http://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;32:245-254)

- 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;32:245-254)
- 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).
- Among American Indians ages 45-74, the average percent of total calories from fat ranged from 34 to 36 percent for men and was 34 percent for women. Mean dietary intake of saturated fat ranged from 25 to 29 percent for men and 22 to 23 percent for women. (SHS [1989-92], NHLBI)
- 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;32:245-254)
- 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;32:245-254)
- 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;32:245-254)
- 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).
- 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 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;289:1659-1666)
- 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;32:245-254)
- 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;90:777-781)
- 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;32:245-254)
- Recent studies support the intake of up to 9 servings of fruits and vegetables per day. (*NEJM.* 1997;336:1117-1124)
- Nationwide, 21.4 percent of students in grades 9-12 had eaten 5 or more servings of fruits and vegetables per day during the last 7 days. (YRBS, United States, 2001, *MMWR*, Vol. 51, No. SS-4, June 28, 2002)
  - Male students (23.3 percent) were significantly more likely than female students (19.7 percent) to have eaten 5 or more servings per day.
  - 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.

- 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](http://ers.usda.gov/briefing/consumption))

- 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)

## Quality of Care

### National Medicare and Medicaid Data

In 2003 the Centers for Medicare and Medicaid Services published national data on quality-of-care indicators for Medicare beneficiaries, including an analysis of change between 1998-99 and 2000-01. Only patients who were candidates for each quality indicator were considered in calculating the percentages (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. However, significant room for improvement remains, and these data do not necessarily reflect the overall quality of care that is delivered.

### National Managed Care Data

For 2002 the National Committee for Quality Assurance reported on 5 quality-of-care performance measures related to preventing and treating cardiovascular diseases, including (The State of Health Care Quality, 2002, NCQA):

- Use of beta-blockers after a heart attack
- Cholesterol screening in patients with coronary heart disease
- Cholesterol control in patients with coronary heart disease
- Control of high blood pressure
- Control of diabetes

NCQA data primarily reflect voluntary reporting by participating managed care plans. Performance data apply to patients who receive their medical care from providers participating in specific managed care plans in the United States.

#### Use of beta-blockers after a heart attack

- In 2001, 92.5 percent of heart attack survivors enrolled in commercial managed care plans were receiving a beta-blocker at hospital discharge, an increase from 62.2 percent in 1996. If all practices performed at the 90<sup>th</sup> percentile level (98.7 percent), 1,200 more deaths could be avoided each year. In comparison, for 2000 the Medicaid rate was 82.9 percent and the commercial rate was 89.4 percent.

#### Cholesterol screening in patients with coronary heart disease

- In 2001, 77.1 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 59.1 percent in 1998. In comparison, for 2000 the Medicaid rate was 43.8 percent, the Medicare rate was 70.6 percent, and the commercial rate was 74.2 percent.

## Cholesterol control in patients with coronary heart disease

- In 2001, 59.2 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 45.2 percent from 1999. If all practices performed at the 90<sup>th</sup> percentile level (72.2 percent), 4,700 deaths could be avoided each year. In comparison, for 2000 the Medicaid rate was 28.2 percent, the Medicare rate was 52.9 percent, and the commercial rate was 53.4 percent. This treatment goal is less aggressive than the goal of less than 100 mg/dL endorsed by the American Heart Association and the National Cholesterol Education Program. It's almost certain that lipid control with regard to the AHA and NCEP treatment goals is worse than suggested here.

## Control of high blood pressure

- In 2001, 55.4 percent of adults enrolled in commercial managed care plans and diagnosed with high blood pressure were controlled to levels less than 140/90 mmHg. This was an increase from 40.0 percent in 1999. In comparison, for 2000 the Medicaid rate was 45.4 percent, the Medicare rate was 46.7 percent, and the commercial rate was 51.5 percent.

