

American Stroke  
Association<sup>SM</sup>

A Division of American  
Heart Association

American Heart  
Association<sup>®</sup>



Fighting Heart Disease and Stroke



# Heart Disease and Stroke Statistics – 2003 Update



Our guide to current statistics and the supplement  
to our "Heart and Stroke Facts"

# Table of Contents

1	Understanding and Using Our Statistics .....	1
2	Common Classifications of Cardiovascular Diseases .....	2
3	About Sudden Death From Cardiac Arrest .....	3
4	Women, Children and Myths About Cardiovascular Disease .....	4
5	Cardiovascular Diseases .....	5
6	Coronary Heart Disease and Angina Pectoris .....	11
7	Stroke .....	15
8	High Blood Pressure (and End-Stage Renal Disease) .....	18
9	Other Cardiovascular Diseases .....	21
	Arrhythmias (Disorders of Heart Rhythm) .....	21
	Arteries, Diseases of .....	21
	Bacterial Endocarditis .....	22
	Cardiomyopathy .....	22
	Congenital Cardiovascular Defects .....	22
	Congestive Heart Failure .....	22
	Rheumatic Fever/Rheumatic Heart Disease .....	24
	Valvular Heart Disease .....	24
10	Risk Factors .....	25
	Tobacco Smoke .....	25
	High Blood Cholesterol and Other Lipids .....	27
	Physical Inactivity .....	30
	Overweight and Obesity .....	32
	Diabetes Mellitus .....	33
11	Metabolic Syndrome .....	35
12	Nutrition .....	35
13	Quality of Care .....	37
14	Medical Procedures .....	38
15	Economic Cost of Cardiovascular Diseases .....	40
16	Glossary and Abbreviation Guide .....	41

## About These Statistics

All statistics are for the most recent year available. Incidence, prevalence, mortality and hospitalizations are computed for 2000 unless otherwise noted. “Total mention mortality” is for 1999. Economic costs are for 2003. **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.**

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 214-706-1396.

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 — 2003 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.

## Suggested Citation

American Heart Association. *Heart Disease and Stroke Statistics — 2003 Update*. Dallas, Tex.: American Heart Association; 2002.

©2002, American Heart Association.



# Statistical Fact Sheets

Information for the population groups and risk factors listed below is available on our Web site, [americanheart.org](http://americanheart.org). Click on “Publications & Resources,” then “Statistics,” then “Statistical Fact Sheets.”

## Populations

African Americans and Cardiovascular Diseases

American Indians/Alaska Natives and Cardiovascular Diseases

Asian/Pacific Islanders and Cardiovascular Diseases

Baby Boomers and Cardiovascular Diseases

Hispanics and Cardiovascular Diseases

**International Cardiovascular Disease Statistics [now includes death rates by country]**

Men and Cardiovascular Diseases

Older Americans and Cardiovascular Diseases

Whites and Cardiovascular Diseases

Women and Cardiovascular Diseases

Youth and Cardiovascular Diseases

## Risk Factors

Diabetes Mellitus

High Blood Cholesterol and Other Lipids

High Blood Pressure

Overweight and Obesity

Physical Inactivity

Tobacco Smoke

## Miscellaneous

Cardiovascular Procedures

Death Rates by State — 1999

Hospital Discharges for Cardiovascular Diseases

Leading Causes of Death — 2000

Out-of-Hospital Cardiac Deaths by State — 1999

Sudden Deaths From Cardiac Arrest

## Check Our Web Sites

For more information on cardiovascular diseases including stroke, see [americanheart.org](http://americanheart.org) and [StrokeAssociation.org](http://StrokeAssociation.org).

# Understanding and Using Our Statistics

1

The American Heart Association works with the Centers for Disease Control and Prevention's National Center for Health Statistics (CDC/NCHS), the National Heart, Lung, and Blood Institute (NHLBI) and other government agencies to derive the annual statistics in this booklet. This section describes the most important sources we use. For more details and an alphabetical list of abbreviations, see the Glossary and Abbreviation Guide on pages 41-42.

Morbidity (illness) and mortality (death) data in the United States use a standard classification system — the International Classification of Diseases. About every 10-20 years the ICD codes are revised to reflect changes over time in medical technology, diagnosis or terminology. Effective with mortality data for 1999, we're using the tenth revision (ICD/10). It will be a few more years before the tenth revision is used for hospital discharge data.

## Prevalence

Prevalence is an estimate of how many people have a disease at a given point in time. Government agencies periodically conduct health examination surveys. Rates for specific diseases are calculated from those surveys. These rates are applied as the population changes for several years, until a new health examination survey is done and new rates are established. It's important to realize that the prevalence rates **do not change** from year to year until there is a new survey.

**The annual changes in prevalence as reported in this booklet only reflect changes in the population. It's impossible to develop a prevalence "trend" by comparing numbers from yearly issues of this booklet or its precursors.**

## Incidence

Incidence is 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 cardiovascular disease (CVD) in the United States 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. The estimates were revised to reflect the 2000 U.S. Census. **Neither the incidence nor the rates should be compared with those in past issues of the *Heart and Stroke Statistical Update*.**

Our incidence estimates for the various cardiovascular diseases are extrapolations from the Framingham Heart Study (FHS), Atherosclerosis Risk in Communities (ARIC) study and Cardiovascular Health Study (CHS). All of these were conducted by the NHLBI.

## Mortality

The most accurate data available for assessing the impact of cardiovascular diseases and stroke are mortality figures. These data are compiled from death certificates and sent by state health agencies to the NCHS. Here the information is verified and tabulated by cause of death, age, sex and race/ethnicity, for the United States and each state. This

process is time-consuming. That's why the statistics in this booklet and other American Heart Association print and electronic materials seem to be about two years "late." For example, 2000 mortality statistics, the latest available, didn't become available until 2002. **Because mortality is considered "hard" data, it's possible to do time-trend analysis and compute percent changes over time.**

## Comparability Across ICD/9 and ICD/10

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. When using multiple revisions spanning several decades, we must modify the figures using multiple comparability ratios.

Overall comparability ratios are available for each of the more common causes of death. With 2000 mortality data, there are also separate ratios by age, sex and race/ethnicity. In this booklet we use the reported mortality when we want to show only 2000 data. When we want to compare the number or rate of deaths with that of an earlier year, then we use the "comparability-modified" 2000 number or rate.

**Using data from old issues of this booklet to construct mortality trends can lead to errors unless all data are from the same ICD revision.**

## Race and Hispanic Origin

Race and Hispanic origin are reported separately on death certificates. This means that mortality data for each race can include persons of Hispanic origin, and mortality data for Hispanic origin can include persons of any race. In this booklet, 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 Glossary on page 41 for definition of Hispanic origin.) (National Vital Statistics Report, Vol. 49, No. 11, October 12, 2001, pp. 84-85)

## Death Rates and Age-Adjustment

A death rate is a **ratio** between mortality and population. National death rates are computed per 100,000 population. Dividing the mortality by the population results in a **crude** death rate. When summarizing death rates over time or among populations, we compute **age-adjusted** death rates. These remove the effects from differences in the age distribution of the population over time and among population groups. The year 2000 is the base year that the federal government and health organizations use for age-adjustment.

# Common Classifications of Cardiovascular Diseases

In compiling our statistics, the American Heart Association looks at specific cardiovascular disease categories, based on the tenth revision of the ICD codes (ICD/10, see “Mortality” on page 1). It’s important to understand what the following terms mean. By excluding or including different cardiovascular diseases, it’s possible to get very different perspectives on the scope of CVD.

## Major vs. Total CVD

“Major Cardiovascular Diseases,” commonly reported by the NCHS, represents ICD codes I00-I78. “Total Cardiovascular Disease” comprises all “Diseases of the Circulatory System” codes (I00-I99). When data are available, we add congenital cardiovascular defects codes (Q20-Q28) to “Total Cardiovascular Disease.”

Mortality data for a state or county obtained from state health agencies may be defined differently. You can obtain “Diseases of the Circulatory System” for states from [www.cdc.gov/nchs](http://www.cdc.gov/nchs) or by direct communication with the CDC/NCHS. You can also receive copies of any state’s mortality data from the National Center upon request.

## Diseases of the Heart

The NCHS tabulates mortality of “Diseases of the Heart.” The term is commonly used in its statistical publications and its compilation of the **leading causes of death**. This category groups diseases containing words referring to the “heart” and **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)
- Other Forms of Heart Disease (I29-I49, I50.1-I52)

“Diseases of the Heart” is **not** equivalent to “Total Cardiovascular Disease,” which the American Heart Association prefers to use to describe the leading causes of death. “Diseases of the Heart” represents about three-fourths of “Total Cardiovascular Disease” mortality.

# About Sudden Death From Cardiac Arrest

3

**Cardiac arrest** is the stopping of the heartbeat. The heartbeat stops when a person dies from illness or injury, or it may also stop abruptly and unexpectedly. In this latter case it's called **sudden cardiac arrest** and is often associated with coronary heart disease.

**Sudden death** is unexpected death resulting from various causes including cardiac arrest, pulmonary embolus (blood clot or other blockage in the lung), aortic rupture, intracranial hemorrhage (bleeding in the brain), etc. Death from sudden cardiac arrest is more properly called **sudden cardiac death (SCD)**.

Although the direct medical costs are much less than for lingering illnesses, the economic and social impacts of sudden death from cardiac arrest are huge. Sudden cardiac death occurs on average at about 60 years of age, claims many people during their most productive years, and devastates unprepared families.

The most common underlying cause of sudden cardiac arrest is a heart attack that results in ventricular fibrillation (VF) (quivering of the heart's lower chambers) or pulseless ventricular tachycardia (extremely rapid but ineffective beating of the heart's lower chambers). This irregular heart rhythm causes the heart to suddenly stop pumping blood. A small number of cardiac arrests are caused by extreme slowing of the heart (bradycardia).

The victim may or may not have diagnosed heart disease. Under certain conditions, various heart medications and other drugs — as well as illegal drug abuse — can lead to abnormal heart rhythms that cause cardiac arrest and sudden death. Other causes of cardiac arrest include respiratory arrest, electrocution, drowning, choking and trauma. Cardiac arrest also can occur without any known cause.

A victim of VF sudden cardiac arrest suddenly collapses, is unresponsive to gentle shaking, stops normal breathing and after two rescue breaths, has no signs of circulation such as normal breathing, coughing or movement. Death can occur within minutes if the victim receives no treatment. Brain damage can start to occur in just 4 to 6 minutes after the heart stops pumping blood. Death may be prevented if the sudden cardiac arrest victim receives immediate bystander **cardiopulmonary resuscitation** (CPR) and defibrillation within a few minutes after collapse.

When bystanders perform effective CPR immediately after sudden cardiac arrest, they can double a victim's chance of survival. About 80 percent of all sudden cardiac arrests happen at home, and almost 60 percent are witnessed.

## When Every Second Counts

VF sudden cardiac arrest can be reversed if the victim is treated with an electric shock to the heart within a few minutes. The electric shock can stop the abnormal rhythm and allow a normal rhythm to resume. This process, called **defibrillation**, is done using a defibrillator. Lay rescuers can be trained to operate portable, computerized, automated external defibrillators (AEDs).

It's estimated that about 95 percent of sudden cardiac arrest victims die before reaching the hospital. Survival is directly linked to the amount of time between the onset of sudden cardiac arrest and defibrillation. If no bystander CPR is provided, a victim's chances of survival are reduced by 7 to 10 percent with every minute of delay until defibrillation. The VF sudden cardiac arrest survival rate is only **two to five percent** if defibrillation is provided more than 12 minutes after collapse.

The average time from collapse to beginning CPR to providing defibrillation varies widely across the country. Communities that train in CPR and strategically place AEDs in public buildings, arenas and emergency vehicles can significantly reduce response times. Some studies show, for example, that police equipped with AEDs can cut response time to sudden cardiac arrest victims by about three minutes, compared to historical response times.

In some cities with public access defibrillation or "community AED programs," when bystanders provide **immediate** CPR and the first shock is delivered **within 3 to 5 minutes**, the reported survival rates from VF sudden cardiac arrest are as high as 48 to 74 percent.

No statistics are available for the exact number of sudden cardiac arrests that occur each year. However, about 250,000 people a year die of coronary heart disease without being hospitalized. That's about half of all deaths from CHD — more than 680 Americans each day. In the rest of this booklet, statistics relating to sudden death from cardiac arrest are highlighted in pink.

If survival rates from sudden cardiac arrest were increased from 5 percent to 20 percent, about 40,000 more lives could be saved each year. **That's why the American Heart Association urges the public to be prepared for cardiac emergencies.** See [americanheart.org](http://americanheart.org) for warning signs and emergency actions.

The American Heart Association encourages the widespread use of AEDs by trained lay rescuers through community AED programs. In fiscal year 2001-02 we trained over 3 million lay rescuers worldwide in CPR (including CPR in schools) and more than 600,000 in both CPR and the use of AEDs. We also offer a variety of CPR and AED training courses for health professionals. To learn more, call 1-877-AHA-4CPR (1-877-242-4277) or visit [americanheart.org](http://americanheart.org).

# Women, Children and Myths About Cardiovascular Disease

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 continues to widen, as the graph on this page shows.

**The harsh fact is, cardiovascular diseases are the No. 1 killer of women and men. These diseases claim the lives of more than half a million females every year — about a death a minute. That’s more lives than the next 7 causes of death combined.**

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.

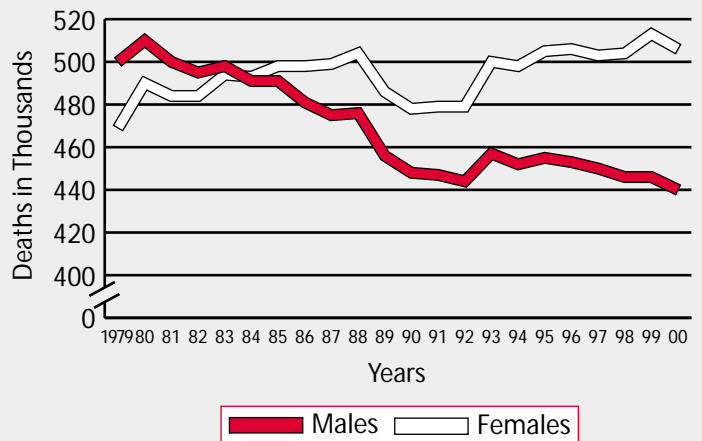
About 40,000 babies are born each year with congenital cardiovascular defects. In fact, such defects claim more lives than any other type of defect — about 4,300 young people’s lives a year. About 1 million Americans alive today have congenital cardiovascular defects — and a high percentage of this number are children.

Besides congenital heart defects, children also can have a variety of other cardiovascular ailments, including cardiomyopathy, high blood pressure, Kawasaki disease and end-stage renal disease. CVD ranks as the No. 2 cause of death (behind accidents) for children under age 15. Speaking of surgery alone, about 150,000 cardiovascular procedures were performed on people age 15 or younger in 2000.

When it comes to cardiovascular disease, myths that promote complacency, promote disease. We all need to know the truth.

For more information, see our Statistical Fact Sheets, **Women and Cardiovascular Diseases** and **Youth and Cardiovascular Diseases**. Instructions to find them on our Web site are on page ii.