## Control of diabetes

- In 2001, 36.9 percent of adults enrolled in commercial managed care plans and diagnosed with diabetes were poorly controlled (HbA1c >9.5 percent or not tested). This proportion represented a decrease from 38.3 percent in 1998, the first year of use for this performance indicator. If all practices performed at the 10<sup>th</sup> percentile level (23.1 percent), 5,100 deaths could be avoided over the next 10 years. In 2000 the Medicaid rate was 54.9 percent, the Medicare rate was 33.4 percent, and the commercial rate was 42.5 percent.

## Advising smokers to quit

- In 2000, 66.3 percent of smokers enrolled in commercial managed care plans were advised to quit, an increase from 59.1 percent in 1996.
- The 90<sup>th</sup> percentile benchmark was 74.1 percent of smokers. If all practices performed at this level, 2.7 million more smokers would be advised to quit and 82,000 more smokers would quit smoking. This would lead to substantial reductions in smoking-related morbidity, mortality (683 fewer deaths per year) and health care costs.

## American Heart Association GWTG-CAD Program

*Get With The Guidelines*<sup>SM</sup> (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 120 hospitals.

Performance indicator	Percent of inpatients
Aspirin within 24 hours of admission	75.3%
Aspirin at discharge	93.2%
Beta-blocker within 24 hours of admission	62.0%
Beta-blocker at discharge	79.4%
ACE-inhibitor at discharge for patients with LVEF <40%	63.6%
Lipid therapy at discharge	66.5%
Lipid therapy at discharge if LDL >100 mg/dL	72.8%
Blood pressure therapy at discharge	74.5%
Smoking cessation counseling	57.2%
Referral to cardiac rehabilitation	65.0%

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 our 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 a data set of 54,639 patients enrolled September 2001 through May 2003 from these 260 U.S. hospitals was as follows:

Performance indicator	Percent of inpatients
Complete set of discharge instructions	28%
Measure of LV function	80%
ACE-inhibitor at discharge for patients with LVEF <40%, no contraindications	68%
Smoking cessation counseling, current smokers	34%

These patients were hospitalized with a primary diagnosis of heart failure. The mean age was 72.5 years and 52 percent of them were female. There were 59 percent of HF patients with a medical history of coronary artery disease. In-hospital mortality was 4.1 percent and median length of stay 4.3 days.

Further information on the ADHERE registry can be found at [adhereregistry.com](http://adhereregistry.com).

# Medical Procedures and Costs

From 1979 to 2001 the number of cardiovascular operations and procedures increased 417 percent.

## Cardiac Catheterization

- From 1979 to 2001 the number of cardiac catheterizations increased 304 percent.
- An estimated 1,208,000 inpatient cardiac catheterizations were performed in 2001.
- 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](http://hcup.ahrq.gov))

## Coronary Artery Bypass Surgery

In the United States in 2001, the NCHS estimates that 516,000 of these procedures were performed on 305,000 patients.

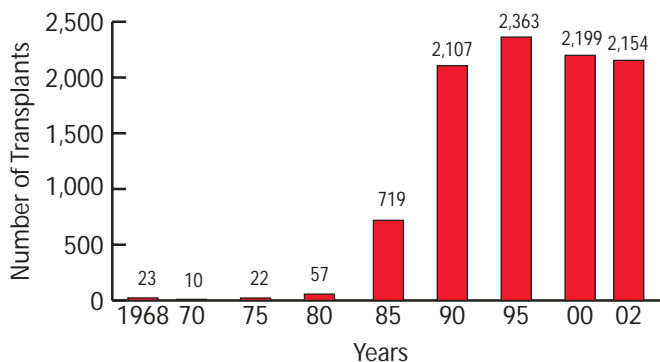
## Heart Transplants

In 2002, 2,154 heart transplants were performed in the United States. There are 257 organ transplant centers in the United States, 140 of which perform heart transplants.

- Each year thousands more Americans would benefit from a heart transplant if more donated hearts were available.
- In the United States in 2002, 77 percent of heart transplant patients were male, 74 percent were white, 19 percent were ages 35-49, and 50 percent were ages 50-64.
- In 2002 the 1-year survival rate was 86 percent. Based on heart transplants performed from 1994 to March 2001, the 3-year survival rate was about 77 percent, and the 5-year survival rate was 71 percent.

### Trend in Heart Transplants

UNOS: 1968-2002



Source: United Network for Organ Sharing (UNOS), scientific registry data.

## Percutaneous Transluminal Coronary Angioplasty (PTCA)

- An estimated 571,000 PTCA procedures were performed on 559,000 patients in 2001 in the United States. From 1987 to 2001 the number of procedures increased 266 percent.
- In 2001, 66 percent of PTCA procedures were performed on men; 51 percent were performed on people age 65 and older.

## 2001 National HCUP Statistics

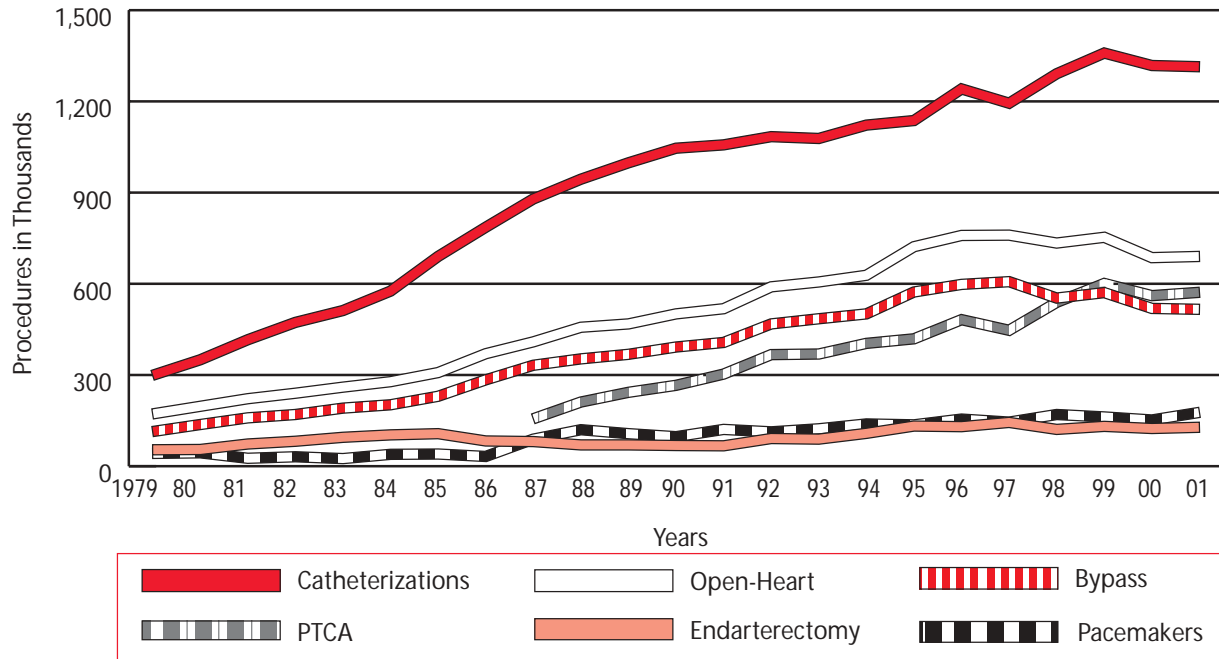
Data from the latest Healthcare Cost and Utilization Project (HCUP) provide data for the mean charges and in-hospital death rate for the following ([hcup.ahrq.gov](http://hcup.ahrq.gov)):

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%
Enderectomy, vessel of head and neck	16,890	0.4%
Heart valves	85,187	5.8%

2001 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](http://hcup.ahrq.gov)):

Primary Diagnosis	Rank	National Bill
Coronary atherosclerosis	1	\$35.1 billion
Acute MI	2	23.7 billion
Congestive HF, nonhypertensive	4	17.6 billion
Acute cerebrovascular disease	8	12.0 billion
Cardiac dysrhythmias	10	11.4 billion

### Trends in Cardiovascular Operations and Procedures United States: 1979-2001



Source: CDC/NCHS.