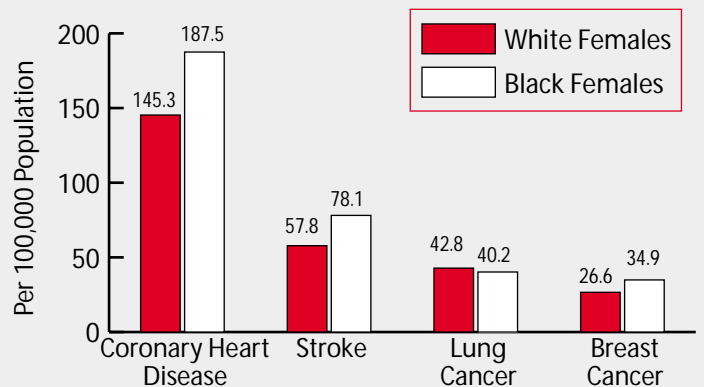
**Cardiovascular Disease Mortality Trends for Males and Females**  
United States: 1979-2000



Source: CDC/NCHS.

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

United States: 2000



Source: CDC/NCHS.

# Cardiovascular Diseases



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

Population Group	Prevalence	Mortality	Hospital Discharges	Cost
Total population	61,800,000	945,836	6,294,000	\$351.8 billion
Total males	29,700,000	440,175	3,115,000	—
Total females	32,100,000	505,661	3,179,000	—
White males	30.0%	382,516	—	—
White females	23.8%	440,903	—	—
Black males	40.5%	48,708	—	—
Black females	39.6%	57,063	—	—
Mexican-American males	28.8%	—	—	—
Mexican-American females	26.6%	—	—	—

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 2003.

## ● Prevalence

Of the total Americans with one or more types of cardiovascular disease (CVD), 25,100,000 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 — 12,900,000.
  - Myocardial infarction (heart attack) — 7,600,000.
  - Angina pectoris (chest pain) — 6,600,000.
- Congestive heart failure — 4,900,000.
- Stroke — 4,700,000.
- Congenital cardiovascular defects — 1,000,000. (NHANES II [1976-80], 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...
  - 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, there is a higher proportion of CVD events due to coronary heart disease (CHD) in men than in women, and a higher proportion due to congestive heart failure (CHF) 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.

## ○ Mortality

CVD claimed 39.4 percent of all deaths or 1 of every 2.5 deaths in the United States in 2000. CVD was about 60 percent of "total mention mortality." This means that of over 2,400,000 deaths from all causes, CVD was listed as a primary or contributing cause on about 1,415,000 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 33 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.
- Almost 150,000 Americans killed by CVD each year are under age 65.

- In 2000, 32 percent of deaths from CVD occurred prematurely (i.e., before age 75, the approximate average life expectancy in that year).
- The 2000 overall death rate from CVD was 343.1. The rates were 397.6 for white males and 509.6 for black males; 285.8 for white females and 397.1 for black females.
- From 1990 to 2000 death rates from CVD (ICD/10 I00-I99) declined 17.0 percent. In the same 10-year period actual CVD deaths increased 2.5 percent.
- 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. Heart disease death in this study included deaths from all forms of heart disease (Diseases of the Heart) and congenital malformations of the heart (I00-I09, I11, I13, I20-I51, Q20-Q24). (*Morbidity and Mortality Weekly Report [MMWR]*, Vol. 51, No. 6, Feb. 15, 2002, CDC/NCHS) See the **Out-of-Hospital Cardiac Deaths by State** fact sheet, instructions on page ii.
- Other causes of death in 2000 — cancer 553,091; accidents 97,900; Alzheimer's disease 49,558; HIV (AIDS) 14,478.
- In the United States in 2000, 46.5 percent of deaths from CVD were males and 53.5 percent were females. (See table on page 5 for numbers.) Cancer killed 286,082 males and 267,009 females.
- The CVD death rates were 404.0 for males and 294.3 for females. Cancer death rates were 247.4 for males and 169.6 for females.
- Breast cancer claimed the lives of 41,872 females in 2000; lung cancer claimed 65,052. The 2000 death rates were 27.1 for breast cancer and 41.8 for lung cancer.
- 1 in 29 women's deaths is from breast cancer, while 1 in 2.4 is from CVD.
- Declines in death rates from cardiovascular diseases are largely responsible for the recent major improvement in life expectancy. Based on recent preliminary data, the average life expectancy of people born in the United States is now 76.9 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)
- 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 statistical notes, No. 23, CDC/NCHS, Jan. 2002)
- Many factors may affect the decline in CVD mortality. They include more effective medical treatment, more emphasis on reducing the major controllable cardiovascular risk factors (high blood pressure, smoking, high blood cholesterol, physical inactivity, overweight and obesity, and diabetes), and better treatment for heart attack and stroke patients.

## ● Risk Factors

For statistics on individual CVD risk factors, see section beginning on page 25.

- 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

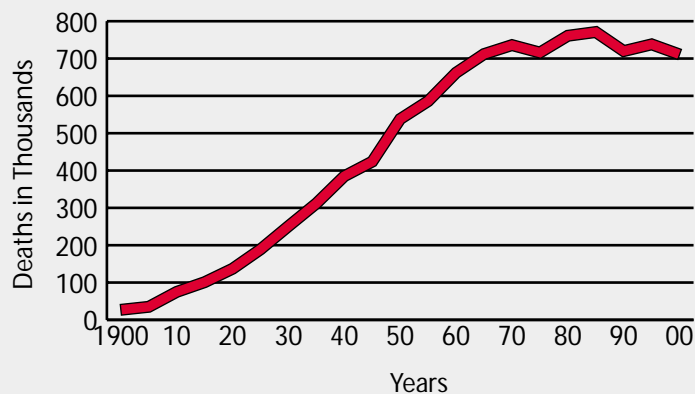
- From 1979 to 2000 the number of Americans discharged from short-stay hospitals with CVD as the first listed diagnosis increased 28 percent. In 2000 CVD ranked highest among all disease categories in hospital discharges.
- In 2000 there were 65,843,000 physician office visits and 6,854,000 outpatient department visits with a primary diagnosis of CVD. (National Hospital Ambulatory Medical Care Survey, 2000, CDC/NCHS)
- In 2000 there were 4,397,000 visits to emergency departments with a primary diagnosis of CVD. (National Hospital Ambulatory Medical Care Survey, 2000, 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)
- In 1999 the annual rate of emergency department visits for cardiovascular conditions was 16.2 per 1,000 persons, up from 15.4 in 1992. (Trends in Hospital Emergency Department Utilization: U.S. 1992-99, CDC/NCHS)

## Cost

- In 1999, \$26.3 billion in payments were made to Medicare beneficiaries for hospital expenses due to cardiovascular problems. That was an average of \$7,883 per discharge. (Personal communication with the Centers for Medicare and Medicaid Services [CMS], 2002)

### Deaths From Diseases of the Heart

United States: 1900-2000

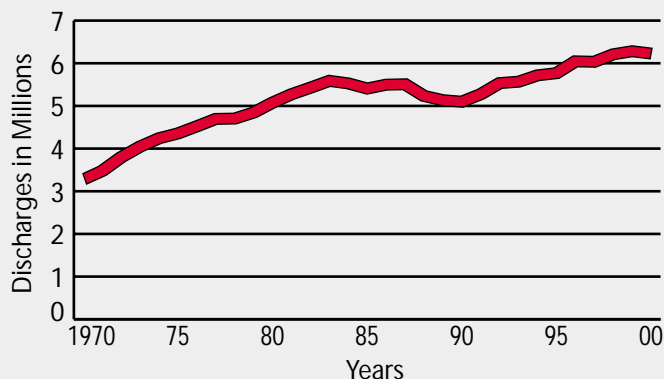


Note: See page 2 for an explanation of "Diseases of the Heart." Total cardiovascular disease data are not available for much of the period covered by this chart.

Source: CDC/NCHS.

### Hospital Discharges for Cardiovascular Diseases

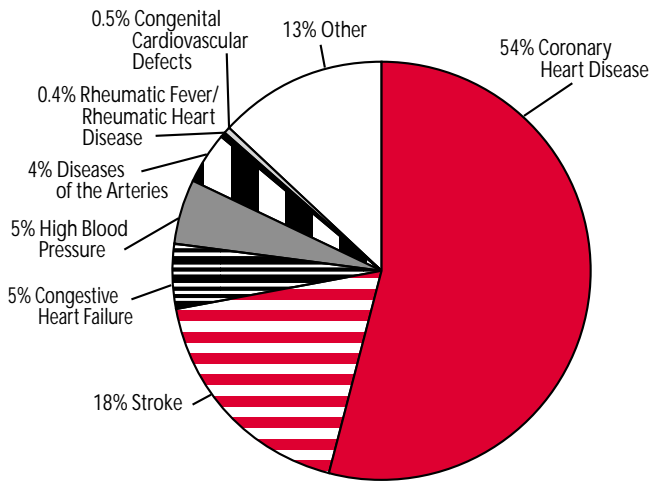
United States: 1970-2000



Note: Hospital discharges include people both living and dead.

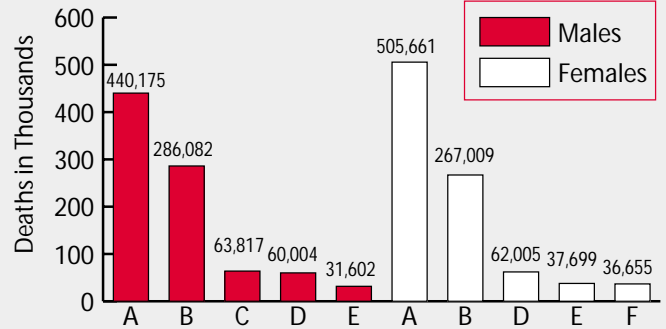
Source: CDC/NCHS.

**Percentage Breakdown of Deaths From Cardiovascular Diseases**  
United States: 2000



Source: CDC/NCHS.

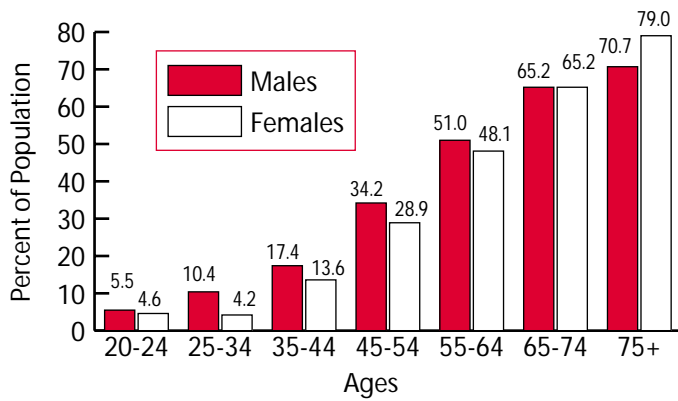
**Leading Causes of Death for All Males and Females**  
United States: 2000



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

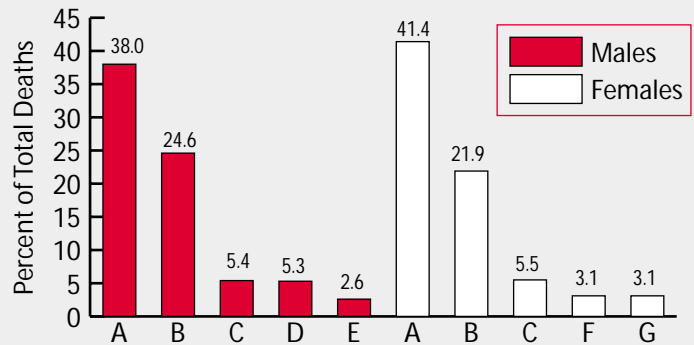
Source: CDC/NCHS.

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



Source: NHANES III (1988-94), CDC/NCHS.

**Leading Causes of Death for White Males and Females**  
United States: 2000



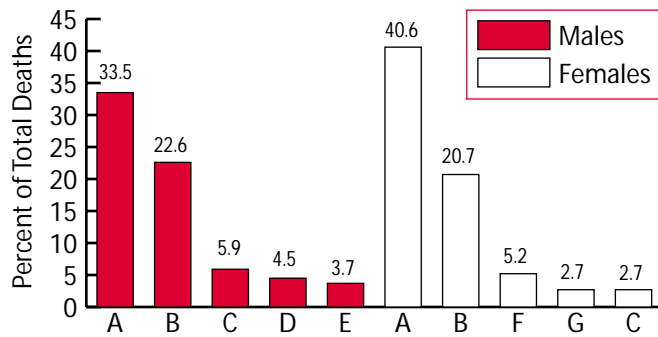
- A Total CVD
- B Cancer
- C Chronic Lower Respiratory Diseases
- D Accidents
- E Diabetes Mellitus
- F Alzheimer's Disease
- G Influenza and Pneumonia

Note: Using "Diseases of the Heart, and Stroke," which do not constitute total CVD, the percentages of the "A" bars would be 35.4 for males and 38.5 for females.

Source: CDC/NCHS.

### Leading Causes of Death for Black Males and Females

United States: 2000



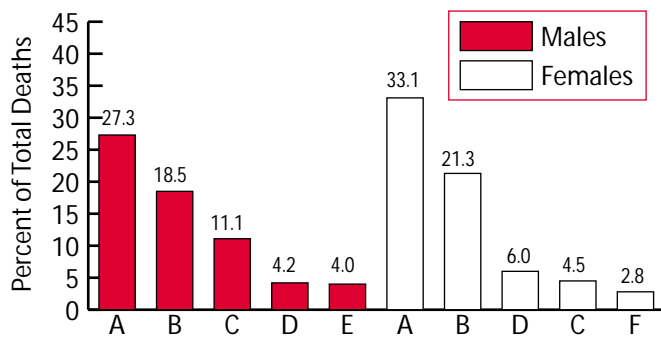
- A Total CVD
- B Cancer
- C Accidents
- D Assault (Homicide)
- E HIV (AIDS)
- F Diabetes Mellitus
- G Nephritis, Nephrotic Syndrome and Nephrosis

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 37.0 for females.

Source: CDC/NCHS.

### Leading Causes of Death for Hispanic Males and Females

United States: 2000

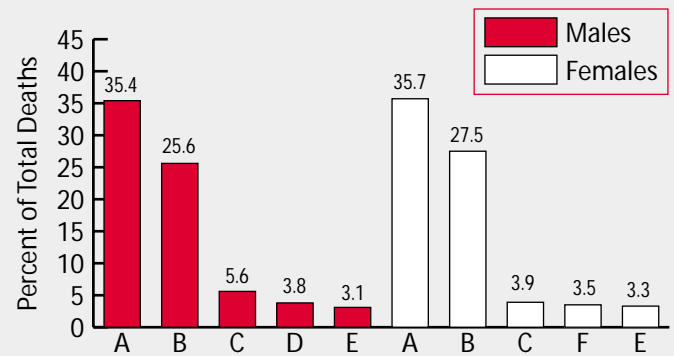


- A Diseases of the Heart, and Stroke
- B Cancer
- C Accidents
- D Diabetes Mellitus
- E Assault (Homicide)
- F Influenza and Pneumonia

Source: CDC/NCHS.

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

United States: 2000



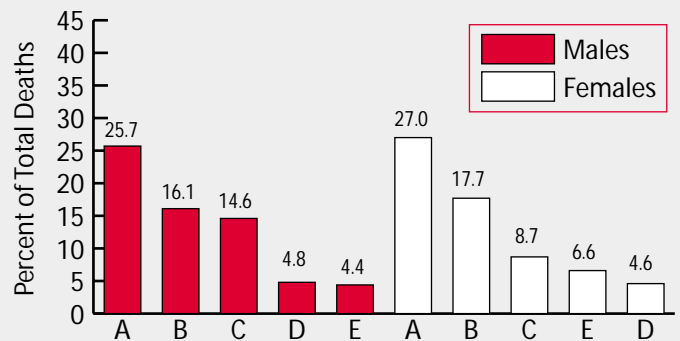
- A Diseases of the Heart, and Stroke
- B Cancer
- C Accidents
- D Chronic Lower Respiratory Diseases
- E Influenza and Pneumonia
- F Diabetes Mellitus

Note: This 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: 2000



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

Source: CDC/NCHS.

## 1999 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 page ii for instructions.

State	Total Cardiovascular Disease*			Coronary Heart Disease**			Stroke#		
	Rank##	Death Rate	Percent Change <sup>+</sup> 1989 to 1999	Rank##	Death Rate	Percent Change <sup>+</sup> 1989 to 1999	Rank##	Death Rate	Percent Change <sup>+</sup> 1989 to 1999
Alabama	46	401.7	-12.9	20	171.6	-24.3	46	72.4	-17.2
Alaska	4	282.1	-22.6	3	125.8	-36.9	43	70.7	-3.6
Arizona	15	308.6	-14.5	25	179.0	-20.3	10	56.1	-2.3
Arkansas	45	401.1	-7.5	32	195.1	-18.8	51	80.0	-4.2
California	28	339.3	-19.2	34	198.3	-24.7	29	63.3	-19.3
Colorado	6	284.0	-17.3	7	136.4	-34.9	11	57.0	-5.8
Connecticut	16	311.2	-15.7	21	171.6	-22.8	4	50.1	-12.6
Delaware	30	345.3	-20.8	42	208.9	-26.6	6	50.4	-21.5
District of Columbia	38	368.5	-16.7	28	186.7	-2.9	8	52.2	-24.9
Florida	22	325.5	-13.9	36	200.2	-19.6	7	51.5	-11.8
Georgia	42	390.8	-14.2	19	171.1	-28.5	47	73.6	-15.4
Hawaii	3	280.9	-13.0	2	122.4	-26.5	28	63.2	-9.8
Idaho	11	307.1	-16.5	11	156.4	-25.4	36	67.3	-9.0
Illinois	33	364.0	-18.6	40	203.0	-26.9	33	63.9	-10.1
Indiana	41	378.3	-14.8	35	198.3	-24.1	38	69.4	-12.5
Iowa	24	330.3	-14.1	33	195.8	-16.9	25	62.7	-6.7
Kansas	23	327.7	-14.8	13	158.8	-26.3	21	61.7	-6.0
Kentucky	48	407.6	-11.6	45	212.8	-20.9	45	71.0	-11.4
Louisiana	47	403.0	-17.7	38	202.4	-29.4	39	69.7	-12.5
Maine	25	331.4	-16.4	24	178.2	-25.9	31	63.4	-4.1
Maryland	29	344.8	-17.8	31	191.9	-21.4	26	63.1	-5.4
Massachusetts	8	299.6	-20.8	10	153.1	-31.5	5	50.3	-17.7
Michigan	40	376.9	-15.7	46	215.4	-27.1	30	63.3	-9.6
Minnesota	2	279.3	-22.4	4	129.7	-37.2	16	60.1	-15.6
Mississippi	52	449.6	-11.4	48	223.7	-21.7	44	70.8	-16.8
Missouri	44	392.8	-7.7	47	221.1	-14.7	34	66.1	-3.7
Montana	7	297.8	-15.3	5	129.9	-29.1	24	62.3	-5.6
Nebraska	19	321.1	-16.1	9	143.0	-31.8	18	60.6	-9.5
Nevada	34	364.2	-14.7	26	181.1	-23.1	19	60.7	2.6
New Hampshire	21	322.6	-15.5	27	186.0	-17.6	15	58.6	-7.9
New Jersey	27	338.4	-18.4	41	206.0	-24.9	2	47.5	-19.8
New Mexico	9	301.9	-14.9	16	167.6	-20.5	9	54.5	-1.9
New York	37	366.7	-19.3	52	247.4	-22.1	1	42.1	-26.3
North Carolina	36	365.5	-16.9	29	190.4	-27.3	49	78.1	-11.4
North Dakota	20	321.7	-12.9	18	169.8	-19.0	32	63.4	-1.6
Ohio	39	372.3	-15.3	43	209.2	-24.1	23	62.1	-8.4
Oklahoma	51	416.5	-6.9	51	237.2	-9.4	40	69.8	-7.8
Oregon	13	308.0	-17.2	8	140.8	-34.3	50	78.6	5.9
Pennsylvania	35	364.2	-16.4	39	202.6	-26.9	13	58.0	-10.3
Puerto Rico	5	283.8	—	6	133.2	—	14	58.5	—
Rhode Island	17	311.8	-20.7	44	211.2	-18.7	3	49.9	-13.6
South Carolina	43	392.7	-16.1	30	191.2	-25.3	52	85.6	-11.9
South Dakota	14	308.2	-19.7	23	174.0	-27.4	20	60.7	-6.0
Tennessee	49	408.1	-8.6	49	227.4	-15.6	48	78.0	-8.6
Texas	32	360.2	-12.5	37	201.4	-15.8	35	66.3	-8.1
Utah	1	269.8	-21.6	1	117.6	-34.8	17	60.2	-11.9
Vermont	10	304.5	-17.2	17	169.3	-24.7	12	57.7	-5.6
Virginia	31	347.4	-18.2	15	165.5	-28.1	41	69.8	-10.9
Washington	12	307.9	-19.0	14	162.8	-27.6	42	69.8	-5.1
West Virginia	50	413.4	-12.2	50	233.1	-19.8	27	63.1	-7.3
Wisconsin	26	333.9	-17.0	22	171.8	-31.1	37	67.9	-4.8
Wyoming	18	315.6	-11.9	12	158.1	-18.9	22	61.7	2.8
<b>Total United States</b>		<b>352.4</b>	<b>-15.7</b>		<b>195.6</b>	<b>-24.0</b>		<b>61.8</b>	<b>-9.5</b>

\* 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, 1989-1999. For computing percent change, the death rates in 1999 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 1996 to 1999.

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 page ii for instructions.

# Coronary Heart Disease and Angina Pectoris

## Coronary Heart Disease

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

Population Group	Prevalence CHD	Prevalence MI	Incidence CHD	Incidence MI	Mortality CHD	Mortality MI	Hospital Discharges CHD	Cost CHD
Total population	12,900,000	7,600,000	1,100,000	540,000	515,204	192,898	2,166,000	\$129.9 billion
Total males	6,300,000	4,700,000	660,000	330,000	260,574	100,306	1,274,000	—
Total females	6,600,000	2,900,000	440,000	210,000	254,630	92,585	892,000	—
White males	6.9%	5.2%	—	—	230,951	89,383	—	—
White females	5.4%	2.0%	—	—	224,449	81,201	—	—
Black males	7.1%	4.3%	68,200	—	24,625	9,045	—	—
Black females	9.0%	3.3%	47,700	—	26,640	10,067	—	—
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).

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 (1987-94), 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 2003.

### 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)

### Incidence

- This year an estimated 650,000 Americans will have a new coronary attack. About 450,000 will have a recurrent attack. (Atherosclerosis Risk in Communities [ARIC, 1987-94], NHLBI. These data represent Americans hospitalized with definite or probable MI or fatal CHD, not including silent MIs.)
- 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...
  - 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. At age 70, lifetime risk is 35 percent for men and 24 percent for women.
  - The incidence of CHD in women lags behind men by 10 years for total CHD and by 20 years for more serious clinical events such as MI and sudden death.
- The annual rates per 1,000 population of new and recurrent heart attacks in non-black men are 26.3 for ages 65-74, 39.7 for ages 75-84, and 53.6 for age 85 and older. For non-black women in the same age groups the rates are 7.8, 21.0 and 24.2, respectively. For black men the rates are 16.3, 54.9 and 40.8, and for black women the rates are 13.3, 18.3 and 14.1, respectively. (CHS, NHLBI)

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

## Mortality

Coronary heart disease caused more than 1 of every 5 deaths in the United States in 2000. CHD total mention mortality — 681,000. MI total mention mortality — 239,000.

- CHD is the single largest killer of American males and females.
- About every 29 seconds an American will suffer a coronary event, and about every minute someone will die from one.
- About 47 percent of the people who experience a coronary attack in a given year will die from it.
- About 250,000 people a year die of CHD without being hospitalized. Most of these are sudden deaths caused by cardiac arrest, usually resulting from ventricular fibrillation. (See also Arrhythmias, page 21.)
- 50.6 percent of deaths from CHD in 2000 were males and 49.4 percent were females.
- In 2000 the overall CHD death rate was 186.9 per 100,000 population. The death rates were 238.0 for white males and 262.4 for black males, and 145.3 for white females and 187.5 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. (CDC/NCHS)
- Yearly totals of sudden cardiac death 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)
- From 1990 to 2000, the death rate from CHD declined 25.0 percent, but the actual number of deaths declined only 7.6 percent.
- 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)
- 50 percent of men and 63 percent of women who died suddenly of CHD had no previous symptoms of this disease. (FHS, NHLBI)
- 25 percent of men and 38 percent of women will die within 1 year after having an initial recognized MI. (FHS, NHLBI)
- 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.

- People who've had a heart attack have a sudden death rate that's 4-6 times that of the general population. (FHS, NHLBI)
- Almost half of men and women under age 65 who have a heart attack (MI) die within 8 years. (FHS, NHLBI)
- CHD is a prominent cause of death in adults at the peak of their productive lives. (BRFSS [1997], *MMWR*, Vol. 49, No. SS-2, March 24, 2000, CDC/NCHS)

## Aftermath

- Depending on their sex 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... (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.
- 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

(ICD/9 410-414, 429.2)

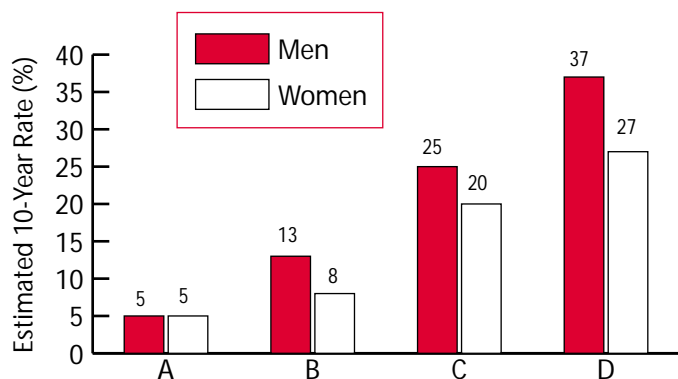
- From 1979 to 2000 the number of Americans discharged from short-stay hospitals with CHD as the first listed diagnosis increased 17.7 percent.

## Cost

- In 1998, \$10.6 billion was paid to Medicare beneficiaries for CHD (\$10,428 per discharge for acute MI; \$11,399 per discharge for coronary atherosclerosis; and \$3,617 per discharge for other CHD). (Health Care Financing Review, Statistical Supplement [2000], CMS)

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

United States



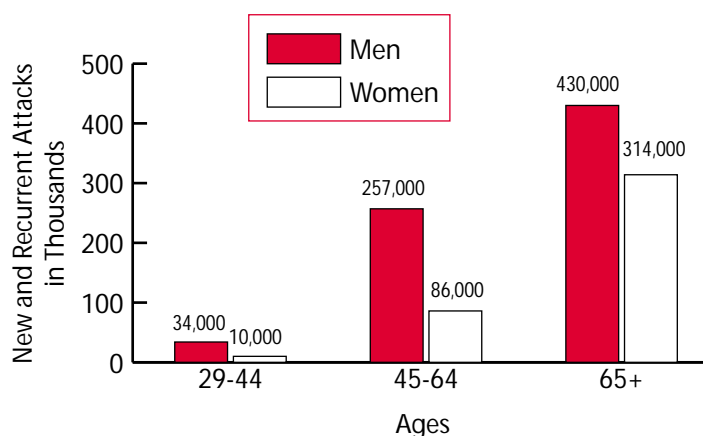
	A	B	C	D
Blood Pressure (mm Hg)	120/80	140/90	140/90	140/90
Total Cholesterol (mg/dL)	200	240	240	240
HDL Cholesterol (mg/dL)	50	50	40	40
Diabetes	No	No	Yes	Yes
Cigarettes	No	No	No	Yes

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

Source: FHS. 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

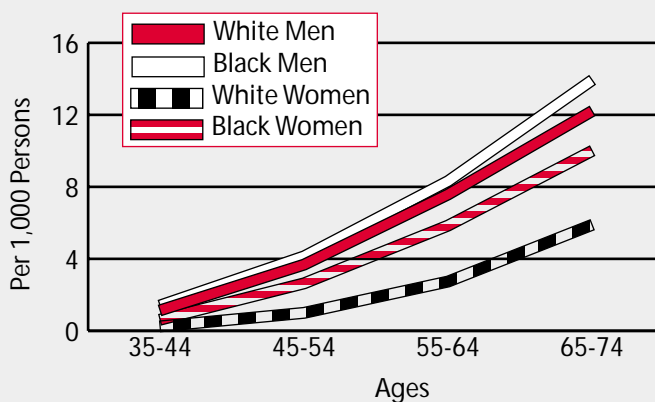
United States: 2000



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

### Annual Rate of First Heart Attacks by Age, Sex and Race

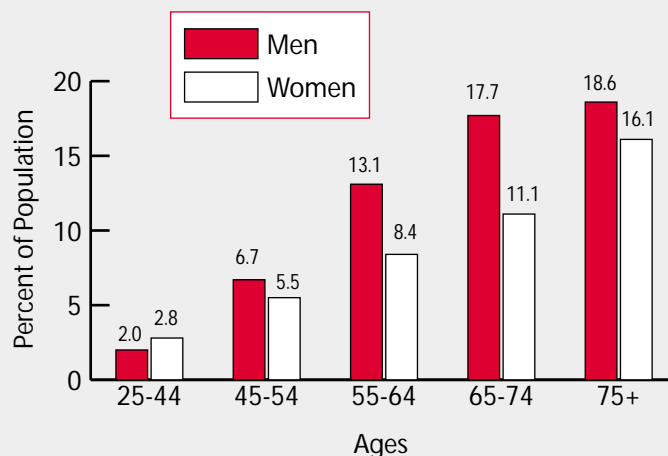
United States: 1987-94



Source: Rates in the NHLBI's ARIC surveillance study, 1987-94.