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

United States: 2001 (in Thousands)

Operations/Procedures/Patients (ICD/9 Code)		Total	Sex		Age				Region#			
			Male	Female	<15	15-44	45-64	65+	Northeast	Midwest	South	West
Angioplasty (36.0)	Procedures	1,051	689	363	—	60	455	537	185	316	361	190
PTCA (36.01, .02, .05) (a)	Procedures	571	375	197	—	33	245	293	100	177	191	102
	Patients	559	367	192	—	32	241	287	99	169	190	101
Stenting (36.06)	Procedures	475	310	164	—	26	207	241	84	136	167	88
Cardiac Revascularization (Bypass) (36.1-36.3) (b)	Procedures	516	365	151	—	19	220	277	111	132	189	84
	Patients	305	212	93	—	11	128	165	64	76	116	49
Diagnostic Cardiac Catheterizations (37.2) (a)	Procedures	1,314	779	534	9	98	534	673	254	341	510	209
Endarterectomy (38.12)	Procedures	128	72	56	—	—	30	97	28	31	51	18
Implantable Defibrillators (37.94-.99)	Procedures	46	32	9	—	—	13	23	11	10	13	7
Open-Heart Surgery (c)	Procedures	690	460	225	30	33	258	350	156	162	237	125
Pacemakers (37.8) (d)	Procedures	177	89	88	—	—	22	150	48	37	69	23
Valves (35.1, .2, .99) (e)	Procedures	82	49	33	—	—	17	50	22	12	24	16
<b>Total Vascular and Cardiac Surgery and Procedures (35-39)**</b>		<b>6,188</b>	<b>3,574</b>	<b>2,615</b>	<b>197</b>	<b>578</b>	<b>2,172</b>	<b>3,241</b>	<b>1,291</b>	<b>1,450</b>	<b>2,334</b>	<b>1,113</b>

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 nonhospitalized 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 92,000 "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.

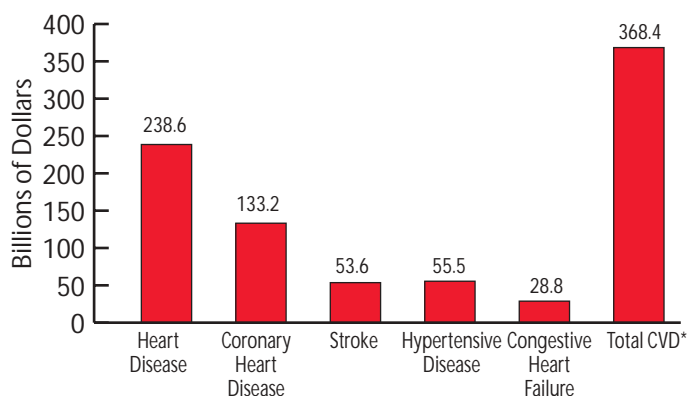
(e) — Open-heart valvuloplasty without replacement; replacement of heart valve; other operations on heart valves.

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).

# Economic Cost of Cardiovascular Diseases

The cost of cardiovascular diseases and stroke in the United States in 2004 is estimated at \$368.4 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 2003 the estimated cost of all cancers was \$189 billion (\$64 billion in direct costs, \$16 billion in morbidity indirect costs and \$109 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: 2004