### Prevalence of Coronary Heart Disease by Age and Sex

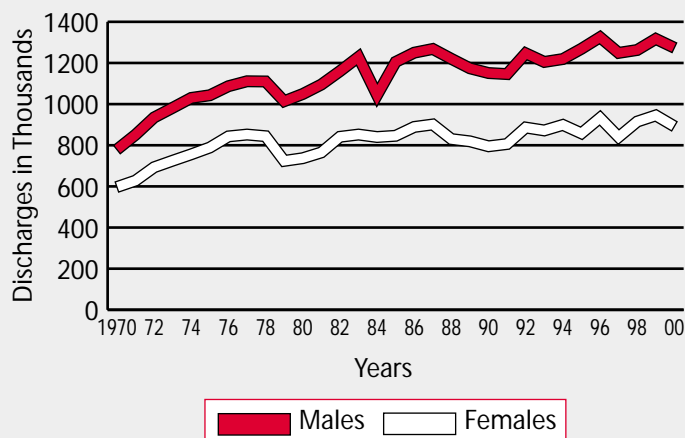
United States: 1988-94



Source: NHANES III (1988-94), CDC/NCHS.

### Hospital Discharges for Coronary Heart Disease by Sex

United States: 1970-2000



Note: Hospital discharges include people both living and dead.  
Source: CDC/NCHS.

# Angina Pectoris

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

Population Group	Prevalence	Incidence of Stable Angina	Hospital Discharges
Total population	6,600,000	400,000	82,000
Total males	2,500,000	—	34,000
Total females	4,100,000	—	48,000
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.

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], CHC/NCHS)

## ○ Incidence

- 27 percent of men and 14 percent of women will develop angina within 6 years after a recognized heart attack. (FHS, NHLBI)
- 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)

Population Group	Prevalence	Incidence	Mortality	Hospital Discharges	Cost
Total population	4,700,000	700,000	167,661	981,000	\$51.2 billion
Total males	2,300,000	47%*	64,769	428,000	—
Total females	2,400,000	53%*	102,892	553,000	—
White males	2.2%	267,160	54,938	—	—
White females	1.5%	300,800	89,642	—	—
Black males	2.5%	52,960	8,026	—	—
Black females	3.2%	62,390	11,195	—	—
Mexican-American males	2.3%	—	—	—	—
Mexican-American females	1.3%	—	—	—	—

\* These percentages represent the portion of total incidence 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. **Incidence:** Various studies, NINDS. **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 2003.

## Prevalence

- 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. (CHS, NHLBI)
- From the early 1970s to early 1990s, the estimated number of noninstitutionalized stroke survivors increased from 1.5 to 2.4 million. (*Stroke*. 2002;33:1209-1213)

## 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. (Various studies, NINDS)

- The most common variety of complete stroke is atherothrombotic brain infarction, which is closely related to cerebral thrombosis. It accounts for 61 percent of all strokes (excluding transient ischemic attacks or TIAs). The next most common is cerebral embolus (24 percent). (44-year follow-up of participants and 20-year follow-up of their offspring, FHS, NHLBI)
- Each year about 40,000 more women than men have a stroke. This is because the average life-expectancy for women is greater than for men, and the highest rates for stroke are in the oldest age groups. (Various studies, NINDS)
- Of all strokes, 88 percent are ischemic, 9 percent are intracerebral hemorrhage, and 3 percent are subarachnoid hemorrhage. (Various studies, NINDS)
- 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). Lapsed smokers develop stroke at the same rate as nonsmokers soon after stopping. 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)
- 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. (Various studies, NINDS)
- The annual rates (per 1,000) of new and recurrent strokes in American Indians ages 65-74 are 15.2 for men and 7.9 for women. (SHS [1991-98], NHLBI)
- The average annual incidence rates (per 1,000) of stroke in Japanese-American men increased with advancing age from 45-49 to 65-68 at the initial examination: 2.1 to 8.2 for total stroke, 1.5 to 6.6 for thromboembolic stroke; and 0.4 to 1.0 for intracerebral hemorrhage. (During 24 years of follow-up of the Honolulu Heart Program [HHP], NHLBI)
  - The age-adjusted annual incidence rate (per 1,000) has declined markedly for total stroke 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. (During the 1969-88 follow-up period of the HHP, NHLBI)

## Mortality

Stroke accounted for about 1 of every 14 deaths in the United States in 2000. About 50 percent of these deaths occurred out of hospital. Total mention mortality — about 283,000.

- When considered separately from other cardiovascular diseases, stroke ranks as the third leading cause of death, behind diseases of the heart and cancer. (CDC/NCHS)
- On average, every 3.1 minutes someone dies of a stroke.
- 7.6 percent of ischemic strokes and 37.5 percent of hemorrhagic strokes result in death within 30 days. (*Stroke*. 1999;30:736-743)
- From 1990 to 2000, the stroke death rate fell 12.3 percent, but the actual number of stroke deaths rose 9.9 percent.
- 38.6 percent of deaths from stroke in 2000 were males and 61.4 percent were females.
- The 2000 overall death rate for stroke was 60.8. Death rates were 58.6 for white males and 87.1 for black males, and 57.8 for white females and 78.1 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)
- Racial and ethnic minority populations **in some age groups** have a higher relative risk of stroke death when compared with the U.S. non-Hispanic white population. Other age groups in these populations have a lower relative risk. (*MMWR*, Vol. 49, No. 5, Feb. 11, 2000, CDC/NCHS)
  - Among non-Hispanic blacks, the relative risk is 4 times higher at ages 35-54, 3 times higher at ages 55-64 and almost 2 times higher at ages 65-74. The risk is only 1.2 times higher at ages 75-84 and slightly lower at age 85 and older.
  - Among Hispanics, the relative risk is about 1.3 times higher at ages 35-64 and slightly lower at ages 65-74. The risk is about half that of non-Hispanic whites at age 75 and older.
  - Among Asian/Pacific Islanders, the relative risk is 1.3 times higher at ages 35-54 and 1.4 times higher at ages 55-64. The risk is about the same at ages 65-84 and slightly lower at age 85 and older.
  - Among American Indians/Alaska Natives, the relative risk is almost 2 times higher at ages 35-44, 1.3 times higher at ages 45-54 and 1.5 times higher at ages 55-64. The risk is slightly less at ages 65-84 and less than half at age 85 and older.
- Stroke age-adjusted (1940 standard) death rates from 1990 to 1998 were substantially higher for non-Hispanic blacks compared with other ethnic groups. (Healthy People statistical notes, No. 23, CDC/NCHS, Jan. 2002)
  - In 1998 Hispanics had the lowest age-adjusted death rate due to stroke (19.0 per 100,000). The 1998 rate for non-Hispanic blacks (42.5 per 100,000) was 2.2 times the rate for Hispanics.
    - From 1990 to 1998, age-adjusted rates declined 7.2 percent for non-Hispanic whites, 11.1 percent for non-Hispanic blacks, 8.2 percent for Hispanics and 8.1 percent for Asian/Pacific Islanders. They rose 2.6 percent for American Indians/Alaska Natives.
- 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.
- The most deadly stroke types are hemorrhagic and cardioembolic (a subtype of ischemic stroke). (CHS, NHLBI, *Neurology*. 2001;56:368-375)
- From 1995 to 1998, age-standardized mortality rates for the three stroke subtypes 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 female-to-male mortality ratio differs for stroke subtypes by race/ethnicity and age. (*Am J Epi*. 2001;154:1057-1063)
  - From 1995 to 1998, age-standardized mortality rates of ischemic and intracerebral hemorrhage stroke were lower for women compared to men for ages 25-64 but higher for ischemic stroke among women age 65 and older.
  - Only among whites did women have higher age-standardized mortality rates from ischemic strokes than men.
  - Age-standardized death rates for intracerebral hemorrhage stroke among women were lower than or similar to those among men in all racial/ethnic subgroups.
  - Women had higher risk of death from subarachnoid hemorrhage stroke, and this sex differential increased with age.

## Aftermath

- Stroke is a leading cause of serious, long-term disability in the United States.
- 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...
  - 8 percent of men and 11 percent of women will have a stroke within 6 years after a heart attack (MI).
  - 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.

## Hospital Discharges

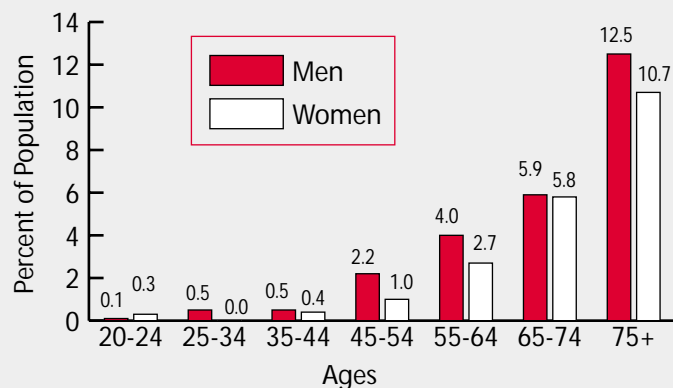
- From 1979 to 2000 the number of Americans discharged from short-stay hospitals with stroke as the first listed diagnosis increased 31.3 percent.
- During 1988-97, the age-adjusted stroke hospitalization rate increased 18.6 percent (from 560 to 664 per 100,000), while total hospitalizations increased 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 greater for blacks than for whites by more than 70 percent. Both groups were similar in terms of in-hospital mortality rates. (*Neuroepidemiology*. 2002;21:131-141)

## Cost

- In 1998, \$3.6 billion (\$5,912 per discharge) was paid to Medicare beneficiaries discharged from short-stay hospitals for stroke. (Health Care Financing Review, Statistical Supplement [2000], CMS)

### Prevalence of Stroke by Age and Sex

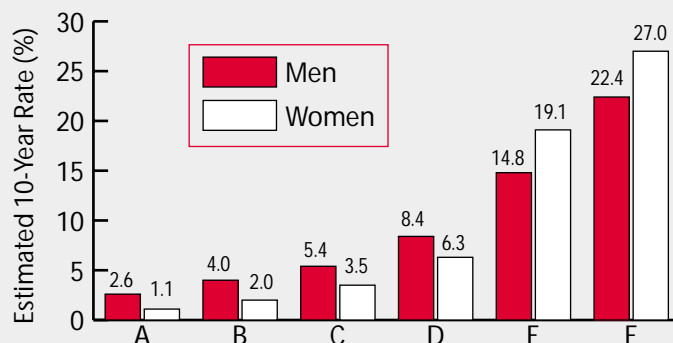
United States: 1988-94



Source: Unpublished data from NHANES III (1988-94), CDC/NCHS.

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

United States



	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	Mortality	Hospital Discharges	Cost
Total population	50,000,000	44,619	457,000	\$50.3 billion
Total males	26.4%*	17,934	186,000	—
Total females	21.4%*	26,685	271,000	—
White males	25.2%	12,822	—	—
White females	20.5%	20,282	—	—
Black males	36.7%	4,670	—	—
Black females	36.6%	5,912	—	—
Mexican-American males	24.2%	—	—	—
Mexican-American females	22.4%	—	—	—

Sources: **Prevalence:** NHANES III (1988-94), CDC/NCHS; data for white and black males and females are for non-Hispanics. Total population data include Americans age 6 and older; percentages for racial/ethnic groups are age-adjusted for age 20 and older. \* Health United States 2002, NHANES III (1988-94), CDC/NCHS; data are age-adjusted for ages 20-74. **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 2003.

## 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.

- 1 in 5 Americans (and 1 in 4 adults) has HBP. (NHANES III [1988-94], CDC/NCHS)
- The cause of 90-95 percent of the cases of HBP isn't known; however, HBP is easily detected and usually controllable.
- People with lower educational and income levels tend to have higher levels of blood pressure.
- Of those with HBP, 31.6 percent are unaware they have it; 27.4 percent are on medication and have it controlled; 26.2 percent are on medication but don't have their HBP under control; and 14.8 percent aren't on medication. (Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure [JNC VI, 1991-94])
- 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 2002*, 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 Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure [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)
- 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.
- 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 hypertension. (*Utilization of Ambulatory Medical Care by Women: U.S., 1997-98*, NCHS, 2001)
- According to FHS, NHLBI, 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. (*JAMA.* 1996;275:1557-1562)

- 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 greater or diastolic blood pressure of 95 mm Hg or greater on one occasion or reported to be currently taking antihypertensive medication.) (SHS [1989-92], NHLBI)
- 73 percent of Japanese-American men ages 71-93 have HBP. (HHP, NHLBI)
- Among Americans age 18 and older, the median percentages who have been told by a professional that they have high blood pressure are (BRFSS [1997], CDC/NCHS):
  - For Hispanics, 18.6 percent.
  - For Asian/Pacific Islanders, 16.3 percent.
  - For American Indians/Alaska Natives, 20.7 percent.
- 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)

## Incidence

- Investigators found that the lifetime risk of developing hypertension was about 90 percent for men and women ages 55 and 65. More than half of participants age 55 and about two-thirds of those age 65 went on to develop HBP within 10 years. (FHS, NHLBI, 2002).

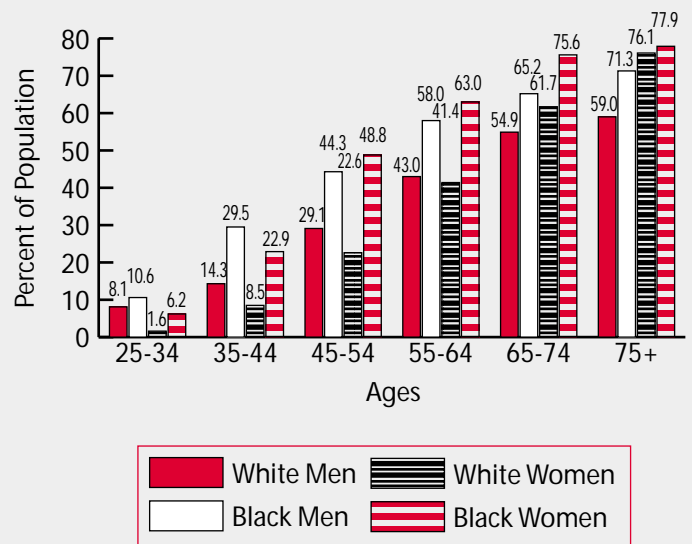
## Mortality

HBP was listed as a primary or contributing cause of death in about 118,000 of over 2,400,000 U.S. deaths in 2000.

- From 1990 to 2000 the age-adjusted death rate from HBP increased 21.3 percent, but the actual number of deaths rose 49.1 percent.
- 40.2 percent of deaths from HBP in 2000 were males and 59.8 percent were females.
- The 2000 overall death rate from HBP was 16.2. Death rates were 13.2 for white males, 46.3 for black males, 13.1 for white females and 40.8 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)

### Prevalence of High Blood Pressure in Americans Age 25 and Older by Age, Sex and Race

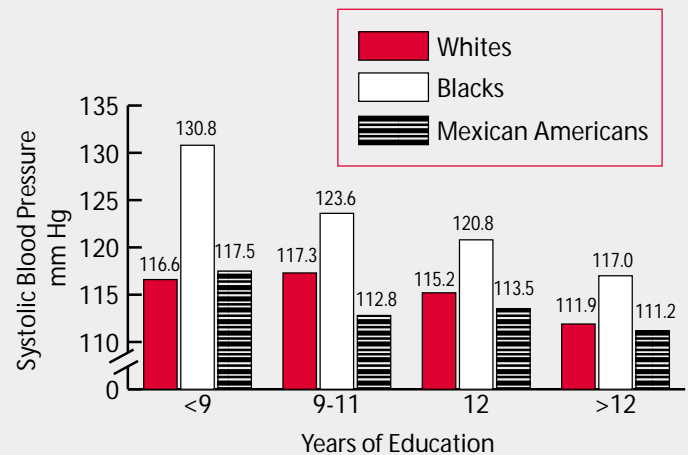
United States: 1988-94



Source: Wolz M, et al. Statement from the National High Blood Pressure Education Program: prevalence of hypertension. *Am J Hypertens.* 2000;13:103-104. These rates are based on two or more readings.