**Estimated Direct and Indirect Costs (in Billions of Dollars) of Cardiovascular Diseases and Stroke**

United States: 2004

	Heart Disease**	Coronary Heart Disease	Stroke	Hypertensive Disease	Congestive Heart Failure	Total Cardiovascular Disease*
<b>Direct Costs</b>						
Hospital	\$72.0	\$37.0	\$13.7	\$5.5	\$13.6	\$101.7
Nursing Home	18.5	9.7	12.8	3.8	3.5	38.1
Physicians/Other Professionals	17.1	9.6	2.7	9.6	1.8	33.4
Drugs/Other						
Medical Durables	18.3	8.5	1.1	21.0	2.7	43.3
Home Health Care	4.6	1.4	2.7	1.5	2.1	10.3
<b>Total Expenditures*</b>	<b>\$130.6</b>	<b>\$66.3</b>	<b>\$33.0</b>	<b>\$41.5#</b>	<b>\$26.7</b>	<b>\$226.7</b>
<b>Indirect Costs</b>						
Lost Productivity/Morbidity	20.6	9.1	6.1	7.2	—	33.6
Lost Productivity/Mortality##	87.4	57.8	14.5	6.8	2.1	108.1
<b>Grand Totals*</b>	<b>\$238.6</b>	<b>\$133.2</b>	<b>\$53.6</b>	<b>\$55.5</b>	<b>\$28.8</b>	<b>\$368.4</b>

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 2004, 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 1980-2012 (cms.hhs.gov).*

Rice DP, Hodgson TA, Kopstein AN. *The economic cost of illness: a replication and update. Health Care Financ Rev.* 1985;7:61-80.

*Historic Income Tables — People (census.gov).*

*Deaths for 358 Selected Causes by 5-Year Age Groups, Race, and Sex, United States, 2000 (cdc.nchs/default/htm).*

Rice, Max, Michel, and Sung. *Present Value of Lifetime Earnings, U.S. 2000. Unpublished tables, Institute for Health and Aging, University of California, San Francisco, 2003.*

All estimates prepared by Thomas Thom, NHLBI.

# At-a-Glance Summary Tables

## Men and Cardiovascular Diseases

13

Diseases and Risk Factors	Total Population	Total Males	White Males	Black Males	Mexican-American Males
<b>Total CVD</b>					
Prevalence 2001	64.4 M (22.6%)	31.1 M (21.5%)	30.0%	40.5%	28.8%
Mortality 2001	931.1 K	432.2 K	374.3 K	48.9 K	—
<b>Coronary Heart Disease</b>					
Prevalence 2001 CHD	13.2 M (6.4%)	6.5 M (6.9%)	6.9%	7.1%	7.2%
Prevalence 2001 MI	7.8 M (3.5%)	4.8 M (5.1%)	5.2%	4.3%	4.1%
Prevalence 2001 AP	6.8 M (3.5%)	2.6 M (2.7%)	2.6%	3.1%	4.1%
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 2001 CHD	502.2 K	254.0 K	224.5 K	24.6 K	—
Mortality 2001 MI	184.8 K	95.9 K	85.3 K	8.7 K	—
<b>Stroke</b>					
Prevalence 2001	4.8 M (2.0%)	2.1 M (2.3%)	2.2%	2.5%	2.3%
New and recurrent attacks	700.0 K	327.0 K	277.0 K	50.0 K	—
Mortality 2001	163.5 K	63.2 K	53.4 K	7.9 K	—
<b>High Blood Pressure</b>					
Prevalence 2001	50.0 M (32.8%)	33.1%	32.2%	41.6%	34.5%
Mortality 2001	46.8 K	18.9 K	13.5 K	4.9 K	—
<b>Congestive Heart Failure</b>					
Prevalence 2001	5.0 M (2.2%)	2.5 M (2.5%)	2.3%	3.5%	—
Mortality 2001	52.8 K	19.8 K	17.8 K	1.8 K	—
<b>Tobacco</b>					
Prevalence 2001	48.1 M (22.8%)	25.6 M (25.2%)	25.1%	27.6%	—
<b>Blood Cholesterol</b>					
Prevalence 2001:					
Total cholesterol 200 mg/dL+	104.7 M (50.7%)	49.2 M (50.4%)	51.0%	37.3%	54.3%
Total cholesterol 240 mg/dL+	37.0 M (18.3%)	16.5 M (17.2%)	17.8%	10.6%	17.8%
LDL cholesterol 130 mg/dL+	93.0 M (45.8%)	47.3 M (48.5%)	49.6%	46.3%	43.6%
HDL cholesterol <40 mg/dL	53.6 M (26.4%)	38.0 M (39.0%)	40.5%	24.3%	40.1%
<b>Physical Inactivity</b>					
Prevalence 1998	—	—	32.5%	44.1%	—
<b>Overweight and Obesity</b>					
Prevalence 2001:					
Overweight BMI 25.0 or higher	130.8 M (64.5%)	65.3 M (67.2%)	67.4%	60.7%	74.7%
Obesity BMI 30.0 or higher	62.0 M (30.5%)	26.6 M (27.5%)	27.3%	28.1%	28.9%
<b>Diabetes Mellitus</b>					
Prevalence 2001:					
Physician-diagnosed diabetes	11.1 M (5.5%)	5.1 M (5.5%)	5.4%	7.6%	8.1%
Undiagnosed diabetes	5.9 M (2.9%)	3.1 M (3.3%)	3.0%	2.8%	5.8%
Pre-diabetes	14.5 M (7.1%)	8.8 M (9.3%)	9.4%	8.0%	12.1%
Incidence (type 2 diabetes)	798.0 K	—	—	—	—
Mortality (diabetes)	71.4 K	32.8 K	26.9 K	5.0 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 summary tables for each chapter in this publication. For data on men in other ethnic groups, see other chapters and Statistical Fact Sheets.