### Mean Systolic Blood Pressure for Women\* Ages 25-64 by Education and Race/Ethnicity

United States: 1988-94

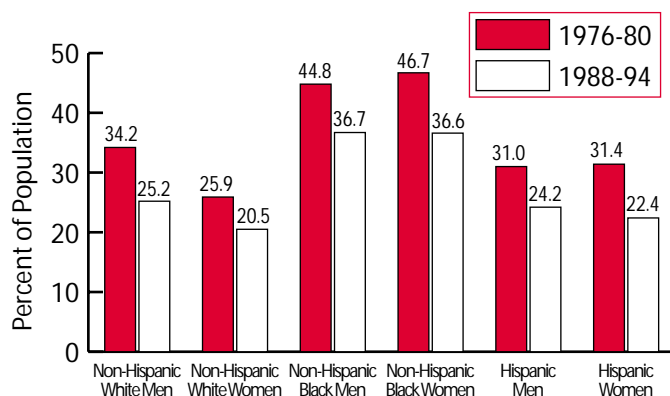


\* Findings for men are similar but of lower magnitude. See Winkleby MA, et al. Pathways by which SES and ethnicity influence cardiovascular disease risk factors. *Annals New York Academy of Science.* 1999;896:191-209.

Source: Winkleby MA, et al. 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.

## Age-Adjusted Prevalence Trends for High Blood Pressure, Ages 20-74 by Race/Ethnicity, Sex and Survey

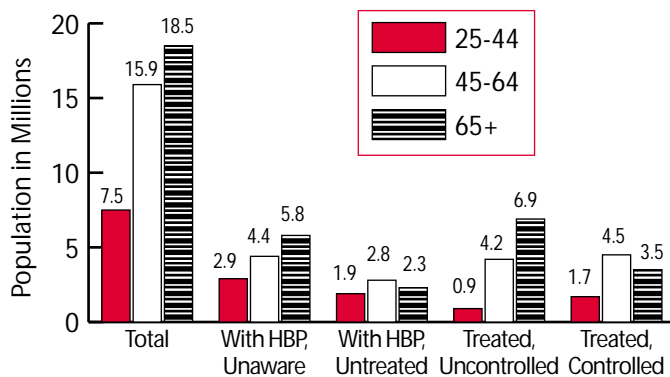
United States: 1976-80 and 1988-94



Source: NHANES II (1976-80) and NHANES III (1988-94), CDC/NCHS. Data based on multiple measures of blood pressure.

## Estimated Number of Americans Age 25 and Older by Category of High Blood Pressure and Age

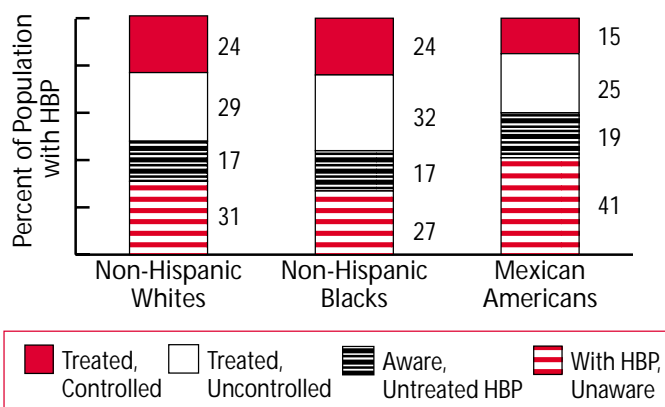
United States: 1988-94



Source: Characteristics of patients with uncontrolled hypertension in the United States. NEJM. 2001;345:479-486.

## Extent of Awareness, Treatment and Control of High Blood Pressure by Race/Ethnicity

United States: 1988-94



Source: Characteristics of patients with uncontrolled hypertension in the United States. NEJM. 2001;345:479-486.

## 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.
- 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.
- The incidence of reported ESRD therapy has almost doubled in the past 10 years. (NHLBI from [www.usrds.org](http://www.usrds.org) Web site)

## Age, Sex, Race and Ethnicity

- The average incidence rates for pediatric ESRD are more than twice as high among children 15-19 years as for children 10-14 years. 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 20-64 years of age 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.

Mortality, prevalence and death rate data in this section are for 2000 unless otherwise noted. Hospital discharge data are still based on ICD/9 codes.

## Arrhythmias (Disorders of Heart Rhythm)

(ICD/9 426, 427) (ICD/10 I46-I49)

Mortality — 37,646. Total mention mortality — 491,000 of over 2,400,000 U.S. deaths. Hospital discharges — 769,000. In 1998, \$2.1 billion (\$6,047 per discharge) was paid to Medicare beneficiaries for cardiac arrhythmias. (Health Care Financing Review, Statistical Supplement [2000], CMS)

- Atrial fibrillation and flutter (ICD/9 427.3) (ICD/10 I48). Mortality — 8,736. Total mention mortality — 67,000. Prevalence — about 2,000,000. Hospital discharges — 399,000. A higher percentage of men than women have atrial fibrillation, but the actual numbers of men and women with it are about equal. About 70 percent of people with atrial fibrillation are between 65 and 85 years old. (*Archives of Internal Medicine*, 1995;155:469-473). About 15 percent of strokes occur in people with atrial fibrillation.
- Tachycardia (ICD/9 427.0,1,2) (ICD/10 I47.0,1,2,9). Mortality — 626. Total mention mortality — 8,400. Hospital discharges — 79,000.
  - Paroxysmal supraventricular tachycardia (ICD/9 427.0) (ICD/10 I47.1). Mortality — 124. Hospital discharges — 29,000.
- Ventricular fibrillation (ICD/9 427.4) (ICD/10 I49.0). Mortality — 1,371. Total mention mortality — 17,500. Hospital discharges — 6,000. 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 250,000 per year) is thought to be from ventricular fibrillation.

## Arteries, Diseases of

(ICD/9 440-448) (ICD/10 I70-I79) (Includes peripheral vascular disease)

Mortality — 40,429. Total mention mortality — 101,700. Hospital discharges — 284,000.

- 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 — 14,979. Total mention mortality — 76,200. Hospital discharges — 125,000. Atherosclerosis is also a leading cause of many deaths from heart attack and stroke. As such, it 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.
- Peripheral arterial disease (PAD) affects 8 to 12 million Americans and is associated with significant morbidity and mortality.
- Aortic aneurysm (ICD/9 441) (ICD/10 I71). Mortality — 15,810. Total mention mortality — 22,000. Hospital discharges — 60,000.
- Other diseases of arteries (ICD/9 442-448) (ICD/10 I72-I78). Mortality — 10,226. Hospital discharges — 99,000.
  - Kawasaki disease (ICD/9 446.1) (ICD/10 M30.3). Mortality — 4. Up to 2,500 cases of Kawasaki disease are diagnosed yearly. Hospital discharges — 6,000, 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.
- Deep vein thrombosis (ICD/9 451.1) (ICD/10 I80.2). Mortality — 2,632. Hospital discharges — 11,000.
  - Medicare recipients age 65 and older reported 30-day case fatality rates in patients with pulmonary embolism (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 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 41 for definition.) Heavy cigarette smoking and high blood pressure were also identified as risk factors for PE.

## Bacterial Endocarditis

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

Total mention mortality — 2,340. Hospital discharges — 23,000, primary plus secondary diagnoses.

## Cardiomyopathy

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

Mortality — 27,213. Total mention mortality — 54,900. Hospital discharges — 31,000.

- 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, 1995, NHLBI)
- Recent studies show that 36 percent of young athletes who die suddenly have probable or definite hypertrophic cardiomyopathy.
- Mortality from cardiomyopathy is highest in older persons, men and blacks. (FHS, NHLBI)

## Congenital Cardiovascular Defects

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

Population Group	Prevalence	Incidence	Mortality	Hospital Discharges
Total population	1,000,000	40,000	4,310	44,000
Total males	—	—	2,282	25,000
Total females	—	—	2,028	19,000
White males	—	—	1,803	—
White females	—	—	1,610	—
Black males	—	—	393	—
Black females	—	—	337	—

Sources: **Prevalence:** NHANES II (1976-80), CDC/NCHS. **Incidence:** Metropolitan Atlanta Congenital Defects Program (MACDP), CDC/NCHS. **Mortality:** CDC/NCHS; data for white and black males and females include Hispanics. **Hospital discharges:** CDC/NCHS; data include people both living and dead.

## Prevalence

- About 1,000,000 American adults and children with congenital cardiovascular defects are alive today.

## Incidence

- At least 35 distinct types of defects are recognized, ranging from simple defects to complex malformations. Common defects diagnosed in infancy include ventricular septal defect (14-17 percent), tetralogy of Fallot (9-12 percent), transposition of the great arteries (10-11 percent), atrioventricular septal defect (4-10 percent) and coarctation of the aorta (8-11 percent). Most defects can be corrected or improved with surgery or catheter-based therapy.

## Mortality

- Congenital cardiovascular disease caused 4,310 deaths in 2000. Total mention mortality — 6,449.
- Heart defects cause more deaths than any other birth defect. (*Genetic Epidemiology*. 1997;14:493-505)
- The 2000 overall death rate for congenital cardiovascular defects was 1.6. Death rates were 1.7 for white males, 2.1 for black males, 1.4 for white females and 1.8 for black females. Crude infant death rates (under 1 year) were 45.7 for white babies and 62.8 for black babies. Some types of defects occur more commonly in females or males.
- Mortality associated with congenital defects has been declining. From 1979-97, death rates from all defects declined 39 percent. More than half of deaths occur in infants less than 1 year old. Mortality varies considerably according to type of defect. (*Circulation*. 2001;103:2376-2381)
- From 1990 to 2000, death rates for congenital cardiovascular defects declined 27.1 percent, while the actual number of deaths declined 26.1 percent.

## Congestive Heart Failure

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

Population Group	Prevalence	Incidence	Mortality	Hospital Discharges	Cost
Total population	4,900,000	550,000	51,546	999,000	\$24.3 billion
Total males	2,400,000	—	19,384	418,000	—
Total females	2,500,000	—	32,162	581,000	—
White males	2.3%	—	17,440	—	—
White females	1.5%	—	29,143	—	—
Black males	3.5%	—	1,701	—	—
Black females	3.1%	—	2,726	—	—

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 2003.

## ● Prevalence

- According to estimates from FHS, NHLBI, people free of congestive heart failure (CHF) at age 40 have a remaining lifetime risk of developing CHF of 21.0 percent for men and 20.3 percent for women. At age 80, the remaining lifetime risk is 20.2 percent for men and 19.3 for women. At age 40, the remaining lifetime risk of CHF in the absence of MI is 11.4 percent for men and 15.4 for women.

## ○ Incidence

- Based on the 44-year follow-up of the NHLBI's FHS...
  - 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.
- 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

37.6 percent of total deaths from CHF in 2000 were males and 62.4 percent were females. Total mention mortality — 262,300.

- 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 2000, CHF deaths increased 148 percent.
- The 2000 overall death rate for CHF was 18.7. Death rates were 19.5 for white males, 20.4 for black males, 18.1 for white females and 19.3 for black females.

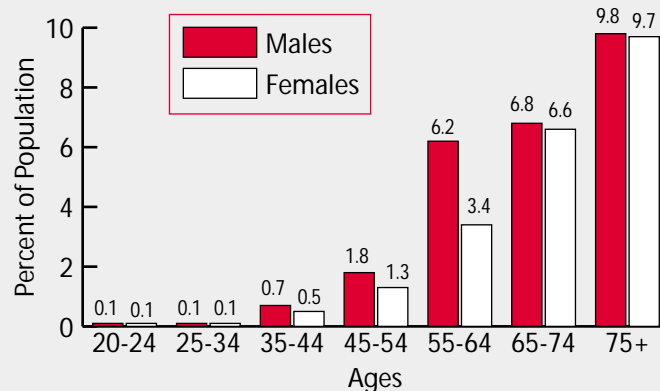
## ○ Hospital Discharges

- Hospital discharges for CHF rose from 377,000 in 1979 to 999,000 in 2000, an increase of 165 percent.

## ○ Cost

- In 1998, \$3.6 billion (\$5,471 per discharge) was paid to Medicare beneficiaries for CHF. (Health Care Financing Review, Statistical Supplement [2000], CMS)

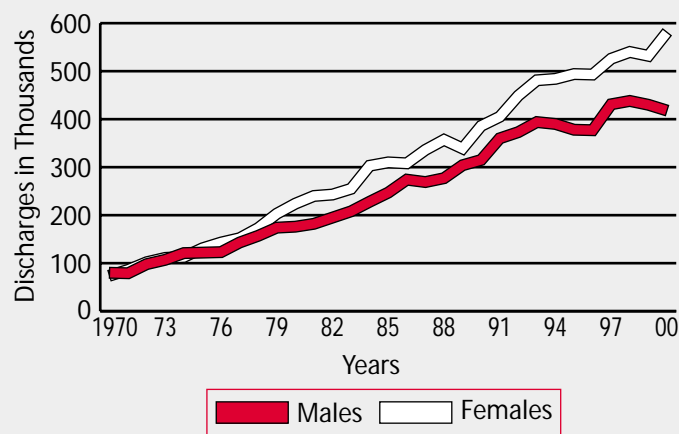
**Prevalence of Congestive Heart Failure by Age and Sex**  
United States: 1988-94



Source: NHANES III (1988-94), CDC/NCHS.

**Hospital Discharges for Congestive Heart Failure by Sex**

United States: 1970-2000



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	Hospital Discharges
Total population	3,582	47,000
Total males	1,072	16,000
Total females	2,510	31,000
White males	965	—
White females	2,264	—
Black males	79	—
Black females	186	—

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 of the 96,000 annual 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*. 9th ed. New York, NY: McGraw-Hill; 1998)

### Mortality

- 29.9 percent of total deaths from RF/RHD in 2000 were males and 70.1 percent were females. Total mention mortality — about 7,500.
- In 1950 about 15,000 Americans (adjusted for changes in ICD codes) died of RF/RHD compared with about 3,500 today.
- From 1990 to 2000 the death rate from RF/RHD fell 39.1 percent, while actual deaths declined 27.5 percent.
- The 2000 overall death rate for RF/RHD was 1.3. Death rates were 1.0 for white males and 0.7 for black males, 1.6 for white females and 1.2 for black females.

## Valvular Heart Disease

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

Mortality — 19,737. Total mention mortality — 42,300. Hospital discharges — 93,000.

- Aortic valve disorders (ICD/9 424.1) (ICD/10 I35). Mortality — 12,380. Total mention mortality — about 26,400. Hospital discharges — 51,000.
- Mitral valve disorders (ICD/9 424.0) (ICD/10 I34). Mortality — 2,865. Total mention mortality — about 7,500. Hospital discharges — 39,000.
  - The NHLBI's FHS reports that among people ages 26-84, prevalence is about 1-2 percent and equal between women and men.
- Pulmonary valve disorders (ICD/9 424.3) (ICD/10 I37). Mortality — 12. Total mention mortality — 28.
- Tricuspid valve disorders (ICD/9 424.2) (ICD/10 I36). Mortality — 3. Total mention mortality — 42.

## Tobacco Smoke

Population Group	Prevalence
Total population	48,700,000
Total males	26,000,000
Total females	22,700,000
White males	25.8%
White females	21.6%
Black or African-American males	26.1%
Black or African-American females	20.8%
Hispanic males	24.1%
Hispanic females	12.3%
Asian/Pacific Islander males	24.3%
Asian/Pacific Islander females	7.1%
American Indian/Alaska Native males	40.9%
American Indian/Alaska Native females	40.8%

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

Sources: *Prevalence for total population, white and black males and females: Health United States 2002, CDC/NCHS. Prevalence for other racial/ethnic groups: NHIS (1999), CDC/NCHS.*

### Prevalence

- Since 1965, smoking has declined by over 40 percent among people age 18 and older in the United States.
- 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, with the most common ages of initiation being 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 current smokers compared with 35 percent of minority youth. (*JAMA*. 1999;281:1006-1013)
- From 1980 to 2001, the percentage of high school seniors who smoked in the past month decreased 3.3 percent. For males it increased 10.8 percent, and for females it decreased 14.1 percent. For whites it increased 10.0 percent, while for blacks there was a 48.8 percent **decrease**. (*Health United States 2002*, 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 percent 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.
- Current prevalence for Americans age 18 and older shows 25.7 percent of men and 21.0 percent of women are smokers, putting them at increased risk of heart attack and stroke. (*Health United States 2002*, 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. As the respondents' level of education increases, they are more likely to report working under 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, and within 15 years, the relative risk of dying from CHD for an ex-smoker approaches that of a long-time (lifetime) nonsmoker.
- Passive smoking substantially reduces blood flow velocity in the coronary arteries of healthy young adults. (*JAMA*. 2001;286:436-441)

## Incidence

- During 1988-96, among people 12-17 years old, the incidence of initiation of first use increased by 30 percent, and first daily use increased by 50 percent. Each day among people under age 18, more than 6,000 persons try a cigarette, and more than 3,000 become daily smokers. If trends continue, about 5 million of these people will eventually die from a disease attributed to smoking. (National Household Survey on Drug Abuse, analyzed by CDC/NCHS and the Substance Abuse and Mental Health Services Administration)

## Mortality

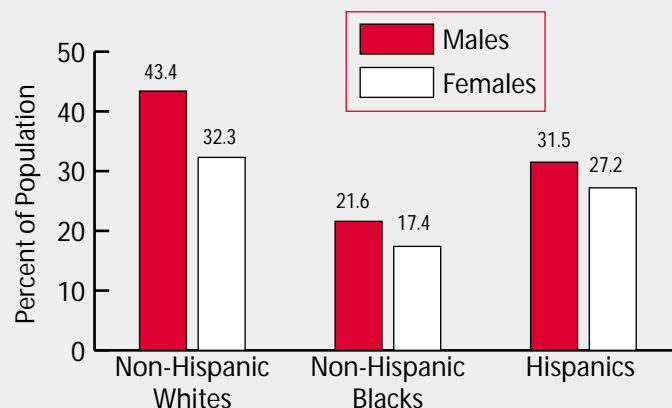
- From 1995 to 1999, an average of 442,398 Americans died each year of smoking-related illnesses. 33.5 percent of these deaths were cardiovascular-related. (*MMWR*, Vol. 51, No. 14, 2002, CDC/NCHS)
- About 35,000 nonsmokers die from CHD each year as a result of exposure to environmental tobacco smoke. (*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 medical care. 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

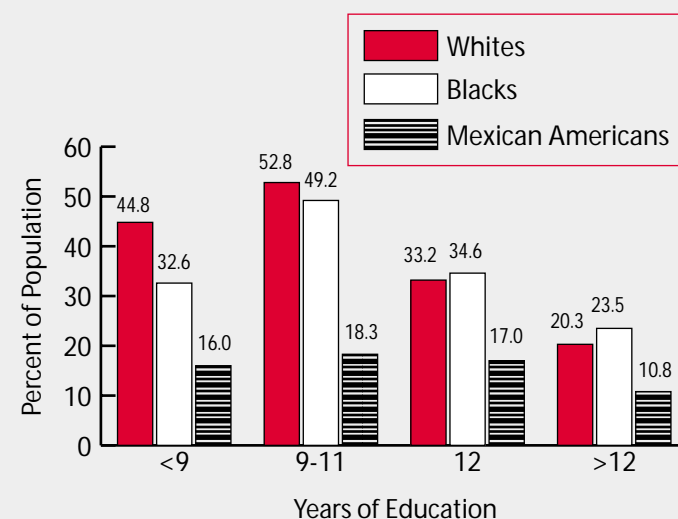
United States: 2001



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

### Prevalence of Current Cigarette Smoking for Women\* Ages 25-64 by Education and Race/Ethnicity

United States: 1988-94

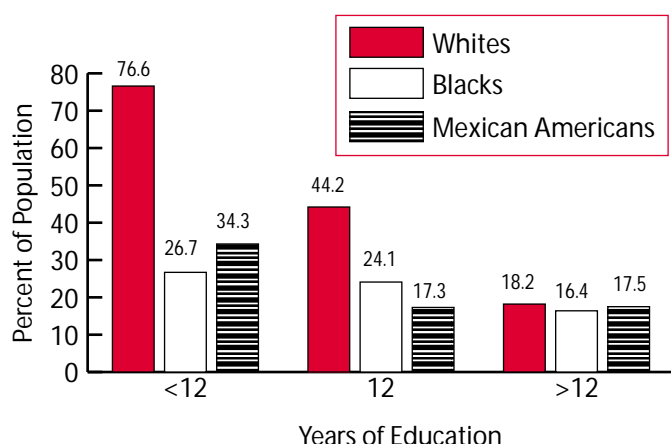


\* Findings for men are similar but of lower magnitude. See Winkleby MA, et al. Pathways by which SES and ethnicity influence cardiovascular disease risk factors. *Annals New York Academy of Science*. 1999;896:191-209.

Source: Winkleby MA, et al. 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.

### Prevalence of Current Smoking for Men Ages 18-24 by Education and Race/Ethnicity

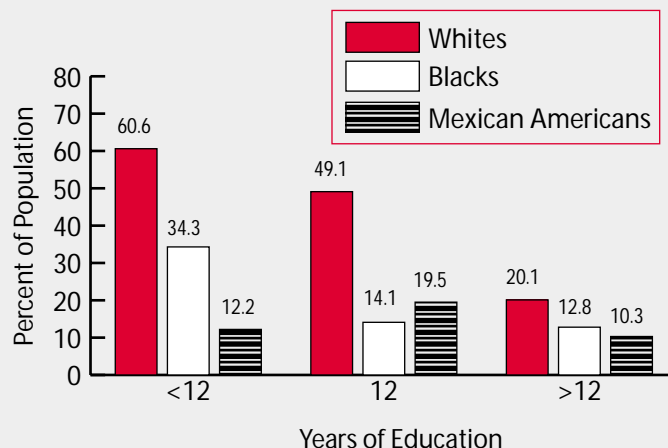
United States: 1988-94



Source: Winkleby MA, et al. 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

United States: 1988-94



Source: Winkleby MA, et al. 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.

## High Blood Cholesterol and Other Lipids

Population Group	Prevalence of Total Cholesterol 200mg/dL or higher	Prevalence of Total Cholesterol 240 mg/dL or higher	Prevalence of LDL Cholesterol 130 mg/dL or higher <sup>#</sup>	Prevalence of HDL Cholesterol less than 40 mg/dL <sup>#</sup>
Total population*	105,000,000	42,000,000	—	—
Total males*	50,000,000	18,000,000	48.6%	39.0%
Total females*	55,000,000	24,000,000	43.3%	14.9%
White males**	52%	18%	49.6%	40.5%
White females**	49%	20%	43.7%	14.5%
Black males**	45%	15%	46.3%	24.3%
Black females**	46%	18%	41.6%	13.0%
Mexican-American males**	53%	18%	43.6%	40.1%
Mexican-American females**	48%	17%	41.6%	18.4%

Note: mg/dL = milligrams per deciliter of blood. Data for white and black males and females are for non-Hispanics. "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.

\* Total population data are for Americans age 20 and older.

\*\* Total cholesterol data for these groups are age-adjusted for ages 20-74.

<sup>#</sup> LDL and HDL cholesterol data are age-adjusted for age 20 and older.

Source: NHANES III (1988-94), CDC/NCHS.

## Prevalence

For information on dietary cholesterol, total fat, saturated fat and other factors that affect blood cholesterol levels, see the Nutrition section on pages 35-36.

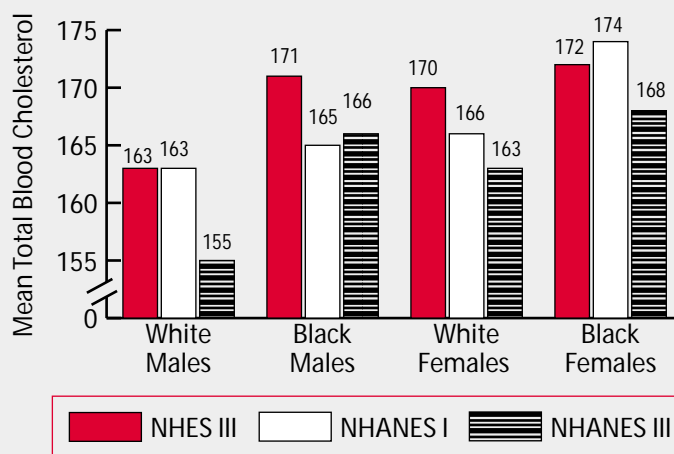
- Among children and adolescents ages 4-19 (NHANES III [1988-94], CDC/NCHS):
  - Females have significantly higher average total cholesterol and low-density lipoprotein (LDL) cholesterol (bad cholesterol) than do males.
  - Non-Hispanic black children and adolescents have significantly higher mean total cholesterol, LDL cholesterol and high-density lipoprotein (HDL) cholesterol (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)
- The prevalence of cholesterol screening during the preceding 5 years increased from 67.3 percent in 1991 to 70.8 percent in 1999. For the 47 states that participated in the BRFSS study in all years from 1991 through 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 may result in an estimated 30-percent reduction in the incidence of CHD. (*MMWR*, Vol. 49, No. 33, Aug. 25, 2000, CDC/NCHS)

- Among Americans age 18 and older, the median percentages who have been told by a professional that they have high blood cholesterol are (BRFSS [1997], *MMWR*, Vol. 49, No. SS-2, March 24, 2000, CDC/NCHS):

- For Hispanics, 25.6 percent.
- For Asian/Pacific Islanders, 27.3 percent.
- For American Indians/Alaska Natives in Alaska, 26.0 percent; in Oklahoma, 28.6 percent; in Washington, 26.5 percent.

- Beginning at age 50, a higher percentage of women than men have total blood cholesterol of 200 mg/dL or higher.
- 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)
- For 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. 8.6 percent of men and 12.7 percent of women have levels of 240 mg/dL or higher. (SHS [1989-92], NHLBI)

**Trends in Mean Total Blood Cholesterol Among Adolescents Ages 12-17 by Sex, Race and Survey**  
United States: 1966-70, 1971-74, 1988-94



Source: NHES III (1966-70), NHANES I (1971-74), NHANES III (1988-94), 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

In general, higher LDL cholesterol levels combined with other risk factors increase the risks of heart disease, heart attack and stroke. An adult's LDL cholesterol goal depends on how many other risk factors he or she has:

For people who...	The LDL goal is...
Don't have CHD, other vascular diseases or diabetes and have one or no risk factors	Less than 160 mg/dL
Don't have CHD, other vascular disease or diabetes and have two or more risk factors	Less than 130 or less than 100 mg/dL depending on overall risk score
Do have CHD, other vascular disease or diabetes	Less than 100 mg/dL

mg/dL = milligrams per deciliter of blood

- 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.

- The eligibility for drug therapy was determined in a subsample of NHANES III participants using NCEP II and III guidelines.
  - Under NCEP II an estimated 15 million Americans ages 20-79 would be eligible for drug therapy. 51 percent are males, 49 percent are females, 26 percent are under age 45, and 28 percent are age 65 or older.
  - Under NCEP III, 36 million Americans would be eligible for treatment; 55 percent are males, 45 percent are females, 32 percent are under age 45, and 27 percent are age 65 or older.
  - Of treatment-eligible individuals, 26 percent of males, 24 percent of females, 39 percent of those age 65 or older, and 14 percent of those under age 45 are targeted for lowering LDL cholesterol to less than 100 mg/dL.

## 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.
- The risk of heart attack in both men and women is highest at lower HDL cholesterol (HDL-C) levels and higher total cholesterol levels, overall. However, those with lower levels of HDL-C (37 mg/dL or lower in men and 47 mg/dL or lower in women) 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
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.

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

### Prevalence

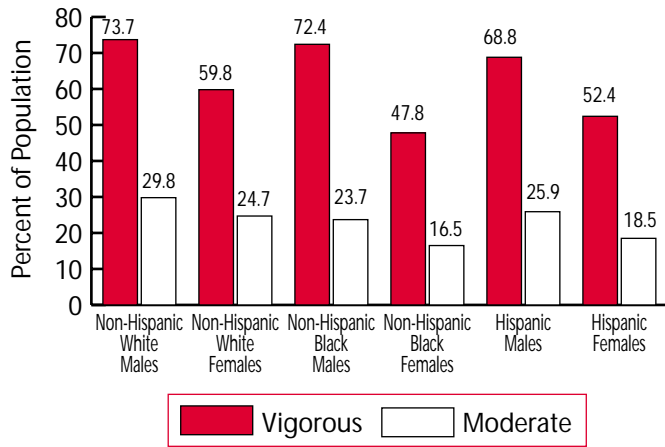
The following data are based on **leisure-time** physical activity.