# At-a-Glance Summary Tables

## Women and Cardiovascular Diseases

Diseases and Risk Factors	Total Population	Total Females	White Females	Black Females	Mexican-American Females
<b>Total CVD</b>					
Prevalence 2001	64.4 M (22.6%)	33.3 M (22.4%)	23.8%	39.6%	26.6%
Mortality 2001	931.1 K	498.9 K	433.9 K	56.8 K	—
<b>Coronary Heart Disease</b>					
Prevalence 2001 CHD	13.2 M (6.4%)	6.7 M (6.0%)	5.4%	9.0%	6.8%
Prevalence 2001 MI	7.8 M (3.5%)	3.0 M (2.1%)	2.0%	3.3%	1.9%
Prevalence 2001 AP	6.8 M (3.5%)	4.2 M (4.3%)	3.9%	6.2%	5.5%
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 2001 CHD	502.2 K	248.2 K	218.1 K	26.3 K	—
Mortality 2001 MI	184.8 K	88.9 K	77.7 K	9.9 K	—
<b>Stroke</b>					
Prevalence 2001	4.8 M (2.0%)	2.7 M (1.7%)	1.5%	3.2%	1.3%
New and recurrent attacks	700.0 K	373.0 K	312.0 K	61.0 K	—
Mortality 2001	163.5 K	100.4 K	87.0 K	11.1 K	—
<b>High Blood Pressure</b>					
Prevalence 2001	50.0 M (32.8%)	32.1%	29.5%	44.7%	29.9%
Mortality 2001	46.8 K	27.9 K	21.4 K	5.9 K	—
<b>Congestive Heart Failure</b>					
Prevalence 2001	5.0 M (2.2%)	2.5 M (1.9%)	1.5%	3.1%	—
Mortality 2001	52.8 K	33.0 K	29.9 K	2.8 K	—
<b>Tobacco</b>					
Prevalence 2001	48.1 M (22.8%)	22.6 M (20.7%)	21.7%	18.0%	—
<b>Blood Cholesterol</b>					
Prevalence 2001:					
Total cholesterol 200 mg/dL+	104.7 M (50.7%)	55.5 M (50.9%)	53.6%	46.4%	44.7%
Total cholesterol 240 mg/dL+	37.0 M (18.3%)	20.5 M (19.1%)	19.9%	17.7%	13.9%
LDL cholesterol 130 mg/dL+	93.0 M (45.8%)	45.7 M (43.3%)	43.7%	41.6%	41.6%
HDL cholesterol <40 mg/dL	53.6 M (26.4%)	15.7 M (14.9%)	14.5%	13.0%	18.4%
<b>Physical Inactivity</b>					
Prevalence 1998	—	—	36.2%	55.2%	—
<b>Overweight and Obesity</b>					
Prevalence 2001:					
Overweight BMI 25.0 or higher	130.8 M (64.5%)	65.5 M (61.9%)	57.3%	77.3%	71.9%
Obesity BMI 30.0 higher	62.0 M (30.5%)	35.4 M (33.4%)	30.1%	49.7%	39.7%
<b>Diabetes Mellitus</b>					
Prevalence 2001:					
Physician-diagnosed diabetes	11.1 M (5.5%)	6.0 M (5.5%)	4.7%	9.5%	11.4%
Undiagnosed diabetes	5.9 M (2.9%)	2.8 M (2.5%)	2.1%	4.7%	3.9%
Pre-diabetes	14.5 M (7.1%)	5.8 M (5.3%)	4.8%	6.8%	6.7%
Incidence (type 2 diabetes)	798.0 K	—	—	—	—
Mortality (diabetes)	71.4 K	38.5 K	30.3 K	7.3 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 summary tables for each chapter in this publication. For data on men 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
<b>Total CVD</b>									
Prevalence 2001	64.4 M (22.6%)	30.0%	23.8%	40.5%	39.6%	28.8%	26.6%	—	—