- In 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.
- 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)
- Less-active, less-fit persons have a 30-50 percent greater risk of developing high blood pressure. (Cardiovascular benefits and assessment of physical activity and physical fitness in adults. *Med Sci Sports Exerc*. 1992;24(suppl 6):S201-S220)

- 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)
- By the age of 16 or 17 years, 56 percent of black girls and 31 percent of white 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.
  - Pregnancy is associated with decline in activity among black girls but not among white girls. Cigarette smoking is associated with decline in activity 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 when compared with physical activity done at an average or casual pace. (*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)
- The annual cost for diseases associated with physical inactivity is \$76 billion. (CDC)

**Percentage 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**

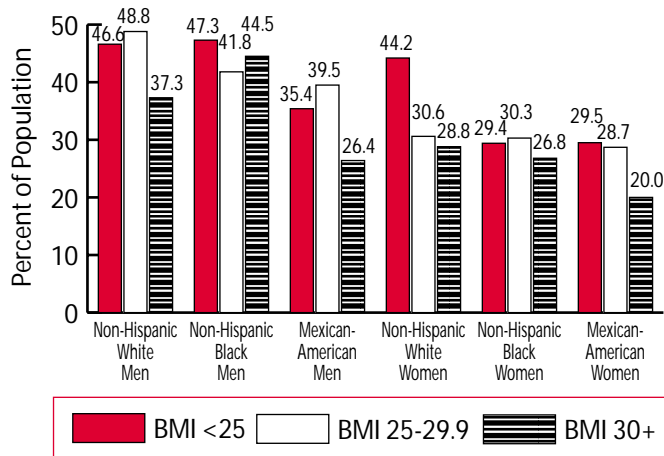
United States: 2001



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

**Prevalence of Moderate or Vigorous Physical Activity in Americans Age 20 and Older by Sex, Race/Ethnicity and BMI**

United States: 1988-94

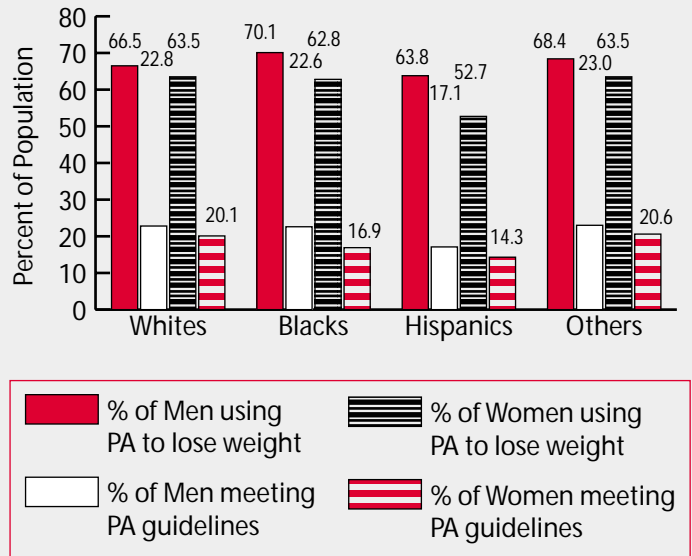


Note: BMI indicates body mass index: weight in kilograms divided by height in meters squared (kg/m<sup>2</sup>).

Source: NHANES III (1988-94), CDC/NCHS.

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

United States: 1998



Source: BRFSS, 1998, MMWR, Vol. 49, No. 15, April 21, 2000, CDC/NCHS.

# Overweight and Obesity

Population Group	Prevalence of Overweight and Obesity in Adults	Prevalence of Obesity in Adults	Prevalence of Overweight in Children Ages 6-11	Prevalence of Overweight in Adolescents Ages 12-19
Total population	129,250,000	61,200,000	—	—
Total males	64,660,000	26,370,000	—	—
Total females	64,590,000	34,830,000	—	—
White males	67.4%	27.3%	12.0%	12.8%
White females	57.3%	30.1%	11.6%	12.4%
Black males	60.7%	28.1%	17.1%	20.7%
Black females	77.3%	49.7%	22.2%	26.6%
Mexican-American males	74.7%	28.9%	27.3%	27.5%
Mexican-American 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: BMI (body mass index) = weight in kilograms divided by height in meters squared (kg/m<sup>2</sup>). Data for white, black and Asian/Pacific Islander males and females are for non-Hispanics. 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 (1999-2000), CDC/NCHS (except as noted below); data in adults are for ages 20 and older.

\* 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 8,800,000 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 [1999-2000], CDC/NCHS)
- Based on data from the 1999-2000 NHANES, 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)
- In 1998-99, people surveyed 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. Nationally, the estimated annual cost attributable to obesity-related diseases is about \$100 billion. (*MMWR*, Vol. 51, No. 36, Sept. 13, 2002)
- 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 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.

## ○ Mortality

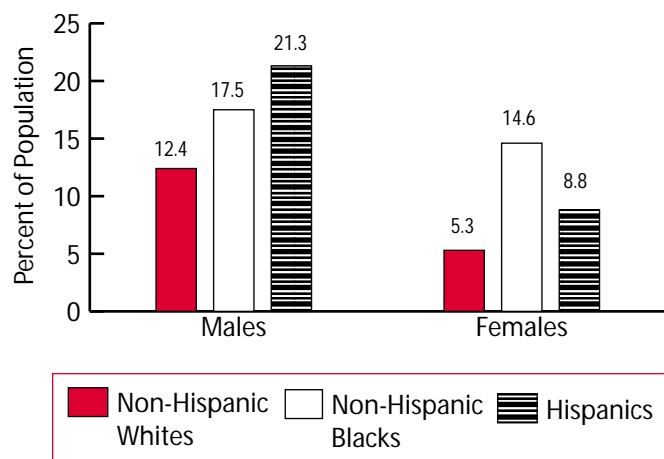
- Each year an estimated 300,000 U.S. adults die of causes related to obesity. (BRFSS, CDC/NCHS, *JAMA*. 1999;282:1530-1538)

## ○ Cost

- In 1995, obesity among U.S. adults cost \$99.2 billion, of which \$51.6 billion was for direct medical costs. (CDC)
- Among children and adolescents, annual hospital costs related to obesity were \$127 million during 1997-99. (CDC)
- Among U.S. adults in 1996, \$31 billion of treatment costs for CVD was related to overweight and obesity. (CDC)

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

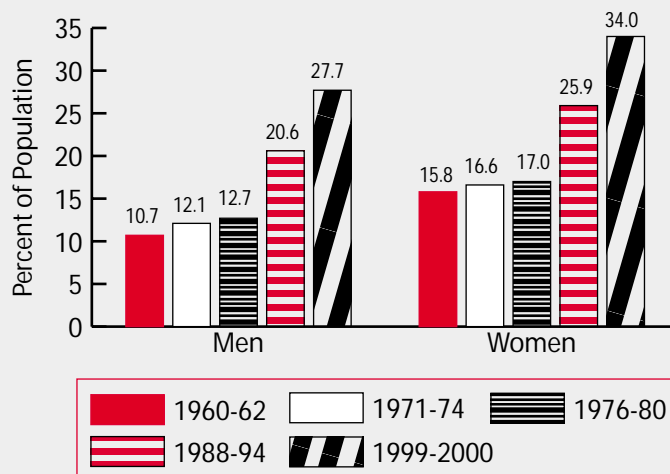
United States: 2001



Source: BMI 95th 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

United States: 1960-62, 1971-74, 1976-80, 1988-94 and 1999-2000



Source: Obesity is defined as a BMI of 30.0 or higher. Respective health examination surveys, CDC/NCHS.

## Diabetes Mellitus

(ICD/9 250) (ICD/10 E10-E14)

Population Group	Prevalence of Physician-Diagnosed Diabetes	Prevalence of Undiagnosed Diabetes	Prevalence of Pre-Diabetes	Incidence (Type 2 Diabetes)	Mortality (Diabetes)	Hospital Discharges
Total population	10,910,000	5,700,000	14,200,000	798,000	69,301	557,000
Total males	5,030,000	3,000,000	8,600,000	—	31,602	279,000
Total females	5,880,000	2,700,000	5,600,000	—	37,699	278,000
White males	5.4%	3.0%	9.4%	—	26,009	—
White females	4.7%	2.1%	4.8%	—	29,552	—
Black males	7.6%	2.8%	8.0%	—	4,771	—
Black females	9.5%	4.7%	6.8%	—	7,250	—
Mexican-American males	8.1%	5.8%	12.1%	—	—	—
Mexican-American females	11.4%	3.9%	6.7%	—	—	—

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.

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.

## Prevalence

- The prevalence of diabetes rose from 4.9 percent in 1990 to 6.5 percent in 1998, an increase of 33.3 percent. Increases were observed in both sexes, all ages, all ethnic groups, all education levels, and nearly all states. (BRFSS [1990-98], CDC/NCHS, *Diabetes Care*. 2000;23:1278-1283)
- The prevalence of diabetes was 7.3 percent in 2000. Mississippi had the highest prevalence of diabetes (8.8 percent) and Alaska had the lowest (4.4 percent). (*JAMA*. 2001;286:1195-1200)
- Among Americans age 18 and older, the median percentages who have been told by a professional that they have diabetes are (BRFSS [1997], CDC/NCHS):
  - For Hispanics, 5.5 percent.
  - For Asian/Pacific Islanders, 4.6 percent.
  - For American Indians/Alaska Natives, 7.6 percent.
- Among American Indians ages 45-74, 43.5 percent of men and 52.4 percent of women have diabetes mellitus. Also, 14.2 percent of men and 17.4 percent of women have impaired glucose tolerance (pre-diabetes). (SHS [1989-92], NHLBI)
- 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)
- 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)
- 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: U.S., 1997-98*. NCHS, 2001)
- CVD is the leading cause of death among all women. The risk of death from CVD among women with diabetes is two to four times higher than that for women without diabetes. The age-adjusted prevalence of major CVD for women with diabetes is twice that for women without diabetes. 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)

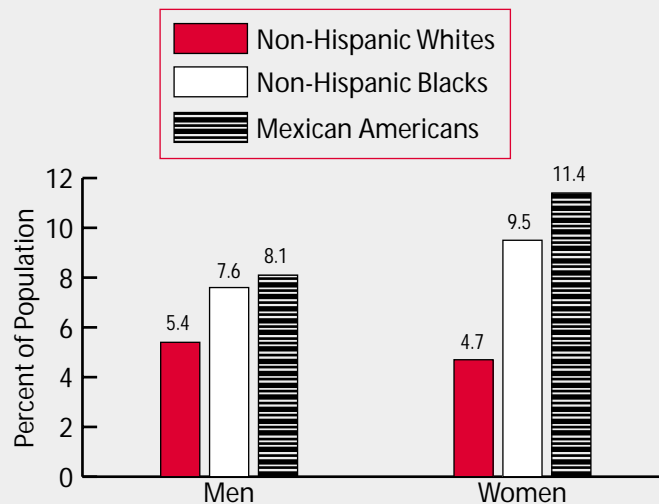
## Mortality

45.6 percent of total deaths from diabetes in 2000 were males and 54.4 percent were females. Total mention mortality — 210,000.

- The 2000 overall death rate from diabetes was 25.2. Death rates were 25.8 for white males, 47.8 for black males, 20.6 for white females and 50.4 for black females.
- 75 percent of people with diabetes mellitus die of some form of heart or blood vessel disease.

### Age-Adjusted Prevalence of Physician-Diagnosed Diabetes in Americans Age 20 and Older by Sex and Race/Ethnicity

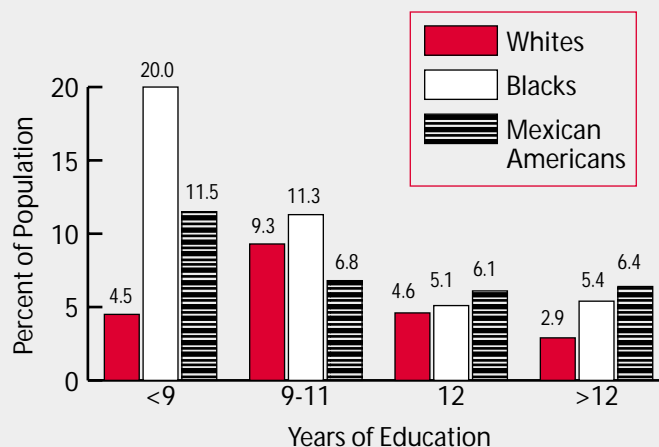
United States: 1988-94



Source: Harris MI, et al. 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

United States: 1988-94



\* Findings for men are similar but of lower magnitude. See Winkleby MA, et al. Pathways by which SES and ethnicity influence cardiovascular disease risk factors. *Annals New York Academy of Science*. 1999;896:191-209.

Source: Winkleby MA, et al. 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.

# Metabolic Syndrome

11

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

- Applying the age-specific prevalence rates to the U.S. census population for 2000 suggests that 47 million U.S. residents have the metabolic syndrome. (NHANES III [1988-94], CDC/NCHS)

- The unadjusted prevalence of the metabolic syndrome in adults is 21.8 percent. The age-adjusted prevalence is 23.7 percent. (NHANES III [1988-94], CDC/NCHS)
  - 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 whites and members of the “other” race or ethnicity, men and women had a similar prevalence. (NHANES III [1988-94], CDC/NCHS)
  - Among African Americans, women had about a 57 percent higher prevalence than men.
  - Among Mexican Americans, women had about a 26 percent higher prevalence than men.

# Nutrition

12

Good nutrition helps prevent heart disease and stroke. Healthy food habits help maintain normal blood pressure, desirable blood cholesterol levels and a healthy body weight. They also may aid blood clotting, oxidation, maintaining a normal heart rhythm and other effects. A poor diet contributes to high blood pressure, high blood cholesterol and excess body weight. Overweight and obesity in turn contribute to diabetes, cholesterol disorders and high blood pressure.

The American Heart Association recommends a diet low in saturated fat, *trans*-fat, cholesterol and sodium. It should be high in vegetables, fruits, whole grains, legumes, fat-free or low-fat dairy products, and dietary fiber. The following data support these recommendations.

Note: The recommended daily intake of total fat and saturated fat (in grams) for adults depends on total calories and presence of risk factors. (For details, see [americanheart.org](http://americanheart.org). Click on “Heart & Stroke Encyclopedia,” then “F,” then “Fat.”)

- 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 U.S. is 27.9 grams (33.1 g for males and 23.0 g for females). (NHANES III [1988-94], CDC/NCHS)
  - For non-Hispanic whites the average is 28.4 grams (34.1 g for males and 23.1 g for females).
  - For non-Hispanic blacks the average is 27.5 grams (31.7 g for males and 23.8 g for females).
  - For Mexican Americans the average is 26.7 grams (30.1 g for males and 23.1 g for females).
- The proportion of fat calories from beef, pork, dairy products and eggs fell from 50 percent in 1965 to 33 percent in 1994-96. The proportion of fat calories from poultry increased from 4 percent to 7 percent. Calories from fruits and vegetables rose from 8 percent to 13 percent. (*Prev Med.* 2001;32:245-254)
- 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 U.S. 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).
- 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. (Appel, et al., *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 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.
- 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)

The National Committee for Quality Assurance has chosen 5 quality-of-care performance measures related to preventing and treating cardiovascular diseases (The State of Managed Care Quality, 2000, NCQA):

- Advising smokers to quit
- 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

Performance data for these indicators apply to patients who receive their medical care from U.S. managed care plan providers. Evidence supports that managed care settings may provide better quality of care than other settings. Improvements in the quality of care measured by these performance indicators are associated with substantially reduced cardiovascular disease morbidity and mortality.

## Advising smokers to quit

- In 1999, 65.3 percent of smokers were advised to quit, an increase from 61.0 percent of smokers in 1996.
- The 90<sup>th</sup> percentile benchmark was 73 percent of smokers. If all practices performed at this level, an estimated 2.7 million additional smokers would be advised to quit and 82,000 additional smokers would quit smoking. This would lead to substantial reductions in smoking-related morbidity, mortality (683 fewer deaths per year) and healthcare costs.

## Use of beta blockers after a heart attack

- In 1999, 85.0 percent of heart attack survivors were receiving a beta blocker at the time of discharge from the hospital, an increase from 62.2 percent in 1996. If all practices performed at the 90<sup>th</sup> percentile level (96 percent), an additional 4,000 deaths could be avoided each year.

## Cholesterol screening in patients with coronary heart disease

- In 1999, 68.9 percent of patients 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, the first year this performance indicator was used. The 90<sup>th</sup> percentile benchmark was 83 percent.

## Cholesterol control in patients with coronary heart disease

- In 1999, 45.3 percent of patients hospitalized for heart attack, bypass surgery or angioplasty were treated with an LDL cholesterol goal of less than 130 mg/dL. The 90<sup>th</sup> percentile benchmark was 64.4 percent.
- Note that this treatment goal is less aggressive than the goal endorsed by the American Heart Association and the National Cholesterol Education Program (less than 100 mg/dL). Hence, it's likely that control to the AHA and NCEP goal is worse than suggested here.

## Control of high blood pressure

- In 1999 only 39.0 percent of adults with high blood pressure were controlled to levels less than 140/90 mm Hg. The 90<sup>th</sup> percentile performance goal was 47.9 percent.

From 1979 to 2000, the number of cardiovascular operations and procedures increased 397 percent.

## Cardiac Catheterization

- From 1979 to 2000, the number of cardiac catheterizations increased 341 percent.
- An estimated 1,318,000 inpatient cardiac catheterizations were performed in 2000.
- 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. [www.ahrq.gov/data/hcup/hcupnet.htm](http://www.ahrq.gov/data/hcup/hcupnet.htm).)
- 472,000 ambulatory (outpatient) surgical procedures for cardiac catheterization were performed in 1996. 298,000 of them were done on males and 175,000 on females.

## Coronary Artery Bypass Surgery

In the United States in 2000, the NCHS estimates that 519,000 of these procedures were performed on 314,000 patients. These numbers represent both code and vessel data. Thus it's impossible to determine the average number of vessels per patient.

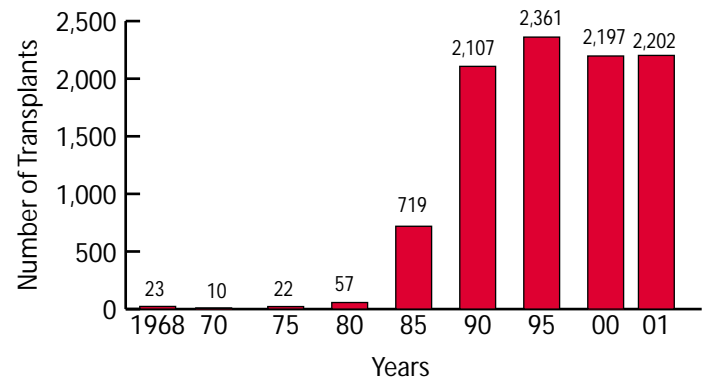
## Heart Transplants

In 2001, 2,202 heart transplants were performed in the United States. Currently there are 257 transplant centers in the United States, 140 of which perform heart transplants.

- It's estimated that each year thousands more Americans would benefit from a heart transplant if more donated hearts were available.
- In the United States 73 percent of heart transplant patients are male, 74 percent are white, 21 percent are ages 35-49, and 49 percent are ages 50-64.
- 85 percent of patients survived 1 year, 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

United States: 1968-2001



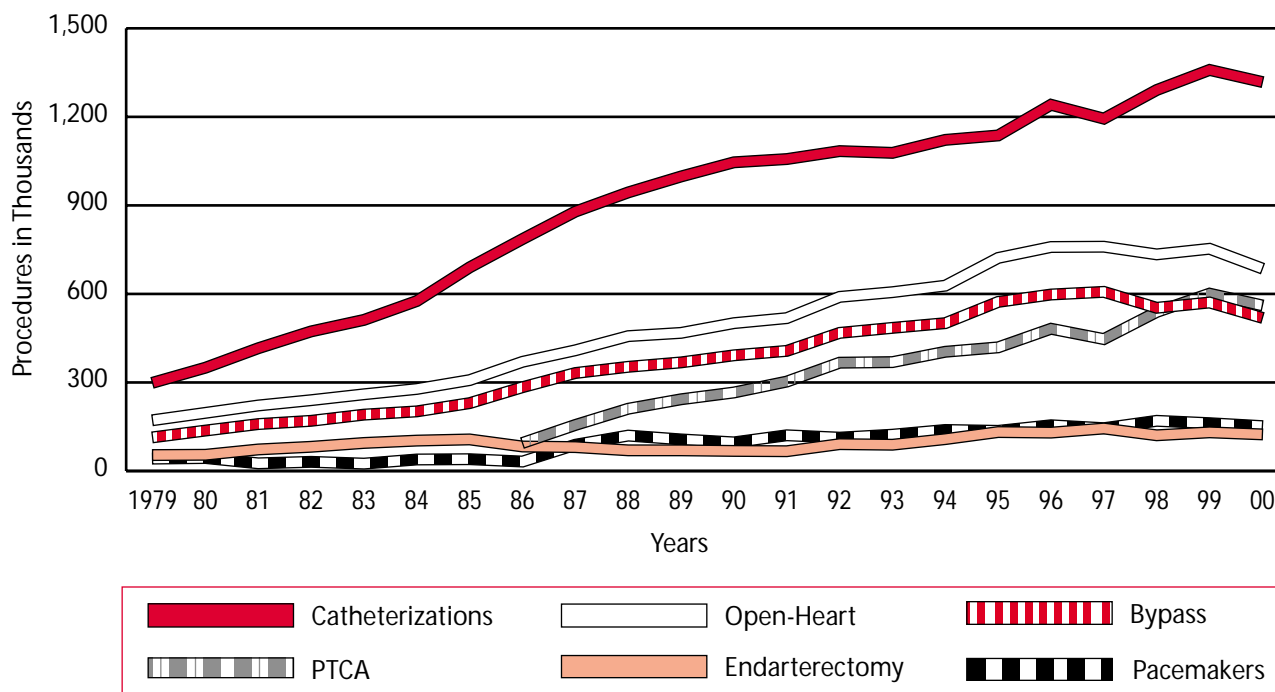
Source: United Network for Organ Sharing (UNOS), scientific registry data.

## Percutaneous Transluminal Coronary Angioplasty (PTCA)

- An estimated 561,000 PTCA procedures were performed in 2000 in the United States. From 1987 to 2000 the number of procedures increased 262 percent and the number of patients increased 260 percent.
- In 2000, 64 percent of PTCA procedures were performed on men; 50 percent were performed on people age 65 and older.

### Trends in Cardiovascular Operations and Procedures

United States: 1979-2000



Source: CDC/NCHS.

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

United States: 2000 (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	1,025	655	370	—	62	437	524	194	290	360	181
PTCA (36.01, .02, .05) (a)	Procedures	561	360	198	—	30	236	283	107	159	188	94
	Patients	547	351	196	—	33	234	279	106	154	190	97
Stenting (36.06)	Procedures	456	290	166	—	28	195	233	85	127	163	82
Cardiac Revascularization (Bypass) (36.1-36.3) (b)	Procedures	519	371	148	—	17	216	286	123	133	174	89
	Patients	314	218	94	—	10	127	177	72	78	111	53
Diagnostic Cardiac Catheterizations (37.2) (a)	Procedures	1,318	793	525	9	113	550	646	274	324	516	202
Endarterectomy (38.12)	Procedures	124	67	57	—	—	32	91	29	30	50	16
Implantable Defibrillators (37.94-.99)	Procedures	34	27	7	—	—	10	22	9	8	11	7
Open-Heart Surgery (c)	Procedures	686	456	225	20	38	258	357	166	166	216	124
Pacemakers (37.8) (d)	Procedures	152	74	79	—	—	20	129	47	35	52	19
Valves (35.1, .2, .99)	Procedures	87	48	39	—	7	23	49	19	18	21	14
<b>Total Vascular and Cardiac Surgery and Procedures (35-39)**</b>		<b>5,939</b>	<b>3,420</b>	<b>2,519</b>	<b>154</b>	<b>549</b>	<b>2,113</b>	<b>3,123</b>	<b>1,315</b>	<b>1,412</b>	<b>2,167</b>	<b>1,045</b>

\* 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.

(a) — Does not include procedures in the outpatient or other nonhospitalized setting; thus, excludes some cardiac catheterizations and PTCAs.

(b) — Some patients have both internal mammary artery grafts and saphenous vein grafts. These numbers represent a combination of code and vessel data. It's impossible from this (mixed) data to determine the average number of vessels per patient.

(c) — Includes valves, bypass and 80,000 "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.

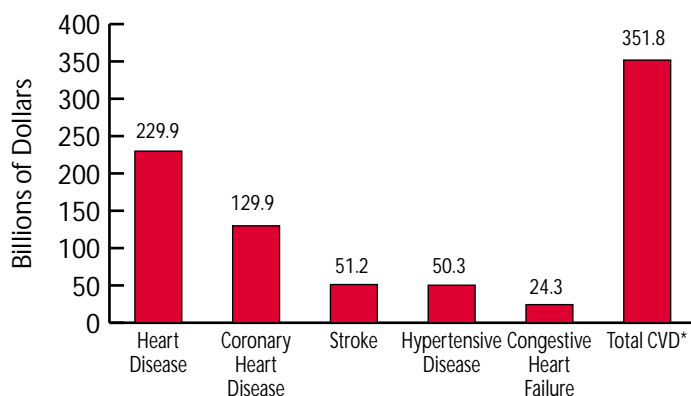
# Regions: Northeast — Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont  
 Midwest — Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin  
 South — Alabama, Arkansas, Delaware, 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

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 2003 is estimated at \$351.8 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 2002 the estimated cost of all cancers was \$202.0 billion (\$61.0 billion in direct costs, \$16.0 billion in morbidity indirect costs and \$95.0 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: 2003



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

United States: 2003

	Heart Disease**	Coronary Heart Disease	Stroke	Hypertensive Disease	Congestive Heart Failure	Total Cardiovascular Disease*
<b>Direct Costs</b>						
Hospital	\$66.6	\$34.2	\$12.6	\$5.1	\$12.7	\$94.1
Nursing Home	17.5	9.2	12.1	3.6	3.3	36.0
Physicians/Other Professionals	16.3	9.2	2.5	9.2	1.7	31.8
Drugs/Other						
Medical Durables	15.5	7.2	0.9	17.8	2.3	36.6
Home Health Care	4.8	1.4	2.9	1.5	2.2	10.8
<b>Total Expenditures*</b>	<b>\$120.7</b>	<b>\$61.2</b>	<b>\$31.0</b>	<b>\$37.2#</b>	<b>\$22.2</b>	<b>\$209.3</b>
<b>Indirect Costs</b>						
Lost Productivity/Morbidity	19.9	8.8	5.9	7.0	—	32.4
Lost Productivity/Mortality##	89.3	59.9	14.3	6.1	2.1	110.1
<b>Grand Totals*</b>	<b>\$229.9</b>	<b>\$129.9</b>	<b>\$51.2</b>	<b>\$50.3</b>	<b>\$24.3</b>	<b>\$351.8</b>

\* 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 \$108.8 billion in 1998.

## Lost future earnings of persons who will die in 2003, 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 1980-2011 (www.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 (www.census.gov).*

*Deaths for 358 Selected Causes by 5-Year Age Groups, Race, and Sex, United States, 1999 (www.cdc.nchs/default/htm).*

Rice, Max, Michel, and Sung. *Present Value of Lifetime Earnings, U.S. 1999. Unpublished tables, Institute for Health and Aging, University of California, San Francisco, 2002.*

All estimates prepared by Thomas Thom, NHLBI.

# Glossary and Abbreviation Guide

16

**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 ( $\text{kg}/\text{m}^2$ ).

**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.

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

- *National Health Interview Survey (NHIS)*
- *National Home and Hospice Care Survey*
- *National Hospital Ambulatory Medical 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. This overall statistic is known as a **crude 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. It allows you to look at well-defined subgroups of the total population. Each year the American Heart Association calculates cause-, age-, sex- and race-specific rates as well as crude rates.

**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.

**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.

**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.

**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.

**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

- *Atherosclerosis Risk in Communities (ARIC) study (1985 to date).*
- *Cardiovascular Health Study (CHS) (1988 to date).*
- *Framingham Heart Study (FHS) (1948 to date).*
- *Honolulu Heart Program (HHP) (1965-97).*
- *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 VI 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*
- *Northern Manhattan Stroke Study (NOMASS)*
- *Rochester (Minnesota) Stroke Epidemiology Project*

## Abbreviation Guide

AED	automated external defibrillator
AHA	American Heart Association
AIDS	acquired immune deficiency syndrome
ARIC	Atherosclerosis Risk in Communities
ATP	Adult Treatment Panel
BMI	body mass index
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CHD	coronary heart disease
CHF	congestive heart failure
CHS	Cardiovascular Health Study
CMS	Centers for Medicare and Medicaid Services
CPR	cardiopulmonary resuscitation
CVD	cardiovascular disease
EMS	emergency medical services
ESRD	end-stage renal disease
FHS	Framingham Heart Study
HBP	high blood pressure
HCFA	Health Care Financing Administration
HDL	high-density lipoprotein
HHP	Honolulu Heart Program
HIV	human immunodeficiency virus
ICD	International Classification of Diseases
ICDA	International Classification of Diseases, Adapted
ICH	intracerebral hemorrhage
JAMA	<i>Journal of the American Medical Association</i>
JNC	Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure
LDL	low-density lipoprotein

**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.

**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). Depending upon availability, data for congenital cardiovascular defects (Q20-Q28) are also included.

**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.

MACDP	Metropolitan Atlanta Congenital Defects Program
MI	myocardial infarction
MMWR	<i>Morbidity and Mortality Weekly Report</i>
NCEP	National Cholesterol Education Program
NCHS	National Center for Health Statistics
NCQA	National Committee for Quality Assurance
NEJM	<i>New England Journal of Medicine</i>
NHANES	National Health and Nutrition Examination Survey
NHES	National Health Examination Survey
NHIS	National Health Interview Survey
NHLBI	National Heart, Lung, and Blood Institute
NINDS	National Institute of Neurological Disorders and Stroke
NOMASS	Northern Manhattan Stroke Study
PA	physical activity
PAD	peripheral arterial disease
PTCA	percutaneous transluminal coronary angioplasty
PE	pulmonary embolism
RF	rheumatic fever
RHD	rheumatic heart disease
SAH	subarachnoid hemorrhage
SCD	sudden cardiac death
SES	socioeconomic status
SHS	Strong Heart Study
TIA	transient ischemic attack
UNOS	United Network for Organ Sharing
USDHHS	U.S. Department of Health and Human Services
VF	ventricular fibrillation
WHO	World Health Organization
YRBS	Youth Risk Behavior Surveillance



Fighting Heart Disease and Stroke

---

## American Stroke Association<sup>SM</sup>

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.

National Center  
7272 Greenville Avenue  
Dallas, Texas 75231-4596