Mortality 2001	931.1 K	374.3 K	433.9 K	48.9 K	56.8 K	—	—	—	—
<b>Coronary Heart Disease</b>									
Prevalence 2001 CHD	13.2 M (6.4%)	6.9%	5.4%	7.1%	9.0%	7.2%	6.8%	—	—
Prevalence 2001 MI	7.8 M (3.5%)	5.2%	2.0%	4.3%	3.3%	4.1%	1.9%	—	—
Prevalence 2001 AP	6.8 M (3.5%)	2.6%	3.9%	3.1%	6.2%	4.1%	5.5%	—	—
New and recurrent CHD*	1.2 M	650.0 K	425.0 K	65.0 K	60.0 K	—	—	—	—
Mortality 2001 CHD	502.2 K	224.5 K	218.1 K	24.6 K	26.3 K	—	—	—	—
Mortality 2001 MI	184.8 K	85.3 K	77.7 K	8.7 K	9.9 K	—	—	—	—
<b>Stroke</b>									
Prevalence 2001	4.8 M (2.0%)	2.2%	1.5%	2.5%	3.2%	2.3%	1.3%	—	—
New and recurrent attacks	700.0 K	277.0 K	312.0 K	50.0 K	61.0 K	—	—	—	—
Mortality 2001	163.5 K	53.4 K	87.0 K	7.9 K	11.1 K	—	—	—	—
<b>High Blood Pressure</b>									
Prevalence 2001	50.0 M (32.8%)	32.2%	29.5%	41.6%	44.7%	34.5%	29.9%	—	18.6%
Mortality 2001	46.8 K	13.5 K	21.4 K	4.9 K	5.9 K	—	—	—	—
<b>Congestive Heart Failure</b>									
Prevalence 2001	5.0 M (2.2%)	2.3%	1.5%	3.5%	3.1%	—	—	—	—
Mortality 2001	52.8 K	17.8 K	29.9 K	1.8 K	2.8 K	—	—	—	—
<b>Tobacco</b>									
Prevalence 2001	48.1 M (22.8%)	25.1%	21.7%	27.6%	18.0%	—	—	23.2%	12.5%
<b>Blood Cholesterol</b>									
Prevalence 2001:									
Total cholesterol 200 mg/dL+	104.7 M (50.7%)	51.0%	53.6%	37.3%	46.4%	54.3%	44.7%	—	—
Total cholesterol 240 mg/dL+	37.0 M (18.3%)	17.8%	19.9%	10.6%	17.7%	17.8%	13.9%	—	25.6%
LDL cholesterol 130 mg/dL+	93.0 M (45.8%)	49.6%	43.7%	46.3%	41.6%	43.6%	41.6%	—	—
HDL cholesterol <40 mg/dL	53.6 M (26.4%)	40.5%	14.5%	24.3%	13.0%	40.1%	18.4%	—	—
<b>Physical Inactivity</b>									
Prevalence 1998	—	32.5%	36.2%	44.1%	55.2%	—	—	48.9%	57.4%
<b>Overweight and Obesity</b>									
Prevalence 2001:									
Overweight BMI 25.0 or higher	130.8 M (64.5%)	67.4%	57.3%	60.7%	77.3%	74.7%	71.9%	66.2%	56.6%
Obesity BMI 30.0 or higher	62.0 M (30.5%)	27.3%	30.1%	28.1%	49.7%	28.9%	39.7%	21.8%	23.3%
<b>Diabetes Mellitus</b>									
Prevalence 2001:									
Physician-diagnosed diabetes	11.1 M (5.5%)	5.4%	4.7%	7.6%	9.5%	8.1%	11.4%	—	5.5%
Undiagnosed diabetes	5.9 M (2.9%)	3.0%	2.1%	2.8%	4.7%	5.8%	3.9%	—	—
Pre-diabetes	14.5 M (7.1%)	9.4%	4.8%	8.0%	6.8%	12.1%	6.7%	—	—
Incidence (type 2 diabetes)	798.0 K	—	—	—	—	—	—	—	—
Mortality (diabetes)	71.4 K	26.9 K	30.3 K	5.0 K	7.3 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 summary tables for each chapter in this publication. For data on other ethnic groups, see other chapters and Statistical Fact Sheets.

# At-a-Glance Summary Tables

## Children, Youth and Cardiovascular Diseases

Diseases and Risk Factors	Total Population	Total Males	Total Females	Non-Hispanic Whites		Non-Hispanic Blacks		Mexican Americans	
				Males	Females	Males	Females	Males	Females
<b>Congenital Defects</b>									
Mortality 2001 (all ages)	4.1 K	2.1 K	1.9 K	1.8 K	1.5 K	0.4 K	0.3 K	—	—
Mortality 2001 (< age 15)	2.1 K	1.1 K	1.0 K	—	—	—	—	—	—
<b>Tobacco</b>									
Prevalence grades 9-12:									
Current tobacco use 2001	—	38.5%	29.5%	—	—	—	—	—	—
Current cigar use 2001	—	22.1%	8.5%	—	—	—	—	—	—
Smokeless tobacco use 2001	—	14.8%	1.9%	—	—	—	—	—	—
High school students:									
Used any tobacco product in last 30 days	—	—	—	43.4%	32.3%	21.6%	17.4%	31.5%	27.2%
<b>Blood Cholesterol</b>									
Ages 4-19:									
Mean total cholesterol mg/dL	165	—	—	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
<b>Physical Inactivity</b>									
Prevalence 2001 grades 9-12:									
Vigorous activity last 7 days	—	—	—	73.7%	59.8%	72.4%	47.8%	68.8%	52.4%
Moderate activity last 7 days	—	—	—	29.8%	24.7%	23.7%	16.5%	25.9%	18.5%
<b>Overweight</b>									
Prevalence 2001:									
Preschool children ages 2-5	>10%	—	—	10%	—	8%	—	11%	—
Children ages 6-11	3.8 M (15.3%)	2.0 M (16.0%)	1.8 M (14.5%)	11.9%	12.0%	17.6%	22.1%	27.3%	19.6%
Adolescents ages 12-19	5.0 M (15.5%)	2.6 M (15.5%)	2.4 M (15.5%)	13.0%	12.2%	20.5%	25.7%	27.5%	19.4%
Students grades 9-12	—	—	—	12.4%	5.3%	17.5%	14.6%	21.3%	8.8%

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

Sources: See summary tables for related chapters in this publication. For more data on congenital defects, see pages 21-22 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/m<sup>2</sup>).

**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 IV (NHANES IV, 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](http://cdc.gov/nchs), by direct communication with the CDC/NCHS, or from our National Center Biostatistics Consultant 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, 2001 mortality statistics, the latest available, didn’t become available until Fall 2003. 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)*

**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.**

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



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**American Stroke  
Association**™

A Division of American  
Heart Association

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](http://americanheart.org)

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

Your contributions will support research and educational programs that help reduce disability and death from America's No. 1 and No. 3 killers.

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